



NP 38

# WEST COAST OF INDIA PILOT

**Maldives, Lakshadweep, Sri Lanka, with Palk Bay;  
The west coast of India,  
The coast of Pakistan**

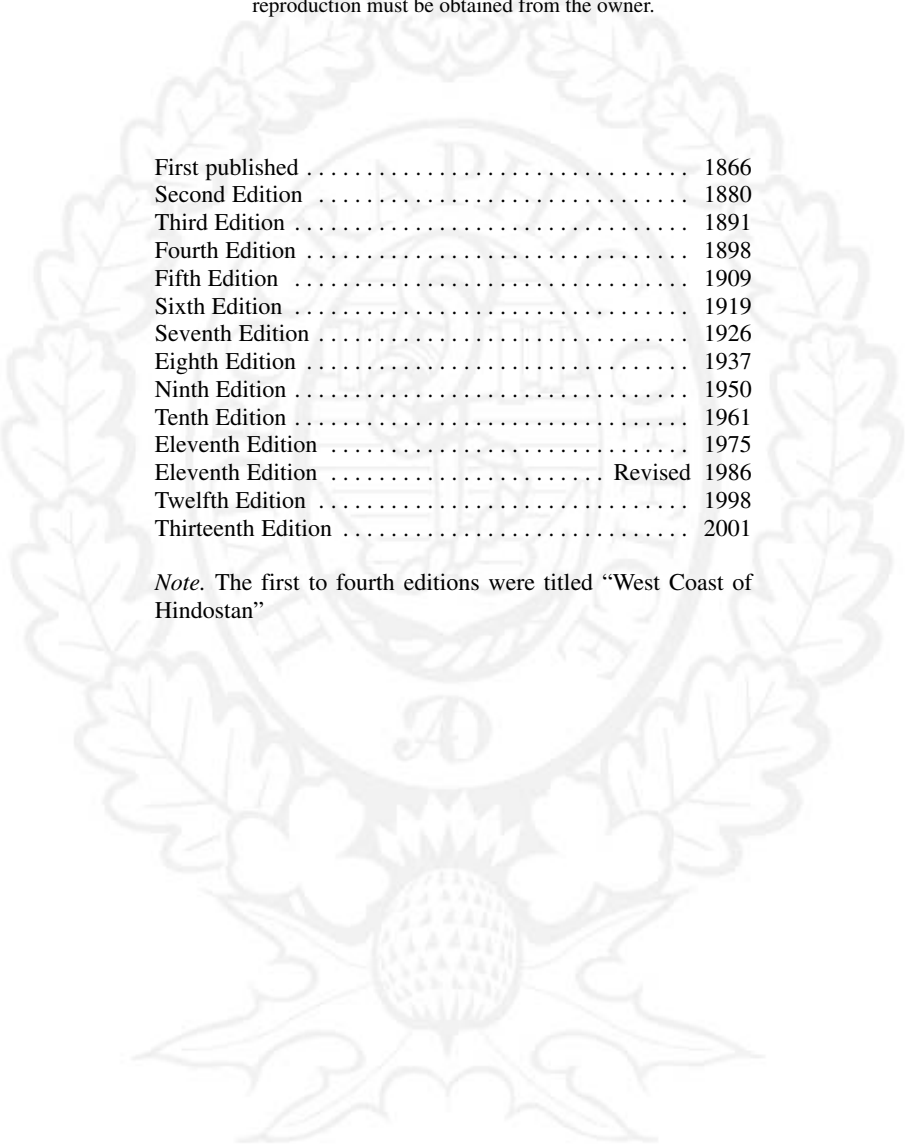
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2004**

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*Note.* The first to fourth editions were titled “West Coast of  
Hindustan”

## PREFACE

The Fourteenth Edition of *West Coast of India Pilot* has been prepared by Captain J.A. Attwater, Master Mariner and Mr. S.R. Fernandes, B.Com, Master Mariner, and contains the latest information received in the United Kingdom Hydrographic Office to the date given below.

This edition supersedes the Thirteenth Edition (2001), which is cancelled.

Information on climate and currents has been based on data provided by the Met Office, Exeter.

The following sources of information, other than UKHO Publications and Ministry of Defence papers, have been consulted:

### British

*Lloyd's Register Fairplay, Ports and Terminal Guide 2003–2004.*  
*The Statesman's Year Book 2005.*

### India

*Charts.*

### Pakistan

*Charts.*

### United States of America

*Sailing Directions (Planning Guide) Pub 160 South Atlantic Ocean and Indian Ocean, 3rd Edition, 2004.*  
*Sailing Directions (Enroute) Pub 172 Red Sea and the Persian Gulf Pilot, 10th Edition, 2004.*  
*Sailing Directions (Enroute) Pub 173 India and the Bay of Bengal, 7th Edition, 2002.*

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## PREFACE

The Twelfth Edition of *West Coast of India Pilot* has been compiled by Captain A.J. Attwood, Master Mariner, and contains the latest information received in the United Kingdom Hydrographic Office to the date given below.

This edition supersedes the Eleventh Edition (1975) (Revised 1986) and Supplement No 5 (1997), which are cancelled.

Information on climate and currents has been based on data provided by the Meteorological Office, Bracknell.

The following sources of information, other than United Kingdom Hydrographic Office Publications and Ministry of Defence papers, have been consulted:

### British

*Fairplay World Ports Guide 1998.*  
*Guide to Port Entry 1997–98.*  
*Lloyd's Maritime Guide 1997.*  
*The Statesman's Year Book 1997–98.*  
*Whitaker's Almanac 1998.*

### Sri Lanka

*Charts.*

### India

*Charts.*  
*West Coast of India Pilot, 1st Edition, 1981.*

### Pakistan

*Charts.*

### United States of America

*India and the Bay of Bengal Pilot, 5th Edition, 1994.*  
*Red Sea and the Persian Gulf Pilot, 8th Edition, 1998.*

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## CONTENTS

|                                             | Pages      |
|---------------------------------------------|------------|
| Preface .....                               | iii        |
| Preface to the Twelfth Edition (1998) ..... | iv         |
| Contents .....                              | v          |
| Explanatory notes .....                     | vii        |
| Abbreviations .....                         | ix         |
| Glossary .....                              | xi         |
| Index chartlets .....                       | xiii & xiv |

## CHAPTER 1

|                                                          |    |
|----------------------------------------------------------|----|
| Navigation and regulations                               |    |
| Limits of the book (1.1) .....                           | 1  |
| Navigation dangers and hazards (1.2) .....               | 1  |
| Traffic and operations (1.5) .....                       | 2  |
| Charts (1.13) .....                                      | 2  |
| Navigational aids (1.15) .....                           | 3  |
| Pilotage (1.19) .....                                    | 3  |
| Radio facilities (1.20) .....                            | 3  |
| Regulations (1.33) .....                                 | 4  |
| Signals (1.44) .....                                     | 7  |
| Distress and rescue (1.49) .....                         | 8  |
| Piracy and armed robbery (1.56) .....                    | 9  |
| Countries and ports                                      |    |
| Maldives (1.61) .....                                    | 10 |
| India (Lakshadweep) (1.72) .....                         | 10 |
| Sri Lanka (1.77) .....                                   | 11 |
| India (1.90) .....                                       | 12 |
| Pakistan (1.130) .....                                   | 17 |
| Iran (1.150) .....                                       | 19 |
| Principal ports harbours and anchorages (1.151) .....    | 19 |
| Port services — summary (1.155) .....                    | 21 |
| Natural conditions                                       |    |
| Maritime topography (1.160) .....                        | 22 |
| Currents and tidal streams (1.163) .....                 | 22 |
| Sea level and tides (1.171) .....                        | 29 |
| Sea and swell (1.172) .....                              | 29 |
| Sea water characteristics (1.176) .....                  | 32 |
| Climate and weather (1.178) .....                        | 32 |
| Climatic tables (1.204) .....                            | 50 |
| Meteorological conversion table and scales (1.223) ..... | 70 |

## CHAPTER 2

|                                |    |
|--------------------------------|----|
| Maldives and Lakshadweep ..... | 74 |
|--------------------------------|----|

## CHAPTER 3

|                                                                    |     |
|--------------------------------------------------------------------|-----|
| South and east coasts of Sri Lanka; Palk Strait and Palk Bay ..... | 123 |
|--------------------------------------------------------------------|-----|

## CHAPTER 4

|                                         |     |
|-----------------------------------------|-----|
| Gulf of Mannār, including Colombo ..... | 153 |
|-----------------------------------------|-----|

## CHAPTER 5

|                                                   |     |
|---------------------------------------------------|-----|
| Malabar Coast — Cape Comorin to Mount Dilli ..... | 179 |
|---------------------------------------------------|-----|

## CHAPTER 6

|                                                     |     |
|-----------------------------------------------------|-----|
| Malabar Coast — Mount Dilli to Terekhol River ..... | 201 |
|-----------------------------------------------------|-----|

CONTENTS

CHAPTER 7

Konkan Coast, including Mumbai (Bombay) ..... 225

CHAPTER 8

Mumbai (Bombay) to Dwārka, including the Gulf of Khambāt ..... 255

CHAPTER 9

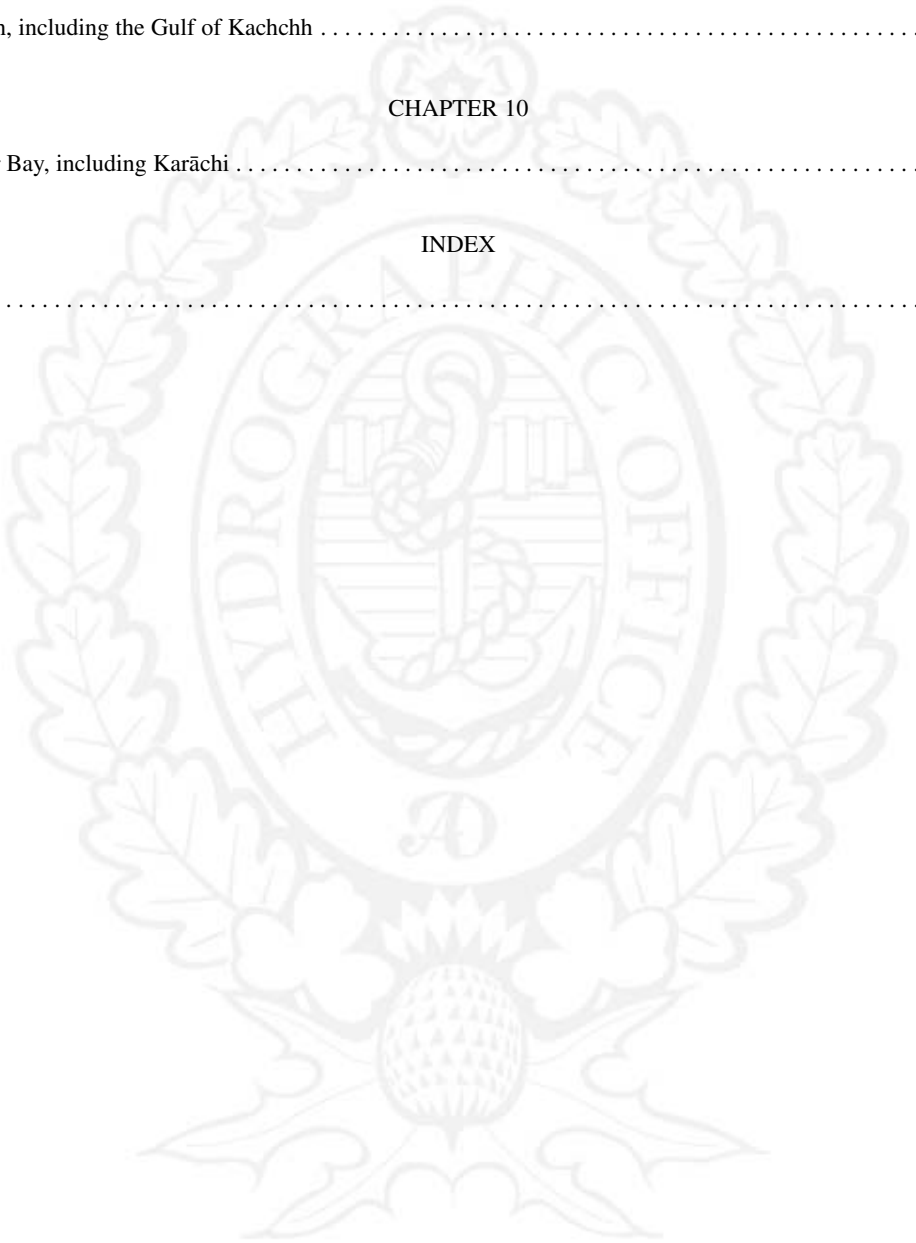
Dwārka to Sir Mouth, including the Gulf of Kachchh ..... 285

CHAPTER 10

Sir Mouth to Gwatār Bay, including Karāchi ..... 313

INDEX

Index ..... 337



## EXPLANATORY NOTES

Admiralty Sailing Directions are intended for use by vessels of 12 m or more in length. They amplify charted detail and contain information needed for safe navigation which is not available from Admiralty charts, or other hydrographic publications. They are intended to be read in conjunction with the charts quoted in the text.

This volume of the Sailing Directions will be kept up-to-date by the issue of a new edition at intervals of approximately 3 years, without the use of supplements. In addition important amendments which cannot await the new edition are published in Section IV of the weekly editions of *Admiralty Notices to Mariners*. A list of such amendments and notices in force is published in the last weekly edition for each month. Those still in force at the end of the year are reprinted in the *Annual Summary of Admiralty Notices to Mariners*.

**This volume should not be used without reference to Section IV of the weekly editions of Admiralty Notices to Mariners.**

### References to hydrographic and other publications

*The Mariner's Handbook* gives general information affecting navigation and is complementary to this volume.

*Ocean Passages for the World* and *Routeing Charts* contain ocean routeing information and should be consulted for other than coastal passages.

*Admiralty List of Lights* should be consulted for details of lights, lanterns and fog signals, as these are not fully described in this volume.

*Admiralty List of Radio Signals* should be consulted for information relating to coast and port radio stations, radio details of pilotage services, radar beacons and radio direction finding stations, meteorological services, radio aids to navigation, Global Maritime Distress and Safety System (GMDSS) and Differential Global Positioning System (DGPS) stations, as these are only briefly referred to in this volume.

*Admiralty Maritime Communications* is a comprehensive guide on all aspects of maritime communications for the yachtman and small craft user. It provides general information on Global Maritime Distress and Safety System (GMDSS), the management of VHF, Maritime Safety Information, NAVTEX, Inmarsat and Radio Facsimile, and detailed information and procedures for marinas and harbours used by small craft.

*Annual Summary of Admiralty Notices to Mariners* contains in addition to the temporary and preliminary notices, and amendments and notices affecting Sailing Directions, a number of notices giving information of a permanent nature covering radio messages and navigational warnings, distress and rescue at sea and exercise areas.

*The International Code of Signals* should be consulted for details of distress and life-saving signals, international ice-breaker signals as well as international flag signals.

### Remarks on subject matter

**Buoys** are generally described in detail only when they have special navigational significance, or where the scale of the chart is too small to show all the details clearly.

**Chart index diagrams** in this volume show only those Admiralty charts of a suitable scale to give good coverage of the area. Mariners should consult NP 131 *Catalogue of Admiralty Charts and Publications* for details of larger scale charts.

**Chart references** in the text normally refer to the largest scale Admiralty chart but occasionally a smaller scale chart may be quoted where its use is more appropriate.

**Firing, practice and exercise areas.** Except for submarine exercise areas, details of firing, practice and exercise areas are not mentioned in Sailing Directions, but signals and buoys used in connection with these areas are sometimes mentioned if significant for navigation. Attention is invited to the Annual Notice to Mariners on this subject.

**Names** have been taken from the most authoritative source. When an obsolete name still appears on the chart, it is given in brackets following the proper name at the principal description of the feature in the text and where the name is first mentioned.

**Tidal information** relating the daily vertical movements of the water is not given; for this *Admiralty Tide Tables* should be consulted. Changes in water level of an abnormal nature are mentioned.

Time difference used in the text when applied to the time of High Water found from the *Admiralty Tide Tables*, gives the time of the event being described in the Standard Time kept in the area of that event. Due allowance must be made for any seasonal daylight saving time which may be kept.

**Wreck information** is included where drying or below-water wrecks are relatively permanent features having significance for navigation or anchoring.

### Units and terminology used in this volume

**Latitude and Longitude** given in brackets are approximate and are taken from the chart quoted.

**Bearings and directions** are referred to the true compass and when given in degrees are reckoned clockwise from 000° (North) to 359°  
Bearings used for positioning are given from the reference object.

Bearings of objects, alignments and light sectors are given as seen from the vessel.

Courses always refer to the course to be made good over the ground.

**Winds** are described by the direction from which they blow.

**Tidal streams and currents** are described by the direction towards which they flow.

**Distances** are expressed in sea miles of 60 to a degree of latitude and sub-divided into cables of one tenth of a sea mile.

**Depths** are given below chart datum, except where otherwise stated.

**Heights** of objects refer to the height of the structure above the ground and are invariably expressed as "... m in height".

**Elevations**, as distinct from heights, are given above Mean High Water Springs or Mean Higher High Water whichever is quoted in *Admiralty Tide Tables*, and expressed as, "an elevation of ... m". However the elevation of natural features such as hills may alternatively be expressed as "... m high" since in this case there can be no confusion between elevation and height.

**Metric units** are used for all measurements of depths, heights and short distances, but where feet/fathoms charts are referred to, these latter units are given in brackets after the metric values for depths and heights shown on the chart.

**Time** is expressed in the four-figure notation beginning at midnight and is given in local time unless otherwise stated. Details of local time kept will be found in *Admiralty List of Radio Signals Volume 2*.

**Bands** is the word used to indicate horizontal marking.

**Stripes** is the word used to indicate markings which are vertical, unless stated to be diagonal.

**Conspicuous objects** are natural and artificial marks which are outstanding, easily identifiable and clearly visible to the mariner over a large area of sea in varying conditions of light. If the scale is large enough they will normally be shown on the chart in bold capitals and may be marked "conspic".

**Prominent objects** are those which are easily identifiable, but do not justify being classified as conspicuous.

## ABBREVIATIONS

The following abbreviations are used in the text.

### Directions

|     |                                                      |     |                  |
|-----|------------------------------------------------------|-----|------------------|
| N   | north (northerly, northward, northern, northernmost) | S   | south            |
| NNE | north-north-east                                     | SSW | south-south-west |
| NE  | north-east                                           | SW  | south-west       |
| ENE | east-north-east                                      | WSW | west-south-west  |
| E   | east                                                 | W   | west             |
| ESE | east-south-east                                      | WNW | west-north-west  |
| SE  | south-east                                           | NW  | north-west       |
| SSE | south-south-east                                     | NNW | north-north-west |

### Navigation

|       |                                                    |        |                                  |
|-------|----------------------------------------------------|--------|----------------------------------|
| AIS   | Automatic Identification System                    | Satnav | Satellite navigation             |
| CVTS  | Co-operative Vessel Traffic System                 | TSS    | Traffic Separation Scheme        |
| DGPS  | Differential Global Positioning System             | VDR    | Voyage Data Recorder             |
| GPS   | Global Positioning System                          | VMRS   | Vessel Movement Reporting System |
| ITCZ  | Intertropical Convergence Zone                     | VTC    | Vessel Traffic Centre            |
| Lanby | Large automatic navigation buoy                    | VTs    | Vessel Traffic Services          |
| MCTS  | Marine Communications and Traffic Services Centres | VTMS   | Vessel Traffic Management System |
| ODAS  | Ocean Data Acquisition System                      |        |                                  |

### Offshore operations

|       |                                                   |      |                                        |
|-------|---------------------------------------------------|------|----------------------------------------|
| ALC   | Articulated loading column                        | FPU  | Floating production unit               |
| ALP   | Articulated loading platform                      | FSO  | Floating storage and offloading vessel |
| CALM  | Catenary anchor leg mooring                       | PLEM | Pipe line end manifold                 |
| CBM   | Conventional buoy mooring                         | SALM | Single anchor leg mooring system       |
| ELSBM | Exposed location single buoy mooring              | SALS | Single anchored leg storage system     |
| FPSO  | Floating production storage and offloading vessel | SBM  | Single buoy mooring                    |
|       |                                                   | SPM  | Single point mooring                   |

### Organizations

|      |                                                     |      |                                     |
|------|-----------------------------------------------------|------|-------------------------------------|
| EU   | European Union                                      | IMO  | International Maritime Organization |
| IALA | International Association of Lighthouse Authorities | NATO | North Atlantic Treaty Organization  |
| IHO  | International Hydrographic Organization             | RN   | Royal Navy                          |
|      |                                                     | UKHO | United Kingdom Hydrographic Office  |

### Radio

|      |                                  |        |                             |
|------|----------------------------------|--------|-----------------------------|
| AIS  | Automatic Identification System  | Navtex | Navigational Telex System   |
| DF   | direction finding                | RT     | radio telephony             |
| HF   | high frequency                   | UHF    | ultra high frequency        |
| LF   | low frequency                    | VHF    | very high frequency         |
| MF   | medium frequency                 | WT     | radio (wireless) telegraphy |
| MMSI | Maritime Mobile Service Identity |        |                             |

### Rescue and distress

|       |                                                  |      |                                      |
|-------|--------------------------------------------------|------|--------------------------------------|
| AMVER | Automated Mutual Assistance Vessel Rescue System | JRCC | Joint Rescue Cooperation Centre      |
| EPIRB | Emergency Position Indicating Radio Beacon       | MRCC | Maritime Rescue Co-ordination Centre |
| GMDSS | Global Maritime Distress and Safety System       | MRSC | Maritime Rescue Sub-Centre           |
|       |                                                  | SAR  | Search and Rescue                    |

### Tides

|      |                           |      |                         |
|------|---------------------------|------|-------------------------|
| HAT  | Highest Astronomical Tide | MHWS | Mean High Water Springs |
| HW   | High Water                | MLHW | Mean Lower High Water   |
| LAT  | Lowest Astronomical Tide  | MLLW | Mean Lower Low Water    |
| LW   | Low Water                 | MLW  | Mean Low Water          |
| MHHW | Mean Higher High Water    | MLWN | Mean Low Water Neaps    |
| MHLW | Mean Higher Low Water     | MLWS | Mean Low Water Springs  |
| MHW  | Mean High Water           | MSL  | Mean Sea Level          |
| MHWN | Mean High Water Neaps     |      |                         |



## ABBREVIATIONS

## Times

|     |                             |     |                             |
|-----|-----------------------------|-----|-----------------------------|
| ETA | estimated time of arrival   | UT  | Universal Time              |
| ETD | estimated time of departure | UTC | Co-ordinated Universal Time |

## Units and miscellaneous

|                   |                            |     |                             |
|-------------------|----------------------------|-----|-----------------------------|
| °C                | degrees Celsius            | kHz | kilohertz                   |
| DG                | degaussing                 | km  | kilometre(s)                |
| dwt               | deadweight tonnage         | kn  | knot(s)                     |
| DZ                | danger zone                | kW  | kilowatt(s)                 |
| feu               | forty foot equivalent unit | m   | metre(s)                    |
| fm                | fathom(s)                  | mb  | millibar(s)                 |
| ft                | foot (feet)                | MHz | megahertz                   |
| g/cm <sup>3</sup> | gram per cubic centimetre  | mm  | millimetre(s)               |
| GRP               | glass reinforced plastic   | MW  | megawatt(s)                 |
| grt               | gross register tonnage     | No  | number                      |
| gt                | gross tonnage              | nrt | nett register tonnage       |
| hp                | horse power                | teu | twenty foot equivalent unit |
| hPa               | hectopascal                |     |                             |

## Vessels and cargo

|      |                          |       |                           |
|------|--------------------------|-------|---------------------------|
| CDC  | Certain Dangerous Cargo  | MV    | Motor Vessel              |
| HMS  | Her (His) Majesty's Ship | MY    | Motor Yacht               |
| HSC  | High Speed Craft         | POL   | Petrol, Oil & Lubricants  |
| LASH | Lighter Aboard Ship      | RMS   | Royal Mail Ship           |
| LHG  | Liquefied Hazardous Gas  | Ro-Ro | Roll-on, Roll-off         |
| LNG  | Liquefied Natural Gas    | SS    | Steamship                 |
| LOA  | Length overall           | ULCC  | Ultra Large Crude Carrier |
| LPG  | Liquefied Petroleum Gas  | VLCC  | Very Large Crude Carrier  |

## GLOSSARY

foreign words used in this volume

*Foreign ..... English*

|                         |                          |
|-------------------------|--------------------------|
| ar (H) .....            | river                    |
| ar, aru (T) .....       | river                    |
| baia (P) .....          | bay                      |
| banco (P) .....         | bank                     |
| bet (G) .....           | island                   |
| cabo (P) .....          | cape                     |
| dagoba (S) .....        | tomb                     |
| enseada (P) .....       | bay                      |
| fortaleza (P) .....     | fortress                 |
| forte (P) .....         | fort                     |
| gala (S) .....          | stone                    |
| ganga (S) .....         | river                    |
| guda, gudde (Tel) ..... | hamlet                   |
| halla (K) .....         | stream                   |
| idgah (U) .....         | place of prayer          |
| ilha, ilheu (P) .....   | island                   |
| ilhas (P) .....         | islands                  |
| jabal (A) .....         | hill, mountain           |
| jazirat (A) .....       | island, islet, peninsula |
| jinjira (H) .....       | island                   |
| kari, khari (H) .....   | river                    |
| kaur (A) .....          | stream                   |

*Foreign ..... English*

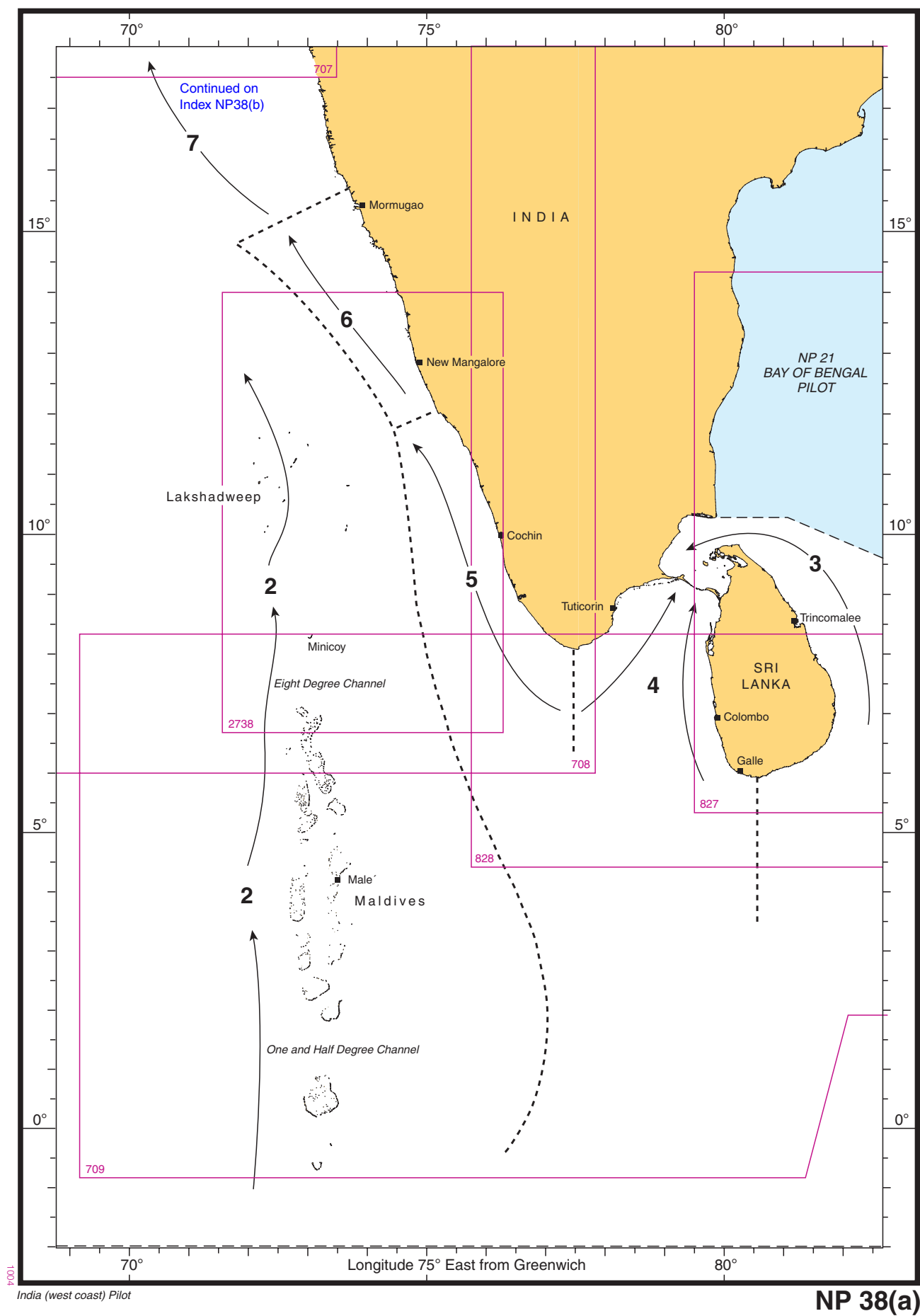
|                     |                         |
|---------------------|-------------------------|
| khorr (A) .....     | creek, arm of the sea   |
| koh (A) .....       | mountain, hill          |
| kunnu (M) .....     | hillock                 |
| mala (M) .....      | hill                    |
| monte (P) .....     | mountain                |
| morro (P) .....     | hill, rock              |
| oya (S) .....       | river                   |
| pir (U) .....       | saint                   |
| planalto (P) .....  | headland                |
| ponta (P) .....     | point                   |
| pôrto (P) .....     | port                    |
| puzha (M) .....     | stream                  |
| ranu (G) .....      | salt or sand waste      |
| ras (A) .....       | point                   |
| recife (P) .....    | reef                    |
| rio (P) .....       | river                   |
| roca (P) .....      | rock                    |
| san (P) .....       | saint                   |
| sarkarkun (H) ..... | customs or port officer |
| tanni (T) .....     | water                   |
| tīvu (T) .....      | island                  |

|     |   |            |
|-----|---|------------|
| A   | = | Arabic     |
| G   | = | Gujerati   |
| H   | = | Hindi      |
| K   | = | Kanada     |
| M   | = | Malayalam  |
| P   | = | Portuguese |
| S   | = | Sinhalese  |
| T   | = | Tamil      |
| Tel | = | Telugu     |
| U   | = | Urdu       |

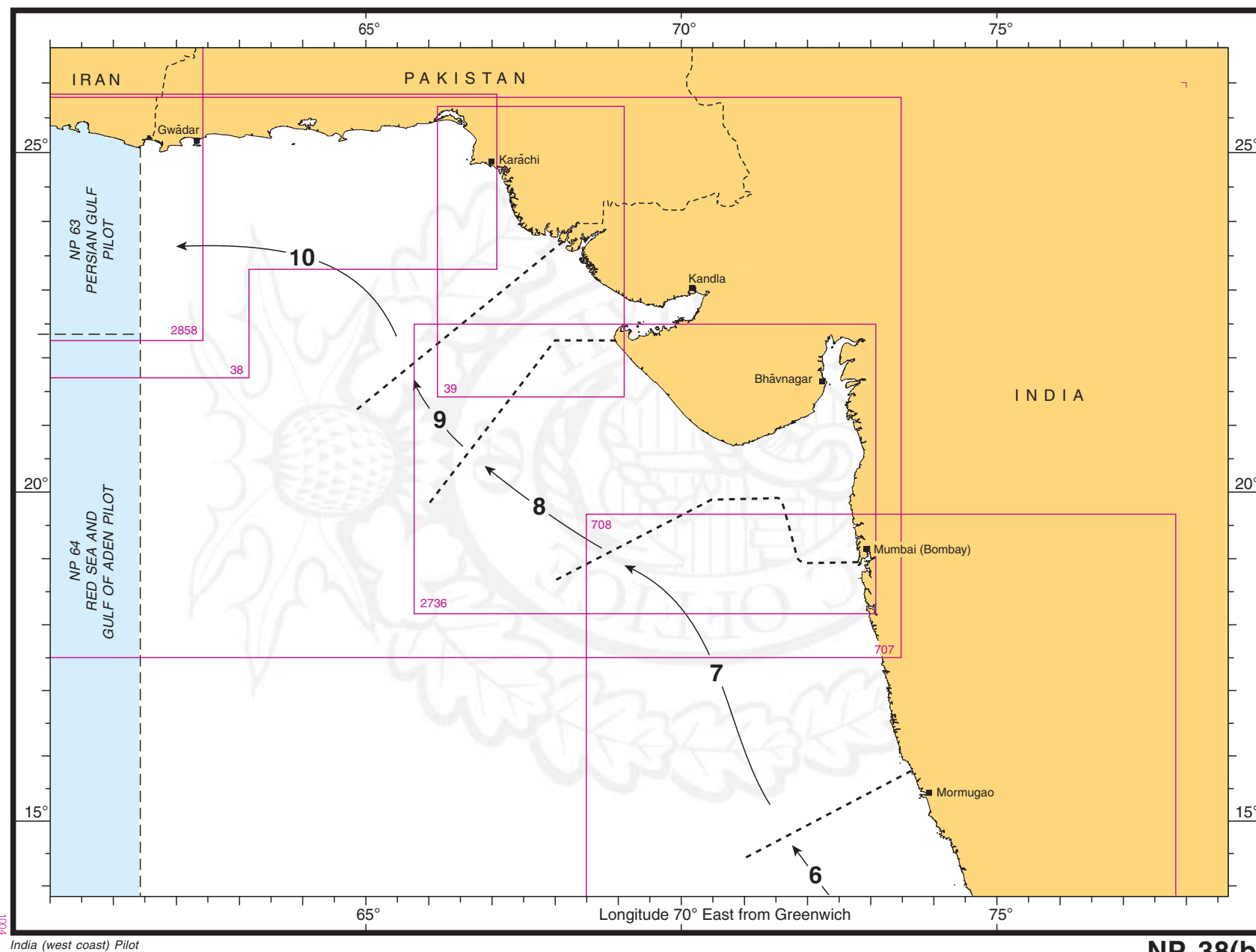




## Chapter Index Diagram



## Chapter Index Diagram



NP 38(b)

## LAWS AND REGULATIONS APPERTAINING TO NAVIGATION

While, in the interests of safety of shipping, the United Kingdom Hydrographic Office makes every endeavour to include in its hydrographic publications details of the laws and regulations of all countries appertaining to navigation, it must be clearly understood:

- (a) that no liability whatever will be accepted for failure to publish details of any particular law or regulation, and
- (b) that publication of the details of a law or regulation is solely for the safety and convenience of shipping and implies no recognition of the international validity of the law or regulation.

# WEST COAST OF INDIA PILOT

## CHAPTER 1

### NAVIGATION AND REGULATIONS COUNTRIES AND PORTS NATURAL CONDITIONS

#### NAVIGATION AND REGULATIONS

##### LIMITS OF THE BOOK

Chart 4071

##### 1.1

- 1 **Area covered.** This volume describes the SE and W coasts of India, the coast of Pakistan, a small part of the S coast of Iran, Sri Lanka and the island groups of Maldives and Lakshadweep.

- 2 Its coastal limits extend from close N of Point Calimere (10°17'N, 79°52'E) on the SE coast of India, to close W of Damāgheh-ye Pas Bandar (25°04'N, 61°25'E) on the S coast of Iran.

- 3 The seaward limits are defined as follows:

|                                     |         |         |
|-------------------------------------|---------|---------|
| From close W of Damāgheh-ye Pas     | 25°04'N | 61°25'E |
| Bandar                              |         |         |
| South to                            | 2°00'S  | 61°20'E |
| Thence E to                         | 2°00'S  | 90°00'E |
| Thence N to                         | 6°00'N  | 90°00'E |
| Thence NW to                        | 10°20'N | 81°00'E |
| Thence W to a position on the coast | 10°17'N | 79°52'E |
| close N of Point Calimere           |         |         |

##### NAVIGATION, DANGERS AND HAZARDS

##### Principal routes

##### 1.2

- 1 The principal routes for powered vessels through the area covered by this volume lie between the South Asian sub-continental ports of Colombo, Mumbai (Bombay) and Karāchi and ports on the coasts of S and E Africa and the Red Sea.

- 2 Optimum routes vary considerably according to the monsoon seasons and the currents associated with them, and according to the power of the vessels concerned. In July, at the peak of the SW monsoon, speeds of ships in the Arabian Sea may have to be reduced about 60 percent of the time with seas ahead or abeam and about 20 percent of the time with following seas.

- 3 For full details of routes through the area mariners should consult *Ocean Passages for the World*.

##### Navigation amongst coral

##### 1.3

- 1 In the S part of the area covered by this volume are Maldives and Lakshadweep, two large groups of coral atolls having numerous islands and islets situated on barrier reefs encircling lagoons. These lagoons are in some cases extensive and contain numerous coral islets and reefs.

- 2 Depths over coral reefs may alter rapidly as the coral of which they are composed grows towards the surface. In some cases this process, combining with the accumulation of coral debris, may produce a very rapid decrease in depths; as much as 0.3 m in a year has been recorded.

- 3 Navigation in coral waters demands caution and consideration of the following factors: conditions of light; clarity of water; ruffling of the sea surface; cloud cover and the height of eye of the observer.

- 4 For further details of navigation amongst coral reefs, rates of coral growth and erosion; see *The Mariner's Handbook*.

##### Mines

##### 1.4

- 1 Reports have been received indicating that waters near Sri Lankan ports may be mined.

## TRAFFIC AND OPERATIONS

### Traffic

#### 1.5

- 1 Concentrations of shipping will be encountered in the approaches to most of the major ports of India, Pakistan and Sri Lanka.

### Fishing

#### 1.6

- 1 **Fishing stakes.** On some of the off-lying banks and off many parts of the coast covered by this volume, fishing stakes and enclosures will be encountered generally in depths of 5 to 10 m, but in some cases they may be found in greater depths.
- 2 The above enclosures are usually constructed of wooden poles or bamboo firmly driven into the seabed and interlaced with branches or material; they form a considerable danger to navigation. The structures last for many years but their positions are subject to considerable change; they are only charted where their approximate positions are known.
- 3 **Fishing vessels.** Heavy concentrations of fishing vessels, both large and small, will generally be encountered, especially from September to May, off the many ports and harbours covered by this volume.
- 4 Concentrations of fishing vessels may also be encountered in the Gulf of Khambhāt and Gulf of Kachchh, and off the coasts of Pakistan and Maldives, as described in the text of this volume.
- 5 Mariners are advised to keep a special lookout, particularly at night and at the times of sunrise and sunset.

### Exercise areas

#### 1.7

- 1 **Surface exercise areas.** Naval gunnery exercise areas have been established off the coast Sri Lanka, the E and W coasts of India and off the coast of Pakistan.
- 2 Warning signals, when given, usually consist of red flags by day and red fixed or red flashing lights by night, shown from shortly before practice commences until it ceases. The absence of any such signal cannot, however, be accepted as evidence that a practice area does not exist.
- 3 Vessels may be made aware of the activation of a practice area by either NAVAREA VIII or IX warning messages, coastal warning messages, local notices to mariners, or by observing the visual warning signals of the practice, see also *Annual Summary of Admiralty Notices to Mariners No 5*.
- 4 The geographical limits of the various Indian exercise areas are given in *Indian Notice to Mariners No 9 of the Annual Edition*.
- 5 The geographical limits of the various Pakistani exercise areas and other details are given in *Pakistan Notices to Mariners No 5* in the Annual Edition.

#### 1.8

- 1 **Submarine exercise areas.** Indian and Pakistani submarines may be encountered in the waters covered by this volume. Submarine exercise areas, without the promulgation of warning messages or signals, are permanently established along the coasts of India and Pakistan, in the following general areas, off: Cochin (5.7), Mormugao (6.8), Ratnāgiri (7.8), Porbandar (8.6) and Rās Muāri (10.11), as shown on the chart.
- 2 For general information concerning submarines, including lights and signals, see *The Mariner's Handbook* and *Annual Summary of Admiralty Notices to Mariners*

No 8. In nearly all respects Indian and Pakistani submarines conform to the practices described in these publications, however, some classes of submarine do not carry indicator buoys.

- 3 For further information see *Indian Notice to Mariners No 9 of the Annual Edition* and *Pakistani Notices to Mariners, Annual Edition*.

### Danger areas

#### 1.9

- 1 **Rocket and satellite launching stations.** A high altitude meteorological/scientific rocket launching site is located at Thumba (8°32'6N, 76°51'5E) on the W coast of India; its danger area extends from S, through W to WNW for a distance of about 125 miles. Danger areas, from satellite launching stations situated on the E coast of India, exist in the SE part of the area covered by this volume.
- 2 Vessels may be made aware of the activation of a launching by either NAVAREA VIII or coastal radio warning messages; visual warning signals are not displayed. For further information see *Indian Notice to Mariners, No 9 of the Annual Edition*.

### Marine exploitation

#### General

##### 1.10

- 1 Oil exploration is taking place off the coast of India, principally within 100 miles of Mumbai, for which details are given at 7.10, and off the Pakistani coast in depths up to 3000 m. Some exploration has taken place in the Gulf of Mannār.
- 2 A description of the development of offshore oil and gas fields is contained in *The Mariner's Handbook*.

#### Pipelines

##### 1.11

- 1 **Caution.** Mariners are advised not to anchor nor trawl in the vicinity of pipelines. Gas from a damaged oil or gas pipeline could cause an explosion, loss of a vessel's buoyancy or other serious hazard. Pipelines are not always buried and may effectively reduce the charted depth by as much as 2 metres. They may also span seabed undulations and cause fishing gear to become irrecoverably snagged, putting a vessel in severe danger. See *Annual Notice to Mariners No 24* and *The Mariner's Handbook*.

#### Oil and gas fields

##### 1.12

- 1 Production platforms and associated structures, including tanker moorings, storage tankers and platforms on pipelines, generally exhibit Mo (U) lights, aircraft obstruction lights, and audible fog signals. Unauthorised navigation is prohibited within 500 m of all such structures, including storage tankers which can swing about their moorings. Tankers manoeuvring in the vicinity of platforms and moorings should be given a wide berth. For further information see *The Mariner's Handbook*.

## CHARTS

### Admiralty charts

#### 1.13

- 1 The area covered by this volume is adequately covered by British Admiralty Charts. The scale everywhere is sufficient for coastal navigation except for part of the coast of Makrān.
- 2 Charting of some parts of the area is based upon nineteenth century surveys with lead and line; notably the



coast of Makrān, the SE part of the delta of Indus River, part of the coast of Malabar, Palk Bay and most of Lakshadweep and Maldives. Especial care in navigation is required where, as off the delta of Indus River, such charts cover areas subject to sudden shoaling and shifting sandbanks or where, as off the coast of Makrān, the charts are on a small scale and soundings which, because of later (1945) volcanic disturbance of the sea bed, are now of doubtful value.

3 All major ports in the area are covered by large scale Admiralty charts; in the case of Colombo, Mumbai and Karāchi these are based on modern national surveys.

4 A charting agreement has been reached between United Kingdom and India whereby each country may reproduce selected charts from each other's catalogues on a modified facsimile basis, for publication and sale.

### Foreign charts

#### 1.14

1 In certain areas, where the British Admiralty charts show insufficient detail for navigation close inshore, these Sailing Directions have been written using foreign charts. These are not quoted as reference charts in the text, which has been written on the assumption that mariners wishing to navigate in these areas will have provided themselves with suitable charts on which so to do.

## NAVIGATIONAL AIDS

### Lights

#### 1.15

1 A number of lights on the West Coast of India are extinguished during the SW monsoon; for details see *Admiralty List of Lights Volumes D and F*.

### Buoyage

### IALA Maritime Buoyage System

#### 1.16

1 The IALA Maritime Buoyage System (Region A) has been introduced throughout the area covered by this volume although in some small areas the buoyage may not conform to the IALA system; see notes on charts.

#### 1.17

1 **Monsoon conditions.** During the SW monsoon, from mid-May to mid-September, most of the ports on the Malabar coast are closed and many of the buoys are temporarily withdrawn.

### Ocean Data Acquisition System (ODAS)

#### 1.18

1 ODAS Buoys may well be encountered both in deep water, beyond the 200 m depth contour, and inshore, often to seaward of port approaches. Mariners should not moor to them, nor pick up drifting buoys; vessels fishing should keep well clear. See *The Mariner's Handbook* for details of buoys including their charting.

## PILOTAGE

### National pilotage

#### 1.19

1 Pilotage for merchant vessels is compulsory for many of the ports in the area of this volume as described in the text. In other cases pilotage though optional is advisable; in such cases where qualified pilots cannot be obtained details of arrangements for obtaining local unqualified pilots are given in the text where these are known.

Arrangements for pilots should be made through shipping agents well in advance of arrival.

2 For further information see the relevant *Admiralty List of Radio Signals Volume 6(4)*.

## RADIO FACILITIES

### Electronic position fixing systems

#### Loran-C

##### 1.20

1 The Mumbai (Bombay) Loran-C chain gives groundwave coverage of the Gulf of Khambāt and an area SW of the gulf up to about 180 miles offshore, and skywave coverage N of about 12°N.

The Saudi Arabia North Loran-C chain gives skywave coverage in the W of the area of this volume.

2 For further information see *Admiralty List of Radio Signals Volume 2*.

#### Satellite navigation systems

##### 1.21

1 **Global Positioning System.** The Navstar Global Positioning System (GPS), a military satellite navigation system owned and operated by the United States Department of Defence, provides world wide position fixing.

2 The system is referenced to the datum of the World Geodetic System 1984 (WGS84) and therefore positions obtained must be adjusted, if necessary, to the datum of the chart being used.

3 **Global Navigation Satellite System.** The Russian Global Navigation Satellite System (GLONASS) is similar to GPS in that it is a space-based navigation system which provides world wide position fixing.

4 The system is referenced to the Soviet Geocentric Co-ordinate System 1990 (SGS-90) and as for GPS positions must be adjusted, if necessary, to the datum of the chart being used.

5 **DGPS.** Differential GPS compares the position of a fixed point, referred to as the reference station, with positions obtained from a GPS receiver at that point. The resulting differences are then broadcast as corrections to suitable receivers. The system and services have been developed to overcome the inherent and imposed limitations of GPS.

In India and Sri Lanka there are a number of beacons transmitting or planning to transmit DGPS corrections.

6 **Caution.** Satellite navigation systems are under the control of the owning nation which can impose selective availability or downgrade the accuracy to levels less than that available from terrestrial radio navigational systems.

7 For full details of these systems see *Admiralty List of Radio Signals Volume 2*.

### Other aid to navigation

#### Marine radiobeacons

##### 1.22

1 A marine radiobeacon transmits from Karāchi in Pakistan.

For further information see *Admiralty List of Radio Signals Volume 2*.

#### Racons

##### 1.23

1 Racons, to assist in landfall, transmit from many salient points on the coast and from some fairway buoys in the approaches to harbours and gulfs; these racons are mentioned in the text and are shown on the chart.

Within the area of this volume there are racons in India and Sri Lanka.

- 2 For further information see *Admiralty List of Radio Signals Volume 2*.

### Radio stations

#### 1.24

- 1 For full details of all of the radio stations in the area covered by this volume see *Admiralty List of Radio Signals Volumes 1(1) and 6(4)*.

### Signal stations

#### 1.25

- 1 There are numerous signal stations established in the area covered by this volume, these stations are mentioned in the text and are shown on the chart.

### Radio navigational warnings

#### Long range warnings

##### 1.26

- 1 The area covered by this volume lies within the limits of NAVAREA VIII and NAVAREA IX of the World-wide Navigation Warning Service (WWNWS).
- 2 **NAVAREA VIII warnings.** The majority of the area covered by this volume lies within the limits of NAVAREA VIII; India is the co-ordinator for this area and warnings are issued by the Chief Hydrographer to the Government of India, Dehra Dun, India. Warnings are broadcast through:
  - 3 Mumbai (Bombay) Naval Radio.  
SafetyNET (Enhanced Group Calling International SafetyNET).  
NAVTEX (depending upon the area affected).
- 4 **NAVAREA IX warnings.** The NW part of the area covered by this volume lies within the limits of NAVAREA IX; Pakistan is the co-ordinator for this area and warnings are issued by the Hydrographer of the Pakistan Navy, Naval Headquarters, Karāchi, Pakistan. Warnings are broadcast through:
  - 5 Karāchi Naval Radio.  
SafetyNET (Enhanced Group Calling International SafetyNET).  
NAVTEX (depending upon the area affected).
- 6 For full details of all the above services see *Admiralty List of Radio Signals Volumes 3(1) and 5*.

#### Coastal navigational warnings

##### 1.27

- 1 Coastal navigational warnings issued by the national co-ordinators, covering a region or part of NAVAREAS VIII and IX, are broadcast in English through national coast radio stations.
- 2 For full details see *Admiralty List of Radio Signals Volume 3(1)*.

#### Local warnings

##### 1.28

- 1 Local warnings cover the area within the limits of jurisdiction of a harbour or port authority and may be issued by these authorities. Warnings may be issued in the national language only; they supplement the coastal warnings and give information which the ocean-going vessels may normally not require.
- 2 For full details see *Admiralty List of Radio Signals Volume 3(1)*.

### Radio weather services

#### 1.29

- 1 The World Meteorological Organization has established a global service for the broadcasting of high seas weather warnings and routine weather bulletins, through the Enhanced Group Calling International SafetyNET Service. Meteorological Service Areas are identical to the NAVAREAS.
- 2 Each Meteorological Service Area has a designated National Meteorological Service responsible for issuing high seas weather warnings and bulletins. However, the designated authorities are not necessarily in the same country as the NAVAREA co-ordinators.
- 3 Weather warnings and routine bulletins are broadcast through:
  - National coast radio stations.  
SafetyNET.
- 4 For full details see *Admiralty List of Radio Signals Volume 3(1)*.

### Piracy warnings

#### 1.30

- 1 Piracy warnings are issued by the Regional Piracy Countermeasures Centre; they are broadcast daily to NAVAREAS VIII and XI through the Enhanced Group Calling International SafetyNET System.
- 2 For further information and details see *Admiralty List of Radio Signals Volume 1(1) and 1.56*.

### Radio medical advice

#### 1.31

- 1 Mariners may obtain medical advice by radio through the International Radio Medical Centre (CIRM) in Rome.  
Off the coasts of India, Pakistan and Sri Lanka advice may be obtained through some of the local coast radio stations.  
For further information see *Admiralty List of Radio Signals Volume 1(1)*.

### Locust reports

#### 1.32

- 1 Locusts swarms may be encountered over the Arabian Sea. To assist in the provision of appropriate warnings to countries threatened by locust invasions, mariners sighting locusts are asked to make a report by radio, see *Admiralty List of Radio Signals Volume 1(1)*.

## REGULATIONS

### International regulations

#### Submarine cables

##### 1.33

- 1 Mariners are warned that every care should be taken to avoid anchoring, trawling or other activities in the vicinity of submarine cables on account of the serious consequences which would result from fouling them. Submarine cables may contain high voltages and contact with them, or proximity to them, poses an extreme danger. If a submarine cable is fouled it should never be cut. See *The Mariner's Handbook* for information on the *International Convention for the Protection of Submarine Cables*.

#### Pollution

##### 1.34

- 1 *The International Convention for the Prevention of Pollution from Ships 1973* was adopted by the International Conference on Marine Pollution convened by IMO in 1973.



It was modified by the Protocol of 1978 relating thereto and adopted by the International Conference on Tanker Safety and Pollution Prevention convened by IMO in 1978. The convention, as modified by the protocol, is known as *MARPOL 73/78*.

- 2 The convention consists of six annexes: Annex I (Oil), Annex II (Noxious Liquid Substances in Bulk), Annex III (Harmful Substances carried at sea in Packaged Form), Annex IV (Sewage from Ships), Annex V (Garbage from Ships) are mandatory, and Annex VI (Air Pollution from Ships) which comes into force on 19th May 2005.

For further details see *The Mariner's Handbook*.

- 3 **Facilities for the disposal of oily waste and garbage**, where known, are described in other facilities, under the appropriate port; see also 1.158.

### Traffic Separation Scheme

#### 1.35

- 1 See IMO publication *Ship's Routeing* for general provisions on ship's routeing. The following Traffic Separation Scheme in the waters covered by this volume is IMO adopted and regulations for navigating in this scheme are contained in Rule 10 of the *International Regulations for Preventing Collisions at Sea (1972)*.

- 2 South of Dondra Head (5°55'N, 80°35'E).

### National regulations

#### Pollution

##### 1.36

- 1 In the area covered by this volume discharge of any oil into the sea is prohibited within 50 miles of the coasts of the mainland and island groups.

#### Vessels carrying dangerous and polluting goods

##### 1.37

- 1 The government of India has declared its intention to adopt regulations which require all vessels above 100 grt, carrying dangerous and hazardous cargo transiting through the Indian Exclusive Economic Zone (EEZ), to report the details of the cargo carried by the vessel 48 hours prior to entering any Indian port or 24 hours prior to entering the Indian EEZ. Vessels sailing from neighbouring countries shall also be required to report details of cargo 24 hours prior to departure from the port.

- 2 Crude oil and product tankers that are more than 25 years old, whether carrying petroleum products or not, are not allowed to enter Indian ports.

The Pakistani authorities require vessels to strictly adhere to the requirements of MARPOL and to advise them if any pollution is sighted or detected.

- 3 For further information see *Admiralty List of Radio Signal Volume 1(1)*.

#### Quarantine

##### 1.38

- 1 The following regulation applies to all vessels arriving at ports in India, Pakistan or Sri Lanka.

- 2 The Master of every suspected or infected vessel, or if any vessel on which unusual mortality among rats has been observed, shall, on arrival at port, hoist the appropriate quarantine signals prescribed in the *International Code of Signals*.

- 3 In Maldives a vessel with smallpox onboard is placed under strict quarantine for 40 days after the recovery of the last person affected. In cases where the disease was prevalent at the vessels previous port, quarantine is enforced for 12 days even if there is no sickness onboard.

- 4 Indian Port Health Authorities require a quarantine message to be sent not more than 12 and not less than 4 hours prior to arrival.

- 5 For further information see *Admiralty List of Radio Signal Volume 1(1)*.

### Control of navigation

#### Indian and Pakistani Ports

##### 1.39

- 1 The Governments of India and Pakistan, having separately taken into consideration the fact that it may be necessary to forbid all entrance to certain ports under their control, give notice that on approaching the shores of India or Pakistan or any Indian or Pakistani port or locality a good lookout should be kept for the signals from shore described below, also for the vessels of the examination service and for the distinguishing or other signals made by them. In the event of such signals being displayed, the port or locality should be approached with great caution, as obstructions may exist.

- 2 If entrance to a port is prohibited, three red balls disposed vertically by day, or three red lights (flashing in India, fixed in Pakistan) disposed vertically at night, will be exhibited in some conspicuous position, in or near its approach; these signals will also be shown by the vessels of the examination service.

- 3 If these signals are displayed, vessels must approach the port or locality with the greatest caution and implicitly obey all orders and signals given to them by the examination vessel, traffic control vessel or signal station.

If entrance to a port is permitted, three green lights disposed vertically will be exhibited.

- 4 If movement of shipping in a port or anchorage, under naval control, is prohibited, a green light between two red lights disposed vertically at night, or a blue flag by day, will be exhibited. Signals affecting movement of shipping in parts of a port will be found in the public traffic regulations for that port.

At some ports or localities, searchlights are occasionally exhibited for exercise.

- 5 Instructions have been given to avoid directing movable searchlights during practice on to vessels underway, but mariners are warned that great care should be taken to keep a good lookout for the signals given above, when searchlights are observed to be working.

Vessels are particularly warned not to enter a declared dangerous area or approach boom defences without permission, nor to anchor or remain stopped in a dangerous area or prohibited anchorage unless specially instructed to do so.

#### Examination Service

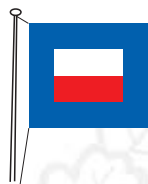
##### 1.40

- 1 In certain circumstances it is necessary to take special measures to examine, or to establish the identity of, individual vessels desiring to enter ports or localities and to control entry generally. This is the function of the Examination Service. Where traffic control vessels take the place of examination vessels their authority is the same.

- 2 In such case, vessels carrying the distinguishing flags or lights mentioned below will be charged with the duty of examining ships which desire to enter the port and of allotting positions in which they shall anchor. If government vessels, or vessels belonging to the local port authority, are found patrolling in the offing, merchant vessels are advised to communicate with such vessels with a view to obtaining information as to the course on which

they should approach the port. Such communications will not be necessary in cases where the pilot onboard has already received this information from the local authorities.

- 3 As the institution of the Examination Service will probably be unknown to vessels desiring to enter the port, special care should be taken in approaching the ports, by day and night, to keep a good lookout for any vessel carrying the flags or lights mentioned below, and to be ready to stop at once when hailed by the examination vessel or warned by the firing of a gun or sound rocket.
- 4 By day the distinguishing flag of the examination vessel or traffic control vessel will be a special flag (white over red horizontal bands surrounded by a blue border). Also three red balls disposed vertically will be exhibited if any entrance is prohibited.



Examination Service special flag (1.40)

- 5 Usually the examination vessels or traffic control vessels will fly the Indian or Pakistani blue or white ensign.  
At night the vessel will exhibit:  
Three red lights (flashing in India, fixed in Pakistan) disposed vertically if entrance is prohibited.  
Three green lights disposed vertically if entrance is permitted.
- 6 The above lights will be carried in addition to the ordinary navigation lights, and will show an unbroken arc around the horizon.  
In some ports the pilot's launch may be used as the examination vessel and Masters should keep a good lookout for it.
- 7 Merchant vessels approaching an Indian or Pakistani port at which the Examination Service is in force, must hoist their signal letters on arriving within visual signal distance of the port, and are not to wait for the signal "What is the name of your vessel" to be made from the examination vessel.
- 8 Masters are warned that, before attempting to enter any port when the Examination Service is in force, they must in their own interests strictly obey all instructions given to them by the examination vessel or traffic control vessel.
- 9 Whilst at anchor in the examination anchorage, masters are warned that it is forbidden, except for the purpose of avoiding accident, to do any of the following things, without permission from the Examination Officer:  
To lower a boat.  
To communicate with the shore or with other ships.  
To move the ship.  
To work cables.
- 10 To allow any person or thing to leave the ship.  
To switch on or show any light while blackout restrictions are in force.
- 11 The permission of the Immigration Officer must be obtained before any passenger or member of the crew who has embarked outside India or Pakistan, respectively, is allowed to land.  
In case of fog, masters are enjoined to use the utmost care, and the port should be approached with caution.
- 12 When the Examination Service is in force merchant vessels, when approaching ports, are especially cautioned against making use of private signals of any description,

either by day or night; the use of them will render a vessel liable to be fired on.

The pilots attached to ports will be acquainted with the regulations to be followed.

- 13 Nothing in these regulations is to be taken as overruling such general or local regulations as may be issued by the public traffic regulations at each port, through routeing authorities, by Indian or Pakistani Notices to Mariners or other means to meet new dangers or situations which may arise, to cover local conditions.

## Examination anchorages

### 1.41

- 1 Examination anchorages are established off Cochin, Mormugao, Mumbai, Porbandar and Okha.

The limits of these anchorages are enclosed by the following positions:

#### *Cochin*

|       |           |            |
|-------|-----------|------------|
| (i)   | 9°55'·00N | 76°11'·30E |
| (ii)  | 9°55'·00N | 76°12'·30E |
| (iii) | 9°54'·00N | 76°11'·80E |
| (iv)  | 9°54'·00N | 76°12'·80E |

#### *Mormugao*

|       |            |            |
|-------|------------|------------|
| (i)   | 15°23'·50N | 73°44'·00E |
| (ii)  | 15°23'·50N | 73°45'·00E |
| (iii) | 15°22'·50N | 73°45'·00E |
| (iv)  | 15°22'·50N | 73°44'·00E |

#### *Mumbai (Bombay)*

|       |            |            |
|-------|------------|------------|
| (i)   | 18°53'·05N | 72°49'·83E |
| (ii)  | 18°51'·55N | 72°48'·92E |
| (iii) | 18°51'·20N | 72°49'·63E |
| (iv)  | 18°52'·40N | 72°50'·40E |

#### *Okha*

|       |            |            |
|-------|------------|------------|
| (i)   | 22°30'·40N | 69°02'·00E |
| (ii)  | 22°30'·40N | 69°03'·65E |
| (iii) | 22°31'·30N | 69°03'·65E |
| (iv)  | 22°31'·30N | 69°02'·00E |

## Sri Lanka

### 1.42

- 1 The Sri Lankan Government has issued regulations controlling navigation in the territorial waters of Sri Lanka.
- 2 1. No vessel shall enter or remain within Sri Lanka's territorial waters other than:  
Vessels entering or leaving the ports of Colombo, Galle, Trincomalee and Kankasanturai.  
Vessels navigating through the Traffic Separation Scheme off Dondra Head.  
Vessels laid up inside Trincomalee Harbour.  
Vessels engaged in Sri Lanka's coastal trade.  
Vessels waiting in the roads off the port of Colombo with the approval of the Harbour Master.  
Vessels navigating through Sri Lanka's territorial sea and internal waters in Palk Strait with the permission of the Commander of the Sri Lanka Navy.
- 4 2. Any vessel which enters Sri Lanka's territorial waters in contravention of these regulations shall do so at their

own risk, and the Sri Lankan Government shall not be liable for any loss or damage such vessel may suffer.

- 5 3. The Master of any vessel which enters Sri Lanka's territorial waters shall identify his vessel if challenged by:

Any vessel responsible for performing coastguard duties.

Any aircraft.

Any Sri Lankan authority from land by radio.

- 6 4. Any vessel which has to enter Sri Lanka's territorial waters for purposes other than those given in (1) shall do so only with the approval of the Harbour Master.

- 7 **Yachts.** Foreign yachts are prohibited from entry to Sri Lankan ports except those having special permission or having agents registered in Sri Lanka.

#### 1.43

- 1 Sri Lanka has announced that entrance by unauthorized vessels into the waters of Palk Strait and the eastern territorial waters of Sri Lanka is prohibited because of increased acts of terrorism against shipping and Sri Lankan naval vessels. Sri Lanka requires that vessels in the vicinity contact the Sri Lankan Command for written authorization if they wish to enter these areas.

- 2 The Government also has established a restrictive zone in the coastal waters along the W coast from Kalpitiya (8°14'N, 79°46'E) to Colombo Port's southern backwaters, about 80 miles S. Written permission from the Sri Lankan Command is also required for entry into these waters. Sri Lankan authorities have advised that they will fire on violators.

- 3 For details see *Admiralty List of Radio Signals Volume 6(4)*.

It has been reported that in a 3 month period in 1997 at least three vessels were attacked, one being set on fire and sunk; two of the attacks resulted in the deaths of crew members; in 2000 a vessel in Trincomalee was attacked by a suicide bomber and in 2001 two vessels were rammed, including one sunk near Point Pedro, resulting in the death of crew members.

## SIGNALS

### Storm signals

#### General information

##### 1.44

- 1 The arrangement of storm warnings at ports covered by this volume consists of 2 systems which may be summarised as follows.

- 2 **General system** consisting of 11 signals, 2 of which indicate the existence of distant disturbed weather, eight indicate that local bad weather threatens the port and the remaining one indicates that communication with the Meteorological Department has broken down and that, in the opinion of the local officer, there is danger of bad weather.

- 3 **Brief system** consisting of 5 only of the above signals is used at ports frequented mainly by smaller vessels engaged in local traffic.

- 4 The Meteorological Department of Sri Lanka, India and Pakistan keep port officers informed of all necessary warnings and the latest information with respect to disturbances in the seas off the coasts of the Indian

Peninsula. Ships' officers may therefore apply to the port officers for details, to supplement the indications of the signals displayed; they will also receive detailed information in the broadcast weather bulletins issued by the Meteorological Departments through coast radio stations.

- 5 The system in force at each port where storm signals are displayed will be found in the text of this volume and is described in the following paragraphs.

#### General system

##### 1.45

- 1 **Distant signals.** These indicate that vessels may be exposed to danger after they have left harbour.

- 2 **Legend** for the following signals.

3

| Signal No | Day                                                                                 | Night                                                                                 | Meaning                                                                                                                                                              |
|-----------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| I         |   |    | <b>Cautionary.</b> There is a region of squally weather in which a storm may be forming.                                                                             |
| II        |  |  | <b>Warning.</b> A storm has formed.                                                                                                                                  |
| III       |  |  | <b>Cautionary.</b> The port is threatened by squally weather.                                                                                                        |
| IV        |  |  | <b>Warning.</b> The port is threatened by a storm, but it does not appear that the danger is as of yet sufficiently great to justify extreme measures of precaution. |

I

- 4 This signal is shown at ports so situated with reference to the disturbed weather that a ship leaving the port might run into danger during its voyage.

- 5 If one of the later-mentioned signals is not more appropriate and has not already been shown, this signal is also shown at Arabian Sea ports when a disturbance from the Bay of Bengal is crossing the peninsula and may develop into a cyclone after entering the Arabian Sea.

II

- 6 This signal is shown when there is no immediate danger of the port itself being affected, but ships leaving the port might run into the storm.

- 7 But if, in addition to such distant warnings, there is risk of the port experiencing bad weather, the appropriate local signals are shown in preference to distant signals. For instance, if a port is threatened by squally weather, although the storm centre is far away from it, the Local Cautionary signal, III, will be shown instead of the District Warning signal, II. In general, if the weather situation warrants either of 2 or 3 signals, then the highest-numbered signal will be shown.

##### 1.46

- 1 **Local signals.** These indicate that the port itself and the vessels in it are threatened.

III

IV

- 2 The existence of a storm can often be determined before its direction of motion can be fixed. In this case all those



ports which the storm could possibly strike are warned by this signal.

|      |  |  |                                                                                                                                                                                |
|------|--|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| V    |  |  | <b>Danger.</b> The port will experience severe weather from a cyclone expected to move keeping the port to the left of its track.                                              |
| VI   |  |  | <b>Danger.</b> The port will experience severe weather from a cyclone expected to move keeping the port to the right of its track.                                             |
| VII  |  |  | <b>Danger.</b> The port will experience severe weather from a cyclone expected to move over or close to the port.                                                              |
| VIII |  |  | <b>Great danger.</b> The port will experience severe weather from a severe cyclone expected to move keeping the port to the left of its track.                                 |
| IX   |  |  | <b>Great danger.</b> The port will experience severe weather from a severe cyclone expected to move keeping the port to the right of its track.                                |
| X    |  |  | <b>Great danger.</b> The port will experience severe weather from a severe cyclone expected to move over or close to the port.                                                 |
| XI   |  |  | <b>Failure of communications.</b> Communications with the Meteorological Warning Centre have broken down, and the local officer considers that there is danger of bad weather. |

### Brief system

#### 1.47

- In the Brief System only 1 of the 5 following signals is shown and the port officers are kept informed of the prospects of local bad weather, associated with any disturbance at sea, for the general information of shipping.

| Signal No | Meaning                   | Full meaning                                        |
|-----------|---------------------------|-----------------------------------------------------|
| III       | Cautionary                | Same as day and night signals in the General System |
| IV        | Warning                   | as above                                            |
| VII       | Danger                    | as above                                            |
| X         | Great danger              | as above                                            |
| XI        | Failure of communications | as above                                            |

### Storm signal stations

#### 1.48

- Within the area covered by this volume there are storm signal stations at numerous places. The presence of such a station is noted in the description of the place concerned.

## DISTRESS AND RESCUE

### General information

#### 1.49

- For general information concerning distress and safety, including helicopter assistance, see *Annual Summary of Admiralty Notices to Mariners* and *The Mariner's Handbook*.

### Global Maritime Distress and Safety System (GMDSS)

#### 1.50

- Throughout the waters covered in this book the principal means of searching for and assisting persons in distress is via the Global Maritime Distress and Safety System (GMDSS).
- The basic concept of the GMDSS is that Search and Rescue (SAR) organisations ashore as well as shipping in the immediate vicinity will be rapidly alerted to a distress incident so that they can assist in a co-ordinated SAR operation. Within the regions covered, there are National SAR Agencies and Maritime Rescue Co-ordination Centres (MRCCs), Maritime Rescue Co-ordination Sub-centres (MRSCs) or Rescue Co-ordination Centres (RCCs).
- Within the area of this volume there are Search and Rescue Regions (SRRs) for Maldives, Sri Lanka, India, Pakistan, Oman and Iran; for full details, including diagrams, and a list of Digital Selective Calling (DSC) stations, see *Admiralty List of Radio Signals Volume 5*.

### Ship reporting system

### Automated Mutual-assistance Vessel Rescue System (AMVER)

#### 1.51

- The Automated Mutual Assistance Vessel Rescue System (AMVER) has world wide coverage providing important aid to the development and co-ordination of Search and Rescue (SAR) efforts in many offshore areas of the world. It is operated by the United States Coast Guard and merchant vessels of all nations making offshore voyages are encouraged to send movement reports and periodic position reports to the U.S. Coastguard AMVER Centre in Martinsburg, West Virginia.
  - US Maritime Administrative regulations require certain US flag vessels and foreign flag "War Risk" vessels to report and regularly update their voyages to the AMVER Centre.
- Details are given in *Admiralty List of Radio Signals Volume 1(1)*.

### India

#### 1.52

- The Indian Ship Position and Information Reporting System (INSPIRES)** covers the majority of the waters in this volume.
- The system is mandatory for all Indian merchant ships over 300 gt, and other vessels within the area are encouraged to participate in the system. The purpose of the system is to provide data for SAR operations, vessel traffic management, weather forecasting and the prevention and containment of marine pollution. Participating vessels should send regular reports via selected Indian coast radio stations.
- For further information see *Admiralty List of Radio Signals Volume 1(1)*.

#### 1.53

- INDSAR** is a voluntary ship reporting system for foreign vessels over 300 gt operated by the Indian Coast Guard through the MRCC in Mumbai (Bombay). It is

supplementary to INSPIRES (1.52) and is an integral part of the Indian Maritime SAR system covering the area of their SRR.

- 2 Details, including the coverage area, are given in *Admiralty List of Radio Signals Volumes 1(1)* and 5.

#### 1.54

- 1 **The Island Reporting System (ISLEREP)** is a system to enhance navigational safety, and to minimise the risk of maritime accidents, consequential pollution and damage to the maritime environment in and around the waters of the Andaman and Nicobar Islands (*Bay of Bengal Pilot*) and Lakshadweep and Minicoy Islands. It is mandatory for all vessels of 50 m or more LOA, for some vessels engaged in towing, and for all oil tankers, liquefied gas carriers, chemicals tankers and vessels coming within the INF code.

- 2 Full details are given in *Admiralty List of Radio Signals Volumes 1(1)*.

### Rescue services

#### Life-saving stations

##### 1.55

- 1 Limited rescue services are available in the area covered by this volume. However, seven life-saving stations, equipped as indicated, are reported to be situated at:  
Male': small salvage tug; speed boats (40 kn); seaplane and helicopters.  
Jaffna: one lifeboat.  
Galle: one lifeboat.
- 2 Colombo: three powered lifeboats and 3 life-saving tugs.  
Alleppey: co-ordination centre only.  
Aguada Bay (mouth of Sinquerim River): one lifeboat.  
Karāchi: three powered lifeboats.
- 3 The signals used between these stations and vessels in distress are as internationally agreed under the International Convention on Safety of Life at Sea, 1974.

### PIRACY AND ARMED ROBBERY

#### General information

##### 1.56

- 1 The United Kingdom Maritime and Coastguard Agency (MCA) has brought to the attention of shipowners, masters and crews, the risk of acts of piracy on the high seas or armed robbery against ships at anchor or when underway through a state's coastal territorial waters. It has outlined the steps that should be taken to reduce the risk of such attacks, possible responses to them and the need to report attacks, both successful and unsuccessful, to the authorities of the relevant coastal state and to the ship's own maritime administration.

- 2 Many attacks involve the use of knives or firearms resulting, in some cases, in death or injury to crew members.

#### 1.57

- 1 Attacks on vessels by armed thieves can take place in international waters as piracy or, more commonly, as armed robbery in the territorial waters of a coastal state. There has been a recent (2002) increase of vessels being hijacked for ransom.
- 2 Ships may be attacked whilst at anchor off a port or whilst underway. Ships underway are usually approached from the stern, but also the sides if the ship has a low freeboard. However, vessels with a high freeboard and travelling in excess of 17 kn have been boarded. Attacks usually take place under cover of darkness, most often between 2200 hours and 0600 hours.
- 3 For further information, including recommended precautions and reporting details, see *The Mariner's Handbook* and 'Piracy and Armed Robbery – Reports' in *Admiralty List of Radio Signals Volume 1(1)*.

#### Incidents

##### 1.58

- 1 Attacks on all classes of vessels occur in the waters of India and Sri Lanka and have been reported at or off many of the ports; they are most prevalent at Cochin. They also occur at a considerable distance offshore. Acts of terrorism with loss of life have occurred in the N part of Sri Lanka.

#### Piracy Reporting Centre

##### 1.59

- 1 The International Maritime Bureau (IMB) of the International Chamber of Commerce operates a Piracy Reporting Centre (PRC) at Kuala Lumpur in Malaysia. The PRC broadcasts daily warnings of pirate activity on a world wide basis, see 1.60. The services of the centre are free of charge to all vessels, irrespective of their flag.

#### Recommended practices

##### 1.60

- 1 Recommended practices, including anti-attack plans, reporting, radio procedures and responses are detailed in *Admiralty List of Radio Signals Volume 1(1)* together with the telephone, telex and fax numbers and e-mail address of the Piracy Reporting Centre at Kuala Lumpur which is fully operational 24 hours a day.
- 2 The International Maritime Organization (IMO) recommends that reports concerning attacks, successful or not, or suspicious movements which may lead to an attack, should be made to the Rescue Co-ordination Centre (RCC) for the area concerned (1.50). The SafetyNET (Enhanced Group Calling International SafetyNET) System may be used to issue, or receive daily warnings; for further information see *Admiralty List of Radio Signals Volume 5*.

## COUNTRIES AND PORTS

## MALDIVES

## General description

Chart 709

## 1.61

- 1 The Maldives, an archipelago consisting of a chain of atolls, is situated in the SE part of the Arabian Sea; the S atoll of the group lies some 600 miles SSW of Cape Comorin, the S point of India. From the S-most atoll this chain of atolls, separated by several wide channels, extends about 470 miles in a general N direction; its estimated area is about 90 000 sq km.
- 2 In total, the Maldives group comprises about 1190 coral islands of which some 200 are inhabited.

## General information

## 1.62

- 1 The capital of the Republic of Maldives is Male' (4°10'5N, 73°30'5E) located on the island of that name which is one of the islands of North Male' Atoll.
- 2 The exact origin of the Maldivian race is completely shrouded in obscurity, the reason being pronounced geographic isolation of the islands from other countries and world shipping routes
- 3 The Maldivians are Moslems and are great navigators and traders.

## National limits

## 1.63

- 1 Maldives claims a 12 mile territorial sea and an exclusive economic zone of 200 miles, both measured from an archipelagic baseline.
- 2 For further information see *Annual Summary of Admiralty Notices to Mariners*.

## Maritime boundary

## 1.64

- 1 The maritime boundary between Maldives and India is described at 1.93.

## History

## 1.65

- 1 Maldives has been an independent country, except for a short period of Portuguese rule of 15 years in the mid-16th century. Maldives became a British protectorate in 1887 and remained so until 1965, though throughout this period Britain did not participate in the internal affairs of the country. Maldives regained its full sovereignty in 1965. The independent Maldives changed from a Sultanate to a Republic on 11th November 1968.

## Government

## 1.66

- 1 The islands are governed by the President and members of the Cabinet. The Majlis, or Parliament, consists of 56 members, of whom 48 are elected by the islanders and 8 are nominated by the President. On each inhabited island there is a Katheeb, or island Chief, who represents the law and the authority of the Government.

## Population

## 1.67

- 1 The population of Maldives in 2004 is estimated to be about 339 330.

## Language

## 1.68

- 1 The Maldivian language, now known as Divehi, contains many Sinhalese words, with modified vowels and a change of "p" to "f" due to Arabic influence; it derives from a root common to both Sinhalese and Divehi. The script, Thaana, is written from right to left and has some letters which resemble Arabic numerals. Increasing contact with other races has added many words of foreign origin.

## Physical features

## 1.69

- 1 Maldives consists of 26 atolls (some adjoining); these are generally ring-shaped coral reefs with numerous islets upon them and with openings leading usually to a fairly deep central area or lagoon containing more islets and detached reefs.
- 2 The islets are seldom more than 2 m high so that the coconut palms on them appear, on first approach, to be growing out of the water. The highest point is about 3 m above sea level.

## Flora and fauna

## 1.70

- 1 The flora and fauna of Maldives is very similar to that found in the tropical island ecosystem; very few terrestrial fauna, except tropical fauna, are represented.
- 2 Numerous trees, many of local food value, exist with the coconut palm being the most common, but there is no room for thick jungle.
- 3 The protective coral reef surrounding the islands is home to a vast selection of tropical marine life and in the adjoining sea the sword fish is common; sharks and porpoise are plentiful.

## Industry and trade

## 1.71

- 1 The principal industries are tourism and fishing; agriculture is limited by poor soil conditions. However, traditional local industries, including boat building, mat weaving, jewellery and lacquer work may be found on some of the atolls.
- 2 Exports include canned fish, clothing, tortoise-shell, copra, coir yarn, cowries and a few mats.  
Imports include rice, dates, salt, sugar, tobacco, areca nuts, cloth, cotton, curry, ghi, pottery, fuel and domestic oils.
- 3 All export and import trade of the islands is conducted at Male', where produce is brought from the other atolls.

## LAKSHADWEEP

## General description

Chart 2738

## 1.72

- 1 Lakshadweep, formerly known as Laccadive Islands, consists of 19 islands, of which 10 are inhabited; they lie about 200 miles W of the Malabar Coast and constitute a Union Territory of the Republic of India.
- 2 The islands are divided into N and S groups which are described fully at 2.477.

## General information

## 1.73

- 1 The islanders, save those on Minicoy, a detached island lying about 100 miles S of the south group of islands, are



nearly all Moslems of Hindu descent; they are mostly all bold seamen and expert boat builders.

- 2 Except for Minicoy, in appearance, manners and customs the islanders are indistinguishable from the Moplahs of Kerala. The Minicoites however resemble more the Maldivians in appearance, customs and manners, thereby differing strikingly from the inhabitants of the other islands.
- 3 The climate is healthy but leprosy and filariasis remain to be eradicated.

### Government

#### 1.74

- 1 The islands are administered by the Administrator for Lakshadweep whose headquarters are located on Kavaratti an island of the S group of islands.

### Languages

#### 1.75

- 1 The dialect of the islanders, except Minicoy, is old Malayalam with local variations in each island. The Minicoites language, Mahl, is said to be allied to primitive Sinhalese.

### Industry and trade

#### 1.76

- 1 Industry is very limited. Coir, sold to the Government in exchange for rice, provides the major source of income for the islands, but fishing, particularly off Minicoy, has been a developing industry.

## SRI LANKA

### General description

Chart 828

#### 1.77

- 1 Sri Lanka, formerly Ceylon, is an important island lying off the SE coast of India to which it is almost connected by a narrow line of islands and shoals that form the head of the Gulf of Mannār. It has a total land area of about 65 600 sq km.
- 2 The capital and seat of government is Colombo (6°57'N, 79°51'E).

### National limits

#### 1.78

- 1 Sri Lanka claims a 12 mile territorial sea and an exclusive economic zone of 200 miles.  
For further information see *Annual Summary of Admiralty Notices to Mariners*.

### Maritime boundary

#### 1.79

- 1 The maritime boundary between Sri Lanka and India is described at 1.92.

### Security zone

#### 1.80

- 1 The Government of Sri Lanka has declared (1986) a 3 mile wide territorial security zone off the E coast of Sri Lanka between Sangama Kanda Point (7°02'N, 81°53'E) (3.79) and Point Pedro (3.184), the NE point of Sri Lanka, 194 miles NNW. Vessels approaching the coast between these points may be requested by naval patrol vessels to identify themselves and to give their destination.

### History

#### 1.81

- 1 The foundation of the nation is considered to be the arrival and settlement in the island of Prince Vijaya, from northern India, in the 6th century BC.
- 2 In 1505, the Portuguese formed settlements on the W and S coasts of the island, but these were taken from them about the middle of the next century by the Dutch. In 1796, the British Government annexed the foreign settlements on the island to the presidency of Madras. A monarchical form of government continued until the beginning of the nineteenth century when the British subjugated the Kandyan Kingdom in the central highlands. In 1802, Sri Lanka was separated from India and became a Crown Colony.
- 3 After passing through various stages of increasing self-government Sri Lanka attained full membership of The Commonwealth on 4th February 1948. In May 1972 the island adopted a new constitution thereby becoming an independent republic within The Commonwealth. Sri Lanka is also a member of the United Nations and the Colombo Plan.
- 4 In September 1978 a new constitution for the Democratic Socialist Republic of Sri Lanka was promulgated.

### Government

#### 1.82

- 1 Sri Lanka has a parliamentary form of Government with an Executive President at its head.  
The country is divided into 25 districts for Local Government, each district is administered by a government agent.

### Population

#### 1.83

- 1 The population of Sri Lanka comprises Sinhalese (74%), Tamils (18%), Moslems, Burghers, Malay and Veddahs (aboriginal inhabitants).  
The majority of the inhabitants are Buddhists.
- 2 In 2004, the population of Sri Lanka is estimated to be about 20.48 million.

### Languages

#### 1.84

- 1 The official language is Sinhala, with Tamil and English as national languages.

### Physical features

#### 1.85

- 1 The central part of the S half of the island is mountainous, and, on a clear day, its outline is visible from the W seaboard. Pidurutalagala (7°00'N, 80°46'E), the summit of the island, cannot be identified from seaward; but the remarkable cone known as Adam's Peak (6°48'N, 80°30'E), is very prominent from S and W during NE monsoon.
- 2 On the W side of the mountain district the foothills lie compactly together in long parallel folds, but elsewhere on its W side the island is practically flat.
- 3 The S and W coasts are generally densely planted with coconut trees; these trees are also found in the vicinity of every village on the island where the temperature is suitable for their growth.

#### 1.86

- 1 One of the peculiarities of the coastal parts is the extensive fresh and salt water lagoons, lying a short distance inland. These lagoons are found on the W coast,

but only to a limited extent at the S end. They appear to have been formed by the action of the sea currents off the coast, combined with that of the monsoon swell, in piling up a sand ridge, thus enclosing a space filled originally of sea water. These lagoons may now be seen in process of formation in the N parts; but in the S they are complete, and lie some distance inland, the water in them having become fresh from the heavy rainfall experienced in Sri Lanka.

- 2 Slight earthquake tremors are occasionally felt in Sri Lanka, but they are not sufficiently intense to cause serious damage.

Rivers on the W side of the island, fed by the long lasting rains of the SW monsoon, are never without water but those flowing N which are dependent on the shorter rainy season of the NE monsoon are reduced at other times of the year to dry sandy river beds. Many of the rivers, N of Colombo, are from 80 to 100 miles long but they all have bars at their mouths and are only navigable, for 30 to 40 miles upstream, by local craft.

### Flora and fauna

#### 1.87

- 1 The tropical vegetation of Sri Lanka resembles that of India (1.125) but there are many indigenous forms, some of which have adapted to grow where nothing else will, thus much of the island appears green most of the time.

Dry and wet zones are not clearly demarcated though their vegetation shows a distinct difference.

- 2 The most extensive forest is of the dry zone type. Few of its trees are economically valuable but re-forestation is in the process of remedying this situation.

- 3 Much forest land has been cleared and where it has not been replanted with valuable trees it is cultivated for a wide variety of crops, including tea, rice, rubber and coconut palm. The best tea is grown in the hills where there is also much grassland and terraced rice cultivation.

#### 1.88

- 1 Wild life is similar to that in S India (1.126) but there are species peculiar to Sri Lanka.

Formerly unrestricted hunting and trapping caused the decline or extinction of many species, but since 1930 land has been set aside for the preservation of plant and animal life and hunting is now regulated.

- 2 The larger mammals include the Sri Lankan elephant and bear, also leopards and water buffalo.

Reptiles range in size from the lizard to the crocodile and include python of up to 4.5 m in length.

Small mammals include a grey squirrel with a flat broad tail, several kinds of monkey and bat, the latter species includes the "flying fox", porcupine and hare.

- 3 Ruhuna, on the SE side of the island, and Wilpattu, on the NW side, are national parks. Elephant, deer and peafowl are abundant at Ruhuna, and Wilpattu is the habitat of many kinds of water birds including storks, spoonbills, pelicans, ibis and teal. Hunting and trapping and the picking or destruction of wildlife is strictly forbidden in these reserves.

### Industry and trade

#### 1.89

- 1 Industry is mainly engaged in the processing of agriculture products for export and domestic markets. The most important manufacturing industries are those processing the primary export trade commodities of tea,

petroleum and rubber; other industries include chemicals, coconut, plastics, textiles, clothing, leather goods, tobacco and beverages.

## INDIA

### General description

Chart 4073

#### 1.90

- 1 The Republic of India is bounded to the W by Pakistan and the Arabian Sea, in the E by Bangladesh and the Bay of Bengal and on its N side lie the mountains of the Great Himalayan system; Nepal and the protectorate state of Bhutan are situated along the S slopes of the latter mountains with Tibet farther N.

### National limits

#### 1.91

- 1 India claims a 12 mile territorial sea and an exclusive economic zone of 200 miles.

For further information see *Annual Summary of Admiralty Notices to Mariners*.

### Maritime boundaries

#### Boundary with Sri Lanka

##### 1.92

- 1 In 1974 the governments of India and Sri Lanka agreed their mutual boundary in the waters from Adam's Bridge to Palk Strait to be the arcs of Great Circles between positions:

|   |   |            |            |
|---|---|------------|------------|
| 2 | 1 | 10°05'·00N | 80°03'·00E |
|   | 2 | 9°57'·00N  | 79°35'·00E |
|   | 3 | 9°40'·15N  | 79°22'·60E |
|   | 4 | 9°21'·80N  | 79°30'·70E |
| 3 | 5 | 9°13'·00N  | 79°32'·00E |
|   | 6 | 9°06'·00N  | 79°32'·00E |

#### Boundary with Maldives

##### 1.93

- 1 In 1976 the governments of India, Maldives and Sri Lanka agreed the determination of the tri-junction point (Point T) between the three countries in the Gulf of Mannār, and in 1978 the governments of India and Maldives agreed their mutual boundary to be the arcs of Great Circles between positions:

|   |   |           |            |
|---|---|-----------|------------|
| 2 | T | 4°47'·07N | 77°01'·67E |
|   | 1 | 4°52'·25N | 76°56'·80E |
|   | 2 | 5°05'·58N | 76°43'·25E |
|   | 3 | 5°13'·93N | 76°36'·80E |
| 3 | 4 | 6°28'·23N | 75°41'·57E |
|   | 5 | 6°33'·35N | 75°38'·52E |
|   | 6 | 6°51'·10N | 75°25'·77E |
|   | 7 | 7°15'·45N | 75°16'·32E |

|   |    |          |           |
|---|----|----------|-----------|
| 4 | 8  | 7°24'00N | 75°12'10E |
|   | 9  | 7°25'32N | 75°11'30E |
|   | 10 | 7°51'50N | 74°56'15E |

## History

### 1.94

- 1 The history of India within the boundaries defined above may be regarded as starting with the collapse in about 2000 BC of the Harappan, or Indus Valley, civilization, in the present day Pakistan, under the impact of invasions of that area, and of Jumna Valley farther E, by Aryan peoples whose original homeland had been Central Asia.
- 2 From the Aryan settlement in N India there slowly developed a synthesis of religious behaviour and social customs from which Hinduism duly evolved. The new civilization, based upon Hinduism and Sanskrit, the language of the invaders, gradually spread to the whole of N India giving it a degree of political unity and a social organisation which, in time, spread into S India.
- 3 During the early part of the 1st millennium BC a number of states, some dynastic and some republican, emerged in N India; all shared a common social and religious pattern.

### 1.95

- 1 In 323 BC Chandra Gupta Maurya seized from Alexander the Great's successor Alexander's Asian dominions and became the founder of the Mauryan dynasty and an empire which embraced the whole of India and extended W to include Kabul in Afghanistan.
- 2 The Mauryan Empire, lasting 150 years, was a period of high civilization and artistic achievement; its monarchs included Asoka, a convert to the non-violent doctrine of Buddhism, who despatched missionaries and scholars as far W as Greece and Egypt.
- 3 With the decay of Mauryan power numerous petty kingdoms arose in the Ganges Valley, none strong enough to revive the imperial tradition until, in about AD 320, the Gupta dynasty was formed.

### 1.96

- 1 In the intervening period a new dynasty, the Satavahana dynasty, had established itself in S India in an area between the plains of Hindustan and the Deccan plateau. Hitherto, and perhaps as early as 1200 BC, S India had shaped its history mainly through its maritime relations with Egypt and the Middle East. But throughout this period S India gradually became increasingly under the influence of the Aryan N; although Tamil, the native language of the S, was never replaced by Sanskrit and, up to the present day, S India retains a distinct political and cultural identity.

### 1.97

- 1 The Gupta dynasty, lasting 150 years until about AD 475, marked the zenith of the ancient civilization of India during which able civil servants administered the country and major irrigation and other public works were undertaken. The famous university of Nalanda attracted students from all over Asia.
- 2 In time, under successive attacks from the White Huns of the Central Asian steppes, the central authority of the Gupta Empire declined and N India fell into a state of general anarchy until, in the seventh century AD, it was re-united under Harsha, a great general and administrator.
- 3 At about this time the great reformer, Sankaracharya, succeeded in the integration of the Buddhist and Hindu

philosophies leading to the emergence of Hinduism as the principal religion of India and the virtual extinction of Buddhism in the country.

### 1.98

- 1 In 1192 the Moslems, who had gained a foothold in Sind during the eighth century and were already entrenched in Afghanistan, and the border kingdom of Peshawar, began an invasion of India and, quickly brushing aside the weak and petty kingdoms into which N India had broken up upon the death of Harsha, soon established themselves throughout the Ganges Valley as far E as Bengal.
- 2 Under Moslem suzerainty the Brahmins, who used Sanskrit as the language of learning, were displaced from positions of leadership; as a result there was a profuse growth of regional languages.
- 3 Moslem rule was exercised through a number of sultanates of which the chief was the Sultanate of Delhi; most of the rulers were Turkish or Afghan.

### 1.99

- 1 Towards the end of the fourteenth century the Sultanate of Delhi, after the sacking of the city by the Mongol invader Tamerlane, fell into decline and was further weakened by organised Hindu resistance.
- 2 In 1526, Babur, a Mongol and descendant of both Tamerlane and Genghis Khan, invaded the Punjab and, after defeating the Sultan of Delhi, proclaimed himself Emperor of India. Thus began the Mogul dynasty which lasted until 1707. Its most renowned ruler, Akbar, the grandson of Babur, combined exceptional military and administrative skill with a degree of religious tolerance calculated to secure the loyalty of Hindu, Christian and Moslem subjects alike.
- 3 The reign of Aurangzeb, the last of the Great Moguls, marked an epoch of notable achievement in the arts, literature and architecture combined with great economic activity. But, by intensifying the persecution of non-Moslems carried out by his predecessor, Shah Jehan, Aurangzeb reversed Akbar's policy of religious tolerance; reaction among the Hindu population, especially by the Sikhs, Rajputs and Marathas, proved too much for the over centralized system of the Moguls and there followed a period of strife, regicide and revolt.

### 1.100

- 1 By the eighteenth century, with the ascendancy of the Marathas, the establishment of Hindu supremacy seemed near accomplishment, but the period coincided with expansion of Afghan power from the NW and of British power, which had driven the Dutch from the Indian scene, within the sub-continent.
- 2 By 1760 the French had been driven from S India and in 1803, at the battle of Abbaye, Wellington finally broke the Maratha power.
- 3 By 1815 the supremacy of the East India Company, as the main European presence in India, had become unchallengeable. In 1848, with the annexation of the Punjab, virtually the whole of India passed under British authority and so remained for almost 100 years.
- 4 Under British rule the country was divided into states under direct British rule and states in which the Indian princes exercised sovereignty under the principle of ultimate British paramountcy.

### 1.101

- 1 By the early twentieth century a spirit of Indian nationality had begun to assert itself and independence from British rule was demanded by the Indian National Congress. In 1920, following a period of post-war agitation and turbulence, Gandhi, popularly known as "Mahatma",



formulated and secured mass support for a policy of non-violent, non co-operation with the British Government.

- 2 Throughout the Second World War various proposals for India's independence were discussed but all foundered on the rock of Hindu-Moslem irreconcilability. Thus it was left to Lord Mountbatten, the last of the British Viceroys, to bring about a final settlement which required partition of former British India into separate states based upon the incidence of Hindu and Moslem in their populations and so on the 15th August 1947, India and Pakistan emerged as two independent states.

### Government

#### 1.102

- 1 The constitution was passed by the Constituent Assembly on 26th November 1949 and came into force on 26th January 1950. It has since, until 1995, been amended 85 times.
- 2 India is a republic and comprises a Union of 25 States and 7 Union Territories, including Lakshadweep. Executive power, to be exercised on the advice of ministers responsible to Parliament, is vested in the President of the Republic. Each State is administered by a Governor appointed by the President.
- 3 The legislature consists of a Parliament and Cabinet of Ministers headed by the Prime Minister. The parliament is composed of Rajya Sabha or Council of States (Upper House), and Lok Sabha or House of the People (Lower House).

### Population and religion

#### 1.103

- 1 **Population** is estimated to be about 1088 million in 2004 and is the largest of any country in the world except China.
- 2 Ethnically, the country is perhaps the most complex and diverse in the world, being the result of centuries of migration, conquest and intermarriage. However, the majority of the population are of Caucasoid racial type with significant minorities of Proto-Australoid, Mongoloid and Negro stock.

#### 1.104

- 1 **Religion**, although 82 percent of the population are Hindus there were in the 1981 census about 76 million Moslems; 16 million Christians; 13 million Sikhs; 5 million Buddhists and 3 million Jains. Small tribal groups in the more remote areas practice Animism.
- 2 Hinduism is a social as well as religious system and finds part of its social expression in the caste system which establishes a fixed hierarchy of social groups but is in the process of modification, under democratic and evolutionary pressures.

### Language

#### 1.105

- 1 Over 98 percent of the people of India speak languages either of the Indo-European or of the Dravidian families. Almost 75 percent of the population speak a language of the Indo-European family and are mostly distributed N of the Godavari River. In the area S of Godavari River languages of the Dravidian family predominate.
- 2 Hindi, in the Devanagiri script, a language of the Indo-European family, is the official language of the Republic, but English is widely used especially in commerce. There are 14 other languages specified in the Eighth Schedule of the constitution, of these, the regional languages likely to be encountered by the mariner in the

area covered by this volume are Tamil, Malayalam, Kannada, Marathi and Gujarati. States may adopt a regional language to be used for official purposes within their own borders.

- 3 Ethnic minorities comprise indigenous tribes who, with the descendants of foreign groups, have retained their identity. Despite the predominance of the main languages, almost 800 other languages are spoken by these relatively small groups.

### Physical features

#### General information

##### 1.106

- 1 The area covered by this volume includes part of the coast of the State of Tamilnadu, formerly Madras, the coast of the States of Kerala, Mysore (Karnataka) and Gujarat; and the Union Territory of Lakshadweep, formerly Laccadive Islands, for details of the latter see 1.72.
- 2 The coast between Cape Comorin, at the S point of India, and about latitude 15°30'N is known to mariners as the Malabar Coast; though the term is sometimes loosely applied to the whole seaboard as far N as Mumbai.

#### Tamilnadu

##### 1.107

- 1 The state of Tamilnadu lies at the S end of the Indian Peninsula.  
The S and E coasts are low, level and fringed with coconut palms; the hinterland gives way to agriculture. To the W of Manappād Point (8°22'N, 78°04'E) the coast rises gradually to the foothills of the Southern Ghāts which attain an elevation of over 1800 m.
- 2 There are no important rivers along this stretch of coast.

#### Kerala

##### 1.108

- 1 The State of Kerala lies on the Malabar Coast between latitudes 8°15'N and 12°45'N.  
The N part of the state is rich in rubber and tea plantations, much rice is grown in the central area.
- 2 The E boundary of Kerala is formed by the Western Ghāts; this range of hills with elevations from about 900 to 2400 m extends along the whole length of the W coast of the Indian Peninsula running almost parallel with it at distances from 10 to 100 miles inland.
- 3 A striking feature on this coast is Pālghāt Gap, a break in the Western Ghāts about 16 miles wide in the vicinity of latitude 10°43'N, the S side of which is formed by the remarkable Kollengode Bluff (5.112).
- 4 An extensive hill region S of Pālghāt Gap includes some mountains, almost detached and precipitous on their W sides, which are connected with lower hills diminishing in height towards the coast.

##### 1.109

- 1 The coast belt, extending about 10 miles inland, is flat and covered with an almost unbroken belt of coconut and areca palms; along the coast are high white sand dunes and areas of red sand which form good landmarks.
- 2 The surface of the coastal belt consists of undulating hills and valleys traversed, from E to W, by many tortuous rivers flowing into lagoons and backwaters near the coast. These features are connected in places by canals between Alleppey (9°30'N, 76°19'E) and Ponnāni, 81 miles NNW, and they form a continuous line of smooth-water communication inland.
- 3 This great backwater, varying in width from 8 miles to a few hundred metres, is fed by several rivers which rise in the Western Ghāts. During the SW monsoon the increased

drainage of the extensive area through which these rivers flow probably accounts for the constant shifting of the remarkable soft mud bank near Alleppey, described at 5.60.

#### 1.110

- 1 To the N of Pālghāt Gap, the Western Ghāts look down on a country broken by long spurs, extensive ravines and dense forests. Stretching W, gentler slopes and gradually-widening valleys, succeed the forest-clad uplands, until, near the seaboard, the low laterite tablelands shelve into rice plains and backwaters fringed with coconut palms.
- 2 Numerous rivers flow to the coast, where they discharge into the all but continuous line of backwaters, of varying breadth, parallel to the coastline. The coast forms a few headlands, and contains the summit of a conspicuous promontory known as Mount Dilli.

### Mysore (Karnataka)

#### 1.111

- 1 The W seaboard of the State of Mysore (Karnataka) extends N from the N boundary of Kerala to the coast of Goa. The districts of South Kanara and North Kanara back the coast.
- 2 The Western Ghāts continue parallel with the coast through the State, but, except in the S part where they attain elevations of over 1800 m, they are much lower, varying between about 750 and 900 m in elevation.

#### 1.112

- 1 The country in the district of South Kanara is very broken and covered with extensive forest and abundant vegetation. The seaboard for from 5 to 25 miles inland may be regarded as tableland, from about 100 m high near the coast rising to about 180 m high towards the Ghāts, bounded by the lower spurs sloping down from the range.

#### 1.113

- 1 In North Kanara, the lowlands of Payanghat, a belt of from 5 to 15 miles wide, lie between the coast and the foothills of the Western Ghāts. The coastline is only broken by Kārwar Head in the N, and by the estuaries of the rivers and the mouths of smaller streams, which flow into numerous lagoons that wind several miles into the interior. The coast is generally sandy, and behind the lagoons rise groves of coconut trees, inland of which, stretches a narrow strip of level rice land. From this belt rise a few smooth flat-backed hills, from 60 to 90 m high; in places it is covered by lofty rugged densely-wooded spurs, which maintain almost to the coast an elevation of above 300 m.
- 2 The forests of North Kanara, chiefly of teak with smooth stems and about 20 m in height, form its principal feature.

### Konkan Coast

#### 1.114

- 1 To the N of North Kanara, as far as the N boundary of the district of Thāna, the seaboard is known as Konkan Coast, although, the coast S of Mumbai is often referred to as part of the Malabar Coast.

### Maharashtra

#### 1.115

- 1 The coast of the State of Maharashtra extends along the Konkan Coast between Goa, in the S, and Damān, in the N; the districts of Ratnāgiri, Kolāba and Thāna front the coast from S to N.
- 2 The Western Ghāts, with general elevations of from 600 to 900 m, but with some peaks over 1500 m, stand almost parallel with the coast leaving a strip of land up to

60 miles wide, known as Konkan, between them and the sea.

#### 1.116

- 1 The district of Ratnāgiri, lying between Goa and Sāvitrī River, is generally rocky and rugged; near the coast it consists of bare elevated plateaux, intersected by numerous creeks and navigable rivers flowing between steep and lofty hills. About 10 miles inland the country becomes more open, but a little farther back it is occupied by spurs of the Western Ghāts. The coast is almost uniformly rocky and consists of small bays and coves shut in between jutting headlands, edged with sand of dazzling whiteness.

#### 1.117

- 1 The district of Kolāba, lying between Sāvitrī River and Mumbai (Bombay) Harbour, is very hilly, some of the hills being spurs of considerable regularity and height, extending W at right angles to the main range, while others are isolated peaks or lofty detached ridges. A series of minor ranges extend S to N between the main range and the coast. The sea frontage is mostly fringed by a belt of coconut and areca-nut palms, behind which lies a stretch of flat rice-producing country.

#### 1.118

- 1 The coastal region of Thāna district, lying between Mumbai Harbour and Damān, consists of a strip of low land intersected by hill tracts of up to over 750 m high; the flat alluvial belt between Ulas and Vaitarna Rivers is known as North Konkan. To the E and NE the country becomes elevated and wooded, while, near the coast, the land is low and fertile with abundant palm growth and populous villages.

### Gujarat

#### 1.119

- 1 The coastline of the State of Gujarat extends from the N boundary of Damān (20°24'N, 72°49'E) to the E boundary of Pakistan and includes Kāthiawār Peninsula. The districts of Sūrāt and Bharuch front the E side of the Gulf of Khambhāt, those of Bhāvnagar, Amreli, Junagad and Jāmānagar are situated on Kāthiawār Peninsula and the district of Kachchh forms the N side of the Gulf of Kachchh. The coastal regions of Junagad and Jāmānagar Districts are known as Saurashtra Coast.

#### 1.120

- 1 The district of Sūrāt consists of a broad alluvial plain, with small hillocks of drifted sand fringing the greater part of the coast, which in some parts is dry and barren, and in others watered by springs. Through the openings of the river mouths the tide flows up behind the barrier of sandhills, and floods a large area of salt marshes. Beyond spreads a belt of highly cultivated land, restricted by the hills towards the S to a breadth of little more than 15 miles, but with a width of about 60 miles in the N, where Tāpi River forms a deep and fertile delta.

- 2 Narmada River, the only other major river of the W coast of India, enters the sea through a wide estuary 25 miles N of Tāpi River.

#### 1.121

- 1 The district of Bharuch forms an alluvial plain, sloping gently W, varying in breadth from 20 to 40 miles; with the exception of a few hillocks of sand-drift along the coast, there is no rising ground. The soil is highly fertile and well cultivated.

#### 1.122

- 1 Kāthiawār Peninsula, except in its N part, which is almost entirely flat, is generally undulating with low ranges of hills extending in irregular directions. There are



extensive mountain tracts lying within about 35 miles of its SW seaboard; Gir Range, N of Diu Head, and Barda Hills, NE of Porbandar, are the principal mountain groups. The highest summit, however, that of Gorakhnath with an elevation of 1117 m, lies about midway between them.

#### 1.123

- 1 The district of Kachchh is practically an island, being almost entirely cut off from the mainland by the Kori branch of the Indus River, the Rann of Kachchh and The Little Rann. On the whole the country is treeless, barren and rocky with ranges of hills and isolated peaks, but it contains many well-tilled valleys and tracts of rich pasture land. To the S, behind a high bank of sand that lines the coast, there is a low, fertile plain from 20 to 30 miles wide; inland of this a broad belt of hilly ground, from 150 m to over 300 m high, stretches E and W; Nanu, Krikubbah and Kattru are the principal summits.

#### 1.124

- 1 The most striking feature of the State of Gujarat is the Ranns, or salt marshes, in the NW part of the State. The Rann of Kachchh (Great Western Rann) lying N of the district of that name, is about 160 miles long and 80 miles broad with an estimated area of about 7000 square miles. Kala Dongar the highest point in Kachchh, about 463 m high, stands out from the bed of the Rann of Kachchh.
- 2 The Little Rann, at the head of the Gulf of Kachchh, is about 70 miles in length and covers an area of nearly 2000 square miles. In appearance and general character these Ranns differ very little; the dark soil is generally caked by the action of the sun on the saline particles with which it is impregnated. At times the whole surface, particularly of the E part of the Ranns, is covered with salt, which shows with dazzling whiteness during the summer heat, accompanied by much mirage. During the SW monsoon high tides cover the Ranns to a depth of from 0.3 to 0.6 m. The Little Rann is undergoing marked change; the sea is encroaching farther E, making places accessible which were formerly dry.

### Flora and fauna

#### 1.125

- 1 **Vegetation.** India has over 260 000 square miles of forested land, or about 22 percent of its total area. Assam, in the NE, has the highest proportion of forest cover of any state.
- 2 Formerly most of the land was covered by forest but three millennia of unrestricted clearing and burning of land for agriculture and grazing have reduced much of the lower altitude forest land to scrub grassland. Several types of tropical and temperate forest evolve, dependent mainly on rainfall.
- 3 Major timber producing trees of India are the sal, found mainly in the 39 000 square miles of monsoon forest in the N and central India, the deodar, found mainly in the W Himalayas, and such pines as fir and spruce.
- 4 The shisham found in the sub-Himalaya region yields a close grained wood in great demand for carving and furniture. Teak, also valued for furniture, is found in small forests in central India, the Western Ghāts and the Nilgiris in S India.
- 5 Bamboo is found throughout most of India and is used for a very wide variety of purposes. Its quick regrowth enhances its value.
- 6 The wild date palm is also widely distributed and is often found where there are no other trees; its fruit is of poor quality but its sap is used to make toddy or gur (a type of molasses).

- 7 The areca or betel palm is found in hot humid regions; its nuts are carved and its leaves are chewed. Palm leaves are also used for thatching and mat making.

- 8 In the Ranns, NW India, with the exception of some of the islands where grass and a few stunted bushes grow, there is no vegetation.

#### 1.126

- 1 **Wildlife.** India is the home of about 500 species of mammal, 3000 species of bird and 30 000 kinds of insect and a wide variety of fish, amphibians and reptiles. An average of about 40 000 people each year are killed by snakes and wild animals.
- 2 Lions, tigers and other large predators have been very greatly reduced by hunting and the encroachment of civilization upon their natural habitat whereby the natural balance has been upset, resulting in an excess of destructive wild pigs, rodents, monkeys and sickly cattle which formerly fell prey to the great predators.
- 3 A few lions linger on in the Gir forest of Gujarat. Most of the greatly reduced tiger population is found in the delta swamps of Bengal. Elephants, which formerly inhabited the plains, have been driven to the sparsely inhabited hill areas of Mysore (Karnataka), Kerala and Orissa; they may now be hunted only with a licence and on foot.
- 4 Three kinds of rhinoceros are still found in NE India. The gaur, a kind of wild bison, is a favourite target for hunters in the hill jungles.
- 5 Regionally Indian fauna include the wild ass of Rajasthan, the Nilgiri langur and mongoose, the lion-tailed macaque, the wild ass and antelope of the Ranns, the Malabar civet of the S hills and the spotted deer, four-horned antelope and sloth bear.
- 6 Leopards are widely distributed and destructive; wolves abound in open country and black bears are common in rocky hills and forests. Cheetahs are found on the Deccan plateau and are often trained to hunt antelope.
- 7 In 1973 the tiger, snow leopard and elephant were placed on the protected list.

#### 1.127

- 1 Most beautiful of the birds are the Kingfishers and several kinds of parrot. There are many kinds of eagle and falcon and four kinds of vulture. Small game birds such as partridge, quail and duck are plentiful.
- 2 Peafowl are common in many parts of the country but are sacred to the Hindus and must not be shot.
- 3 There are many types of fresh water fish; the carp, catfish and hilsa are much esteemed for eating. The mahseer, a very large type of barbel, provides good sport for the fisherman in many of the larger streams and rivers.
- 4 Reptiles abound; some are among the most poisonous in the world. The bite of the cobra and the krait can be fatal. In general, snakes found in or near saltwort are reputedly poisonous and freshwater ones are harmless. There are crocodiles and several kinds of lizard.
- 5 Scorpions and other insects are plentiful. The worst pests are disease bearing mosquitoes and the swarms of destructive locusts. Useful insects include the silkworm and a scale insect producing lac, a resinous substance used to make shellac.

### Industry and trade

#### 1.128

- 1 India is primarily an agricultural country and about 70 percent of the population are dependent on the land for their living.
- 2 The country has an increasingly modern industrial basis with sophisticated industries in electronics, avionics and

aluminium. However, its infrastructure remains inadequate, notably in communications and power generation, but foreign investment is now officially welcomed in the energy sector, particularly power generation, oil exploration and refineries.

- 3 In 1991 India entered into a standby arrangement with the International Monetary Fund and introduced structural reforms aimed at reducing the fiscal deficit and containing inflation. The trade policy was liberalized in 1992 and customs duties were reduced dramatically, particularly for capital goods.

#### 1.129

- 1 Principal exports (1997), in order of value, were engineering goods, gems and jewellery, ready made garments and cotton yarn.
- 2 The main imports, for the same year, were petroleum, petroleum products and related materials, general and electrical machinery, pearls, precious and semi-precious stones, chemicals and transport equipment.

## PAKISTAN

### General description

Chart 707

#### 1.130

- 1 The Islamic Republic of Pakistan lies on the Arabian Sea between latitudes 24° and 37° N. It is bounded by Iran and Afghanistan to the W and NW, by China to the N and to the NE and E by the disputed territory of Jammu and Kashmir, and by India.
- 2 The extreme N of the country includes formidable mountainous terrain on the fringes of the Pamir, Karakoram and Hindu Kush Ranges of which the main peaks lie N and NW in Central Asia.  
A mountain barrier also extends along the NW frontier between Pakistan and Afghanistan.
- 3 Several natural routes through passes in these mountain barriers have for many centuries served as trade routes, seasonal nomadic migration routes and the means of entry of foreign invaders moving from Central Asia into the S Asian sub-continent.

### National limits

#### 1.131

- 1 Pakistan claims a 12 mile territorial sea and an exclusive economic zone of 200 miles.  
For further information see *Annual Summary of Admiralty Notices to Mariners*.

### History

#### 1.132

- 1 A great civilization flourished in the Indus Valley, during the third and fourth millennia BC, which came to an end about the middle of the second millennium BC.
- 2 Archaeology has uncovered at Mohenjo-Daro, 200 miles N of Karāchi, and at Harappa, 400 miles farther N, evidence of large cities elaborately built and administered.
- 3 The above civilization was succeeded by a prolonged dark age, ending with the emergence in about the fourth century BC of an Indic Civilization which persisted to about AD 700 and flourished in the ancient state of Gandhara; roughly in the area between present-day Rawalpindi and Kabul in Afghanistan. Hinduism developed as part of this civilization but also had links with an earlier period.

#### 1.133

- 1 The invasion of the area by Alexander the Great in the fourth century BC served to establish long persisting links with an Hellenic Culture.
- 2 Islamic influence, so important a factor in the country's history, arrived with Arab seafarers and traders in the seventh century AD, during the lifetime of the Prophet Muhammad. Arab settlements were first established along the Makrān Coast and the Arabs later controlled, for a short time, the area of the lower Indus Valley corresponding to present day Sind.

#### 1.134

- 1 From the eleventh to the eighteenth centuries successive incursions by Afghan and Turkish invaders resulted in a long period of Moslem rule in which large numbers of the population became converted to Islam.
- 2 By the late eighteenth century Great Britain had begun to assert her rule over much of the South Asian sub-continent. By the end of the nineteenth century, after a series of frontier wars and campaigns, Britain had assumed control of the area of present day Pakistan within the frontiers of British India.

- 3 In 1906 Moslem leaders in British India formed the Moslem League, later to adopt the goal of establishing Pakistan as a homeland for the Moslems of the then British India.

#### 1.135

- 1 Thus when independence was granted to British India in August 1947 it was decided that a policy of partition was the only acceptable solution whereby both India and Pakistan would become the successor states to the former territory of British India.
- 2 At this time Pakistan became a self-governing dominion within the British Commonwealth composed of two wings East and West Pakistan.
- 3 In March 1956, under a newly adopted constitution, Pakistan ceased to be a dominion and became a sovereign Islamic Republic within The Commonwealth.
- 4 In 1971 East Pakistan seceded to become the State of Bangladesh; in the same year Pakistan (formerly West Pakistan) ceased to be a member of The Commonwealth and a new constitution was adopted in 1973; subsequently, Pakistan rejoined The Commonwealth in 1989.

### Government

#### 1.136

- 1 After a period of martial law, when central and provincial governments were dismissed and the constitution abrogated, elections were held in 1970, though martial law continued pending settlement of differences between the East and West wings of the country. These developed into civil war which ended in 1971 with the secession of the East wing which then became independent as Bangladesh.
- 2 A new constitution was adopted in 1973 and provided for a bicameral federal parliament, with a National Assembly and Senate; the President became the constitutional head of the country with the Prime Minister as the Chief Executive. In 1977, martial law was re-imposed and the country was brought under military rule. Martial law was finally lifted in December 1985 and the fundamental rights safeguarded under the constitution restored.

#### 1.137

- 1 In 1970 the federal capital and seat of government was moved from the seaport city of Karāchi to Islamabad, 7 miles from Rawalpindi in the Punjab. Provincial capitals

are Peshawar (NW Frontier Province), Lahore (Punjab), Karāchi (Sind), and Quetta (Baluchistan).

- 2 Pakistan controls rather less than one half the disputed territory of Kashmir in the NW part of the country, which is known as Azad Kashmir, and has its seat of government in Muzaffarabad. The territory is divided by a United Nations patrolled cease fire line.

### Population

#### 1.138

- 1 The population of Pakistan is estimated to be about 156 million in 2004; its character is very diverse and there are marked differences, physical, linguistic and cultural between the various ethnic groups.

#### 1.139

- 1 In Baluchistan the main groups, distinguished principally by language and social organisation, are the Baluchis, Brahuis and Pathans, the latter group mostly inhabiting the area of the frontier with Afghanistan. All these groups are composed of numerous tribes some of which, in the remote and inhospitable areas, are nomadic. There are also some distinctive tribes in Makrān.

#### 1.140

- 1 In the NW frontier region of Pakistan the Pathans form the majority ethnic group claiming descent from a single ancestor, contemporary with Muhammad, and through him from King David. Of the many Pathan Tribes the Wazirs, Mahsuds, Mohmands and Afridis portray the fiercest and warlike reputation.

#### 1.141

- 1 In the Punjab, by contrast, tribal organisation plays a minor part, the chief distinguishing feature being caste. The most important castes are the Rajputs, a warrior group with a great regard for personal honour, the Jats, forming the largest group and usually landowning cultivators but also with a martial reputation, and, the Arains who are often farmers but have moved into many other occupations. There are many other castes embracing various trades and crafts and occupying different positions of social precedence.

#### 1.142

- 1 In Sind the ethnic linguist pattern is very mixed and includes many Baluchis and Brahuis who have settled there; perhaps 17 percent of the population are refugees who fled India at the time of partition, while about the same proportion are low caste Hindus who remained behind when those of higher caste fled to India.
- 2 The true Sindhis are divided into an extraordinary number of groups based on geography, tribe, lineage, occupation and caste. The followers of particular local saints or pirs, who abound in Sind, also form distinct groups.

### Languages

#### 1.143

A variety of languages are spoken in the different areas of Pakistan, principally that of the majority tribe in the area. However, additional common languages have developed as a means of communication across the boundaries of the tribal languages.

- 1 Urdu is the national language of the country though it is only spoken by a small percentage of the population. Punjabi is spoken by about 95 percent of the people of Punjab; and Sindhi is the language of the great majority of the people of Sind, of whatever origin.

- 2 English is used in central government, business and higher education.

### Physical features

#### 1.144

- 1 River Indus and its tributaries Jhelum, Chenab, Ravi and Sutlej rise in the Himalayas and, after flowing SSW for 1800 miles, enters the sea through many mouths between Karāchi and the E frontier of Pakistan with India.
- 2 The mouths of River Indus are subject to great and frequent changes following the annual snow melt in the Himalayas and Hindu Kush; the resulting floods starting at the end of March attain their maximum in early August and last until September. Because of the shifting channels and sandbanks, and of the arid country through which it flows, the River Indus is little used as a waterway. With its tributaries, however, it is of paramount importance for irrigation yielding sufficient water, through a very extensive system of canals, for 25 million acres of crops.

#### 1.145

- 1 To the W of Karāchi the coast of Las Bela and Makrān, extending farther W to beyond the frontier with Iran, are chiefly an uninhabited wilderness of hills and cliffs fronting the Baluchistan Plateau. Swamps and desert plains lie at the foot of the hills and several small rivers enter the sea along the coast; these are unimportant for navigation but provide some seasonal irrigation inland.

### Flora and fauna

#### 1.146

- 1 Although the coastal fringe is conspicuously lacking in vegetation cover, the country inland has a rich and diversified flora.
- 2 Where rainfall is low and the soil dry, tough wiry grasses and scrub trees grow, while in the mountain meadows above about 2700 m there are many kinds of alpine flowers; fir trees also grow in large stands at this level. Between about 900 and 1500 m long-leaved pine, oak, chestnut and walnut trees may be found.
- 3 Much of the plains area, as on the Baluchistan Plateau, is so dry as to be almost devoid of vegetation, but along the banks of the River Indus date palm and mangrove abound.

#### 1.147

- 1 Fish are plentiful off Karāchi and the Makrān Coast is considered to be potentially a well-stocked fishing ground.
- 2 In the Indus Delta crocodile, python, deer and wild boar can be found. The swamps of the delta have less dangerous reptiles and quadrupeds than most large deltas, and, beyond some jackals and hyenas, few exist. In the cold weather season vast numbers of ducks, geese and other water-fowl are seen in the neighbourhood of the freshwater mouths.
- 3 Snakes, both poisonous and non-poisonous, inhabit the grassy plains. In the scrub country small game, including partridge, quail and rabbits, abound; larger species include bears, wolves, wild pigs, jackals and deer. The mountains are the habitat of the brown and black Himalayan Bears, several kinds of mountain sheep and the rare snow leopard.
- 4 **Terodo worm.** The salt water worm (Teredo Navalis), which may be found in the Indus Delta, is destructive to a most extraordinary degree, attacking the bottom of boats and timber; in a short space of 6 weeks it has been found that they can penetrate teak plank fully half an inch thick. So well aware of this are the local fishermen that they lay their boats aground every 10 days for the purpose of coating them with fish oil, considered by them to be a good protection.



**Industry and trade****1.148**

- 1 Pakistan is primarily an agricultural country; in 1997 some 50 percent of the population were engaged in this industry, which is the mainstay of the country's economy, accounting for about 25 percent of its GDP.

- 2 Much of the N and W parts of Pakistan, though fringed by mountains, consist of fertile plains watered by the five rivers of the Punjab, their tributaries and associated canals. The main crops are wheat, cotton, barley, sugar cane, rice, maize and fodder crops. The Quetta and Kalat areas yield fruit and dates.

Coal and chromate are mined; the former supplying about half of the country's requirements.

The large natural gas field at Sui supplies industry and domestic consumers in the Karāchi and Multan Areas.

About 4.3 million hectares of reserved and protected forest, mostly in Punjab, Baluchistan, Sind and North West Frontier Province, yield considerable amounts of timber.

**1.149**

- 1 Principal exports (1997–98), in order of value, were cotton cloth, cotton yarn, cotton fabric, rice, carpets and leather.

The main imports, for the same year, were machinery, petroleum chemicals and transport equipment.

**IRAN**

Chart 707

**1.150**

- 1 A small section of E Iran is included in this volume. For details of Iran see the *Persian Gulf Pilot*.

**PRINCIPAL PORTS, HARBOURS AND ANCHORAGES****1.151**

| Place and position | Remarks |
|--------------------|---------|
|--------------------|---------|

**Maldives**

|                                         |                                                        |
|-----------------------------------------|--------------------------------------------------------|
| Addoo Atoll (2.19)<br>(0°40'S, 73°10'E) | Large protected anchorage                              |
| Male' (2.289)<br>(4°10'·5N, 73°30'·5E)  | Large protected anchorage, numerous small craft berths |

**Sri Lanka****1.152**

|                                            |                                                                                                                     |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Trincomalee (3.116)<br>(8°33'N, 81°13'E)   | Large protected anchorage, small naval dockyard, alongside berths                                                   |
| Kankasanturai (3.212)<br>(9°49'N, 80°02'E) | Open roadstead, small port                                                                                          |
| Kayts (3.231)<br>(9°42'N, 79°51'E)         | Small port                                                                                                          |
| Jaffna (3.232)<br>(9°40'N, 80°01'E)        | Commercial anchorage port, bagged salt loaded.                                                                      |
| Galle (4.20)<br>(6°02'N, 80°13'E)          | Commercial port, fishing harbour, protected anchorage for working cargo by lighters. Development in progress (1998) |
| Colombo (4.79)<br>(6°57'N, 79°51'E)        | Major commercial port, container and oil terminals                                                                  |

**India****1.153****Tamilnadu**

|                                                          |                                                                                                |
|----------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Tuticorin Zone A (new port) (4.170)<br>(8°45'N, 78°13'E) | Large artificial commercial port, container and oil terminals                                  |
| Tuticorin Zone B (old port) (4.191)<br>(8°48'N, 78°10'E) | Open roadstead lighterage anchorage, small craft and lighter harbour sheltered from SW monsoon |
| Kolachel (5.20)<br>(8°10'N, 77°15'E)                     | Small open roadstead, Ilmenite sand loaded                                                     |

**Kerala**

|                                           |                                                        |
|-------------------------------------------|--------------------------------------------------------|
| 1 Trivandrum (5.25)<br>(8°29'N, 76°55'E)  | Open roadstead                                         |
| Quilon (5.37)<br>(8°52'N, 76°36'E)        | Open roadstead                                         |
| Nīdakara (5.53)<br>(8°56'N, 76°33'E)      | Open roadstead                                         |
| Alleppey (5.58)<br>(9°30'N, 76°19'E)      | Open roadstead                                         |
| 2 Cochin (5.65)<br>(9°58'N, 76°15'E)      | Commercial and naval port. Oil and container terminals |
| Bey pore (5.116)<br>(11°10'N, 75°48'E)    | Open roadstead                                         |
| Calicut (5.135)<br>(11°15'N, 75°46'E)     | Open roadstead                                         |
| Badagara (5.142)<br>(11°36'N, 75°35'E).   | Open roadstead                                         |
| Tellicherry (5.153)<br>(11°45'N, 75°29'E) | Open roadstead                                         |
| Cannanore (5.160)<br>(11°51'N, 75°23'E)   | Open roadstead                                         |
| 3 Mahe (5.167)<br>(11°42'N, 75°32'E)      | Open roadstead                                         |
| Azhīkkal (5.168)<br>(11°57'N, 75°18'E)    | Open roadstead, timber loaded                          |

**Mysore (Karnataka)**

|                                            |                                      |
|--------------------------------------------|--------------------------------------|
| 4 Mangalore (6.27)<br>(12°51'N, 74°50'E)   | Open roadstead                       |
| New Mangalore (6.34)<br>(12°56'N, 74°49'E) | Protected harbour                    |
| Malpe (6.65)<br>(13°21'N, 74°42'E)         | Open roadstead                       |
| Coondapoor (6.84)<br>(13°38'N, 74°41'E)    | Open roadstead                       |
| 5 Bhatkal (6.102)<br>(13°59'N, 74°33'E)    | Open roadstead                       |
| Honāvar (6.118)<br>(14°16'·5N, 74°26'·6E)  | Open roadstead                       |
| Tadri (6.119)<br>(14°31'N, 74°21'E)        | Open roadstead                       |
| Belekeri (6.128)<br>(14°42'N, 74°16'E)     | Open roadstead                       |
| 6 Kār wār (6.130)<br>(14°49'N, 74°08'E)    | Open roadstead and protected harbour |



**Goa, Damān and Diu**

|                                          |                       |
|------------------------------------------|-----------------------|
| Mormugao (6.173)<br>(15°25'N, 73°48'E)   | Major commercial port |
| Aguada Bay (6.220)<br>(15°29'N, 73°47'E) | Open anchorage        |
| Panaji (6.223)<br>(15°30'N, 73°50'E)     | Minor port            |

**Maharashtra**

|                                                      |                                                          |
|------------------------------------------------------|----------------------------------------------------------|
| 7 Port Redi (7.30)<br>(15°45'N, 73°40'E)             | Open roadstead, iron ore loading                         |
| Vengurla Roads (7.37)<br>(15°50'N, 73°36'E)          | Open roadstead                                           |
| Mālvan (7.42)<br>(16°03'N, 73°28'E)                  | Open roadstead                                           |
| Devgarh (7.58)<br>(16°22'4N, 73°22'5E)               | Small protected anchorage and port                       |
| 8 Vijayadurg (7.64)<br>(16°33'N, 73°20'E)            | Small open harbour                                       |
| Rājāpur Bay (7.88)<br>(16°37'N, 73°20'E)             | Open anchorage                                           |
| Ratnāgiri Bay (7.79)<br>(16°59'N, 73°17'E)           | Open anchorage                                           |
| Mirya Bay (7.85)<br>(17°00'N, 73°16'E)               | Open anchorage and small protected port                  |
| 9 Jaigarh Bay (7.102)<br>(17°18'N, 73°12'E)          | Protected anchorage                                      |
| Port Dābhol (7.109)<br>(17°35'N, 73°09'E)            | Open roadstead and small but developing protected port   |
| Port Bānkot (7.131)<br>(17°59'N, 73°03'E)            | Open roadstead and small protected port                  |
| Murud—Janjīra Harbour (7.152)<br>(18°18'N, 72°58'E)  | Open roadstead and protected anchorage for small vessels |
| 10 Revadanda Port (7.158)<br>(18°33'N, 72°54'E)      | Open roadstead                                           |
| Mumbai (Bombay) (7.191)<br>(18°54'N, 72°49'E)        | Major commercial and naval port                          |
| Jawahar Lal Nehru Port (7.258)<br>(18°57'N, 72°57'E) | Developing large commercial port                         |

**Goa, Damān and Diu**

|                                           |                               |
|-------------------------------------------|-------------------------------|
| Moti Damān (8.63)<br>(20°24'5N, 72°50'0E) | Open roadstead and small port |
|-------------------------------------------|-------------------------------|

**Gujarat**

|                                                       |                                               |
|-------------------------------------------------------|-----------------------------------------------|
| 11 Sūrāt Roads (8.54)<br>(21°01'N, 72°38'E)           | Open roadstead anchorage and lighterage areas |
| Hāzira Offshore Terminal (8.55)<br>(21°09'N, 72°34'E) | SPM Tanker berth                              |
| Jāfarābād (8.87)<br>(20°52'N, 71°23'E)                | Open roadstead and small port                 |
| Pīpāvāv Bandar (8.112)<br>(20°59'N, 71°34'E)          | Open roadstead and small protected port       |

|                                               |                                     |
|-----------------------------------------------|-------------------------------------|
| 12 Pīpāvāv Port (8.112)<br>(20°55'N, 71°30'E) | Developing commercial port.         |
| Bharūch Roads (8.145)<br>(21°35'N, 72°30'E)   | Open roadstead                      |
| Bhāvnagar Port (8.153)<br>(21°45'N, 72°14'E)  | Commercial port with open roadstead |

**Goa, Damān and Diu**

|                                  |                |
|----------------------------------|----------------|
| Diu (8.82)<br>(20°43'N, 70°59'E) | Open roadstead |
|----------------------------------|----------------|

**Gujarat**

|                                                                  |                                                 |
|------------------------------------------------------------------|-------------------------------------------------|
| 13 Verāval (8.198)<br>(20°54'N, 70°22'E)                         | Open roadstead and small commercial port        |
| Porbandar (8.217)<br>(21°38'N, 69°36'E)                          | Protected small commercial port                 |
| Okha (9.28)<br>(22°28'N, 69°05'E)                                | Protected small commercial port                 |
| Salāya Harbour (9.75)<br>(22°25'N, 69°35'E)                      | Small anchorage                                 |
| 14 Māndvi (9.96)<br>(22°49'N, 69°21'E)                           | Open roadstead                                  |
| Mundra (9.102)<br>(22°46'N, 69°42'E)                             | Modern developing port for bulk and oil cargoes |
| Mitha Port (9.108)<br>(22°46'N, 69°42'E)                         | Open roadstead                                  |
| Vādīnār Offshore Terminal (9.121)<br>(22°30'6N, 69°42'1E)        | SBM Tanker berth                                |
| 15 Sikka Creek (9.128)<br>(22°29'N, 69°47'E)                     | Liquid ammonia port                             |
| Reliance Jāmānagar Marine Terminal (9.136)<br>(22°35'N, 69°48'E) | Oil Terminal; SPMs and berths                   |
| Bedi Bandar (9.143)<br>(22°31'N, 70°02'E)                        | Small commercial port served by Rozi Anchorage  |
| Rozi Anchorage (9.145)<br>(22°36'9N, 70°03'2E)                   | Lighterage anchorage for Bedi Bandar            |
| 16 Kandla (9.156)<br>(23°02'N, 70°13'E)                          | Commercial port and oil terminal                |
| Navlakhi (9.213)<br>(22°58'N, 70°27'E)                           | Open roadstead                                  |
| Jakhāu (9.231)<br>(23°13'N, 68°33'E)                             | Open roadstead                                  |

**Pakistan****1.154**

|                                                       |                                                                                        |
|-------------------------------------------------------|----------------------------------------------------------------------------------------|
| Port Muhammad Bin Qasim (10.36)<br>(24°47'N, 67°21'E) | Large commercial port                                                                  |
| Karāchi (10.91)<br>(24°50'N, 66°59'E)                 | Large commercial port with container and oil terminals. Naval and commercial dockyards |
| Ormāra (10.178)<br>(25°11'N, 64°38'E)                 | Naval and commercial development in progress (1998)                                    |
| Gwādar (10.198)<br>(25°08'N, 62°19'E)                 | Small but developing commercial and fishing port                                       |

**PORT SERVICES—SUMMARY****Docking facilities****1.155**

- 1 The summary below lists ports with docking facilities; dimensions, where given, relate to the largest vessel that can be accommodated; further details of the facilities are given at the reference quoted for each port.

|   |                      |                                                 |
|---|----------------------|-------------------------------------------------|
| 2 | Trincomalee          | One naval slipway (3.148)                       |
|   | Colombo              | Largest dry dock; capacity 125 000 dwt (4.114)  |
|   | Mandapam             | Dry dock; length 81 m, width 15 m (4.156)       |
|   | Tuticorin            | Dry dock; capacity 200 dwt (4.198)              |
| 3 | Cochin               | Largest dry dock; capacity 125 000 dwt (5.103)  |
|   | Beypore              | Slipway; capacity 150 tonnes (5.123)            |
|   | Mangalore (old port) | Dry dock; length 33.5 m, width 9.1 m (6.33)     |
|   | Mormugao             | Floating dock; capacity 60 000 dwt (6.210)      |
| 4 | Mumbai               | Largest dry dock; capacity 80 000 dwt (7.252)   |
|   | Magdala              | Dry dock; capacity 12 000 tonnes (8.58)         |
|   | Bhāvnagar Creek      | Dry dock; length 76.2 m, width 12.3 m (8.173)   |
|   | Bhāvnagar New Port   | Dry dock; length 74.4 m, width 13.7 m (8.171)   |
| 5 | Verāval              | Dry dock; capacity 840 dwt (8.205)              |
|   | Porbandar            | Dry dock; length 56.08 m, width 12.19 m (8.224) |
|   | Okha                 | Slipway; cradle length 35 m (9.56)              |
|   | Bedi Bandar          | Dry dock; length 70.1 m, width 13.4 m (9.150)   |

|   |          |                                                     |
|---|----------|-----------------------------------------------------|
| 6 | Kandla   | Largest floating dock; capacity 2700 tonnes (9.194) |
|   | Navlakhi | Dry dock; length 30 m, width 23 m (9.218)           |
|   | Karāchi  | Largest dry dock; capacity 26 000 dwt (10.136)      |

**Other facilities****Deratting****1.156**

- 1 Deratting and deratting exemption certificates

**Sri Lanka**

Colombo (4.115)

**India**

Cochin (5.104)

Mumbai (Bombay) (7.253)

Jawahar Lal Nehru Port (7.265)

- 2

**Pakistan**

Karāchi (10.137)

**1.157**

- 1 Exemption certificates only

**India**

Mandapam (4.156)

Mormugao (6.210)

Kandla (9.195)

**Oily waste reception****1.158**

- 1

**Sri Lanka**

Colombo (4.115)

**India**

Cochin (5.104)

**Pakistan**

Muhammad Bin Qasim (10.70)

**Measured distance****1.159**

- 1

Jaigarh Head (7.96)

Karāchi (10.78)

## NATURAL CONDITIONS

## MARITIME TOPOGRAPHY

## General information

## 1.160

- 1 The Arabian Sea is divided into two major basins, with depths in some places greater than 3600 m, by the Carlsberg Ridge which is an extension of the Mid-Indian Ridge that stretches SE to NW through the SW part of the area covered by this volume. The Arabian Basin lies NE of the Carlsberg Ridge and part of the Somali Basin lies, within the area, SW of the ridge.
- 2 Murray Ridge, extending SW to NE, enters the NW part of the area covered by this volume and terminates about 100 miles off Makrān Coast. In this vicinity is the separation zone between the Indian continental plate and parts of the African and Eurasian plates.
- 3 Maldives Ridge, a semi-continental submarine plateau, enters the S part of the area of this volume along meridian 73°E and extends N to join the SW Indian continental shelf at about latitude 15°N. The island chains of Maldives and Lakshadweep lie upon this ridge.
- 4 Lakshadweep Sea is the sea area enclosing Lakshadweep and Maldives, it extends E to Sri Lanka and the SW coast of India.
- 5 The continental shelf off the S tip of India is about 60 miles wide, narrowing somewhat to the N; at 11°N it is 30 miles wide but widens again off the Gulf of Khambhāt (21°N, 72°E) to 190 miles. Off Karāchi it is 100 miles wide but narrows abruptly to the W, averaging about 20 miles off the coast of Baluchistan and Makrān Coast.
- 6 The continental slope extending from the shelf is relatively steep throughout the area of this volume.

## Seamount

## 1.161

- 1 MGU Seamount (12°20'N, 61°20'E) lies at the W edge of the area covered by this volume.

## Volcanic activity

## 1.162

- 1 Makrān Coast is subject to volcanic activity; in 1945 such activity resulted in significant changes to the seabed offshore.

## CURRENTS AND TIDAL STREAMS

## General information

## 1.163

- 1 The surface currents within the area covered by this volume change direction in association with the NE and SW monsoon winds. The relationship is complex and there is no close relationship between the wind direction and the prevailing current over the E half of the Arabian Sea although over the W half of the Arabian Sea, and towards the equator, the prevailing winds are more indicative of the direction of the current.

## Currents Diagram

## 1.164

- 1 In the currents diagrams (1.164.1 to 1.164.6), arrows indicating the Predominant Direction, Average Rate in knots and Constancy are shown. These terms are defined as follows:
  - 2 **Predominant Direction.** The mean direction within a continuous 90° sector containing the highest proportion of observations from all sectors.

- 3 **Average Rate.** This rate, as indicated by the figures in the diagrams, is the average of the highest 50 per cent of observations in the predominant sectors. It is emphasised that rates above or below those shown may be experienced.
- 4 **Constancy,** as indicated by the thickness of the arrows, is a measure of its persistence, eg Low Constancy implies marked variability in rate and, particularly, direction.

## Arabian Sea N of 6°N

## 1.165

- 1 From November to March the currents set mainly towards the W but with an anti-clockwise eddy over the central part of the Arabian Sea, between 6° and 10°N, during November and with a clockwise eddy forming in the N during February and March. Near the W coast of India the current sets NW then W along the coast of Pakistan and finally SW off the Arabian peninsula. In February and March, the coastal current off Pakistan and W India reverses its direction and first sets E then SE due to the clockwise eddy in the N.
- 2 Between May and September, the current sets E over the central part of the Arabian Sea and is an extension of the NE-setting Somali Current. As the E-setting current nears the coasts of Pakistan and NW India it turns SE.
- 3 In April and October, the currents over the central part of the Arabian Sea are more variable but usually set SE near the coasts of Pakistan and W India, particularly during April.

## Equatorial Counter Current

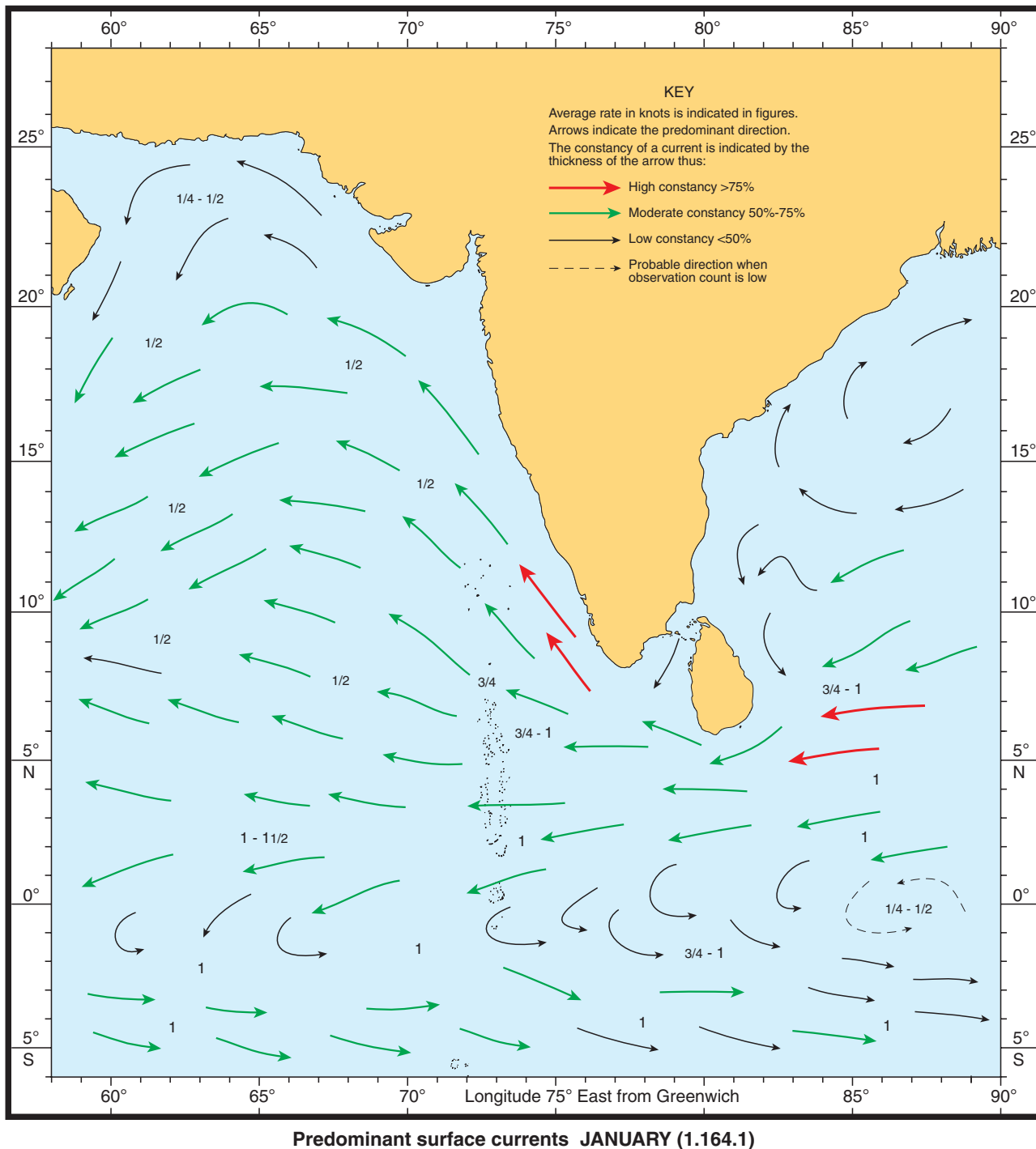
## 1.166

- 1 The Equatorial Current is a narrow and relatively fast E-setting current flowing within a few degrees of the Equator. It is most evident during the transitions between the NE and SW monsoons (April/May and October/November) when its axis is near the equator and with an average rate of 1–1½ kn. During the NE monsoon this current usually moves S to about 5°S between January and March.
- 2 In April the Equatorial Counter Current starts to move N and by May its axis lies close to the Equator but its N boundary is difficult to define as the current just to the N also sets E. In July and August this current is difficult to discern but in September and October it starts to regain its identity. During the height of the NE monsoon, a small change in latitude near the equator can, on occasions, result in an abrupt change from a marked W-setting current to a marked E flow to the S.
- 3 The development and decline of the Equatorial Counter Current can be rapid and also be subject to some variations from year to year.

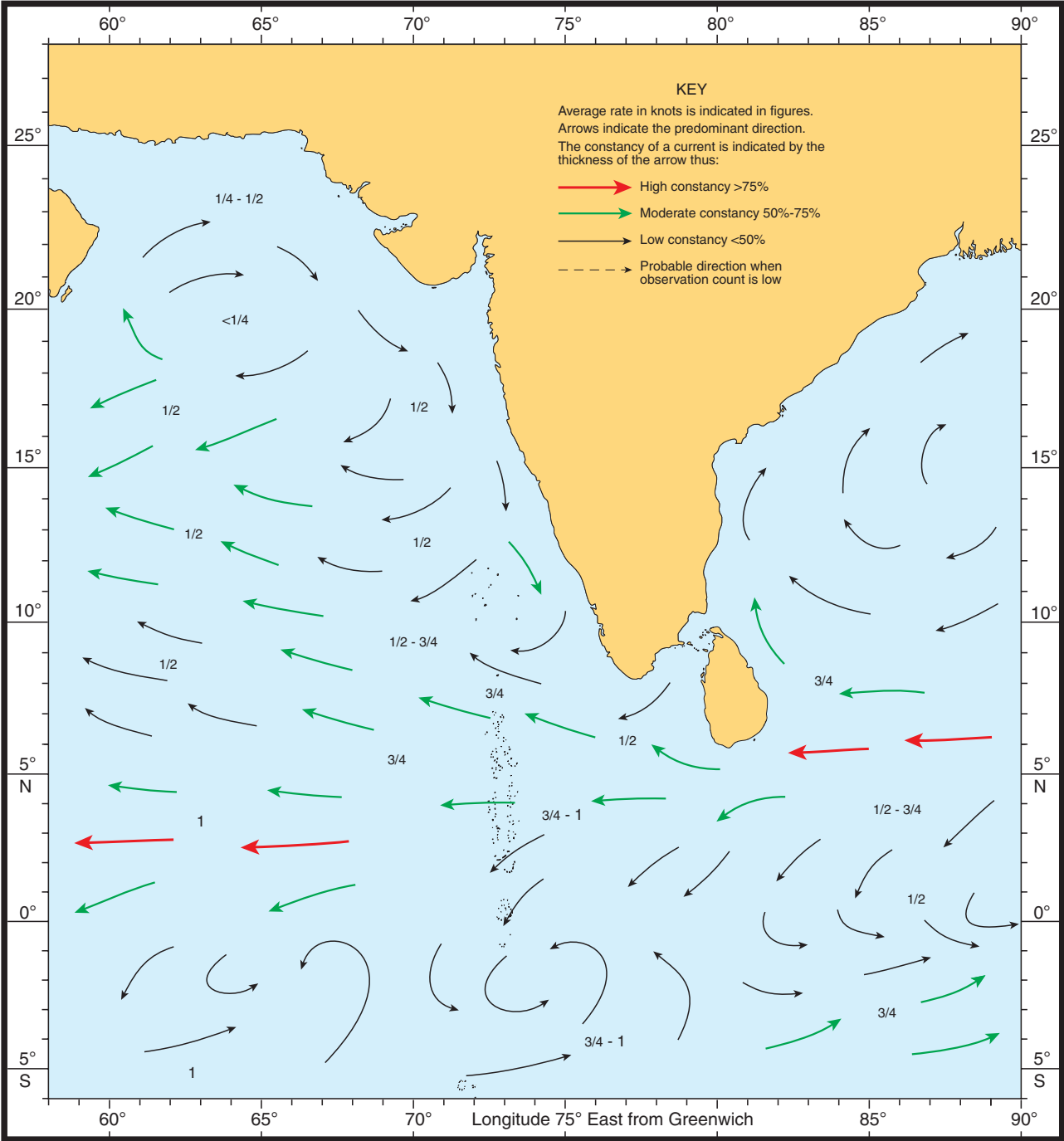
## Currents near Sri Lanka

## 1.167

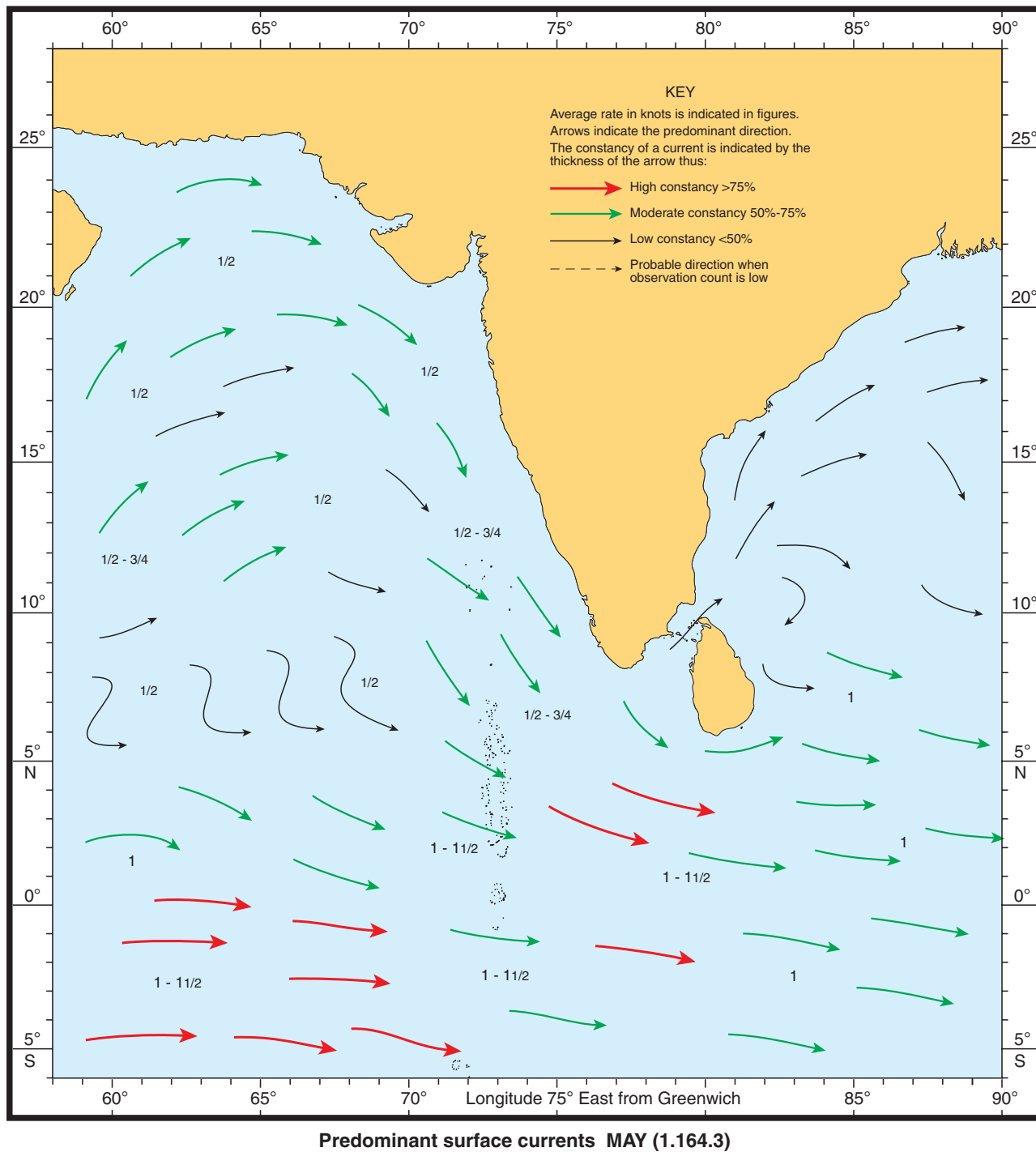
- 1 Currents near Sri Lanka are often strong and are influenced by the general circulations in the Arabian Sea, Indian Ocean and Bay of Bengal. The currents around the island are subject to abrupt changes within short intervals of time and/or distance, particularly near the SE coast.
- 2 The currents tend to parallel the coast but on occasions there may be a significant onshore component. In depths of less than 200 m, or within 12–15 miles of the coast, the currents can be very variable and with counter currents existing within a few miles of each other.

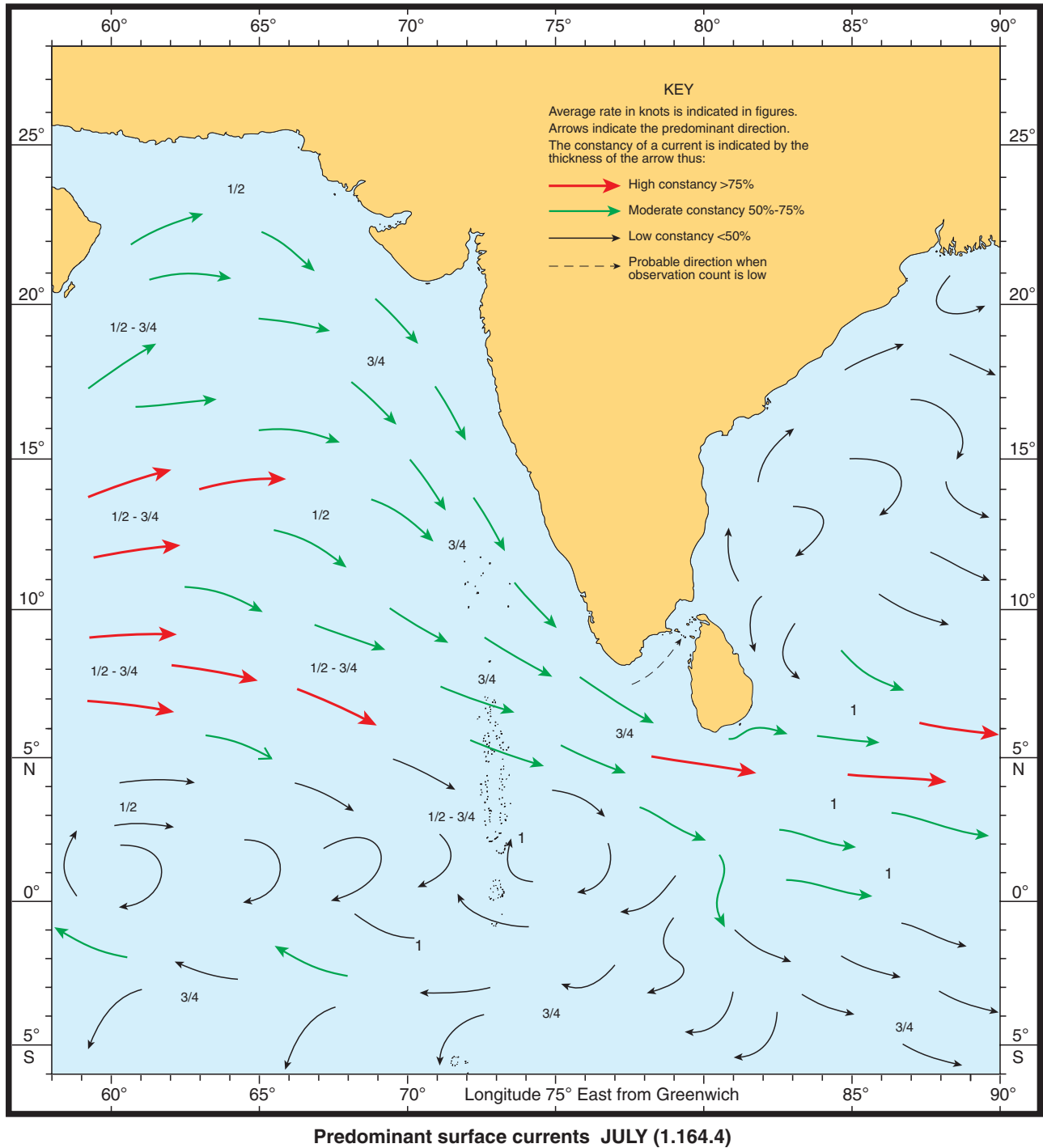


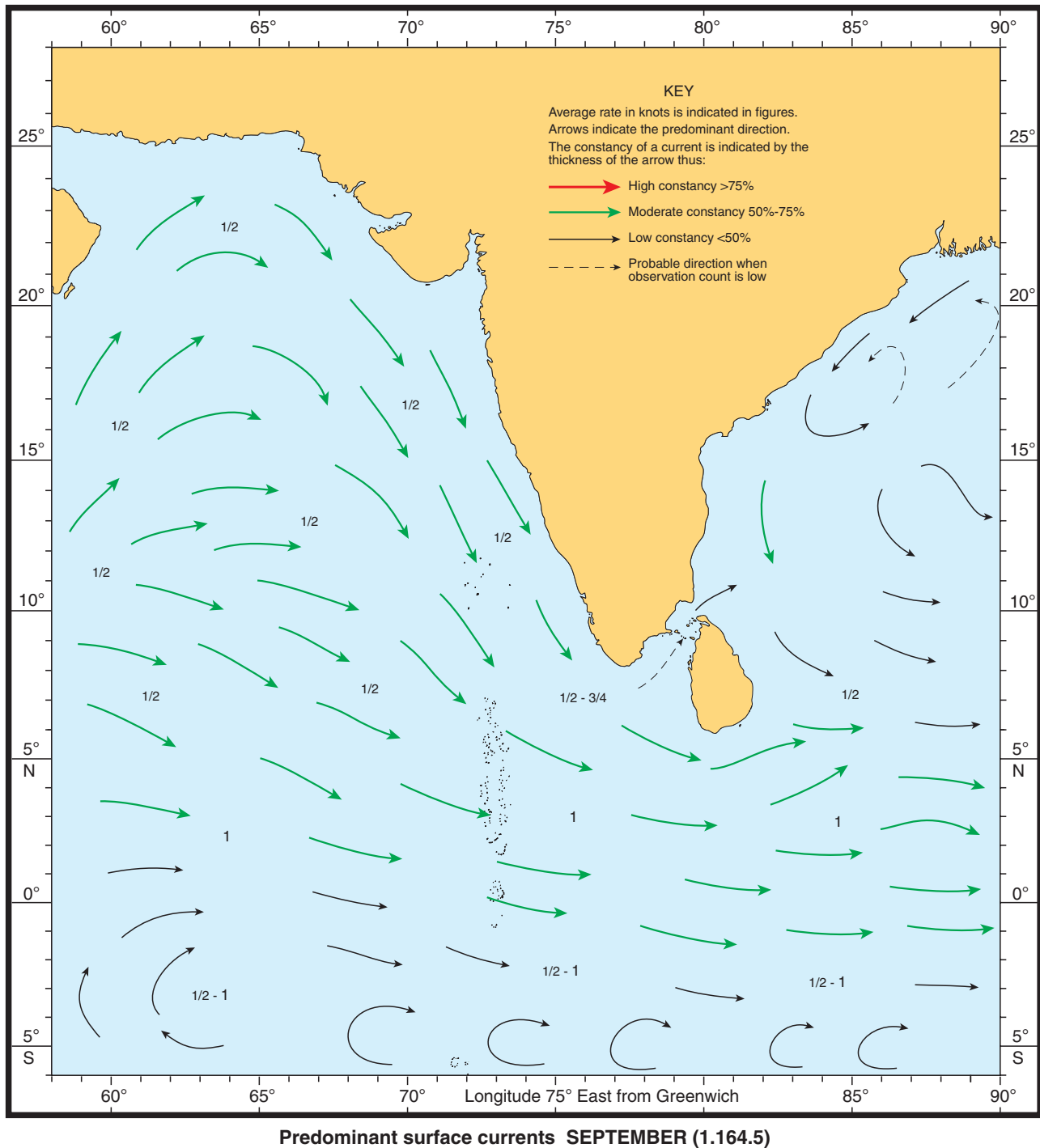




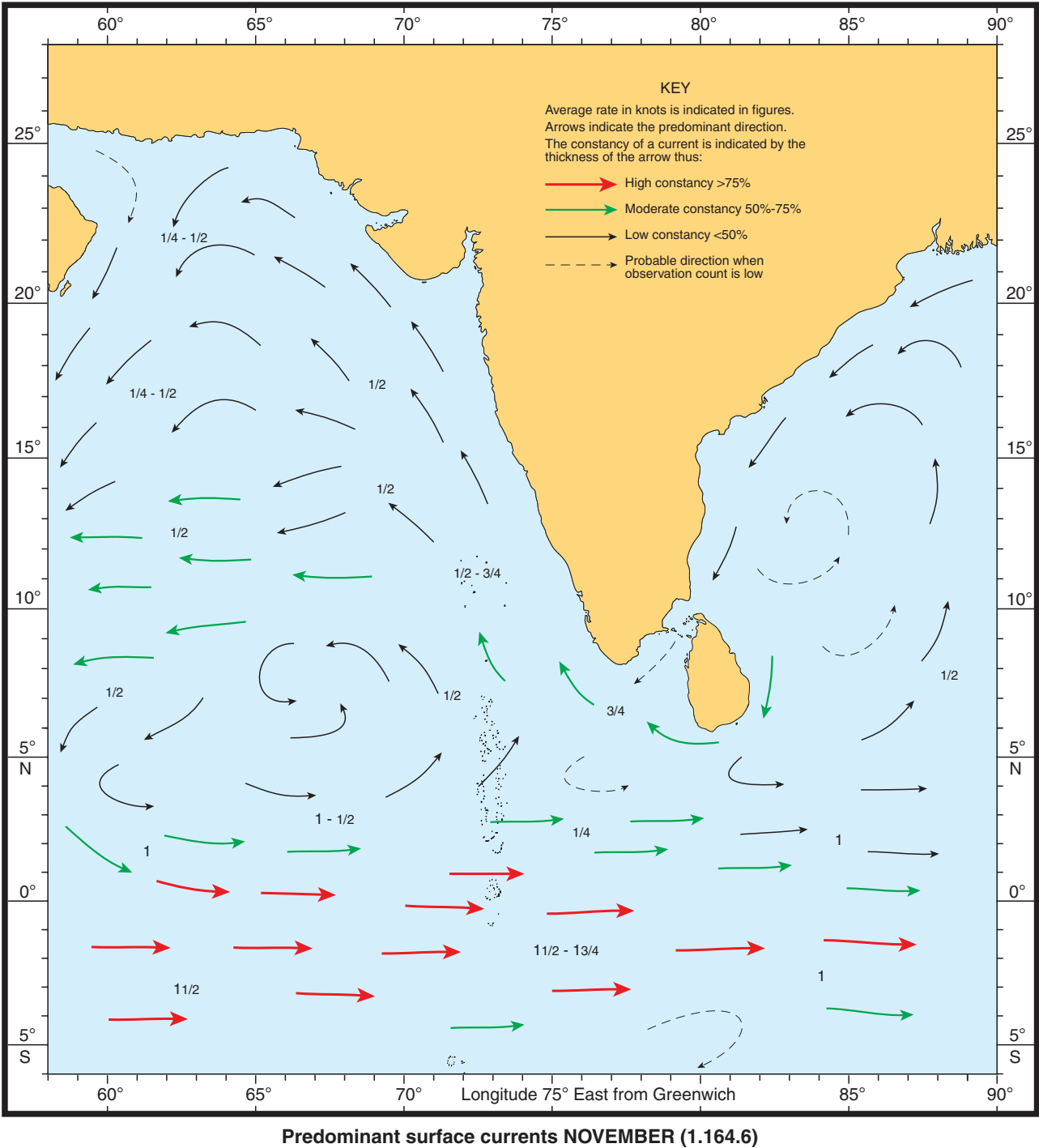
Predominant surface currents MARCH (1.164.2)











- 3 Strong inshore currents with a rate of 5 to 6 kn may be encountered, on occasions, near Little Basses Reef and in the Pāmban Pass. Farther offshore along the S coast, strong currents with a moderate to high constancy are usually associated with the SW and NE monsoons. Currents set W or SW from about November to March, and to the E or SE between May and September. Rates of about 4 kn have been recorded on occasions and even in the transitional months, of April and October, rates of 1 kn are not uncommon.
- 4 Off the NE coast of Sri Lanka, between July and January, the flow is usually S with occasional rates of 4 kn being recorded. In February, the developing clockwise rotation in the Bay of Bengal extends to the NE coast and NW-setting currents become more persistent during March and April. The set of the currents become very variable in May but, in June, SE sets are more frequent than those to the NW along most of this part of the coast.
- 5 The currents off the W coast are generally more variable. In the Gulf of Mannār, during the SW monsoon, the set of the current is probably E to NE and SW during the height of the NE monsoon.

### Currents between 6°N and 2°S

#### 1.168

- 1 In January the currents set W to the N of the equator and to the E at about 2°S. The zone between the two opposing flows tends to be wider in the E than to the W. By March the zone between the two flows is much broader as the W flow starts to decline from the E. In April little W flow remains and the E flow reaches a maximum rate during May. In July and August the current is variable between the Equator and about 2°N in the W and with a clockwise eddy near 3°N 75°E. During September and October, the Equatorial Counter Current starts to become more evident in the S part of the area and reaches a maximum in November. In December, between about 75° and 80°E, there is a W set with an average rate of about 1 kn in the vicinity of 2°N and with an almost equally strong E set just to the S.

### Tropical Cyclones and Currents

#### 1.169

- 1 Tropical cyclones can induce a surface current which may reinforce or reduce the rate of the existing current. However, since the induced current is dependent on both the wind strength and the length of time the wind blows in a certain direction, the induced current generally does not become fully developed due to the movement of the tropical cyclone. Thus only slow moving tropical cyclones produce induced currents with rates of up to 2 kn, or higher where there is a piling up of water near a particular coast.

### Tidal streams

#### 1.170

- 1 To the S of Mount Dilli (12°02'N, 75°12'E) the in-going stream is just appreciable as coming from the NW but off Cochin it is plainly so.
- 2 Along the Konkan coast the in-going stream sets N, and strongly so off Port Bānkot (17°59'N, 73°03'E); its strength increases with the latitude as far as the Gulf of Khambhāt.
- 3 Along the S and W coasts of Kāthiawār Peninsula the in-going stream sets E between the Gulf of Khambhāt and Porbandar and in a N direction to the N of Porbandar. It has been found to set E at a rate of from 1 to 1½ kn off Diu Head, where there are frequent eddies, doubtless caused by the out-going stream from the Gulf of Khambhāt

setting W while the in-going stream at Porbandar is setting E.

- 4 Where evaporation is as great as in the Indian Ocean, there are doubtless some local movements of the ocean water dependent upon that cause; where the rise of tide is great, as in the Gulf of Kachchh, this cause may be little appreciated, but at Cochin the in-going stream has been known to be constant for 20 hours, although the regular, but inconsiderable, rise and fall of little more than 0.3 m has been marked on the tide gauge.

## SEA LEVEL AND TIDES

### 1.171

- 1 The tides in the area covered by this volume vary in character but, except in the Gulf of Kachchh and the Gulf of Khambhāt, the range is not very great anywhere.  
On Makrān Coast the character is diurnal with a range of about 2 m.
- 2 On the coast of Pakistan the semi-diurnal tide increases and the range also starts to increase.
- 3 At the heads of the Gulf of Kachchh and the Gulf of Khambhāt maximum spring ranges are about 6½ and 9 m respectively; as distance from the Gulf of Khambhāt increases the semi-diurnal tide decreases until, in about latitude 15°N, the diurnal tide again predominates and the range is about 1 m; this state continues S along the coast to Cape Comorin.
- 4 East of Cape Comorin and on the coast of Sri Lanka the diurnal tide again predominates, though the range is less than 1 m.  
In Lakshadweep and Maldives there is a strong diurnal influence but the range is less than 1 m.

## SEA AND SWELL

### General remarks

#### 1.172

- 1 For general information on sea and swell see *The Mariner's Handbook*.

### Sea conditions

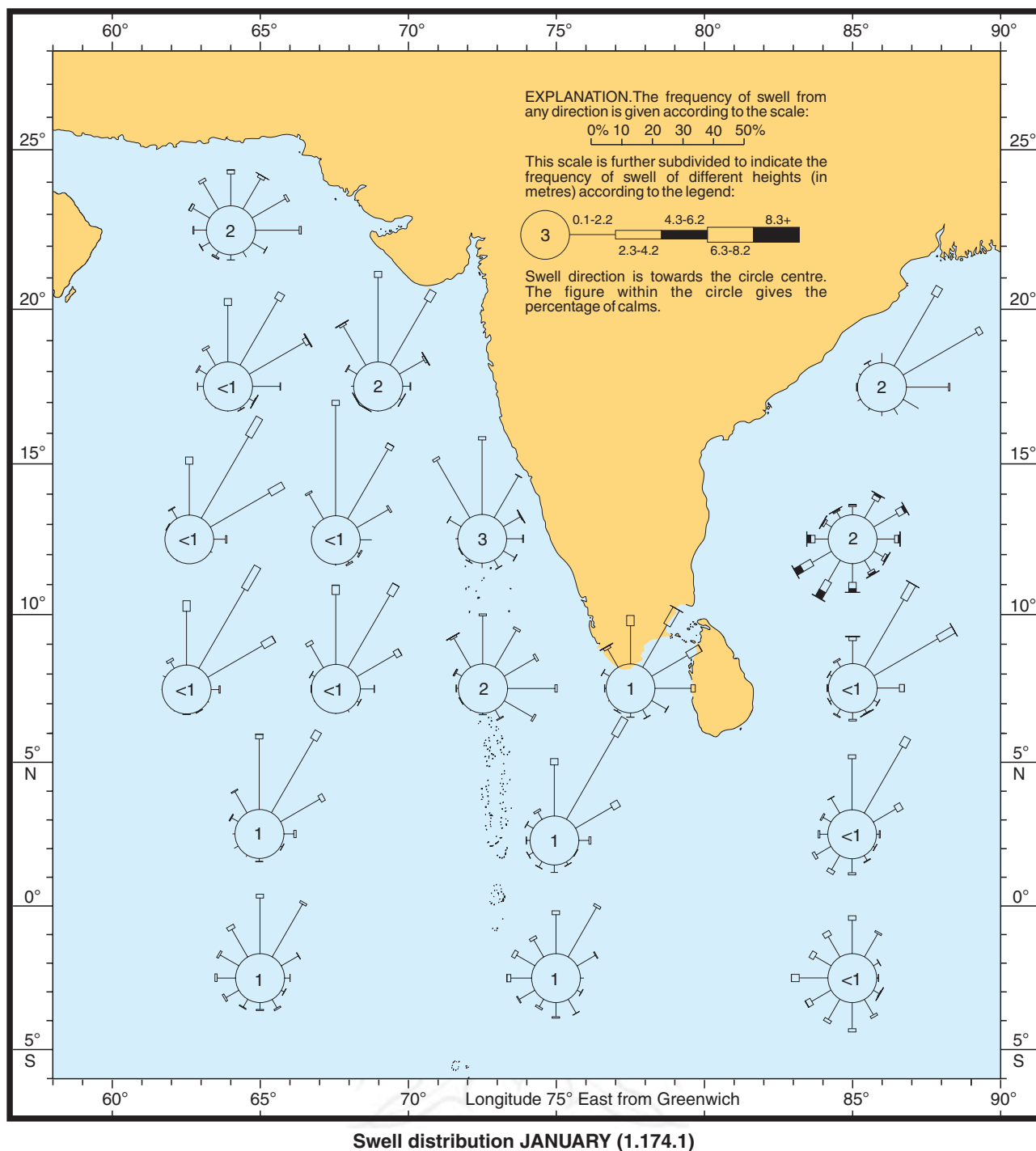
#### 1.173

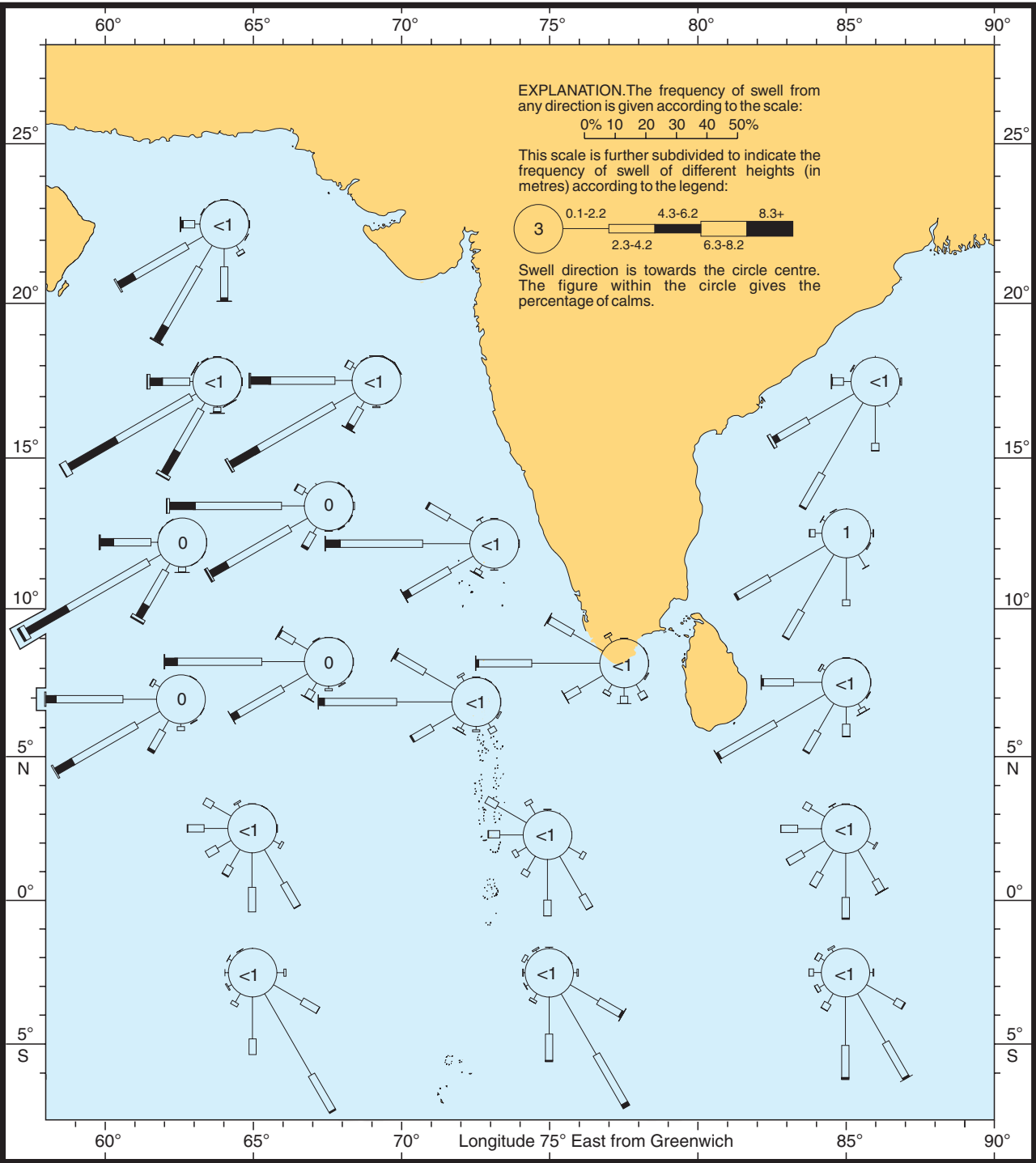
- 1 Sea waves are generated locally by the wind and can be very variable in direction in the transitional months between the NE and SW monsoons. During the transitional month of April, waves of 2 m and over are recorded on less than 5 per cent of occasions over most of the area except for the extreme N and the SE where it is between 5 to 10 per cent, and in October is about 5 per cent in the W and about 15 to 20 per cent in the E.
- 2 During the height of the NE monsoon in January, the frequency of occasions with waves in excess of 2 m increases to about 20 per cent in W areas between 5° and 15°N, and near Sri Lanka, but with a much lower frequency near the coasts of Pakistan and W India. At the height of the SW monsoon in July, the frequencies of waves of 2 m and over are significantly higher with a frequency of about 90 per cent in W areas between 10° and 20°N, 60 per cent in the NE and about 25 per cent off the S coast of India and Sri Lanka.

### Swell conditions

#### 1.174

- 1 Diagrams 1.174.1 and 1.174.2 give swell roses for several areas in January and July. The roses show the percentages of observations recording swell waves for each sector and for several ranges of wave height.





Swell distribution JULY (1.174.2)



- 2 During the height of the NE monsoon in January, there is a persistent NE swell over most of the open sea to the N of the equator. Swells of 2 m and over are usually recorded on about 5 to 10 per cent of occasions off the coasts of Pakistan, W India and S of the equator, and about 15 per cent in W areas between 5° and 15°N and near Sri Lanka.
- 3 Swells heights are both significantly higher and more persistent during the SW monsoon season, and with the predominantly SW swell in the W part of the area becoming progressively more W over the E part of the Arabian Sea. To the S of the equator the swell direction is predominantly SSE.

### Tropical cyclones — sea and swell waves

#### 1.175

- 1 Mountainous and confused seas are raised by the violent winds associated with tropical cyclones. Near the centre of a cyclone groups of large waves, moving in different directions, create very irregular wave heights, and can combine together to give exceptionally high waves.
- 2 Waves travel radially outwards from the cyclone centre as swell waves, with the highest swell moving ahead of the centre and roughly in the same direction as the cyclone. When a cyclone approaches a coastline, higher than predicted tides may occur, due to the addition of the heavy swell and, later, the very high seas, which may cause severe flooding in low lying areas. In extreme cases, an exceptionally huge wave may precede to the cyclone centre with catastrophic consequences.

## SEA WATER CHARACTERISTICS

### Sea surface temperature

#### 1.176

- 1 Diagrams 1.176.1 to 1.176.3 show the mean sea surface temperature for January, May and July. In January the mean sea surface temperature increases from about 23.5°C in the N to about 28°C in the S part of the area. From February onwards the sea surface temperatures rapidly increase in the N, and in May reach a maximum of about 29.5°C over most of the central part of the Arabian Sea.
- 2 The onset of the SW monsoon in June results in a small decrease in sea temperature over central and southern areas and by July there is a small temperature difference between the NW and SE parts of the area but a slightly higher difference between W and E areas of the central part of the Arabian Sea. Sea temperatures fall steadily in the N during the winter months but the variation is small in the S.
- 3 Throughout the year the difference between the mean sea surface temperature and the overlying air seldom exceeds 1°C, except in the extreme NW part of the area in summer when the mean air temperature over the sea is usually about 2° to 3°C higher than the mean sea surface temperature.

### Variability

#### 1.177

- 1 In shallow coastal waters and inlets, variations in the sea surface temperature may differ from the mean by about 4°C.

## CLIMATE AND WEATHER

### General information

#### 1.178

- 1 The following information on climate and weather should be read in conjunction with the information

contained in *The Mariner's Handbook* which explains in more detail many aspects of meteorology and climatology of importance to the mariner.

- 2 Weather reports and forecasts, that cover the area, are regularly broadcast in English; for details see *Admiralty List of Radio Signals Volume 3(1)*.

### General conditions

#### 1.179

- 1 The region covered by this book has a typical monsoon climate with the onset of the SW monsoon affecting S India and Sri Lanka from late May to early June and steadily moving NW to affect SE Pakistan and NW India by early July. In early September the SW monsoon starts to retreat towards the SE and by mid to late December the SW monsoon has usually cleared most of Sri Lanka.
- 2 The weather pattern over much of the area is more regular than in most parts of the world with 4 distinct seasons, and which are usually classified, for most of India, as follows:
- 3 The cool season (December to March) — NE winds, dry and with little cloud except in the S.  
The hot season (April and May) — light variable winds with sea breezes on coasts and a small chance of a tropical cyclone.
- 4 The SW monsoon or rainy season (June to September) — winds W to SW but W to NW along the coast of SW India.
- 5 The interim or transitional period (October and November) — light variable winds with sea and land breezes. Occasional tropical cyclones may be experienced.
- 6 On the W coast of India the whole period from the cessation of the SW monsoon to its recommencement is often referred to as the “fine weather season”, and this termed is frequently used in this volume. Along much of the coast of Pakistan and the W coast of India most of the rainfall is associated with the SW monsoon. The rainy season is more prolonged over S India and Sri Lanka, and in the extreme S part of the area the monthly variation in rainfall is small.
- 7 Tropical cyclones (force 12) are infrequent with an average of only 1 or 2 occurring over the Arabian Sea each year.

### Pressure

### Average distribution

#### 1.180

- 1 The average pressure distribution at mean sea level and predominant winds in January and July are shown in the accompanying diagrams 1.180.1 and 1.180.2. In general, the average pressure in the SE part of the area is about 1011 hPa (mb) throughout the year, and in the NW reaches a maximum in January of about 1017 hPa (NE monsoon) and a minimum in July of about 998 hPa (SW monsoon).

### Variability

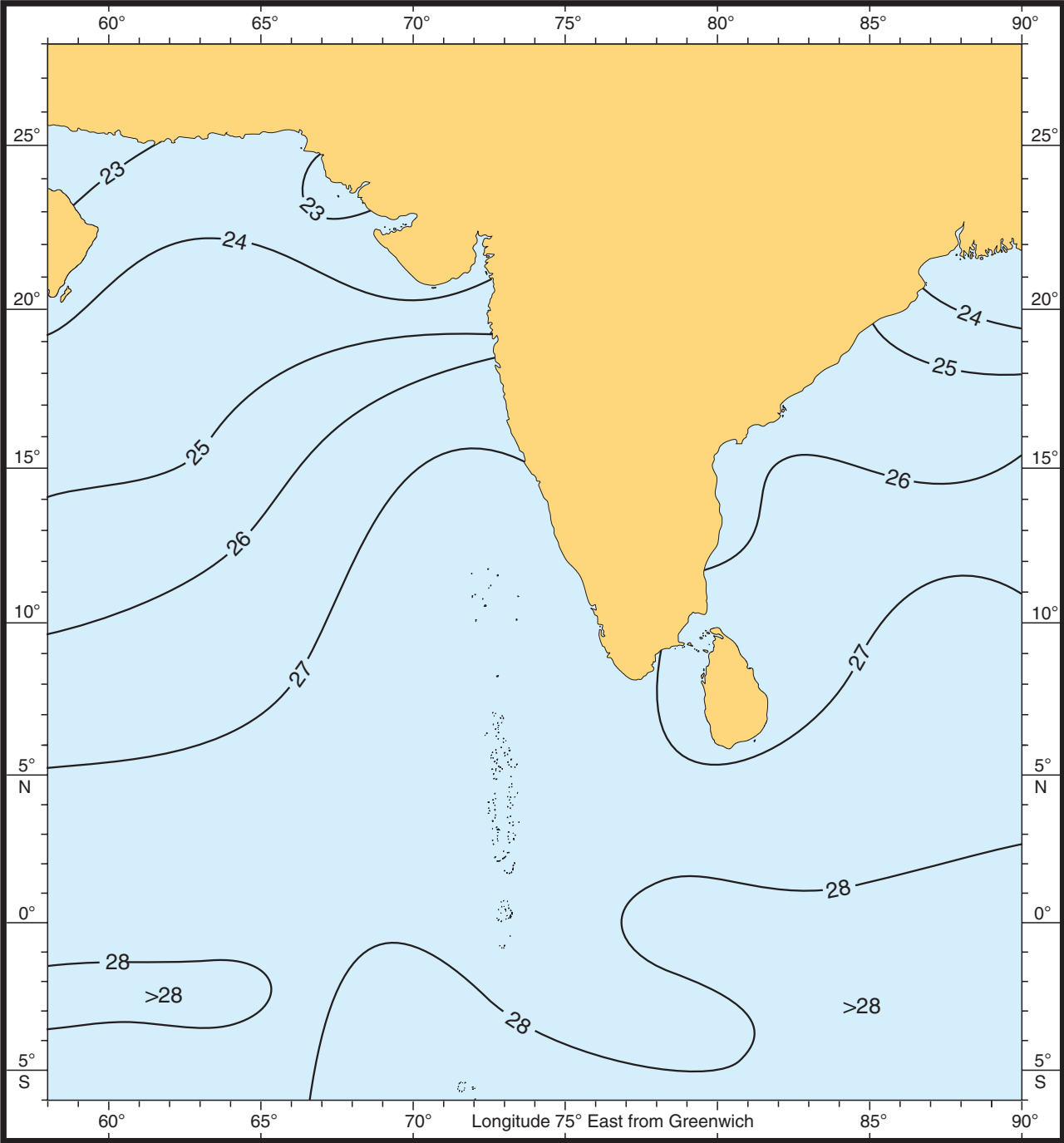
#### 1.181

- 1 Day to day variations are about 1 to 2 hPa in central and S parts of the area but can be significantly larger in the N in all seasons.

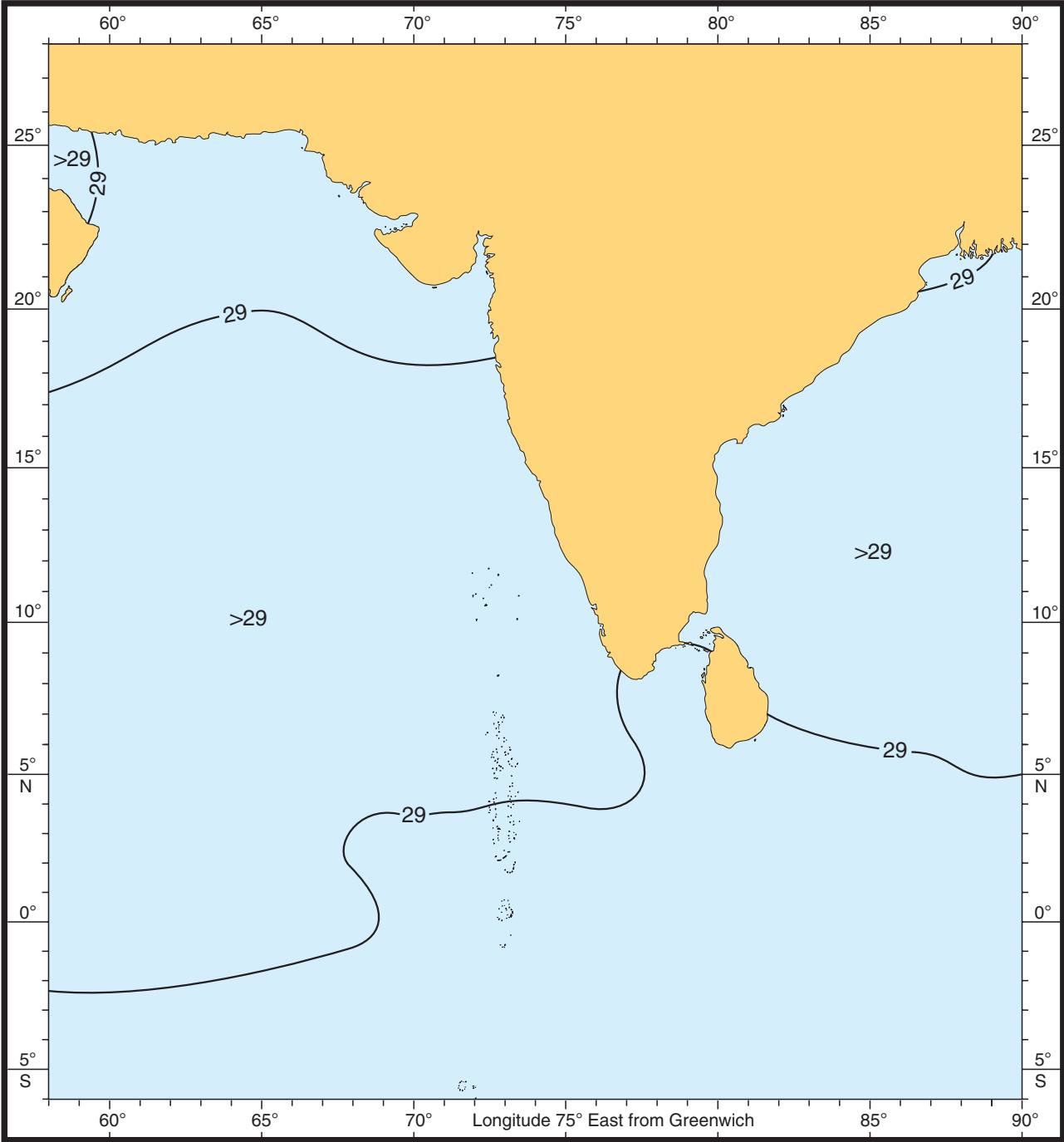
### Diurnal variation

#### 1.182

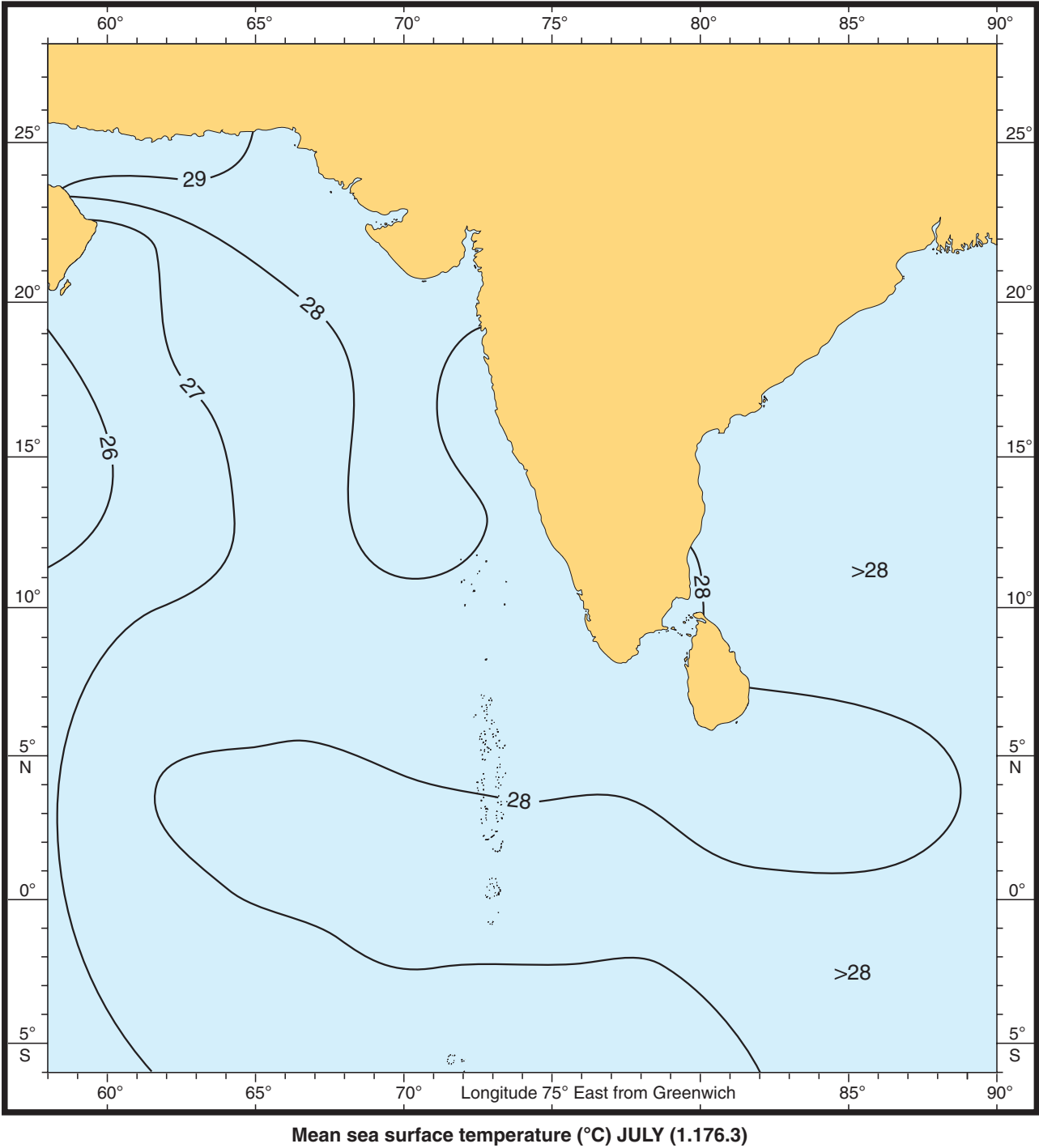
- 1 There is a regular diurnal variation of about 4 hPa (mb) on the W coast of India from December to March and about 2 to 3 mb from June to October, with a maxima at 1000 and 2200 and minima at 0400 and 1600.

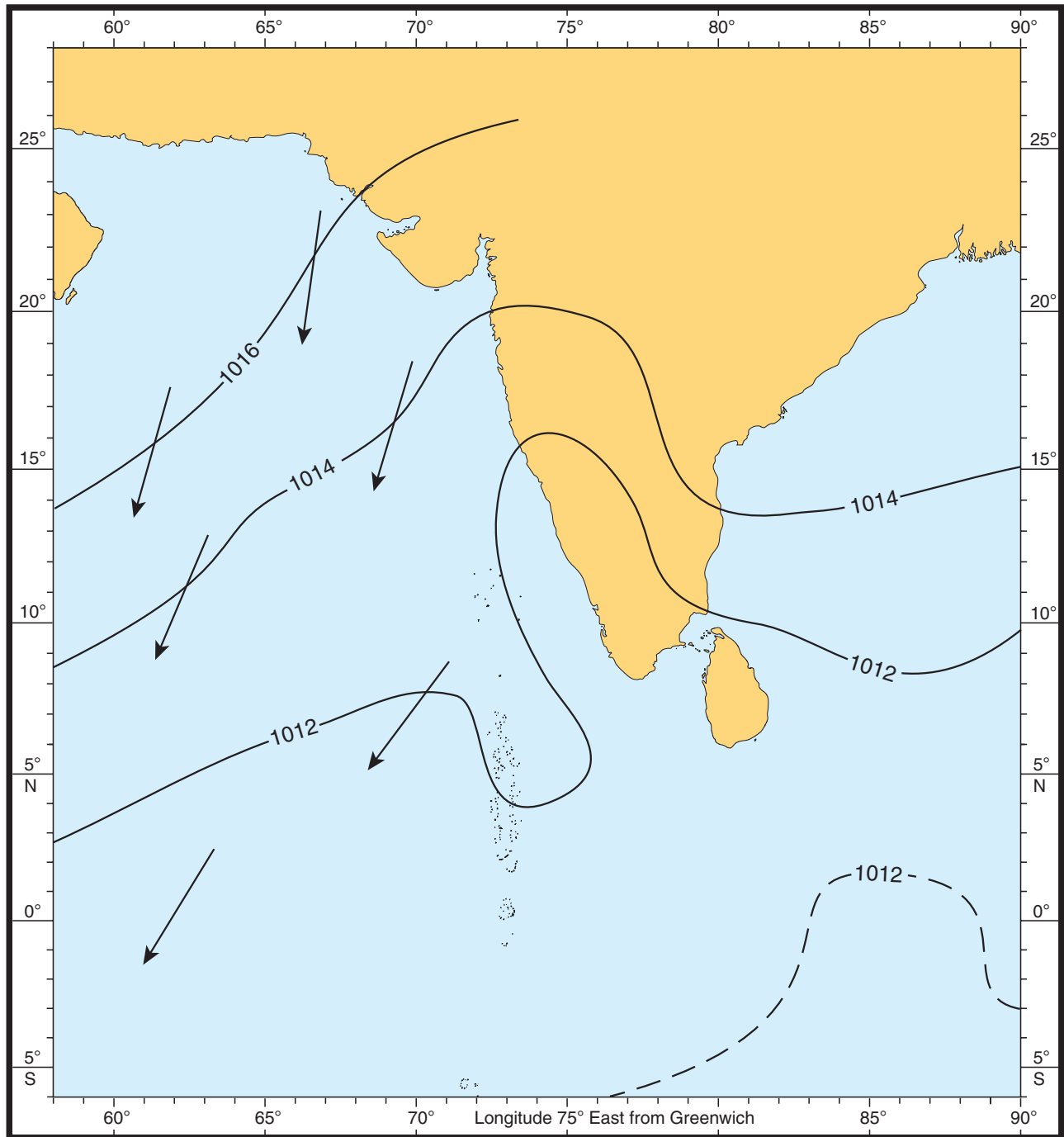


Mean sea surface temperature (°C) JANUARY (1.176.1)



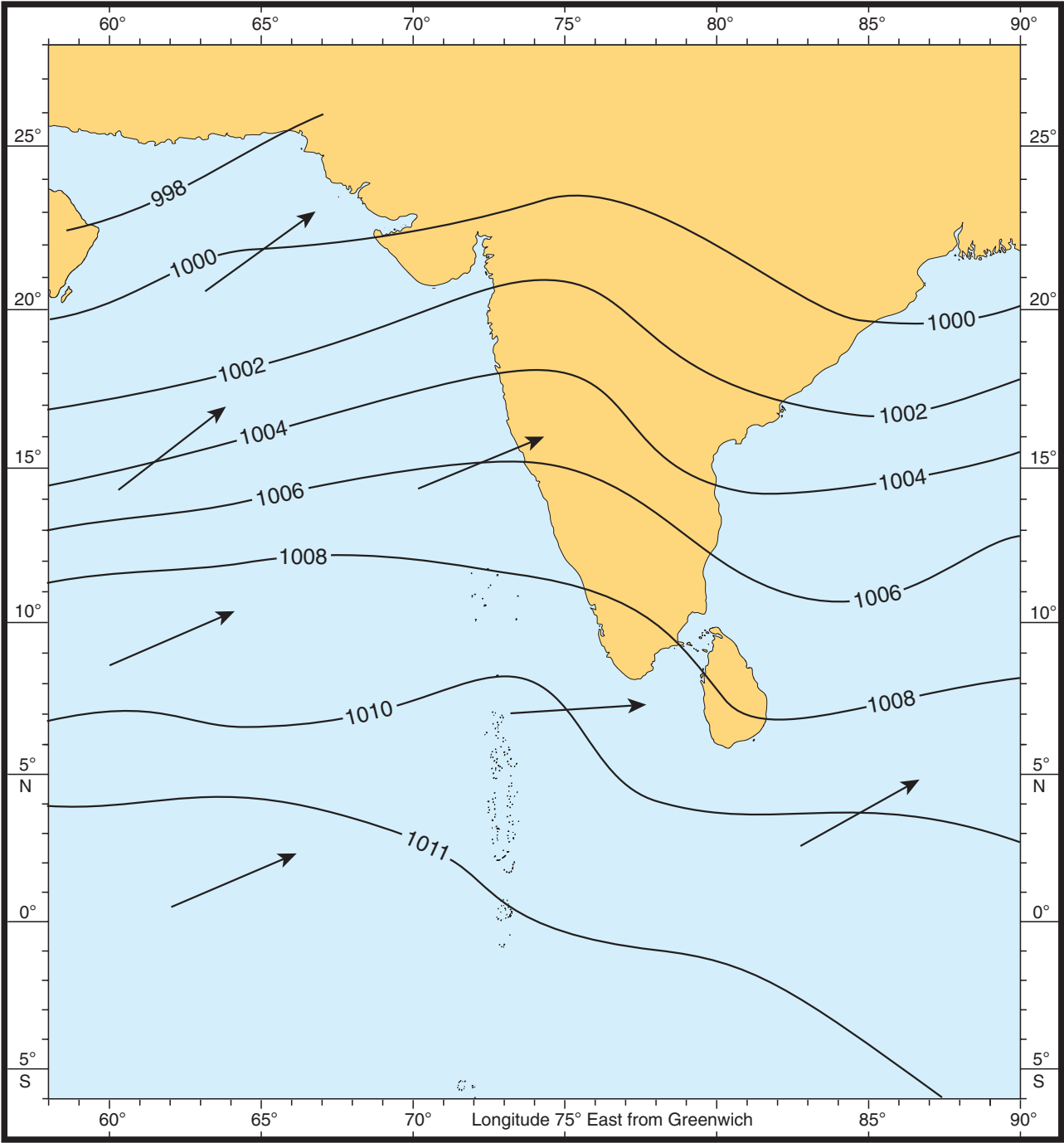
Mean sea surface temperature (°C) MAY (1.176.2)





Mean barometric pressure (hPa) and predominant winds JANUARY (1.180.1)





Mean barometric pressure (hPa) and predominant winds JULY (1.180.2)

## Depressions

### Depressions

#### 1.183

- 1 There are 2 main types of depressions that affect the area, these are tropical depressions and non-tropical depressions. Tropical depressions normally move initially from the E and are sometimes referred to as “eastern depressions” whilst non-tropical depressions usually move from the W and are referred to as “western depressions”.
- 2 Western depressions usually only affect the extreme NW part of the area in winter and spring and are similar in character to depressions of more temperate latitudes. On average 4 depressions occur each month between November and April and may give rise to gales and squally conditions.

### Tropical cyclones

#### 1.184

- 1 On average 4 to 6 tropical depressions affect the Arabian Sea each year, of which, 1 or 2 may intensify into a tropical storm or cyclone (force 12). They are most likely to form in either May and June or October and November, although occasionally a tropical depression may form during a lull in the SW monsoon in summer or slightly more frequently in early winter.
- 2 Most tropical depressions form over the SE part of the Arabian Sea or, mainly in October and November, originate in the Bay of Bengal and move W or NW across S India into the Arabian Sea. Once formed, most tropical depressions either move WNW across the Arabian Sea towards Arabia or recurve to the N or NE to cross the coast of Pakistan or NW India. However, the track of a tropical cyclone can be very erratic.
- 3 See *The Mariner's Handbook* for a full description of tropical storms and typhoons, and the appropriate avoiding action.

## Fronts

### Warm and cold fronts

#### 1.185

- 1 Warm and cold fronts associated with “western depressions” in the extreme NW part of the area are usually ill defined. See *The Mariner's Handbook* for a full description of these fronts.

### Intertropical Convergence Zone (ITCZ)

#### 1.186

- 1 This front or zone, sometimes called the Intertropical Front, represents the boundary between air masses of the N and S hemispheres. The ITCZ moves N over Sri Lanka in May, marking the N boundary of the SW monsoon, then across most of India in June to lie N of the area by the end of July. It returns S in September to reach Colombo in November.
- 2 The movement of ITCZ, and its associated weather, can be very variable. When the ITCZ is active, it can give rise to a band of low thick cloud some 300 miles across with heavy outbreaks of thundery rain, squally winds and poor visibility, whilst at other times, particularly in the N part of

the area, it may become ill defined and weak at times. Similarly, its movement may become very erratic particularly in the N part of the area.

## Winds

### Average distribution

#### 1.187

- 1 Wind roses showing the frequency of winds of various directions and speeds for January, April, July and October are given in diagrams 1.187.1 to 1.187.4. The winds are governed by the NE and SW monsoons (see diagrams 1.187.5 and 1.187.6 for the mean dates for the onset and end of the SW monsoon).

### Open sea — N of 5°N

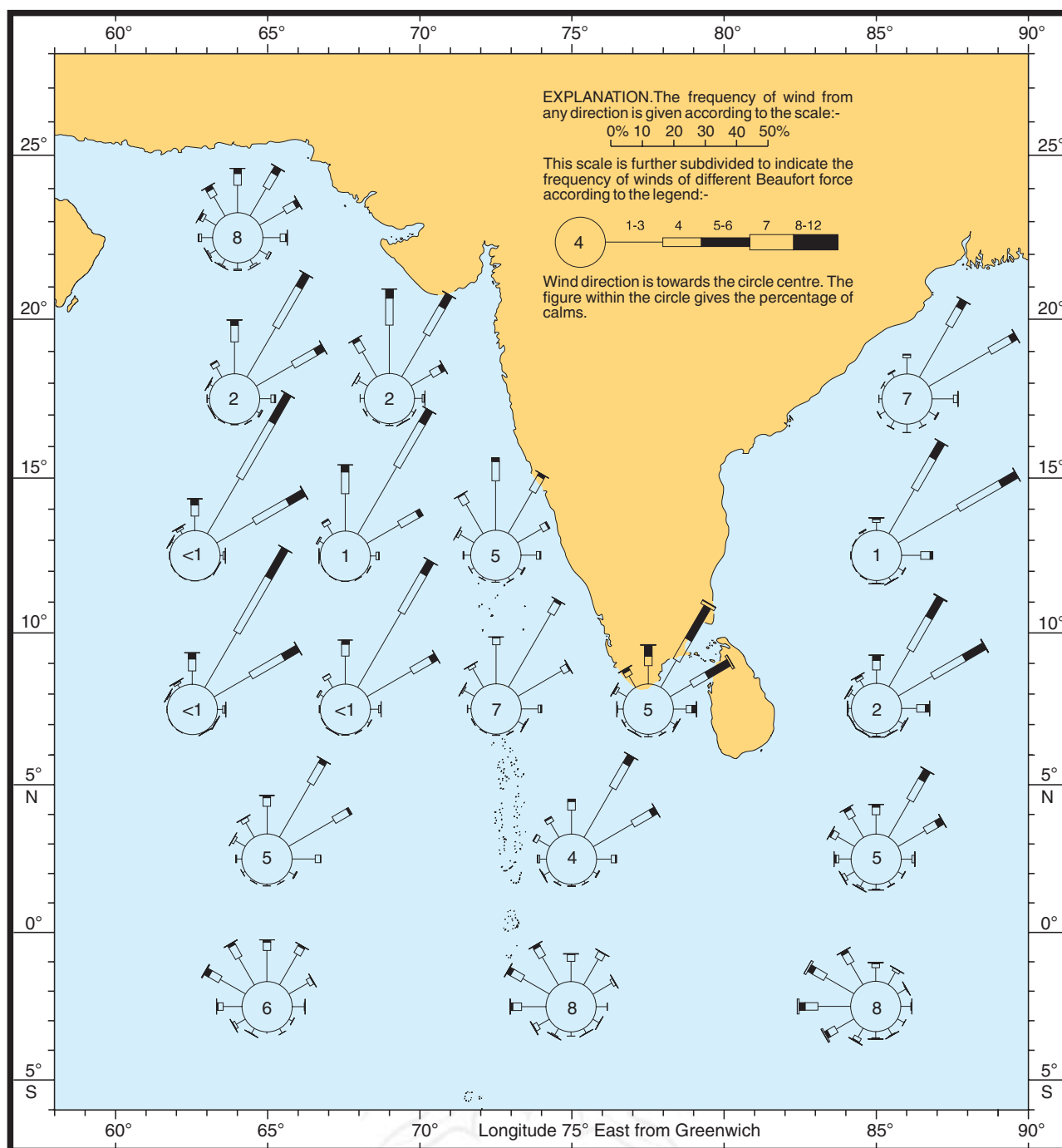
#### 1.188

- 1 Between March and May the predominant winds gradually change from between NNW and NE to between NW and W and in June, with the onset of the SW monsoon, they become SW to W and strengthen from the W. In July the winds are predominantly SW but W towards the S coasts of India and Sri Lanka. During this month winds of force 5 and over are recorded on about 90 per cent of occasions in the W between 10° and 20°N, 55 to 60 per cent in the N, 25 per cent towards the S coast of India and 30 to 45 per cent in the E.
- 2 During September the winds slowly moderate and by October the winds are significantly lighter in the W, and mainly from the N, but still W to SW in the E with force 5 winds and over being reported on about 22 per cent of occasions. During November the winds become predominantly N to NE in the N and then also in the S during December.
- 3 In January, during the height of the NE monsoon, the winds are predominantly between NNE and ENE and with winds of force 5 and over being reported on about 20 per cent of occasions in both the SW and SE parts of the area, 25 per cent off S India and significantly less elsewhere. The wind direction during the NE monsoon is usually more variable in the N than at the height of the SW monsoon.

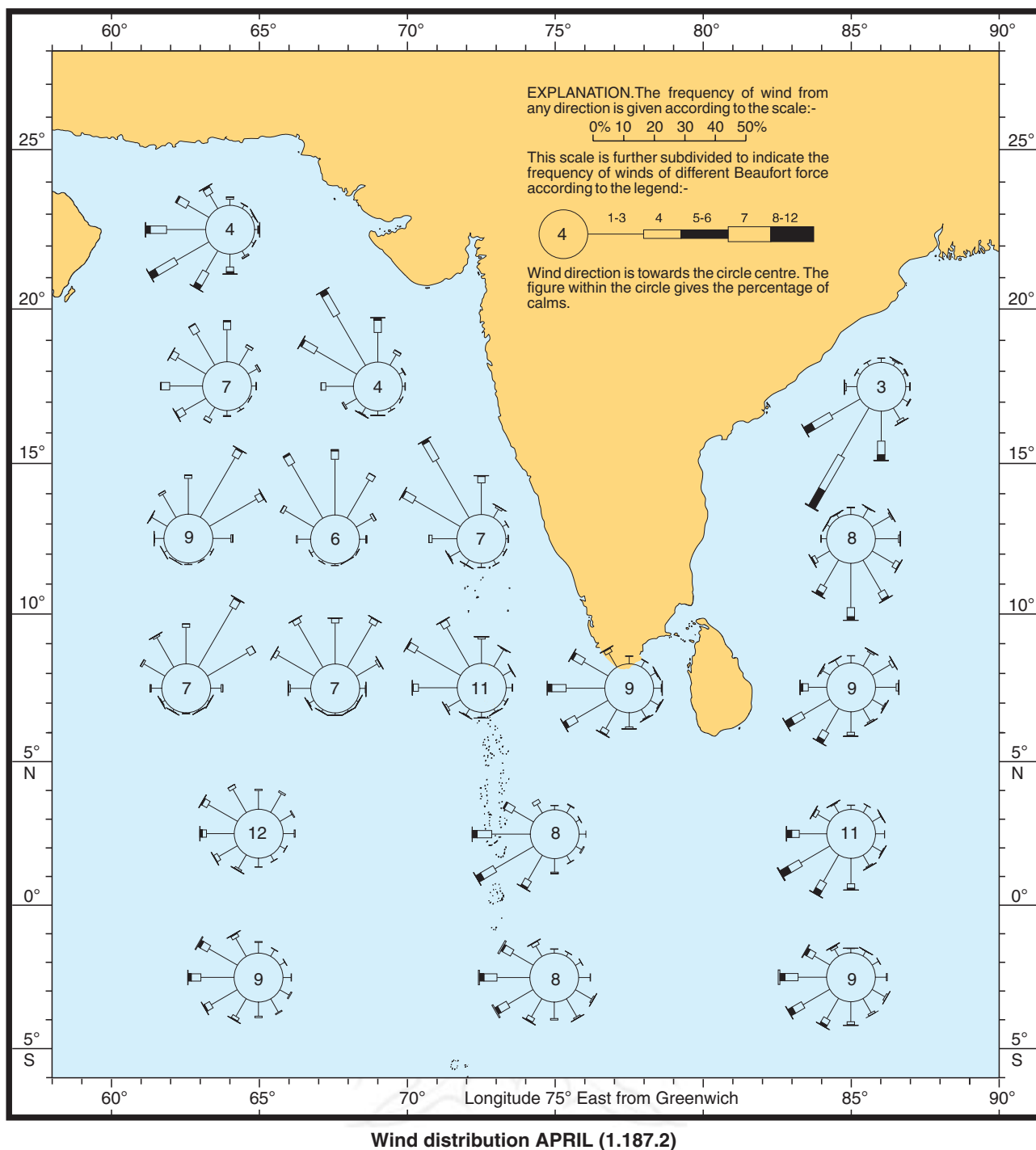
### Open sea — 2°S to 5°N

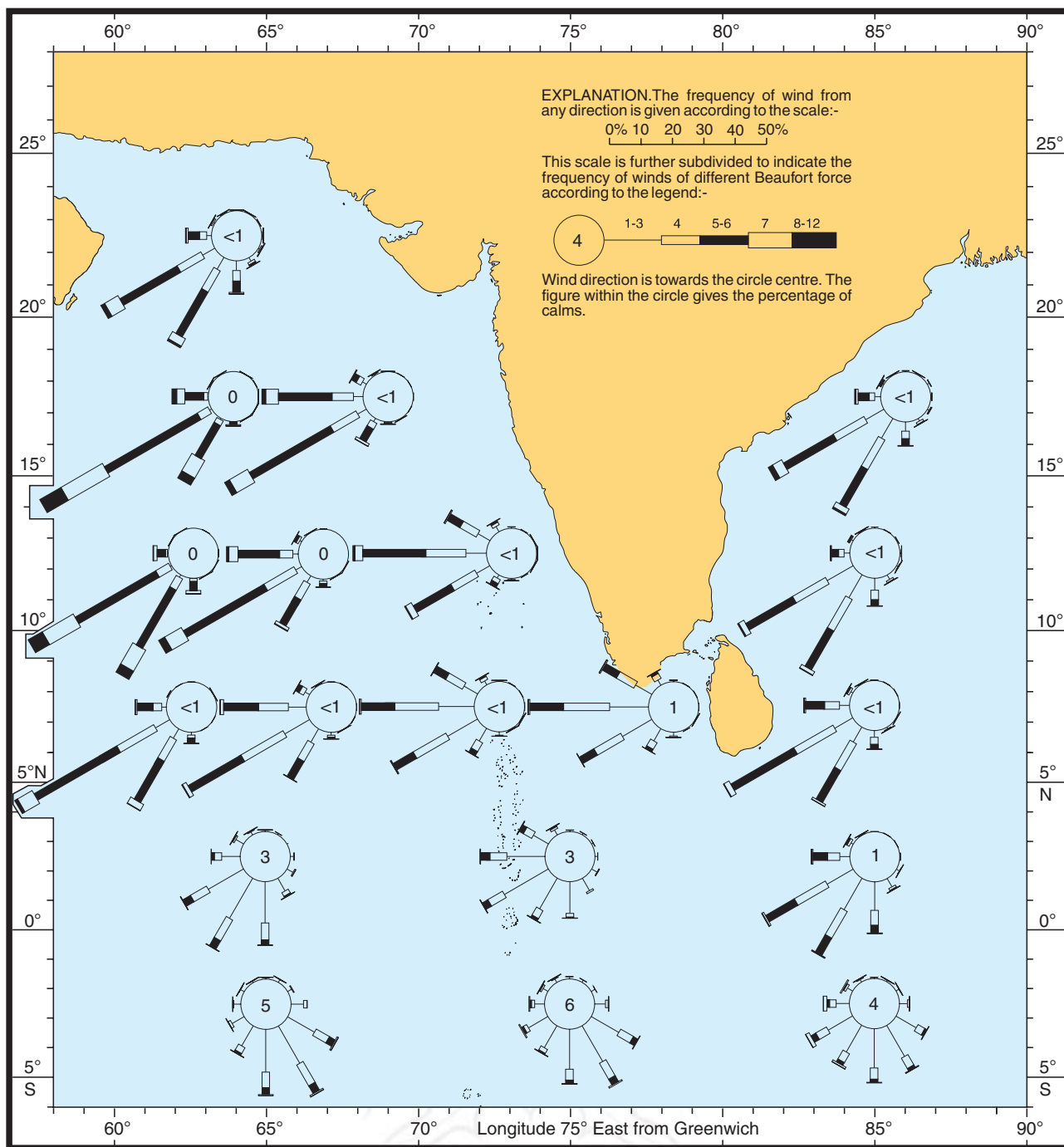
#### 1.189

- 1 In January NE winds predominant N of the equator but become more variable in the S and mainly W to NW in the SE part of the area. Winds of force 5 or more occur on about 3 to 5 per cent of occasions in the W and 5 to 10 per cent in the E. The winds in April are usually light and variable in the W but with an increasing frequency of W to SW winds in the E half of the area where winds of force 5 or more are reported on about 5 to 10 per cent of occasions.
- 2 At the height of the SW monsoon in July, winds are most frequently between W and SW to the N of the equator and S or SE in the S. Winds of force 5 or more are reported on about 10 per cent of occasions except in the NE where the percentage increases to about 25 to 30 per cent. During the transitional month of October, winds are mainly W but SW in the extreme NE and variable in the extreme SE. Force 5 winds are reported on less than 10



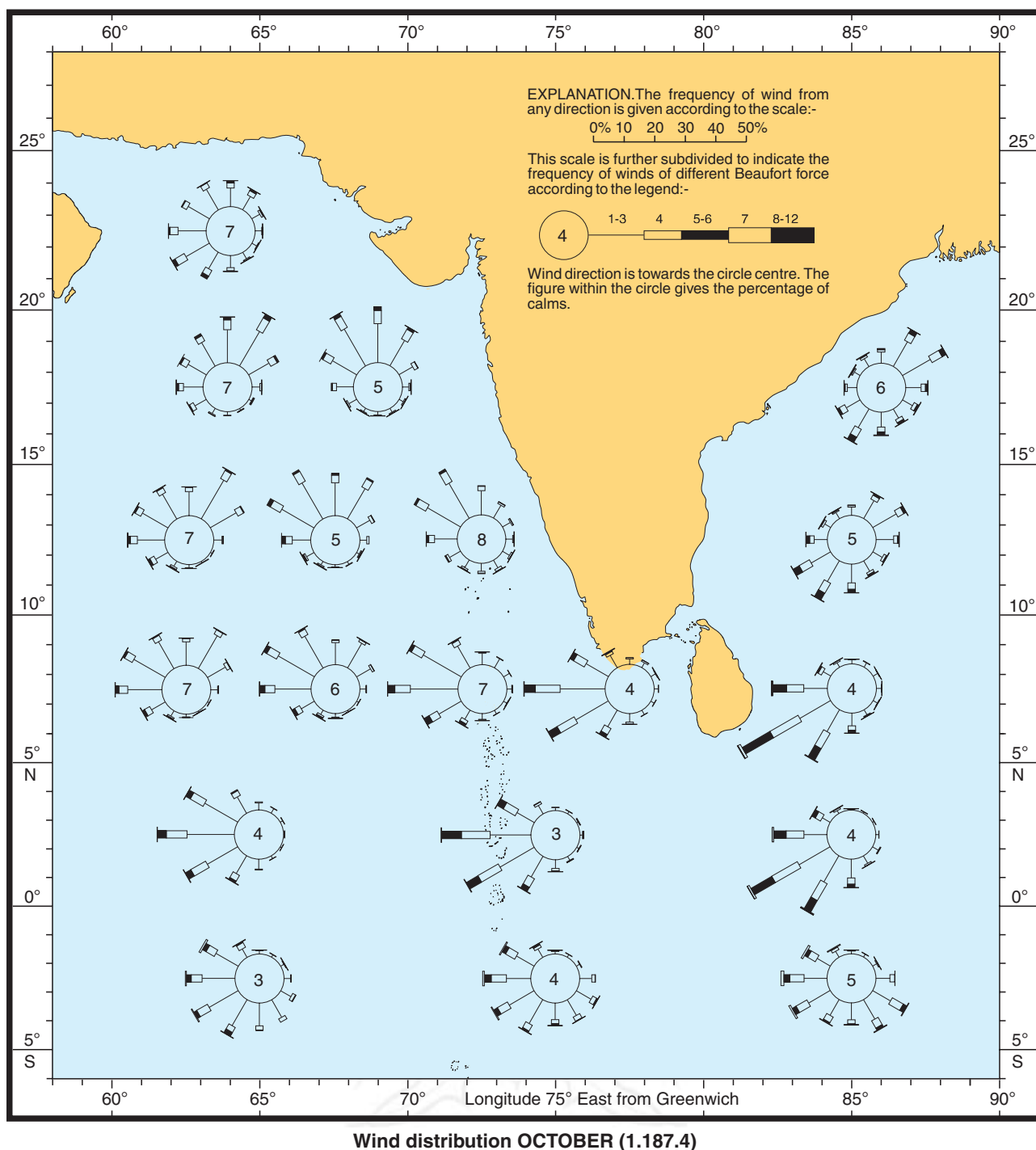
Wind distribution JANUARY (1.187.1)

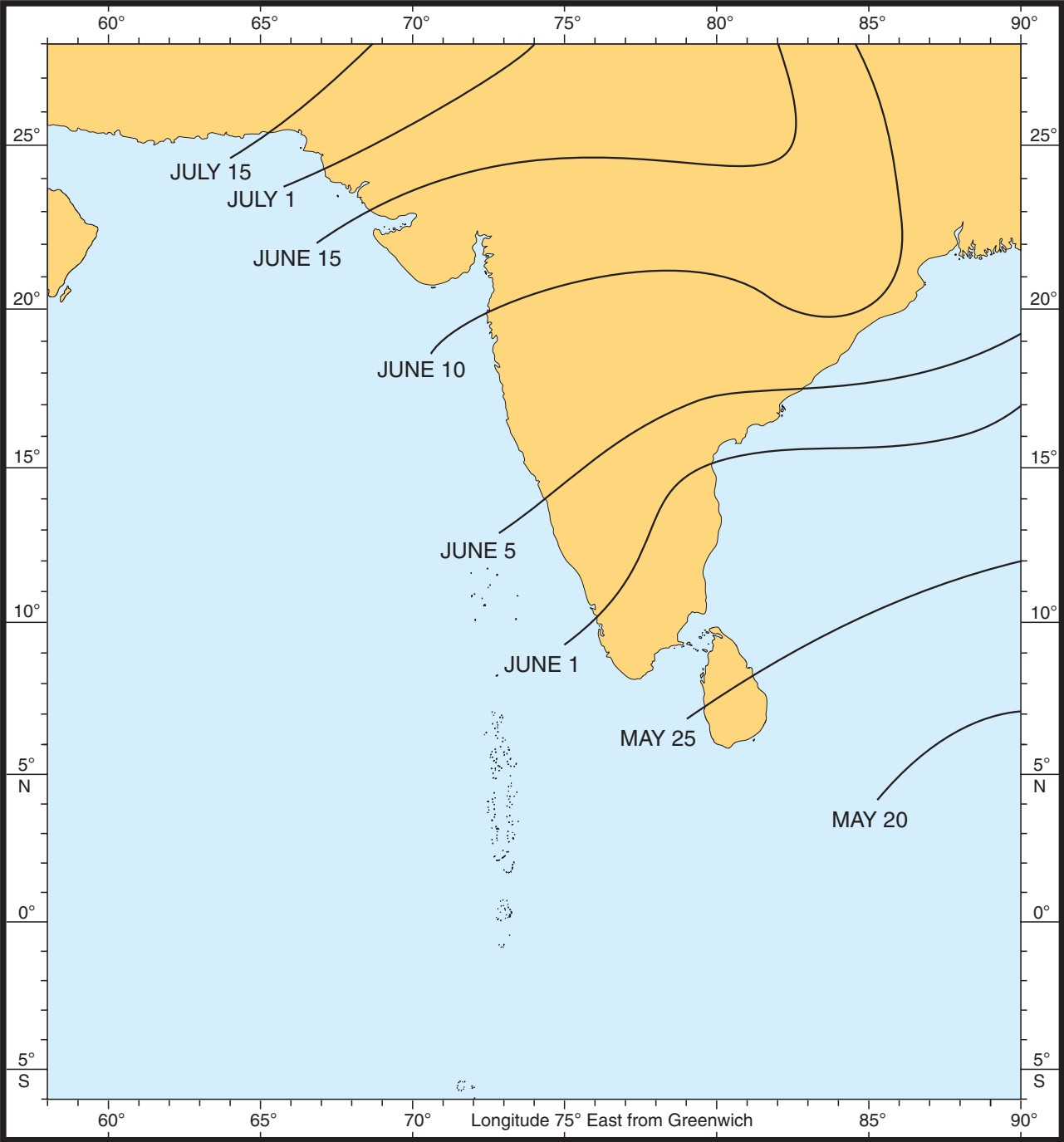




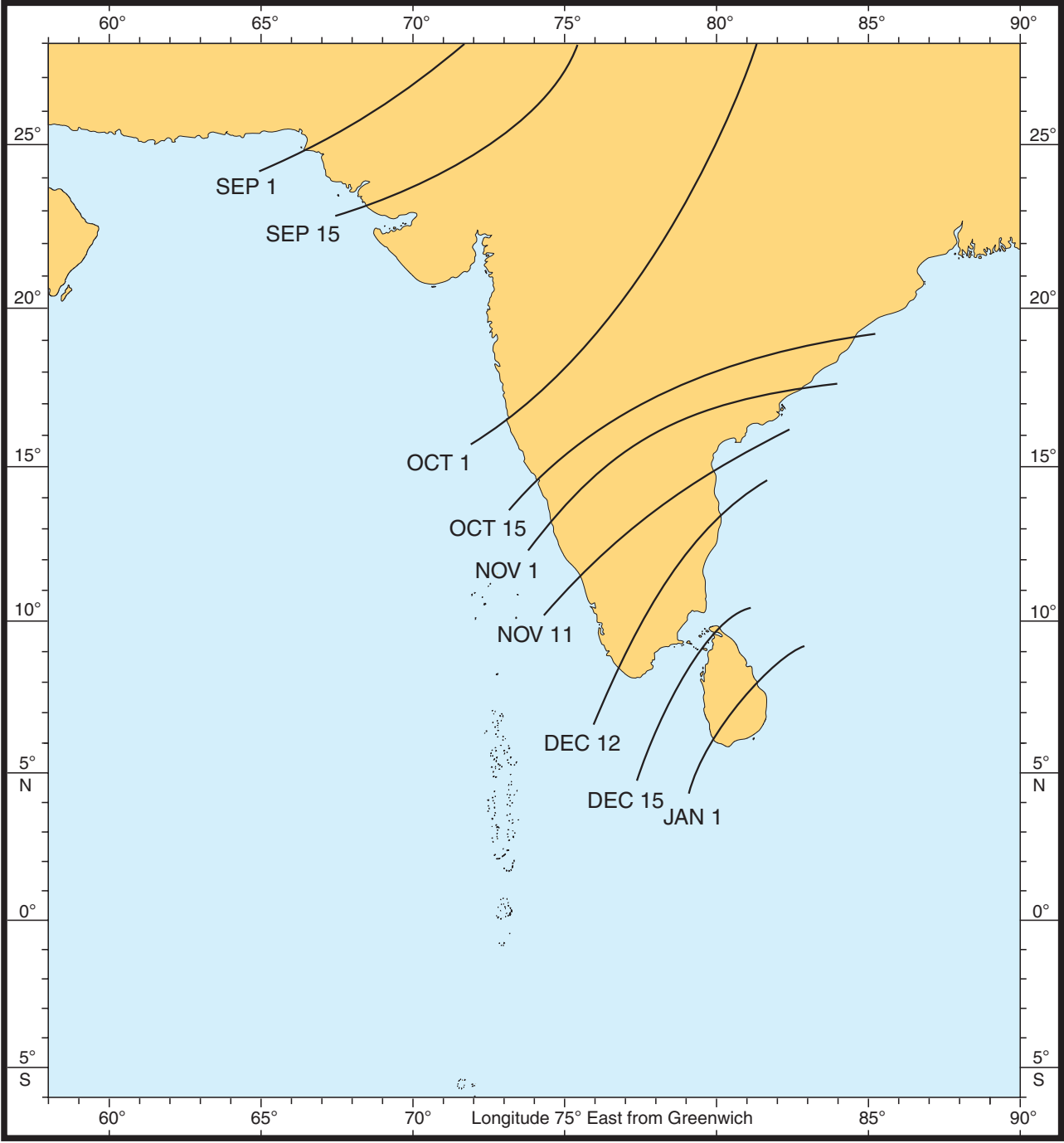
Wind distribution JULY (1.187.3)







Normal dates of onset of SW monsoon (1.187.5)



Normal dates of end of SW monsoon (1.187.6)

per cent of occasions in the S and W but increase to about 20 per cent in the extreme NE part of the area.

## Coastal waters

### 1.190

- 1 Topography has a major influence on the strength and direction of the wind. See *The Mariner's Handbook* for further details on the modification of both wind speed and direction in coastal waters.
- 2 **South and east coasts of Sri Lanka.** During the NE monsoon, between December and March, the E coast is exposed to the full force of the NE winds, with Hambantota (6°07'N, 81°08'E) reporting gale force winds on about 1 day per month. During the SW monsoon the central and N parts of this coast are usually well sheltered due to the high ground inland.
- 3 **Gulf of Mannār.** The NE monsoon is normally at its strongest during January and becomes relatively weak in March. Towards the end of April the winds are often light and variable but squally showers are common. The SW monsoon usually becomes established during May and gains in strength during June.
- 4 From July to the end of September fresh SW winds prevail, with mainly fair weather in the N. The wind often decreases in the N overnight and freshens during the afternoon as a result of the land/sea effects. In October the winds are usually more variable but with squally showers in the latter part of the month. In November the wind is often light between WNW and NE with heavy rain squalls, and by the end of the month the NE monsoon is usually well established.
- 5 **West coast of India to 16°N.** Land and sea breezes are frequent except during the SW monsoon. Land breezes are common during the NE monsoon, particularly in December and January, they may persist throughout the day and night especially where there are gaps in the mountains to the E, which may cause a funnelling of the wind.
- 6 The SW monsoon usually arrives in late May or early June to the S of Pālgāt Gap (5.2). It often begins with gale force winds from the SE that later veer to the SW, or with squalls from the SW. During the SW monsoon the winds over the open sea are mainly W to SW but these are usually diverted by the Western Ghāts and become WNW or NW along the coast. Squalls are common in the early part of the season. In October strong E or S winds with thundery squalls (sometimes called *Elephantas*) are possible and indicate the approaching end of the SW monsoon.
- 7 **West coast of India between 16°N to 20°N.** In April and May the wind gradually starts to back towards the SW with increasing thundery showers and occasional strong to gale force SW winds. In early June the SW monsoon is usually well established with much rain, occasional severe squalls, but some short periods of fine weather. In August the SW monsoon begins to weaken and usually ends in September.
- 8 In October and November the winds are often light and variable with occasional squally showers. In late September, or October, strong E or S squally winds (*Elephantas*) are possible and usually herald the end of the SW monsoon season. By late November or early December the NE monsoon is established.
- 9 **West coast of India N of 20°N.** In April and May the land breezes become less frequent whilst the sea breezes increase, and the SW is monsoon normally established in June with strengthening winds. The SW monsoon rapidly weakens in September and is soon replaced by the NE

monsoon. Some 6 or 7 squalls occur each year near Karāchi and are most frequent in summer, they are often accompanied by thunderstorms and/or dust storms. Occasional winds of 40 kn have been recorded in all seasons.

- 10 **Makrān Coast.** NE winds usually prevail from November to January and SW winds from June to September, however there are often some variations in the lengths of both monsoon seasons and their intensities. Strong to gale winds, although infrequent, are most common in December, January, June and July.

## Gales

### 1.191

- 1 Winds of force 7 or more are most frequent in July at the height of the SW monsoon (see 1.191.1). In August the frequency reduces by about 10 per cent in the W part of the area and to less than 1 per cent off the coast of Pakistan. The frequency of winds of force 7 or more in September is between 1 and 5 per cent over most of the area and less than 1 per cent off the coasts of NW India, Pakistan and around the Maldives.
- 2 In January the frequency is less than 1 per cent over most of the area but about 3 per cent off the S tip of India. May shows an increase to between 1 and 5 per cent in the S and SW. In June the frequency of strong winds starts to rapidly increase again in the W part of the area, with a frequency of occurrence of over 30 per cent by the end of the month; a similar pattern prevails to July.

## Cloud

## Open sea

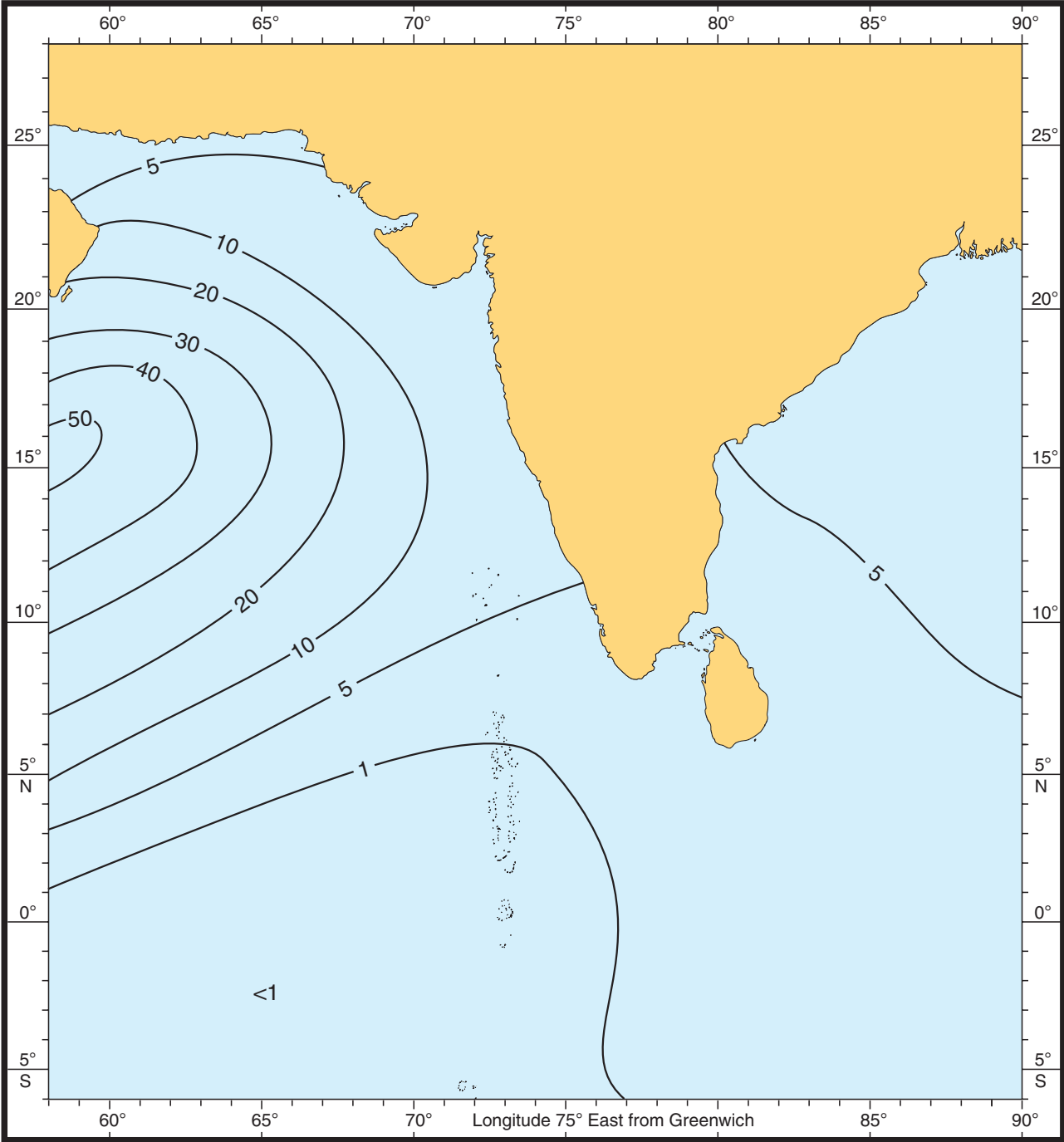
### 1.192

- 1 The average cloud amount over open waters in January varies from about 1 to 2 oktas in the N to 4 oktas in the SW and 5 oktas in the SE. In July the average cloud amount increases to between 5 and 6 oktas in the NW part of the Arabian Sea and 6 to 7 oktas in the NE. In the S part of the area the average cloud amount is about 5 oktas but with slightly less cloud in the extreme W between 5° and 15°N.

## Coastal waters

### 1.193

- 1 The average cloud amount for a number of coastal stations is included in the climatic tables (1.204).
- 2 The approach of the SW monsoon is usually heralded on the W coast of India, from Mumbai S, by the daily formation of large clouds over the high ground to the E which then move W. The cloud, frequently accompanied by lightning, usually disperses after sunset. This pattern normally continues for a week or more until the first major onset of the SW monsoon. During the SW monsoon overcast skies are relatively frequent and prolonged along the W coast of India.
- 3 Cloud amounts decrease to about 1 to 2 oktas in February along the coasts of Pakistan and W India N of about 10°N, and to about 3 to 4 oktas over S India, Sri Lanka and the Maldives.
- 4 Along the W coast of Sri Lanka there is a well-marked diurnal variation in the cloud during the NE monsoon; cloud amounts steadily increase during the day to reach a maximum in the afternoon/evening and then disperse overnight. On the S and E coasts, March usually has the least cloud and June the most.



Percentage frequency of winds Beaufort force 7 or over JULY (1.191.1)



## Precipitation

### General information

#### 1.194

- 1 The climatic tables (1.204) give the average amounts of precipitation for each month at a number of coastal stations and the mean number of days in each month when significant precipitation is recorded.

### Precipitation

#### 1.195

- 1 There is a marked seasonal variation in the rainfall along the coast between Cape Comorin and Mumbai. Rainfall rapidly decreases N of 20°N and towards the N part of the Gulf of Mannār during the SW monsoon. In the extreme NW part of the area near Jīwani in Pakistan, rainfall is highest during the period between December and early March due to depressions that affect this area in winter and early spring. Rainfall amounts vary greatly in Sri Lanka and are very dependent on the area's exposure to the prevailing onshore wind.
- 2 At Colombo, which is well exposed to winds from between W and SSW, the highest rainfall occurs during the SW monsoon, whilst at Trincomalee, which is well exposed to winds from between SE and N, the highest rainfall is recorded over the winter period during the NE monsoon. Over the Maldives rainfall amounts are abundant and fairly evenly spread throughout the year.
- 3 The annual variation in rainfall is generally greatest where the rainfall is least, particularly over the coastal regions of Pakistan and NW India.
- 4 Over the open sea, the percentage frequency of observations reporting rain tends to increase away from the coast during the height of NE monsoon. During the height of the SW monsoon, the reverse is generally true with an increasing frequency of occurrence towards the W coast of India.

### Thunderstorms

#### 1.196

- 1 In the Maldives thunderstorms occur on between 22 and 35 days a year and are fairly uniformly spread throughout the year. Over S India and Sri Lanka thunderstorms are more frequent and occur between 30 and 90 days a year and are usually most frequent during the two transitional periods between the NE and SW monsoons. In the N and NW parts of the area the frequency is much reduced to about 4 days per year.

## Fog and visibility

### Open sea

#### 1.197

- 1 Fog is rare over the open sea throughout the year. Visibilities of 5 miles or less are more common and reach a maximum of about 50 to 60 per cent of occasions in the extreme NW part of the area in July (see diagrams 1.197.1 and 1.197.2). In January, the percentage frequency of occurrence falls to about 2 to 5 per cent except in the area to the S of Cape Comorin and W of Sri Lanka where it remains between 5 and 10 per cent.

### Coastal waters

#### 1.198

- 1 Mist sometimes develops on calm clear nights but usually disperses soon after sunrise; it is more likely to occur near the coasts of the Kāthiawār coast (8.2) and Pakistan than elsewhere. Thick fog banks are possible in the Gulf of Kachchh and along the coast of Pakistan

between October and February. They tend to drift seaward with overnight offshore winds, then back towards the coast with developing sea breezes, before dispersing during rising day-time temperatures.

- 2 Normally the coast of Pakistan is clearest in the morning but rather hazy during the day with an offshore wind. Haze is also relatively common in coastal areas between Mumbai and Cochin from November to March.

## Air temperature

### Open Sea

#### 1.199

- 1 The mean air temperature in January is about 22° to 23°C in the extreme N part of the area and steadily increases to between 27° and 28°C in the S. By mid-July the mean air temperature across the whole of the area is about 27° to 28°C. In general, the mean air temperature over the sea seldom varies by more than 1°C above or below that of the mean sea surface temperatures shown in diagrams 1.176.1 to 1.176.3. Sudden temporary decreases in air temperature are possible during squally thundery showers and during the passage of frontal troughs in the extreme N part of the area in winter.

### Coastal waters

#### 1.200

- 1 The climatic tables (1.204) give mean air temperatures for a number of coastal stations. The mean daily maximum air temperature in the hottest month along the W coast of India and around Sri Lanka, which is usually just before the onset of the SW monsoon, is about 33°C but slightly higher in Pakistan and slightly lower in Maldives. Mean daily minimum air temperatures show a much greater variation between N and S and, in January, is about 15°C in the N and 24°C in the S. Temperatures of 7°C are not uncommon in winter along the coast of Pakistan.

## Relative humidity

### General information

#### 1.201

- 1 Humidity is closely related to air temperature and generally decreases as the temperature increases. During the early morning, when the air temperature is normally at its lowest, the humidity is generally at its highest, and falls to a minimum in the afternoon.

### Open sea

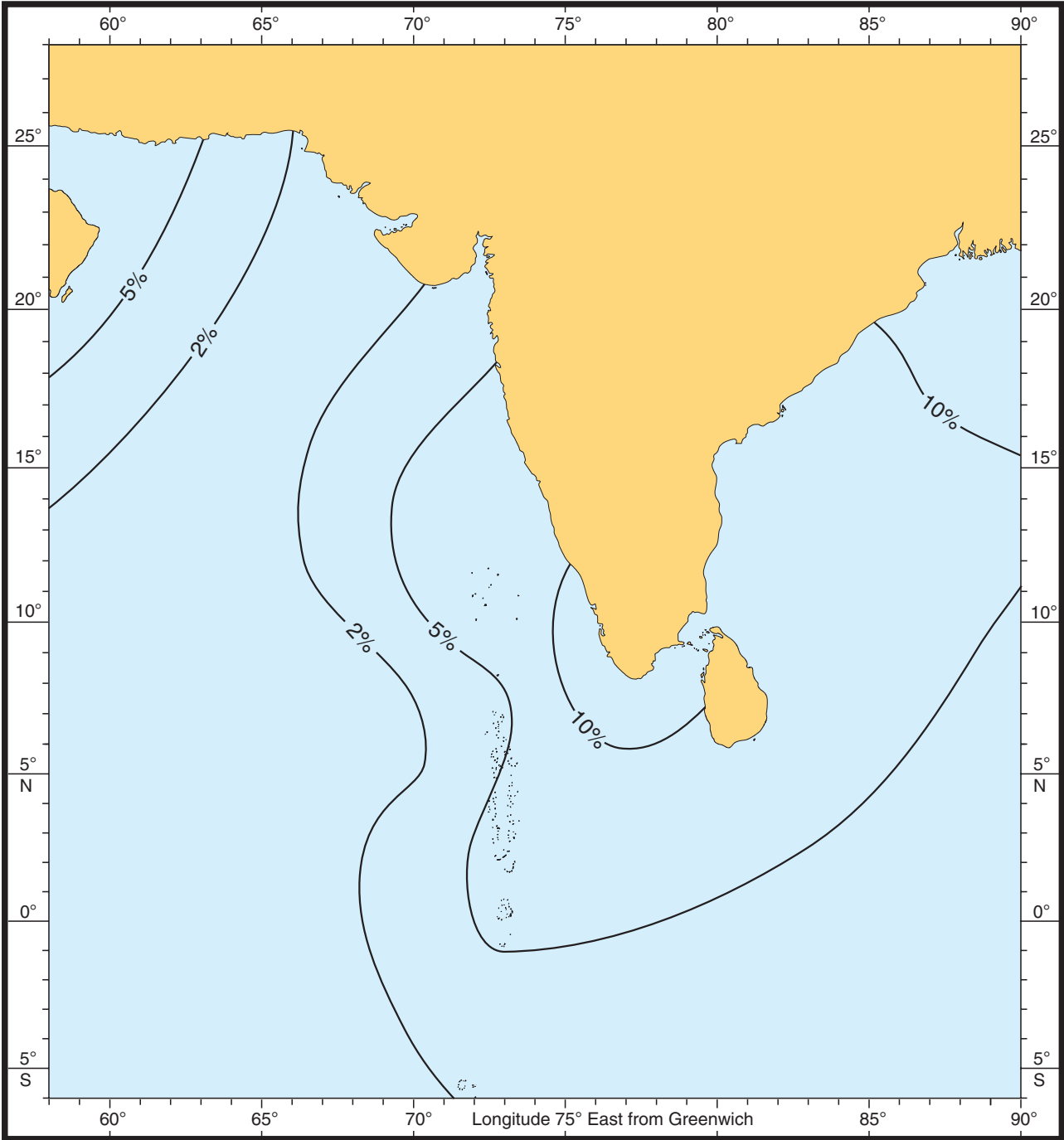
#### 1.202

- 1 The mean humidity, in January, is about 61 to 65 per cent in the extreme N part of the area and steadily increases to about 79 to 81 per cent in the extreme S. In July the figures are about 83 to 85 per cent in the N, and 79 to 80 per cent in the S.

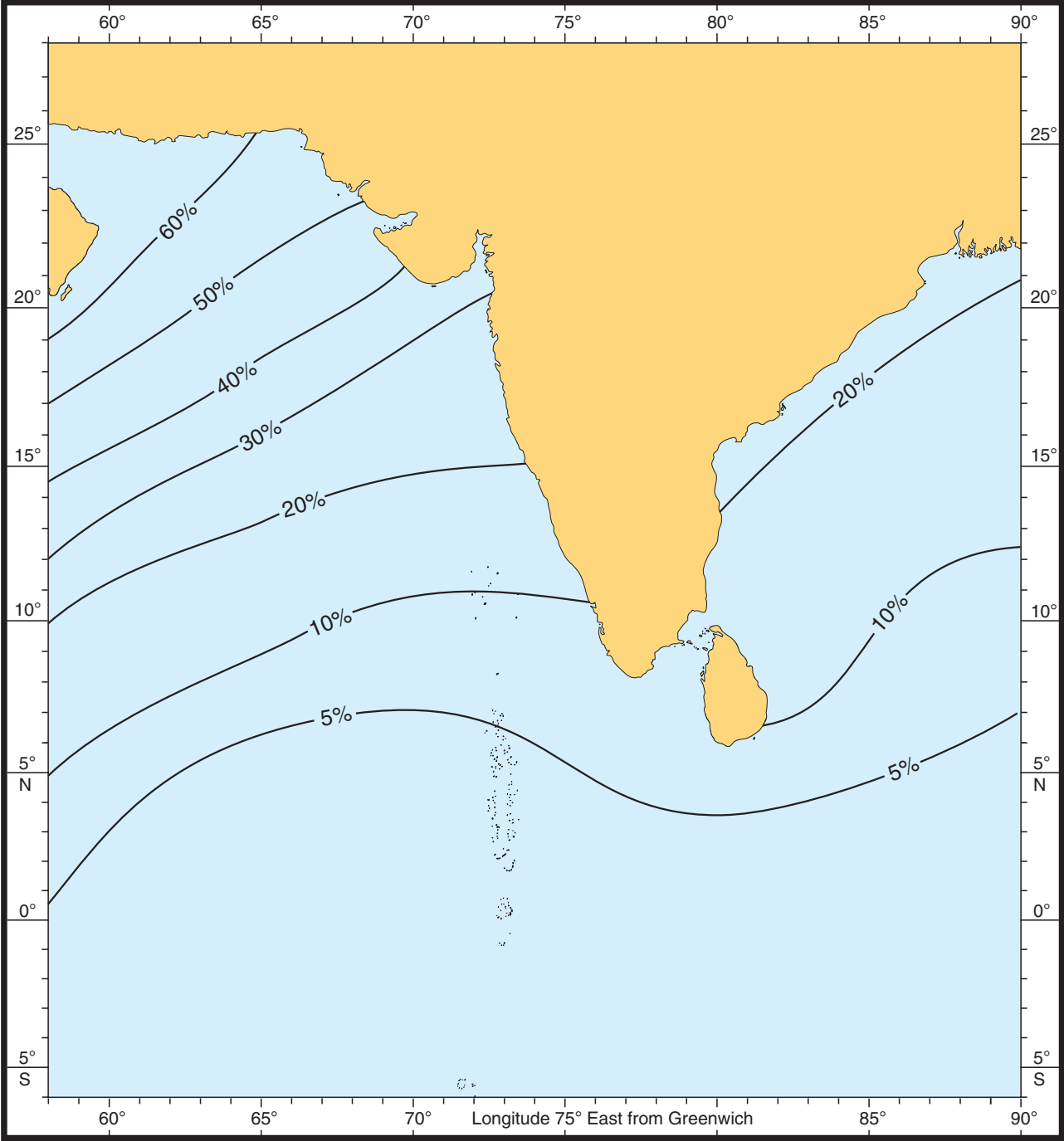
### Coastal waters

#### 1.203

- 1 In coastal waters, and just inland, the diurnal variation is much larger and is greatly affected by the direction of the wind. During January in the extreme N part of the area, the humidity is frequently about 65 to 70 per cent near dawn and 35 to 45 per cent in the afternoon. Whilst in the S, the humidity is about 80 to 85 per cent in the morning and between 70 and 80 per cent in the afternoon. During the height of the SW Monsoon in July, the humidity usually reaches a maximum of about 80 to 85 per cent in the N around dawn and between 90 and 95 per cent near Goa and Mangalore.



Frequency (%) of poor visibility (less than 5 miles) JANUARY (1.197.1)



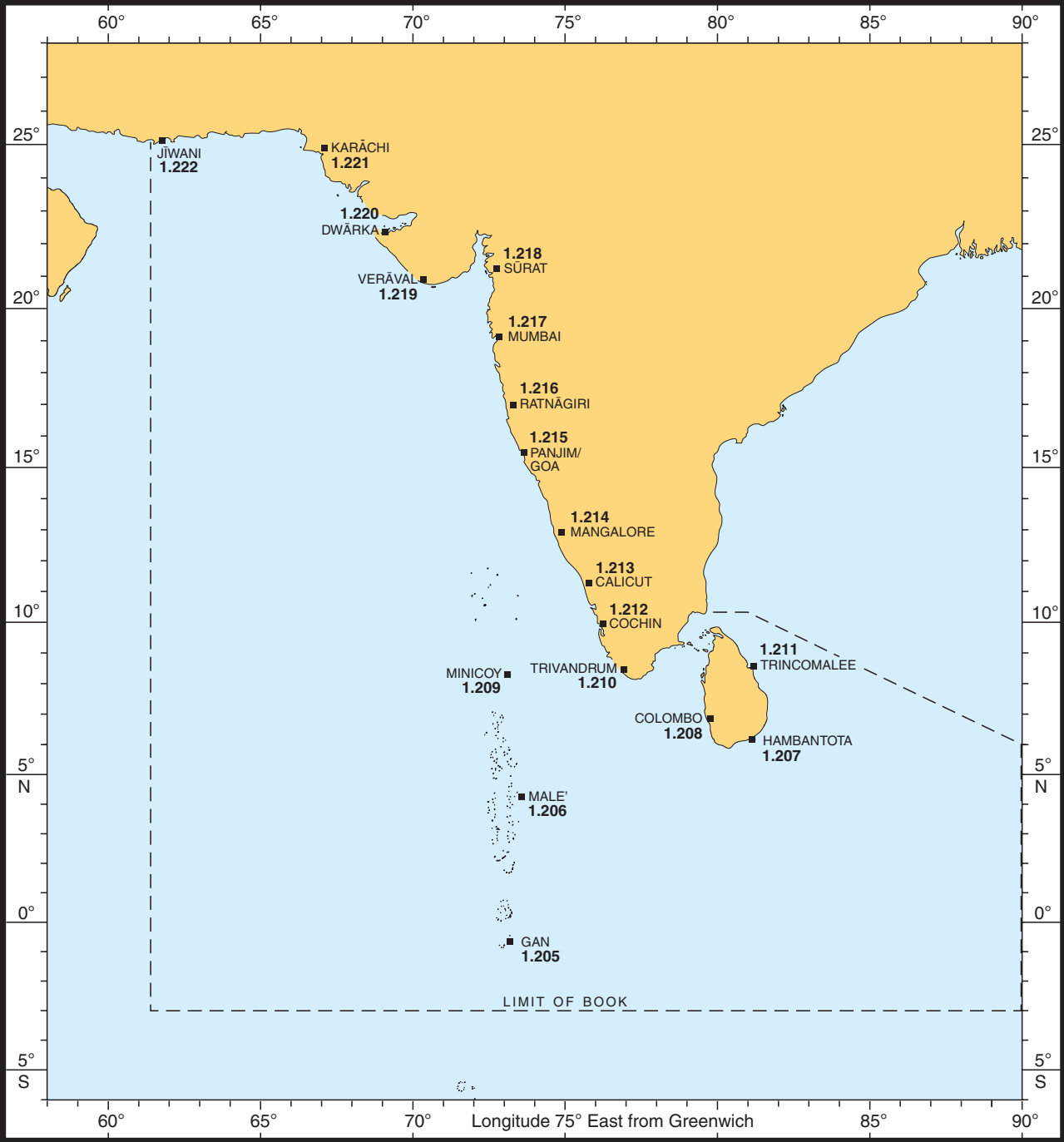
Frequency (%) of poor visibility (less than 5 miles) JULY (1.197.2)

**Climatic tables****1.204**

- 1 The climatic tables which follow give data for several coastal stations which regularly undertake weather observations. Some of these stations have been re-sited and so the position given is the latest available.
- 2 It is emphasised that these data are average conditions and refer to the specific location of the observing station and therefore may not be totally representative of the conditions over the open sea or in approaches to ports in their vicinity. The following comments briefly list some of the differences to be expected between conditions over the open sea and those at the nearest reporting station:

- 3 Wind speeds tend to be higher at sea than on land, although funnelling in narrow inlets can result in an increase in wind strength.
- 4 Precipitation along hilly wind-facing coasts can be considerably higher than at sea to windward. Similarly, precipitation in the lee of high ground is generally less.
- 5 Air temperature over the sea is less variable than over the land.
- 6 Topography has a marked effect on local conditions. For further details see *The Mariner's Handbook*.





Location of climatic stations (1.204)



1.205

WMO No 43599

GAN (ADDOO ATOLL) (0°41'S, 73°09'E) Height above MSL – 2 m

Climatic Table compiled from 10 to 15 years observations, 1960 to 1997

| Month                        | Average pressure<br>at MSL | Temperatures       |                    |                               |                              | Average<br>humidity |         | Average<br>cloud<br>cover |      | Precipitation   |                                     | Wind distribution – Percentage of observations from |    |    |    |    |    |    |    |      |    |      |   |    |    |    |    |    |      |                |    |      |      |      |     |         |  |  |  | Mean<br>wind<br>speed |  | Number<br>of days<br>with |  |  |
|------------------------------|----------------------------|--------------------|--------------------|-------------------------------|------------------------------|---------------------|---------|---------------------------|------|-----------------|-------------------------------------|-----------------------------------------------------|----|----|----|----|----|----|----|------|----|------|---|----|----|----|----|----|------|----------------|----|------|------|------|-----|---------|--|--|--|-----------------------|--|---------------------------|--|--|
|                              |                            | Mean<br>daily max. | Mean<br>daily min. | Mean highest<br>in each month | Mean lowest<br>in each month | 0800                | 1700    | 0800                      | 1700 | Average<br>fall | No. of days with<br>0.25 mm or more | 0800                                                |    |    |    |    |    |    |    |      |    | 1700 |   |    |    |    |    |    |      |                |    | 0800 | 1700 | Gale | Fog | Thunder |  |  |  |                       |  |                           |  |  |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                     |                                                     |    |    |    |    |    |    |    |      |    |      |   |    |    |    |    |    |      |                |    |      |      |      |     |         |  |  |  |                       |  |                           |  |  |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                     | N                                                   | NE | E  | SE | S  | SW | W  | NW | Calm | N  | NE   | E | SE | S  | SW | W  | NW | Calm |                |    |      |      |      |     |         |  |  |  |                       |  |                           |  |  |
| January                      | hPa<br>1011                | °C<br>30           | °C<br>24           | °C<br>32                      | °C<br>22                     | %<br>83             | %<br>80 | Oktas<br>6   6            |      | mm<br>251       | 14                                  | 33                                                  | 27 | 10 | 2  | 4  | 1  | 9  | 9  | 7    | 38 | 24   | 8 | 3  | 3  | 2  | 5  | 11 | 6    | Knots<br>6   8 |    | ⊕    | 1    | 3    |     |         |  |  |  |                       |  |                           |  |  |
| February                     | 1011                       | 31                 | 25                 | 32                            | 22                           | 81                  | 76      | 4                         | 5    | 107             | 7                                   | 44                                                  | 34 | 10 | ⊕  | ⊕  | ⊕  | 2  | 2  | 8    | 50 | 26   | 5 | 1  | ⊕  | 1  | 4  | 10 | 3    | 6              | 8  | ⊕    | 1    | 2    |     |         |  |  |  |                       |  |                           |  |  |
| March                        | 1011                       | 31                 | 25                 | 33                            | 23                           | 80                  | 76      | 4                         | 5    | 155             | 10                                  | 11                                                  | 17 | 12 | 1  | 4  | 13 | 18 | 4  | 20   | 23 | 9    | 6 | 4  | 5  | 5  | 27 | 12 | 9    | 5              | 7  | ⊕    | ⊕    | 3    |     |         |  |  |  |                       |  |                           |  |  |
| April                        | 1010                       | 32                 | 25                 | 33                            | 22                           | 81                  | 76      | 5                         | 5    | 145             | 13                                  | 7                                                   | ⊕  | ⊕  | 2  | 5  | 19 | 43 | 15 | 8    | 7  | ⊕    | 3 | 2  | 8  | 14 | 47 | 13 | 6    | 7              | 8  | 0    | ⊕    | 3    |     |         |  |  |  |                       |  |                           |  |  |
| May                          | 1010                       | 31                 | 25                 | 32                            | 22                           | 82                  | 79      | 5                         | 6    | 234             | 14                                  | 2                                                   | 1  | ⊕  | 2  | 22 | 29 | 32 | 6  | 6    | 1  | 1    | 1 | 2  | 14 | 26 | 42 | 8  | 5    | 8              | 10 | ⊕    | ⊕    | 2    |     |         |  |  |  |                       |  |                           |  |  |
| June                         | 1011                       | 31                 | 25                 | 32                            | 23                           | 81                  | 78      | 6                         | 6    | 191             | 15                                  | 3                                                   | 2  | 3  | 12 | 31 | 16 | 23 | 5  | 4    | 2  | ⊕    | 2 | 9  | 30 | 17 | 24 | 6  | 10   | 8              | 8  | 0    | 1    | 1    |     |         |  |  |  |                       |  |                           |  |  |
| July                         | 1011                       | 31                 | 24                 | 32                            | 23                           | 82                  | 79      | 6                         | 6    | 119             | 11                                  | 1                                                   | 3  | 8  | 23 | 28 | 10 | 12 | 9  | 7    | 3  | 0    | 5 | 12 | 27 | 16 | 20 | 5  | 12   | 7              | 7  | ⊕    | 1    | 2    |     |         |  |  |  |                       |  |                           |  |  |
| August                       | 1012                       | 31                 | 24                 | 32                            | 22                           | 83                  | 80      | 6                         | 7    | 196             | 13                                  | 4                                                   | 3  | 8  | 19 | 23 | 5  | 16 | 4  | 18   | 6  | 3    | 7 | 10 | 28 | 14 | 14 | 7  | 12   | 6              | 7  | 0    | 1    | 3    |     |         |  |  |  |                       |  |                           |  |  |
| September                    | 1012                       | 30                 | 24                 | 32                            | 21                           | 84                  | 80      | 6                         | 6    | 150             | 10                                  | 6                                                   | ⊕  | 4  | 5  | 16 | 21 | 36 | 5  | 9    | 3  | 1    | 4 | 6  | 16 | 23 | 31 | 8  | 8    | 7              | 9  | 0    | 1    | 2    |     |         |  |  |  |                       |  |                           |  |  |
| October                      | 1012                       | 30                 | 24                 | 31                            | 22                           | 83                  | 81      | 6                         | 6    | 292             | 17                                  | 5                                                   | 2  | 4  | 3  | 10 | 26 | 33 | 13 | 5    | 4  | 0    | 6 | 5  | 6  | 17 | 45 | 15 | 4    | 9              | 10 | ⊕    | 1    | 2    |     |         |  |  |  |                       |  |                           |  |  |
| November                     | 1011                       | 30                 | 24                 | 31                            | 22                           | 83                  | 80      | 5                         | 5    | 168             | 12                                  | 5                                                   | 4  | 1  | 3  | 3  | 9  | 55 | 14 | 6    | 5  | 2    | 9 | 2  | 2  | 9  | 48 | 18 | 4    | 10             | 10 | ⊕    | ⊕    | ⊕    |     |         |  |  |  |                       |  |                           |  |  |
| December                     | 1012                       | 30                 | 24                 | 31                            | 22                           | 85                  | 82      | 5                         | 5    | 246             | 14                                  | 20                                                  | 8  | 8  | 4  | 3  | 7  | 20 | 20 | 10   | 15 | 11   | 7 | 6  | 3  | 5  | 33 | 14 | 6    | 7              | 8  | ⊕    | 1    | 1    |     |         |  |  |  |                       |  |                           |  |  |
| Means                        | 1011                       | 31                 | 24                 | 33*                           | 22§                          | 82                  | 79      | 5                         | 6    | —               | —                                   | 10                                                  | 7  | 5  | 7  | 13 | 14 | 26 | 9  | 9    | 12 | 6    | 5 | 5  | 12 | 13 | 29 | 11 | 7    | 7              | 8  | —    | —    | —    |     |         |  |  |  |                       |  |                           |  |  |
| Totals                       | —                          | —                  | —                  | —                             | —                            | —                   | —       | —                         | —    | 2254            | 150                                 | —                                                   | —  | —  | —  | —  | —  | —  | —  | —    | —  | —    | — | —  | —  | —  | —  | —  | —    | —              | —  | —    | ⊕    | 8    | 24  |         |  |  |  |                       |  |                           |  |  |
| Extreme values               | —                          | —                  | —                  | 34†                           | 21‡                          | —                   | —       | —                         | —    | —               | —                                   | —                                                   | —  | —  | —  | —  | —  | —  | —  | —    | —  | —    | — | —  | —  | —  | —  | —  | —    | —              | —  | —    | —    | —    |     |         |  |  |  |                       |  |                           |  |  |
| No. of years<br>observations | 15                         | 15                 |                    |                               |                              | 15                  |         | 15                        |      | 10              |                                     | 15                                                  |    |    |    |    |    |    |    |      |    | 15   |   |    |    |    |    |    |      |                |    | 15   |      | 15   | 15  | 15      |  |  |  |                       |  |                           |  |  |

\* Mean of highest each year

§ Mean of lowest each year

† Highest recorded temperature

‡ Lowest recorded temperature

⊕ Rare

⊖ All observations

1.206

WMO No 43555

**MALE'** (4°12'N, 73°32'E) Height above MSL – 2 m  
Climatic Table compiled from 15 to 30 years observations, 1960 to 1997

| Month                        | Average pressure<br>at MSL | Temperatures       |                    |                               |                              | Average<br>humidity |         | Average<br>cloud<br>cover |      | Precipitation   |                                  | Wind distribution – Percentage of observations from |    |    |    |   |    |    |    |      |    |      |    |    |   |    |    |    |      |                  |    | Mean<br>wind<br>speed |      | Number<br>of days<br>with |     |         |
|------------------------------|----------------------------|--------------------|--------------------|-------------------------------|------------------------------|---------------------|---------|---------------------------|------|-----------------|----------------------------------|-----------------------------------------------------|----|----|----|---|----|----|----|------|----|------|----|----|---|----|----|----|------|------------------|----|-----------------------|------|---------------------------|-----|---------|
|                              |                            | Mean<br>daily max. | Mean<br>daily min. | Mean highest<br>in each month | Mean lowest<br>in each month | 0500                | 1700    | 0500                      | 1700 | Average<br>fall | No. of days with<br>1 mm or more | 0500                                                |    |    |    |   |    |    |    |      |    | 1700 |    |    |   |    |    |    |      |                  |    | 0500                  | 1700 | Gale                      | Fog | Thunder |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                  |                                                     |    |    |    |   |    |    |    |      |    |      |    |    |   |    |    |    |      |                  |    |                       |      |                           |     |         |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                  | N                                                   | NE | E  | SE | S | SW | W  | NW | Calm | N  | NE   | E  | SE | S | SW | W  | NW | Calm |                  |    |                       |      |                           |     |         |
| January                      | hPa<br>1012                | °C<br>30           | °C<br>24           | °C<br>32                      | °C<br>–                      | %<br>82             | %<br>75 | Oktas<br>4   5            |      | mm<br>75        | 5                                | 5                                                   | 50 | 36 | 3  | 1 | 1  | 1  | 1  | 2    | 7  | 46   | 38 | 2  | 1 | 0  | 1  | 4  | 1    | Knots<br>12   12 |    | ⊕                     | 0    | 2                         |     |         |
| February                     | 1011                       | 31                 | 24                 | 32                            | –                            | 82                  | 72      | 4                         | 4    | 50              | 4                                | 17                                                  | 37 | 30 | 1  | 1 | ⊕  | 2  | 4  | 7    | 22 | 47   | 25 | 1  | ⊕ | 0  | 1  | 4  | ⊕    | 8                | 10 | ⊕                     | ⊕    | 1                         |     |         |
| March                        | 1011                       | 32                 | 25                 | 33                            | –                            | 81                  | 71      | 3                         | 4    | 73              | 6                                | 15                                                  | 21 | 25 | 3  | 3 | 2  | 10 | 9  | 12   | 18 | 30   | 20 | 1  | 2 | 3  | 13 | 10 | 4    | 7                | 8  | ⊕                     | ⊕    | 3                         |     |         |
| April                        | 1010                       | 32                 | 26                 | 33                            | –                            | 82                  | 75      | 4                         | 5    | 132             | 9                                | 5                                                   | 5  | 5  | 2  | 3 | 9  | 30 | 24 | 18   | 11 | 4    | 5  | 1  | 5 | 9  | 32 | 29 | 5    | 12               | 8  | ⊕                     | ⊕    | 4                         |     |         |
| May                          | 1010                       | 31                 | 26                 | 32                            | –                            | 84                  | 79      | 5                         | 6    | 216             | 14                               | 2                                                   | 0  | 0  | ⊕  | 2 | 15 | 64 | 14 | 2    | 3  | 1    | ⊕  | ⊕  | ⊕ | 12 | 66 | 17 | ⊕    | 12               | 13 | ⊕                     | ⊕    | 5                         |     |         |
| June                         | 1010                       | 31                 | 25                 | 32                            | –                            | 84                  | 78      | 5                         | 6    | 172             | 13                               | 2                                                   | 0  | 0  | 1  | 6 | 24 | 62 | 4  | 1    | 1  | 0    | 0  | 1  | 3 | 21 | 66 | 9  | 1    | 11               | 13 | 1                     | 1    | 2                         |     |         |
| July                         | 1011                       | 31                 | 25                 | 32                            | –                            | 82                  | 76      | 5                         | 6    | 147             | 12                               | ⊕                                                   | ⊕  | 0  | 1  | 6 | 14 | 52 | 19 | 7    | 1  | 0    | ⊕  | 0  | 4 | 12 | 60 | 20 | 2    | 11               | 12 | ⊕                     | ⊕    | 6                         |     |         |
| August                       | 1011                       | 31                 | 25                 | 32                            | –                            | 83                  | 77      | 5                         | 6    | 188             | 13                               | 4                                                   | ⊕  | ⊕  | ⊕  | 6 | 12 | 46 | 26 | 5    | 4  | ⊕    | ⊕  | ⊕  | 3 | 11 | 55 | 26 | 1    | 10               | 11 | ⊕                     | 1    | 2                         |     |         |
| September                    | 1012                       | 30                 | 25                 | 31                            | –                            | 83                  | 78      | 5                         | 6    | 243             | 16                               | 6                                                   | 0  | 1  | 0  | 2 | 12 | 48 | 29 | 3    | 3  | 1    | 1  | 0  | 2 | 9  | 63 | 21 | 1    | 11               | 12 | ⊕                     | ⊕    | 1                         |     |         |
| October                      | 1011                       | 30                 | 24                 | 31                            | –                            | 84                  | 79      | 5                         | 6    | 222             | 15                               | 2                                                   | ⊕  | 3  | 1  | 3 | 10 | 59 | 14 | 8    | 4  | ⊕    | 4  | 2  | 3 | 7  | 59 | 18 | 4    | 11               | 11 | ⊕                     | 1    | 2                         |     |         |
| November                     | 1011                       | 30                 | 24                 | 31                            | –                            | 85                  | 79      | 5                         | 5    | 201             | 13                               | 6                                                   | 7  | 11 | 5  | 5 | 5  | 38 | 13 | 9    | 5  | 9    | 10 | 3  | 3 | 4  | 41 | 18 | 8    | 9                | 10 | 1                     | ⊕    | 3                         |     |         |
| December                     | 1012                       | 30                 | 23                 | 31                            | –                            | 83                  | 77      | 4                         | 5    | 232             | 12                               | 5                                                   | 31 | 38 | 3  | 2 | 3  | 10 | 3  | 7    | 8  | 25   | 38 | 5  | 1 | 2  | 13 | 5  | 3    | 10               | 11 | ⊕                     | 1    | 2                         |     |         |
| Means                        | 1011                       | 31                 | 24                 | 33*                           | –§                           | 83                  | 76      | 5                         | 5    | –               | –                                | 6                                                   | 13 | 13 | 2  | 3 | 9  | 35 | 13 | 6    | 7  | 14   | 12 | 1  | 2 | 8  | 39 | 15 | 2    | 10               | 11 | –                     | –    | –                         |     |         |
| Totals                       | –                          | –                  | –                  | –                             | –                            | –                   | –       | –                         | –    | 1951            | 132                              | –                                                   | –  | –  | –  | – | –  | –  | –  | –    | –  | –    | –  | –  | – | –  | –  | –  | –    | –                | –  | 2                     | 3    | 33                        |     |         |
| Extreme values               | –                          | –                  | –                  | 35†                           | 22‡                          | –                   | –       | –                         | –    | –               | –                                | –                                                   | –  | –  | –  | – | –  | –  | –  | –    | –  | –    | –  | –  | – | –  | –  | –  | –    | –                | –  | –                     | –    | –                         |     |         |
| No. of years<br>observations | 15                         | 15                 |                    |                               |                              | 15                  |         | 15                        |      | 30              |                                  | 15                                                  |    |    |    |   |    |    |    |      |    | 15   |    |    |   |    |    |    |      |                  |    | 15                    |      | 15                        | 15  | 15      |

\* Mean of highest each year

§ Mean of lowest each year

† Highest recorded temperature

‡ Lowest recorded temperature

⊕ Rare

⊖ All observations

1.207

WMO No 43497

**HAMBANTOTA (6°07'N, 81°08'E) Height above MSL – 20 m**  
Climatic Table compiled from 15 to 30 years observations, 1960 to 1997

| Month                        | Average pressure<br>at MSL | Temperatures       |                    |                               |                              | Average<br>humidity |         | Average<br>cloud<br>cover |      | Precipitation   |                                | Wind distribution – Percentage of observations from |    |   |    |   |    |    |    |      |   |      |    |    |    |    |    |    |      |                  |    | Mean<br>wind<br>speed |      | Number<br>of days<br>with |     |         |
|------------------------------|----------------------------|--------------------|--------------------|-------------------------------|------------------------------|---------------------|---------|---------------------------|------|-----------------|--------------------------------|-----------------------------------------------------|----|---|----|---|----|----|----|------|---|------|----|----|----|----|----|----|------|------------------|----|-----------------------|------|---------------------------|-----|---------|
|                              |                            | Mean<br>daily max. | Mean<br>daily min. | Mean highest<br>in each month | Mean lowest<br>in each month | 0530                | 1730    | 0530                      | 1730 | Average<br>fall | No. of days with<br>mm or more | 0530                                                |    |   |    |   |    |    |    |      |   | 1730 |    |    |    |    |    |    |      |                  |    | 0530                  | 1730 | Gale                      | Fog | Thunder |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                | N                                                   | NE | E | SE | S | SW | W  | NW | Calm | N | NE   | E  | SE | S  | SW | W  | NW | Calm |                  |    |                       |      |                           |     |         |
| January                      | hPa<br>1011                | °C<br>30           | °C<br>–            | °C<br>32                      | °C<br>–                      | %<br>85             | %<br>75 | Oktas<br>3   5            |      | mm<br>58        | –                              | 25                                                  | 64 | 1 | 1  | 1 | 3  | 0  | 6  | 0    | 4 | 59   | 27 | 5  | 3  | 1  | ⊕  | 1  | 1    | Knots<br>11   16 |    | 1                     | ⊕    | 1                         |     |         |
| February                     | 1011                       | 31                 | –                  | 32                            | –                            | 85                  | 75      | 3                         | 4    | 47              | –                              | 34                                                  | 56 | 3 | 0  | 1 | 0  | 0  | 6  | 1    | 3 | 41   | 38 | 10 | 3  | 2  | 1  | 2  | 1    | 8                | 16 | 1                     | 0    | 1                         |     |         |
| March                        | 1010                       | 31                 | –                  | 32                            | –                            | 87                  | 75      | 2                         | 4    | 66              | –                              | 29                                                  | 30 | 4 | 2  | 2 | 13 | 1  | 17 | 1    | 3 | 24   | 32 | 18 | 9  | 12 | 1  | 1  | ⊕    | 6                | 14 | ⊕                     | 0    | 3                         |     |         |
| April                        | 1009                       | 32                 | –                  | 33                            | –                            | 88                  | 78      | 4                         | 5    | 95              | –                              | 20                                                  | 19 | 2 | 2  | 0 | 27 | 10 | 19 | 2    | 2 | 7    | 9  | 21 | 22 | 35 | 2  | 4  | 0    | 6                | 13 | 1                     | ⊕    | 7                         |     |         |
| May                          | 1008                       | 31                 | –                  | 33                            | –                            | 89                  | 82      | 4                         | 5    | 89              | –                              | 4                                                   | 0  | 0 | 0  | 2 | 60 | 25 | 3  | 6    | 1 | 1    | 1  | 4  | 9  | 72 | 11 | 1  | ⊕    | 7                | 16 | ⊕                     | 0    | 5                         |     |         |
| June                         | 1008                       | 31                 | –                  | 34                            | –                            | 89                  | 79      | 5                         | 6    | 59              | –                              | 0                                                   | 0  | 0 | 0  | 0 | 71 | 27 | 2  | 0    | 0 | 0    | ⊕  | 0  | 3  | 75 | 21 | ⊕  | 0    | 11               | 17 | 1                     | 0    | 1                         |     |         |
| July                         | 1008                       | 31                 | –                  | 34                            | –                            | 88                  | 76      | 4                         | 5    | 48              | –                              | 0                                                   | 0  | 0 | 0  | 1 | 76 | 22 | 1  | 0    | 1 | ⊕    | 0  | 0  | 3  | 69 | 27 | ⊕  | 0    | 10               | 17 | ⊕                     | 0    | 1                         |     |         |
| August                       | 1009                       | 31                 | –                  | 34                            | –                            | 88                  | 75      | 4                         | 5    | 55              | –                              | 0                                                   | 0  | 0 | 0  | 0 | 81 | 19 | 0  | 0    | 0 | 1    | 0  | 0  | 2  | 83 | 14 | 1  | 0    | 10               | 17 | ⊕                     | 0    | 1                         |     |         |
| September                    | 1009                       | 30                 | –                  | 33                            | –                            | 88                  | 80      | 4                         | 6    | 71              | –                              | 0                                                   | 1  | 0 | 0  | 1 | 81 | 10 | 3  | 3    | 0 | ⊕    | 0  | ⊕  | 6  | 84 | 9  | 0  | ⊕    | 11               | 18 | 1                     | 0    | 3                         |     |         |
| October                      | 1009                       | 30                 | –                  | 32                            | –                            | 89                  | 80      | 5                         | 6    | 151             | –                              | 1                                                   | 1  | 0 | 0  | 0 | 56 | 13 | 14 | 8    | 2 | 2    | 3  | 3  | 9  | 63 | 16 | 3  | 1    | 9                | 14 | 1                     | ⊕    | 6                         |     |         |
| November                     | 1010                       | 30                 | –                  | 32                            | –                            | 90                  | 79      | 5                         | 6    | 188             | –                              | 26                                                  | 26 | 1 | 2  | 0 | 15 | 3  | 24 | 2    | 5 | 16   | 12 | 12 | 14 | 28 | 9  | 4  | ⊕    | 7                | 11 | ⊕                     | ⊕    | 7                         |     |         |
| December                     | 1011                       | 30                 | –                  | 31                            | –                            | 88                  | 79      | 4                         | 5    | 118             | –                              | 26                                                  | 52 | 3 | 3  | 2 | 2  | 1  | 10 | 1    | 6 | 46   | 24 | 6  | 6  | 12 | 1  | 1  | 0    | 9                | 14 | 1                     | ⊕    | 2                         |     |         |
| Means                        | 1009                       | 31                 | –                  | 35*                           | –§                           | 88                  | 78      | 4                         | 5    | –               | –                              | 16                                                  | 24 | 1 | 1  | 1 | 36 | 10 | 9  | 2    | 2 | 18   | 13 | 7  | 7  | 42 | 9  | 2  | ⊕    | 9                | 15 | –                     | –    | –                         |     |         |
| Totals                       | –                          | –                  | –                  | –                             | –                            | –                   | –       | –                         | –    | 1045            | –                              | –                                                   | –  | – | –  | – | –  | –  | –  | –    | – | –    | –  | –  | –  | –  | –  | –  | –    | –                | –  | 7                     | ⊕    | 38                        |     |         |
| Extreme values               | –                          | –                  | –                  | 36†                           | –‡                           | –                   | –       | –                         | –    | –               | –                              | –                                                   | –  | – | –  | – | –  | –  | –  | –    | – | –    | –  | –  | –  | –  | –  | –  | –    | –                | –  | –                     | –    | –                         |     |         |
| No. of years<br>observations | 15                         | 15                 |                    |                               |                              | 15                  |         | 15                        |      | 30              | –                              | 15                                                  |    |   |    |   |    |    |    |      |   | 15   |    |    |    |    |    |    |      |                  |    | 15                    | 15   | 15                        |     |         |

\* Mean of highest each year  
§ Mean of lowest each year

† Highest recorded temperature  
‡ Lowest recorded temperature

⊕ Rare  
⊖ All observations

1.208

WMO No 43467

COLOMBO/RATMALANA (6°49'N, 79°53'E) Height above MSL – 5 m

Climatic Table compiled from 24 to 30 years observations, 1960 to 1997

| Month                        | Average pressure<br>at MSL | Temperatures       |                    |                               |                              | Average<br>humidity |         | Average<br>cloud<br>cover |      | Precipitation   |                                    | Wind distribution – Percentage of observations from |    |   |    |    |    |    |    |      |    |      |   |    |   |    |    |    |      |                |   | Mean<br>wind<br>speed |      | Number<br>of days<br>with |     |         |
|------------------------------|----------------------------|--------------------|--------------------|-------------------------------|------------------------------|---------------------|---------|---------------------------|------|-----------------|------------------------------------|-----------------------------------------------------|----|---|----|----|----|----|----|------|----|------|---|----|---|----|----|----|------|----------------|---|-----------------------|------|---------------------------|-----|---------|
|                              |                            | Mean<br>daily max. | Mean<br>daily min. | Mean highest<br>in each month | Mean lowest<br>in each month | 0530                | 1730    | 0530                      | 1730 | Average<br>fall | No. of days with<br>2.5 mm or more | 1130                                                |    |   |    |    |    |    |    |      |    | 1730 |   |    |   |    |    |    |      |                |   | 0530                  | 1730 | Gale                      | Fog | Thunder |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                    | N                                                   | NE | E | SE | S  | SW | W  | NW | Calm | N  | NE   | E | SE | S | SW | W  | NW | Calm |                |   |                       |      |                           |     |         |
| January                      | hPa<br>1011                | °C<br>32           | °C<br>22           | °C<br>34                      | °C<br>19                     | %<br>88             | %<br>69 | Oktas<br>3   5            |      | mm<br>62        | 4                                  | 20                                                  | 27 | 6 | 1  | 1  | 7  | 19 | 12 | 7    | 18 | 9    | 2 | 1  | 1 | 3  | 22 | 42 | 3    | Knots<br>3   8 |   | 0                     | ⊕    | 3                         |     |         |
| February                     | 1011                       | 32                 | 22                 | 35                            | 20                           | 90                  | 69      | 2                         | 4    | 69              | 5                                  | 7                                                   | 11 | 3 | ⊕  | 1  | 15 | 42 | 16 | 5    | 8  | 4    | 2 | ⊕  | 2 | 9  | 40 | 32 | 3    | 1              | 7 | 0                     | ⊕    | 4                         |     |         |
| March                        | 1011                       | 33                 | 23                 | 35                            | 21                           | 91                  | 69      | 2                         | 4    | 130             | 7                                  | 2                                                   | ⊕  | 1 | 1  | 7  | 21 | 53 | 12 | 3    | 1  | 1    | 4 | 2  | 4 | 19 | 50 | 16 | 3    | 1              | 5 | 0                     | ⊕    | 8                         |     |         |
| April                        | 1009                       | 33                 | 24                 | 34                            | 22                           | 90                  | 74      | 4                         | 6    | 253             | 13                                 | 1                                                   | 1  | ⊕ | 2  | 4  | 33 | 46 | 8  | 5    | 1  | 3    | 7 | 5  | 5 | 25 | 39 | 7  | 9    | 1              | 5 | 0                     | ⊕    | 18                        |     |         |
| May                          | 1009                       | 32                 | 26                 | 34                            | 22                           | 88                  | 77      | 6                         | 6    | 382             | 14                                 | 1                                                   | 1  | 2 | 2  | 10 | 39 | 38 | 3  | 5    | 1  | ⊕    | 2 | 2  | 7 | 49 | 31 | 2  | 6    | 3              | 5 | ⊕                     | ⊕    | 11                        |     |         |
| June                         | 1009                       | 31                 | 25                 | 33                            | 23                           | 85                  | 78      | 6                         | 6    | 186             | 13                                 | ⊕                                                   | 0  | 0 | 1  | 8  | 44 | 41 | 4  | 2    | ⊕  | 0    | 1 | 1  | 5 | 52 | 35 | 4  | 3    | 4              | 6 | 0                     | 1    | 6                         |     |         |
| July                         | 1009                       | 31                 | 25                 | 32                            | 23                           | 84                  | 76      | 6                         | 6    | 125             | 8                                  | 0                                                   | 0  | 0 | ⊕  | 3  | 34 | 58 | 3  | 1    | 1  | 0    | 1 | 0  | 2 | 32 | 56 | 4  | 4    | 5              | 6 | 0                     | ⊕    | 1                         |     |         |
| August                       | 1010                       | 31                 | 25                 | 32                            | 23                           | 85                  | 77      | 6                         | 6    | 114             | 8                                  | ⊕                                                   | ⊕  | ⊕ | 0  | 3  | 41 | 51 | 3  | 1    | 0  | ⊕    | ⊕ | ⊕  | 5 | 40 | 49 | 3  | 2    | 4              | 6 | 0                     | 1    | 2                         |     |         |
| September                    | 1010                       | 31                 | 25                 | 33                            | 23                           | 88                  | 77      | 6                         | 6    | 236             | 10                                 | ⊕                                                   | 1  | 1 | 0  | 6  | 42 | 45 | 2  | 4    | ⊕  | 0    | 1 | 1  | 5 | 46 | 41 | 1  | 6    | 3              | 5 | ⊕                     | ⊕    | 3                         |     |         |
| October                      | 1010                       | 31                 | 24                 | 33                            | 22                           | 89                  | 78      | 5                         | 6    | 369             | 15                                 | 1                                                   | 1  | 1 | 1  | 5  | 32 | 49 | 8  | 4    | ⊕  | ⊕    | 2 | 2  | 4 | 32 | 44 | 7  | 9    | 2              | 5 | 0                     | 1    | 9                         |     |         |
| November                     | 1010                       | 31                 | 23                 | 33                            | 21                           | 93                  | 78      | 5                         | 6    | 310             | 14                                 | 14                                                  | 4  | 2 | 1  | 2  | 16 | 40 | 11 | 9    | 7  | 4    | 6 | 3  | 3 | 9  | 31 | 22 | 16   | 1              | 5 | ⊕                     | 1    | 16                        |     |         |
| December                     | 1011                       | 32                 | 22                 | 34                            | 20                           | 91                  | 74      | 3                         | 5    | 168             | 9                                  | 22                                                  | 27 | 6 | 1  | 1  | 5  | 16 | 12 | 10   | 22 | 11   | 2 | 2  | 4 | 5  | 20 | 28 | 6    | 3              | 6 | 1                     | ⊕    | 4                         |     |         |
| Means                        | 1010                       | 32                 | 24                 | 36*                           | 18§                          | 89                  | 75      | 5                         | 6    | —               | —                                  | 5                                                   | 6  | 2 | 1  | 4  | 28 | 42 | 8  | 4    | 5  | 3    | 2 | 1  | 4 | 28 | 38 | 13 | 6    | 3              | 6 | —                     | —    | —                         |     |         |
| Totals                       | —                          | —                  | —                  | —                             | —                            | —                   | —       | —                         | —    | 2404            | 120                                | —                                                   | —  | — | —  | —  | —  | —  | —  | —    | —  | —    | — | —  | — | —  | —  | —  | —    | —              | — | 1                     | 4    | 85                        |     |         |
| Extreme values               | —                          | —                  | —                  | 39†                           | 15‡                          | —                   | —       | —                         | —    | —               | —                                  | —                                                   | —  | — | —  | —  | —  | —  | —  | —    | —  | —    | — | —  | — | —  | —  | —  | —    | —              | — | —                     | —    | —                         |     |         |
| No. of years<br>observations | 24                         | 24                 |                    |                               |                              | 24                  |         | 24                        |      | 30              |                                    | 24                                                  |    |   |    |    |    |    |    |      |    | 24   |   |    |   |    |    |    |      |                |   | 24                    | 24   | 24                        |     |         |

\* Mean of highest each year

§ Mean of lowest each year

† Highest recorded temperature

‡ Lowest recorded temperature

⊕ Rare

⊖ All observations

1.209

WMO No 43369

**MINICOY** (8°18'N, 73°09'E) Height above MSL – 2 m  
Climatic Table compiled from 15 to 30 years observations, 1960 to 1997

| Month                        | Average pressure<br>at MSL | Temperatures       |                    |                               |                              | Average<br>humidity |         | Average<br>cloud<br>cover |      | Precipitation   |                                  | Wind distribution – Percentage of observations from |    |    |    |   |    |    |    |      |    |      |    |    |   |    |    |    |      |              |   |      |      |      |     |         |  |  |  | Mean<br>wind<br>speed |  | Number<br>of days<br>with |  |  |
|------------------------------|----------------------------|--------------------|--------------------|-------------------------------|------------------------------|---------------------|---------|---------------------------|------|-----------------|----------------------------------|-----------------------------------------------------|----|----|----|---|----|----|----|------|----|------|----|----|---|----|----|----|------|--------------|---|------|------|------|-----|---------|--|--|--|-----------------------|--|---------------------------|--|--|
|                              |                            | Mean<br>daily max. | Mean<br>daily min. | Mean highest<br>in each month | Mean lowest<br>in each month | 0830                | 1730    | 0830                      | 1730 | Average<br>fall | No. of days with<br>1 mm or more | 0830                                                |    |    |    |   |    |    |    |      |    | 1730 |    |    |   |    |    |    |      |              |   | 0830 | 1730 | Gale | Fog | Thunder |  |  |  |                       |  |                           |  |  |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                  |                                                     |    |    |    |   |    |    |    |      |    |      |    |    |   |    |    |    |      |              |   |      |      |      |     |         |  |  |  |                       |  |                           |  |  |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                  | N                                                   | NE | E  | SE | S | SW | W  | NW | Calm | N  | NE   | E  | SE | S | SW | W  | NW | Calm |              |   |      |      |      |     |         |  |  |  |                       |  |                           |  |  |
| January                      | hPa<br>1012                | °C<br>31           | °C<br>24           | °C<br>32                      | °C<br>21                     | %<br>81             | %<br>71 | Oktas<br>3 4              |      | mm<br>13        | 2                                | 23                                                  | 23 | 11 | 2  | ⊕ | 0  | 1  | 2  | 39   | 29 | 30   | 18 | 3  | 1 | ⊕  | 1  | 7  | 10   | Knots<br>2 3 |   | ⊕    | ⊕    | 1    |     |         |  |  |  |                       |  |                           |  |  |
| February                     | 1011                       | 31                 | 24                 | 33                            | 22                           | 79                  | 70      | 3                         | 4    | 23              | 2                                | 33                                                  | 17 | 7  | 1  | 0 | 0  | 1  | 10 | 31   | 52 | 23   | 6  | 1  | ⊕ | ⊕  | 1  | 14 | 4    | 4            | 4 | 0    | ⊕    | ⊕    |     |         |  |  |  |                       |  |                           |  |  |
| March                        | 1011                       | 32                 | 25                 | 34                            | 23                           | 78                  | 69      | 3                         | 4    | 21              | 2                                | 28                                                  | 12 | 6  | ⊕  | 1 | ⊕  | 4  | 16 | 33   | 41 | 13   | 6  | 2  | 1 | 1  | 4  | 27 | 6    | 2            | 3 | 0    | ⊕    | 2    |     |         |  |  |  |                       |  |                           |  |  |
| April                        | 1009                       | 33                 | 27                 | 34                            | 24                           | 76                  | 70      | 4                         | 5    | 60              | 5                                | 26                                                  | 9  | 2  | 3  | 2 | 1  | 3  | 37 | 18   | 26 | 5    | 3  | 2  | 3 | 1  | 8  | 44 | 8    | 3            | 4 | 0    | ⊕    | 4    |     |         |  |  |  |                       |  |                           |  |  |
| May                          | 1009                       | 33                 | 26                 | 35                            | 24                           | 79                  | 74      | 5                         | 6    | 189             | 12                               | 11                                                  | 1  | 1  | 1  | ⊕ | 5  | 22 | 42 | 18   | 12 | 1    | 1  | 1  | 2 | 4  | 29 | 47 | 3    | 4            | 4 | ⊕    | ⊕    | 6    |     |         |  |  |  |                       |  |                           |  |  |
| June                         | 1008                       | 31                 | 26                 | 34                            | 24                           | 85                  | 81      | 6                         | 7    | 293             | 19                               | ⊕                                                   | 0  | 0  | ⊕  | 1 | 8  | 62 | 19 | 11   | ⊕  | 1    | 0  | ⊕  | 2 | 9  | 71 | 16 | 1    | 6            | 7 | 0    | ⊕    | 4    |     |         |  |  |  |                       |  |                           |  |  |
| July                         | 1009                       | 31                 | 25                 | 33                            | 23                           | 87                  | 81      | 7                         | 7    | 230             | 16                               | ⊕                                                   | 0  | 0  | 0  | ⊕ | 5  | 74 | 17 | 5    | 2  | ⊕    | 0  | 1  | 0 | 5  | 70 | 22 | ⊕    | 6            | 6 | 0    | ⊕    | 2    |     |         |  |  |  |                       |  |                           |  |  |
| August                       | 1010                       | 31                 | 26                 | 33                            | 23                           | 85                  | 80      | 6                         | 6    | 241             | 16                               | 1                                                   | 0  | 0  | 0  | 0 | 2  | 61 | 31 | 5    | 1  | 0    | 0  | ⊕  | 0 | 2  | 58 | 39 | 1    | 6            | 6 | ⊕    | ⊕    | 1    |     |         |  |  |  |                       |  |                           |  |  |
| September                    | 1010                       | 31                 | 26                 | 32                            | 23                           | 82                  | 78      | 5                         | 6    | 184             | 14                               | 4                                                   | 0  | 0  | 1  | 1 | 3  | 29 | 59 | 5    | 7  | 0    | 0  | ⊕  | ⊕ | 3  | 37 | 51 | 1    | 5            | 5 | 0    | ⊕    | 1    |     |         |  |  |  |                       |  |                           |  |  |
| October                      | 1010                       | 31                 | 25                 | 33                            | 23                           | 84                  | 78      | 6                         | 5    | 147             | 11                               | 3                                                   | 3  | 5  | 2  | 5 | 6  | 28 | 20 | 28   | 6  | 2    | 3  | 2  | 5 | 5  | 27 | 38 | 13   | 2            | 4 | ⊕    | ⊕    | 2    |     |         |  |  |  |                       |  |                           |  |  |
| November                     | 1010                       | 31                 | 25                 | 33                            | 22                           | 82                  | 77      | 5                         | 5    | 145             | 9                                | 10                                                  | 7  | 7  | 5  | 2 | 2  | 8  | 25 | 34   | 14 | 11   | 11 | 5  | 2 | 4  | 10 | 26 | 17   | 2            | 2 | ⊕    | ⊕    | 3    |     |         |  |  |  |                       |  |                           |  |  |
| December                     | 1011                       | 31                 | 25                 | 33                            | 22                           | 80                  | 74      | 4                         | 4    | 67              | 5                                | 9                                                   | 27 | 15 | 6  | 3 | 2  | 1  | 6  | 31   | 20 | 28   | 18 | 8  | 3 | 2  | 2  | 7  | 12   | 3            | 3 | 0    | ⊕    | 2    |     |         |  |  |  |                       |  |                           |  |  |
| Means                        | 1010                       | 31                 | 25                 | 36 <sup>*</sup>               | 21 <sup>§</sup>              | 82                  | 75      | 5                         | 5    | —               | —                                | 12                                                  | 8  | 4  | 2  | 1 | 3  | 25 | 24 | 21   | 17 | 9    | 5  | 2  | 2 | 3  | 27 | 29 | 6    | 4            | 4 | —    | —    | —    |     |         |  |  |  |                       |  |                           |  |  |
| Totals                       | —                          | —                  | —                  | —                             | —                            | —                   | —       | —                         | —    | 1613            | 113                              | —                                                   | —  | —  | —  | — | —  | —  | —  | —    | —  | —    | —  | —  | — | —  | —  | —  | —    | —            | — | ⊕    | ⊕    | 28   |     |         |  |  |  |                       |  |                           |  |  |
| Extreme values               | —                          | —                  | —                  | 40 <sup>†</sup>               | 17 <sup>‡</sup>              | —                   | —       | —                         | —    | —               | —                                | —                                                   | —  | —  | —  | — | —  | —  | —  | —    | —  | —    | —  | —  | — | —  | —  | —  | —    | —            | — | —    | —    | —    |     |         |  |  |  |                       |  |                           |  |  |
| No. of years<br>observations | 15                         | 15                 |                    |                               |                              | 15                  |         | 15                        |      | 30              |                                  | 15                                                  |    |    |    |   |    |    |    |      |    | 15   |    |    |   |    |    |    |      |              |   | 15   |      | 15   | 15  | 15      |  |  |  |                       |  |                           |  |  |

\* Mean of highest each year  
§ Mean of lowest each year

† Highest recorded temperature  
‡ Lowest recorded temperature

⊕ Rare  
⊖ All observations



## 1.210

WMO No 43371

**TRIVANDRUM** (8°29'N, 76°57'E) Height above MSL – 64 m  
Climatic Table compiled from 24 to 30 years observations, 1960 to 1997

| Month                        | Average pressure<br>at MSL | Temperatures       |                    |                               |                              | Average<br>humidity |         | Average<br>cloud<br>cover |      | Precipitation   |                                  | Wind distribution – Percentage of observations from |    |   |    |   |    |    |    |      |   |      |   |    |    |    |    |    |      |                |   | Mean<br>wind<br>speed |      | Number<br>of days<br>with |     |         |
|------------------------------|----------------------------|--------------------|--------------------|-------------------------------|------------------------------|---------------------|---------|---------------------------|------|-----------------|----------------------------------|-----------------------------------------------------|----|---|----|---|----|----|----|------|---|------|---|----|----|----|----|----|------|----------------|---|-----------------------|------|---------------------------|-----|---------|
|                              |                            | Mean<br>daily max. | Mean<br>daily min. | Mean highest<br>in each month | Mean lowest<br>in each month | 0830                | 1730    | 0830                      | 1730 | Average<br>fall | No. of days with<br>1 mm or more | 0830                                                |    |   |    |   |    |    |    |      |   | 1730 |   |    |    |    |    |    |      |                |   | 0830                  | 1730 | Gale                      | Fog | Thunder |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                  | N                                                   | NE | E | SE | S | SW | W  | NW | Calm | N | NE   | E | SE | S  | SW | W  | NW | Calm |                |   |                       |      |                           |     |         |
| January                      | hPa<br>1012                | °C<br>32           | °C<br>22           | °C<br>35                      | °C<br>20                     | %<br>78             | %<br>63 | Oktas<br>3   4            |      | mm<br>26        | 2                                | 5                                                   | 15 | 5 | 3  | 0 | 1  | 0  | 0  | 71   | 2 | 1    | 1 | 2  | 13 | 34 | 31 | 8  | 9    | Knots<br>1   4 |   | ⊕                     | 1    | 2                         |     |         |
| February                     | 1011                       | 33                 | 23                 | 35                            | 21                           | 79                  | 63      | 3                         | 4    | 21              | 2                                | 7                                                   | 8  | 3 | 2  | ⊕ | 1  | 1  | 7  | 71   | 2 | 1    | ⊕ | 2  | 10 | 38 | 33 | 10 | 4    | 1              | 4 | ⊕                     | ⊕    | 3                         |     |         |
| March                        | 1010                       | 33                 | 24                 | 35                            | 22                           | 79                  | 66      | 3                         | 5    | 33              | 4                                | 15                                                  | 12 | 2 | 1  | 0 | 1  | 1  | 9  | 58   | 1 | 1    | 1 | 2  | 10 | 31 | 33 | 15 | 6    | 1              | 5 | ⊕                     | 1    | 6                         |     |         |
| April                        | 1009                       | 33                 | 25                 | 35                            | 23                           | 79                  | 73      | 5                         | 6    | 125             | 8                                | 19                                                  | 7  | 2 | 3  | 0 | ⊕  | 3  | 25 | 40   | 3 | 4    | 1 | 3  | 5  | 15 | 37 | 23 | 9    | 3              | 6 | ⊕                     | 1    | 16                        |     |         |
| May                          | 1008                       | 33                 | 25                 | 35                            | 23                           | 81                  | 74      | 6                         | 6    | 202             | 12                               | 27                                                  | 2  | 1 | 0  | 0 | ⊕  | 5  | 23 | 41   | 5 | 2    | ⊕ | 1  | 1  | 9  | 46 | 30 | 5    | 2              | 7 | ⊕                     | ⊕    | 15                        |     |         |
| June                         | 1009                       | 30                 | 24                 | 33                            | 22                           | 89                  | 81      | 7                         | 7    | 306             | 20                               | 15                                                  | 1  | 1 | 0  | 0 | 7  | 15 | 22 | 40   | 5 | 1    | 0 | 0  | 1  | 6  | 40 | 44 | 4    | 2              | 7 | ⊕                     | ⊕    | 5                         |     |         |
| July                         | 1009                       | 30                 | 23                 | 33                            | 22                           | 90                  | 80      | 7                         | 7    | 175             | 16                               | 16                                                  | 1  | 0 | ⊕  | 0 | 3  | 14 | 37 | 29   | 6 | 1    | ⊕ | 0  | ⊕  | 3  | 37 | 50 | 2    | 3              | 7 | ⊕                     | ⊕    | 2                         |     |         |
| August                       | 1010                       | 30                 | 23                 | 32                            | 22                           | 89                  | 78      | 7                         | 7    | 152             | 13                               | 10                                                  | 1  | 0 | 0  | 0 | 1  | 15 | 48 | 24   | 6 | 0    | 0 | ⊕  | 0  | 1  | 38 | 55 | 1    | 4              | 8 | ⊕                     | ⊕    | 1                         |     |         |
| September                    | 1010                       | 31                 | 23                 | 33                            | 22                           | 85                  | 78      | 6                         | 6    | 179             | 12                               | 17                                                  | 1  | 0 | 0  | 0 | 0  | 9  | 52 | 22   | 4 | ⊕    | 0 | ⊕  | ⊕  | 4  | 46 | 41 | 4    | 3              | 6 | ⊕                     | ⊕    | 6                         |     |         |
| October                      | 1010                       | 31                 | 23                 | 33                            | 22                           | 89                  | 80      | 6                         | 7    | 223             | 14                               | 10                                                  | 7  | 1 | 0  | 0 | 0  | 3  | 13 | 67   | 3 | 2    | 2 | 1  | 4  | 9  | 35 | 23 | 22   | 1              | 4 | ⊕                     | ⊕    | 14                        |     |         |
| November                     | 1010                       | 31                 | 23                 | 33                            | 22                           | 88                  | 78      | 6                         | 6    | 206             | 12                               | 3                                                   | 9  | 3 | 1  | 0 | 2  | 1  | 4  | 78   | 3 | 4    | 2 | 2  | 5  | 16 | 24 | 14 | 30   | 1              | 3 | ⊕                     | 1    | 12                        |     |         |
| December                     | 1011                       | 32                 | 23                 | 34                            | 21                           | 80                  | 69      | 4                         | 5    | 65              | 6                                | 6                                                   | 12 | 4 | 1  | 0 | 2  | 0  | 4  | 71   | 2 | 3    | 1 | 2  | 8  | 25 | 26 | 11 | 22   | 2              | 3 | 0                     | 1    | 4                         |     |         |
| Means                        | 1010                       | 32                 | 23                 | 36 <sup>*</sup>               | 20 <sup>§</sup>              | 84                  | 74      | 5                         | 6    | —               | —                                | 12                                                  | 6  | 2 | 1  | ⊕ | 2  | 6  | 20 | 51   | 3 | 2    | 1 | 1  | 5  | 16 | 35 | 27 | 10   | 2              | 5 | —                     | —    | —                         |     |         |
| Totals                       | —                          | —                  | —                  | —                             | —                            | —                   | —       | —                         | —    | 1713            | 121                              | —                                                   | —  | — | —  | — | —  | —  | —  | —    | — | —    | — | —  | —  | —  | —  | —  | —    | —              | — | ⊕                     | 5    | 86                        |     |         |
| Extreme values               | —                          | —                  | —                  | 39 <sup>†</sup>               | 18 <sup>‡</sup>              | —                   | —       | —                         | —    | —               | —                                | —                                                   | —  | — | —  | — | —  | —  | —  | —    | — | —    | — | —  | —  | —  | —  | —  | —    | —              | — | —                     | —    | —                         |     |         |
| No. of years<br>observations | 24                         | 24                 |                    |                               |                              | 24                  |         | 24                        |      | 30              |                                  | 24                                                  |    |   |    |   |    |    |    |      |   | 24   |   |    |    |    |    |    |      |                |   | 24                    | 24   | 24                        |     |         |

\* Mean of highest each year  
§ Mean of lowest each year

† Highest recorded temperature  
‡ Lowest recorded temperature

⊕ Rare  
⊖ All observations

## 1.211

WMO No 43418

**TRINCOMALEE (8°35'N, 81°15'E) Height above MSL – 7 m**  
Climatic Table compiled from 15 to 30 years observations, 1960 to 1997

| Month                        | Average pressure<br>at MSL | Temperatures       |                    |                               |                              | Average<br>humidity |         | Average<br>cloud<br>cover |      | Precipitation   |                                    | Wind distribution – Percentage of observations from |    |    |    |    |    |    |    |      |    |      |    |    |   |    |    |    |      |                |    |      |      |      |     | Mean<br>wind<br>speed |  | Number<br>of days<br>with |  |  |
|------------------------------|----------------------------|--------------------|--------------------|-------------------------------|------------------------------|---------------------|---------|---------------------------|------|-----------------|------------------------------------|-----------------------------------------------------|----|----|----|----|----|----|----|------|----|------|----|----|---|----|----|----|------|----------------|----|------|------|------|-----|-----------------------|--|---------------------------|--|--|
|                              |                            | Mean<br>daily max. | Mean<br>daily min. | Mean highest<br>in each month | Mean lowest<br>in each month | 0530                | 1730    | 0530                      | 1730 | Average<br>fall | No. of days with<br>2.5 mm or more | 0530                                                |    |    |    |    |    |    |    |      |    | 1730 |    |    |   |    |    |    |      |                |    | 0530 | 1730 | Gale | Fog | Thunder               |  |                           |  |  |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                    |                                                     |    |    |    |    |    |    |    |      |    |      |    |    |   |    |    |    |      |                |    |      |      |      |     |                       |  |                           |  |  |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                    | N                                                   | NE | E  | SE | S  | SW | W  | NW | Calm | N  | NE   | E  | SE | S | SW | W  | NW | Calm |                |    |      |      |      |     |                       |  |                           |  |  |
| January                      | hPa<br>1012                | °C<br>29           | °C<br>24           | °C<br>30                      | °C<br>22                     | %<br>85             | %<br>80 | Oktas<br>4   5            |      | mm<br>132       | 9                                  | 3                                                   | 39 | 32 | 5  | 0  | 1  | 0  | 0  | 21   | 7  | 55   | 18 | 5  | 0 | ⊕  | ⊕  | 1  | 13   | Knots<br>4   5 |    | 0    | ⊕    | ⊕    |     |                       |  |                           |  |  |
| February                     | 1011                       | 30                 | 24                 | 31                            | 22                           | 85                  | 76      | 4                         | 4    | 100             | 5                                  | 2                                                   | 23 | 22 | 16 | 0  | 1  | 1  | 2  | 33   | 4  | 34   | 29 | 20 | 1 | 0  | 0  | 1  | 11   | 4              | 4  | ⊕    | 0    | 1    |     |                       |  |                           |  |  |
| March                        | 1011                       | 31                 | 25                 | 34                            | 22                           | 90                  | 77      | 3                         | 3    | 54              | 4                                  | 0                                                   | 13 | 9  | 18 | 6  | 2  | 3  | 3  | 46   | 2  | 17   | 34 | 32 | 3 | 0  | 0  | 1  | 11   | 3              | 4  | 0    | ⊕    | 2    |     |                       |  |                           |  |  |
| April                        | 1009                       | 33                 | 26                 | 36                            | 23                           | 91                  | 77      | 4                         | 5    | 50              | 4                                  | 2                                                   | 1  | 1  | 32 | 9  | 6  | 6  | 4  | 40   | 2  | 7    | 16 | 50 | 3 | 3  | 6  | 1  | 12   | 3              | 5  | ⊕    | ⊕    | 8    |     |                       |  |                           |  |  |
| May                          | 1007                       | 36                 | 26                 | 38                            | 23                           | 87                  | 71      | 5                         | 5    | 52              | 5                                  | 1                                                   | 0  | 0  | 5  | 12 | 39 | 23 | 7  | 14   | ⊕  | 2    | 8  | 36 | 5 | 14 | 22 | 4  | 8    | 7              | 7  | 0    | 0    | 8    |     |                       |  |                           |  |  |
| June                         | 1006                       | 35                 | 26                 | 37                            | 23                           | 85                  | 62      | 5                         | 6    | 26              | 2                                  | 0                                                   | 0  | 0  | 2  | 3  | 59 | 20 | 4  | 11   | 1  | 1    | 1  | 1  | 2 | 28 | 59 | 3  | 5    | 9              | 11 | ⊕    | 0    | 2    |     |                       |  |                           |  |  |
| July                         | 1006                       | 35                 | 26                 | 37                            | 24                           | 83                  | 66      | 5                         | 6    | 70              | 3                                  | 0                                                   | 0  | 0  | 2  | 4  | 44 | 37 | 4  | 9    | 2  | 0    | 0  | 7  | 3 | 20 | 58 | 5  | 6    | 9              | 8  | 0    | 0    | 4    |     |                       |  |                           |  |  |
| August                       | 1007                       | 36                 | 25                 | 38                            | 23                           | 83                  | 67      | 4                         | 6    | 89              | 6                                  | 0                                                   | 0  | 0  | 1  | 2  | 50 | 42 | 2  | 4    | 1  | 3    | 3  | 12 | 3 | 13 | 45 | 10 | 10   | 9              | 7  | 0    | 0    | 5    |     |                       |  |                           |  |  |
| September                    | 1008                       | 35                 | 25                 | 37                            | 23                           | 86                  | 73      | 4                         | 6    | 104             | 5                                  | 0                                                   | 0  | 0  | 3  | 3  | 44 | 28 | 4  | 18   | 3  | 1    | 2  | 16 | 6 | 20 | 29 | 13 | 10   | 6              | 6  | 0    | ⊕    | 10   |     |                       |  |                           |  |  |
| October                      | 1009                       | 32                 | 24                 | 35                            | 23                           | 92                  | 78      | 5                         | 6    | 217             | 10                                 | 0                                                   | 1  | 1  | 1  | 12 | 16 | 20 | 13 | 36   | 4  | 5    | 9  | 12 | 3 | 8  | 22 | 10 | 28   | 4              | 4  | 0    | ⊕    | 9    |     |                       |  |                           |  |  |
| November                     | 1010                       | 30                 | 24                 | 32                            | 22                           | 95                  | 84      | 6                         | 6    | 334             | 13                                 | 2                                                   | 7  | 4  | 13 | 3  | 5  | 6  | 20 | 39   | 11 | 22   | 15 | 10 | 4 | 1  | 5  | 11 | 22   | 3              | 4  | 0    | ⊕    | 7    |     |                       |  |                           |  |  |
| December                     | 1012                       | 29                 | 24                 | 30                            | 22                           | 88                  | 85      | 5                         | 6    | 341             | 13                                 | 9                                                   | 36 | 20 | 6  | 0  | 1  | 2  | 6  | 21   | 12 | 36   | 18 | 9  | 0 | 0  | ⊕  | 7  | 19   | 5              | 5  | ⊕    | ⊕    | 2    |     |                       |  |                           |  |  |
| Means                        | 1009                       | 33                 | 25                 | 38*                           | 21§                          | 88                  | 75      | 5                         | 5    | —               | —                                  | 1                                                   | 10 | 7  | 8  | 5  | 22 | 16 | 6  | 25   | 4  | 15   | 13 | 18 | 3 | 9  | 19 | 6  | 13   | 6              | 6  | —    | —    | —    |     |                       |  |                           |  |  |
| Totals                       | —                          | —                  | —                  | —                             | —                            | —                   | —       | —                         | —    | 1569            | 79                                 | —                                                   | —  | —  | —  | —  | —  | —  | —  | —    | —  | —    | —  | —  | — | —  | —  | —  | —    | —              | —  | ⊕    | ⊕    | 58   |     |                       |  |                           |  |  |
| Extreme values               | —                          | —                  | —                  | 40†                           | 18‡                          | —                   | —       | —                         | —    | —               | —                                  | —                                                   | —  | —  | —  | —  | —  | —  | —  | —    | —  | —    | —  | —  | — | —  | —  | —  | —    | —              | —  | —    | —    | —    |     |                       |  |                           |  |  |
| No. of years<br>observations | 15                         | 15                 |                    |                               |                              | 15                  |         | 15                        |      | 30              |                                    | 15                                                  |    |    |    |    |    |    |    |      |    | 15   |    |    |   |    |    |    |      |                |    | 15   | 15   | 15   |     |                       |  |                           |  |  |

\* Mean of highest each year  
§ Mean of lowest each year

† Highest recorded temperature  
‡ Lowest recorded temperature

⊕ Rare  
⊖ All observations

1.212

WMO No 43353

COCHIN/WILLINGDON (9°57'N, 76°16'E) Height above MSL – 3 m

Climatic Table compiled from 15 to 30 years observations, 1960 to 1997

| Month                        | Average pressure<br>at MSL | Temperatures       |                    |                               |                              | Average<br>humidity |         | Average<br>cloud<br>cover |      | Precipitation   |                                  | Wind distribution – Percentage of observations from |    |    |    |   |    |    |    |      |    |      |   |    |   |    |    |    |      |                |   |      |      |      |     |         |  |  |  | Mean<br>wind<br>speed |  | Number<br>of days<br>with |  |  |
|------------------------------|----------------------------|--------------------|--------------------|-------------------------------|------------------------------|---------------------|---------|---------------------------|------|-----------------|----------------------------------|-----------------------------------------------------|----|----|----|---|----|----|----|------|----|------|---|----|---|----|----|----|------|----------------|---|------|------|------|-----|---------|--|--|--|-----------------------|--|---------------------------|--|--|
|                              |                            | Mean<br>daily max. | Mean<br>daily min. | Mean highest<br>in each month | Mean lowest<br>in each month | 0830                | 1730    | 0830                      | 1730 | Average<br>fall | No. of days with<br>1 mm or more | 0830                                                |    |    |    |   |    |    |    |      |    | 1730 |   |    |   |    |    |    |      |                |   | 0830 | 1730 | Gale | Fog | Thunder |  |  |  |                       |  |                           |  |  |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                  |                                                     |    |    |    |   |    |    |    |      |    |      |   |    |   |    |    |    |      |                |   |      |      |      |     |         |  |  |  |                       |  |                           |  |  |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                  | N                                                   | NE | E  | SE | S | SW | W  | NW | Calm | N  | NE   | E | SE | S | SW | W  | NW | Calm |                |   |      |      |      |     |         |  |  |  |                       |  |                           |  |  |
| January                      | hPa<br>1012                | °C<br>32           | °C<br>23           | °C<br>33                      | °C<br>20                     | %<br>74             | %<br>62 | Oktas<br>3   3            |      | mm<br>10        | 1                                | 7                                                   | 33 | 18 | 0  | ⊕ | 1  | 2  | 1  | 38   | 4  | ⊕    | 2 | 1  | ⊕ | 8  | 68 | 17 | 1    | Knots<br>3   7 |   | ⊕    | ⊕    | 1    |     |         |  |  |  |                       |  |                           |  |  |
| February                     | 1011                       | 32                 | 24                 | 34                            | 22                           | 78                  | 66      | 3                         | 2    | 34              | 2                                | 7                                                   | 21 | 12 | 0  | 3 | 0  | 1  | ⊕  | 56   | 2  | 1    | 1 | 0  | ⊕ | 9  | 60 | 26 | ⊕    | 3              | 8 | ⊕    | ⊕    | 1    |     |         |  |  |  |                       |  |                           |  |  |
| March                        | 1010                       | 33                 | 25                 | 34                            | 23                           | 77                  | 68      | 3                         | 3    | 50              | 4                                | 11                                                  | 8  | 5  | 1  | 1 | 0  | ⊕  | 1  | 72   | 5  | 1    | ⊕ | ⊕  | 1 | 7  | 58 | 28 | 1    | 3              | 9 | ⊕    | 1    | 4    |     |         |  |  |  |                       |  |                           |  |  |
| April                        | 1009                       | 33                 | 26                 | 34                            | 23                           | 77                  | 70      | 4                         | 5    | 145             | 9                                | 6                                                   | 6  | 11 | 3  | 0 | ⊕  | 2  | 5  | 67   | 6  | 2    | 2 | 2  | 3 | 8  | 47 | 29 | 2    | 2              | 9 | ⊕    | 1    | 10   |     |         |  |  |  |                       |  |                           |  |  |
| May                          | 1008                       | 33                 | 26                 | 34                            | 23                           | 81                  | 73      | 5                         | 5    | 364             | 15                               | 8                                                   | 8  | 2  | 3  | ⊕ | 3  | 3  | 1  | 70   | 8  | 2    | 1 | 1  | 2 | 3  | 40 | 41 | 2    | 3              | 8 | ⊕    | 1    | 11   |     |         |  |  |  |                       |  |                           |  |  |
| June                         | 1008                       | 30                 | 25                 | 34                            | 22                           | 89                  | 82      | 6                         | 7    | 756             | 27                               | 5                                                   | 4  | 4  | 2  | 7 | 9  | 20 | 9  | 40   | 12 | 2    | 1 | 1  | 2 | 9  | 39 | 26 | 8    | 4              | 7 | 1    | 2    | 8    |     |         |  |  |  |                       |  |                           |  |  |
| July                         | 1009                       | 30                 | 24                 | 32                            | 22                           | 91                  | 84      | 7                         | 7    | 572             | 26                               | 6                                                   | 1  | 2  | 3  | 2 | 3  | 17 | 12 | 55   | 15 | 2    | ⊕ | ⊕  | 1 | 6  | 37 | 30 | 8    | 4              | 6 | ⊕    | 1    | 4    |     |         |  |  |  |                       |  |                           |  |  |
| August                       | 1010                       | 30                 | 24                 | 32                            | 22                           | 90                  | 83      | 7                         | 7    | 386             | 23                               | 10                                                  | 1  | 0  | 0  | 1 | 4  | 10 | 12 | 62   | 20 | 1    | 0 | ⊕  | ⊕ | 4  | 35 | 38 | 3    | 3              | 7 | 1    | 1    | 3    |     |         |  |  |  |                       |  |                           |  |  |
| September                    | 1010                       | 30                 | 24                 | 32                            | 23                           | 86                  | 80      | 6                         | 6    | 235             | 17                               | 18                                                  | 2  | 2  | 1  | 3 | 4  | 9  | 2  | 58   | 13 | ⊕    | 1 | ⊕  | 3 | 9  | 34 | 37 | 3    | 3              | 7 | 1    | 1    | 4    |     |         |  |  |  |                       |  |                           |  |  |
| October                      | 1010                       | 31                 | 24                 | 32                            | 23                           | 86                  | 77      | 5                         | 6    | 333             | 17                               | 3                                                   | 1  | 9  | 5  | 2 | ⊕  | ⊕  | 2  | 77   | 3  | 1    | 1 | 2  | 5 | 14 | 52 | 22 | 1    | 4              | 6 | ⊕    | 1    | 12   |     |         |  |  |  |                       |  |                           |  |  |
| November                     | 1011                       | 31                 | 24                 | 34                            | 23                           | 83                  | 72      | 5                         | 5    | 184             | 11                               | 6                                                   | 15 | 4  | 7  | 5 | 0  | 1  | 1  | 61   | 6  | 2    | 4 | 1  | 6 | 15 | 49 | 16 | 2    | 4              | 6 | ⊕    | 1    | 8    |     |         |  |  |  |                       |  |                           |  |  |
| December                     | 1012                       | 32                 | 23                 | 33                            | 20                           | 75                  | 64      | 3                         | 3    | 37              | 3                                | 2                                                   | 30 | 14 | 1  | ⊕ | 0  | ⊕  | ⊕  | 53   | 5  | 3    | 3 | ⊕  | 2 | 10 | 57 | 18 | 3    | 3              | 6 | ⊕    | ⊕    | 3    |     |         |  |  |  |                       |  |                           |  |  |
| Means                        | 1010                       | 31                 | 24                 | 35*                           | 19§                          | 82                  | 73      | 5                         | 5    | —               | —                                | 7                                                   | 11 | 7  | 2  | 2 | 2  | 6  | 4  | 59   | 8  | 2    | 1 | 1  | 2 | 8  | 48 | 27 | 3    | 3              | 7 | —    | —    | —    |     |         |  |  |  |                       |  |                           |  |  |
| Totals                       | —                          | —                  | —                  | —                             | —                            | —                   | —       | —                         | —    | 3106            | 155                              | —                                                   | —  | —  | —  | — | —  | —  | —  | —    | —  | —    | — | —  | — | —  | —  | —  | —    | —              | — | 3    | 10   | 69   |     |         |  |  |  |                       |  |                           |  |  |
| Extreme values               | —                          | —                  | —                  | 36†                           | 16‡                          | —                   | —       | —                         | —    | —               | —                                | —                                                   | —  | —  | —  | — | —  | —  | —  | —    | —  | —    | — | —  | — | —  | —  | —  | —    | —              | — | —    | —    | —    |     |         |  |  |  |                       |  |                           |  |  |
| No. of years<br>observations | 15                         | 15                 |                    |                               |                              | 15                  |         | 15                        |      | 30              |                                  | 15                                                  |    |    |    |   |    |    |    |      |    | 15   |   |    |   |    |    |    |      |                |   | 15   |      | 15   | 15  | 15      |  |  |  |                       |  |                           |  |  |

\* Mean of highest each year

§ Mean of lowest each year

† Highest recorded temperature

‡ Lowest recorded temperature

⊕ Rare

⊖ All observations

1.213

WMO No 43314

CALICUT(KOZHIKODE) (11°15'N, 75°47'E) Height above MSL – 5 m

Climatic Table compiled from 15 to 30 years observations, 1960 to 1997

| Month                        | Average pressure<br>at MSL | Temperatures       |                    |                               |                              | Average<br>humidity |         | Average<br>cloud<br>cover |      | Precipitation   |                                   | Wind distribution – Percentage of observations from |    |    |    |   |    |    |    |      |    |      |   |    |   |    |    |    |      |                |   | Mean<br>wind<br>speed |      | Number<br>of days<br>with |     |         |
|------------------------------|----------------------------|--------------------|--------------------|-------------------------------|------------------------------|---------------------|---------|---------------------------|------|-----------------|-----------------------------------|-----------------------------------------------------|----|----|----|---|----|----|----|------|----|------|---|----|---|----|----|----|------|----------------|---|-----------------------|------|---------------------------|-----|---------|
|                              |                            | Mean<br>daily max. | Mean<br>daily min. | Mean highest<br>in each month | Mean lowest<br>in each month | 0830                | 1730    | 0830                      | 1730 | Average<br>fall | No. of days with<br>2.5mm or more | 0830                                                |    |    |    |   |    |    |    |      |    | 1730 |   |    |   |    |    |    |      |                |   | 0830                  | 1730 | Gale                      | Fog | Thunder |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                   |                                                     |    |    |    |   |    |    |    |      |    |      |   |    |   |    |    |    |      |                |   |                       |      |                           |     |         |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                   | N                                                   | NE | E  | SE | S | SW | W  | NW | Calm | N  | NE   | E | SE | S | SW | W  | NW | Calm |                |   |                       |      |                           |     |         |
| January                      | hPa<br>1012                | °C<br>32           | °C<br>22           | °C<br>33                      | °C<br>20                     | %<br>77             | %<br>65 | Oktas<br>2   2            |      | mm<br>6         | ⊕                                 | 1                                                   | 2  | 80 | 11 | 1 | 1  | 1  | 1  | 3    | 2  | 1    | 1 | 0  | 1 | 3  | 54 | 38 | 1    | Knots<br>4   7 |   | 0                     | ⊕    | ⊕                         |     |         |
| February                     | 1011                       | 32                 | 23                 | 33                            | 22                           | 79                  | 67      | 1                         | 2    | 11              | ⊕                                 | 4                                                   | 5  | 75 | 11 | 1 | ⊕  | 1  | 2  | 2    | 2  | 1    | 0 | 0  | 1 | 2  | 43 | 51 | ⊕    | 4              | 8 | ⊕                     | ⊕    | 0                         |     |         |
| March                        | 1011                       | 33                 | 25                 | 34                            | 23                           | 79                  | 70      | 1                         | 2    | 21              | 1                                 | 8                                                   | 12 | 54 | 6  | 1 | 2  | 3  | 5  | 9    | 4  | 1    | ⊕ | 0  | 0 | 2  | 42 | 51 | 0    | 3              | 9 | ⊕                     | 1    | 1                         |     |         |
| April                        | 1009                       | 33                 | 26                 | 35                            | 23                           | 76                  | 71      | 3                         | 4    | 111             | 5                                 | 16                                                  | 13 | 30 | 5  | ⊕ | ⊕  | 6  | 17 | 14   | 2  | 1    | 2 | 1  | ⊕ | 2  | 44 | 48 | ⊕    | 4              | 9 | ⊕                     | 1    | 5                         |     |         |
| May                          | 1008                       | 33                 | 26                 | 35                            | 23                           | 78                  | 74      | 4                         | 5    | 322             | 11                                | 20                                                  | 10 | 18 | 3  | 2 | 3  | 9  | 24 | 11   | 3  | 1    | ⊕ | ⊕  | 1 | 3  | 39 | 51 | 1    | 4              | 9 | ⊕                     | ⊕    | 8                         |     |         |
| June                         | 1008                       | 30                 | 25                 | 34                            | 23                           | 89                  | 85      | 6                         | 7    | 871             | 24                                | 6                                                   | 13 | 31 | 7  | 2 | 6  | 14 | 10 | 9    | 6  | 4    | 6 | 1  | 2 | 11 | 35 | 27 | 7    | 5              | 6 | ⊕                     | 1    | 5                         |     |         |
| July                         | 1009                       | 29                 | 23                 | 32                            | 22                           | 94                  | 87      | 7                         | 7    | 860             | 26                                | 8                                                   | 11 | 31 | 5  | 2 | 5  | 15 | 9  | 13   | 10 | 5    | 3 | ⊕  | 1 | 10 | 27 | 39 | 4    | 3              | 6 | ⊕                     | 1    | 2                         |     |         |
| August                       | 1010                       | 29                 | 24                 | 32                            | 22                           | 92                  | 87      | 6                         | 6    | 405             | 20                                | 14                                                  | 7  | 12 | 1  | 3 | 6  | 14 | 21 | 21   | 13 | 2    | 1 | 0  | 1 | 5  | 32 | 43 | 3    | 3              | 5 | ⊕                     | 1    | 1                         |     |         |
| September                    | 1010                       | 30                 | 24                 | 32                            | 23                           | 89                  | 82      | 5                         | 6    | 215             | 12                                | 10                                                  | 10 | 18 | 2  | 2 | 2  | 18 | 24 | 14   | 5  | ⊕    | 1 | 1  | ⊕ | 7  | 44 | 41 | 1    | 4              | 6 | ⊕                     | ⊕    | 3                         |     |         |
| October                      | 1010                       | 31                 | 24                 | 33                            | 23                           | 88                  | 78      | 5                         | 6    | 290             | 12                                | 5                                                   | 9  | 50 | 7  | 3 | 3  | 6  | 3  | 15   | 7  | 3    | 5 | 1  | 2 | 9  | 39 | 31 | 3    | 3              | 6 | 0                     | ⊕    | 9                         |     |         |
| November                     | 1011                       | 32                 | 24                 | 33                            | 22                           | 85                  | 73      | 4                         | 5    | 140             | 7                                 | ⊕                                                   | 6  | 70 | 9  | 2 | 2  | 4  | 0  | 8    | 3  | 4    | 8 | 2  | 1 | 11 | 43 | 26 | 2    | 3              | 5 | ⊕                     | 1    | 6                         |     |         |
| December                     | 1012                       | 32                 | 23                 | 34                            | 21                           | 78                  | 66      | 2                         | 3    | 30              | 1                                 | 2                                                   | 3  | 80 | 12 | ⊕ | ⊕  | 1  | 0  | 3    | 2  | 1    | 1 | 1  | 1 | 6  | 56 | 31 | 1    | 5              | 6 | ⊕                     | ⊕    | 2                         |     |         |
| Means                        | 1010                       | 31                 | 24                 | 36*                           | 19§                          | 84                  | 75      | 4                         | 5    | –               | –                                 | 8                                                   | 8  | 46 | 7  | 1 | 2  | 8  | 10 | 10   | 5  | 2    | 2 | ⊕  | 1 | 6  | 42 | 40 | 2    | 4              | 7 | –                     | –    | –                         |     |         |
| Totals                       | –                          | –                  | –                  | –                             | –                            | –                   | –       | –                         | –    | 3282            | 120                               | –                                                   | –  | –  | –  | – | –  | –  | –  | –    | –  | –    | – | –  | – | –  | –  | –  | –    | –              | – | ⊕                     | 6    | 42                        |     |         |
| Extreme values               | –                          | –                  | –                  | 40†                           | 16‡                          | –                   | –       | –                         | –    | –               | –                                 | –                                                   | –  | –  | –  | – | –  | –  | –  | –    | –  | –    | – | –  | – | –  | –  | –  | –    | –              | – | –                     | –    | –                         |     |         |
| No. of years<br>observations | 15                         | 15                 |                    |                               |                              | 15                  |         | 15                        |      | 30              |                                   | 15                                                  |    |    |    |   |    |    |    |      |    | 15   |   |    |   |    |    |    |      |                |   | 15                    |      | 15                        | 15  | 15      |

\* Mean of highest each year

§ Mean of lowest each year

† Highest recorded temperature

‡ Lowest recorded temperature

⊕ Rare

⊖ All observations

1.214

WMO No 43284

MANGALORE/BAJPE (12°55'N, 74°53'E) Height above MSL – 102 m

Climatic Table compiled from 15 to 30 years observations, 1960 to 1997

| Month                        | Average pressure<br>at MSL | Temperatures       |                    |                               |                              | Average<br>humidity |         | Average<br>cloud<br>cover |      | Precipitation   |                                    | Wind distribution – Percentage of observations from |    |    |    |   |    |    |    |      |   |      |   |    |    |    |    |    |      |              |    | Mean<br>wind<br>speed |      | Number<br>of days<br>with |     |         |
|------------------------------|----------------------------|--------------------|--------------------|-------------------------------|------------------------------|---------------------|---------|---------------------------|------|-----------------|------------------------------------|-----------------------------------------------------|----|----|----|---|----|----|----|------|---|------|---|----|----|----|----|----|------|--------------|----|-----------------------|------|---------------------------|-----|---------|
|                              |                            | Mean<br>daily max. | Mean<br>daily min. | Mean highest<br>in each month | Mean lowest<br>in each month | 0830                | 1730    | 0830                      | 1730 | Average<br>fall | No. of days with<br>2.5 mm or more | 0830                                                |    |    |    |   |    |    |    |      |   | 1730 |   |    |    |    |    |    |      |              |    | 0830                  | 1730 | Gale                      | Fog | Thunder |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                    |                                                     |    |    |    |   |    |    |    |      |   |      |   |    |    |    |    |    |      |              |    |                       |      |                           |     |         |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                    | N                                                   | NE | E  | SE | S | SW | W  | NW | Calm | N | NE   | E | SE | S  | SW | W  | NW | Calm |              |    |                       |      |                           |     |         |
| January                      | hPa<br>1012                | °C<br>33           | °C<br>21           | °C<br>36                      | °C<br>18                     | %<br>73             | %<br>55 | Oktas<br>2 2              |      | mm<br>5         | 1                                  | 3                                                   | 5  | 68 | 13 | 1 | 0  | 0  | 2  | 10   | 1 | 0    | 1 | 1  | ⊕  | 7  | 74 | 16 | 2    | Knots<br>5 8 |    | ⊕                     | ⊕    | ⊕                         |     |         |
| February                     | 1011                       | 33                 | 21                 | 36                            | 20                           | 77                  | 58      | 1                         | 2    | 2               | ⊕                                  | 2                                                   | 6  | 60 | 6  | 1 | 0  | 0  | 1  | 25   | 1 | ⊕    | 1 | 0  | 0  | 7  | 67 | 24 | ⊕    | 4            | 10 | ⊕                     | ⊕    | 0                         |     |         |
| March                        | 1011                       | 34                 | 24                 | 37                            | 21                           | 79                  | 63      | 2                         | 2    | 9               | 1                                  | 4                                                   | 8  | 42 | 8  | 1 | ⊕  | 1  | 1  | 34   | 1 | 1    | 0 | 0  | 1  | 7  | 70 | 21 | ⊕    | 4            | 10 | ⊕                     | ⊕    | 1                         |     |         |
| April                        | 1009                       | 34                 | 25                 | 36                            | 22                           | 76                  | 64      | 3                         | 3    | 40              | 3                                  | 5                                                   | 9  | 38 | 8  | 3 | 0  | 2  | 6  | 31   | 1 | 1    | ⊕ | ⊕  | 1  | 5  | 68 | 24 | ⊕    | 4            | 10 | ⊕                     | ⊕    | 5                         |     |         |
| May                          | 1008                       | 34                 | 25                 | 36                            | 22                           | 77                  | 66      | 5                         | 5    | 233             | 10                                 | 11                                                  | 11 | 32 | 8  | 2 | 1  | 5  | 10 | 22   | 1 | 2    | 1 | 1  | 2  | 5  | 63 | 25 | 1    | 4            | 10 | ⊕                     | ⊕    | 7                         |     |         |
| June                         | 1008                       | 30                 | 24                 | 34                            | 22                           | 90                  | 83      | 7                         | 7    | 980             | 26                                 | 4                                                   | 3  | 32 | 16 | 4 | 6  | 16 | 5  | 13   | 2 | 1    | 2 | 3  | 10 | 17 | 46 | 8  | 11   | 6            | 8  | ⊕                     | 1    | 10                        |     |         |
| July                         | 1008                       | 29                 | 23                 | 32                            | 21                           | 94                  | 86      | 7                         | 7    | 1059            | 28                                 | 2                                                   | 3  | 16 | 10 | 4 | 14 | 26 | 5  | 20   | 2 | 1    | 1 | 2  | 4  | 11 | 53 | 15 | 9    | 5            | 8  | ⊕                     | 1    | 6                         |     |         |
| August                       | 1009                       | 29                 | 23                 | 31                            | 22                           | 93                  | 86      | 7                         | 7    | 577             | 26                                 | 5                                                   | 2  | 6  | 7  | 3 | 13 | 23 | 9  | 33   | 2 | ⊕    | ⊕ | ⊕  | 2  | 9  | 65 | 15 | 7    | 4            | 8  | ⊕                     | 1    | 3                         |     |         |
| September                    | 1010                       | 30                 | 23                 | 32                            | 22                           | 90                  | 79      | 6                         | 6    | 279             | 19                                 | 3                                                   | 4  | 27 | 10 | 1 | 3  | 6  | 9  | 38   | 1 | ⊕    | ⊕ | ⊕  | 3  | 14 | 55 | 22 | 4    | 4            | 8  | ⊕                     | 1    | 4                         |     |         |
| October                      | 1010                       | 32                 | 23                 | 34                            | 22                           | 87                  | 78      | 5                         | 6    | 206             | 13                                 | 1                                                   | 5  | 41 | 16 | 2 | ⊕  | 1  | 2  | 32   | 1 | 1    | 3 | 1  | 4  | 14 | 49 | 20 | 6    | 4            | 7  | ⊕                     | 1    | 11                        |     |         |
| November                     | 1011                       | 33                 | 23                 | 35                            | 20                           | 81                  | 67      | 4                         | 5    | 71              | 6                                  | 2                                                   | 3  | 55 | 15 | 1 | ⊕  | 0  | 0  | 24   | 3 | 1    | 2 | 2  | 3  | 9  | 56 | 17 | 6    | 6            | 6  | ⊕                     | ⊕    | 6                         |     |         |
| December                     | 1012                       | 33                 | 21                 | 35                            | 18                           | 72                  | 59      | 3                         | 3    | 18              | 1                                  | 2                                                   | 3  | 75 | 13 | 1 | 0  | 1  | 0  | 6    | 2 | 0    | 2 | 2  | 2  | 7  | 59 | 21 | 5    | 6            | 7  | ⊕                     | ⊕    | 1                         |     |         |
| Means                        | 1010                       | 32                 | 23                 | 37*                           | 17§                          | 82                  | 70      | 4                         | 5    | —               | —                                  | 4                                                   | 5  | 41 | 11 | 2 | 3  | 6  | 4  | 24   | 1 | 1    | 1 | 1  | 3  | 9  | 61 | 19 | 4    | 5            | 8  | —                     | —    | —                         |     |         |
| Totals                       | —                          | —                  | —                  | —                             | —                            | —                   | —       | —                         | —    | 3479            | 134                                | —                                                   | —  | —  | —  | — | —  | —  | —  | —    | — | —    | — | —  | —  | —  | —  | —  | —    | —            | —  | ⊕                     | 5    | 54                        |     |         |
| Extreme values               | —                          | —                  | —                  | 39†                           | 15‡                          | —                   | —       | —                         | —    | —               | —                                  | —                                                   | —  | —  | —  | — | —  | —  | —  | —    | — | —    | — | —  | —  | —  | —  | —  | —    | —            | —  | —                     | —    | —                         |     |         |
| No. of years<br>observations | 15                         | 15                 |                    |                               |                              | 15                  |         | 15                        |      | 30              |                                    | 15                                                  |    |    |    |   |    |    |    |      |   | 15   |   |    |    |    |    |    |      |              |    | 15                    |      | 15                        | 15  | 15      |

\* Mean of highest each year

§ Mean of lowest each year

† Highest recorded temperature

‡ Lowest recorded temperature

⊕ Rare

⊖ All observations



1.215

WMO No 43192

**PANJIM, GOA** (15°29'N, 73°49'E) Height above MSL – 60 m  
Climatic Table compiled from 24 to 30 years observations, 1960 to 1997

| Month                        | Average pressure<br>at MSL | Temperatures       |                    |                               |                              | Average<br>humidity |         | Average<br>cloud<br>cover |      | Precipitation   |                                  | Wind distribution – Percentage of observations from |    |    |    |   |    |    |    |      |   |      |   |    |    |    |    |    |      | Mean<br>wind<br>speed |      | Number<br>of days<br>with |     |         |
|------------------------------|----------------------------|--------------------|--------------------|-------------------------------|------------------------------|---------------------|---------|---------------------------|------|-----------------|----------------------------------|-----------------------------------------------------|----|----|----|---|----|----|----|------|---|------|---|----|----|----|----|----|------|-----------------------|------|---------------------------|-----|---------|
|                              |                            | Mean<br>daily max. | Mean<br>daily min. | Mean highest<br>in each month | Mean lowest<br>in each month | 0830                | 1730    | 0830                      | 1730 | Average<br>fall | No. of days with<br>1 mm or more | 0830                                                |    |    |    |   |    |    |    |      |   | 1730 |   |    |    |    |    |    |      | 0830                  | 1730 | Gale                      | Fog | Thunder |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                  | N                                                   | NE | E  | SE | S | SW | W  | NW | Calm | N | NE   | E | SE | S  | SW | W  | NW | Calm |                       |      |                           |     |         |
| January                      | hPa<br>1012                | °C<br>32           | °C<br>20           | °C<br>35                      | °C<br>17                     | %<br>77             | %<br>56 | Oktas<br>2                | 2    | mm<br>0         | 0                                | 4                                                   | 45 | 45 | 2  | 1 | 1  | 0  | 1  | 2    | 3 | 1    | 1 | 1  | 1  | 12 | 49 | 33 | 1    | 3                     | 6    | ⊕                         | 1   | ⊕       |
| February                     | 1011                       | 32                 | 20                 | 36                            | 18                           | 77                  | 59      | 1                         | 2    | 0               | 0                                | 6                                                   | 33 | 48 | 2  | 1 | 1  | ⊕  | 3  | 5    | 3 | ⊕    | 0 | ⊕  | 1  | 11 | 44 | 41 | ⊕    | 4                     | 7    | ⊕                         | 1   | ⊕       |
| March                        | 1010                       | 32                 | 23                 | 34                            | 20                           | 80                  | 65      | 3                         | 2    | 1               | 0                                | 13                                                  | 28 | 36 | 10 | 5 | 1  | 1  | 1  | 6    | 3 | 1    | 0 | ⊕  | ⊕  | 13 | 48 | 35 | 1    | 4                     | 7    | ⊕                         | 1   | ⊕       |
| April                        | 1009                       | 33                 | 25                 | 35                            | 23                           | 76                  | 67      | 4                         | 3    | 5               | 1                                | 21                                                  | 27 | 18 | 5  | 6 | 2  | 1  | 8  | 11   | 2 | ⊕    | 0 | ⊕  | 1  | 9  | 44 | 43 | 2    | 4                     | 8    | ⊕                         | ⊕   | 2       |
| May                          | 1008                       | 34                 | 26                 | 36                            | 23                           | 75                  | 68      | 6                         | 5    | 56              | 4                                | 30                                                  | 15 | 7  | 4  | 5 | 5  | 11 | 13 | 10   | 4 | 1    | 1 | ⊕  | 1  | 7  | 46 | 40 | 1    | 4                     | 8    | ⊕                         | 1   | 4       |
| June                         | 1006                       | 31                 | 25                 | 34                            | 23                           | 87                  | 83      | 7                         | 7    | 891             | 24                               | 10                                                  | 7  | 10 | 10 | 6 | 15 | 28 | 7  | 8    | 2 | 1    | 2 | 3  | 10 | 28 | 35 | 18 | 1    | 5                     | 8    | ⊕                         | 2   | 7       |
| July                         | 1006                       | 29                 | 24                 | 31                            | 22                           | 92                  | 87      | 8                         | 8    | 853             | 28                               | 2                                                   | 5  | 8  | 5  | 4 | 23 | 41 | 5  | 7    | 3 | 1    | 1 | 1  | 3  | 22 | 55 | 12 | 1    | 8                     | 8    | ⊕                         | 1   | 2       |
| August                       | 1008                       | 29                 | 24                 | 31                            | 23                           | 91                  | 86      | 7                         | 7    | 622             | 27                               | 3                                                   | 3  | 6  | 6  | 2 | 11 | 52 | 6  | 11   | 2 | 1    | ⊕ | 1  | 1  | 14 | 60 | 20 | 2    | 5                     | 7    | ⊕                         | 1   | 1       |
| September                    | 1009                       | 30                 | 24                 | 32                            | 23                           | 89                  | 81      | 7                         | 7    | 237             | 15                               | 8                                                   | 15 | 22 | 7  | 4 | 7  | 11 | 6  | 19   | 6 | 1    | ⊕ | ⊕  | 7  | 13 | 39 | 34 | 1    | 3                     | 6    | ⊕                         | 1   | 3       |
| October                      | 1010                       | 32                 | 24                 | 35                            | 22                           | 85                  | 76      | 6                         | 5    | 97              | 7                                | 5                                                   | 34 | 37 | 11 | 2 | 2  | 1  | 2  | 6    | 5 | 2    | 2 | 2  | 7  | 12 | 42 | 27 | 2    | 3                     | 5    | ⊕                         | 3   | 6       |
| November                     | 1011                       | 33                 | 23                 | 35                            | 20                           | 76                  | 64      | 4                         | 4    | 29              | 4                                | 4                                                   | 39 | 48 | 5  | 1 | 0  | ⊕  | 1  | 2    | 5 | 4    | 4 | 2  | 5  | 11 | 37 | 31 | 2    | 3                     | 4    | ⊕                         | 1   | 2       |
| December                     | 1012                       | 33                 | 21                 | 34                            | 19                           | 74                  | 58      | 3                         | 3    | 3               | 0                                | 4                                                   | 46 | 46 | 2  | 0 | ⊕  | 0  | 0  | 2    | 4 | 4    | 4 | 2  | 1  | 12 | 43 | 29 | 1    | 4                     | 4    | ⊕                         | 1   | ⊕       |
| Means                        |                            | 32                 | 23                 | 36*                           | 16§                          | 82                  | 71      | 5                         | 5    | –               | –                                | 9                                                   | 25 | 27 | 6  | 3 | 6  | 12 | 4  | 8    | 4 | 1    | 1 | 1  | 3  | 14 | 45 | 30 | 1    | 4                     | 7    | –                         | –   | –       |
| Totals                       | –                          | –                  | –                  | –                             | –                            | –                   | –       | –                         | –    | 2794            | 110                              | –                                                   | –  | –  | –  | – | –  | –  | –  | –    | – | –    | – | –  | –  | –  | –  | –  | –    | –                     | –    | ⊕                         | 14  | 27      |
| Extreme values               | –                          | –                  | –                  | 37†                           | 14‡                          | –                   | –       | –                         | –    | –               | –                                | –                                                   | –  | –  | –  | – | –  | –  | –  | –    | – | –    | – | –  | –  | –  | –  | –  | –    | –                     | –    | –                         | –   | –       |
| No. of years<br>observations | 24                         | 24                 |                    |                               |                              | 24                  |         | 24                        |      | 30              |                                  | 24                                                  |    |    |    |   |    |    |    |      |   | 24   |   |    |    |    |    |    |      | 24                    |      | 24                        | 24  | 24      |

\* Mean of highest each year  
§ Mean of lowest each year

† Highest recorded temperature  
‡ Lowest recorded temperature

⊕ Rare  
⊖ All observations

1.216

WMO No 43110

**RATNĀGIRI** (16°59'N, 73°20'E) Height above MSL – 67 m

Climatic Table compiled from 15 to 30 years observations, 1960 to 1997

| Month                        | Average pressure<br>at MSL | Temperatures       |                    |                               |                              | Average<br>humidity |         | Average<br>cloud<br>cover |      | Precipitation   |                                    | Wind distribution – Percentage of observations from |    |    |    |    |    |    |    |      |    |      |   |    |   |    |    |    |      |                |   | Mean<br>wind<br>speed |      | Number<br>of days<br>with |     |         |
|------------------------------|----------------------------|--------------------|--------------------|-------------------------------|------------------------------|---------------------|---------|---------------------------|------|-----------------|------------------------------------|-----------------------------------------------------|----|----|----|----|----|----|----|------|----|------|---|----|---|----|----|----|------|----------------|---|-----------------------|------|---------------------------|-----|---------|
|                              |                            | Mean<br>daily max. | Mean<br>daily min. | Mean highest<br>in each month | Mean lowest<br>in each month | 0830                | 1730    | 0830                      | 1730 | Average<br>fall | No. of days with<br>2.5 mm or more | 0830                                                |    |    |    |    |    |    |    |      |    | 1730 |   |    |   |    |    |    |      |                |   | 0830                  | 1730 | Gale                      | Fog | Thunder |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                    | N                                                   | NE | E  | SE | S  | SW | W  | NW | Calm | N  | NE   | E | SE | S | SW | W  | NW | Calm |                |   |                       |      |                           |     |         |
| January                      | hPa<br>1013                | °C<br>32           | °C<br>19           | °C<br>35                      | °C<br>15                     | %<br>60             | %<br>56 | Oktas<br>2   2            |      | mm<br>2         | ⊕                                  | 4                                                   | 11 | 58 | 15 | 1  | 1  | 0  | 1  | 9    | 27 | 1    | 1 | 1  | ⊕ | 3  | 19 | 48 | ⊕    | Knots<br>2   5 |   | ⊕                     | ⊕    | 0                         |     |         |
| February                     | 1012                       | 31                 | 19                 | 36                            | 16                           | 61                  | 57      | 1                         | 1    | 1               | ⊕                                  | 11                                                  | 18 | 40 | 16 | 2  | 0  | 0  | 4  | 9    | 24 | ⊕    | ⊕ | ⊕  | 0 | 5  | 17 | 54 | 0    | 2              | 6 | 0                     | 1    | ⊕                         |     |         |
| March                        | 1011                       | 31                 | 22                 | 34                            | 18                           | 71                  | 64      | 2                         | 2    | 1               | ⊕                                  | 16                                                  | 15 | 15 | 25 | 10 | 0  | 1  | 4  | 16   | 12 | 0    | 0 | 0  | ⊕ | 7  | 26 | 54 | 0    | 2              | 6 | ⊕                     | ⊕    | ⊕                         |     |         |
| April                        | 1009                       | 32                 | 24                 | 34                            | 21                           | 73                  | 67      | 3                         | 3    | 2               | ⊕                                  | 28                                                  | 15 | 6  | 15 | 10 | 1  | 2  | 15 | 9    | 13 | 0    | 0 | 1  | 0 | 6  | 28 | 52 | 0    | 3              | 6 | 0                     | ⊕    | 1                         |     |         |
| May                          | 1008                       | 33                 | 26                 | 35                            | 24                           | 73                  | 69      | 5                         | 5    | 34              | 2                                  | 25                                                  | 10 | 5  | 7  | 5  | 5  | 12 | 20 | 11   | 6  | 0    | ⊕ | ⊕  | ⊕ | 7  | 35 | 52 | ⊕    | 3              | 7 | ⊕                     | ⊕    | 2                         |     |         |
| June                         | 1006                       | 31                 | 25                 | 34                            | 22                           | 85                  | 82      | 7                         | 7    | 732             | 22                                 | 9                                                   | 3  | 7  | 16 | 10 | 7  | 25 | 15 | 9    | 4  | 1    | 1 | 2  | 7 | 26 | 37 | 20 | 3    | 3              | 6 | ⊕                     | 1    | 7                         |     |         |
| July                         | 1006                       | 29                 | 24                 | 30                            | 22                           | 90                  | 86      | 7                         | 7    | 838             | 25                                 | 1                                                   | 2  | 3  | 9  | 5  | 13 | 53 | 8  | 5    | 4  | 0    | 0 | ⊕  | 2 | 17 | 60 | 14 | 4    | 4              | 5 | 0                     | 1    | 2                         |     |         |
| August                       | 1007                       | 29                 | 24                 | 30                            | 22                           | 89                  | 87      | 7                         | 7    | 501             | 21                                 | 3                                                   | 3  | 2  | 5  | 4  | 6  | 56 | 11 | 9    | 4  | 1    | ⊕ | ⊕  | 1 | 8  | 61 | 20 | 5    | 3              | 5 | ⊕                     | 1    | ⊕                         |     |         |
| September                    | 1009                       | 30                 | 24                 | 32                            | 22                           | 89                  | 81      | 6                         | 7    | 307             | 15                                 | 7                                                   | 9  | 12 | 21 | 9  | 5  | 13 | 5  | 20   | 11 | 0    | 1 | ⊕  | 2 | 9  | 39 | 35 | 4    | 2              | 5 | ⊕                     | 1    | 2                         |     |         |
| October                      | 1010                       | 32                 | 23                 | 36                            | 21                           | 78                  | 73      | 5                         | 5    | 94              | 5                                  | 6                                                   | 7  | 28 | 34 | 10 | 2  | 1  | 1  | 12   | 21 | 2    | 1 | 2  | 3 | 7  | 16 | 45 | 5    | 2              | 4 | ⊕                     | 1    | 4                         |     |         |
| November                     | 1012                       | 33                 | 22                 | 35                            | 19                           | 62                  | 62      | 3                         | 3    | 24              | 1                                  | 2                                                   | 9  | 52 | 25 | 5  | 1  | 1  | 1  | 6    | 28 | 1    | 3 | 1  | ⊕ | 4  | 17 | 44 | 2    | 3              | 4 | 0                     | 1    | 1                         |     |         |
| December                     | 1013                       | 32                 | 20                 | 35                            | 17                           | 58                  | 57      | 2                         | 2    | 2               | ⊕                                  | 1                                                   | 7  | 56 | 30 | 1  | 0  | ⊕  | 0  | 5    | 30 | 2    | 4 | 1  | ⊕ | 2  | 11 | 47 | 2    | 4              | 4 | 0                     | ⊕    | ⊕                         |     |         |
| Means                        | 1010                       | 31                 | 23                 | 37 <sup>*</sup>               | 15 <sup>§</sup>              | 74                  | 70      | 4                         | 4    | —               | —                                  | 9                                                   | 9  | 24 | 18 | 6  | 3  | 14 | 7  | 10   | 15 | 1    | 1 | 1  | 1 | 8  | 31 | 40 | 2    | 3              | 5 | —                     | —    | —                         |     |         |
| Totals                       | —                          | —                  | —                  | —                             | —                            | —                   | —       | —                         | —    | 2538            | 91                                 | —                                                   | —  | —  | —  | —  | —  | —  | —  | —    | —  | —    | — | —  | — | —  | —  | —  | —    | —              | — | ⊕                     | 7    | 19                        |     |         |
| Extreme values               | —                          | —                  | —                  | 42 <sup>†</sup>               | 13 <sup>‡</sup>              | —                   | —       | —                         | —    | —               | —                                  | —                                                   | —  | —  | —  | —  | —  | —  | —  | —    | —  | —    | — | —  | — | —  | —  | —  | —    | —              | — | —                     | —    | —                         |     |         |
| No. of years<br>observations | 15                         | 15                 |                    |                               |                              | 15                  |         | 15                        |      | 30              |                                    | 15                                                  |    |    |    |    |    |    |    |      |    | 15   |   |    |   |    |    |    |      |                |   | 15                    |      | 15                        | 15  | 15      |

\* Mean of highest each year

§ Mean of lowest each year

† Highest recorded temperature

‡ Lowest recorded temperature

⊕ Rare

⊖ All observations

1.217

WMO No 43003

**MUMBAI (BOMBAY)/SANTA CRUZ (19°07'N, 72°51'E) Height above MSL –14 m**

Climatic Table compiled from 24 to 30 years observations, 1960 to 1997

| Month                        | Average pressure<br>at MSL | Temperatures       |                    |                               |                              | Average<br>humidity |         | Average<br>cloud<br>cover |      | Precipitation   |                                  | Wind distribution – Percentage of observations from |    |    |    |    |    |    |    |      |    |      |   |    |   |    |    |    |      |                |   | Mean<br>wind<br>speed |      | Number<br>of days<br>with |     |         |
|------------------------------|----------------------------|--------------------|--------------------|-------------------------------|------------------------------|---------------------|---------|---------------------------|------|-----------------|----------------------------------|-----------------------------------------------------|----|----|----|----|----|----|----|------|----|------|---|----|---|----|----|----|------|----------------|---|-----------------------|------|---------------------------|-----|---------|
|                              |                            | Mean<br>daily max. | Mean<br>daily min. | Mean highest<br>in each month | Mean lowest<br>in each month | 0830                | 1730    | 0830                      | 1730 | Average<br>fall | No. of days with<br>1 mm or more | 0830                                                |    |    |    |    |    |    |    |      |    | 1730 |   |    |   |    |    |    |      |                |   | 0830                  | 1730 | Gale                      | Fog | Thunder |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                  | N                                                   | NE | E  | SE | S  | SW | W  | NW | Calm | N  | NE   | E | SE | S | SW | W  | NW | Calm |                |   |                       |      |                           |     |         |
| January                      | hPa<br>1013                | °C<br>31           | °C<br>17           | °C<br>35                      | °C<br>12                     | %<br>70             | %<br>50 | Oktas<br>1   1            |      | mm<br>0         | 0                                | 3                                                   | 13 | 14 | 1  | 1  | 0  | 0  | 2  | 66   | 23 | ⊕    | 0 | ⊕  | 1 | 1  | 18 | 57 | 1    | Knots<br>1   6 |   | ⊕                     | 1    | ⊕                         |     |         |
| February                     | 1012                       | 31                 | 18                 | 36                            | 14                           | 69                  | 47      | 1                         | <1   | 0               | 0                                | 8                                                   | 14 | 13 | 2  | 1  | 0  | 0  | 1  | 63   | 21 | ⊕    | 0 | ⊕  | ⊕ | ⊕  | 15 | 63 | ⊕    | 2              | 8 | ⊕                     | ⊕    | 0                         |     |         |
| March                        | 1011                       | 32                 | 21                 | 38                            | 17                           | 71                  | 51      | 2                         | 1    | 0               | 0                                | 14                                                  | 7  | 4  | 3  | 1  | 1  | ⊕  | 6  | 62   | 17 | 0    | 0 | 0  | 0 | 2  | 20 | 61 | 1    | 1              | 8 | ⊕                     | 1    | ⊕                         |     |         |
| April                        | 1009                       | 33                 | 24                 | 37                            | 21                           | 70                  | 60      | 3                         | 1    | 2               | 0                                | 11                                                  | 13 | 7  | 3  | 6  | 2  | 3  | 8  | 48   | 7  | ⊕    | 0 | ⊕  | ⊕ | 3  | 36 | 52 | 1    | 2              | 8 | ⊕                     | ⊕    | ⊕                         |     |         |
| May                          | 1007                       | 33                 | 27                 | 36                            | 24                           | 71                  | 66      | 5                         | 3    | 12              | 1                                | 4                                                   | 2  | 1  | 5  | 10 | 16 | 22 | 12 | 28   | 2  | ⊕    | 0 | ⊕  | 1 | 7  | 56 | 33 | 1    | 4              | 8 | ⊕                     | ⊕    | ⊕                         |     |         |
| June                         | 1004                       | 32                 | 27                 | 35                            | 24                           | 80                  | 74      | 6                         | 6    | 592             | 17                               | 1                                                   | ⊕  | 1  | 8  | 6  | 25 | 35 | 5  | 18   | 1  | ⊕    | 1 | 1  | 8 | 27 | 49 | 11 | 2    | 4              | 8 | ⊕                     | 1    | 5                         |     |         |
| July                         | 1004                       | 31                 | 26                 | 32                            | 23                           | 86                  | 82      | 7                         | 7    | 682             | 25                               | ⊕                                                   | 0  | 0  | 3  | 6  | 31 | 47 | 4  | 10   | 1  | ⊕    | 0 | ⊕  | 3 | 26 | 59 | 6  | 4    | 6              | 7 | ⊕                     | 1    | 3                         |     |         |
| August                       | 1006                       | 30                 | 25                 | 32                            | 23                           | 86                  | 82      | 7                         | 7    | 487             | 25                               | ⊕                                                   | 0  | 0  | 0  | 2  | 19 | 59 | 4  | 16   | ⊕  | ⊕    | 0 | ⊕  | 1 | 14 | 69 | 9  | 5    | 5              | 7 | ⊕                     | 1    | 2                         |     |         |
| September                    | 1008                       | 31                 | 25                 | 33                            | 22                           | 86                  | 77      | 6                         | 6    | 307             | 15                               | 2                                                   | 1  | 2  | 2  | 3  | 6  | 14 | 3  | 64   | 5  | 1    | 1 | ⊕  | 1 | 11 | 45 | 32 | 5    | 1              | 6 | ⊕                     | ⊕    | 5                         |     |         |
| October                      | 1010                       | 34                 | 24                 | 36                            | 20                           | 75                  | 65      | 4                         | 3    | 61              | 5                                | 1                                                   | 11 | 15 | 2  | 2  | 0  | 1  | 1  | 67   | 16 | 2    | 1 | ⊕  | 2 | 4  | 22 | 49 | 3    | 1              | 5 | ⊕                     | 1    | 2                         |     |         |
| November                     | 1012                       | 34                 | 21                 | 36                            | 17                           | 65                  | 56      | 2                         | 2    | 23              | 2                                | 2                                                   | 18 | 27 | 4  | 0  | 0  | 0  | ⊕  | 50   | 22 | 4    | 1 | 1  | 1 | 1  | 15 | 52 | 3    | 1              | 5 | ⊕                     | ⊕    | 1                         |     |         |
| December                     | 1013                       | 32                 | 19                 | 34                            | 15                           | 67                  | 53      | 2                         | 2    | 2               | 0                                | 1                                                   | 15 | 27 | 1  | 0  | 0  | 0  | 1  | 55   | 21 | 2    | ⊕ | 0  | 0 | ⊕  | 16 | 59 | 1    | 1              | 5 | ⊕                     | ⊕    | ⊕                         |     |         |
| Means                        | 1009                       | 32                 | 23                 | 39*                           | 12§                          | 75                  | 64      | 4                         | 3    | —               | —                                | 4                                                   | 8  | 9  | 3  | 3  | 9  | 15 | 4  | 45   | 11 | 1    | ⊕ | ⊕  | 2 | 8  | 35 | 40 | 3    | 2              | 7 | —                     | —    | —                         |     |         |
| Totals                       | —                          | —                  | —                  | —                             | —                            | —                   | —       | —                         | —    | 2168            | 90                               | —                                                   | —  | —  | —  | —  | —  | —  | —  | —    | —  | —    | — | —  | — | —  | —  | —  | —    | —              | — | ⊕                     | 6    | 18                        |     |         |
| Extreme values               | —                          | —                  | —                  | 41†                           | 10‡                          | —                   | —       | —                         | —    | —               | —                                | —                                                   | —  | —  | —  | —  | —  | —  | —  | —    | —  | —    | — | —  | — | —  | —  | —  | —    | —              | — | —                     | —    | —                         |     |         |
| No. of years<br>observations | 24                         | 24                 |                    |                               |                              | 24                  |         | 24                        |      | 30              |                                  | 24                                                  |    |    |    |    |    |    |    |      |    | 24   |   |    |   |    |    |    |      |                |   | 24                    |      | 24                        | 24  | 24      |

\* Mean of highest each year

§ Mean of lowest each year

† Highest recorded temperature

‡ Lowest recorded temperature

⊕ Rare

⊖ All observations

1.218

WMO No 42840

SŪRAT (21°12'N, 72°50'E) Height above MSL – 12 m

Climatic Table compiled from 15 to 30 years observations, 1960 to 1997

| Month                        | Average pressure<br>at MSL | Temperatures       |                    |                               |                              | Average<br>humidity |         | Average<br>cloud<br>cover |      | Precipitation   |                                    | Wind distribution – Percentage of observations from |    |    |    |    |    |    |    |      |    |      |    |    |    |    |    |    |      |              |   | Mean<br>wind<br>speed |      | Number<br>of days<br>with |     |         |
|------------------------------|----------------------------|--------------------|--------------------|-------------------------------|------------------------------|---------------------|---------|---------------------------|------|-----------------|------------------------------------|-----------------------------------------------------|----|----|----|----|----|----|----|------|----|------|----|----|----|----|----|----|------|--------------|---|-----------------------|------|---------------------------|-----|---------|
|                              |                            | Mean<br>daily max. | Mean<br>daily min. | Mean highest<br>in each month | Mean lowest<br>in each month | 0830                | 1730    | 0830                      | 1730 | Average<br>fall | No. of days with<br>2.5 mm or more | 0830                                                |    |    |    |    |    |    |    |      |    | 1730 |    |    |    |    |    |    |      |              |   | 0830                  | 1730 | Gale                      | Fog | Thunder |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                    | N                                                   | NE | E  | SE | S  | SW | W  | NW | Calm | N  | NE   | E  | SE | S  | SW | W  | NW | Calm |              |   |                       |      |                           |     |         |
| January                      | hPa<br>1014                | °C<br>31           | °C<br>16           | °C<br>35                      | °C<br>12                     | %<br>66             | %<br>39 | Oktas<br>1 1              |      | mm<br>3         | ⊕                                  | 27                                                  | 15 | 4  | 4  | 2  | 1  | 2  | 17 | 27   | 21 | 7    | 1  | 2  | 1  | 4  | 13 | 46 | 5    | Knots<br>3 5 |   | ⊕                     | ⊕    | ⊕                         |     |         |
| February                     | 1013                       | 32                 | 17                 | 36                            | 14                           | 61                  | 31      | <1                        | 1    | 2               | ⊕                                  | 16                                                  | 12 | 1  | 5  | 4  | 3  | 4  | 16 | 40   | 21 | 7    | 1  | ⊕  | 1  | 9  | 20 | 38 | 2    | 2            | 5 | 0                     | 1    | 0                         |     |         |
| March                        | 1011                       | 35                 | 21                 | 39                            | 17                           | 61                  | 30      | 1                         | 1    | 0               | 0                                  | 8                                                   | 10 | 5  | 3  | 7  | 11 | 11 | 13 | 32   | 8  | 2    | 2  | 1  | 3  | 16 | 34 | 27 | 7    | 3            | 4 | ⊕                     | ⊕    | 0                         |     |         |
| April                        | 1008                       | 37                 | 24                 | 41                            | 21                           | 65                  | 39      | 1                         | 1    | 5               | ⊕                                  | 9                                                   | 2  | 1  | 6  | 18 | 18 | 12 | 9  | 24   | 7  | 1    | 0  | 0  | 6  | 34 | 30 | 19 | 3    | 4            | 5 | ⊕                     | ⊕    | ⊕                         |     |         |
| May                          | 1006                       | 36                 | 27                 | 41                            | 25                           | 70                  | 55      | 2                         | 1    | 3               | ⊕                                  | 3                                                   | 1  | 1  | 1  | 15 | 48 | 15 | 3  | 13   | 1  | ⊕    | ⊕  | 1  | 13 | 56 | 24 | 4  | 1    | 5            | 6 | ⊕                     | ⊕    | ⊕                         |     |         |
| June                         | 1003                       | 35                 | 27                 | 38                            | 24                           | 77                  | 66      | 5                         | 4    | 193             | 8                                  | 1                                                   | 1  | 1  | 2  | 11 | 51 | 20 | 4  | 11   | ⊕  | 1    | 0  | 1  | 14 | 63 | 17 | 2  | 3    | 5            | 6 | 1                     | 1    | 2                         |     |         |
| July                         | 1002                       | 31                 | 26                 | 34                            | 24                           | 83                  | 77      | 7                         | 6    | 451             | 17                                 | 1                                                   | 1  | 0  | 4  | 6  | 50 | 18 | 3  | 18   | 0  | 0    | 0  | 1  | 5  | 69 | 19 | 1  | 5    | 4            | 5 | ⊕                     | 1    | 1                         |     |         |
| August                       | 1004                       | 31                 | 26                 | 33                            | 23                           | 84                  | 77      | 6                         | 6    | 231             | 12                                 | 0                                                   | 0  | 0  | 0  | 1  | 40 | 33 | 4  | 22   | 0  | 1    | ⊕  | ⊕  | 6  | 65 | 24 | 2  | 2    | 4            | 5 | ⊕                     | 1    | 1                         |     |         |
| September                    | 1007                       | 32                 | 25                 | 36                            | 23                           | 82                  | 69      | 4                         | 4    | 221             | 9                                  | 2                                                   | 1  | 0  | 3  | 6  | 23 | 21 | 7  | 37   | 3  | 1    | 1  | 1  | 8  | 52 | 20 | 7  | 8    | 3            | 4 | ⊕                     | 1    | 2                         |     |         |
| October                      | 1010                       | 35                 | 25                 | 38                            | 21                           | 69                  | 50      | 2                         | 2    | 33              | 3                                  | 10                                                  | 7  | 6  | 12 | 5  | 2  | 3  | 7  | 47   | 9  | 9    | 5  | 3  | 8  | 16 | 18 | 21 | 13   | 2            | 4 | ⊕                     | ⊕    | 1                         |     |         |
| November                     | 1013                       | 34                 | 21                 | 36                            | 17                           | 61                  | 40      | 1                         | 1    | 18              | 1                                  | 11                                                  | 16 | 13 | 9  | 3  | 1  | 2  | 7  | 39   | 15 | 13   | 11 | 5  | 1  | 7  | 11 | 25 | 13   | 3            | 4 | ⊕                     | 1    | ⊕                         |     |         |
| December                     | 1014                       | 32                 | 18                 | 35                            | 14                           | 64                  | 40      | 1                         | 1    | 3               | ⊕                                  | 23                                                  | 12 | 14 | 7  | 2  | 1  | 2  | 8  | 31   | 21 | 11   | 8  | 4  | 1  | 5  | 9  | 30 | 11   | 3            | 4 | ⊕                     | ⊕    | 0                         |     |         |
| Means                        | 1009                       | 33                 | 23                 | 42 <sup>*</sup>               | 12 <sup>§</sup>              | 70                  | 51      | 3                         | 2    | —               | —                                  | 9                                                   | 6  | 4  | 5  | 7  | 21 | 12 | 8  | 28   | 9  | 5    | 2  | 2  | 5  | 32 | 20 | 19 | 6    | 3            | 5 | —                     | —    | —                         |     |         |
| Totals                       | —                          | —                  | —                  | —                             | —                            | —                   | —       | —                         | —    | 1163            | 51                                 | —                                                   | —  | —  | —  | —  | —  | —  | —  | —    | —  | —    | —  | —  | —  | —  | —  | —  | —    | —            | — | 1                     | 6    | 7                         |     |         |
| Extreme values               | —                          | —                  | —                  | 45 <sup>†</sup>               | 4 <sup>‡</sup>               | —                   | —       | —                         | —    | —               | —                                  | —                                                   | —  | —  | —  | —  | —  | —  | —  | —    | —  | —    | —  | —  | —  | —  | —  | —  | —    | —            | — | —                     | —    | —                         |     |         |
| No. of years<br>observations | 15                         | 15                 |                    |                               |                              | 15                  |         | 15                        |      | 30              |                                    | 15                                                  |    |    |    |    |    |    |    |      |    | 15   |    |    |    |    |    |    |      |              |   | 15                    |      | 15                        | 15  | 15      |

\* Mean of highest each year

§ Mean of lowest each year

† Highest recorded temperature

‡ Lowest recorded temperature

⊕ Rare

⊖ All observations

1.219

WMO No 42909

VERĀVAL (20°54'N, 70°22'E) Height above MSL – 8 m

Climatic Table compiled from 15 to 30 years observations, 1960 to 1997

| Month                        | Average pressure<br>at MSL | Temperatures       |                    |                               |                              | Average<br>humidity |         | Average<br>cloud<br>cover |      | Precipitation   |                                  | Wind distribution – Percentage of observations from |    |   |    |   |    |    |    |      |    |      |   |    |    |    |    |    |      |                |    | Mean<br>wind<br>speed |      | Number<br>of days<br>with |     |         |
|------------------------------|----------------------------|--------------------|--------------------|-------------------------------|------------------------------|---------------------|---------|---------------------------|------|-----------------|----------------------------------|-----------------------------------------------------|----|---|----|---|----|----|----|------|----|------|---|----|----|----|----|----|------|----------------|----|-----------------------|------|---------------------------|-----|---------|
|                              |                            | Mean<br>daily max. | Mean<br>daily min. | Mean highest<br>in each month | Mean lowest<br>in each month | 0830                | 1730    | 0830                      | 1730 | Average<br>fall | No. of days with<br>1 mm or more | 0830                                                |    |   |    |   |    |    |    |      |    | 1730 |   |    |    |    |    |    |      |                |    | 0830                  | 1730 | Gale                      | Fog | Thunder |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                  | N                                                   | NE | E | SE | S | SW | W  | NW | Calm | N  | NE   | E | SE | S  | SW | W  | NW | Calm |                |    |                       |      |                           |     |         |
| January                      | hPa<br>1015                | °C<br>29           | °C<br>15           | °C<br>31                      | °C<br>12                     | %<br>65             | %<br>61 | Oktas<br>1   1            |      | mm<br>1         | 0                                | 25                                                  | 55 | 8 | ⊕  | 1 | 0  | ⊕  | 8  | 3    | 13 | 6    | 1 | 2  | 6  | 9  | 32 | 30 | ⊕    | Knots<br>5   9 |    | ⊕                     | 1    | ⊕                         |     |         |
| February                     | 1013                       | 30                 | 16                 | 35                            | 13                           | 68                  | 65      | 1                         | <1   | 1               | 0                                | 34                                                  | 41 | 4 | 1  | 0 | 1  | 2  | 15 | 2    | 2  | 4    | 0 | 2  | 4  | 7  | 49 | 32 | 0    | 5              | 10 | ⊕                     | 1    | 0                         |     |         |
| March                        | 1012                       | 32                 | 19                 | 38                            | 16                           | 69                  | 74      | 1                         | 1    | 0               | 0                                | 38                                                  | 23 | 2 | 1  | 0 | 0  | 7  | 24 | 5    | 1  | 0    | 0 | 1  | 3  | 4  | 57 | 34 | 0    | 5              | 10 | ⊕                     | 1    | 0                         |     |         |
| April                        | 1009                       | 32                 | 22                 | 39                            | 20                           | 76                  | 77      | 2                         | 1    | 1               | 0                                | 30                                                  | 4  | 1 | 0  | 1 | 1  | 13 | 44 | 5    | 1  | ⊕    | 0 | 1  | 1  | 5  | 64 | 28 | 0    | 5              | 11 | ⊕                     | 1    | ⊕                         |     |         |
| May                          | 1007                       | 32                 | 26                 | 35                            | 23                           | 82                  | 79      | 3                         | 2    | 1               | 0                                | 9                                                   | 1  | 0 | ⊕  | 4 | 7  | 46 | 33 | 1    | ⊕  | 1    | 0 | ⊕  | 1  | 6  | 75 | 17 | 0    | 7              | 11 | ⊕                     | 1    | ⊕                         |     |         |
| June                         | 1003                       | 32                 | 27                 | 35                            | 25                           | 85                  | 81      | 5                         | 5    | 207             | 7                                | 2                                                   | 2  | 1 | 1  | 4 | 14 | 59 | 17 | 1    | 1  | 1    | 0 | 2  | 7  | 20 | 62 | 7  | 1    | 9              | 12 | ⊕                     | 1    | 1                         |     |         |
| July                         | 1002                       | 31                 | 26                 | 33                            | 23                           | 88                  | 85      | 7                         | 7    | 229             | 13                               | 1                                                   | 1  | 0 | 2  | 2 | 20 | 68 | 6  | 1    | 1  | 1    | 0 | 1  | 3  | 15 | 74 | 7  | ⊕    | 13             | 14 | ⊕                     | 1    | 1                         |     |         |
| August                       | 1004                       | 30                 | 25                 | 31                            | 23                           | 89                  | 85      | 7                         | 7    | 168             | 13                               | ⊕                                                   | 1  | 1 | 1  | 2 | 12 | 70 | 12 | 2    | ⊕  | ⊕    | 0 | 0  | 1  | 10 | 80 | 9  | ⊕    | 11             | 11 | ⊕                     | 1    | ⊕                         |     |         |
| September                    | 1007                       | 31                 | 25                 | 34                            | 23                           | 87                  | 81      | 4                         | 4    | 79              | 6                                | 15                                                  | 4  | 2 | ⊕  | 2 | 3  | 40 | 25 | 10   | 2  | ⊕    | ⊕ | 0  | 3  | 8  | 60 | 26 | 1    | 7              | 9  | ⊕                     | 1    | 1                         |     |         |
| October                      | 1010                       | 34                 | 23                 | 38                            | 21                           | 73                  | 73      | 2                         | 2    | 15              | 1                                | 24                                                  | 39 | 7 | 1  | ⊕ | 2  | 4  | 16 | 6    | 1  | 2    | 1 | 6  | 11 | 11 | 45 | 22 | 1    | 5              | 8  | ⊕                     | 1    | 1                         |     |         |
| November                     | 1013                       | 33                 | 20                 | 37                            | 16                           | 60                  | 65      | 1                         | 1    | 33              | 1                                | 25                                                  | 62 | 5 | ⊕  | 1 | 0  | 1  | 5  | 1    | 3  | 3    | 1 | 14 | 17 | 9  | 33 | 17 | 3    | 5              | 6  | ⊕                     | 1    | 0                         |     |         |
| December                     | 1015                       | 31                 | 17                 | 34                            | 13                           | 61                  | 63      | 1                         | 1    | 0               | 0                                | 23                                                  | 65 | 5 | ⊕  | ⊕ | 1  | 1  | 3  | 1    | 11 | 6    | 1 | 14 | 15 | 8  | 24 | 20 | 2    | 5              | 7  | 1                     | ⊕    | 0                         |     |         |
| Means                        | 1009                       | 31                 | 22                 | 40*                           | 11§                          | 75                  | 74      | 3                         | 3    | –               | –                                | 19                                                  | 25 | 3 | 1  | 1 | 5  | 26 | 17 | 3    | 3  | 2    | ⊕ | 4  | 6  | 9  | 54 | 21 | 1    | 7              | 10 | –                     | –    | –                         |     |         |
| Totals                       | –                          | –                  | –                  | –                             | –                            | –                   | –       | –                         | –    | 735             | 41                               | –                                                   | –  | – | –  | – | –  | –  | –  | –    | –  | –    | – | –  | –  | –  | –  | –  | –    | –              | –  | 1                     | 11   | 4                         |     |         |
| Extreme values               | –                          | –                  | –                  | 44†                           | 4‡                           | –                   | –       | –                         | –    | –               | –                                | –                                                   | –  | – | –  | – | –  | –  | –  | –    | –  | –    | – | –  | –  | –  | –  | –  | –    | –              | –  | –                     | –    | –                         |     |         |
| No. of years<br>observations | 15                         | 15                 |                    |                               |                              | 15                  |         | 15                        |      | 30              |                                  | 15                                                  |    |   |    |   |    |    |    |      |    | 15   |   |    |    |    |    |    |      |                |    | 15                    |      | 15                        | 15  | 15      |

\* Mean of highest each year  
§ Mean of lowest each year

† Highest recorded temperature  
‡ Lowest recorded temperature

⊕ Rare  
⊖ All observations



1.220

WMO No 42731

DWĀRKA (22°22'N, 69°05'E) Height above MSL – 11 m

Climatic Table compiled from 26 to 30 years observations, 1936 to 1990

| Month                        | Average pressure<br>at MSL | Temperatures       |                    |                               |                              | Average<br>humidity |         | Average<br>cloud<br>cover |      | Precipitation   |                                  | Wind distribution – Percentage of observations from |    |    |    |   |    |    |    |      |    |      |   |    |   |    |    |    |      |                |   | Mean<br>wind<br>speed |   | Number<br>of days<br>with |     |         |    |
|------------------------------|----------------------------|--------------------|--------------------|-------------------------------|------------------------------|---------------------|---------|---------------------------|------|-----------------|----------------------------------|-----------------------------------------------------|----|----|----|---|----|----|----|------|----|------|---|----|---|----|----|----|------|----------------|---|-----------------------|---|---------------------------|-----|---------|----|
|                              |                            | Mean<br>daily max. | Mean<br>daily min. | Mean highest<br>in each month | Mean lowest<br>in each month | 0800                | 1700    | 0800                      | 1700 | Average<br>fall | No. of days with<br>1 mm or more | 0800                                                |    |    |    |   |    |    |    |      |    | 1700 |   |    |   |    |    |    |      |                |   | ⊕                     |   | Gale                      | Fog | Thunder |    |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                  | N                                                   | NE | E  | SE | S | SW | W  | NW | Calm | N  | NE   | E | SE | S | SW | W  | NW | Calm |                |   |                       |   |                           |     |         |    |
| January                      | hPa<br>1015                | °C<br>26           | °C<br>16           | °C<br>29                      | °C<br>12                     | %<br>63             | %<br>41 | Oktas<br>2   2            |      | mm<br>1         | 0                                | 32                                                  | 42 | 9  | 1  | 1 | 1  | 3  | 7  | 4    | 18 | 20   | 5 | 0  | 1 | 2  | 9  | 45 | 0    | Knots<br>7   – |   | 0                     | – | ⊕                         |     |         |    |
| February                     | 1014                       | 26                 | 17                 | 30                            | 13                           | 71                  | 60      | 2                         | 2    | 4               | 0                                | 29                                                  | 20 | 6  | 1  | 1 | 5  | 12 | 22 | 4    | 6  | 8    | 2 | 0  | 1 | 7  | 38 | 40 | 0    | 8              | – | 0                     | – | ⊕                         |     |         |    |
| March                        | 1012                       | 28                 | 22                 | 34                            | 16                           | 71                  | 66      | 2                         | 2    | 0               | 0                                | 25                                                  | 9  | 3  | 1  | 1 | 6  | 19 | 34 | 2    | 4  | 3    | 1 | 1  | 0 | 4  | 44 | 43 | 0    | 9              | – | 0                     | – | 0                         |     |         |    |
| April                        | 1009                       | 29                 | 24                 | 32                            | 22                           | 78                  | 72      | 2                         | 1    | 0               | 0                                | 9                                                   | 1  | 0  | 1  | 3 | 20 | 39 | 26 | 1    | 1  | 0    | 0 | 0  | 0 | 13 | 63 | 23 | 0    | 9              | – | 0                     | – | ⊕                         |     |         |    |
| May                          | 1006                       | 31                 | 26                 | 33                            | 25                           | 80                  | 75      | 2                         | 3    | 1               | 0                                | 3                                                   | 0  | 1  | 0  | 6 | 44 | 39 | 7  | 0    | 1  | 0    | 1 | 0  | 5 | 40 | 49 | 4  | 0    | 10             | – | ⊕                     | – | 0                         |     |         |    |
| June                         | 1002                       | 32                 | 28                 | 34                            | 26                           | 80                  | 76      | 4                         | 5    | 60              | 3                                | 6                                                   | 2  | 1  | 1  | 8 | 51 | 25 | 5  | 1    | 1  | 1    | 0 | 0  | 3 | 59 | 34 | 2  | 0    | 11             | – | ⊕                     | – | 2                         |     |         |    |
| July                         | 1000                       | 31                 | 27                 | 33                            | 24                           | 84                  | 80      | 6                         | 7    | 97              | 6                                | 4                                                   | 2  | 0  | 1  | 4 | 52 | 34 | 2  | 1    | 0  | 0    | 0 | 0  | 5 | 57 | 38 | 1  | 0    | 12             | – | ⊕                     | – | 1                         |     |         |    |
| August                       | 1003                       | 30                 | 26                 | 31                            | 24                           | 85                  | 79      | 6                         | 7    | 78              | 8                                | 1                                                   | 0  | 1  | 2  | 3 | 49 | 42 | 2  | 0    | 0  | 0    | 0 | 0  | 2 | 54 | 43 | 1  | 0    | 11             | – | ⊕                     | – | 0                         |     |         |    |
| September                    | 1007                       | 29                 | 25                 | 31                            | 24                           | 82                  | 76      | 4                         | 5    | 21              | 3                                | 2                                                   | 1  | 1  | 1  | 5 | 35 | 39 | 14 | 2    | 1  | 0    | 1 | 0  | 2 | 34 | 50 | 12 | 0    | 8              | – | 0                     | – | ⊕                         |     |         |    |
| October                      | 1011                       | 31                 | 24                 | 35                            | 21                           | 73                  | 69      | 2                         | 2    | 10              | 1                                | 27                                                  | 14 | 3  | 4  | 3 | 7  | 19 | 19 | 4    | 5  | 6    | 2 | 0  | 1 | 9  | 33 | 44 | 0    | 7              | – | 0                     | – | 0                         |     |         |    |
| November                     | 1013                       | 30                 | 21                 | 34                            | 17                           | 66                  | 53      | 2                         | 2    | 2               | 0                                | 34                                                  | 35 | 10 | 1  | 1 | 2  | 4  | 11 | 2    | 13 | 16   | 2 | 1  | 2 | 3  | 16 | 47 | 0    | 6              | – | 0                     | – | 1                         |     |         |    |
| December                     | 1015                       | 27                 | 16                 | 31                            | 12                           | 64                  | 44      | 2                         | 2    | 1               | 0                                | 30                                                  | 41 | 17 | 1  | 1 | 1  | 2  | 5  | 2    | 25 | 24   | 5 | 0  | 0 | 2  | 10 | 33 | 1    | 7              | – | 0                     | – | ⊕                         |     |         |    |
| Means                        | 1009                       | 29                 | 23                 | 37*                           | 11§                          | 75                  | 66      | 3                         | 4    | –               | –                                | 17                                                  | 14 | 4  | 1  | 3 | 23 | 23 | 13 | 2    | 6  | 6    | 2 | ⊕  | 2 | 24 | 35 | 25 | ⊕    | 9              | – | –                     | – | –                         |     |         |    |
| Totals                       | –                          | –                  | –                  | –                             | –                            | –                   | –       | –                         | –    | 275             | 21                               | –                                                   | –  | –  | –  | – | –  | –  | –  | –    | –  | –    | – | –  | – | –  | –  | –  | –    | –              | – | ⊕                     | – | –                         | 5   |         |    |
| Extreme values               | –                          | –                  | –                  | 43†                           | 6‡                           | –                   | –       | –                         | –    | –               | –                                | –                                                   | –  | –  | –  | – | –  | –  | –  | –    | –  | –    | – | –  | – | –  | –  | –  | –    | –              | – | –                     | – | –                         |     |         |    |
| No. of years<br>observations | 30                         | 30                 |                    |                               |                              | 30                  |         | 30                        |      | 30              |                                  | 28                                                  |    |    |    |   |    |    |    |      |    | 26   |   |    |   |    |    |    |      |                |   | 26                    |   |                           | 28  |         | 28 |

\* Mean of highest each year

§ Mean of lowest each year

† Highest recorded temperature

‡ Lowest recorded temperature

⊕ Rare

⊖ All observations

1.221

WMO No 41780

**KARĀCHĪ AIRPORT** (24°54'N, 67°08'E) Height above MSL – 22 m

Climatic Table compiled from 24 to 30 years observations, 1960 to 1997

| Month                        | Average pressure<br>at MSL | Temperatures       |                    |                               |                              | Average<br>humidity |         | Average<br>cloud<br>cover |      | Precipitation   |                                   | Wind distribution – Percentage of observations from |    |   |    |   |    |    |    |      |   |      |   |    |   |    |    |    |      |                |    |      |      |      |     |         |  |  |  | Mean<br>wind<br>speed |  | Number<br>of days<br>with |  |  |
|------------------------------|----------------------------|--------------------|--------------------|-------------------------------|------------------------------|---------------------|---------|---------------------------|------|-----------------|-----------------------------------|-----------------------------------------------------|----|---|----|---|----|----|----|------|---|------|---|----|---|----|----|----|------|----------------|----|------|------|------|-----|---------|--|--|--|-----------------------|--|---------------------------|--|--|
|                              |                            | Mean<br>daily max. | Mean<br>daily min. | Mean highest<br>in each month | Mean lowest<br>in each month | 0800                | 1700    | 0800                      | 1700 | Average<br>fall | No. of days with<br>2.5mm or more | 0800                                                |    |   |    |   |    |    |    |      |   | 1700 |   |    |   |    |    |    |      |                |    | 0800 | 1700 | Gale | Fog | Thunder |  |  |  |                       |  |                           |  |  |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                   |                                                     |    |   |    |   |    |    |    |      |   |      |   |    |   |    |    |    |      |                |    |      |      |      |     |         |  |  |  |                       |  |                           |  |  |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                   | N                                                   | NE | E | SE | S | SW | W  | NW | Calm | N | NE   | E | SE | S | SW | W  | NW | Calm |                |    |      |      |      |     |         |  |  |  |                       |  |                           |  |  |
| January                      | hPa<br>1017                | °C<br>26           | °C<br>11           | °C<br>30                      | °C<br>7                      | %<br>67             | %<br>35 | Oktas<br>2   2            |      | mm<br>6         | 1                                 | 6                                                   | 18 | 4 | ⊕  | 0 | 0  | 1  | 3  | 69   | 2 | 19   | 8 | 5  | 4 | 34 | 11 | 5  | 13   | Knots<br>2   5 |    | ⊕    | 1    | ⊕    |     |         |  |  |  |                       |  |                           |  |  |
| February                     | 1015                       | 27                 | 14                 | 32                            | 9                            | 69                  | 36      | 2                         | 2    | 10              | 1                                 | 4                                                   | 14 | 2 | 2  | 0 | 1  | 9  | 8  | 60   | 1 | 7    | 8 | 5  | 3 | 45 | 19 | 5  | 7    | 1              | 6  | ⊕    | 1    | ⊕    |     |         |  |  |  |                       |  |                           |  |  |
| March                        | 1012                       | 32                 | 18                 | 36                            | 13                           | 70                  | 41      | 3                         | 2    | 12              | 1                                 | 3                                                   | 7  | 2 | 1  | 0 | 3  | 18 | 11 | 55   | 1 | 2    | 2 | 2  | 2 | 50 | 32 | 8  | 1    | 2              | 7  | ⊕    | 1    | ⊕    |     |         |  |  |  |                       |  |                           |  |  |
| April                        | 1008                       | 34                 | 22                 | 39                            | 16                           | 73                  | 48      | 3                         | 2    | 4               | ⊕                                 | 2                                                   | 5  | 1 | 1  | 0 | 8  | 36 | 14 | 33   | 0 | 1    | 0 | 1  | 2 | 66 | 31 | 4  | 1    | 4              | 8  | ⊕    | ⊕    | ⊕    |     |         |  |  |  |                       |  |                           |  |  |
| May                          | 1005                       | 36                 | 26                 | 41                            | 22                           | 77                  | 56      | 3                         | 1    | 0               | ⊕                                 | 1                                                   | 2  | 0 | 1  | 0 | 15 | 65 | 9  | 7    | 0 | 1    | ⊕ | ⊕  | 2 | 61 | 34 | 1  | ⊕    | 5              | 9  | ⊕    | ⊕    | 0    |     |         |  |  |  |                       |  |                           |  |  |
| June                         | 1000                       | 35                 | 28                 | 40                            | 25                           | 74                  | 63      | 5                         | 3    | 6               | 1                                 | 1                                                   | 1  | 0 | 1  | 1 | 18 | 61 | 8  | 10   | ⊕ | 1    | ⊕ | 1  | 5 | 58 | 33 | 1  | 1    | 7              | 10 | 1    | ⊕    | ⊕    |     |         |  |  |  |                       |  |                           |  |  |
| July                         | 999                        | 34                 | 27                 | 37                            | 25                           | 78                  | 68      | 6                         | 6    | 86              | 2                                 | 1                                                   | 1  | 1 | 1  | 2 | 16 | 64 | 10 | 5    | 1 | 1    | 1 | 1  | 1 | 54 | 38 | 3  | 1    | 7              | 10 | ⊕    | ⊕    | 2    |     |         |  |  |  |                       |  |                           |  |  |
| August                       | 1001                       | 32                 | 26                 | 35                            | 25                           | 79                  | 70      | 6                         | 6    | 67              | 2                                 | 0                                                   | 1  | 1 | 2  | 1 | 15 | 69 | 7  | 6    | 1 | 1    | ⊕ | 1  | 1 | 45 | 47 | 1  | 2    | 7              | 9  | ⊕    | ⊕    | 1    |     |         |  |  |  |                       |  |                           |  |  |
| September                    | 1006                       | 33                 | 25                 | 37                            | 24                           | 78                  | 64      | 5                         | 3    | 20              | 1                                 | ⊕                                                   | 2  | 1 | ⊕  | 0 | 10 | 72 | 8  | 8    | ⊕ | 2    | ⊕ | 1  | ⊕ | 52 | 43 | 2  | 1    | 5              | 8  | ⊕    | ⊕    | 1    |     |         |  |  |  |                       |  |                           |  |  |
| October                      | 1011                       | 35                 | 21                 | 39                            | 17                           | 68                  | 45      | 1                         | 1    | 1               | ⊕                                 | 6                                                   | 9  | 3 | 0  | 0 | 1  | 17 | 5  | 60   | 1 | 3    | 2 | 1  | 4 | 51 | 30 | 3  | 4    | 3              | 6  | 1    | 1    | ⊕    |     |         |  |  |  |                       |  |                           |  |  |
| November                     | 1015                       | 32                 | 16                 | 36                            | 11                           | 63                  | 36      | 1                         | 1    | 2               | ⊕                                 | 9                                                   | 23 | 3 | 1  | 0 | 2  | 1  | 1  | 61   | 2 | 15   | 8 | 4  | 5 | 38 | 18 | 2  | 9    | 2              | 5  | ⊕    | ⊕    | ⊕    |     |         |  |  |  |                       |  |                           |  |  |
| December                     | 1017                       | 28                 | 12                 | 31                            | 8                            | 65                  | 37      | 2                         | 2    | 4               | ⊕                                 | 9                                                   | 21 | 2 | 1  | 0 | 0  | 2  | 3  | 62   | 2 | 18   | 8 | 5  | 6 | 29 | 8  | 2  | 21   | 2              | 4  | ⊕    | ⊕    | ⊕    |     |         |  |  |  |                       |  |                           |  |  |
| Means                        | 1009                       | 32                 | 20                 | 42*                           | 7§                           | 72                  | 50      | 3                         | 3    | –               | –                                 | 4                                                   | 8  | 2 | 1  | ⊕ | 7  | 35 | 7  | 36   | 1 | 6    | 3 | 2  | 3 | 48 | 29 | 3  | 5    | 4              | 7  | –    | –    | –    |     |         |  |  |  |                       |  |                           |  |  |
| Totals                       | –                          | –                  | –                  | –                             | –                            | –                   | –       | –                         | –    | 218             | 10                                | –                                                   | –  | – | –  | – | –  | –  | –  | –    | – | –    | – | –  | – | –  | –  | –  | –    | –              | –  | –    | 2    | 4    | 4   |         |  |  |  |                       |  |                           |  |  |
| Extreme values               | –                          | –                  | –                  | 45†                           | 3‡                           | –                   | –       | –                         | –    | –               | –                                 | –                                                   | –  | – | –  | – | –  | –  | –  | –    | – | –    | – | –  | – | –  | –  | –  | –    | –              | –  | –    | –    | –    |     |         |  |  |  |                       |  |                           |  |  |
| No. of years<br>observations | 24                         | 24                 |                    |                               |                              | 24                  |         | 24                        |      | 30              |                                   | 24                                                  |    |   |    |   |    |    |    |      |   | 24   |   |    |   |    |    |    |      |                |    | 24   |      | 24   | 24  | 24      |  |  |  |                       |  |                           |  |  |

\* Mean of highest each year

§ Mean of lowest each year

† Highest recorded temperature

‡ Lowest recorded temperature

⊕ Rare

⊖ All observations

1.222

WMO No 41756

**JIWANI** (25°04'N, 61°48'E) Height above MSL – 57 m  
Climatic Table compiled from 15 to 30 years observations, 1960 to 1997

| Month                        | Average pressure<br>at MSL | Temperatures       |                    |                               |                              | Average<br>humidity |         | Average<br>cloud<br>cover |      | Precipitation   |                                | Wind distribution – Percentage of observations from |    |    |    |    |    |    |    |      |    |      |   |    |    |    |    |    |      |                |    | Mean<br>wind<br>speed |      | Number<br>of days<br>with |     |         |
|------------------------------|----------------------------|--------------------|--------------------|-------------------------------|------------------------------|---------------------|---------|---------------------------|------|-----------------|--------------------------------|-----------------------------------------------------|----|----|----|----|----|----|----|------|----|------|---|----|----|----|----|----|------|----------------|----|-----------------------|------|---------------------------|-----|---------|
|                              |                            | Mean<br>daily max. | Mean<br>daily min. | Mean highest<br>in each month | Mean lowest<br>in each month | 0800                | 1700    | 0800                      | 1700 | Average<br>fall | No. of days with<br>mm or more | 0800                                                |    |    |    |    |    |    |    |      |    | 1700 |   |    |    |    |    |    |      |                |    | 0800                  | 1700 | Gale                      | Fog | Thunder |
|                              |                            |                    |                    |                               |                              |                     |         |                           |      |                 |                                | N                                                   | NE | E  | SE | S  | SW | W  | NW | Calm | N  | NE   | E | SE | S  | SW | W  | NW | Calm |                |    |                       |      |                           |     |         |
| January                      | hPa<br>1017                | °C<br>24           | °C<br>15           | °C<br>27                      | °C<br>11                     | %<br>70             | %<br>47 | Oktas<br>2   2            |      | mm<br>27        | –                              | 21                                                  | 23 | 5  | 3  | 3  | 1  | 5  | 10 | 29   | 10 | 3    | 3 | 17 | 18 | 14 | 26 | 7  | 2    | Knots<br>4   7 |    | 1                     | ⊕    | ⊕                         |     |         |
| February                     | 1015                       | 25                 | 16                 | 28                            | 10                           | 71                  | 48      | 2                         | 2    | 33              | –                              | 22                                                  | 5  | 1  | 7  | 2  | 1  | 17 | 18 | 28   | 4  | 2    | 1 | 15 | 25 | 21 | 29 | 4  | ⊕    | 4              | 8  | ⊕                     | 1    | 1                         |     |         |
| March                        | 1013                       | 28                 | 18                 | 32                            | 12                           | 77                  | 54      | 3                         | 3    | 10              | –                              | 9                                                   | 12 | 1  | 4  | 2  | 3  | 16 | 20 | 32   | 1  | 0    | 1 | 13 | 28 | 28 | 27 | 2  | 1    | 5              | 8  | ⊕                     | ⊕    | 1                         |     |         |
| April                        | 1009                       | 32                 | 22                 | 36                            | 18                           | 77                  | 53      | 2                         | 2    | 6               | –                              | 4                                                   | 4  | 1  | 6  | 4  | 5  | 30 | 11 | 35   | 1  | 0    | 1 | 8  | 18 | 32 | 38 | 2  | ⊕    | 4              | 9  | ⊕                     | ⊕    | ⊕                         |     |         |
| May                          | 1005                       | 35                 | 25                 | 39                            | 23                           | 78                  | 57      | 2                         | 1    | 0               | –                              | ⊕                                                   | 2  | 2  | 12 | 18 | 12 | 24 | 6  | 25   | ⊕  | ⊕    | 1 | 10 | 39 | 29 | 20 | 1  | 0    | 4              | 9  | ⊕                     | ⊕    | ⊕                         |     |         |
| June                         | 1000                       | 34                 | 27                 | 40                            | 24                           | 79                  | 64      | 2                         | 1    | 1               | –                              | ⊕                                                   | 1  | 6  | 26 | 19 | 15 | 13 | 2  | 18   | 0  | 0    | ⊕ | 19 | 49 | 24 | 6  | 1  | 0    | 5              | 10 | 1                     | ⊕    | ⊕                         |     |         |
| July                         | 998                        | 32                 | 27                 | 36                            | 24                           | 80                  | 69      | 4                         | 2    | 8               | –                              | 0                                                   | 0  | 11 | 42 | 22 | 5  | 4  | 1  | 15   | 0  | ⊕    | ⊕ | 37 | 53 | 9  | ⊕  | 0  | 0    | 5              | 11 | 1                     | ⊕    | ⊕                         |     |         |
| August                       | 1001                       | 31                 | 26                 | 36                            | 24                           | 78                  | 70      | 5                         | 3    | 4               | –                              | 0                                                   | 1  | 2  | 41 | 20 | 11 | 1  | ⊕  | 25   | 1  | 1    | 2 | 30 | 56 | 9  | ⊕  | ⊕  | ⊕    | 3              | 10 | ⊕                     | ⊕    | ⊕                         |     |         |
| September                    | 1006                       | 31                 | 24                 | 35                            | 22                           | 82                  | 67      | 3                         | 1    | 0               | –                              | 2                                                   | 1  | 2  | 14 | 18 | 11 | 4  | 1  | 49   | ⊕  | ⊕    | ⊕ | 11 | 61 | 24 | 3  | 1  | 0    | 3              | 9  | ⊕                     | ⊕    | ⊕                         |     |         |
| October                      | 1011                       | 32                 | 21                 | 36                            | 17                           | 73                  | 53      | 1                         | 0    | 0               | –                              | 18                                                  | 3  | 3  | 3  | ⊕  | 3  | 9  | 6  | 55   | 3  | 0    | 2 | 19 | 34 | 29 | 12 | 1  | 1    | 2              | 7  | ⊕                     | 1    | ⊕                         |     |         |
| November                     | 1015                       | 30                 | 18                 | 34                            | 14                           | 74                  | 52      | 1                         | 1    | 5               | –                              | 21                                                  | 10 | 1  | 2  | 1  | ⊕  | 7  | 9  | 49   | 2  | 2    | 1 | 18 | 24 | 26 | 22 | 4  | 3    | 2              | 7  | ⊕                     | 1    | 1                         |     |         |
| December                     | 1017                       | 26                 | 15                 | 29                            | 11                           | 72                  | 49      | 2                         | 2    | 20              | –                              | 32                                                  | 16 | 1  | 1  | 2  | 1  | 3  | 9  | 34   | 13 | 5    | 5 | 17 | 20 | 16 | 16 | 7  | 3    | 3              | 7  | 1                     | 1    | 1                         |     |         |
| Means                        | 1009                       | 28                 | 21                 | 41*                           | 8§                           | 76                  | 57      | 2                         | 2    | –               | –                              | 11                                                  | 6  | 3  | 13 | 9  | 6  | 11 | 8  | 33   | 3  | 1    | 2 | 17 | 34 | 22 | 17 | 3  | 1    | 4              | 8  | –                     | –    | –                         |     |         |
| Totals                       | –                          | –                  | –                  | –                             | –                            | –                   | –       | –                         | –    | 114             | –                              | –                                                   | –  | –  | –  | –  | –  | –  | –  | –    | –  | –    | – | –  | –  | –  | –  | –  | –    | –              | –  | 4                     | 4    | 4                         |     |         |
| Extreme values               | –                          | –                  | –                  | 45†                           | 5‡                           | –                   | –       | –                         | –    | –               | –                              | –                                                   | –  | –  | –  | –  | –  | –  | –  | –    | –  | –    | – | –  | –  | –  | –  | –  | –    | –              | –  | –                     | –    | –                         |     |         |
| No. of years<br>observations | 15                         | 15                 |                    |                               |                              | 15                  |         | 15                        |      | 30              | –                              | 15                                                  |    |    |    |    |    |    |    |      |    | 15   |   |    |    |    |    |    |      |                |    | 15                    |      | 15                        | 15  | 15      |

\* Mean of highest each year  
§ Mean of lowest each year

† Highest recorded temperature  
‡ Lowest recorded temperature

⊕ Rare  
⊖ All observations

1.223

METEOROLOGICAL CONVERSION TABLE AND SCALES

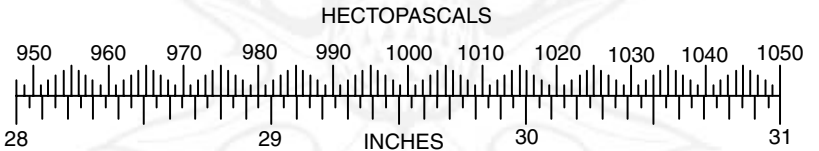
Fahrenheit to Celsius  
°Fahrenheit

|      | 0     | 1     | 2     | 3               | 4     | 5     | 6     | 7     | 8     | 9     |
|------|-------|-------|-------|-----------------|-------|-------|-------|-------|-------|-------|
| °F   |       |       |       | Degrees Celsius |       |       |       |       |       |       |
| -100 | -73.3 | -73.9 | -74.4 | -75.0           | -75.6 | -76.1 | -76.7 | -77.2 | -77.8 | -78.3 |
| -90  | -67.8 | -68.3 | -68.9 | -69.4           | -70.0 | -70.6 | -71.1 | -71.7 | -72.2 | -72.8 |
| -80  | -62.2 | -62.8 | -63.3 | -63.9           | -64.4 | -65.0 | -65.6 | -66.1 | -66.7 | -67.2 |
| -70  | -56.7 | -57.2 | -57.8 | -58.3           | -58.9 | -59.4 | -60.0 | -60.6 | -61.1 | -61.7 |
| -60  | -51.1 | -51.7 | -52.2 | -52.8           | -53.3 | -53.9 | -54.4 | -55.0 | -55.6 | -56.1 |
| -50  | -45.6 | -46.1 | -46.7 | -47.2           | -47.8 | -48.3 | -48.9 | -49.4 | -50.0 | -50.6 |
| -40  | -40.0 | -40.6 | -41.1 | -41.7           | -42.2 | -42.8 | -43.3 | -43.9 | -44.4 | -45.0 |
| -30  | -34.4 | -35.0 | -35.6 | -36.1           | -36.7 | -37.2 | -37.8 | -38.3 | -38.9 | -39.4 |
| -20  | -28.9 | -29.4 | -30.0 | -30.6           | -31.1 | -31.7 | -32.2 | -32.8 | -33.3 | -33.9 |
| -10  | -23.3 | -23.9 | -24.4 | -25.0           | -25.6 | -26.1 | -26.7 | -27.2 | -27.8 | -28.3 |
| -0   | -17.8 | -18.3 | -18.9 | -19.4           | -20.0 | -20.6 | -21.1 | -21.7 | -22.2 | -22.8 |
| +0   | -17.8 | -17.2 | -16.7 | -16.1           | -15.6 | -15.0 | -14.4 | -13.9 | -13.3 | -12.8 |
| 10   | -12.2 | -11.7 | -11.1 | -10.6           | -10.0 | -9.4  | -8.9  | -8.3  | -7.8  | -7.2  |
| 20   | -6.7  | -6.1  | -5.6  | -5.0            | -4.4  | -3.9  | -3.3  | -2.8  | -2.2  | -1.7  |
| 30   | -1.1  | -0.6  | 0     | +0.6            | +1.1  | +1.7  | +2.2  | +2.8  | +3.3  | +3.9  |
| 40   | +4.4  | +5.0  | +5.6  | 6.1             | 6.7   | 7.2   | 7.8   | 8.3   | 8.9   | 9.4   |
| 50   | 10.0  | 10.6  | 11.1  | 11.7            | 12.2  | 12.8  | 13.3  | 13.9  | 14.4  | 15.0  |
| 60   | 15.6  | 16.1  | 16.7  | 17.2            | 17.8  | 18.3  | 18.9  | 19.4  | 20.0  | 20.6  |
| 70   | 21.1  | 21.7  | 22.2  | 22.8            | 23.3  | 23.9  | 24.4  | 25.0  | 25.6  | 26.1  |
| 80   | 26.7  | 27.2  | 27.8  | 28.3            | 28.9  | 29.4  | 30.0  | 30.6  | 31.1  | 31.7  |
| 90   | 32.2  | 32.8  | 33.3  | 33.9            | 34.4  | 35.0  | 35.6  | 36.1  | 36.7  | 37.2  |
| 100  | 37.8  | 38.3  | 38.9  | 39.4            | 40.0  | 40.6  | 41.1  | 41.7  | 42.2  | 42.8  |
| 110  | 43.3  | 43.9  | 44.4  | 45.0            | 45.6  | 46.1  | 46.7  | 47.2  | 47.8  | 48.3  |
| 120  | 48.9  | 49.4  | 50.0  | 50.6            | 51.1  | 51.7  | 52.2  | 52.8  | 53.3  | 53.9  |

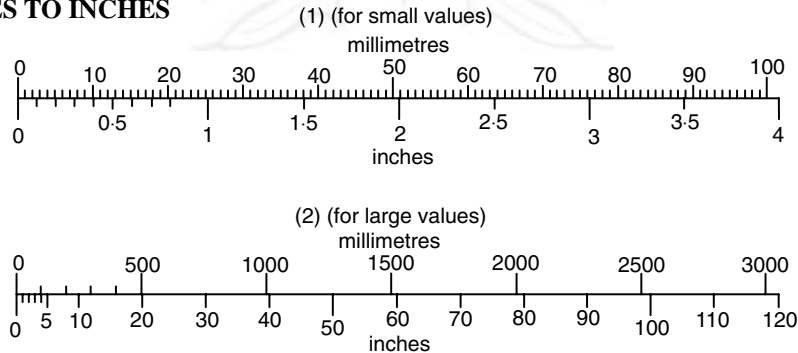
Celsius to Fahrenheit  
°Celsius

|     | 0     | 1     | 2     | 3                  | 4      | 5      | 6      | 7      | 8      | 9      |
|-----|-------|-------|-------|--------------------|--------|--------|--------|--------|--------|--------|
| °C  |       |       |       | Degrees Fahrenheit |        |        |        |        |        |        |
| -70 | -94.0 | -95.8 | -97.6 | -99.4              | -101.2 | -103.0 | -104.8 | -106.6 | -108.4 | -110.2 |
| -60 | -76.0 | -77.8 | -79.6 | -81.4              | -83.2  | -85.0  | -86.8  | -88.6  | -90.4  | -92.2  |
| -50 | -58.0 | -59.8 | -61.6 | -63.4              | -65.2  | -67.0  | -68.8  | -70.6  | -72.4  | -74.2  |
| -40 | -40.0 | -41.8 | -43.6 | -45.4              | -47.2  | -49.0  | -50.8  | -52.6  | -54.4  | -56.2  |
| -30 | -22.0 | -23.8 | -25.6 | -27.4              | -29.2  | -31.0  | -32.8  | -34.6  | -36.4  | -38.2  |
| -20 | -4.0  | -5.8  | -7.6  | -9.4               | -11.2  | -13.0  | -14.8  | -16.6  | -18.4  | -20.2  |
| -10 | +14.0 | +12.2 | +10.4 | +8.6               | +6.8   | +5.0   | +3.2   | +1.4   | -0.4   | -2.2   |
| -0  | 32.0  | 30.2  | 28.4  | 26.6               | 24.8   | 23.0   | 21.2   | 19.4   | +17.6  | +15.8  |
| +0  | 32.0  | 33.8  | 35.6  | 37.4               | 39.2   | 41.0   | 42.8   | 44.6   | 46.4   | 48.2   |
| 10  | 50.0  | 51.8  | 53.6  | 55.4               | 57.2   | 59.0   | 60.8   | 62.6   | 64.4   | 66.2   |
| 20  | 68.0  | 69.8  | 71.6  | 73.4               | 75.2   | 77.0   | 78.8   | 80.6   | 82.4   | 84.2   |
| 30  | 86.0  | 87.8  | 89.6  | 91.4               | 93.2   | 95.0   | 96.8   | 98.6   | 100.4  | 102.2  |
| 40  | 104.0 | 105.8 | 107.6 | 109.4              | 111.2  | 113.0  | 114.8  | 116.6  | 118.4  | 120.2  |
| 50  | 122.0 | 123.8 | 125.6 | 127.4              | 129.2  | 131.0  | 132.8  | 134.6  | 136.4  | 138.2  |

HECTOPASCALS TO INCHES



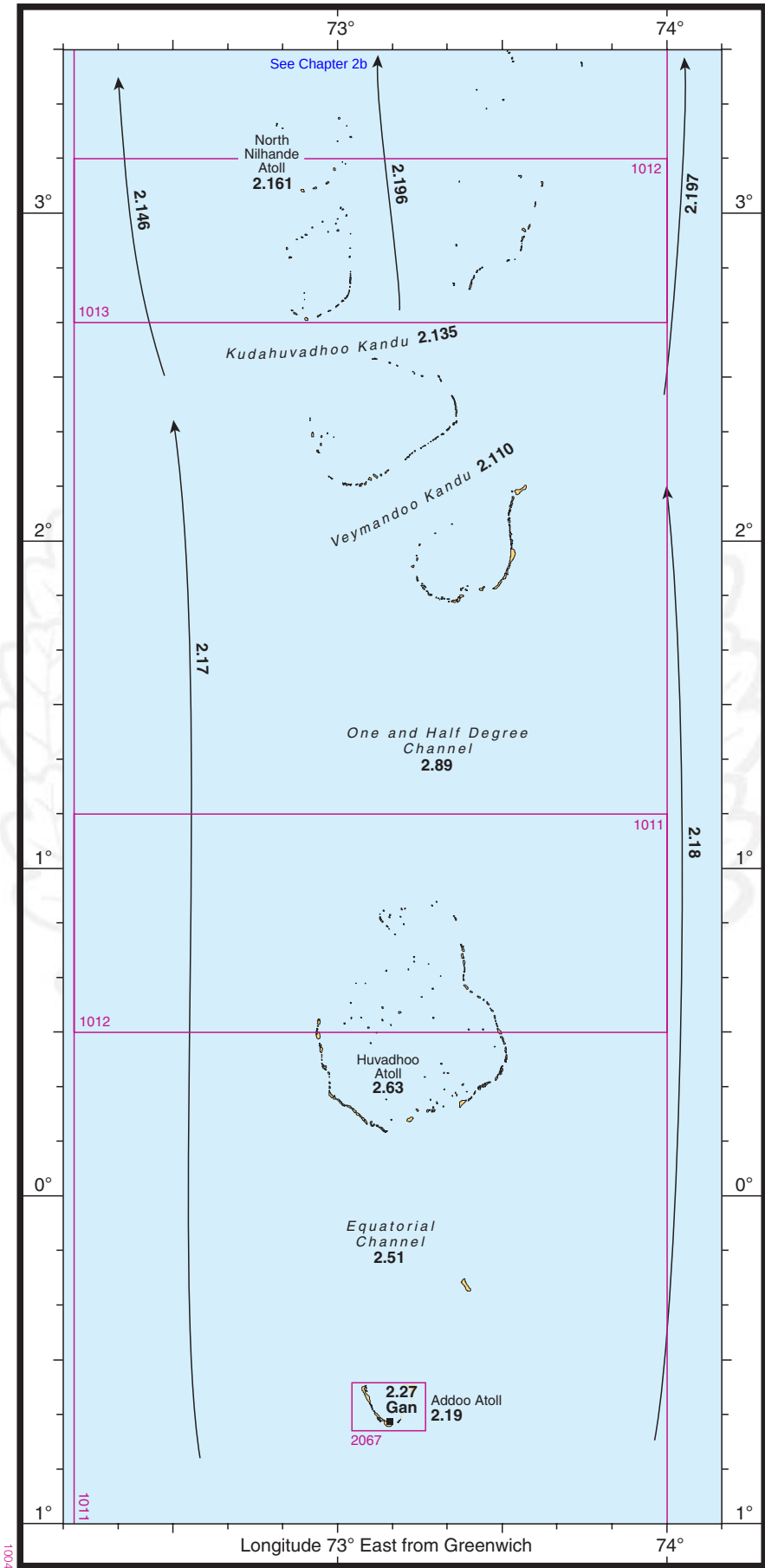
MILLIMETRES TO INCHES



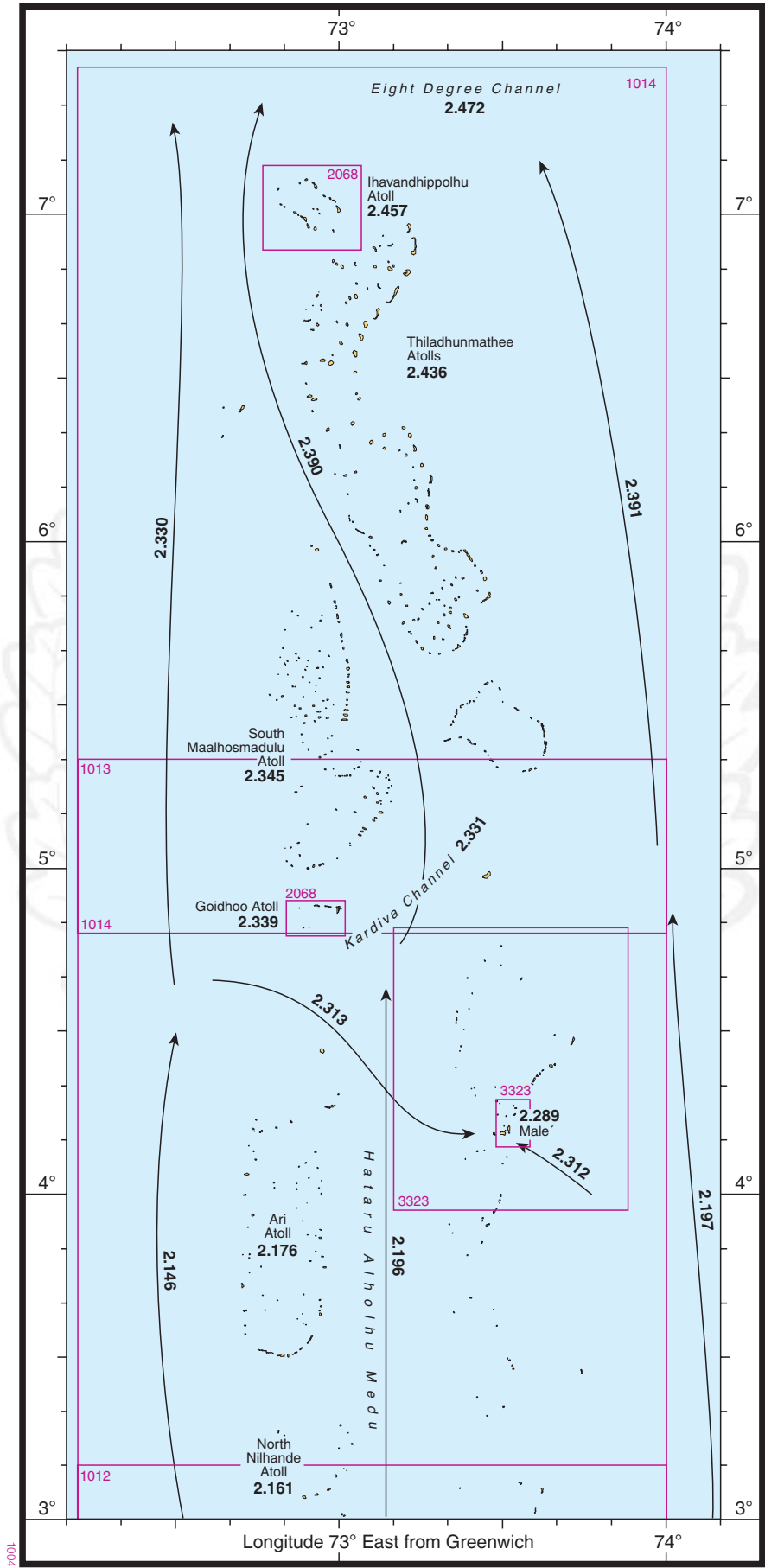




Chapter 2a - Maldives (south)



Chapter 2b - Maldives (north)



## CHAPTER 2

## MALDIVES AND LAKSHADWEEP

## GENERAL INFORMATION

*Charts 708, 709*

**Scope of chapter****2.1**

- 1 The area covered by this chapter includes two groups of coral atolls and below-water reefs, comprising the Maldives, an independent republic and Lakshadweep, a Union Territory of the Republic of India. The atolls and reefs extend a distance of almost 900 miles in a S/N direction from Addoo Atoll (0°40'S, 73°10'E) in the S to Cora Divh (13°42'N, 72°10'E), a below-water reef, in the N.

**Routes****2.2**

- 1 Ocean-going vessels proceeding in an E/W direction through the Maldives and Lakshadweep have a choice of several channels, the principal ones being:  
One and Half Degree Channel or Huvadhoo Kandu (1°30'N, 73°20'E) (2.89).

Kardiva Channel or Kaashidoo Kandu (4°50'N, 73°10'E) (2.331).

Eight Degree Channel or Maa Ma Lee Kandu (7°50'N, 73°00'E) (2.472).

- 2 Routes through these channels are also described in *Ocean Passages for the World*.

Other channels available for E/W-going shipping include:  
Equatorial Channel or Addoo Kandu (0°02'S, 73°15'E) (2.51).

Veymandoo Kandu (2°15'N, 73°25'E) (2.110).

Kudahuvadhoo Kandu (2°40'N, 73°15'E) (2.135).

Nine Degree Channel (9°10'N, 73°00'E) (2.507).

**Date of information****2.3**

- 1 Much of the detailed information in this chapter is very old, for little recent information can be derived from places so seldom visited. However, dates of more recent definite information have been included in the text.

## MALDIVES

## GENERAL INFORMATION

*Chart 709*

**General description****2.4**

- 1 Maldives are a chain of atolls extending from 40 miles S of the equator to 7°N along the meridian of 73°E.  
Among the different atolls comprising the Maldives there are several good deep channels, but some are intricate and demand local knowledge; such channels should be avoided by low-powered vessels as currents set strongly through them, running E or W according to the season. It should be noted that marked variations in the direction of these currents have been reported.
- 2 Although very low lying the coral islands standing on the atolls may be detected by radar at ranges of more than 20 miles, thence the arrangement of individual islands can often be obtained at about 15 miles distant and the breakers near the edges of reefs are usually detected at about 2 miles.
- 3 The many openings through the barrier reefs which fringe the atolls are generally deep, but difficult to discern beyond a distance of 3 or 4 miles at which range they appear as one continuous line to a vessel approaching them; however, when within 1 or 2 miles the channels will usually be seen distinctly in favourable light conditions.
- 4 On the inhabited islands boat channels leading over the reefs to the villages are marked by stakes and, being kept weeded by villagers, are generally distinct.  
Many of the islands have uncharted small landing platforms, piers or jetties and small harbours; it should be noted that the navigational lights for some of the harbours may not conform to the *IALA Maritime Buoyage System (Region A)*.
- 5 In 1994 numerous developments were reported to be in progress; the principal changes are described in the relevant sections of this chapter.

**Charting****2.5**

- 1 The charts of the Maldives are derived almost entirely from lead line surveys of 1835, or in some areas from a small scale survey of 1974. It is known that many uncharted dangers exist and that the position and shapes of many of the reefs are different from those shown on the charts. See notes on the relevant charts.

**Navigation****2.6**

- 1 **Caution.** Mariners should navigate with extreme care.  
**By day.** Provided the sun is high and behind the observer all the channels between the atolls, and even those amongst islets or reefs, may be passed through without anxiety as below-water coral dangers will be visible from the masthead. However, extra care should be taken at periods of spring tides when strong rips and eddies in the reef entrances make below-water hazards more difficult to be seen.
- 2 **By night.** Many light-beacons are erected on the reefs and atolls for use by local fishermen; these lights are of limited range and may not be visible from the middle of the wider channels.

**Off-lying reef****2.7**

- 1 In 1962 a reef was reported by aircraft to lie about 155 miles S of Addoo Atoll (0°40'S, 73°10'E), as shown on Chart 4703; in 1964 a search for it was inconclusive.

**Currents****2.8**

- 1 **General.** Currents tend to be monsoonal in origin, generally setting W during the NE Monsoon (January to March) and E during the SW Monsoon (May to October); during the intervening months the currents are variable. The

rate of the current in the E/W channels of the Maldives may attain 5 kn.

## 2 Local observations:

In February 1960 a W set, with a rate of 1½ kn, was reported to have been experienced between a position 25 miles E of Huvadhoo Atoll (00°30'N, 73°15'E) and Vaadhoo Kandu, 220 miles N.

In October 1960 a S set, with a rate of about 1 kn, was reported to have been experienced off the E side of the atolls lying between Male' Island (4°10'·5N, 73°30'·5E) and latitude 2°30'N, 100 miles S.

## Anchorage

### 2.9

Within the atolls good anchorage may be obtained in calm water of moderate depth, coral and sand.

## ADDOO ATOLL TO KUDAHUVADHOO KANDU

### GENERAL INFORMATION

Charts 1011, 1012, 709

### Area covered

#### 2.13

The area covered by this section comprises the southern part of the Maldives and the routes through the area as follows:

Addoo Atoll (2.19), Huvadhoo Atoll (2.63), Hadhdhunmathee Atoll (2.94) and Kolhumadulu Atoll (2.116).

Equatorial Channel (2.51) and One And Half Degree Channel (2.89) also Veymandoo Kandu (2.110) and Kudahuvadhoo Kandu (2.135).

The routes west (2.17) and east (2.18) of the above atolls.

## Atolls

### 2.14

A general description of the atolls is given at 2.4.

## Currents

### 2.15

See 2.8.

## Principal marks

### 2.16

#### 1 Landmarks:

The landmarks in the area covered by this section are few and will only be seen by vessels approaching an individual atoll; therefore the descriptions of landmarks will be found in the relevant part and not in the directions for the area.

#### 2 Major lights:

There are no major lights in the area being described.

### Passage directions west of atolls

#### 2.17

From a position W of Addoo Atoll (0°40'S, 73°10'E) (2.19) the passage leads direct N for about 185 miles, passing:

W of Huvadhoo Atoll (0°30'N, 73°15'E) (2.63), thence:

W of Hadhdhunmathee Atoll (1°55'N, 73°24'E) (2.94), thence:

## Climate and weather

### 2.10

For climate and weather see 1.178.

## Trade

### 2.11

The Maldivians may not barter or accept gifts without the sanction of the Government, an order, which is enforced by the headman of the villages. However the Government may authorize a representative to accept Sri Lankan currency in exchange for foodstuffs, chiefly chickens, eggs and fish.

## Supplies

### 2.12

Water in small quantities may be obtained at many of the islands in the group; it should not be drunk without taking the usual precautions. There are no facilities for supplying water to shipping except at Male' where un-chlorinated water can be supplied by barge.

To a position W of Kolhumadulu Atoll (2°22'N, 73°07'E) (2.116).

*(Directions continue for the passage*

*W of Maldives at 2.146)*

*(Directions for Hataru Alholhu Medu are given at 2.196)*

### Passage directions east of atolls

#### 2.18

From a position E of Addoo Atoll (0°40'S, 73°10'E) (2.19) the passage leads direct N for about 185 miles, passing:

E of Foammulah Island (0°18'S, 73°26'E) (2.56), thence:

E of Huvadhoo Atoll (0°30'N, 73°15'E) (2.63), thence:

E of Hadhdhunmathee Atoll (1°55'N, 73°24'E) (2.94), thence:

To a position E of Kolhumadulu Atoll (2°22'N, 73°07'E) (2.116).

*(Directions continue for the passage*

*E of Maldives at 2.197)*

*(Directions for Hataru Alholhu Medu are given at 2.196)*

## ADDOO ATOLL

### General information

Chart 2067

### Position

#### 2.19

Addoo Atoll (0°40'S, 73°10'E), situated at the S end of the Maldives, lies on the S side of Equatorial Channel.

### General description

#### 2.20

The atoll is fertile and consists of many islands and islets, lying on a barrier reef, surrounding a central lagoon which has general depths from 8 to 75 m and which provides good anchorage.

The barrier reef, which dries, extends up to about 5 cables seaward of the islands but its outer limits are only approximately charted.

- 2 There are 4 navigable channels into the lagoon:  
 Gan Kandu (2.28) and Viligili Kandu (2.44) on the SE side of the atoll, and  
 Kuda Kandu (2.38) and Maa Kandu (2.39) on its N side.

- 3 Gan and Viligili Kandas are to be preferred to the N channels, being broader and less intricate.

The main village stands on Hithadhoo at the NW corner of the atoll; the atoll Chief lived on this island in 1973. There are smaller villages on Maradhoo and Feydhoo which lie on the SW rim of the atoll and others are situated on Hulhumedhoo near the NE point of the lagoon.

### Topography

#### 2.21

- 1 The S and W islands and islets are more densely wooded than those on the E side, the latter are mostly covered with scrub and scattered trees.

### Tidal streams

#### 2.22

- 1 The ingoing stream sets strongly into the lagoon through Viligili Kandu and out of the lagoon through Gan Kandu. The outgoing stream sets out through both channels; thus, the stream through Gan Kandu is continuously out of the lagoon. For details of the effect of the current close off the entrance to Gan Kandu see 2.23.
- 2 In Kuda Kandu the sets are into the lagoon with the in-going stream and out with the out-going stream; but in Maa Kandu it sets continuously out of the lagoon. The tidal stream in Maa Kandu is reported to attain a rate of 5 kn.

### Currents

#### 2.23

- 1 **General.** The N fringe of the Equatorial Counter-current is the main influence both near Addoo Atoll and in Equatorial Channel, the predominant direction appears to be E or NE throughout the year, but observations in the area are scanty and marked variations no doubt occur.

Observations suggest the current increases in strength within 50 miles from the atoll. See also 1.168.

- 2 **Local observation:**

In December 1965, a vessel approaching Addoo Atoll from W in an approximate latitude of 0°45'S, reported the counter-current to have a rate of 1 kn or less; thence when E of meridian 72°E the set was observed to be ENE with the rate increased to an estimated 3 kn, and subsequently, possibly to 5 kn when 30 miles W of Gan Kandu.

- 3 **Gan Kandu.** A strong set across the entrance to Gan Kandu is frequently experienced, usually in an E direction, but changing to SW when the wind has been E for a period.

### Tidal levels

#### 2.24

- 1 See information in *Admiralty Tide Tables Volume 3*. Mean spring range about 0.9 m; mean neap range about 0.3 m.

### Natural conditions

#### 2.25

- 1 For details see climatic table 1.205.

### Local weather

#### 2.26

- 1 **Wind direction** has a seasonal pattern not totally conforming to that of the monsoon. The NNE winds predominate in January and February backing to W in

March, April and May; and to S in July and August. In September the predominant direction veers to become W for October and November, then N by December. Winds from E are rare and usually light.

- 2 **Wind speeds** are generally below 15 kn with their greatest mean speeds in May and October; occasional gusts exceeding 40 kn occur, in association with rain showers from SW or NW, at any time of the year.

### Southern side of Addoo Atoll

Chart 2067

### Gan

#### 2.27

- 1 **Position.** Gan (0°42'S, 73°10'E), an island, lies at the S end of Addoo Atoll.

**Function.** An airfield, with its runway orientated E/W, occupies the central part of the island; the N shore is lined with buildings associated with the airfield.

**Topography.** The island is very fertile with many palm and casuarina trees on its NW side, but the S part is covered by scrub and a few trees.

### Gan Kandu

#### 2.28

- 1 Gan Kandu is entered between the E side of the reef fringing Gan and the W side of the reef fringing Viligili, 1 mile NE; the channel is about 5 cables wide and has a least charted depth of 16.5 m in the middle of the fairway. The channel gives access to the anchorage (2.32) N of Gan and to the jetties (2.33) on the N side of the island.

### Principal marks

#### 2.29

- 1 **Landmarks** (positioned from the blue water towers described below):

Two water towers (blue, square, elevation 9 m) (0°41'4S, 73°09'1E) stand on the N side of Gan 5 cables from its NW end; they are conspicuous from E and N, but obscured from NW.

- 2 Four radio masts (black, framework towers, elevation 40 m) (close SW), from which red obstruction lights are exhibited; the airfield control tower stands close WSW of the SW-most radio mast. Trees (1 mile ESE); a conspicuous clump of casuarina trees standing on the shore.

### Directions

#### 2.30

- 1 Gan Kandu is the broadest of the four channels leading into the lagoon. Its navigation by day presents little difficulty since the reefs on each side are generally outlined by breakers.

The current (2.23), usually setting across the entrance and the tidal stream (2.22), always setting out of the entrance should both be allowed for.

- 2 Aircraft runway lights at each end of the runway on Gan are switched on when it is in use; in line they bear 098½°/278½° but have no navigational significance for ships. However, it should be noted that the flight path of aircraft using the airfield crosses the channel.

### Useful marks

#### 2.31

- 1 Radio tower (black, lattice) (0°41'3S, 73°09'0E) stands among several other masts, all with an elevation of 30 m; red obstruction lights are exhibited from the tower and from some of the masts.



- 2 Tower (black, lattice, fitted with cross trees, elevation 27 m) (0°42'·03S, 73°09'·59E); there is another tower standing close SW (elevation 30 m) which is fitted with reflector devices, the upper one being rectangular and the lower crescent-shaped. Numerous other radio masts (elevations 37 m) stand in the vicinity, red obstruction lights are exhibited from some of these masts.
- 3 Pier (0°42'·2S, 73°09'·3E) extending 2 cables SSE from the S shore of Gan is radar conspicuous.

### **Anchorage**

#### **2.32**

- 1 **Anchorage**, for vessels up to 12 000 tonnes, with good holding in coral and sand may be obtained about 4 cables N of the centre of the N shore of Gan, as shown on the chart; there is very little swell in this position, but farther inside the lagoon it may be moderate to heavy.
- 2 **Caution**. An area of foul ground (sunken moorings) exists, as shown on the chart, about 7½ cables NW of the anchorage. A submarine power cable (2.48) is laid S and W of these foul areas.

### **Berths**

#### **2.33**

- 1 A concrete jetty, 136 m long and 13·4 m wide, is situated about 3 cables ESE of the NW end of Gan. On both sides of the jetty there is a channel 15·2 m wide, with a depth of 2·3 m; at the seaward end of the jetty there is a least depth of 2·7 m.  
An oil jetty extends 134 m to the edge of the barrier reef from a position 1½ cables ESE of the concrete jetty.

### **Facilities**

#### **2.34**

- 1 Water, fuel and supplies are not regularly available.

### **Western side of Addoo Atoll**

*Chart 2067*

### **General description**

#### **2.35**

- 1 Several islands lie on the barrier reef which extends about 7½ miles NW from Gan (0°42'S, 73°10'E); the principal islands on the S part of this reef are described below.  
Feydhoo, lying close NW of Gan is thickly wooded; a ruined causeway connects it with Gan. A number of small islets lie on the barrier reef SW and W of Feydhoo.
- 2 Maradhoo Feydhoo, the SE part of Maradhoo, lying close NW of Feydhoo to which it is connected by a causeway, is thickly wooded; Maradhoo has scattered trees and shrub near its NW end.
- 3 Hankede, a wooded island, lying about 1 cable NW of Maradhoo is connected to it by a causeway; it is also connected by causeway NW, to a wooded isthmus extending about 1¼ miles SSE from the S end of Hithadhoo (2.36). Hankede Hajara lies on the coral reef close S of Hankede.

### **Hithadhoo Island**

#### **2.36**

- 1 **General information**. Hithadhoo (0°36'S, 73°05'E), the largest island of Addoo Atoll of which it forms the NW corner, is thickly wooded.  
**Habitation**. A large village, with three mosques, is situated on the N part of the island.

- 2 **Boat channel**. The village is connected to the lagoon by a boat channel which is marked by a strip of clean sand on either side, the weed having been removed.

**Boat piers**. There are four small piers situated on the E side of the island, as shown on the chart. A channel marked by buoys leads to the S pier which is located near the N end of the narrow isthmus that extends SSE from the S end of the island.

- 3 **Communications**. A road connects Koatthey (Demon Point), the NE point of Hithadhoo, with the SE end of Feydhoo (12 km SSE).

**Development**. Reclamation work was reported (1993) to be in progress off the E coast of the island.

### **Northern side of Addoo Atoll**

*Chart 2067*

### **General description**

#### **2.37**

- 1 From Koatthey, also known as Demon Point (0°34'·7S, 73°05'·4E), the outer edge of the barrier reef trends SE and E for a total of about 3¾ miles to Kuda Kandu; thence it leads 9 cables farther E to Maa Kandu. From Maa Kandu the reef extends 5 miles ENE to Hulhumheedhoo which forms the NE island of Addoo Atoll.

### **Kuda Kandu**

#### **2.38**

- 1 Kuda Kandu (0°37'·0S, 73°08'·3E) gives access to the lagoon of Addoo Atoll from N. It is about 2 cables wide and has a least charted depth of 24 m. It is the longest and narrowest of the four channels leading into the lagoon. The channel is not easy to distinguish from N.

### **Maa Kandu**

#### **2.39**

- 1 Maa Kandu gives access to the lagoon of Addoo Atoll from N, it is situated 9 cables E of Kuda Kandu (2.38) from which it is separated by a reef upon which there are three sandy cays; the E cay, with a prominent clump of trees, is known as Kandu Huraa. The channel is about 2 cables wide and has a depth of 11 m in its SSE approach; the tidal stream sets NNW out of the channel during both the out-going and in-going streams at a rate of up to 5 kn.

### **Useful mark**

#### **2.40**

- 1 Kandu Huraa Light (framework tower, concrete base) (0°36'·7S, 73°08'·9E), stands on the reef on the W side of Maa Kandu.

### **Hulhumheedhoo**

#### **2.41**

- 1 Hulhumheedhoo (0°35'S, 73°14'E), the NE island of the atoll, is generally covered with bush and scattered trees except near the villages of Meedhoo and Hulhudhoo, standing, respectively, at the NW corner and at the S end of the island N of its isthmus.

### **Eastern side of Addoo Atoll**

*Chart 2067*

### **General description**

#### **2.42**

- 1 The E side of the atoll consists of a number of islands and a long narrow isthmus that extends 2¾ miles S from the S end of Hulhumheedhoo (2.41). The islands and isthmus stand on a coral reef which, except for Viligili Kandu (2.44) that gives access to the lagoon, is continuous.

**Viligili****2.43**

- 1 Viligili (0°41'·0S, 73°11'·5E), the SSW island of the E side of Addoo Atoll, stands on a detached reef; the NE part of the island is thickly wooded. The island is thought to be uninhabited but it is sometimes visited by fishermen.

**Viligili Kandu****2.44**

- 1 Viligili Kandu enters the lagoon of Addoo Atoll from SE on the N side of Viligili. The channel is about 4 cables wide with a least charted depth of 18·3 m in its SE approach.
- 2 **Directions.** Care should be exercised to navigate through the channel in deep water passing between Girekede, an area of foul ground extending into the channel from the NW end Viligili, and Kanandhou Kaleyge Galha, the NW reef lying on the N side of the channel, 5 cables NE of Girekede.

**3 Landmark:**

Palm tree (0°39'·5S, 73°13'·0E) stands near the E side of Mulikolhu.

**Islands north of Viligili Kandu****2.45**

- 1 From Viligili Kandu the barrier reef trends NE for 7½ cables to Mulikolhu, a small islet, which is generally covered with bush.  
Gesskaluhura, a small islet lying about 7 cables NNE of Mulikolhu is covered with trees.
- 2 Heretere, is the isthmus that extends about 2½ miles N from its S point, located close N of Gesskaluhura, to the S part of Hulhumeedhoo (2.41); it is mostly covered with bush and scattered trees.

**Lagoon of Addoo Atoll**

*Chart 2067*

**General description****2.46**

- 1 **Lagoon.** The NW and NE corners of the lagoon are both encumbered by reefs, above and below-water, and by numerous coral heads; the NE corner has not been thoroughly examined and vessels should not approach either of these areas too closely.
- 2 **Reefs.** Arivara (0°38'·3S, 73°10'·6E) and Medu Gaa, 6 cables S, two drying coral reefs, lie near the centre of the lagoon. Hulhuvaa Galaa, a foul area surrounded by shoal water, lies 2 cables SSW of Medu Gaa and a shoal patch with a depth of 12·8 m over it lies a further 3½ cables S. Aa Galaa (0°40'·0S, 73°08'·1E), another drying reef, lies in the WSW part of the lagoon.

**Useful mark****2.47**

- 1 Beacon (white, pillar, about 2·4 m in height) (0°37'·6S, 73°06'·7E) stands close SE of the N extremity of Magavari, a reef which dries, in the NW corner of the lagoon.

**Submarine cable****2.48**

- 1 A power cable is laid between the islands of Gan (0°42'·S, 73°10'·E) and Hithadhoo, 4½ miles NW, as shown on the chart. Vessels are warned not to anchor within 5 cables of this cable which carries a high voltage; see 1.33.

**Anchorage****2.49**

- 1 During E winds vessels can anchor off the W side of the E islands and in W or S winds off the NE side of the SW islands, but local knowledge of the extremities of the reef and the positions of isolated shoal patches is necessary. These anchorages are the most convenient ones for communication with the inhabitants.
- 2 For anchorage off Gan see 2.32.

**Swell****2.50**

- 1 Swell may be experienced in the lagoon throughout the year but most often and most severely with W or S winds; discharging or embarking cargo and refuelling operations under these conditions can be difficult.

**EQUATORIAL CHANNEL****General information**

*Chart 1011*

**Description****2.51**

- 1 The channel between Addoo Atoll (0°40'S, 73°10'E) and Huvadhoo Atoll, 46 miles N, is generally known as Equatorial Channel (Addoo Kandu) but the name should be more correctly applied only to the channel between the S point of Huvadhoo Atoll and Foammulah Island (0°18'S, 73°26'E) which lie about 12 and 16 miles N and S of the equator respectively.

**Dangers****2.52**

- 1 Except for the reefs surrounding Addoo Atoll, Huvadhoo Atoll and Foammulah Island, there are no known dangers in Equatorial Channel.

**Currents****2.53**

- 1 Strong sets, both E and W, with rates up to 5½ kn have often been reported in Equatorial Channel but in its S part the E-going counter equatorial current with a rate up to about 4 kn seems to prevail.

**Lights****2.54**

- 1 Lights of limited range are exhibited from both sides of Equatorial Channel, including Foammulah Island (2.59).  
For the light on the S side of the channel see 2.40.  
For the light on the N side of the channel see 2.69.

**Passage directions****2.55**

- 1 For Equatorial Channel the chart is sufficient guide.

**Foammulah**

*Chart 1011*

**General information****2.56**

- 1 **Position.** Foammulah (0°18'S, 73°26'E) is an island that lies about 20 miles NE of Addoo Atoll.
- 2 **Topography.** The island is generally wooded. It is steep-to on its W, N and E sides but a shelving bank, on which the surf breaks heavily up to about 7½ cables offshore, extends 1¼ miles SE from the S end of the island; this bank is also steep-to.

**Tidal streams****2.57**

- 1 Tidal streams, setting E when in-going and W when out-going, are negligible near Foammulah except for the effect of retarding or accelerating the current.

**Principal marks****2.58**

- 1 **Landmarks:**

House (0°18'·2S, 73°26'·2E) (position approximate) stands near the SE corner of the island.

- 2 Tower (0°16'·7S, 73°25'·2E) (position approximate) stands at the N end of the island.

**Useful marks****2.59**

- 1 Light (framework tower, concrete base) (0°18'·5S, 73°26'·0E) stands near the SW corner of the island.
- Light (framework tower, concrete base) (0°16'·7S, 73°25'·2E) is exhibited from near the tower (2.58) which stands at the N end of the island.

**Other mark****2.60**

- 1 House (red roof) (not charted) is situated about midway along the E side of the island.

**Anchorage****2.61**

- 1 Vessels can obtain anchorage, during moderate weather, on the S end of the bank extending SE from the S end of the island in depths of 11 to 13 m.

**Landing****2.62**

- 1 A landing place on the E side of the island may be identified by a collection of boat sheds. Landing on the W side of the island is considered dangerous and should not be attempted.

**HUVADHOO ATOLL***Chart 1011***Position****2.63**

- 1 Huvadho Atoll (0°30'N, 73°15'E), comprising South and North Huvadho Atolls, lies on the N side of Equatorial Channel.

**General description****2.64**

- 1 Huvadho Atoll is one of the largest atolls of the Maldives Group, there are many islets on the barrier reef and within the lagoon; some of the islets are inhabited.
- 2 Depths in the lagoon are greater than those in the other atolls of the group and there is less obstruction by coral reefs.
- 3 The atoll is the unhealthiest of the group; elephantiasis is said to be common and cases of leucoderma have been

reported, isolation of such cases are strictly enforced by the Government. However, in 1991 it was reported that as a result of assistance from the *World Health Organisation* this situation was much improved.

- 4 The atoll is the centre of the mat-making industry of the Maldives; the rush, which is the raw material used, grows in abundance on the islets.

**Southern side of Huvadho Atoll****2.65**

- 1 **Description.** From the NE side of Redhdhutta (0°20'N, 73°31'E) the reef extends about 19 miles WSW to Vaadhoo Kuda Kandu.

Gadhdhoo Islet (0°17'·5N, 73°27'·3E) provides the site and facilities for the main part of the atoll's mat-making industry.

- 2 Vaadhoo (0°13'·5N, 73°16'·5E) is the site of ancient mosques and burial places. The island is reported to have a harbour constructed from loose coral.

**2.66**

- 1 **Lagoon entrances.** Across this side of the atoll there are several passages leading into the lagoon; the principal ones are described below.

- 2 Gan Kandu (0°16'N, 73°25'E) is about 1½ miles wide with a least charted depth of 38 m, but there is a foul area, shown on the chart, in the middle of the fairway. An islet 1½ miles NW of Gan (0°17'N, 73°26'E) may be passed on either side but care must be taken to avoid a reef which extends about 1¼ miles SSW from it and also a low bushy island lying about 5 cables off the W side of the reef. Within the entrance of this channel the lagoon is encumbered with islands and reefs all of which are plainly visible from aloft in a favourable light.

- 3 Kuda Kandu (0°15'N, 73°19'E) enters the lagoon between Kalherehaa and Vashavarrehaa islets forming, respectively, its E and W entrance points; the channel is about 6 cables wide at its narrowest part with a least charted depth of 37 m.

- 4 Vaadhoo Kuda Kandu (0°12'N, 73°14'E) is a narrow channel that enters the lagoon between two reefs; there is a least charted depth of 12·5 m at the inner end of the channel.

**2.67**

- 1 **Anchorage** may be found, as shown on the chart, about 5 cables NW of Gadhdhoo (0°17'·5N, 73°27'·3E) and off Gan Island, close SW.

**South-western side of Huvadho Atoll****2.68**

- 1 **Description.** From Vaadhoo Kuda Kandu (0°12'N, 73°14'E) the reef extends 5½ miles WNW to Fiyoaree Kandu (2.70).

- 2 From Fiyoaree Kandu the reef extends about 8 miles NW to Nadallaa and thence NNW for 11 miles to Kaadedhdhoo Kandu; this reef, forming the largest part of the SW side of the lagoon, is so densely encumbered with small islets that it appears, from some directions, as a single large island.

- 3 Thinadhoo (0°32'N, 73°00'E), an islet lying about 3½ miles N of Kaadedhdhoo Kandu, is well wooded, very low and swampy in parts. It is densely populated and reported to be the seat of Government of the atoll with radio communication with Male'. There is a concrete wharf situated on the E side of the island; the approach to the wharf is tortuous and local knowledge is required.



- 4 **Caution.** From SW or W Thinadhoo islet may appear as the N point of the atoll because none of the low-lying islets situated farther N of it are wooded.

**2.69**

- 1 **Useful mark:**

Fiyoari Light (0°13'·2N, 73°08'·3E) stands near the SE end of Fiyoari close W of Fiyoaree Kandu (2.70).

**2.70**

- 1 **Lagoon entrances.** Fiyoaree Kandu (0°13'N, 73°09'E) is the only opening to the lagoon in this part of the atoll. Kaadedhdhoo Kandu (0°28'N, 73°00'E) is considered the principal entrance into the lagoon on this side of the atoll; it is about 7 cables wide, with a least charted depth of 11 m.

**2.71**

- 1 **Anchorage** may be found about 1½ miles ENE of Nadallaa (0°17'·6N, 73°02'·6E) (2.68), as shown on the chart.

During the SW monsoon anchorage may also be found on the E side of Hoadedhdhoo (0°27'N, 73°00'E) in depths of 49 to 64 m.

- 2 Local knowledge is necessary for approaching these anchorages.

**2.72**

- 1 **Landing.** There is a small jetty situated on the NE side of Fiyoari (0°13'·5N, 73°08'·2E); the approach to the jetty is marked by wooden stakes.

**2.73**

- 1 **Communication.** There is an airstrip on Kaadedhdhoo (0°29'·5N, 72°59'·5E).

**2.74**

- 1 **Development.** In 1994 it was reported that a harbour was under construction at Kaadedhdhoo (0°29'·5N, 72°59'·5E) (2.73).

**North-western side of Huvadhoo Atoll****2.75**

- 1 **Description.** On the NW side of the atoll the reef recedes, forming a bight between Thinadhoo (0°32'N, 73°00'E) and Kolamaafushi, 22 miles NNE.

**2.76**

- 1 **Principal islets.** Kolamaafushi (0°50'·3N, 73°11'·2E) is the principal islet on this part of the reef. There is a boat landing at the village near the centre of the E side of the islet, but the boat channel is not marked at low water; only boats of shallow draught can land here.

- 2 Hithaadhoo, an islet lying within the lagoon 3½ miles E of Kolamaafushi, is marked by tall luxuriant trees. The islet was reported in 1970 to be very unhealthy.

**2.77**

- 1 **Useful mark:**

Footukandu Light (framework tower, concrete base) (0°34'·8N, 73°02'·2E) stands near the end of a reef extending about ¾ miles NE from Thinadhoo (2.68).

**2.78**

- 1 **Lagoon entrances.** On the NW side of the atoll there are numerous openings into the lagoon but no useful landmarks to identify them. However, in an emergency a vessel might pass through one of these with a good lookout from the masthead and in favourable light conditions. The best of these openings are considered to be the ones either side of Maafushi (0°39'N, 73°07'E) or those in the vicinity of Fulangi, 6 miles ENE. The entrances on this side of the

atoll are much encumbered by reefs and islets close within the lagoon.

**2.79**

- 1 **Anchorage** may be obtained with Kolamaafushi (0°50'·3N, 73°11'·2E) bearing 267° distant 1 mile, in a depth of 18 m, as shown on the chart.

**2.80**

- 1 **Development.** In 1994 it was reported that a harbour was under construction at Kolamaafushi (0°50'·3N, 73°11'·2E) (2.76). It was also reported that a reclamation project, in progress nearby, appears to be joining Kolamaafushi to the islet of Kolaa lying close S.

**Northern side of Huvadhoo Atoll****2.81**

- 1 **Description.** The N side of the atoll is bounded by detached reefs with a few islets lying about 2 miles within the lagoon.

**2.82**

- 1 **Useful marks:**

Kaduviligili Light (0°52'·0N, 73°11'·7E) stands on Kaduviligili near the edge of the reef that forms the SW side of Viligili Kandu.

- 2 Kudalafari Light (0°53'·9N, 73°21'·2E) stands on Kudalafari near the SE end of a reef of that name.

**2.83**

- 1 **Lagoon entrances.** On this side of the atoll there are several safe entrances through the reef, but a careful lookout is necessary for there are no islets between the two lights described at 2.82 to provide landmarks for the other entrances.

**Eastern side of Huvadhoo Atoll****2.84**

- 1 **Description.** From Kaduhulhudhoo (0°21'·3N, 73°32'·6E) the E side of the atoll trends 6 miles NNE then 20 miles NNW to Kooddoo; there are several openings in the reef and numerous islets standing upon it.

- 2 Viligili (0°45'·5N, 73°26'·2E) lies on the N side of the opening N of Kooddoo; a small harbour is situated near the SW point of the islet. From Viligili the barrier reef then extends about 11 miles NNW and is impassable.

- 3 Maamutaa (0°50'·8N, 73°24'·7E) standing on the reef, about 4½ miles from its N end, is usually the first islet seen by vessels approaching from NE.

**2.85**

- 1 **Lagoon entrances.** On the E side of the atoll the S-most entrance lies close SW of Kaduhulhudhoo (0°21'·3N, 73°32'·6E); it is about 1 mile wide with a least charted depth of 11 m.

- 2 There are a number of other entrances along the E face, the most northerly of which are the entrances lying N and S of Kooddoo (0°44'·2N, 73°26'·1E). The S entrance is about 3 cables wide with a least charted depth of 24 m; the N entrance is about 2 cables wide with a least charted depth of 22 m.

**2.86**

- 1 **Anchorage.** During the NE monsoon well-sheltered anchorage may be found on the W side of Nilandhoo (0°38'·2N, 73°27'·0E) as shown on the chart; a similar anchorage may also be found on the W side of Kodey, 10 miles SE. Local knowledge is required for the latter anchorage.

**2.87**

- 1 **Landing.** Dhaandhoo Islet (0°37'·5N, 73°28'·0E) has a wharf, constructed from loose coral, situated on its SW side.

**Other islets****2.88**

- 1 Dhiyadhoo (0°28'·6N, 73°33'·8E), an islet.  
Gemanafushi (0°26'·5N, 73°34'·3E), an islet.  
Maafehelaa (0°23'·0N, 73°33'·3E), an islet.  
Vodamulaa (0°36'·3N, 73°29'·4E), an islet.

**ONE AND HALF DEGREE CHANNEL***Chart 1012***Description****2.89**

- 1 One and Half Degree Channel (Huvadhoo Kandu) lies between the N end of Huvadhoo Atoll (0°30'N, 73°15'E) and Hadhdhunmathee Atoll, 52 miles N. It is one of the principal routes through the Maldives for ocean-going vessels proceeding in an E/W direction; for details of such routes see *Ocean Passages for the World*.

**Depths****2.90**

- 1 The channel is generally very deep and free from charted dangers. However, an area with depths of less than 1000 m lies about 22 miles N of Huvadhoo Atoll; a detached shoal with a depth of 15·5 m, the existence of which is doubtful, was reported in 1963 to lie in this area in approximate position 1°16'N, 73°17'E.

**Currents****2.91**

- 1 Currents setting E with a rate of up to 3½ kn have been experienced in October and November but during the NE monsoon (December to March) a W set with a rate of nearly 4 kn was reported to have been experienced in the middle of the channel.

**Lights****2.92**

- 1 Lights of limited range are exhibited from both sides of One and Half Degree Channel.  
For the lights on the S side of the channel see 2.82.  
For the light on the N side of the channel see 2.97.

**Passage directions****2.93**

- 1 For One and Half Degree Channel the chart is sufficient guide.

**HADHDHUNMATHEE ATOLL***Chart 1012***Position****2.94**

- 1 Hadhdhunmathee Atoll (1°55'N, 73°24'E) lies on the N side of One and Half Degree Channel.

**General description****2.95**

- 1 Hadhdhunmathee Atoll has 6 openings through the barrier reef surrounding it, of which some are suitable for large vessels. There are many coral reefs within the atoll but on a clear day, with the sun behind the observer, these can be seen by a lookout at the masthead.

- 2 The principal occupation of the inhabitants of the atoll is cultivation.

**South-western side of Hadhdhunmathee Atoll****2.96**

- 1 **Description.** The island of Hithadhoo (1°48'·0N, 73°23'·5E) lies close NE of Mendhoo and Kunahandhoo; this group of islands, from some directions, appear as one. Hithadhoo is the atoll Chief's island and is served by a jetty. A radio mast (not charted) stands on the island.
- 2 From a position close E of Hithadhoo the reef extends in a curve about 12 miles NW to a position about 1½ miles N of Maavah, which lies near the W extremity of the atoll and is the principal island. A small jetty extends from the E side of Maavah.

**2.97****Useful marks:**

- 1 Kunahandhoo Light (black cylindrical daymark on grey framework tower, 12 m in height) (1°46'·7N, 73°22'·4E) stands on the reef close SE of Kunahandhoo.
- 2 Suaroge Light (framework tower, concrete base) (1°55'·2N, 73°15'·2E) stands on the N side of Maavah Kandu (2.98), 2 miles NNE of Maavah Island.

**2.98**

- 1 **Lagoon entrances.** The S opening into the lagoon lies between the reef close E of Hithadhoo (1°48'·0N, 73°23'·5E) and the reef projecting about 5 cables W of Gaadhoo, 3½ miles ENE. The entrance is fronted, within the lagoon towards its W side, by 3 reef-fringed islets which divide the opening into 2 passages; Hithadhoo Kandu forms the W passage and Gaadhoo Kandu lies to the E of the islets; these passages have least charted depths of 27 m and 55 m respectively. There are several coral reefs lying inside the lagoon at the inner ends of each passage. Particular care is required by vessels using Hithadhoo Kandu where isolated reefs extend across the fairway W of the 3 islets.
- 2 Maavah Kandu (1°55'N, 73°15'E) is very narrow with no recorded soundings. This entrance has previously been described as safe but its use without local knowledge is not recommended.

**2.99**

- 1 **Anchorage.** Convenient anchorage is reported to be available N of Hithadhoo (1°48'·0N, 73°23'·5E), in a depth of 44 m. There is easy landing by boat, on a sandy beach on the island, passing over the reef which extends a short distance offshore.
- 2 Good anchorage with shelter from W winds can be found about 1 mile ESE of Maavah Island (1°53'·0N, 73°14'·5E), in depths of 31 to 37 m, as shown on the chart.

**North-western side of Hadhdhunmathee Atoll****2.100**

- 1 **Description.** The NW side of the atoll is virtually straight and mostly low. It extends about 2 miles N from Suaroge Light (1°55'·2N, 73°15'·2E) to Hanhushi (1°57'N, 73°16'E), then 22 miles NE to Isdhoo Kalaidhoo (2.103). There are a number of small islets standing on the reef and several boat channels pass through its NE part.

**2.101****Useful mark:**

- 1 Vadinolhu Light (grey framework tower, 5 m in height) (2°01'·3N, 73°21'·4E) stands near the NE end of Vadinolhu and close NNW of Vadinolhu.



**2.102**

- 1 **Lagoon entrance.** Vadinolhu Kandu (2°01'N, 73°22'E) lying on the E side of Vadinolhu, is entered close E of Vadinolhu Light (2.101); the entrance is about 2 cables wide between Vadinolhu and the sandbanks on the reef to the E; there are depths of about 18 to 31 m in the fairway.

**Eastern side of Hadhdhunmathee Atoll****2.103**

- 1 **Description.** From Gaadhoo (1°49'N, 73°27'E) the reef extends 3 miles E to Fonadhoo, thence it trends 19 miles NNE to the NE point of the atoll. There are several large islands on the S part of the reef, the largest being Gan (1°55'N, 73°33'E); some of the islands are joined by a narrow causeway. On the N part of the reef there are numerous islets between Gan and Isdhoo Kalaidhoo, 10 miles N, an island with two villages which lies at the NE extremity of the atoll.

**2.104**

- 1 **Useful mark:**

Isdhoo Light (black cylindrical daymark on grey framework tower, 12 m in height) (2°08'·0N, 73°35'·2E) stands on the NE point of Isdhoo Kalaidhoo; a stranded wreck lies on the reef S of the island, 1¼ miles SW of the light.

**2.105**

- 1 **Lagoon entrances.** There are entrances to the lagoon close S and N of Maabaidhoo (2°02'N, 73°32'E). Maabaidhoo Kandu, the S entrance, is about 2 cables wide with a charted depth of 14·5 m; Fushi Kandu, the N entrance, is shallow.

**2.106**

- 1 **Harbour.** There is a boat harbour situated on the E side of Maabaidhoo.

**2.107**

- 1 **Communication:** airport at Kaddhoo (1°52'N, 73°31'E).

**2.108**

- 1 **Development.** In 1994 a small harbour was reported to be nearing completion on the W side of Maandhoo Island (1°52'·5N, 73°31'·5E).

**Other islets****2.109**

- 1 Dhabidhoo (2°05'·7N, 73°32'·8E), an islet.  
Kalhaidhoo (1°59'·3N, 73°32'·3E), an islet.  
Mundoo (2°00'·8N, 73°32'·1E), an islet.

**VEYMANDOO KANDU**

*Chart 1012*

**Position****2.110**

- 1 Veymandoo Kandu lies between the NW side of Hadhdhunmathee Atoll (1°55'N, 73°24'E) and Kolhumadulu Atoll, 16 miles NW.

**Depths****2.111**

- 1 The channel is very deep and free from charted dangers.

**Tidal streams****2.112**

- 1 Tidal streams in this channel attain a rate of 2 kn at springs; this rate may be increased or reduced by the current prevailing.

**Current****2.113**

- 1 A set in the direction 070° with a rate of between 1¾ and 3½ kn has been experienced in October.

**Lights****2.114**

- 1 Lights of limited range are exhibited from both sides of Veymandoo Kandu.

For the lights on the SE side of the channel see 2.97, 2.101 and 2.104.

- 2 For the light on the NW side of the channel see 2.119.

**Passage directions****2.115**

- 1 For Veymandoo Kandu the chart is sufficient guide.

**KOLHUMADULU ATOLL**

*Chart 1012*

**Position****2.116**

- 1 Kolhumadulu Atoll (2°22'N, 73°07'E) lies on the NW side of Veymandoo Kandu.

**General description****2.117**

- 1 Kolhumadulu Atoll has several openings in the barrier reef surrounding it and there are numerous islets on its W, S and E sides but very few on the N side. An abundance of drying reefs encumber the lagoon.

**Southern side of Kolhumadulu Atoll****2.118**

- 1 **Description.** From Guraidhoo (2°19'·5N, 73°19'·0E) the reef trends 22 miles WSW to Vanbadi. Numerous islets stand on this stretch of reef and there are three openings into the lagoon located towards its WSW end.

**2.119**

- 1 **Useful mark:**

Guraidhoo Light (grey framework tower, 5 m in height) (2°19'·3N, 73°19'·0E), stands on the reef close S of Guraidhoo.

**2.120**

- 1 **Lagoon entrances.** The lagoon may be entered WSW of Thimarafushi (2°12'·2N, 73°08'·4E) as described below.

Fonaddoo Kandu, lying between Thimarafushi and Fonaddoo, 8 cables WSW, has a least charted depth of 68 m. A shoal area extends NE from Fonaddoo which reduces the width of the channel to about 1¾ cables.

- 2 Kanimeedhoo Kandu, about 1 mile farther W, is not recommended; it has a least charted depth of 11 m but there is a rocky shoal lying near the centre of the fairway.

- 3 About 1 mile farther W again, between Kanimeedhoo (2°11'·5N, 73°06'·5E) and Veymandhoo, 1 mile WSW, there is a broad deep channel; but care must be taken to avoid a large coral patch with outlying rocks about 8 cables within the entrance.

**2.121**

- 1 **Harbour.** Thimarafushi (2°12'·2N, 73°08'·4E) has a small harbour, constructed from loose coral, situated on its NW side.

**Western side of Kolhumadulu Atoll****2.122**

- 1 **Description.** From Vanbadi (2°11'·4N, 72°58'·5E) the reef trends 17 miles NNW then 6 miles NE to Maa Kandu.

**2.123**

- 1 **Lagoon entrance.** The W opening to the lagoon lies between Hirilandhoo (2°16'·2N, 72°55'·8E) and Kadoodhoo,

3 miles NNW; the opening is divided into 2 channels by a reef, which dries in places, lying in the centre of the opening. Hirilandhoo Kandu, the S opening, is about 6 cables wide with a charted depth of 12.5 m. Kadoodhoo Kandu, the N opening, is the narrower of the 2 channels and has no recorded soundings.

#### 2.124

- 1 **Directions.** The reef in the centre of the entrance may be best avoided by keeping well to the S or N sides of the entrance, whilst maintaining a good lookout, for the reefs extending N from Hirilandhoo and S from Kadoodhoo. Thence, close within the combined entrance, there are several islets and reefs for which a good lookout is also required.

#### 2.125

- 1 **Anchorage** may be found on the E side of Hirilandhoo or Kadoodhoo (2.123), according to the prevailing wind, but care must be taken to anchor well clear of the coral reefs described at 2.124.

#### 2.126

- 1 **Landing.** There is a small wooden landing platform situated on the E side of Kadoodhoo (2°19'·5N, 72°55'·1E) (2.123). The approach to the landing is tortuous but marked by tree branches set in the coral reef; the seaward end of the approach is marked by a red flashing light.

### Northern side of Kolhumadulu Atoll

#### 2.127

- 1 **Description.** From Maa Kandu (2°31'·5N, 72°58'·0E) the reef trends 21 miles E to Vilufushi, an islet near the NE extremity of the atoll; Vilufushi Light (2.132) stands on the reef close NE of the islet.

- 2 The few islets standing on this side of the atoll were wooded, in 1970, with many coconut trees.

#### 2.128

- 1 **Lagoon entrances.** There are several entrances to the lagoon on this side of the atoll, the principal ones are described below.

- 2 Maa Kandu (2°31'·5N, 72°58'·0E) a deep channel about 2½ cables wide.

Burunee Kandu (2°33'·5N, 73°07'·0E) a wide shallow channel.

- 3 Fushifaru Kandu (2°32'·6N, 73°09'·5E) a narrow channel with a reported depth of 29 m; there is a reef lying about 1 mile S of this entrance.

Olhugiri Kandu (2°30'·5N, 73°15'·8E), the E-most entrance, with a least charted depth of 9 m.

#### 2.129

- 1 **Anchorage** may be obtained about 1 mile S of Buruni (2°33'·5N, 73°06'·5E), as shown on the chart.

#### 2.130

- 1 **Landing.** There is a small concrete landing platform situated near the mid-point of the S shore of Buruni.

### Eastern side of Kolhumadulu Atoll

#### 2.131

- 1 **Description.** From Guraidhoo Kandu (2°20'N, 73°20'E) the reef trends 10 miles N, in a shallow unbroken outward curve, to Vilufushi the NE-most island of the atoll. Dhiyamigili, an islet, stands on the NE side of Guraidhoo Kandu at the SW extremity of the reef, thence for 2½ miles NE there are a number of other small islets.

Kalhufahala-fushi, a long narrow island orientated N/S, occupies the E central part of the reef and a few more small islets stand on its N part close S of Vilufushi.

#### 2.132

- 1 **Useful mark:**

Vilufushi Light (black cylindrical daymark on grey framework tower, 12 m in height) (2°30'·7N, 73°18'·6E) stands near the edge of the reef close NE of Vilufushi.

#### 2.133

- 1 **Lagoon entrance.** Guraidhoo Kandu (2°20'N, 73°20'E), about 8 cables wide with a charted depth of 35 m, makes a good entrance into the lagoon; there is normally a tide-rip across the entrance.

### Other islands

#### 2.134

- 1 Gaadhiffushi (2°15'N, 73°13'E), an island.  
Kurandhuvaru (2°32'N, 73°11'E), an island.  
Madifushi (2°21'N, 73°21'E), an island.

## KUDAHUVADHOO KANDU

*Chart 1012*

### Position

#### 2.135

- 1 Kudahuvadhoo Kandu lies between the N side of Kolhumadulu Atoll (2°22'N, 73°07'E) and South Nilandhe and Mulaku Atolls to the N. The channel is 9 miles wide at its W entrance between Kolhumadulu Atoll and South Nilandhe Atoll and 14½ miles wide at its E entrance between Kolhumadulu Atoll and Mulaku Atoll.

### Depths

#### 2.136

- 1 The channel is deep with no known dangers.

### Tidal streams

#### 2.137

- 1 Tidal streams in this channel set E when in-going and W when out-going.

### Currents

#### 2.138

- 1 Currents in this channel are more obstructed by nearby atolls than in the channels to the S and are thus more uncertain in direction and have a greater rate.

### Lights

#### 2.139

- 1 Lights of limited range are exhibited from both sides of Kudahuvadhoo Kandu.

For the light on the S side of the channel see 2.132.

For the lights on the N side of the channel see 2.150 and 2.202.

### Passage directions

#### 2.140

- 1 For Kudahuvadhoo Kandu the chart is sufficient guide.

### Useful mark

#### 2.141

- 1 Kudahuvadhoo (2°40'N, 72°54'E) (2.149), an island on the N side of the channel defines its W end.

## KUDAHUVADHOO KANDU TO KARDIVA CHANNEL

## GENERAL INFORMATION

Charts 1012, 1013

## Area covered

## 2.142

- 1 The area covered by this section comprises the atolls in the central part of the Maldives. These are described in two groups together with the routes through the area as follows:
- 2 West group. South Nilandhe Atoll (2.147), North Nilandhe Atoll (2.161), Ari Atoll (2.176), Rasdhoo Atoll (2.191); Dheburideethere Kandu (2.160) and Ariadhoo Kandu (2.171).
- 3 East group. Mulaku Atoll (2.198), Felidhe Atoll (2.215), South Male' Atoll (2.235), Male' Atoll (2.248) and Male' (2.289); Vattaru Kandu (2.209), Fulidhoo Kandu (2.230) and Vaadhoo Kandu (2.247).
- 4 Routes. West (2.146) and east (2.197) of the above atolls; central route (Hataru Alholhu Medu, see 2.196) a channel lying between the two groups of atolls.

## Atolls

## 2.143

- 1 A general description of the atolls is given at 2.4.

## Currents

## 2.144

- 1 See 2.8.

## Principal marks

## 2.145

- 1 **Landmarks:**  
The landmarks in the area covered by this section are few and will only be seen by vessels approaching an individual atoll; therefore the descriptions of landmarks will be found in the relevant part and not in the directions for the area.
- 2 **Major lights:**  
There are no major lights in the area being described.

## WEST GROUP OF ATOLLS INCLUDING CHANNELS AND DIRECTIONS

## Passage directions west of atolls

(continued from 2.17)

Charts 1012, 1013

## 2.146

- 1 From a position W of Kolhumadulu Atoll (2°22'N, 73°07'E) (2.116) the passage leads direct N for about 125 miles, passing:  
W of South Nilandhe Atoll (2°50'N, 72°55'E) (2.147), thence:  
W of North Nilandhe Atoll (3°12'N, 72°55'E) (2.161), thence:  
W of Ari Atoll (3°55'N, 72°50'E) (2.176), thence:
- 2 To a position W of the approaches to Kardiva Channel (4°50'N, 73°10'E) (2.331).  
(Directions continue for the passage  
W of Maldives at 2.330)

## SOUTH NILANDHE ATOLL

Charts 1012, 1013

## Position

## 2.147

- 1 South Nilandhe Atoll (2°50'N, 72°55'E) lies on the N side of Kudahuvadhoo Kandu (2.135).

## General description

## 2.148

- 1 South Nilandhe Atoll has many openings in the barrier reef but it is not accessible on its SW side.  
There are few islets on the barrier reef on the W side of the atoll but many on the barrier reef on the E side, those in the SE part being closely grouped.
- 2 The lagoon is deep, but encumbered with large and small coral reefs some of which dry; these reefs are steep-to and easily discernible. Most of the many islets in the lagoon lie in its N part and about 3 miles within the barrier reef.
- 3 The islands are mostly covered by vegetation with many coconut palms.

## South-western side of South Nilandhe Atoll

## 2.149

- 1 **Description.** The island of Kudahuvadhoo (2°40'N, 72°54'E), lying near the SW point of the atoll, is the atoll Chief's island. There is an old wooden landing platform, with a new concrete jetty under construction (1994), situated on the N side of the island. From Kudahuvadhoo the reef extends unbroken W and N for a total of about 12 miles.

## 2.150

- 1 **Useful mark:**  
Bodugaa Muli Light (black cylindrical daymark on grey framework tower, 12 m in height) (2°40'1N, 72°52'2E) stands near the edge of the reef at the SW point of the atoll about 1½ miles W of Kudahuvadhoo.

## 2.151

- 1 **Lagoon entrances.** Hulhudheli (2°51'5N, 72°50'8E), an island lying close N of the SW side of the atoll, has openings S and N of it. The S opening, about 2 cables wide between the edges of the reef, has a least charted depth of 27 m. The N opening between Hulhudheli and Maadheli Island, 1½ miles NNW, is about 6 cables wide between the reefs and has a least charted depth of 35 m in the fairway; this opening is better defined than the S opening. Within the lagoon, a reef extends about 1 mile NE and SE from Hulhudheli.

## North-western side of South Nilandhe Atoll

## 2.152

- 1 **Description.** Between Maadheli Island (2°53'0N, 72°50'2E) and the E end of Meedhuffushi, about 12½ miles NE, the barrier reef extends NNE and ENE in an arc with three openings but no other islet upon it. Some islets situated inside the lagoon have trees upon them which are visible from a distance, but they lie too far within the lagoon to provide safe navigational marks; thus the NW side of this atoll is unsafe to approach.

## 2.153

- 1 **Lagoon.** Ribudhoo (2°55'5N, 72°53'8E), situated in the NW part of the lagoon, with Doores lying 8 cables SW are known locally as Jewellers' Islands; their inhabitants having formerly been the chief jewellers in the Maldives.



**2.154**

- 1 **Anchorage** NE of Ribudhoo is more comfortable in a swell from SW than in the anchorage charted SW of the island.

**2.155**

- 1 **Harbour.** Maadheli Island (2°53'·0N, 72°50'·2E) (2.152) has a small harbour, constructed from loose coral, and a small landing platform; both are situated on its S side. Fuel and lubricants are reported to be available.

**South-eastern side of South Nilandhe Atoll****2.156**

- 1 **Description.** From Eboodhoofushi (2°40'·5N, 72°55'·8E) the reef extends, 6 miles NE to Kadimma then 16 miles N to Meedhoo, the NE point of the atoll. There are several openings in this part of the reef and a large number of islets stand on its S part.

**2.157**

- 1 **Useful mark:**

Meedhoo Light (grey framework tower, 5 m in height) (3°00'·2N, 73°00'·5E) stands near the edge of the reef NNE of Meedhoo Island at the NE point of the atoll.

**2.158**

- 1 **Lagoon entrances.** There are several openings on this part of the barrier reef, the principal ones are described below.
- 2 Kudahuvadhoo Kanduolhi, the opening between Eboodhoofushi and Kudahuvadhoo (2.149), 1¼ miles WSW, is about 1 mile wide with a least charted depth of 16·5 m.
- 3 Maiboodhoo Kanduolhi, an opening about 5 cables wide with a least charted depth of 12·5 m, lies close ENE of Maebloodhoo (2°41'·7N, 72°57'·9E); an area of shoal water lies E of the fairway, as shown on the chart.  
Vaanee Kandu, a narrow opening in the reef with a least reported depth of about 37 m, lies between Vaanee (2°43'·5N, 73°00'·2E) and Kadimma, 4 cables NE.
- 4 Maalefaru Kandu (2°52'·5N, 73°01'·5E) is a narrow opening with a least charted depth of 16·5 m; it is encumbered with rocks close within the lagoon. Madivaru Kandu and Hulhuvehi Kandu lie, respectively, 3 miles and 1½ miles S of Maalefaru Kandu; both entrances are very narrow with the coral reefs encroaching upon their inner ends.
- 5 Bandidhoo Maa Kandu (2°54'·8N, 73°01'·5E) is about 8 cables wide with a least charted depth of 31 m and free of dangers close within the lagoon. Kihafun Kandu, lying 3 miles N of Bandidhoo Maa Kandu, is deep and about 1 mile wide but it is divided into two channels by an unmarked shoal patch and a coral reef lying near its centre.
- 6 Velavaru Kandu and Meedhoo Kandu enter the NE part of the lagoon, respectively, SE and NW of Meedhoo Island (3°00'·0N, 73°00'·4E); both channels are narrow with reefs about 1 mile long on each side.

**Other islet****2.159**

- 1 Hiriyaufushi (2°42'·7N, 72°59'·3E), an islet.

**Dheburideetheree Kandu**

*Chart 1013*

**General information****2.160**

- 1 Dheburideetheree Kandu (3°02'N, 72°56'E) separates South Nilandhe Atoll (2.147) and North Nilandhe Atoll (2.161); the channel is about 3 miles wide at its narrowest part and is deep and free from charted dangers.

- 2 For passage through this channel the chart is sufficient guide.

**NORTH NILANDHE ATOLL**

*Chart 1013*

**Position****2.161**

- 1 North Nilandhe Atoll (3°12'N, 72°55'E) lies on the N side of Dheburideetheree Kandu.

**General description****2.162**

- 1 North Nilandhe Atoll has many openings on all sides of the barrier reef; a few islets stand on the reef, mostly on its S and E part.  
The lagoon is deep, but encumbered with large and small coral reefs some of which dry; there are a few islets in the lagoon.
- 2 The islets are mostly covered by vegetation with many coconut palms.

**Western side of North Nilandhe Atoll****2.163**

- 1 **Description.** The island of Nilandhoo (3°03'·4N, 72°53'·5E) stands near the SW point of the atoll, from where the barrier reef extends 4 miles NW to Maavarufalhu. Thence the reef trends 10 miles N to the island of Himithi (3°15'·5N, 72°49'·2E) at which point it curves about 6 miles NE to Kadumoonufushi Reef that marks the N end of the atoll.

**2.164**

- 1 **Useful mark:**

Maavaru Light (black cylindrical daymark on grey framework tower, 12 m in height) (3°05'·3N, 72°50'·5E) stands on Maavarufalhu Reef (2.163).

**2.165**

- 1 **Lagoon entrances.** There are several openings on this part of the barrier reef, the principal ones are described below.  
Nilandhoo Kandu the opening between Nilandhoo (2.163) and Dharaboodhoo, an island standing on a reef 2 miles ENE, is about 8 cables wide with a least charted depth of 37 m; a shoal patch lies on the E side of the fairway adjacent to Dharaboodhoo Reef.
- 2 Maavaashi Kandu the opening between the N point of Maavarufalhu Reef (3°06'N, 72°51'E) and Kudafalhu, a roughly circular reef 1½ miles NNE, has a wide entrance with a least charted depth of 27 m. There is a deep, but very narrow, passage N of Kudafalhu.
- 3 Kuda Vshee Kandu, enters the lagoon S of Himithi (3°15'·5N, 72°49'·2E). It is narrow with a least charted depth of 11 m and is encumbered by reefs at its inner end; N of Himithi, Himithe Kandu, about 8 cables wide with a least charted depth of 24 m, is less encumbered.
- 4 Near the N point of the atoll, Gaafunee Kandu enters the lagoon W of Kadumoonufushi Reef (3°19'·0N, 72°53'·5E) and Fushi Kandu enters the lagoon to the E of the reef; both channels are deep with least charted depths of 37 and 40 m respectively.

**2.166**

- 1 **Landing place.** There is a wooden jetty standing on the E side of Nilandhoo Island (3°03'·4N, 72°53'·5E) (2.163).

**Eastern side of North Nilandhe Atoll****2.167**

- 1 **Description.** The island of Magoodhoo (3°04'·6N, 72°58'·0E) is the atoll Chief's island. From this island the

barrier reef extends, in a semi-circle, about 15 miles NNW to Kadumoonufushi Reef (2.163). Several islets stand on the SE and NE parts of the reef.

#### 2.168

##### 1 Useful mark:

Ficeali Light (grey framework tower, 5 m in height) (3°16'·7N, 72°59'·7E) stands on a reef about 5 cables NW of Viligilivarufinolhu Islet.

#### 2.169

1 **Lagoon entrances.** There are several openings, from 1 to 4 miles apart, on this part of the barrier reef as shown on the chart; the narrow openings all have moderate depths except for Miyaru Kandu (3°17'·1N, 72°59'·5E) which has a least charted depth of 5·5 m. The principal wide openings are described below.

2 Dharaboodhoo Kandu (3°04'·0N, 72°56'·4E) lies adjacent to the E end of Dharaboodhoo Island (2.165). The opening is about 7 cables wide with a least charted depth of 27 m and, except for the reef on its E side, it is free from charted dangers in the fairway and for about 2½ miles within the lagoon.

3 Biledhdhoo Kandu, 4½ miles NE of Dharaboodhoo Kandu, is about 5 cables wide with a least charted depth of 31 m; the entrance leads to Biledhdhoo (3°07'·2N, 72°59'·1E) where a boat harbour is situated on the NW side of the island.

4 Filitheyo Kandu, lying between the N end of Maavaruhuraa Reef (3°11'N, 73°02'E) and Firiteyo, 1½ miles N, is about 1 mile wide with a least charted depth of 35 m in its S part but there is a dangerous rock near the centre of its N part.

#### 2.170

1 **Landing place.** Viligilivarufinolhu (3°16'·2N, 73°00'·2E) (2.168) has a wooden landing platform standing on its S side.

## ARIADHOO KANDU

Chart 1013

### Position

#### 2.171

1 Ariadhoo Kandu lies between the N side of North Nilandhe Atoll (3°12'N, 72°55'E) and the S side of Ari Atoll, 9 miles N.

### Depths

#### 2.172

1 The channel is deep with no known dangers.

### Tidal streams

#### 2.173

1 Tidal streams, which are very strong at spring tides, set E when in-going and W when out-going. These streams are periodically retarded or accelerated by the current.

### Light

#### 2.174

1 For the light on the S side of the channel see 2.168.

### Passage directions

#### 2.175

1 For Ariadhoo Kandu the chart is sufficient guide.

## ARI ATOLL

Chart 1013

### Position

#### 2.176

1 Ari Atoll (3°55'N, 72°50'E) comprising South Ari Atoll and North Ari Atoll, which are joined, lies on the N side of Ariadhoo Kandu. The atoll extends about 50 miles S/N and 17 miles E/W.

### General description

#### 2.177

1 Ari Atoll consists of many islands and islets most of which are situated on the barrier reef; some of these are inhabited. The principal occupations are the traditional turtle and fishing trades, but more recently tourism has greatly increased, for which there are many resorts, each of which has at least one landing platform and some have breakwaters constructed with loose coral.

2 Except for the S side of the atoll, which has only one break that affords two entrances, the barrier reef encircling the lagoon has no continuous long stretches of reef and there are many good passages through it.

3 The lagoon is much encumbered with coral reefs, some of which dry, leaving small lagoons within their perimeter. Most of these dangers may be seen on a clear day with a good lookout from aloft.

4 The influence of spring tides is felt in the lagoon.

#### 2.178

1 **Caution.** Reports have been received indicating that fast growing coral exists near the N end of the atoll; depths less than charted may be encountered and reefs may be joined. Mariners should not place too much reliance on the chart covering the N part of Ari Atoll on account of reported changes.

### Southern side of Ari Atoll

#### 2.179

1 **Description.** From Dhidhdhoo (3°29'N, 72°53'E), an islet lying near the SE corner of the atoll, the barrier reef trends 11 miles WNW to Huru-elhi.

#### 2.180

1 **Lagoon entrances.** There is an entrance into the lagoon on each side of Ariadhoo (3°28'·4N, 72°51'·4E). Ariadhoo Kandu, the E entrance lies adjacent to Ariadhoo. It is about 5 cables wide and has a least charted depth of 51 m in the fairway but an area of shoal water borders its E side, as shown on the chart. Maamigilee Kandu, the W entrance lies between Ariadhoo and the reef off Maamigili, 1 mile W; this entrance is about 5 cables wide with a least charted depth of 48 m in the N part of the fairway. There are areas of shoal water lying on each side of the fairway, as shown on the chart.

2 Within the lagoon there is deep water between the barrier reef and the inner charted reefs, except for shoal patches near the N side of the barrier reef.

### Western side of Ari Atoll

#### 2.181

1 **Description.** From Huru-elhi (3°32'·5N, 72°43'·1E) the barrier reef trends 44 miles N to Gaha Faru the crescent-shaped reef forming the N end of the atoll with a similar shaped reef lying about 1 mile SE of it. The reef at Gaha Faru is reported to be extending northwards (2004).

2 The barrier reef comprises many large reefs, several enclosing lagoons within their perimeter, they are situated between generally wide and deep openings which lead into the atoll lagoon.



**2.182**

- 1 **Principal islets.** The principal islets on this side of the atoll are Mandhoo (3°42'0N, 72°42'3E), Himendhoo, 13½ miles N of Mandhoo, with Maalhos and Feridhoo, respectively, 4 and 8 miles farther N.

**2.183**

- 1 **Useful marks:**

Rangali Light (3°35'9N, 72°43'0E).

Gangehi Light (4°13'2N, 72°45'3E) stands on an islet near the SE extremity of Gaha Faru (2.181).

**2.184**

- 1 **Lagoon entrances.** The principal entrances to the lagoon lie S and N of the reef on which Mandhoo (3°42'0N, 72°42'3E) stands. Mandhoo Dhekunu Kandu, the S entrance, is about 2½ miles wide with a least charted depth near the centre of the fairway of 31 m but lesser depths are recorded on each side; Mandhoo Uthuru Kandu, the N entrance, is about 2 miles wide with a least charted depth near the centre of the fairway of 14.5 m.

- 2 Malhohu Dhekunu Kandu, 16 miles N of Mandhoo, is a wide and deep entrance that is free from charted dangers in the fairway and for about 2 miles within the lagoon.

Other safe, both wide and narrow, entrances are shown on the chart.

**2.185**

- 1 **Anchorage** has been obtained about 2 miles ENE of Mathiveri (4°11'4N, 72°44'7E). Vessels anchoring should keep well clear of the isolated rocks lying S and W of the deep water.

**Eastern side of Ari Atoll****2.186**

- 1 **Description.** From Dhidhdhoofinolhu (3°30'N, 72°54'E), an islet lying near the SE corner of the atoll which provides a tourist resort, the barrier reef trends 7½ miles NNE to Dhagethi; thence 31 miles N to Beyrumadivaru, from where a chain of small reefs extends a further 9½ miles NNW to Gaagandu, an islet near the N end of the atoll.

- 2 The barrier reef comprises many small reefs, several enclosing lagoons within their perimeter; they are situated between generally narrow but deep openings, mostly about 1 mile apart, which lead through the reef into the atoll lagoon.

**2.187**

- 1 **Principal islands.** The principal islands on this side of the atoll are Dhigurah (3°32'N, 72°56'E), a tourist resort; Dhagethi, 4½ miles NNE of Dhigurah; with Mahibadhoo and Omadhoo lying, respectively, a further 9 and 11 miles N. Each of the 3 latter islands have breakwaters.

- 2 Ukulhas (4°13'N, 72°52'E), an islet located within the lagoon near its N end, has a good channel on its W side that leads S towards the centre of the lagoon.

**2.188**

- 1 **Useful marks:**

Bathalaa (4°04'N, 72°57'E); an obstruction light (not charted) but visible from about 12 miles was reported (1987) to be exhibited from a radio mast that stands on the islet.

- 2 Fushi Islet (4°13'N, 72°53'E); a sand bank in the vicinity of this islet was reported (1987) to be radar conspicuous.

**2.189**

- 1 **Lagoon entrances.** Dhigurashu Kandu, the widest entrance into the lagoon on this side of the atoll, lies N of Dhigurah (3°32'N, 72°56'E); it is generally shallow, with an

isolated rock, but has a least charted depth of 6.5 m in the narrow fairway at its N end close N of the rock.

- 2 Numerous other entrances throughout the barrier reef are generally narrow compared to those entering the lagoon from the W side. However, the named charted entrances are reported to be safe providing a good lookout is maintained and local knowledge is available.

**2.190**

- 1 **Landing place.** Hangnaameedhoo (3°50'8N, 72°57'8E) provides a landing place at about the centre of its S side abreast a village; there appears to be another landing at the W end of the island.

- 2 **Caution.** A strong current sets through Hangnaameedhoo Dhekunu Kandu, the channel passing S of Hangnaameedhoo.

**ISLANDS AND REEFS NORTH-EAST OF ARI ATOLL***Chart 1013***Rasdho Atoll****2.191**

- 1 **Description.** Rasdho Atoll (4°18'N, 72°59'E) is connected with the NE part of Ari Atoll, 5 miles SW, by a submarine plateau which has a least charted depth of 183 m.

- 2 The lagoon of the atoll is deep but encumbered with coral reefs and numerous isolated rocks.

In 1963 Rasdho had trees about 24 m high, and in 1987 the atoll was reported visible from a distance of 20 miles.

Rasdho Atoll forms part of Ari Atoll for administrative purposes.

**2.192**

- 1 **Islets.** Rasdho (4°16'N, 73°00'E) and the tourist resort Kuramathi, 5 cables WSW, stand on the S side of the atoll; Veligadu, 2½ miles NNE of Rasdho, is also a tourist resort.

It was reported (1978) that the islet charted midway between Rasdho and Kuramathi does not exist.

**2.193**

- 1 **Useful mark:**

A red light (not charted) is exhibited from a mast standing on the E end of Kuramathi.

**2.194**

- 1 **Lagoon entrances.** The opening between Rasdho (4°16'N, 73°00'E) and Kuramathi, 5 cables WSW, can be used only by vessels if local knowledge is available. There is one other opening, about 1 mile NNW of Veligadu (4°17'8N, 73°01'2E), which is generally shallow and local knowledge is also required.

**Thoddoo****2.195**

- 1 Thoddoo (4°26'N, 72°58'E), an isolated island which is partially wooded, may be visible at a considerable distance. A reef extends about 6 cables from its W side.

**CENTRAL ROUTE****Passage directions for Hataru Alholhu Medu***Chart 1013***2.196**

- 1 From the vicinity of 2°40'N, 73°11'E the route leads 120 miles N through Hataru Alholhu Medu and thence between the atolls of the West Group (described previously) and the East Group (described later) to Kardiva Channel.

The central channel is about 18 miles wide, deep and free from charted dangers; it is mostly sheltered from ocean swell. For this route the chart is sufficient guide.

*(Directions continue for the next central passage N of Kardiva Channel at 2.390)*

### EAST GROUP OF ATOLLS INCLUDING CHANNELS, DIRECTIONS AND THE PORT OF MALE'

#### Passage directions east of atolls (continued from 2.18)

Charts 1012, 1013

#### 2.197

- 1 From a position E of Kolhumadulu Atoll (2°22'N, 73°07'E) (2.116) the passage leads direct N for about 160 miles, passing:
- 2 E of Mulaku Atoll (3°00'N, 73°30'E) (2.198), thence:  
E of Felidhe Atoll (3°30'N, 73°30'E) (2.215), thence:  
E of South Male' Atoll (4°00'N, 73°27'E) (2.235), thence:  
E of Male' Atoll (4°25'N, 73°30'E) (2.248), thence:
- 3 To a position E of the approaches to Kardiva Channel (4°50'N, 73°10'E) (2.331).

*(Directions continue for the passage E of Maldives at 2.391)*

### MULAKU ATOLL

Charts 1012, 1013

#### Position

#### 2.198

- 1 Mulaku Atoll (3°00'N, 73°30'E) lies on the N side of Kudahuvadhoo Kandu (2.135).

#### General description

#### 2.199

- 1 Mulaku Atoll consists of several islets of which all except one lie on the barrier reef; most of the larger islets are situated on the E and SE sides of the atoll.  
The lagoon is deep, but encumbered with numerous small coral reefs and rocks; the bottom of the lagoon is sandy.
- 2 The principal occupation of the inhabitants of the atoll is fishing.

#### South-eastern side of Mulaku Atoll

#### 2.200

- 1 **Description.** From the S extremity of the atoll, about 2 miles SW of Dhiththudi (2°45'·7N, 73°25'·3E), the reef trends 12 miles NE to Hakuraahuraa, thence 15 miles NNE to Raiymandhoo, which lies about 1 mile SW of the NE point of the reef; it was reported (1994) that a jetty has been constructed, from wood and coral, on the E side of this islet.
- 2 The barrier reef on this side of the atoll is virtually continuous with just 1 opening near its mid point.

#### 2.201

- 1 **Principal islands** on the barrier reef on this side of the atoll are Kolhuvaariyaafushi (2°47'·0N, 73°25'·5E) and Muli, 12½ miles NE of Kolhuvaariyaafushi; Muli Island is the atoll Chief's island.
- 2 Boli Mulah (2°57'N, 73°35'E), the largest islet of the atoll, lies close within the lagoon on its E side. It was reported (1994) that a concrete jetty has been constructed on the NE side of the islet.

#### 2.202

##### Useful marks:

- 1 Dhiththudi Light (grey framework tower with black cylindrical daymark, 12 m in height) (2°45'·7N, 73°25'·3E).  
A large radio mast (not charted) was reported (1994) to stand on Kolhuvaariyaafushi (2°47'·0N, 73°25'·5E).
- 2 Raiymandhoo Light (grey framework tower with black cylindrical daymark, 12 m in height) (3°05'·3N, 73°38'·4E).

#### 2.203

- 1 **Lagoon entrance.** Mulee Kandu and Mulah Kandu occupy the same entrance into the lagoon which lies between Muli (2°55'N, 73°35'E) and Veyvah, 2 miles NNE. Mulee Kandu, the S part of the opening provides the principal fairway; it has a charted depth of 5·5 m but is narrowed, to about 6 cables wide, by reefs extending N from Muli and S from Boli Mulah, 1 mile N. The N part of the opening, Mulah Kandu, is very narrow and tortuous.

#### 2.204

- 1 **Landing** can be made on the W side of Kolhuvaariyaafushi (2°47'·0N, 73°25'·5E) and on the chain of islets lying close N; the nearest entrance into the lagoon is about 3½ miles W of the islets.

#### 2.205

- 1 **Supplies:** local produce and fresh water, in small quantities, are obtainable in a village situated on the N side of Boli Mulah (2°57'N, 73°35'E); see also 2.11 and 2.12.

#### Western side of Mulaku Atoll

#### 2.206

- 1 **Description.** From the S extremity of the atoll, about 2½ miles SE of Kurali (2°46'·7N, 73°22'·4E), the barrier reef extends 25 miles N to Fenbofinolhu.
- 2 The barrier reef comprises numerous large and small reefs situated between narrow, but generally deep, openings which lead into the lagoon.

#### 2.207

- 1 **Lagoon entrance.** Thuvarudhekunu Kandu, entering the lagoon close S of Thuvaru (2°53'·8N, 73°22'·8E), forms a good but narrow channel with a least charted depth in the fairway of 59 m. However, there are coral reefs lying just within the entrance which require careful avoidance.

#### Northern side of Mulaku Atoll

#### 2.208

- 1 **Description.** From the NW corner of the atoll (3°10'N, 73°23'E) the barrier reef extends 5 miles E, thence 8 miles SE and 4½ miles E, to the NE extremity of the atoll; the reef along this side is virtually continuous.
- 2 There are 3 islets on this part of the reef, Gaahuraa (3°08'·8N, 73°31'·2E) with Dhiggaru and Maduvvari lying, respectively, 3½ and 4 miles SE of Gaahuraa.  
The openings into the lagoon from N are very narrow, difficult to distinguish and tortuous; local knowledge is required before a transit is made.

### VATTARU KANDU

Chart 1013

#### Position and description

#### 2.209

- 1 Vattaru Kandu lies between the N side of Mulaku Atoll (3°00'N, 73°30'E) and the S side of Felidhe Atoll, 7½ miles N; it is divided into two channels at its W end by Vattaru Falhu (2.214); these channels are about the same width but the S channel has a deeper charted depth.

**Depths****2.210**

- 1 The main channel and the channels on each side of Vattaru Falhu are deep with no known dangers.

**Sea conditions****2.211**

- 1 Currents and tidal streams are strong; a heavy swell from E is reported to build up a dangerous sea off Vattaru Falhu.

**Useful marks****2.212**

- 1 For the light on the S side of the channel see 2.202. For the light on the N side of the channel see 2.219. For the stranded wreck on the N side of the channel see 2.219.  
Rakeedhoo (3°19'N, 73°28'E), the S islet of Felidhe Atoll.

**Passage directions****2.213**

- 1 For Vattaru Kandu the chart is sufficient guide.

**Vattaru Falhu****2.214**

- 1 Vattaru Falhu (3°15'N, 73°26'E) forms a small atoll, centrally located, in the W part of Vattaru Kandu. On the S side of the atoll there is a single opening into the lagoon, through which boats may pass. The E entrance point is marked by Vattarurah Islet; this islet had palm trees on it in 1970.

**FELIDHE ATOLL**

Chart 1013

**Position****2.215**

- 1 Felidhe Atoll (3°30'N, 73°30'E) lies on the N side of Vattaru Kandu (2.209).

**General description****2.216**

- 1 Felidhe Atoll consists of several islets most of which lie on the barrier reef on the NE side of the atoll.  
The lagoon is deep, but encumbered in its W part with numerous small coral reefs and rocks; the narrow E part of the lagoon is less cluttered.
- 2 The principal occupation of the inhabitants of the atoll is making fishing nets.

**South-eastern side of Felidhe Atoll****2.217**

- 1 **Description.** From Rakeedhoo Kandu, the very narrow opening into the lagoon situated close E of Rakeedhoo (3°19'N, 73°28'E) (2.225), the barrier reef extends unbroken about 17 miles ENE then 8 miles N to Fotteyo Muli.

**2.218**

- 1 **Principal islets.** The principal islets on this side of the atoll are Bodumohoraa (3°20'6N, 73°31'2E), with Foththeyo-bodufushi, 16 miles ENE, lying about 1 mile W of the E extremity of the reef.

**2.219**

- 1 **Useful marks:**  
Stranded wreck (3°21'5N, 73°35'0E) lies on the reef close SSW of Hingaahuraa Islet.

Fotteyo Light (grey framework tower with black cylindrical daymark, 12 m in height) (3°27'7N, 73°45'6E) stands on the reef close NE of Foththeyo-bodufushi (2.218).

**North-eastern side of Felidhe Atoll****2.220**

- 1 **Description.** From Fotteyo Muli (3°30'5N, 73°44'5E) the barrier reef extends about 11 miles WSW to Kashavaru Falhu; thence it trends 14 miles NNW and 7 miles WNW to Fulidhoo; this latter islet is well wooded.
- 2 Between Fotteyo Muli and the head of the bight near Kashavaru Falhu there are a few openings into the lagoon, but these are very narrow and without landmarks; thus this part of the barrier reef is virtually a continuous single reef. Thence, from the head of this bight towards the N part of the atoll there are a number of openings, but in general, the whole face of this side of the atoll may be considered as a continuous reef.
- 3 A heavy swell sets directly upon the area described above during the NE monsoon. The tidal streams and currents in this vicinity are strong.

**2.221**

- 1 **Principal islands** on the barrier reef on this side of the atoll are Keyodhoo (3°27'7N, 73°32'9E), with Felidhoo and Thinadhoo, respectively, 6 cables and 1¼ miles NNW; Alimathaa lies a further 6¼ miles NNW. Felidhoo is the atoll Chief's island. There is a jetty on the S side of the islands of Felidhoo and Alimathaa.

**2.222**

- 1 **Landmark:**

A conspicuous clump of trees stands at the centre of Fulidhoo (3°41'N, 73°25'E).

**2.223**

- 1 **Useful mark:**

Fulidhoo Light (grey framework tower with black cylindrical daymark, 12 m in height) (3°40'9N, 73°25'1E).

**2.224**

- 1 **Lagoon entrances-cautions:**

Entrances into the lagoon on this side of the atoll should be used with considerable care and then only when local knowledge is available.

- 2 Most of the ENE-facing entrances are tortuous and exposed to the NE monsoon; those on the N side are shallow with isolated dangers and dangerous breaking seas may be experienced.
- 3 Dhiggiri Kandu (3°39'N, 73°30'E) is about 3 cables wide with a least charted depth of 20 m, but it is encumbered with shoal water and reefs at its inner end.

**South-western side of Felidhe Atoll****2.225**

- 1 **Description.** From Rakeedhoo (3°19'N, 73°28'E) the barrier reef trends about 15 miles NW to Fussaru Falhu, the W point of the atoll.

The barrier reef comprises numerous large and small reefs situated between narrow openings which lead into the lagoon, but there are no landmarks to aid their identification.

**2.226**

- 1 **Lagoon entrance.** Maagulhi Kandu, lying between Rakeedhoo (3°19'N, 73°28'E) and Maagulhi Falhu, 1½ miles NW, is about 4 cables wide with a least charted depth of 59 m; within the lagoon there is an area free from charted dangers for about 2½ miles in a NE direction.



**North-western side of Felidhe Atoll****2.227**

- 1 **Description.** From Fussaru Falhu (3°28'·5N, 73°16'·5E), the W point of the atoll, the barrier reef trends about 15 miles NE to the reef extending W from Fulidhoo (2.220).

- 2 The barrier reef comprises numerous large and small reefs situated between openings to the lagoon, these openings are not easily seen.

**2.228**

- 1 **Useful mark:**

Fussaru Light-beacon No 2 (grey framework tower, 5 m in height) (3°30'·7N, 73°17'·1E) stands on an islet close N of Fussaru Falhu (2.227).

**2.229**

- 1 **Lagoon entrances.** There are several entrances into the lagoon on this side of the atoll. However, the entrances are generally narrow and some are encumbered with reefs; many have shallow water either in the entrance or close within the lagoon.

**FULIDHOO KANDU**

*Chart 1013*

**Position****2.230**

- 1 Fulidhoo Kandu lies between the N side of Felidhe Atoll (3°30'N, 73°30'E) and the S side of South Male' Atoll, 7½ miles N.

**Depths****2.231**

- 1 The channel is deep with no known dangers.

**Tidal streams****2.232**

- 1 Tidal streams, which are very strong at spring tides, set E when in-going and W when out-going. These streams are periodically retarded or accelerated by the current.

**Light****2.233**

- 1 For the light on the S side of the channel see 2.223.

**Passage directions****2.234**

- 1 For Fulidhoo Kandu the chart is sufficient guide.

**SOUTH MALE' ATOLL**

*Charts 3323 Male' Atoll, 1013*

**Position****2.235**

- 1 South Male' Atoll (4°00'N, 73°27'E) lies on the N side of Fulidhoo Kandu (2.230).

**General description****2.236**

- 1 South Male' Atoll consists of numerous islets, of which most lie on the barrier reef along the E side of the atoll; most of the islets are wooded with many palm trees.

The lagoon is deep but encumbered with coral reefs; however, these may easily be avoided in a favourable light condition with a good lookout from aloft.

- 2 The principal occupation is tourism.

**Eastern side of South Male' Atoll****2.237**

- 1 **Description.** From the S point of the atoll (3°49'N, 73°23'E) the barrier reef extends 4 miles ENE then 4½ miles N to Guraidhoo. The reef is continuous from its S point to the opening close S of Guraidhoo; several small islets lie on this stretch of reef.

- 2 North of Guraidhoo the barrier reef trends 13½ miles NNE to Finolhu Falhu, the NE point of the atoll; the reef comprises several large and small reefs, with a few islets and some sandbanks, situated between openings into the lagoon.

**2.238**

- 1 **Principal islets.** The principal islets on the S part of this side of the atoll are the tourist resorts of Mahaanahuraa (3°48'·8N, 73°24'·7E) with Olhuveli, Kudafinolhu and Maadhoo situated between 3½ and 4½ miles NE of Mahaanahuraa.

- 2 On its N part, Maafushi (3°56'·3N, 73°29'·4E), is the largest island of the atoll. Gulhi, situated 3 miles NNE of Maafushi, is reported to have a slipway suitable for vessels up to 50 tonnes but the approach to it is tortuous.

Within the lagoon, Viligilivaru and Biyaadhoo, both tourist resorts, lie about 2½ miles SW of Maafushi.

**2.239**

- 1 **Lagoon entrances.** There is an unnamed entrance into the lagoon about 5 cables NE of Guraidhoo (3°54'N, 73°28'E); a least charted depth of 27 m is recorded in the narrow fairway which is about 1¼ miles long. The channel leads to the tourist resorts of Viligilivaru (2.238) and Biyaadhoo (2.238).

- 2 Enboodhoo Kandu leads into the N part of the lagoon about 1 mile S of Eboodhoofinolhu (4°06'·0N, 73°31'·5E). This entrance has a least charted depth of 20 m, is very narrow, and should be used with caution. The islet of Eboodhoo, on which there is a jetty, lies close within the lagoon, on the line of the fairway, the deep water passage lies on the N side of the islet.

- 3 There are a number of other charted entrances but these, although in some cases wider, are generally shallow or obstructed.

**2.240**

- 1 **Landing places.** There are jetties located on the W side of Olhuveli (2.238), on the N side of Kadoomaafushi (3°54'·3N, 73°28'·5E) and on the W side of Eboodhoofinolhu (2.239).

**Northern side of South Male' Atoll****2.241**

- 1 **Description.** The N side of the atoll extends about 8 miles W from Finolhu Falhu (4°07'·2N, 73°31'·6E), the NE point of the atoll, to its NW point. There are some sandbanks on the E part of the barrier reef.

On the W part of this side of the atoll lie the islets of Vaadhoo (4°07'·4N, 73°27'·4E) and Velassaru, about 1¼ miles W of Vaadhoo.

**2.242**

- 1 **Lagoon entrances.** The widest opening, Velassaru Kanduoilhi, lies between Vaadhoo and Velassaru; the channel is about 7 cables wide with a least charted depth of 14 m, however, a least depth of 8 m has been reported to exist in the fairway.

- 2 Vaadhoo Kanduoilhi, a narrow opening, lies on the E side of Vaadhoo.

**Western side of South Male' Atoll****2.243**

- 1 **Description.** From the S point of the atoll (3°49'N, 73°23'E) the barrier reef extends, in a shallow outward curve, 18½ miles N to Velassaru Falhu the NW point of the atoll.

The barrier reef comprises numerous large and small reefs situated between lagoon entrances which vary from wide to narrow and deep to shallow.

- 2 There are several islets spaced along this side of the atoll from Rihiveli (3°49'·2N, 73°22'·6E) to Bolifushi 16¼ miles N. Tholhimarahuraa (3°49'·5N, 73°22'·5E) is reported to be nearly submerged at high water; Vaagali, 7½ miles N of Tholhimarahuraa, is remarkable for a bush-covered sandbank extending from its W side.

- 3 There is a jetty on Bolifushi.

**2.244**

- 1 **Useful mark:**

A tall radio mast (not charted) is reported to stand on Fihaalhohi (3°52'·5N, 73°22'·0E).

**2.245**

- 1 **Lagoon entrances.** At the S end of the atoll the channel of Hathikolhu enters the lagoon, between the reef forming the SE side of the atoll (3°49'N, 73°23'E) and the reef surrounding Rihiveli (2.243), 7 cables W; the channel is about 4 cables wide, with a least charted depth of 37 m in the fairway which lies towards the NW side of the opening.

**Other islet****2.246**

- 1 Rannaalhi (3°54'·3N, 73°21'·5E), an islet.

**Vaadhoo Kandu**

*Chart 3323*

**General information****2.247**

- 1 **General description.** Vaadhoo Kandu (4°09'N, 73°28'E) separates South Male' Atoll (2.235) and Male' Atoll (2.248); the channel is about 2¼ miles wide at its narrowest part. Clear of the reefs on each side, and some rocks (2.276) near the N side, the channel is deep and free from charted dangers.

**Caution.** The area S of Male' Atoll is unsurveyed; see 2.250.

- 2 **Landmarks:** for details see 2.273, 2.277, 2.281 and 2.310.

**Tidal stream and current.** The tidal streams in the channel are very strong; the in-going stream sets E and the out-going W. During the monsoons the stream is accelerated by the prevailing current, setting W during the NE monsoon and E during the SW monsoon attaining a rate of up to 4 kn and causing severe tide-rips.

- 3 **Local observations:**

In February 1960 a current, with a rate of 2 kn in a direction of 255°, was experienced in the channel; and in October 1996 an E set with a rate of 1½ to 2 kn was experienced at the E end of the channel.

**MALE' ATOLL****General information**

*Chart 3323 Male' Atoll*

**Position****2.248**

- 1 Male' Atoll (4°25'N, 73°30'E) lies on the N side of Vaadhoo Kandu (2.247).

**General description****2.249**

- 1 Male' Atoll is the principal atoll of the Maldives and contains about 50 islets and islands.

The lagoon is deep but encumbered with coral reefs, which are, as a rule, easily discernible in favourable conditions of sun and sea; the bottom, except over the coral reefs, is coarse sand.

- 2 The seabed E of Male' Atoll shelves steeply to depths of 2000 m; to the W it shelves less steeply to depths more than 300 m.

The principal occupation is tourism.

**Unsurveyed areas****2.250**

- 1 Areas to S of Male' Island (2.289), and E of Hulhulé Falhu (2.272) and Furanaufushi (2.252, and in E approaches to Kuda Kalhi (2.253) are unsurveyed; for areas see legends and the source data diagram on the chart.

**South-eastern side of Male' Atoll**

*Chart 3323 Male' Atoll and plan of Male' anchorages and Approaches*

**Description****2.251**

- 1 From Hulule (4°11'·4N, 73°31'·7E) (2.272) the barrier reef trends 19 miles NE to Meerufenfushi (2.252), the E-most islet of the atoll. The reef comprises a number of large reefs and is sharply marked by change of water colour or, in swell conditions, by breakers upon it. There is a chain of islands spaced along the entire length of this side of the atoll which has several openings into the lagoon.

**Principal islands and islets****2.252**

- 1 The islands and islets on this side of the atoll, most of which are wooded, are described below and positioned from Farukolhufushi (4°13'·9N, 73°32'·7E) (see below):

- 2 Farukolhufushi is a tourist resort with a large lagoon extending SSW from the W side of the island. A channel into the above lagoon, suitable for vessels with a draught of less than 2 m, has been constructed W of the island; the channel is orientated 110°/290° and it is marked, at its E and W ends by light-beacons (grey).

- 3 Furanaufushi (1 mile N) is a tourist resort. There is a small lagoon off the W side of the island which is entered at the SW corner of the fringing reef; the channel into the lagoon is marked by posts. Within the lagoon there are depths up to 9 m, with a bottom of sand and coral heads, that provides good anchorage for yachts and small craft. A stone jetty projects from the W point of the island and a breakwater encloses its SW part.

**Caution.** The area E of Furanaufushi is unsurveyed; see 2.250.

- 4 Kaduoiyigiri (1½ miles N) is a tourist resort. Lankanfinolhu (3¼ miles N) is a tourist resort with a harbour on the W side approached through an



unmarked artificial gap in the reefs, about ¼ cable wide; works were in progress (1996) on the reefs to the S of the harbour and island.

- 5 Lankanfushi (4 miles NNE), a low islet, is a tourist resort.

Himmafushi (5 miles NNE) is the prison island for the Republic of Maldives; landing is strictly forbidden. Reclamation work and dredging was in progress (1994) on the W side of the island.

- 6 Girifushi (5½ miles NNE) is used as a military training centre to which there is restricted access. A ricochet danger area, W of the island, is placed out of bounds during live firings; a red flag is flown at the W tip of the island when this firing is in progress. Thaburudhoo, situated close E of Girifushi, is another military training centre to which access is also restricted.

- 7 Huraa (7 miles NNE), is a tourist resort with a breakwater extending NW from its W side.

Kanifinolhu (7¼ miles NNE), is a tourist resort with a breakwater extending NW from its W side.

- 8 Lhohifushi (8½ miles NNE), is a tourist resort. A Government coconut seed experimental farm is situated on the island.

Thulusdhoo (10½ miles NE), is a tourist resort, which is reported to have a port suitable for vessels up to 2000 dwt. A large development was in progress (1994) on the NE side of the island. Fresh water is reported to be available.

- 9 Viligilimathidhahuraa (11¼ miles NE), is an islet covered with bush and some palms.

Dhiffushi (16 miles NE), is a thickly wooded island which is a tourist resort.

- 10 Meerufenfushi is an island, wooded with coconut palms, that supports a tourist resort; access to the island is tortuous. East of the island the sea bed slopes less steeply than elsewhere off this side of the atoll; this shoal water has in the past attracted local fishing craft.

- 11 In addition to the islands and islets described above, there are several other small islets shown on the chart all of which are reported to be tourist resorts.

### Lagoon entrances

#### 2.253

- 1 Kuda Kalhi (4°14'·7N, 73°33'·0E) is entered between the N edge of the reef surrounding Farukolhufushi (2.252) and the reef which extends from the SE point of Furanafushi (2.252); there is a least charted depth of 17 m in the S part of the entrance to the fairway, thence the channel, with reefs on each side, deepens in its centre to about 58 m. Close within the lagoon an isolated reef lies on the line of the fairway about 9 cables WNW of Farukolhufushi; another reef, with a shoal patch on its WSW side, lies about 7 cables W of the same island.

**Caution.** The area in the E approaches to Kuda Kalhi is unsurveyed; see 2.250.

- 2 Bodu Kalhi (4°16'N, 73°33'E) the best and widest entrance into the lagoon of Male' Atoll lies between Kaduoyigiri (2.252) and Lankanfinolhu (2.252), 1¼ miles NNE; the channel is about 1¼ miles wide between the reefs. There are depths of about 50 m in the deepest part of the fairway which lies 6 cables S of Lankanfinolhu Islet and about 3 cables clear of its reef; a bank with depths of 10 m or less extends 5 cables into the entrance N from Furanafushi (2.252).

- 3 Between Himmafushi (4°18'·6N, 73°34'·3E) (2.252) and Lhohifushi, 3½ miles NE, there are several entrances into the lagoon which are reported to be well defined but they are all generally narrow and some are encumbered with shoal patches as shown on the chart.

- 4 Thulusdhoo Kandu (4°22'·7N, 73°39'·2E), the N-most entrance on this side of the atoll, lies between Thulusdhoo (2.252) and Viligilimathidhahuraa (2.252), 5 cables ENE; the channel is about 2 cables wide with a least charted depth of 35 m in the approach from SE. Within the lagoon the line of the fairway leads to deep water but there are reefs close SW of this line.

### Principal marks

#### 2.254

- 1 **Landmarks:**

A conspicuous radio mast and a tower (neither charted) stands on Girifushi (4°19'·0N, 73°34'·7E) (2.252).

### Useful marks

#### 2.255

- 1 Radio mast (4°21'N, 73°37'E) stands on Lhohifushi (2.252).

Stranded wreck of a lighter (4°22'·6N, 73°38'·6E), the position of which is approximate, lies close W of Thulusdhoo (2.252).

### North-eastern side of Male' Atoll

*Chart 3323 Male' Atoll*

### Description

#### 2.256

- 1 From Meerufenfushi (4°27'N, 73°43'E) (2.252) the barrier reef trends 19 miles NW to Kagi Kanduolhi (2.258) which enters the lagoon close E of the N point of the atoll; the reef comprises a number of large reefs with a few islets and several openings into the lagoon.

### Principal islets

#### 2.257

- 1 The islets on this side of the atoll, on the barrier reef and within the lagoon, are described below and positioned from Meerufenfushi (4°27'N, 73°43'E):

Asdhoo (3½ miles WNW), an islet covered with coconut palms, is a tourist resort.

- 2 Helegeli (14¼ miles NW), a low long wooded islet, is a tourist resort with a small jetty situated on its W side.

Kagi (18¾ miles NW), a small wooded islet, is not a tourist resort; however it is used by dhonis (open local boats), and a limited supply of fresh water is reported to be available.

### Lagoon entrances

#### 2.258

- 1 Dhiffushi Kandu (4°29'N, 73°42'E) enters the lagoon between unmarked reefs; the channel is deep but divided into two small channels, close within its entrance, by a long narrow reef; the widest channel is the S channel in which there is a least charted depth of 22 m. Within the lagoon the channel gives access to a passage, which requires considerable care, that leads to Male' 21 miles SW; also, close within the entrance a boat channel, that leads W of Meerufenfushi (2.252) and Dhiffushi (2.252), gives access to these islands from within the atoll.

- 2 Asdhoo Kandu, 1 mile NW of Dhiffushi Kandu (see above), enters the lagoon between unmarked reefs; the channel, about 3 cables wide, with a least charted depth of 24 m gives clear access to Asdhoo (2.257).

- 3 Helegeli Irumathee Kanduoilhi ( $4^{\circ}38'N$ ,  $73^{\circ}34'E$ ) enters the lagoon, S of Helegeli Islet (2.257), between the reef enclosing this islet and an unnamed reef about 3 cables SE; there is a least charted depth of 38 m in the fairway. The entrance to the channel is reported to be well defined by a distinctive dark coral rock, which dries; the channel is much used by local craft. Another channel lying close N of Helegeli Islet is narrow in comparison with the S channel and has a reported least depth of 20 m.
- 4 Kagi Kanduoilhi ( $4^{\circ}42'0N$ ,  $73^{\circ}30'5E$ ), the N most entrance into the lagoon on this side of the atoll, passes between reefs which are marked by drying rocks and gives deep clear access to Kagi (2.257).
- 5 There are several other entrances into the lagoon on this side of the atoll, most have deep channels but there are no landmarks to identify them. Nevertheless, a vessel may pass through the wider ones in favourable conditions and keeping a good lookout.

### Principal mark

#### 2.259

#### 1 Landmark:

A radio mast, the charted position of which is approximate, stands on Helegeli ( $4^{\circ}38'1N$ ,  $73^{\circ}33'8E$ ) (2.257).

### Useful mark

#### 2.260

- 1 Maa Haa Light-beacon No 1 (grey framework tower on a concrete base, 5 m in height) ( $4^{\circ}36'0N$ ,  $73^{\circ}29'9E$ ) stands near the centre of the S edge of Maa Haa Reef.



Maa Haa Light-beacon (2.260)  
(Original dated 1994)

## Gaafaru Kandu and Gaafaru Falhu

Chart 3323 Male' Atoll

### Gaafaru Kandu

#### 2.261

- 1 Gaafaru Kandu ( $4^{\circ}43'N$ ,  $73^{\circ}27'E$ ) separates Male' Atoll from Gaafaru Falhu; the channel is about  $1\frac{1}{4}$  miles wide at its narrowest part and is deep and free from charted dangers.
- 2 **Current.** During the NE monsoon a 2 to 3 kn current sets W through the channel causing strong eddies and turbulence where it meets the tidal streams from Male Atoll.

### Gaafaru Falhu

#### 2.262

- 1 **General information.** Gaafaru Falhu (Burulu Falhu) ( $4^{\circ}45'N$ ,  $73^{\circ}26'E$ ) is a small atoll lying on the N side of Gaafaru Kandu (2.261).  
Gaafaru ( $4^{\circ}44'2N$ ,  $73^{\circ}29'9E$ ), an islet with a village, stands near the SE point of the atoll. A clump of trees stands on the reef about 1 mile WSW of the islet.
- 2 **Useful mark:**  
Stranded wreck ( $4^{\circ}46'8N$ ,  $73^{\circ}24'1E$ ), the position of which is approximate, lies on the NW side of the atoll.
- 3 **Lagoon entrances.** Hulhangu Kandu ( $4^{\circ}46'4N$ ,  $73^{\circ}23'9E$ ), the NW entrance, gives deep but narrow access to the lagoon; Iruwai Kandu, 4 miles E, is shallow and encumbered with rocks close within the lagoon. Both entrances are not well marked, good conditions and local knowledge are considered essential before entry is attempted.
- 4 Boat passages through the barrier reef exist about 1 mile W and N of Gaafaru; a beacon stands in the vicinity of the latter passage.

## Western side of Male' Atoll

Chart 3323 Male' Atoll

### Description

#### 2.263

- 1 From Gulhi Falhu ( $4^{\circ}11'N$ ,  $73^{\circ}28'E$ ) the barrier reef trends W and NW in a curve to Kodhipparu, 11 miles NW; then the reef trends generally N and NE to Olhuhali (2.264), 23 miles NNE. The reef comprises a number of large reefs with a few islets and several openings into the lagoon.

### Principal islets

#### 2.264

- 1 The islets on this side of the atoll are generally small. Several are low-bush covered islets about 7 m high lying on the fringing reef, giving effective warning of the below-water reef lying some distance seaward of them. The principal named islets, most of which are reported to be tourist resorts, are described below:
- 2 Giraavaru ( $4^{\circ}12'0N$ ,  $73^{\circ}24'8E$ ), an islet covered with scrub and with a few coconut palms, lies at the NE point of the reef near the SW extremity of the atoll. There are jetties on the islet and it was reported (1998) that extensive development for small craft facilities are in progress.

- 3 Rasfari (4°23'·7N, 73°21'·1E), a low islet covered with trees and scrub, stands on the barrier reef. Nakachchaafushi, with a jetty on its E side and Boduhithi, with breakwaters and a jetty on its S side and another jetty on the N side, lie, respectively, 2 miles SE and 3 miles NE of Rasfari.
- 4 Hebadhoo (4°28'·9N, 73°23'·6E), a heavily wooded island with a jetty, lies about 2 miles within the lagoon. Madivaru, Medhufinolhu, with two jetties on its W side, and Ziyaaraifushi, lie on the barrier reef 2 miles NW of Hebadhoo.
- 5 Makunudhoo (4°32'·5N, 73°24'·4E), with Eriyadhoo 3 miles N, lies about 2 miles within the lagoon; both islets have a jetty.
- 6 Akirifushi (4°38'·N, 73°24'·E), a low islet covered with bushes, lies on the barrier reef; Oluhali, a similar islet, lying 4½ miles NE of Akirifushi marks the NW point of the atoll.

### Lagoon entrances

#### 2.265

- 1 Giraavaru Irumathee Kandu (4°11'·0N, 73°24'·5E) is an easily discernible channel, with a least charted depth of 46 m in the middle of its fairway. Giraavaru Uthuru Kandu, 1½ miles NW of Giraavaru Irumathee Kandu, is wider but less deep than the latter and has a shoal patch with a depth of 35 m in the middle of its fairway. Both entrances have a small islet lying near their SE entrance points.
- 2 Between Giraavaru Irumathee Kandu and Kithi Kandu, 15 miles N, there are numerous openings into the lagoon but many of these, including Kithi Kandu and the unnamed widest opening on this side of the lagoon, situated W Hebadhoo (2.264) and about 1¾ miles N of Kithi Kandu, are encumbered with dangers as shown on the chart.
- 3 Ziyaarahfushi Kandu (4°33'·5N, 73°22'·5E), although wide, has a large shoal patch with a least charted depth of 5·5 m in the middle of its fairway; this opening gives access to Makunudhoo and Eriyadhoo (both 2.264). Himmiya Kandu, which passes through the barrier reef 3½ miles NNE of Ziyaarahfushi Kandu, is narrow at its entrance and has several obstructions where it broadens out into the lagoon.
- 4 There is a narrow but safe opening on each side of Akirifushi (4°38'·N, 73°24'·E) (2.264) and another opening 1 mile ENE of it.
- 5 Oluhali Uthuru Kandu (4°41'·5N, 73°27'·5E) enters the lagoon from Gaafaru Kandu (2.261), near the N point of the atoll, close NE of Oluhali Islet (2.264). The reef edges at the entrance to this channel are reported to be clearly visible and there is a least charted depth of 40 m at the inner end of its fairway. During the NE monsoon, it is advisable to enter this channel at about the time of slack water on account of the strong W-setting current and the eddies which can be experienced in Gaafaru Kandu.

### Southern part of Male' Lagoon

*Chart 3323 Male' Atoll and plan of Male' Anchorage and Approaches*

#### Description

#### 2.266

- 1 Within the S part of Male' Lagoon depths generally range in several places from 40 to 60 m with abrupt shoals and reefs rising from the seabed. The reefs are usually easily discerned by sharp iridescent water contrasts at their edges. A few sandbanks and some drying reef edges also lie in this part of the lagoon.

### Principal islets

#### 2.267

- 1 The islets in this part of the lagoon, all of which have tourist facilities, are described below and positioned from Kuda Wataru (4°15'·6N, 73°22'·9E):
- 2 Kuda Wataru is a small sand islet lying on the inner edge of the main barrier reef; it is sparsely covered with low shrubs. A small scrub-covered sandbank lies about 7 cables SSW of the islet.
- 3 Vabbinfaru (4 miles NE) is thickly wooded with coconut palms and scrub, it is surrounded by an unbroken reef; there is a jetty situated on its S side. Ihuru, lying 6 cables WSW of Vabbinfaru, is a similar islet, with a dense covering of coconut palms and a surrounding reef that is very steep on the SE side; there is also a jetty at this island.
- 4 Baros (3 miles ENE), is a coconut palm wooded islet, which from a distance may appear to have high cliffs due to a mirage effect given by the tourist chalets that stand on the islet. A jetty, which extends from the S shore of the islet, is approached through a break in the surrounding reef; there are depths of about 1 m alongside the jetty.
- 5 Thulhaagiri (7 miles ENE) is surrounded by an unbroken reef and it is wooded with coconut palms; there is a jetty on the SW side of the islet and reclamation work was in progress (1994) on its SE side. A pinnacle shoal, with a least charted depth of 1·1 m, lies about 1¾ miles WSW of the islet.
- 6 Bodubados (6¾ miles E) has a small boat basin situated on its SE side which is enclosed by two breakwaters; a light is exhibited from the E breakwater. Kudabados, lying 6 cables SE of Bodubados, is a wooded islet, with Bandos Maa Gaa, a large circular reef, adjoining its SE side. Both islets are served by marked channels through the reef on their E sides, and a deep narrow channel separates the two islets.

### Useful mark

#### 2.268

- 1 Two radio masts (4°16'·1N, 73°29'·5E) stand on Bodubados (2.267); an obstruction light is exhibited from the E mast.

### Anchorage

#### 2.269

- 1 Vessels may anchor anywhere in this part of the lagoon clear of the reefs.

### Southern part of Male' Atoll

*Chart 3323 Male' Atoll and plan of Male' Anchorage and Approaches*

#### General information and description

#### 2.270

- 1 The islands of Male' (2.289), Hulule (2.272), Viligili (2.276) and several islets lie in the S part of the atoll; they are mostly separated by navigable channels. The principal entrance into the S part of the lagoon is Gaadhoo Koa (2.304).

### Male'

#### 2.271

- 1 For description and details see 2.289.



**Hulule****2.272**

- 1 **Description.** Hulule Island (4°11'4N, 73°31'7E) is occupied by the airport. The runway extends about 6 cables N and 4 cables S of the extremities of the island, giving it a total length of 2 miles; a series of prominent low-level airport buildings stand along the centre part of the W side of the island. In 2003 extensive reclamation works were in progress on Hulul  Falhu extending about 3 miles NNE from the S end of the airport runway. The works will include a new airport control tower.

- 2 Hulul  Falhu extends about 4 miles NNE from the S end of the airport runway. The islet of Farukolhufushi (2.252) lies towards the N end of this reef.

**Caution.** The area E of Hulul  Falhu is unsurveyed; see 2.250.

**2.273**

- 1 **Landmark:**

Control tower (4°11'3N, 73°31'7E), a white building with a red roof from which a light is exhibited, see also 2.272.

**2.274**

- 1 **Harbour.** There is a small boat harbour on the W side of the island, it is protected by breakwaters constructed along the outer edge of the reef. The harbour is reported to be subject to silting.

- 2 **Entrances.** There are two entrances to the harbour between the breakwaters:

The N entrance is marked on the S side by a light on the breakwater head; the depth in the entrance is 1.2 m and the reef extends N of the breakwater into the entrance;

The S entrance is opposite the airport control tower and is narrow between the reef and S breakwater; a light-beacon (green, elevation 3 m) is situated on the reef about   cable S of the entrance.

- 3 **Berths.** Four jetties, each about 6 m long with depths of from 0.9 to 1.8 m alongside, are situated towards the N part of the W side of the island; one jetty is of wood construction, the others are of coral and stone. It is forbidden to secure to these jetties, unless loading or unloading, because they are reserved exclusively for tourists in transit between the airport and other islands.

- 4 **Moorings.** Two mooring buoys (yellow) are moored close NW of the N entrance to the harbour; these are used by small tankers.

**2.275**

- 1 **Useful mark:**

Radio mast (23 m in height) stands about 2  cables N of the airport control tower (2.272), red obstruction lights are exhibited from the mast.

**Viligili****2.276**

- 1 **Description.** Viligili (4°10'4N, 73°29'1E), a tourist resort, lies about 1 mile W of Male' (2.289). It is a low wooded island with a steep-to reef on its S and W sides; a drying reef, on which the sea usually breaks, extends seaward from Rat Point, the SE extremity of the island. A group of rocks (1 m in height), whose existence is doubtful, are reported to exist about 4 cables WSW of Rat Point.

**2.277**

- 1 **Landmark:**

Dish aerial (4°10'3N, 73°29'1E), white in colour, stands about 30 m W of a radio tower, 27 m in height.

**2.278**

- 1 **Berth.** A jetty constructed from coral and cement, with a depth of 0.9 m alongside, projects from the NE side of Viligili; it is protected at the offshore end by a coral breakwater from which a coral wall extends to the shore W of the jetty. This arrangement forms an enclosed swimming pool.

**2.279**

- 1 **Viligili E entrance to lagoon.** The opening between Viligili and Male' is divided into 2 channels by Maa Thila, a shoal, which lies in its centre; further shoals of 11 and 15.4 m lie, respectively, 2 and 4 cables NNE of Maa Thila.

- 2 Tidal streams in the above entrance are strong and tide-rips form near the shoals; navigation in the channels is not recommended.

- 3 **Viligili W entrance to lagoon.** The opening between Viligili and Gulhi Falhu (2.263), 1 mile WNW, is deep with a least charted depth of 41 m but it is narrow and not recommended for navigation. Another channel, 1  miles farther W, is tortuous and also not recommended.

**Feydhoo****2.280**

- 1 Feydhoo (4°12'7N, 73°29'2E), a bare sandy islet mostly surrounded by a steep-to reef which dries in places, lies 2  miles N of Viligili (2.276). The islet is owned by the Ministry of Education and used as an education settlement. There are breakwaters extending from the N part of the islet on its E and W sides.

Landing by boat, of not more than 0.6 m draught, can be effected by passing through a very narrow channel.

- 2 Reclamation work was in progress (1994) on the NW side of the islet.

**2.281**

- 1 **Landmark:**

Red House (4°12'7N, 73°29'2E).

**Aarah****2.282**

- 1 Araah (4°13'8N, 73°29'7E) lies 1  miles NNE of Feydhoo (2.280). The islet is the holiday residence of the President of the Republic of Maldives; access is restricted.

A small boat basin, enclosed by 2 breakwaters, is situated on the S side of the islet.

**Vihamanaafushi****2.283**

- 1 Vihamanaafushi (4°13'6N, 73°31'2E), lying 1  miles E of Araah (2.282), is a tourist resort which is densely populated on its W side; a small jetty extends S from its S shore.

A mooring buoy, with a light-buoy moored close N, lies 2 cables SE of the islet.

**2.284**

- 1 **Useful mark:**

Tower (4°13'6N, 73°31'3E), from which a red obstruction light is exhibited, stands on the NE part of Vihamanaafushi Islet; the position of the tower is approximate.

**Galu Falhu****2.285**

- 1 Galu Falhu (4°12'5N, 73°30'0E), lying 1  miles SW of Vihamanaafushi (2.283), is a circular reef which appears to contain deep water.

**Dhoonidhoo****2.286**

- 1 Dhoonidhoo (4°11'8N, 73°30'8E) is a wooded islet lying 1¼ miles SSW of Vihamanaafushi (2.283), which is surrounded by a reef. It is administered by the Ministry of Public Safety and landing is prohibited, but authorized boats can secure to the outer end of the E of the 2 coral breakwaters situated at the N end of the islet. A derelict iron jetty between the breakwaters is suitable only for small authorized boats.

**2.287**

- 1 **Useful marks:**

There is a large low building standing at the SE end of the island.

A large silver tank stands on the E side of the island.

**Funadhoo****2.288**

- 1 Funadhoo (4°11'0N, 73°31'1E) is an islet, covered with tall trees, lying 8 cables SSE of Dhoonidhoo (2.286); it is surrounded by a reef which dries in places. The islet has a small harbour situated on the S side and another, which is a fuelling harbour with a tank farm onshore, on its NW side. A narrow channel leads through the reef to a jetty at the SW end of the islet.

**MALE'****General information**

*Charts 3323 Male' Atoll and plan of Male' Anchorage and Approaches, 1013*

**Position****2.289**

- 1 Male' (4°10'5N, 73°30'5E) is situated near the SE point of Male' Atoll on the N side of the E entrance to Vaadhoo Kandu (2.247).

**Function****2.290**

- 1 Male' is the capital of the Republic of Maldives and the seat of the office of the President. The island provides a small harbour and a large anchorage both of which are orientated towards the tourist industry.

In 2004, the population of Male' is estimated to be 83 500.

**Topography****2.291**

- 1 Male' and its adjacent islands are all very low and the first landfall points visible are normally the buildings or ships at anchor.
- 2 Most of Male' is built upon; there are many modern buildings especially on the N side and there is a network of earth and paved roads.
- A sea-wall, built with tetrapods, extends along the S side of the island.
- 3 The E side of the island on Gaadhoo Koa is being reclaimed.

**Port Limits****2.292**

- 1 The port limits extend N and W of Male'.

**Approach and entry****2.293**

- 1 The port is approached from SE via Gaadhoo Koa (2.304) and entered between Lonuziyaariykolhu, the SE point of Male' Island and the S end of the airport runway on Hulule, 7 cables ENE.

**Traffic****2.294**

- 1 In 2003 38 vessels with a total dwt of 2 071 564 tonnes used the port; however the port is also used regularly by local vessels.

**Port authority****2.295**

- 1 Maldives Ports Authority, Boduthakurufaanu Magu, Maafannu, Male' 20-02, Republic of Maldives.

**Limiting conditions****Controlling depths****2.296**

- 1 The maximum permitted draughts are 9.5 m at Magathu Faalan (2.318) and 22 m in the anchorage.

**Deepest and longest berth****2.297**

- 1 Magathu Faalan (Northern Pier) (2.318).

**Tidal levels****2.298**

- 1 See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 0.6 and 0.3 m.

**Density of water****2.299**

- 1 Density of water is normally about 1.026 g/cm<sup>3</sup>.

**Maximum size of vessel handled****2.300**

- 1 A vessel of 17 085 grt has used the port.

**Arrival information****Port radio****2.301**

- 1 For details see *Admiralty List of Radio Signals Volume 6(4)*.

**Notice of ETA required****2.302**

- 1 Notice of ETA is required 24 hours and 2 hours before arrival.



## Pilots and tugs

### 2.303

- 1 **Pilotage** is compulsory for vessels over 100 gt entering or leaving harbour. The pilot boarding position is  $\frac{1}{2}$  mile SE of Gaadhoo Koa (2.304).

For further details including pilotage service times see *Admiralty List of Radio Signals Volume 6(4)*.

- 2 **Tugs** are compulsory for berthing and unberthing.

## Harbour

### General layout

#### 2.304

- 1 **Anchorage and berthing areas.** The outer harbour consists of anchorage areas (2.316) in the open water N of Male' and Viligili, 1 mile W; the inner harbour provides numerous berths for small vessels on the N side of the island and another small enclosed harbour has been constructed at its SW corner.
- 2 **Approach channel.** Gaadhoo Koa, the passage between the shoals and reefs fringing Male' and Hulule, is about 4 cables wide at its outer end and has a least charted depth of 35 m near the middle of the fairway. The channel is marked at its outer end by a light-buoy (port hand) and a light-beacon (starboard hand). At its inner end the channel divides, passing each side of Funadhoo with deep water in both channels, the E channel being marked by 2 light-beacons (lateral). For details of tidal streams and currents see 2.306.
- 3 All vessels should obtain permission from the local authority before entering Gaadhoo Koa.

### Natural conditions

#### 2.305

- 1 For details see climatic table 1.206.

### Tidal streams and currents

#### 2.306

- 1 From the few observations which have been made near Male', it seems likely that water movement there is influenced by the monsoon currents far more than by the

tidal streams. When the currents are flowing strongly tidal streams are probably only strong enough to increase or decrease the flow of the currents, but rarely strong enough to reverse their direction. Therefore, because they depend on the current, sets are often strong and unpredictable.

#### 2.307

- 1 In Gaadhoo Koa the streams from Vaadhoo Kandhu (2.247) set across the channel, and may achieve rates up to 6 kts; during the NE monsoon a component of the current sets NW through the entrance setting a vessel towards the reef fringing the E side of Male'; within the entrance, the flow then turns W between Male' and Funadhoo. Strong sets have been reported during the NE monsoon within Male' Harbour.
- 2 In February 1972 the NW flow started  $1\frac{1}{2}$  hours before HW and continued until  $1\frac{1}{2}$  hours before LW, attaining a maximum rate of  $2\frac{1}{2}$  to 3 kn N of Male' Breakwater. At about the time of HW, the flow sets strongly along the N face of the breakwater; at the same time, the flow E of Funadhoo was weak and variable.

#### 2.308

- 1 During the SW monsoon a component of the current enters Male' Lagoon through Giraavaru Irumathee Kandhu (2.265), 6 miles W of Male', flowing out principally through the channel E of Viligili (2.279) and between Male' and Funadhoo into Vaadhoo Kandhu.

#### 2 Local observation:

In August (1972) an E-going set was experienced SE of a line joining Male' and Hulule; within this line, slack water was found between Funadhoo and Dhoonidhoo then a strong E-going set was encountered to the anchorage. It was also observed that four hours after low water, with the in-going stream tending to oppose the current, a moderate NE flow was experienced in the lagoon.

#### 2.309

- 1 At the change of the monsoon it was reported (1991) that the current in the approaches to Gaadhoo Koa had an E set of about 1 kn. At the same time, the tidal streams inside the lagoon were weak and variable, never exceeding  $\frac{1}{2}$  kn.



Inner Atoll Harbour

Commercial Harbour

Male' Harbour from NE (2.304)  
(Original dated 1992)

(Photograph – Maldives Port Authority)

**Principal marks****2.310****1 Landmarks:**

Television tower (red and white bands) ( $4^{\circ}10'3\text{N}$ ,  $73^{\circ}30'6\text{E}$ ), 59 m in height; red obstruction lights are exhibited.

Mosque ( $4^{\circ}10'7\text{N}$ ,  $73^{\circ}30'6\text{E}$ ), white in colour with gold dome; a minaret, white in colour with gold cupola, stands close NE of the mosque.

2 For other landmarks in the vicinity see 2.273 and 2.277.

**Directions****Cautions****2.311**

1 Male' and its adjacent islands may not be detected on radar until after a visual landfall has been made. Several islands are conducting reclamation or construction work and radar ranges should be verified carefully.

2 Gaadhoo Koa (2.304) is the recommended daylight approach to the anchorages N of Male' for all vessels, except those of very low power which normally use Bodu Kalhi; for details see 2.314. However, Gaadhoo Koa has proved to be increasingly dangerous for shipping with the seasonal monsoons causing strong currents that set across its mouth at a reported rate of up to 6 kn; night navigation of the channel is not recommended. For further details of currents and tidal streams see 2.306.

3 There is considerable high speed and small craft passenger traffic, which crosses the entrance channel, between Male' Island and Hulule Harbour, see note on chart.

**Approach from east****2.312**

1 When Male' Island is identified course should be shaped for a position SE of it. Gaadhoo Koa may then be entered with the E side of Dhoonidhoo bearing  $337^{\circ}$ , open NE of Funadhoo, and passing (with positions from Hulule Airport S Light-beacon ( $4^{\circ}10'5\text{N}$ ,  $73^{\circ}31'6\text{E}$ )):

2 ENE of light-buoy (port hand) ( $4\frac{3}{4}$  cables SW), marking the SE edge of the coastal bank extending 3 cables E from Lonuziyaariykolhu, the SE point of Male' Island, thence:

ENE of the shoal patch ( $4\frac{1}{2}$  cables WSW) with 2 m of water over it lying on the coastal bank, and keeping well clear of this bank, thence:

3 WSW of Hulule Airport S Light-beacon, marking the SW end of the reef surrounding Hulule Island, thence:

To a position where the S end of Hulule Island bears  $085^{\circ}$ , thence:

4 The course should be altered for the W end of Vihamanaafushi ( $4^{\circ}13'6\text{N}$ ,  $73^{\circ}31'0\text{E}$ ) passing:

W of a wreck ( $2\frac{3}{4}$  cables NNW) with 10 m of water over it, and marked by buoys, thence:

Through the middle of the channel between Funadhoo and Hulule; Funadhoo Light-beacon (port hand) marks the E edge of the coastal reef.

5 Thence steer as required round the N side of Funadhoo and approach the anchorage or port.

The outline of the reefs in this approach is very distinct.

**Approach from west****2.313**

1 If approaching Male' from W enter Kardiva Channel ( $4^{\circ}50'\text{N}$ ,  $73^{\circ}10'\text{E}$ ) (2.331) between Thoddoo (2.195) and Goidhoo Atoll (2.339), 23 miles N of Thoddoo. Pass at a safe distance close N of Thoddoo and steer for the W entrance to Vaadhoo Kandu (2.247) where course should be shaped to pass S of Male'; both Thoddoo and Male' Islands are normally visible at a good distance and the former usually remains visible until the latter is sighted. Thence, from a position SE of Male' the directions given at 2.312 should be followed.

**Approach from north-east****2.314**

1 Low powered vessels, sailing vessels and other small vessels approaching from E, may use Bodu Kalhi ( $4^{\circ}16'\text{N}$ ,  $73^{\circ}33'\text{E}$ ) (2.253). Vessels entering by this channel should steer for the deep-water fairway lying about 6 cables S of Lankanfinolhu Islet and some 3 cables clear of its reef; thence, the route leads  $1\frac{1}{2}$  miles W and 5 miles SSW to the



Male' Main Entrance – Gold Dome and Minaret (2.310)

(Original dated 2002)

(Photograph – mv Doulos)



- anchorage N of Male', passing (with positions from the W point of Vihamanaafushi (4°13'6N, 73°31'0E)):
- 2 S of two shoal patches (3¼ miles NNE) with a least charted depths of 8 m and 7 m over them, thence: N then WNW of an unnamed reef which dries (2½ miles NNE); shoal patches extend about 1 cable NW and 2 cables S from this reef with charted depths, respectively, of 2.6 and 3.2 m near their outer limits. Thence:
  - 3 ESE of Bandos Maa Gaa (2¼ miles NNW) (2.267), thence:  
WNW of Vihamanaafushi (2.283), and:  
ESE of Aarah (1½ miles WNW) (2.282), thence:  
ESE of Galu Falhu (1½ miles SW) (2.285), thence:  
WNW of Dhoonidhoo (1¾ miles S) (2.286), thence:
  - 4 Steer for the relevant anchorage area (2.316).

### Useful marks

#### 2.315

- 1 Two radio masts (4°10'3N, 73°31'0E) stand close together near the SE point of Male'; red obstruction lights are exhibited; these masts readily identify the island from E.  
Telecommunications (postal) tower (4°10'6N, 73°30'7E); a red obstruction light is exhibited.  
Port control building (4°10'8N, 73°30'7E) stands onshore abreast the main entrance in the breakwater on the N side of the island; a prominent flagstaff stands nearby.

### Berths

### Anchorage

#### 2.316

- 1 **Caution.** Anchoring less than 3 cables N of the breakwater is not recommended, especially during the NE monsoon, because of the strong currents experienced in that vicinity.
- 2 **Outer harbour,** situated N and NW of Male', provides the general anchorage areas for: tankers (two areas); dangerous cargoes; working cargo; military vessels; and a waiting area. The limits of these areas are shown on the chart. Except for coasters and most Ro-Ro vessels work cargo at the anchorage.

### Special moorings

#### 2.317

- 1 During the SW monsoon small vessels can moor on the E side of Galu Falhu (2.285); an anchor is set in the coral of this reef to which a vessel can secure, with a stern anchor laid out to the E. There are also two anchors on the SE part of Dhoonidhoo (2.286) which can be used in the same way.

### Berths

#### 2.318

- Principal berth.** Magathu Faalan (Northern Pier), Ro-Ro berth for vessels up to 150 m in length and a draught of 9.5 m.
- 1 **Inner Atoll Harbour,** situated on the N side of the island with depths from about 1.8 to 3 m, provides berthing for dhonis craft (open local boats), inter island boats,

government vessels, tourist and private launches. This harbour is protected by a low breakwater with 5 entrances into the main part of the harbour and one to a small basin at the E end. The main entrance, which is 17 m wide, lies 4½ cables WNW of Sawmill Point, the NE point of the island. All of the entrances are marked with lights, exhibited from beacons.

- 2 **Commercial Harbour,** situated at the NW corner of the island and enclosed by a breakwater with an entrance marked by lights, provides berthing for lighters and vessels with a maximum draught of 3 m and LOA 60 m.
- 3 **South West Harbour,** situated at the SW corner of the island and enclosed by an unmarked breakwater, provides a Ro-Ro berth berthing for inter-island trading boats and for lighters.

### Port services

### Repairs

#### 2.319

- 1 Limited repairs, general maintenance, slipway for craft up to 50 tonnes, underwater cleaning and welding can be arranged.

### Other facilities

#### 2.320

- 1 Hospital.

### Supplies

#### 2.321

- 1 Lubricating, diesel and gas oil, fresh water, provisions and fish are available. Heavy oil is not available.

### Communications

#### 2.322

- 1 Male' International Airport at Hulule, 1 mile NE; and by sea.

### Regulations

#### 2.323

- 1 **Immobilisation of vessel.** Prior approval from the harbour control office is required for any work that would immobilise a vessel for more than 2 hours.  
**Hot work.** Any hot work while in the anchorage or at a berth may be carried out only after written approval from the port authority has been received.
- 2 **Trade.** The islanders in the out-lying atolls of the Maldives are not permitted to trade with foreign vessels, due to customs regulations, all trade being conducted through Male'; see also 2.11.

### Rescue

#### 2.324

- 1 The following rescue facilities are reported to be available:  
Small salvage tug.  
Speed boats (40 kn).  
Seaplane and helicopters.
- 2 For further information of rescue see *Admiralty List of Radio Signals Volume 5*.

## KARDIVA CHANNEL TO EIGHT DEGREE CHANNEL

## GENERAL INFORMATION

*Charts 1013, 1014, 2738*

## Area covered

## 2.325

- 1 The area covered by this section comprises the atolls situated in the northern part of the Maldives, these atolls are described in 2 groups together with the routes through the area as follows:
- 2 West group. Goidhoo Atoll (2.339), South Maalhosmadulu Atoll (2.345), North Maalhosmadulu Atoll (2.367), Maamakunudhoo Atoll (2.383) and Hani Kandu (2.366).
- 3 East group. Faadhippolhu Atoll (2.392), South Miladhunmadulu Atoll (2.415), North Miladhunmadulu Atoll (2.415), South Thiladhunmathee Atoll (2.436), North Thiladhunmathee Atoll (2.436) and Ihavandhippolhu Atoll (2.457), including Baraveli Kandu (2.413), and Gallandhoo Kandu (2.456).
- 4 Routes. West (2.330) and east (2.391) of the above atolls; central channel (2.390), lying between the two groups of atolls, including Allhuras Kandu (2.381).
- 5 Channels. Kardiva Channel (2.331) and Eight Degree Channel (2.472) the principal E/W channels lying, respectively, S and N of the area are also described.

## Atolls

## 2.326

- 1 A general description of the atolls is given at 2.4. In addition to this description, a common feature of the atolls in the N part of the Maldives is that some the reefs within the barrier reefs are more prominent than those within the atolls in the central and S parts.

## Currents

## 2.327

- 1 Currents in the N part of the Maldivian Group set W and NW from December to March inclusive; from May to October they set E and SE but are subject to much variability at all seasons. April and November are months of transition.
- 2 For details of currents farther S see 2.8.

## Tidal streams

## 2.328

- 1 Tidal streams at the N end of the Maldivian Group attain a rate of about 1½ kn but are very irregular and always influenced by the prevailing winds and currents; thus during the NE monsoon the out-going stream seems to run longer than in the opposite season. With strong W winds the in-going stream sets E for most of the day but when the wind eases the out-going stream takes its turn to set W in the same way when the water may fall 0.1 m lower than it usually does at springs.

## Principal marks

## 2.329

- 1 **Landmarks:**

The landmarks in the area covered by this section are few and will only be seen by vessels approaching an individual atoll; therefore the descriptions of landmarks will be found in the relevant part and not in the directions for the area.

- 2 **Major lights:**

There are no major lights in the area being described.

## WEST GROUP OF ATOLLS INCLUDING CHANNELS AND DIRECTIONS

## Passage directions west of atolls

(continued from 2.146)

*Charts 1012, 1013, 1014*

## 2.330

- 1 From a position W of the approaches to Kardiva Channel (4°50'N, 73°10'E) (2.331) the passage leads N for about 200 miles, passing:
  - W of Goidhoo Atoll (4°51'N, 72°55'E) (2.339), thence:
  - W of South Maalhosmadulu Atoll (5°15'N, 73°00'E) (2.345), thence:
  - W of North Maalhosmadulu Atoll (5°35'N, 72°55'E) (2.367), thence:
- 2 W or E of Maamakunudhoo Atoll (6°20'N, 72°38'E) (2.383), thence:
  - W of South Thiladhunmathee Atoll (6°38'N, 73°00'E) (2.436), thence:
  - W of Ihavandhippolhu Atoll (7°00'N, 72°55'E) (2.457), thence:
- 3 To a position in Eight Degree Channel (2.472) from where vessels may steer to pass W or E of Minicoy Island (8°16'N, 73°03'E) (2.490) as required.

## KARDIVA CHANNEL

*Charts 1013, 1014*

## Description

## 2.331

- 1 Kardiva Channel (Kaashidoo Kandu) (4°50'N, 73°10'E) lies between North Ari and Male' Atolls to the SE and South Maalhosmadulu and Faadhippolhu Atolls, respectively, to the NW and N. The channel is orientated NE/SW and it is one of the principal routes in an E/W direction through the Maldives for ocean going vessels; for details of such routes see *Ocean Passages for the World*.
- 2 The E part of the channel is divided by the island of Kaashidhoo (2.338) into two channels; Kaashidhoo Kuda Kandu leads S of the island and Kaashidhoo Bodu Kandu leads N of it.

## Depths

## 2.332

- 1 The channel is deep and free from charted dangers in the fairway. In the W approaches a seamount (4°26'N, 72°40'E), with a depth of 185 m over it, lies 12 miles NNW of North Ari Atoll (2.176).

## Tidal streams and current

## 2.333

- 1 Tidal streams through the channel set ENE when in-going and WSW when out-going, at a rate of up to 2 kn.
- 2 During the NE monsoon the tidal stream is inappreciable when in-going; but the out-going is reinforced by the surface current generated by the monsoon. Similarly, during the SW monsoon the out-going stream is weak or absent and the in-going stream is strong.

## Lights

## 2.334

- 1 Lights of limited range are exhibited both in, and in the vicinity of, the channel.

For the light in the SE part of the channel see 2.338.  
For the light on the NW side of the channel see 2.349.

### Approach aspect

#### 2.335

- 1 The W entrance of the channel is not easily identified; the wooded islets in Ari Atoll (2.176) and Goidhoo Atoll (2.339) lie several miles within the dangers of their barrier reefs.
- 2 The E entrance of the channel has Gaafaru Falhu (2.262) on its S side which also is not easily identified; however, the N part of this entrance is well defined by Kaashidhoo (4°57'·5N, 73°28'·0E) (2.338) in the centre of the entrance, and by the islets on the SE end of Faadhippolhu Atoll (2.392) at its N entrance point.

### Passage directions

#### 2.336

- 1 For Kardiva Channel the chart is sufficient guide.

### Useful marks

#### 2.337

- 1 Thoddoo (4°26'N, 72°58'E) (2.195) is visible from a good distance.  
Kaashidhoo (4°57'·5N, 73°28'·0E) (2.338).

### Kaashidhoo

#### 2.338

- 1 **General information.** Kaashidhoo (4°57'·5N, 73°28'·0E) is a wooded island with a town situated on its N side. The island is steep-to on its SE side but a reef extends about 1½ miles NW from the NW side.  
**Lagoon.** The reef on the NW side of the island encloses a small lagoon, the entrance to which, is about 5 cables NW of the NE point of the island.
- 2 **Useful marks:**  
Kaashidhoo Light (black cylindrical daymark on grey framework tower, 12 m in height) (4°57'·5N, 73°28'·5E) stands near the E extremity of the island.  
Two prominent palm trees stand on the N side of the reef upon which Kaashidhoo lies.
- 3 **Landing** can only be made on the island by entering the lagoon because, except at the entrance to the lagoon, a heavy surf generally runs around the island and its reef.

### Goidhoo Atoll

Chart 2068

### General information

#### 2.339

- 1 Goidhoo Atoll (4°51'N, 72°55'E) is a small atoll that lies near the SW end of Kardiva Channel (2.331). For administrative purposes, the atoll is considered to form part of the Maalhosmadulu Group of atolls which lie N of it. A barrier reef, which is only broken on its S side, surrounds the atoll and encloses an extensive lagoon; it was reported (1994) that the shape of the reef changes periodically.

### Principal islets

#### 2.340

- 1 Goidhoo (4°52'N, 73°00'E), at the NE end of the atoll, is the largest of the atoll islets; it is wooded along its seaward side and there is considerable habitation on the N part of the islet. A boat channel crosses the reef N of Goidhoo Islet; the channel is indicated by a beacon near its seaward entrance.

- 2 Fehendhoo and Fulhadhoo lie, respectively, 1 and 3 miles W of Goidhoo; both islets are wooded and the villages standing on their N sides are visible from seaward.  
Innafushi, an islet mostly covered with bush, lies on the reef about 2¾ miles W of the W end of Fulhadhoo.
- 3 Maafushi and Fehenfushi lie on the S side of the atoll, respectively, W and E of the lagoon entrance. It was reported (1994) that Fehenfushi was difficult to identify due to several uncharted sand banks, up to 1 m in height, which exist along the SE side of the reef.

### Lagoon

#### 2.341

- 1 The lagoon is fringed with dangers but its centre is clear.
- 2 The only opening into the lagoon is between the islets of Maafushi and Fehenfushi. Doru Kandū, the channel through this opening, lies towards its W side between the reef fringing Maafushi and Dhorukandū Dhekunū Huraa, a low islet about 8 cables W of Fehenfushi; in 1997 Dhorukandū Dhekunū Huraa was reported as being submerged at high water. The channel is about ¾ cable wide at its narrowest part with a least charted depth of 18·3 m, on the W side of the fairway, 2 cables ESE of Maafushi.
- 3 Depths in the opening E of Dhorukandū Dhekunū Huraa are shoal and irregular.

### Principal mark

#### 2.342

- 1 **Landmark:**  
Banyan Tree (36 m in height in 1958) (4°52'·7N, 73°00'·0E).

### Directions

#### 2.343

- 1 **Caution.** Vessels should not attempt to enter the lagoon except through Doru Kandū (2.341); conning from aloft is advisable.  
The SE point of Fehendhoo Islet (2.340) bearing about 052° leads, from seaward, towards Doru Kandū.

### Anchorage

#### 2.344

- 1 Anchorage can be obtained within the lagoon in depths of about 27 to 42 m in good holding ground of sand, mud and clay.

## SOUTH MAALHOSMADULU ATOLL

Chart 1014

### Position

#### 2.345

- 1 South Maalhosmadulu Atoll (5°15'N, 73°00'E) lies on the NW side of Kardiva Channel (2.331) and N of Goidhoo Atoll (2.339).

### General description

#### 2.346

- 1 South Maalhosmadulu Atoll consists of numerous reefs, many of which form individual lagoon atolls; also, there are several islets, most of which lie on the barrier reef on the SW side of the atoll.  
The lagoon is deep, but encumbered throughout with numerous coral reefs and isolated dangerous rocks.
- 2 The principal occupation of the inhabitants of the atoll is fishing, but some weaving is carried out.



**Western side of South Maalhosmadulu Atoll****2.347**

- 1 **Description.** From the S end of Bodufinolhu Reef (5°00'·0N, 72°51'·5E) the barrier reef trends 8 miles NNW to the W point of Maa Faru, then 13 miles NNE to Hanikandu Faru (2.353); the reef comprises several large individual reefs, all separated by narrow channels, as shown on the chart.

**2.348**

- 1 **Principal islet.** Of the few islets on this side of the atoll, the largest is Thulhaadhoo (5°01'·5N, 72°50'·5E) which lies on Bodufinolhu Reef, at its S end.

**2.349**

- 1 **Useful mark:**

Viligili Light (black cylindrical daymark on grey framework tower, 12 m in height) (5°03'·8N, 72°50'·5E) stands on Viligili Islet.

**2.350**

- 1 **Lagoon entrances.** The openings into the lagoon on this side of the atoll mostly lack convenient landmarks and their extremities are difficult to define.

**2.351**

- 1 **Channel.** Kuda Kanduolhi (5°17'·5N, 72°53'·5E) is the W opening to a deep channel that leads E to the NE side of the atoll. The channel gives access to numerous islets in the N part of the lagoon on both its N and S sides.

**Other islets and reefs:****2.352**

- 1 **Western side of South Maalhosmadulu Atoll:**

Ahivahfushi (5°13'·9N, 72°51'·5E), an islet.  
 Dhakandhoo (5°15'·0N, 72°53'·6E), an islet.  
 Fares (5°14'·0N, 72°52'·5E), an islet.  
 Kashi Faru (5°14'·N, 72°52'·E), a reef.

- 2 **South side of Kuda Kanduolhi (2.351)**

Funadhoo (5°16'·5N, 73°02'·0E), an islet.  
 Kendhoo (5°16'·5N, 73°00'·7E), an islet.  
 Undoodhoo (5°16'·5N, 73°02'·7E), an islet.

- 3 **North side of Kuda Kanduolhi (2.351)**

Boifushi (5°18'·0N, 72°59'·7E), an islet.  
 Kashidhoogiri (5°18'·0N, 72°58'·2E), an islet.  
 Kihavahhuruvalhi (5°17'·8N, 73°03'·5E), an islet.  
 Kudarikilu (5°18'·1N, 73°04'·3E), an islet.

**North-western side of South Maalhosmadulu Atoll****2.353**

- 1 **Description.** From Hanikandu Faru (5°18'·N, 72°54'·E) the barrier reef extends 10 miles ENE to Gaagadufaruhuraa Reef, with Gaagadufaruhuraa lying near its E end; this side of the atoll forms the S side of Hani Kandu (2.366).

**2.354**

- 1 **Principal islet.** Maarikilu (5°20'·0N, 72°57'·2E) is the largest islet on this side of the atoll.

**2.355**

- 1 **Lagoon entrances.** There are three deep entrances into the lagoon, marked by islets, as shown on the chart.

**2.356**

- 1 **Other islets:**

Anhenunfushi (5°20'·5N, 72°58'·1E), an islet.  
 Dhigufaruvinagadu (5°21'·1N, 72°59'·5E), an islet.

**South-eastern side of South Maalhosmadulu Atoll****2.357**

- 1 **Description.** From Olhugiri (5°00'·0N, 72°54'·5E), the barrier reef extends along the NW side of Kardiva Channel (2.331), 22 miles NE to Vandhoomaa Faru which forms the E point of the atoll.

**2.358**

- 1 **Principal islands.** Kunfunadhoo (5°06'·7N, 73°04'·6E), a tourist resort, and Daravandhoo, 4¼ miles NE, are the largest islands on this side of the atoll. Within the lagoon there are several islands as shown on the chart.

**2.359**

- 1 **Lagoon entrances.** Maa Kanduolhi (5°00'·N, 72°53'·E), the widest opening into the lagoon lies at the SW end of this side of the atoll, between Olhugiri Islet (2.357) and Bodufinolhu Reef (2.347), about 1¾ miles WNW; the entrance is about 1½ miles wide with a least charted depth of 12.5 m, over a rocky shoal, situated in the middle of the fairway.

- 2 There are numerous other openings into the lagoon on this side of the atoll. Some are deeper but narrower than the widest opening described above, whilst others are encumbered with rocks or shoals, as shown on the chart.

**2.360**

- 1 **Anchorage** can be obtained on the N side of Hitaadhoo (5°00'·5N, 72°55'·5E).

**2.361**

- 1 **Other islets:**

Eydhafushi (5°06'·2N, 73°04'·2E), an islet.  
 Hibalhiddoo (5°08'·5N, 73°07'·0E), an islet.  
 Kanifushi (5°00'·8N, 72°57'·0E), an islet.  
 Maaddoo (5°05'·6N, 73°03'·7E), an islet.  
 Maalhoss (5°08'·1N, 73°06'·5E), an islet.  
 Maa Maduvvari (5°00'·5N, 72°56'·5E), an islet.

**North-eastern side of South Maalhosmadulu Atoll****2.362**

- 1 **Description.** From the N end of Vandhoomaa Faru (5°15'·0N, 73°11'·5E) (2.357) the barrier reef trends 10 miles NW to Gaagadufaruhuraa; the reef is generally broken in its SE part but there are large areas of coral towards its N end.

**2.363**

- 1 **Principal islets.** The largest islets on this side of the reef are Kamadhoo (5°17'·0N, 73°08'·1E) and Bathalaa 6 miles NW. Within the lagoon there are a few islets near its SE part as shown on the chart.

**2.364**

- 1 **Lagoon entrances.** Kamadhoo Kandu (5°16'·5N, 73°09'·0E), is a wide and deep opening which enters the lagoon SE of Kamadhoo (2.363); its SE entrance point is marked by Madhirivaadhoo, 1½ miles ESE of Kamadhoo.

- 2 Kudarikilu Kandu (5°18'·N, 73°06'·E) gives access from E to the deep channel (2.351). The S entrance point of the opening is marked by Landaa Giraavaru which is surrounded by a reef that extends about 2¼ miles WSW.

- 3 There are several other openings into the lagoon on this side of the atoll but they are less well defined than those described above; their positions and dangers are shown on the chart.

**Other islets:****2.365**

- 1 Aidhoo (5°11'·2N, 73°09'·7E), an islet.  
 Hanifaruhuraa (5°10'·5N, 73°09'·1E), an islet.  
 Kudadhoo (5°01'·8N, 72°59'·5E), an islet.  
 Miriyandhoo (5°03'·8N, 73°01'·8E), an islet.

**Hani Kandu***Chart 1014***General information****2.366**

- 1 Hani Kandu (Moresby Channel) (5°19'·N, 72°53'·E) separates South Maalhosmadulu Atoll (2.345) and North

Maalhosmadulu Atoll (2.367); the channel is about  $1\frac{3}{4}$  miles wide at its narrowest part and is deep and free from charted dangers.

- 2 **Caution.** The W entrance to this channel has no wooded islet near it and is difficult to identify.

For passage through this channel the chart is sufficient guide.

## NORTH MAALHOSMADULU ATOLL

Chart 1014

### Position

#### 2.367

- 1 North Maalhosmadulu Atoll ( $5^{\circ}35'N$ ,  $72^{\circ}55'E$ ) lies on the N side of Hani Kandu (2.366).

### General description

#### 2.368

- 1 North Maalhosmadulu Atoll is similar in character to South Maalhosmadulu Atoll (2.345) with large lagoon reefs forming its W side; the E side of the atoll consists of numerous islands and islets which are mostly separated by good passages into the lagoon.
- 2 The lagoon is deep, but encumbered throughout with numerous coral reefs, particularly in its W central part, where navigation is impracticable in a large area because of the close proximity of coral reefs and rocks.
- The population of the atoll was about 9400 in 1985.

### Western side of North Maalhosmadulu Atoll

#### 2.369

- 1 **Description.** From Maamunagaufinolhu ( $5^{\circ}21'N$ ,  $72^{\circ}52'E$ ), the SW lagoon reef of the atoll, the barrier reef extends in a shallow bight  $12\frac{1}{2}$  miles NNW to Bodu Faru, which forms the W point of the atoll; the bight between these two reefs contains three large lagoon reefs, named from S to N, Fenfushi Faru, Maa Faru and Kukulhudhoo Faru.
- 2 From its W point, the barrier reef trends 24 miles NNE in a series of lagoon reefs, some of which have small islets standing upon them, to Maadooni Faru the lagoon reef at its N extremity.
- 3 For a description of the Powell Islands, situated about 3 miles NNE of this side of the atoll, and the channel between them and Maadooni Faru see 2.382.

#### 2.370

- 1 **Principal islet.** The largest islet on this side of the atoll is Fuggiri ( $5^{\circ}43'4N$ ,  $72^{\circ}51'3E$ ). Within the lagoon there are a number of islands near the W and S parts of the atoll as shown on the chart.

#### 2.371

- 1 **Useful marks:**

Bodufarufinolhu Light (black cylindrical daymark on grey framework tower, 12 m in height) ( $5^{\circ}31'8N$ ,  $72^{\circ}48'0E$ ), stands on Bodu Faru (2.369) about 6 cables NE of the reef edge.

Vaffushi Light (black cylindrical daymark on grey framework tower, 12 m in height) ( $5^{\circ}38'5N$ ,  $72^{\circ}50'5E$ ), stands on an islet near the W end of Vaffushihuraa.

#### 2.372

- 1 **Lagoon entrances.** The openings into the lagoon on this side of the atoll mostly lack convenient landmarks and their extremities are difficult to define; also, because the centre

of the lagoon is unsafe for navigation, they are therefore better avoided.

#### 2.373

- 1 **Other islets:**

Maamunagaufinolhu ( $5^{\circ}22'1N$ ,  $72^{\circ}52'1E$ ), an islet.  
Maashigiri, ( $5^{\circ}30'8N$ ,  $72^{\circ}49'7E$ ), an islet.

### South-eastern side of North Maalhosmadulu Atoll

#### 2.374

- 1 **Description.** From Maamunagaufinolhu ( $5^{\circ}21'N$ ,  $72^{\circ}52'E$ ), the SW lagoon reef of the atoll, the barrier reef extends 12 miles ENE to Beriyan Faru, a lagoon reef situated at the SE corner of the atoll; this side of the atoll forms the N side of Hani Kandu (2.366).

#### 2.375

- 1 **Principal islets.** There are a few islets on this side of the atoll, the largest ones being Maamunagau ( $5^{\circ}21'6N$ ,  $72^{\circ}55'2E$ ) and Dheburidheythereyvaadhoo, 5 miles ENE.

### Eastern side of North Maalhosmadulu Atoll

#### 2.376

- 1 **Description.** From Boduhuraa ( $5^{\circ}25'5N$ ,  $73^{\circ}02'0E$ ), an islet lying on the SE side of Beriyan Faru (2.374), the barrier reef trends  $29\frac{1}{2}$  miles N to a rocky shoal lying near the N end of the atoll.

The N part of this side of the atoll is separated from South Miladhunmadulu Atoll (2.415), 9 miles ENE, by Allhuras Kandu (2.381).

#### 2.377

- 1 **Principal islands and islets.** There are numerous similar islands and islets situated on this side of the atoll; the principal ones are inhabited as shown on the chart.

#### 2.378

- 1 **Lagoon entrances.** There are several good entrances into the lagoon on this side of the atoll, many of which are well marked by the islands and islets; however, the channels with charted dangers should be avoided.

- 2 There is a wide entrance at the N end of the atoll between the large lagoon reef extending NNW from Vaadhoo Island ( $5^{\circ}51'4N$ ,  $72^{\circ}59'5E$ ) and Maadooni Faru, about  $2\frac{1}{4}$  miles WNW. The opening is free from charted dangers except for a rocky shoal, with a depth of 7 m over it, lying  $3\frac{1}{2}$  miles NNW of Vaadhoo; in the fairway W of the rocky shoal there is a charted depth of 40 m.

#### 2.379

- 1 **Anchorage.** It was reported (1994) that safe anchorage for small craft can be found in the vicinity of Meedhoo ( $5^{\circ}27'5N$ ,  $72^{\circ}57'2E$ ).

There is good anchorage in the channel between Vaadhoo ( $5^{\circ}51'4N$ ,  $72^{\circ}59'5E$ ) (2.378) and Maadooni Faru (2.369), about  $2\frac{1}{4}$  miles WNW, or farther S in the lagoon.

### Other islands:

#### 2.380

- 1 The islands or islets listed below are positioned from Boduhuraa ( $5^{\circ}25'5N$ ,  $73^{\circ}02'0E$ ) (2.376):

Agolhitheemu (22 miles N).  
Dhuvaafaru (12 miles N).  
Iguraidhoo (3 miles N).  
Innamaadhoo ( $7\frac{1}{2}$  miles N).  
Kinolhas ( $1\frac{1}{4}$  miles N).  
Maakurathu ( $10\frac{1}{2}$  miles N).  
Rasgetheemu (23 miles N).  
Rasmaadhoo ( $8\frac{1}{4}$  miles N).  
Ugoofaaruu ( $14\frac{1}{2}$  miles N).

## Allhuras Kandu

Chart 1014

### General information

#### 2.381

- 1 Allhuras Kandu (5°49'N, 73°05'E), is deep and free from charted dangers.

## Powell Islands

Chart 1014

### General information

#### 2.382

- 1 Powell Islands (5°58'N, 72°57'E), situated off the N end of North Maalhosmadulu Atoll, consist of the islands of Alifushi and Eththigili which are joined by a reef.

The channel between the Powell Islands and Maadooni Faru, about 3 miles SSW, is deep and free from known dangers.

## MAAMAKUNUDHOO ATOLL

Chart 1014

### Position

#### 2.383

- 1 Maamakunudhoo Atoll (6°20'N, 72°38'E), previously known as Malcolm Atoll, lies about 25 miles NW of the Powell Islands (2.382), there is deep water between the two features.

#### 2.384

- 1 **Description.** The atoll consists of a large reef encircling a lagoon; it is about 15 miles long, up to 4 miles wide and orientated SSW/NNE.
- 2 The S and W sides of the atoll are barren with only the surf to indicate their outline, but there was (1970) some vegetation on the islands in the N and NE parts.

For administration purposes the atoll is included with South Thiladhunmathee Atoll (2.436).

In 1985, the population of the atoll was 750.

#### 2.385

- 1 **Principal island and islets.** Makunudhoo (6°24'4N, 72°42'4E), which is heavily inhabited on its NW side, well defines the NE point of the atoll; the main occupations of the inhabitants are fishing and agriculture. There is a channel, marked by a beacon, through the reef on the E side of Makunudhoo; a narrow channel, marked by stakes, continues N then W between the reef and the island to the vicinity of the village. These channels are suitable for local small craft only.
- 2 Innafushi marks the NW point of the atoll and there are two small islets marking the approximate mid point of its E side.

#### 2.386

- 1 **Current and tidal streams,** for details see 2.327 and 2.328.

#### 2.387

- 1 **Useful marks:**  
Makunudhoo Light (6°24'4N, 72°42'6E) stands on Makunudhoo close S of its NE point.

A radio mast (not charted) stands on Makunudhoo (2.385).

#### 2.388

- 1 **Lagoon entrances.** There are 2 openings on the E face of the reef which can be used by boats only; local knowledge is considered essential before an entry is made.

#### 2.389

- 1 **Other islets:**

Edipparufushi (6°19'0N, 72°38'6E), an islet.

Farudhoru (6°19'8N, 72°39'1E), an islet.

Fenboahuraa (6°23'5N, 72°41'7E), an islet.

## CENTRAL ROUTE

### Passage directions for central route

(continued from 2.196)

Charts 1013, 1014, 709

#### 2.390

- 1 From the vicinity of 4°40'N, 73°11'E the route leads 27 miles NNE across Kardiva Channel (2.331) passing between Goidhoo Atoll (2.339) and Kaashidhoo (2.338), thence:
- 2 From the vicinity of 5°05'N, 73°22'E the route leads about 100 miles NNW between the atolls of the West Group (described previously) and the East Group (described later), thence about 40 miles N to Eight Degree Channel. The central channel is about 7 miles wide at its narrowest part, situated near the N end of Allhuras Kandu (2.381), NE of the Powell Islands (2.382). The route is deep and free from charted dangers; also, between the atolls, it is sheltered from ocean swell. For this route the chart is sufficient guide.

## EAST GROUP OF ATOLLS INCLUDING CHANNELS AND DIRECTIONS

### Passage directions east of atolls

(continued from 2.197)

Charts 1013, 1014

#### 2.391

- 1 From a position E of the approaches to Kardiva Channel (4°50'N, 73°10'E) (2.331) the passage leads direct NNW for about 140 miles, passing:
- 2 ENE of Faadhippolhu Atoll (5°24'N, 73°30'E) (2.392), thence:  
ENE of South Miladhunmadulu Atoll (5°50'N, 73°20'E) (2.415), thence:  
ENE of North Miladhunmadulu Atoll (6°17'N, 73°08'E) (2.415), thence:
- 3 ENE of South Thiladhunmathee Atoll (6°38'N, 73°00'E) (2.436), thence:  
ENE of North Thiladhunmathee Atoll (6°55'N, 73°10'E) (2.436), thence:  
ENE of Ihavandhippolhu Atoll (7°00'N, 72°55'E) (2.457), thence:
- 4 To a position in Eight Degree Channel (2.472) from where vessels may steer to pass E or W of Minicoy Island (8°16'N, 73°03'E) (2.490) as required.



## FAADHIPOLHU ATOLL

Chart 1014

### Position

#### 2.392

- 1 Faadhipolhu Atoll (5°24'N, 73°30'E) lies N of the E end of Kardiva Channel (2.331).

### General description

#### 2.393

- 1 Faadhipolhu Atoll consists of numerous islets which are situated on all of its sides.  
The lagoon has moderate depths and a sandy bottom; there are many drying reefs and several below-water coral reefs with depths of 1.8 to 3.7 m over them.
- 2 The main occupations of the inhabitants are sail weaving and coir making.  
The population of the atoll was about 6400 in 1985.

### Tidal streams

#### 2.394

- 1 Tidal streams set strongly through the openings into the lagoon of Faadhipolhu Atoll.

### South-eastern side of Faadhipolhu Atoll

#### 2.395

- 1 **Description.** From Aligau (5°14'6N, 73°31'1E) the barrier reef, which is unbroken, extends 8 miles ENE to its SE point then 9 miles N to Selhihifushi.  
During the NE monsoon the sea breaks heavily upon the seaward face of this stretch of reef, on which, coral rock and sandbanks appear at low water.

#### 2.396

- 1 **Principal islets.** Olhuvelifushi (5°16'8N, 73°36'4E), is the largest islet on the S part of the reef; Maabinhuraa and Diffushi are the largest islets on its N part, and lie respectively, 4½ miles NE and 7 miles NNE of Olhuvelifushi; the names and positions of the many smaller islets on this reef are shown on the chart.

### North-eastern side of Faadhipolhu Atoll

#### 2.397

- 1 **Description.** From Faadhoo (5°26'0N, 73°37'8E) the barrier reef trends 12 miles NW to Fehigili; the reef is broken in several places on this side of the atoll.

#### 2.398

- 1 **Principal islet.** Madhiriguraidhoo (5°28'N, 73°34'E) is the largest islet on this side of the atoll.

#### 2.399

- 1 **Lagoon entrances.** There are several openings into the lagoon on this side of the atoll, but most are narrow, tortuous and not recommended.

#### 2.400

- 1 **Other islet:**  
Fushifaru (5°29'4N, 73°31'2E), an islet.

### South-western side of Faadhipolhu Atoll

#### 2.401

- 1 **Description.** From Aligau (5°14'6N, 73°31'1E) (2.395) the barrier reef recedes in a curve and trends 13 miles NW to Kanifushi, an islet which projects sharply to form the W

point of the atoll. There are wide openings in several places on this side of the atoll.

#### 2.402

- 1 **Principal islet.** Kurendhoo (5°20'N, 73°28'E), one of the largest islets on this side of the atoll, is inhabited and has a small jetty on its lagoon side.

#### 2.403

- 1 **Lagoon entrances.** Between Aligau (5°14'6N, 73°31'1E) and Lhossalafushi, 4½ miles NNW, there is a wide opening into the lagoon; the islet of Maduvvari, with a reef on its seaward side and a small jetty on its lagoon side, lies close NNW of the middle of the opening; Varihuraa, about 1¼ miles NW of Maduvvari, indicates the N entrance point of this wide opening.
- 2 There are narrow openings into the lagoon on each side of Lhohi (5°19'3N, 73°28'6E); each fairway has a least charted depth of 55 m.
- 3 Maa Kandulhi enters the lagoon between Kurendhoo (5°20'N, 73°28'E) (2.402) and Medhafushi, 2½ miles NW; its fairway, which is about 5 cables wide, has a least charted depth of 64 m and lies near the centre of the opening; there are shoal patches on each side of the fairway which extend from the above islets.
- 4 Olhukolhu, the NW-most opening on this side of the atoll, enters the lagoon between Meedhaahuraa (5°22'3N, 73°24'6E) and Dhidhdhoo, 1½ miles WNW; there is a least charted depth of 27 m in its narrow fairway which passes SE of 2 other small islets lying close within the lagoon.

#### 2.404

- 1 **Useful mark:**

Kanifushi Light (black cylindrical daymark on grey framework tower, 12 m in height) (5°21'9N, 73°20'2E) stands on Kanifushi (2.401).

#### 2.405

- 1 **Landing place.** Maafilaafushi (5°22'N, 73°25'E), a large islet, has a small jetty on its lagoon side.

### North-western side of Faadhipolhu Atoll

#### 2.406

- 1 **Description.** From Kanifushi (5°21'9N, 73°20'2E) (2.401) the barrier reef trends 14½ miles NE to Kur Kandulhi (2.408) an opening near the N extremity of the atoll; the reef is broken in numerous places on this side of the atoll.

#### 2.407

- 1 **Principal islands.** Felivaru (5°28'5N, 73°23'4E) has a small harbour that serves a fish factory, blue in colour, which stands near the middle of the SE side of the island; the harbour comprises a small pier and a slipway which are protected from SW by a breakwater that extends about 2 cables from the shore in the vicinity of the fish factory.

- 2 Kuredhdhoo (5°33'N, 73°28'E), an island near the N point of the atoll, provides a tourist resort; there is a long jetty on the S side of the island near its mid-point. For some of the dangers in the approach to this jetty see 2.408.

#### 2.408

- 1 **Lagoon entrances.** At the N end of the atoll Kur Kandulhi (5°33'5N, 73°28'8E) enters the lagoon between Kuredhdhoo (2.407) and Fehigili (2.397). The opening is about 3 cables wide and there is a least charted depth of 14.5 m at its inner end; about 7½ cables within the entrance there are a number of reefs lying across the fairway.

There are several other openings into the lagoon on this side of the atoll, but most are narrow, tortuous and not recommended.

**2.409****1 Landmarks:**

Radio mast (not charted) (about 35 m in height) (5°28'·7N, 73°23'·4E) stands among a number of houses in the vicinity of the fish factory at Felivaru (2.407).

- 2 Two white houses (not charted) standing on the SW extremity of Felivaru Island (5°28'·5N, 73°23'·4E) aid its identification.

**2.410****1 Useful mark:**

A stranded wreck (not charted) lies near the S end of Gaaerifaru (5°29'·2N, 73°24'·4E).



Gaaerifaru S – stranded wreck (2.410)

(Original dated 1994)

**2.411**

- 1 **Development.** Reclamation work was in progress (1994) near the S end of Hinnavaru (5°29'·5N, 73°25'·0E).

**2.412****1 Other islets:**

Huravalhi (5°31'·3N, 73°26'·6E), an islet.  
Madivaru (5°27'·5N, 73°22'·4E), an islet.  
Naifaru (5°26'·7N, 73°22'·2E), an islet.  
Vavvaru (5°25'·1N, 73°21'·4E), an islet.

**Baraveli Kandu**

Chart 1014

**General information****2.413**

- 1 Baraveli Kandu (5°35'N, 73°23'E) separates Faadhippolhu Atoll (2.392) and South Miladhunmadulu Atoll (2.415); the channel is about 8 miles wide at its narrowest part and is deep and free from charted dangers.

For passage through this channel the chart is sufficient guide.

## MILADHUNMADULU ATOLLS AND THILADHUNMATHEE ATOLLS

**General administration**

Chart 1014

**2.414**

- 1 Miladhunmadulu Atolls and Thiladhunmathee Atolls form a single extensive atoll which is divided, for administrative purposes, into four parts; South and North Miladhunmadulu Atolls together with South and North Thiladhunmathee Atolls. The district of South Thiladhunmathee includes Maamkunudhoo Atoll (2.383)

for administrative purposes, and the district of North Thiladhunmathee includes Ihavandhippolhu Atoll (2.457) for the same purpose.

**Miladhunmadulu Atolls**

Chart 1014

**General information****2.415**

- 1 **Position.** South Miladhunmadulu Atoll (5°50'N, 73°20'E) and North Miladhunmadulu Atoll (6°17'N, 73°08'E) lie N of Baraveli Kandu (2.413) and E of Allhuras Kandu (2.381); they are separated from Thiladhunmathee Atolls by a channel (2.427), forming a natural boundary, that follows approximately the parallel of 6°29'N.

**2.416**

- 1 **Description.** Miladhunmadulu Atolls consist of about 100 islands and islets lying mainly on their E sides. Many of these are inhabited, as shown on the chart, and in 1985 the total population was about 14 400.

Almost all of the islands are wooded, with palm trees predominating.

- 2 The lagoon has generally moderate depths, and it is less encumbered with dangers than most other atolls in the Maldives; the bottom is sand with clay in places.

**2.417**

- 1 **Tidal streams** in Miladhunmadulu Atolls set ENE when in-going and WSW when out-going and attain a rate of 1½ to 2 kn at springs but are greatly influenced by the prevailing monsoon currents.

**2.418**

- 1 **Directions.** The lagoon can be navigated in favourable daylight conditions with ease for there are few dangers, especially in the N part; but it is recommended that the vessel should be conned from aloft. For the routes between the dangers the chart is sufficient guide.

**South-eastern side of Miladhunmadulu Atolls****2.419**

- 1 **Description.** From Dhonaerikadoodhoo (5°38'·7N, 73°19'·8E) the barrier reef trends 14 miles NE to Maafaru, an island which occupies the S part of a large lagoon reef that forms the E extremity of the atolls. There are several wide breaks in the barrier reef on this side of the atolls.

**2.420**

- 1 **Principal island.** Manadhoo (5°45'·7N, 73°24'·6E), lying close within the lagoon, was densely populated in 1994 when the main village and many public buildings were located near the centre of the N side of the island.

The island is profusely covered in vegetation, including coconut palms, banyan, breadfruit and almond trees.

- 2 A boat channel extends the whole length of the N side of the island but the passage is narrow, with a depth of about 1·8 m, and fringed by large boulders of coral rock; within the reef there is a deep channel, from 18 to 27 m wide, which skirts the beach.

**2.421**

- 1 **Lagoon entrances.** There are wide and deep entrances into the lagoon on this side of the atolls; the detail of these openings is shown on the chart.

**2.422**

- 1 **Anchorage.** Good anchorage may be obtained, according to the season, on the N or S sides of Manadhoo (2.420).

Small craft may anchor in the lagoon on the W side of Maafaru (2.419); it was reported (1994) that a channel to this anchorage is marked by buoys and stakes.



**2.423**

- 1 **Other island:**  
Miladhoo (5°47'3N, 73°21'7E), an islet.

**Eastern side of Miladhunmadulu Atolls****2.424**

- 1 **Description.** From Maafaru (5°49'7N, 73°28'8E) (2.419) the barrier reef, which is broken in numerous places, trends 45 miles NW to Neyo that marks the NE corner of Miladhunmadulu Atolls.

**2.425**

- 1 **Principal islands and islets.** Several of the many islands and islets on this side of the atolls and within the lagoon are inhabited as shown on the chart.

**2.426**

- 1 **Lagoon entrances.** Kulhudhoo Kandu (5°55'5N, 73°26'0E), lying S of Kedhikulhudhoo near the SE end of this side of the atolls, is about 7 cables wide, considered safe and well identified.

- 2 Noomara Kandu (6°23'N, 73°07'E) is about 9½ miles wide, with a least charted depth of 37 m near its mid-point; the entrance lies between Feevah and Noomara which define, respectively, its ESE and WNW entrance points.

**2.427**

- 1 **Channel.** Maavaidhoo Kanduolhi (6°29'N, 73°03'E) forms the E entrance to the channel which separates Miladhunmadulu Atolls and Thiladhunmathee Atolls. This entrance is about 3½ miles wide with a least charted depth of 37 m; it is well defined by Neyo Islet (2.424) and Maavaidhoo Islet (2.440), 4 miles N, marking respectively the S and N entrance points. The channel leads W, passing S of an unmarked shoal patch near the middle of the atoll, and thence between a reef and another unmarked shoal with rocky patches at its W entrance. The W entrance is less well defined than the E entrance; it is about 1 mile wide and has a least charted depth of 14.5 m in its fairway.

**Other islands****2.428**

- 1 The islands or islets listed below are positioned from Farukolhufunadhoo (6°09'0N, 73°17'3E):  
Bodulhaimendhoo (9 miles S).  
Bomasdhoo (11 miles SSE).  
Burehifasdhoo (12 miles SSE).  
Ekasdhoo (4¾ miles S).  
Eriyadhoo (2½ miles S).  
2 Farukolhu (2½ miles NNE).  
Foakaidhoo (13½ miles NNW).  
Hebadhoo (12½ miles SSE).  
Hirubadhoo (3½ miles NW).  
Kalaiddhoo (10¼ miles SSE).  
Kudalhaimendhoo (8 miles S).  
Lhaimagu (2½ miles WNW).  
3 Maakadoodhoo (5¼ miles NNW).  
Maaugoodhoo (6¾ miles S).  
Migoodhoo (5½ miles NNW).  
Milandhoo (8¾ miles NNW).  
Nalandhoo (11 miles NNW).

**Western side of Miladhunmadulu Atolls****2.429**

- 1 **Description.** From Raafushi Island (5°38'8N, 73°17'8E) the barrier reef, which is broken in numerous places, trends 57 miles NNW to the W entrance of the channel (2.427) that separates Miladhunmadulu Atolls and Thiladhunmathee Atolls. The barrier reef comprises several large lagoon reefs and a number of small reefs on most of which stand small islets.

**2.430**

- 1 **Principal islands and islets.** Some of the islands and islets on this side of the atolls and within the lagoon are inhabited as shown on the chart.

**2.431**

- 1 **Lagoon entrances.** There are some wide and deep entrances into the lagoon on this side of the atolls, the detail of which is shown on the chart; it is recommended that when navigating these channels the vessel should be conned from aloft.

**2.432**

- 1 **Useful marks:**

Raafushi Light (black cylindrical daymark on grey framework tower, 12 m in height) (5°38'8N, 73°17'4E) stands near the WNW edge of the reef that encircles Raafushi Island.

- 2 Light-beacon No 12 (grey framework tower on concrete base, 5 m in height) (6°10'6N, 72°59'6E) stands near the NW end of Gaagandu Faru.

**2.433**

- 1 **Landing,** it has been reported, may be made anywhere along the SE side of Kanditeem (6°26'3N, 72°55'1E) where the fringing reef has depths of about 1.2 to 1.8 m over it; within the reef there is a deeper channel, about 3.7 m wide, lying close along the shore.

**2.434**

- 1 **Development.** In 1994 reclamation work and the construction of a small harbour was in progress on the S side of Velidhoo (5°39'8N, 73°16'3E).

**Other islands****2.435**

- 1 The islands, islets and one reef listed below are positioned from Komandoo (6°03'2N, 73°03'3E):  
Badaidhidhdhoo (25¼ miles SSE).  
Bileffahi (17¾ miles NNW).  
Bolissa Faru (5 miles SE), a reef.  
Fodhdhoo (21 miles SSE).  
2 Gaakoshinbi (14½ miles N).  
Gallaidhoo (6½ miles SE).  
Goidhoo (23¾ miles NNW).  
Holhudhoo (21¾ miles SE).  
Hurasfaruhuraa (5¼ miles NNW).  
Maavelavaru (16½ miles SSE).  
3 Maroshi (9¼ miles N).  
Medhukuburudhoo (8¾ miles N).  
Thaburudhoo (23 miles SSE).

**Thiladhunmathee Atolls**

Chart 1014

**General information****2.436**

- 1 **Position.** South Thiladhunmathee Atoll (6°38'N, 73°00'E) and North Thiladhunmathee Atoll (6°55'N, 73°10'E) lie N of a channel (2.427) that follows approximately the parallel of 6°29'N; the channel forms a natural boundary separating these atolls from Miladhunmadulu Atolls to the S.

**2.437**

- 1 **Description.** Thiladhunmathee Atolls consist of about 40 islands and islets lying mainly on their E sides; the islands and islets are generally larger and lie farther apart, providing good openings into the lagoon, compared with other atolls of the Maldives. Many of the islands are inhabited, as shown on the chart.
- 2 There are numerous reefs, including some lagoon reefs, on the W side of the atolls which form the barrier reef;

there are openings into the lagoon through this barrier reef which are navigable, but due to a lack of identification marks to locate them, most are best avoided.

- 3 The lagoon has generally moderate depths, and it is less encumbered with dangers than most other atolls in the Maldives.

#### 2.438

- 1 **Current and tidal streams**, for details see 2.327 and 2.328.

#### 2.439

- 1 **Directions**. The lagoon can be navigated in favourable daylight conditions with ease for there are few dangers, but it is recommended that the vessel should be conned from aloft. For the routes between the dangers the chart is sufficient guide.

### Eastern side of Thiladhunmathee Atolls

#### 2.440

- 1 **Description**. From Maavaidhoo (6°31'N, 73°03'E) the string of islands and islets forming the E side of the atolls recedes in a curve and then trends N for a total of 28½ miles NNE to Kelaa, an island marking the NE extremity of the atolls.

#### 2.441

- 1 **Principal islands and islets**. All of the islands and islets on this side of the atolls and some of those within the lagoon are inhabited, as shown on the chart; many are densely populated.

- 2 Kulhudhuffushi (6°37'·5N, 73°04'·0E) has a large village which is fronted on its W side by a sandy beach and a lagoon enclosed by a coral reef; within the reef is a small harbour. The boat channel leading to the harbour is marked by stakes; it has been previously reported to be wider and deeper than those usually found in this area.

- 3 Hanimaadhoo (6°45'N, 73°10'E) has a large domestic airfield which facilitates flights to and from Male'. There are 2 landing stages on the W side of the island; the N landing can accommodate small craft with a draught of about 2·5 m; the S landing was reported (1994) to be fragile.

- 4 Kelaa (6°57'·5N, 73°12'·8E) is well populated and has several large public buildings. There is a landing stage situated at the N end of the W side of the island.

#### 2.442

- 1 **Useful marks:**

Two large radio masts (not charted) standing on Kulhudhuffushi (6°37'·5N, 73°04'·0E) (2.441) aid its identification.

- 2 Stranded wreck (6°52'·4N, 73°13'·8E) lying on the SE point of Filladhoo was reported (1994) to be visible at a distance of about 5 miles.

#### 2.443

- 1 **Lagoon entrances**. There are several safe channels leading into the lagoon on this side of the atolls, the detail of these openings is shown on the chart; it is recommended that when navigating these channels the vessel should be conned from aloft.

- 2 Maa Kandulhi (6°51'N, 73°13'E) is a wide channel situated near the N end of this side of the atolls, but it should be noted that its fairway is encumbered by several rocky patches.

### Other islands:

#### 2.444

- 1 The islands listed below are positioned from Kumundhoo Island (6°34'·5N, 73°03'·0E):  
Baarah (17½ miles NNE).

Neykurendhoo (4½ miles WSW).

Nolhivaramu (5½ miles NNE).

Nolhivaranfaru (8½ miles NNE).

### Western side of Thiladhunmathee Atolls

#### 2.445

- 1 **Description**. From the W entrance of the channel (2.427) (6°30'N, 72°53'E) that forms the boundary with Miladhunmadulu Atolls to the S, the barrier reef extends 21 miles N to Maaduni Faru, a lagoon reef which forms the NW corner of the atolls. The barrier reef comprises a large shoal with rocky patches lying close N of the boundary, some large lagoon reefs, and a number of other reefs, on most of which stand small islets.

#### 2.446

- 1 **Principal islands**. Vaikaramuraidhoo (6°32'·5N, 72°54'·0E), which stands on a circular reef, has a landing stage on its S side.

Vaikaradhoo (6°32'·8N, 72°57'·2E) has a small village, with a few public buildings and a landing stage, on its N side.

#### 2.447

- 1 **Lagoon entrances**. There are several channels leading into the lagoon on this side of the atolls but only Ruffushi Kandulhi (6°48'N, 72°57'E) should be considered for navigation; this opening is about ¾ miles wide with a least charted depth of 31 m towards the N part of its fairway. Ruffushi, a small islet standing on a reef close S of the S entrance point of the opening, aids its identification; however, the point should be given a wide berth.

#### 2.448

- 1 **Useful mark:**

Light-beacon No 13 (grey framework tower on concrete base, 5 m in height) (6°35'·8N, 72°52'·5E) stands near the NW end of Adharan Faru.

#### 2.449

- 1 **Other islands:**

Bodunaagoashi (6°40'·2N, 72°54'·3E), an island.

Naivaadhoo (6°44'·8N, 72°56'·0E), an island.

### North-western side of Thiladhunmathee Atolls

#### 2.450

- 1 **Description**. From Maaduni Faru (6°50'N, 72°57'E) (2.445) the barrier reef, bordering the S side of Gallandhoo Kandu (2.456), recedes in a curve and trends 17 miles ENE to Kelaa (2.441). The barrier reef comprises some large lagoon reefs and a number of other reefs on most of which stand islands or islets.

#### 2.451

- 1 **Principal islands**. Maarandhoo Island (6°51'·3N, 72°59'·0E), with Thakandhoo Island lying close SE, are both inhabited; Dhidhdhoo, 8 miles ENE of Maarandhoo, is also inhabited and has a landing stage near the midpoint of its W side.

#### 2.452

- 1 **Lagoon entrances**. There are several channels leading into the lagoon on this side of the atolls; those near the WSW end are well defined by islands as shown on the chart. Gaafushi Kandu (6°52'N, 73°04'E) is the widest entrance with a least charted depth of 38 m in its fairway, but it is marked only by Gaafushi, a small islet, lying near its W entrance point; an unmarked reef, about 1¾ miles ENE of Gaafushi, forms the E entrance point.

#### 2.453

- 1 **Useful marks:**

Light-beacon No 16 (grey framework tower, 5 m in height) (6°56'N, 73°09'E) stands near the NE point

of a lagoon atoll which extends 3 miles NW from Vashafaru (6°54'·0N, 73°09'·5E).

- 2 Stranded wreck (6°57'·5N, 73°11'·0E). The wreck of an upturned landing craft was situated (1994) near the edge of the reef W of Kelaa (2.441).

#### 2.454

- 1 **Lagoon reef entrances.** There is a small boat passage into the lagoon reef which lies NW of Vashafaru Islet (6°54'·0N, 73°09'·5E); the passage enters the lagoon about 1 mile N of the island and was reported (1994) to be marked by stakes. A similar, but unmarked passage, enters the SW side of the lagoon which lies SW of Kelaa Island (6°57'·5N, 73°12'·8E).

#### 2.455

- 1 **Other island:**  
Mulidhoo (6°50'·3N, 73°00'·7E), an island.

### Gallandhoo Kandu

*Charts 2068, 1014*

#### General information

##### 2.456

- 1 Gallandhoo Kandu (6°54'·N, 73°00'·E) separates North Thiladhunmathee Atoll (2.436) and Ihavandhippolhu Atoll (2.457); the channel is about 3 miles wide at its narrowest part and is deep and free from charted dangers in the fairway. Entrances on each side of the channel lead into the lagoons where anchorage may be found.

Tidal streams set ENE through Gallandhoo Kandu when in-going and WSW when out-going.

- 2 For passage through this channel the chart is sufficient guide.

### IHAVANDHIPPOLHU ATOLL

*Chart 2068*

#### Position

##### 2.457

- 1 Ihavandhippolhu Atoll (7°00'·N, 72°55'·E), lying on the N side of Gallandhoo Kandu (2.456), is the N atoll of the Maldives Group.

#### General description

##### 2.458

- 1 Ihavandhippolhu Atoll consists of about 24 islands or islets, mostly small with the largest barely 1½ miles long; the majority of the islands are heavily wooded and lie along the circumference of the barrier reef. About 7 of the islands are inhabited and in 1985 the total population was 4693. The main occupations of the inhabitants are fishing and the cultivation of coconuts.
- 2 For administrative purposes the atoll is included in the district of North Thiladhunmathee Atoll (2.436).
- 3 The central lagoon contains 4 islands, some shoals and a number of isolated reefs, of which, Rasfushifaru Reef (7°01'·7N, 72°56'·0E) has two drying rocks; the names and positions of the islands and other dangers are shown on the chart. There are general depths of 35 to 50 m in the E half and from 20 to 35 m in the W half of the lagoon; but in both parts, the latter particularly, there are many unnamed isolated shoal patches and continuous shoaling in the SW, W and NW parts from near its centre to the surrounding barrier reef.
- 4 With the sun high the shoals described above can easily be seen, from the bridge or aloft, showing pale green against the dark deeper water; however, when the sky is overcast the shoals are not so readily identifiable.

Communication with the other atolls is by boat, but there is no regular service.

#### Currents and tidal streams

##### 2.459

- 1 Tidal streams at Ihavandhippolhu Atoll do not appear to follow any regular pattern and currents are only experienced occasionally, probably entirely under the influence of local weather conditions. The following isolated observations have been made previously:
- 2 Within the lagoon. In December and January, a W set between Madulu (7°03'·4N, 72°57'·1E) and Uligamu, 2 miles NW; and a NW set between Uligamu and Vagaaru, 5 miles WNW of Madulu, were sometimes experienced. In the centre of the lagoon, during the same period, there was an occasional NW set.  
In the offing. During December and January, the current generally sets N or W but it is irregular.
- 3 Offshore. In December, about 50 miles E of the atoll, the current was once observed to set N with a rate of 2 kn; but one month later there was almost no current in this position.
- 4 For general information of current and tidal streams in the N part of the Maldives see 2.327 and 2.328.

#### North-eastern part of Ihavandhippolhu Atoll

##### 2.460

- 1 **Caution.** There are areas surrounding this part of the atoll which have not been surveyed; mariners are advised to give these areas a wide berth.

##### 2.461

- 1 **Description.** From Dhigufaruhuraa (6°55'·7N, 72°58'·1E) a small islet with a sandbank and palm trees, the barrier reef extends 5¼ miles NNE to Mulhadhoo then 8½ miles NW to Thuraakunu, the N island of the atoll, from where it curves 1½ miles WSW to Vagaaru Island. The reef, which is broken in several places, comprises of a number of islands and two large lagoon reefs.

##### 2.462

- 1 **Principal islands.** Mulhadhoo (7°00'·7N, 72°59'·9E) has a village on its W side; there is a boat passage through an otherwise almost unbroken reef surrounding the village where there is a good landing.
- 2 Uligamu (7°05'·0N, 72°55'·7E) is low, flat and thickly wooded. The inner side of the reef encircling the island is separated from the shore and forms a lagoon; there are two openings in the reef through which fishing boats may enter the atoll lagoon to land on the beach. There is a village situated near the centre of the island which is surrounded by coconut palms and breadfruit trees.
- 3 Thuraakunu (7°06'·4N, 72°54'·0E) has a village on its N side; landing can be effected through a gap in the encircling reef on the S side of the island.
- 4 Vagaaru (7°05'·7N, 72°52'·7E), a small island near the N end of the atoll, is low and well wooded. The island is surrounded by a reef which narrows on its SE side where there is a good landing place; however, a moderate surf sometimes makes landing hazardous.

##### 2.463

- 1 **Lagoon entrances.** There are several channels leading into the lagoon on this part of the atoll but those in the S part, lying S and N of Gallandhoo (6°57'·N, 72°59'·E) and the channel N of Kuroolhi, a shoal 1¼ miles N of Gallandhoo, have not been surveyed and should not be used.
- 2 Mulhadhoo Kandu (6°59'·5N, 72°59'·5E) enters the lagoon between Filaafuni (6°58'·8N, 72°59'·0E), a shoal,



and Mulhadoo (2.462), 1¼ miles NNE; the opening is about 1½ miles wide with a least charted depth of 31 m in the S part of the fairway. Vessels approaching the atoll from SE or E and using this entrance should bring the NE point of Medhafushi Islet (7°00'·8N, 72°56'·0E) to bear 287° and keep it so, passing about 7 cables off Mulhadoo, thence when the S end of the latter island bears 070° steer as required to an anchorage.

- 3 Uligamu Kandu (7°04'·2N, 72°56'·4E) is an alternative entrance for vessels approaching the atoll from E or from NE; the opening lies between Madulu (2.459) and Uligamu (2.462); it is about 1¼ miles wide with a least charted depth of 35 m in the middle of the fairway but lesser depths will be found on each side. For details of tidal streams at the inner end of this opening see 2.459.

- 4 Vagaaru Kandu (7°06'·4N, 72°53'·1E) lying between Thuraakunu and Vagaaru (both 2.462) is the deepest opening, in the N part of the atoll, with a least charted depth of 20·1 m in the middle of its fairway; the entrance is fairly well marked and the edges of the reefs on each side of the passage can be seen from aloft at a good distance. Within the lagoon, this entrance is not encumbered by shoal depths; however, it is less wide than the openings in the reef on each side of it. For details of tidal streams at the inner end of this opening see 2.459.

#### 2.464

- 1 **Useful marks:**

A beacon (7°05'·2N, 72°55'·8E) stands on the reef on the E side of Uligamu (2.462) about 9 cables SE of its N point, the position of this beacon is approximate.

Thuraakuna Light (7°06'·5N, 72°53'·5E) stands near the NW extremity of the reef fringing Thuraakunu (2.462).

### South-western part of Ihavandhippolhu Atoll

#### 2.465

- 1 **Caution.** There are areas surrounding this part of the atoll which have not been surveyed; mariners are advised to give these areas a wide berth.

#### 2.466

- 1 **Description.** From Dhigufaruhuraa (6°55'·7N, 72°58'·1E) (2.461), the reef curves WSW and NW for a total of about 4½ miles to Huvahandhoo Kandu (2.468). Dhigu Faru, a reef surrounded by a very shallow area with numerous coral heads, forms the S point of the atoll. From Huvahandhoo (6°57'·5N, 72°54'·3E), an island on the NW side of Huvahandhoo Kandu, the barrier reef trends 9 miles NW to the W point of the atoll where it then curves about 5½ miles ENE to Vagaaru Island (2.462). Between the S end of Huvahandhoo Island and Farukolhu Kandu (7°05'·8N, 72°51'·5E) (2.468), lying W of Vagaaru Island, the reef is unbroken with a number of islands and islets lying inside it and all except one lie on its SW side.

#### 2.467

- 1 **Principal islands.** Ihavandhoo (6°57'·3N, 72°55'·6E), one of the few populated islands within the lagoon, lies at the inner end of Huvahandhoo Kandu (2.468). There are landing places on the S side of this island, and it was reported (1994) that harbour construction and reclamation works were in progress in the same vicinity.
- 2 Huvarafushi (6°59'·0N, 72°53'·8E), with a large village, is the main island of the atoll. There is a natural harbour on its SW side, formed between the island and the barrier reef, which provides good anchorage for numerous fishing craft.

- 3 Hathifushi (7°01'·2N, 72°49'·8E) has a village on its NE part and a harbour for fishing craft, protected by a breakwater, along its N coast; the approach to the harbour is shallow and barely usable at low water.

Matheerah (7°01'·7N, 72°49'·2E), was formerly used as a cemetery and had a flagstaff and small temple standing on it; elsewhere it was well wooded.

- 4 Innafinolhu (7°04'·5N, 72°48'·8E), the only islet in the NW part of the atoll, lies inside the barrier reef near its NW point.

#### 2.468

- 1 **Lagoon entrances.** There are 2 channels leading into the lagoon on this part of the atoll, Huvahandhoo Kandu on its SW side and Farukolhu Kandu on its NW side, which may be used by small vessels approaching the atoll from these directions.

- 2 Huvahandhoo Kandu (6°56'·5N, 72°54'·5E) enters the lagoon between Dhigu Faru (2.466) and Huvahandhoo (2.466). The opening is about 7 cables wide through which a fairway, 4 cables wide, with charted depths of more than 20 m, which leads towards Ihavandhoo Island (2.467) and gives access W of this island to the lagoon; there are several shoal and rocky patches on each side of the opening and off the reef encircling Ihavandhoo, but under suitable conditions these are usually easily seen from aloft.



Thuraakuna Light (2.464)

(Original dated 1994)

- 3 Farukolhu Kandu (7°05'·8N, 72°51'·5E) enters the lagoon between Vagaaru Island (2.462) and the E end of the barrier reef, 2 miles W. Bihedhdhootila and several other shoal patches lie in this opening which has a narrow fairway, situated close W of Vagaaru, where vessels may enter the lagoon in a least charted depth of about 20·1 m; however, there are lesser depths close within the lagoon.

#### 2.469

- 1 **Useful mark:**

Stranded wreck (7°04'·6N, 72°48'·2E). It was reported (1994) that the wreck of the SS *Oceano*, lies near the outer edge of the barrier reef W of Innafinolhu (2.467); the wreck is generally very broken up, but about 1 m of its mast and a few parts of the superstructure are visible at all states of the tide.

### Anchorage in Ihavandhippolhu Atoll

#### 2.470

- 1 The best anchorage within the atoll is reputed to be W of Uligamu Island (7°05'·0N, 72°55'·7E) (2.462) in depths of 27 to 37 m, sand and coral, as shown on the chart.
- 2 There is good anchorage E of the reef in the SW part of the lagoon between Huvarafushi (6°59'·0N, 72°53'·8E) (2.467) and Huvahandhoo (2.466), 1½ miles SSE, in depths of 31 to 37 m, sand and coral, as shown on the chart. This is probably the best anchorage during the SW monsoon but a heavy swell might reach part of the anchorage through Huvahandhoo Kandu.
- 3 Good anchorage may be obtained during the NE monsoon W of Mulhadhoo (7°00'·7N, 72°59'·9E) (2.462) and Gaamathikulhudhoo, 2 miles NNW, in depths of 47 to 55 m, sand and coral, as shown on the chart.
- There are also anchorages S of Vagaaru Island (7°05'·7N, 72°52'·7E) (2.462) and Thuraakunu Island (2.462), 1½ miles ENE, as shown on the chart.

### Other island

#### 2.471

- 1 Govvaafushi (7°00'·8N, 72°55'·2E), an island.

## EIGHT DEGREE CHANNEL

*Charts 2738, 2068, 1014*

### Description

#### 2.472

- 1 Eight Degree Channel (Maa Ma Lee Kandu) lies between the N end of Ihavandhippolhu Atoll (7°00'N, 72°55'E) and Minicoy Island, 70 miles N. It is one of the principal routes through the Maldives for ocean-going vessels proceeding in an E/W direction; for details of such routes see *Ocean Passages for the World*.

### Depths

#### 2.473

- 1 The channel is generally very deep and free from charted dangers. However, an area with two depths of less than 100 m, reported in 1985 and 1986, lies about 34 miles NNW of Ihavandhippolhu Atoll.

### Currents

#### 2.474

- 1 The currents in this channel are similar to those at the N end of the Maldives, for details see 2.327, but during the NE monsoon they sometimes set NW and very occasionally they set N with S winds. Between the ends of September and December the current sets S.

### Lights

#### 2.475

- 1 Lights are exhibited from both sides of Eight Degree Channel.
- For the light on the S side of the channel see 2.464.
- For the light on the N side of the channel see 2.495.

### Passage directions

#### 2.476

- 1 It is recommended that vessels using Eight Degree Channel should keep nearer to Minicoy than the Maldives thus ensuring sighting the light on Minicoy Island, which is much more powerful than the light on Thuraakunu Island; this route also ensures that vessels avoid being set onto the N end of the Maldivian Group. Otherwise, for this channel the chart is sufficient guide.

## LAKSHADWEEP

### GENERAL INFORMATION

*Chart 2738*

### General description

#### 2.477

- 1 Lakshadweep, meaning the hundred thousand isles, consists of the group of coral atolls, formerly known as the Laccadive Islands, which lies up to about 200 miles from the W coast of the mainland of India with numerous detached shoals and banks. The group forms a Union Territory of the Republic of India and is administered by a *Tehsildar*, resident on Androth Island (2.518), under the direction of an Administrator whose office is located on Kavaratti Island (2.511).

### Off-lying dangers

#### 2.478

- 1 ODAS buoys may be encountered between and well to seaward of these islands, and are subject to movement; see also 7.4.

ODAS buoys are located W of Minicoy Island at:

DS6 Light-buoy (special) at 8°18'·0N, 72°45'·6E,  
DS6-A Light-buoy (special) at 8°21'·3N, 72°42'·8E,  
DS7-A Light-buoy (special) at 8°18'·5N, 72°39'·1E,  
DS7 Light-buoy (special) at 8°19'·3N, 72°39'·9E,

ODAS DS2 Light-buoy (special) is moored NW of Kavaratti Island in position 10°40'·3N, 72°30'·7E.

- 2 A minimum berth of 1 mile is requested and mariners are advised not to anchor nor trawl within 1000 m of the buoy.

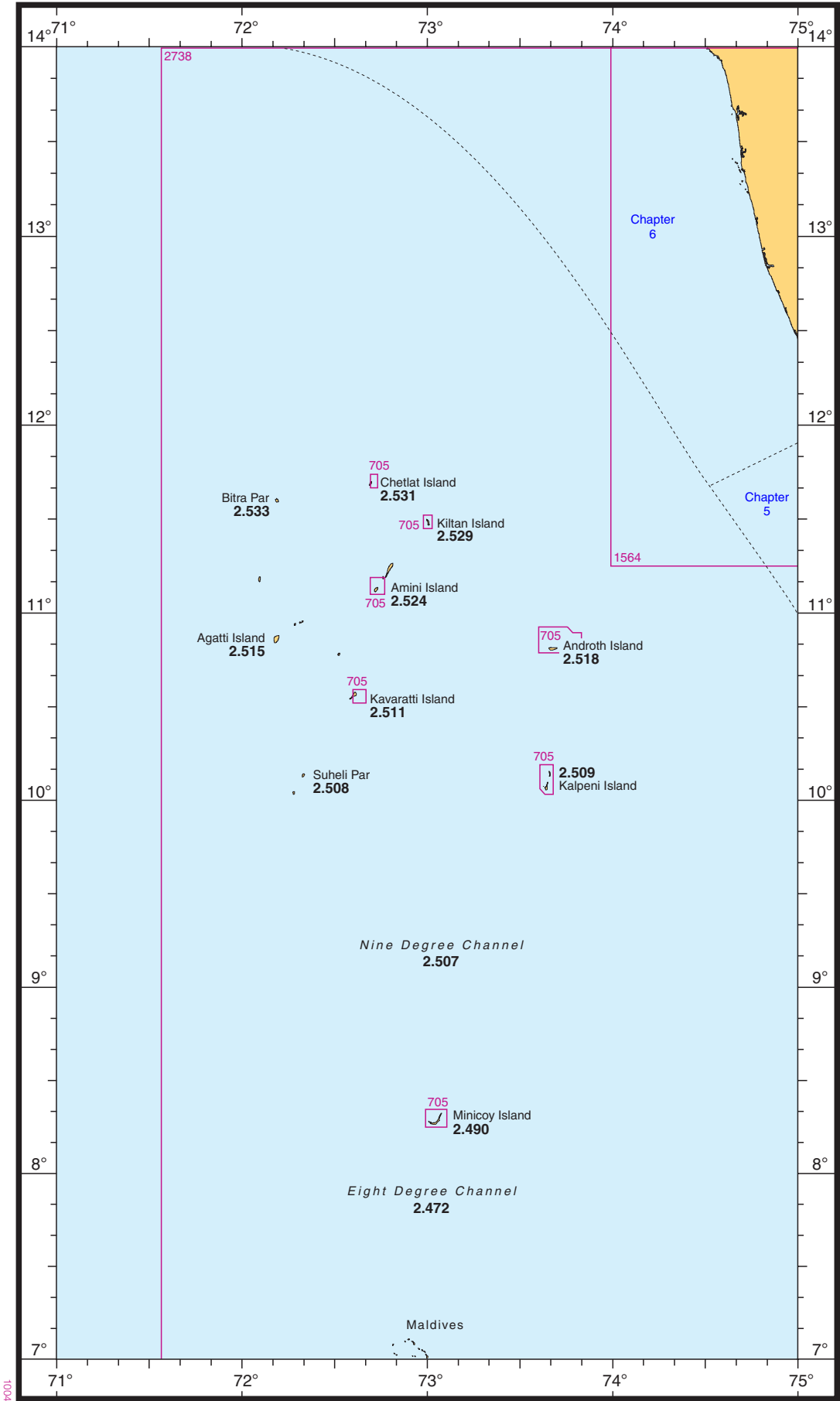
### Islands and atolls

#### 2.479

- 1 Each of the islands composing Lakshadweep lies on a large coral shoal some of which are several square miles in extent; but no parts of these formations are more than about 4 m high. The outer edges are higher than the body of these shoals and in most cases enclose a regularly formed lagoon which remains calm even in adverse weather conditions. The receding tide leaves the edge of the reef nearly dry and the tide runs out of the lagoon



Chapter 2c - Lakshadweep



through breaches in the edges which are often large enough to admit the light local craft into the natural harbour.

### Topography

#### 2.480

- 1 There is little spontaneous vegetation on most of these flat islands, but the conditions are especially favourable to the growth of coconut palms, which is their staple product; these are generally from 18 to 24 m high.

### Navigation

#### 2.481

- 1 The islands and islets of the group are all low and even with their coconut trees are generally not discernible from any great distance and should be avoided; but there are some safe and wide channels between many of them.  
Owing to the great depths near the islands, sounding gives no warning of their proximity, therefore great caution is needed in reduced visibility.

### Principal marks

#### 2.482

- 1 The landmarks and major lights in the area covered by this section are few and will generally only be seen by vessels approaching an individual island; therefore the descriptions of marks and lights will be found in the relevant part and not in the directions for the area.

### Passage directions

#### 2.483

- 1 For passage through Lakshadweep the chart is sufficient guide.

### Flora and fauna

#### 2.484

- 1 On the islands there are patches of tottam or garden land, on which ragi, millet, plantains and other vegetables are grown; limes and breadfruit trees flourish, but no rice is produced. There are cattle, goats, fowls and cats on all of the inhabited islands; birds are few, but turtle and fish are plentiful.

### Physical feature

#### 2.485

- 1 Under the surface of the islands lies a stratum of coral about 0.4 m deep; by breaking through this and removing the sand, fresh water may be obtained. This water rises and falls with the tide, it is reported to be wholesome but slightly brackish.

### Medical facilities

#### 2.486

- 1 There is a Government dispensary on all of the inhabited islands and small hospitals on Agatti, Androth, Amini, Kadmat and Chetlat.

### Traffic

#### 2.487

- 1 The numbers of vessels calling at the islands of Lakshadweep are generally few. In 2003 there were a total of 16 calls with a total dwt of 45 323 tonnes.

## LAKSHADWEEP—SOUTHERN GROUP

### General information

Chart 2738

#### Area covered

##### 2.488

- 1 The area covered by this section includes Nine Degree Channel (2.507), with Minicoy Island (2.490) lying S of it and the Cannanore Islands situated on its N side; the latter group of islands comprises Suheli Par (2.508), Kalpeni (2.509), Kavaratti (2.511), Pitti Islet (2.514), Agatti (2.515) and Androth (2.518).

#### Atolls

##### 2.489

- 1 A general description of the islands and atolls is given at 2.479.

### Minicoy Island

Charts 705 plan of Minicoy Island, 2738

#### General information

##### 2.490

- 1 Minicoy (8°16'N, 73°03'E), an island forming the SE side of an atoll, on the N side of Eight Degree Channel (2.472), is included with the other islands of Lakshadweep for administration purposes although it is situated about 110 miles SSW from the nearest of these.
- 2 The inhabitants of the island, probably of Sri Lankan origin, are darker and smaller than those of other atolls of Lakshadweep or the Maldives; Mahl is the main language spoken but many of the people speak Hindi.

#### Health

##### 2.491

- 1 Leprosy is common; there is a leper settlement 2 km N of Minicoy Town (8°17'1N, 73°03'9E).

#### Traffic

##### 2.492

- 1 In 2003, the island was visited by two vessels with a total dwt of 1143 tonnes. Local boats meet ships which may be summoned through the lighthouse keeper who can communicate with vessels using the *International Code of Signals*.

#### Storm signals

##### 2.493

- 1 Storm signals are displayed at Minicoy Island Lighthouse (8°16'0N, 73°01'6E) (2.495); the brief system is used. See 1.47.

#### Natural conditions

##### 2.494

- 1 For details see climatic table 1.209.

#### Principal marks

##### 2.495

- 1 **Landmarks:**  
Minicoy Island Lighthouse (white round masonry tower, 48 m in height) (8°16'0N, 73°01'6E).  
Mast (red and white, about 30 m in height) stands close SE of Minicoy Light.  
Single Palm (8°19'3N, 73°04'7E) stands close SW of Kodi Point.
- 2 **Major light:**  
Minicoy Island Light—as above; on certain bearings and within a distance of less than 6 miles the light is obscured by trees, for details see the *Admiralty List of Lights Volume F*.

**Other aid to navigation****2.496**

- 1 Racon (8°16'0N, 73°01'6E) at Minicoy Island Light (2.495).

For further details see *Admiralty List of Radio Signals Volume 2*.

**Directions for passing Minicoy****2.497**

- 1 **Caution.** Vessels have grounded and been wrecked on Minicoy Island apparently due to having shaped a course to pass a few miles N of Minicoy Island Light (2.495). In some cases, after sighting the light from E instead of passing S of it where the light provides a useful guide, vessels have steered to pass N of it, where, from E and N it is partly obscured by the densely wooded island.
- 2 Because of this, and also because of unpredictable strong S sets encountered at times, the practice of shaping a course to pass only a few miles N of Minicoy is dangerous, especially at night.

**Useful mark****2.498**

- 1 Stranded wreck (8°19'3N, 73°04'7E) lies on the reef close S of Kodi Point. However, it was reported (1991) that this wreck is no longer visible.

**North-western side of Minicoy Atoll****2.499**

- 1 **Description.** Roebera Point (8°16'1N, 73°01'1E), with Tunda Point 3½ cables NNW, form the SW extremity of Minicoy Island, from where the barrier reef curves 6 cables NW to Viringili Island (Small Pox Island). From this island the reef, which dries in places, extends about 1¼ miles N and then curves 7 cables NE and dries about 0.6 m. Thence from the latter position the reef is formed by a string of below-water rocks, marked by breakers, which trend 4 miles ENE to the NE point of the atoll.

**2.500**

- 1 **Lagoon entrances.** There are 5 entrances into the lagoon on this side of the atoll suitable for shallow draught small craft; some of the channels are marked by beacons in the form of wooden posts but these should not be relied upon for navigation. For all of the channels described below local knowledge is required.
- 2 Bojan Chor Channel (8°17'0N, 73°00'6E), which dries, is marked at its seaward end by two beacons that stand on the reef.
- Neru Magu Channel, 1½ miles NNE of Bojan Chor Channel, has depths of about 0.6 to 0.9 m and is marked by beacons to the centre of the lagoon.
- 3 Khandema Magu Channel enters the lagoon about 9 cables ENE of Neru Magu Channel; it is sparsely marked.
- 4 Saleh Magu Channel, near the NE end of the atoll, enters the lagoon N of Kodi Point (2.501); it is the principal opening into the lagoon with depths of about 2 to 4 m but it is narrow and virtually unmarked. Fahara Magu Channel, which is very narrow and even more tortuous than the previous channels, enters the lagoon from the NE extremity of the atoll and joins Saleh Magu Channel N of Kodi Point. There are 2 wrecks, each with a depth of 0.9 m over it, within the entrance to these channels; lying, respectively, 2¼ cables NNW and 3 cables NNE of Kodi Point.

**South-eastern side of Minicoy Atoll****2.501**

- 1 **Description.** From Roebera Point (8°16'1N, 73°01'1E) (2.499) Minicoy Island, with a dense covering of coconut palms about 19 m high, extends 1¼ miles ESE to Teveratio Point, the SE point of Minicoy; then it extends 1¼ miles NE to Mou-Rambu Point, from where a narrow peninsula projects about 2½ miles NNE to Kodi Point (8°19'4N, 73°04'7E), the NE point of the island, which is marked by a beacon. A rock, 1 m high, stands 1½ cables NE of the point and the barrier reef extends about 1 cable farther NE.

**2.502**

- 1 Ko Vari Bay (8°16'6N, 73°03'7E) lies close SW of Mou-Rambu Point. Two beacons, orange with orange triangular topmarks, stand onshore at the N part of the bay; the alignment (268°) of these beacons leads from seaward towards the bay passing S of the shoal water off Mou-Rambu Point.

**2.503**

- 1 **Jetties.** There is a small jetty on the lagoon side of the island N of Minicoy Lighthouse (8°16'0N, 73°01'6E); two finger jetties extend into the lagoon, 1½ and 2 miles ENE of the latter small jetty.

**2.504**

- 1 **Landing** is possible during the SW monsoon in an inlet about 1½ miles SSW of Kodi Point (8°19'4N, 73°04'7E).

**Directions for entering the lagoon****2.505**

- 1 Approach Minicoy Island from S passing about 4 miles S of Minicoy Island Light (2.495); the morning twilight landfall is considered reasonably safe in adverse weather.
- Small vessels may enter the lagoon through Saleh Magu Channel (2.500) passing clear of the dangers surrounding Kodi Point (2.501) and those in the mouth of the channel (2.500).
- 2 The current in the vicinity of Kodi Point always sets onto Minicoy Island.
- 3 Within the lagoon, course should be shaped to keep about 3 cables off the peninsula shore and in about 6 m of water; in addition to the rock with 0.6 m of water over it, about 6 cables SW of Kodi Point, there are several isolated rocks and shoals also shown on the chart.
- Local knowledge is essential for safe navigation.

**Anchorage****2.506**

- 1 Small vessels may obtain anchorage, within the lagoon, off the town of Minicoy (8°17'1N, 73°03'9E).
- 2 Except for small vessels, the island offers no suitable anchorages for the seabed rises steeply towards the reef. But during the SW monsoon ships may drift safely under power, in fairly calm water, close offshore E of the island.

**Nine Degree Channel***Chart 2738***General information****2.507**

- 1 Nine Degree Channel (9°10'N, 73°00'E) separates Minicoy Island (2.490) and Cannanore Islands (2.488); the channel is about 100 miles wide, very deep and free from charted dangers.
- 2 Investigator Bank (8°32'N, 73°17'E), with a depth of 157 m, lies 17 miles NE of Minicoy Island. An unnamed area in the vicinity of 9°27'N, 74°42'E has isolated depths of 154 and 235 m.
- For passage through this channel the chart is sufficient guide.

## Suheli Par

Chart 2738

### General information

#### 2.508

- 1 **Position.** Suheli Par (10°04'N, 72°17'E) is the S atoll of Lakshadweep.

**Description.** The atoll consists of a drying barrier reef enclosing a lagoon in which lie two islets. For a general description see 2.479.

- 2 **Landmark:**

Cheriyakara Islet Lighthouse (white metal column, red bands, 37 m in height) (10°02'N, 72°17'E), stands on Cheriyakara Islet (South Islet).

- 3 **Major light:**

Cheriyakara Islet Light—as above.

#### Other aid to navigation

Racon at Cheriyakara Islet Light—as above.

For details see *Admiralty List of Radio Signals Volume 2*.

- 4 **Useful mark:**

Valiyakara Islet Light (white wooden framework tower, 12 m in height) (10°08'·2N, 72°19'·7E), stands on Valiyakara (North Islet).

- 5 **Lagoon entrances.** There are two openings on the NW side of the barrier reef which can be entered by small vessels not exceeding about 1·8 m draught; but local knowledge is necessary.

**Anchorage.** Good anchorage has previously been found in a depth of 12 m, sand, with the N end of Valiyakara Islet bearing 163° and the S end of Cheriyakara Islet bearing 201°.

## Kalpeni Atoll

Chart 705 plan of Kalpeni and Cheriyam Islands

### General information

#### 2.509

- 1 **Position.** Kalpeni Atoll (10°06'N, 73°39'E) is the SE atoll of Lakshadweep.

**Description.** The atoll consists of two narrow, low islands standing on the E side of a reef enclosing a lagoon. For further description see 2.479.

Kalpeni Island, the S and larger island, is densely covered with coconut palms believed to be about 30 m high.

Cheriyam Island, the N island, is also covered with palm trees.

- 2 **Industry.** Coconuts and coir rope, made from the coconut fibre, are exported to the mainland of India.

**Depths.** The barrier reef is steep-to and the sea breaks heavily on it, particularly around Cheriyam Island. A steep-to bank with depths between 10 and 20 m extends about 5 cables S from the S end of Kalpeni Island; a similar bank extends N from the N end of Cheriyam Island.

**Tidal streams.** North of Cheriyam Island the in-going stream sets NW and the out-going NE, each with a rate of about 1 kn.

#### 2.510

- 1 **Landmarks:**

Kalpeni Island Lighthouse (white round stone tower, black bands, 41 m in height) (10°04'·9N, 73°38'·9E), stands on Kalpeni Island about 1½ miles N of its S extremity.

Bungalow (10°04'·2N, 73°38'·9E).

Mosque (3 m in height) (10°03'·5N, 73°38'·4E).

- 2 **Major light:**

Kalpeni Island Light—as above.

- 3 **Lagoon.** Depths within the lagoon are generally shallow and much of its S part dries; less water than charted was reported in 1991.

A jetty is situated on the W side of Kalpeni Island, about 3½ cables SSW of Kalpeni Light.

There is a boat channel leading into the lagoon in the vicinity of Cheriyam Island, for which, local knowledge is required.

- 4 **Anchorage** may be obtained about 7 cables N of Cheriyam Island in a depth of 9 m, sand and coral, as shown on the chart.

In March, anchorage has been previously obtained S of Kalpeni Island, about 3½ cables offshore, in a depth of 12·8 m, coral and rock.

- 5 **Landing** is sometimes possible on the E side of Kalpeni Island in the vicinity of the bungalow mentioned above.

## Kavaratti Island

Charts, 705 plan of Kavaratti Island, 2738

### General information

#### 2.511

- 1 **Position.** Kavaratti Island (10°34'N, 72°38'E) lies about 30 miles NE of Suheli Par (2.508) from which it is separated by a channel that is deep and free from charted dangers.

- 2 **Description.** The island, which occupies the SE side of the atoll, is low lying and densely covered with coconut palms about 27 m high; the lagoon on the NW side is enclosed by a barrier reef which lies almost parallel to the island about 6 cables offshore. For further description see 2.479.

The Administrator for Lakshadweep resides on Kavaratti; the island is more heavily populated in its N part.

- 3 **Industry.** Coconut mats and coir ropes are exported to the mainland of India.

**Depths.** The island and barrier reef are steep-to except at their SSW ends where a bank, about 5 cables wide, with depths of less than 50 m extends 7 cables from shore.

- 4 **Offshore buoy.** A fish aggregating device light-buoy (special) lies in deep water 1¼ miles SSW of the S end of the island.

**Traffic.** In 2003, the island was visited by one vessel with a dwt of 179.

**Tidal streams.** In October, near the island, the in-going stream was observed to set SE and the out-going NW; each with a rate from ½ to 1 kn.

#### 2.512

- 1 **Landmarks:**

Kavaratti Island Lighthouse (white concrete tower, 38 m in height) (10°33'·7N, 72°38'·9E), stands on the SE point of the island.

Port Office (10°34'·5N, 72°38'·8E), stands on the NE point of the island.

- 2 **Major light:**

Kavaratti Island Light—as above.

#### Other aid to navigation

Racon at Kavaratti Island Light—as above.

For details see *Admiralty List of Radio Signals Volume 2*.

- 3 **Useful mark:**

Light-beacon (white round concrete tower, black bands) (10°34'·8N, 72°38'·5E), stands near the E extremity of the barrier reef.

#### 2.513

- 1 **Lagoon.** Depths within the lagoon are generally shallow and there are large areas of isolated rocks in its NW and SW parts.



There are two jetties situated on the N part of the NW side of the island.

- 2 A boat channel leads into the lagoon from its NE end. The channel is marked, on the W side of its entrance, by the light-beacon (described above) and by two light-beacons (lateral), shown from September to May, situated close SE of the entrance; thence, the channel between the reef and the shoal water fringing the island is marked by light-buoys. Local knowledge of the channel is required before entry.

- 3 **Anchorage.** During the NE monsoon and in fair weather, anchorage can be obtained on the shoal which extends SSW from the S end of the island, in depths of from 7 to 15 m, sand and coral, as shown on the chart.

**Mooring.** A buoy is laid off the SE point of the island.

**Development.** In 1992 it was reported that development of the N end of the island was planned. The project will provide two breakwaters and an L-shaped jetty, with limited maintenance facilities, for 2 catamaran inter-island ferries.

### Pitti Islet

Chart 2738

#### General information

##### 2.514

- 1 **Position.** Pitti (10°47'N, 72°32'E), a small islet, lies about 14 miles NNW of Kavaratti (2.511).
- Description.** The islet is low lying and has been previously observed to be without vegetation but had several stone cairns, about 6 m in height, standing upon it; the N and NE sides are sandy and there is a black rock on its E side.
- 2 **Depths.** The island lies on a bank of sand and coral, with a maximum width of 11 miles, that extends about 3 miles S and 24 miles NNE of it to Amimi Island (2.524); depths over this bank, which has not been fully examined, may be less than charted.
- 3 **Landing** is only possible on the N side of Pitti and then is only practicable during good weather.

### Agatti Island

Chart 2738

#### General information

##### 2.515

- 1 **Position.** Agatti Island (10°51'N, 72°12'E) lies towards the SW end of an unnamed atoll about 20 miles WNW of Pitti (2.514).
- 2 **Description.** The island, orientated NNE/SSW, is about 4 miles long and narrow; a clump of coconut palm trees stands about 1 mile from its S end. The small uninhabited islet of Kalpitti lies close SSW of the island.
- The coral barrier reef which surrounds Agatti and Kalpitti extends about 2 miles offshore on the W side and encloses a lagoon; for further description see 2.479.
- 3 A bank, with a least charted depth of 7.9 m, connects Agatti with a group of islands on the N part of this unnamed atoll. The principal islets of this N group are Bingaram, 6 miles NE of Agatti, with Tinnakara 1½ miles E of Bingaram. These two islets are encircled, except for the E extremity of Tinnakara, by a reef, the lagoon of which has on its W side numerous coral heads with depths of less than 1 m over them and much of it dries. The Parali Islets, three small sand cays, lie at the NE corner of the reef close N of the E extremity of Tinnakara.

- 4 **Industry.** The main produce of Agatti is coconuts; there are a few sheep and goats on this island.

**Depths.** Agatti Island and its barrier reef are generally steep-to but there are banks, at the S and N ends of the island, where depths of less than 10 m extend 5 cables S of Kalpitti and the same distance N of Agatti.

##### 2.516

- 1 **Landmark:**

Agatti Island Lighthouse (white framework tower, 30 m in height) (10°52'5N, 72°12'3E), stands near the NE point of the island.

##### Useful mark:

Tinnakara Islet Light-beacon (10°56'6N, 72°19'0E), stands near the SW point of the islet.

- 2 **Lagoon.** Depths in the lagoon off Agatti are shallow but it may be entered through a passage located 2½ miles SW of the N end of Agatti, with the clump of coconut palm trees (see above) bearing 142°; local knowledge of this entrance is considered essential.

##### 2.517

- 1 **Anchorage.** Good anchorage can be obtained on the bank between Agatti Island and Bingaram Islet; the area is apparently free from charted dangers but vessels should proceed with caution. The recommended anchorage is with the NE extremity of Agatti bearing 215°, distant 1½ miles, in a depth of about 13 m, coral.
- 2 Good anchorage may also be obtained, during the NE monsoon, on the W side of the atoll towards its N end with the N point of Bingaram bearing 078°, distant 3½ miles, in a depth of 10 m, coral; but noting the dangerous rock lying 2 miles WSW of the islet.
- 3 **Landing** can be effected on the NW side of Agatti Island on a steep-to beach. It is also possible to land on the barren islets of Bingaram and Tinnakara.
- Facilities:** small hospital; post office.
- 4 **Communication:** except during the approximate four months of the SW monsoon, there is communication with Calicut (5.135) and Mangalore (6.27) by sea.

### Androth Island

Chart 705 plan of Androth Island

#### General information

##### 2.518

- 1 **Position.** Androth (10°48'5N, 73°41'0E) is the NW island of the southern group of Lakshadweep.
- 2 **Description.** The island is about 2½ miles long and 8 cables wide at its widest point; it is orientated E/W and is the most fertile island of Lakshadweep, being densely planted with coconut palms.
- The island is surrounded by a coral reef upon which the sea breaks heavily, particularly off its W end.
- 3 The main village is situated on the N coast about 1 mile from the W end, but the population spreads along much of the entire coastline; there is a leper colony near the NW corner of the island.
- For details of administration see 2.477.
- 4 **Depths.** The S side of the reef that surrounds the island is steep-to but from the N side a coral bank, with depths between 10 and 33 m over it, extends about 6 miles N and has a greatest width of about 9½ miles. There are several isolated shoal patches in the vicinity of the N side of the island within the 10 m depth contour.
- Caution – offshore shoals.** A detached shoal, reported in 1975 to have a depth of 13.3 m over it, lies about 6½ miles ENE of the E end of the island. A further

detached shoal, with a depth of 27.5 m over it, lies 6 miles NW of Androth West Light (2.519).

### 2.519

#### 1 Landmarks:

Androth Island East Lighthouse (white square masonry tower, black bands, 33 m in height) (10°48'8N, 73°42'1E), stands near the E end of the island.

Red house (18 m in height) (10°48'9N, 73°41'8E).

Flagstaff (12 m in height) (10°48'9N, 73°40'5E)

which stands close N of a small red-roofed mosque at the W end of the village.

#### 2 Major lights:

Androth Island East Light—as above.

Androth Island West Light (white concrete column, 10 m in height) (10°48'8N, 73°39'7E), stands near the NW corner of the island.

#### 3 Other aid to navigation

Racon at Androth Island East Light—as above.

For details see *Admiralty List of Radio Signals Volume 2*.  
**Radar landfall.** It was reported (1990) that Androth may be identified by radar, from E, at a distance of 18 to 20 miles.

### 2.520

- 1 **Anchorage** may be obtained anywhere off the N side of Androth about 5 cables offshore in depths of about 10 m, sand and coral. Anchorage can also be obtained off the E end of the island, where the bottom appears to be smoother, in depths of from 16 to 18 m.

Good anchorage can be obtained, as shown on the chart, about 7 cables N of the flagstaff (described above) in a depth of 10 m, coarse sand and broken shells.

- 2 During the NE monsoon vessels may anchor off the SW side of the island, with its NW point bearing about 022° and its S point bearing about 089°, in depths from 18 to 22 m; but the shelter here is limited.

Local knowledge is necessary for the above anchorages.

- 3 **Landing** can be effected on the N side of Androth, abreast the village, in a small bay about 1 cable E of the flagstaff (described above); access to the landing is through a channel in the reef which is suitable only for small boats.

**Repairs:** construction and repair facilities for small sailing vessels is available.

**Facilities:** small hospital, post office.

**Supplies:** brackish water with a high lime content.

### Off-lying bank and shoals

*Charts 1564, 2738*

### Elikalpeni Bank

#### 2.521

- 1 Elikalpeni Bank (11°16'N, 74°03'E) lies 35 miles NE of Androth Island (2.518) from which it is separated by a channel that is very deep and free from charted dangers. This bank, which was examined in 1953, is about 5 miles in extent and composed of sharp coral rocks having general depths of 13 to 16 m with a least charted depth of 10.4 m near its SE edge; it is steep-to on all sides with depths falling rapidly to about 2000 m.

- 2 An isolated shoal with a depth of 49 m, was reported in 1949, to lie approximately 3 miles NW of Elikalpeni Bank.

A group of shoal patches with depths from 18.3 to 33.0 m, lies between 16 and 24 miles ENE and E of Elikalpeni Bank; as shown on the chart. Some of these patches are unexamined and others are of doubtful existence.

- 3 It was reported in 1971 that a shoal patch with a depth of 34 m exists in position 12°00'N, 74°12'E.

## LAKSHADWEEP—NORTHERN GROUP

### General information

*Chart 2738*

### Area covered

#### 2.522

- 1 The islands comprising the N group of Lakshadweep, known as Amindivi Islands, consist of Amini (2.524), Kadmat (2.526), Kiltān (2.529), Chetlat (2.531) and Bitra Par (2.533); the off-lying reefs and banks in the area are also described.

### Atolls

#### 2.523

- 1 A general description of the islands and atolls is given at 2.479.

### Amini Island

*Charts 705 plan of Amini Island, 2738*

### General information

#### 2.524

- 1 **Position.** Amini Island (11°07'5N, 72°43'5E) lies at the NE end of the bank which extends NNE from Pitti (2.514).

**Description.** Amini is the principal island of the Amindivi Islands. The village is situated in the middle of the W side of the island, but the population spreads over much of the entire island.

- 2 **Tidal streams** W of the island set SW when in-going and SE when out-going, attaining a rate of about ¾ kn.

#### Useful mark:

Amini Island Light (black metal framework tower, white bands, 30 m in height) (11°06'7N, 72°43'2E) stands on the S point of the island; its position is approximate.

#### 2.525

- 1 **Anchorage.** During the NE monsoon anchorage can be obtained off the W side of Amini, in depths of 7 to 15 m; it should be noted that seaward of the 20 m depth contour depths increase rapidly.

- 2 The recommended anchorage is abreast the village, with the S point of the island bearing 137° distant 11 cables, in a depth 15 m, coral, as shown on the chart.

A small vessel has previously anchored, with the landing (described below) bearing 107° and about 4¾ cables from shore, in a depth of 9.1 m.

- 3 **Landing.** In front of the village there is believed to be a raised stone platform with steps leading down to the beach; behind the platform is a stone pillar and fronting the platform a narrow passage across the reef, suitable for small boats, is marked by stone posts. Local knowledge and considerable caution is required when using this landing.

- 4 **Facilities:** small hospital; post office.

### Kadmat

*Charts 705 plan of Amini Island, 2738*

### General information

#### 2.526

- 1 **Position.** Kadmat Island (11°14'N, 72°47'E) lies ¾ miles NNE of Amini Island (2.524) from which it is separated by a channel, with a fairway about 6 cables wide

near its centre, that is very deep and free from charted dangers.

- 2 **Description.** The island is about 5 miles long, orientated NNE/SSW, with a maximum width of 3 cables; it lies on the E side of a coral atoll. The ends of the island are covered by a low growth of scrub. There is a village in the centre of the island.

The coral atoll extends, nearly parallel with the island, up to about 1 mile off its W side; it also surrounds both the N and S ends of the island extending about 7½ cables S and 2¼ cables N; the E coast is generally steep-to. For further description see 2.479.

- 3 **Offshore mark:**

Stranded wreck (11°14'·5N, 72°46'·0E) lies on the reef 1¾ miles SW of the N end of the island.

- 4 **Useful mark:**

Kadmat Island Light (white framework tower, 30 m in height) (11°15'·4N, 72°47'·4E), stands at the N end of the island. Another framework tower is reported to lie 1½ miles SSW.

### 2.527

- 1 **Lagoon.** Depths within the lagoon are shallow and much of it dries. There are two narrow boat passages into the lagoon through the reef, both are marked on each side by a stone post; one passage is situated at the N end of the atoll, and the other 3 miles SSW of the N end.

- 2 **Anchorage.** In fine weather anchorage can be obtained off the reef S of Kadmat, in depths of 8 to 20 m, between 2 and 5 cables from the reef.

Small vessels can anchor off the N boat passage (described above) in a depth of 31 m about 2 cables from the reef; local knowledge is necessary.

- 3 **Facilities:** small hospital; post office; police station.

## Peremul Par

Chart 2738

### General information

#### 2.528

- 1 **Position.** Peremul Par (11°09'N, 72°03'E), an atoll, lies 18 miles NNW of Agatti (2.515) from which it is separated by a channel that, when clear of the reefs surrounding the atoll and the island, is deep and free from charted dangers.

- 2 **Description.** Peremul Par consists of a narrow drying reef enclosing a lagoon; it has been previously reported that a sand cay, 1 m high, stood near the NE end of the reef. At high water with a smooth sea much of the reef does not break, making the edge of the reef difficult to distinguish. For further description see 2.479.

- 3 **Lagoon.** Within the reef and extending towards the centre for about 7½ cables from its SW and N sides there is a flat with depths of less than 1·8 m over it; the remainder of the lagoon is encumbered with drying coral reefs which have depths from 1·8 to 11·0 m between them.

There are several good boat entrances into the lagoon through its E side and two through its W side.

- 4 **Anchorage** can be obtained on the SW side of Peremul Par, abreast the boat entrances to the lagoon, about 3 cables offshore in a depth of 18 m; local knowledge is necessary here, and also for another anchorage off the NE side of the reef, with the sand cay bearing 213° distant 4½ cables, in depths of from 18 to 22 m.

## Kiltān Island

Charts 705 plan of Kiltan Island, 2738

### General information

#### 2.529

- 1 **Position.** Kiltān Island (11°29'·0N, 73°00'·5E) lies 19 miles NE of Kadmat Island (2.526) from which it is separated by a channel that is deep and free from charted dangers.

- 2 **Description.** Kiltān is densely covered with coconut palms about 27 m high. A reef fringes the W side of the island and extends up to 3½ cables from it, forming a lagoon, with shoal water extending 1½ cables farther W; rocks and foul ground fringe much of the rest of the island and shoal water extends about 3 cables from its N and 2 cables from its S ends. Along the middle of the E side a stretch of steep-to sandy beach breaks the fringing foul ground. For further description see 2.479.

- 3 **Landmark:**

Kiltān Island South Lighthouse (white round stone tower, red bands, 41 m in height) (11°28'·2N, 73°00'·5E) stands near the SW end of the island.

- 4 **Major light:**

Kiltān Island South Light—as above.

#### Useful mark:

Kiltān Island North Light (white round concrete tower, 9 m in height) (11°29'·8N, 73°00'·0E) stands near the NW end of the island.

**Radar landfall.** It was reported (1989) that Kiltān may be identified by radar, from E, at a distance of 21 miles.

#### 2.530

- 1 **Lagoon.** Depths within the lagoon are generally shallow and much of its S part dries.

A boat passage leads through the NW part of the reef into the lagoon where there is a jetty on the W side of the island; another gap in the reef, about 7 cables S of the boat passage, is sometimes smoother. Each opening is marked by buoys (port and starboard hand) from September to May.

- 2 **Anchorage.** Off Kiltān anchorage is available but only in fair weather conditions. In adverse weather the swell conditions in the anchorages described below tend to be far more severe than those prevailing farther offshore.

The best position to anchor is reported to be with Kiltān Island North Light, described above, bearing 129° distant 5½ cables, in depths of about 9 m, fine sand and coral; during S winds vessels should anchor a little closer inshore. Vessels anchoring should keep well clear of a dangerous wreck, the position of which is approximate, which lies 2 cables N of the light.

- 3 Anchorage can also be obtained off the S end of the island, if the swell is not too heavy, about 3½ cables offshore in depths of 9 to 11 m, fine sand and coral.

- 4 **Landing.** During smooth weather conditions good landing may be made on the E side of the island, about its middle, where the beach is sandy and steep-to; it should be noted that breakers occur on the N and S parts of this side of the island.

- 5 **Supplies:** water is obtainable from wells but it is brackish with a very heavy lime content.

## Chetlat Island

Charts 705 plan of Chetlat Island, 2738

### General information

#### 2.531

- 1 **Position.** Chetlat Island (11°41'·5N, 72°43'·0E), the N-most island of the Amindivi Islands, lies 21 miles NW of



Kiltān Island (2.529) from which it is separated by a channel that is deep and free from charted dangers.

- 2 **Description.** Chetlat is wooded with coconut palms. A reef fringes the S and W sides of the island extending up to 5 cables from its W side forming a lagoon, with shoal water and some isolated rocks extending about 3½ cables farther seaward; rocks and foul ground fringe much of the E side of the island which is otherwise steep-to. For further description see 2.479.

- 3 **Industry.** The staple product is coconuts; coir is made and exported to the mainland of India together with limestone and coral.

- 4 **Useful mark:**

Chetlat Island Light (white framework tower, black band, 30 m in height) (11°41'·8N, 72°43'·1E) stands about 3 cables S of the N end of the island; the position of the light is approximate.

- 5 **Radar landfall.** It was reported (1989) that Chetlat may be identified by radar, from E, at a distance of 19½ miles. 2.532

- 1 **Lagoon.** Depths within the lagoon are shallow with numerous isolated rocks. Local knowledge of the lagoon and its entrances is essential before an entry is attempted.

A jetty is situated within the lagoon on the W side of the island near its mid-point and close N of the main village.

- 2 **Anchorage** can be obtained, in fine weather, on the shoal areas extending SSW from the S end and NNW from the N end of Chetlat.

- 3 During the NE monsoon the best anchorage is off the S end of the island, about 4 cables offshore, with the SW end of the barrier reef bearing about 345° and the SW and SE points of Chetlat bearing about 010° and 039° respectively, in depths of from 11 to 18 m, as shown on the chart. However, it has been reported that the SW end of the barrier reef does not provide a good mark; also, it was noted in January, that a vessel anchored close N of the charted anchorage lay across the anchor cable during both the in-going and out-going streams.

- 4 **Landing** is possible on the S side of the island near its SE point. In this vicinity there are depths of about 2·1 m at high water and 1·2 m at low water; it is advisable to employ a local boat for this operation.

**Facilities:** small hospital; post office.

- 5 **Supplies:** water is obtainable from wells but it is brackish with a very heavy lime content.

### Bitra Par

Chart 2738

#### General information

#### 2.533

- 1 **Position.** Bitra Par (11°33'N, 72°10'E), an atoll, lies 33 miles WSW of Chetlat Island (2.531) from which it is separated by a channel that, when clear of the reefs surrounding the atoll and the island, is deep and free from charted dangers.

- 2 **Description.** The atoll encloses a lagoon; the barrier reef, which dries from 0·3 to 0·9 m, is narrow on the W and N sides but wider on its E and S sides.

Bitra Islet (Tree Islet) is situated near the NE point of the atoll. It is about 5 cables long orientated NW/SE and about 1 cable wide. Two sandy cays previously stood on the E part of the reef S of Bitra Islet; the sand dries in patches between these cays.

- 3 **Tidal streams** set strongly into and out of the lagoon at spring tides; care is therefore necessary for vessels

navigating in the vicinity of the atoll and particularly when approaching the anchorage or entering the lagoon.

- 4 **Useful mark:**

Bitra Islet Light (white metal framework tower, red bands, 30 m in height) (11°35'·8N, 72°11'·4E) stands on Bitra Islet.

- 5 **Lagoon.** The depth within the lagoon is from 5 to 7 m; but there are many coral reefs, awash or drying, lying within it especially towards its S end.

An opening in the reef close S of Bitra Islet through which boats can enter has depths of about 2·7 m. Local knowledge is essential before an entry is attempted.

Turtle may be found on this atoll.

- 6 **Anchorage** for small craft may be obtained abreast the opening S of Bitra Islet (described above), with the NE end of the islet bearing 335° distant about 6 cables, in a depth of 19·2 m.

There is no known safe anchorage for a large vessel.

### Reefs and banks at north end of Lakshadweep

Chart 2738

#### Byramgore Reef

#### 2.534

- 1 **Position.** Byramgore Reef (Chereapani Reef) (11°55'N, 71°47'E) lies 25 miles NW of Bitra Par (2.533) from which it is separated by a channel that, when clear of the reefs surrounding the atolls, is deep and free from charted dangers.

- 2 **Description.** The reef is below water except for its SE point which dries. There are shoal depths all around this reef; but the shoal area on the N side, about 3 miles wide with charted depths of from 7·3 to 15·0 m, is indicated by overfalls. The latter area should be avoided because it is encumbered with coral rocks, which can be seen plainly from a vessel passing over them, and it may be shoaler than charted. The coral rocks forming the reef are also discernable at low water.

- 3 **Tidal stream and current,** for details see 2.536 and 2.537.

#### Useful marks:

A beacon (2 m in height) (11°50'·0N, 71°49'·5E) stands near the SE end of the reef; a light-buoy (white, conical) is moored about 1 mile N of the beacon.

A stranded wreck (11°55'·5N, 71°48'·0E) lies on the E side of the reef near its mid-point.

#### Cherbaniani Reef

#### 2.535

- 1 **Position.** Cherbaniani Reef (Beleapani Reef) (12°21'N, 71°53'E) is the N-most dangerous reef of Lakshadweep. It lies 17 miles NNE of Byramgore Reef (2.534) from which it is separated by a channel that, when clear of these reefs, is deep and free from charted dangers.

- 2 **Description.** The NW, N and E sides of Cherbaniani Reef are steep-to, but from its S and W sides a bank extends about 1 mile seaward of the reef.

- 3 A sand cay, with an islet and some sandbanks on its N and E sides, lies on the SE part of the reef; the remaining greater part of the S end of the reef is only visible about the time of low water; there is a small low islet at the NW extremity of the reef. In 1990 some signs of permanent habitation were reported.

There are apparently some boat passages leading into the lagoon.

- 4 **Tidal stream and current,** for details see 2.536 and 2.537.



5 **Aid to navigation:**

A buoy (white, conical) (12°21'·3N, 71°51'·3E) is moored close off the W side of the reef; the position of the buoy is approximate.

6 **Radar landfall.** It was reported (1989) that the reef may be identified by radar, from NNW, at a distance of 8 miles.

**Anchorage** for small craft may be obtained during the NE monsoon, on the bank (described above) which extends S and W from the reef, in depths of from 16 to 18 m.

**Tidal streams****2.536**

- 1 Tidal streams near Byramgore Reef (2.534) and Cherbaniani Reef (2.535) set NE when in-going and SW when out-going; the latter stream being the stronger and running from 8 to 10 hours at springs, during the NE monsoon, when the drain of current runs with it. Also, during this season, the in-going stream is scarcely perceptible although the regular rise and fall of tide is visible on the reefs.

**Current****2.537**

- 1 The current near Byramgore Reef (2.534) and Cherbaniani Reef (2.535) frequently sets 12 to 15 miles during a 12 hour period in uncertain directions, especially during the unsettled weather conditions experienced at the change of monsoons; the direction is usually between SE and SW during the months of March and September and NW in November to January.

**Discoloured water****2.538**

- 1 Two patches of discoloured water, light greenish-brown in colour, were reported previously to lie about 5 cables apart in the vicinity of 12°10'N, 73°21'E.

**Bassas de Pedro****2.539**

- 1 Bassas de Pedro (Padua Bank or Munyal Par) (13°00'N, 72°23'E) is a large steep-to bank with depths from 16·1 to 62·0 m over it, sand, shells and decayed coral; the water on this bank is not discoloured.

**Sesostris Bank****2.540**

- 1 Sesostris Bank (13°09'N, 71°58'E), consisting of coral, sand and shell, is steep-to with depths from 20·1 to 56·0 m over it.

**Cora Divh****2.541**

- 1 Cora Divh (13°42'N, 72°10'E), a bank which is steep-to with depths from 27·5 to 51·0 m over it, consists of sand, decayed coral and broken shells.
- 2 There are some off-lying patches on the E and W sides of the bank, as shown on the chart. The patch with the least charted depth of 23·5 m lies about 14 miles ENE of the S end of Cora Divh and a patch of discoloured water has been reported to lie close off the NE side of the bank.





## CHAPTER 3

## SOUTH AND EAST COASTS OF SRI LANKA; PALK STRAIT AND PALK BAY

## GENERAL INFORMATION

*Charts 813, 1583, 1584, 828*

**Scope of chapter****3.1**

- 1 The area covered by this chapter comprises the S and E coasts of Sri Lanka, Palk Strait and Palk Bay, entered between Point Pedro (9°50'N, 80°15'E) and Point Calimere 36 miles NW, which includes the NW coast of Sri Lanka and a part of the E coast of India.

The chapter describes, together with the appropriate anchorages and small open roadstead ports:

- 2 The passages and routes, both inshore and offshore (to seaward of Great Basses Reef and Little Basses Reef), along the S coast between Rassamunai Point (5°57'N, 80°25'E) and Little Basses Reef (6°24'N, 81°44'E).  
The passage along the E coast between Little Basses Reef and Trincomalee.
- 3 Trincomalee Harbour (8°33'N, 81°13'E).  
The route between Trincomalee and Point Pedro (9°50'N, 80°15'E), including the offshore passage to the Bay of Bengal.  
The routes through Palk Strait.  
Palk Bay, together with its shallow-water harbours.

**Topography****3.2**

- 1 The mountainous district of Sri Lanka occupies the S central part of the island, the higher peaks being generally veiled in haze, particularly during the SW monsoon. Between the mountains and the S and E coasts lies a hilly plain, the hinterland of the NE coast is practically flat. Sri Lanka is covered generally in dense tropical forest and jungle, apart from significant areas given over to open grassland, agriculture and plantations.
- 2 The coastline is generally low and straight, with some small bays, particularly in the S, and with many lagoons close inland, especially on the E and NE coast. Coconut palm trees, occasional low rocky outcrops and sandy beaches predominate.

**Positions****3.3**

- 1 Positions obtained from adjoining charts and from charts of different scales may differ; the mariners attention is drawn to notes on charts.

**Piracy and terrorism****3.4**

- 1 A number of incidents of piracy or attempted piracy have occurred off the coast, including well offshore, of N and NE Sri Lanka.  
Acts of terrorism with loss of life have occurred in the N part of Sri Lanka in Trincomalee Harbour (3.116) and the waters off Point Pedro (3.184).

For possible preventative measures see 1.56.

**Traffic Separation Scheme****3.5**

- 1 A TSS and associated inshore traffic zone is established S of Dondra Head (5°55'N, 80°35'E). See 3.14.

**Natural conditions****3.6**

- 1 **Tidal streams.** Apart from Trincomalee Bay, Palk Strait and Palk Bay, tidal streams are insignificant. Comment for those areas affected may be found in the relevant sections.
- 2 **Currents.** The current experienced largely depends on the distance from the coast and the monsoon season, which together with the circulations in the Bay of Bengal, are the principal driving factors. The currents are often strong, variable in direction, abrupt, and unpredictable, especially during the periods of monsoon change.
- 3 Careful attention to the current being experienced, the remarks in the appropriate sections of this chapter and the notations on the charts is advised. See also 1.167.

**Climate and weather****3.7**

- 1 For climate and weather see 1.178.

**Regulations****3.8**

- 1 **Navigational restriction.** The Sri Lankan authorities have declared a prohibition on all vessels using the Palk Strait and eastern territorial waters of Sri Lanka without prior permission from the Sri Lankan Naval Command. This is due to continued terrorist activity, see 1.56.
  - 2 **Navigational control.** For regulations controlling navigation in the territorial waters of Sri Lanka see 1.42; and for India see 1.39.
- Security zone.** For the security zone established between Sangama Kanda Point (3.79) and Point Pedro (3.184) see 1.80.

**Firing practice areas****3.9**

- 1 Firing practice areas are centred 17 miles NE and 23 miles ESE of Trincomalee Harbour (8°33'N, 81°13'E). see 1.7.

**Shelter****3.10**

- 1 Apart from Trincomalee, there are no completely sheltered harbours on the coast covered by this chapter. The many anchorages along the coast, some of which serve small open roadstead ports, are all, with few exceptions, dependent on the seasonal monsoon direction for their safety.
- 2 In over 500 miles of coastline the only alongside berths for ocean-going vessels are at Trincomalee, which has a very limited number, and 1 berth at Kankesanturai Harbour (9°49'N, 80°02'E).

**Navigational lights****3.11**

- 1 Lights may be found to be extinguished in parts of Sri Lanka, in particular in Palk Strait and its environs. For details, see *Admiralty List of Lights and Fog Signals Volume F*.



## RASSAMUNAI POINT TO LITTLE BASSES REEF

### RASSAMUNAI POINT TO NILEWELLI POINT

#### General information

*Charts 3265, 813*

#### Route

##### 3.12

- 1 From a position S of Rassamunai Point (5°57'N, 80°25'E) to a position S of Nilewelli Point the route leads about 18 miles ESE and E through the TSS (3.14) S of Dondra Head, or via the Inshore Traffic Zone if appropriate.

#### Topography

##### 3.13

- 1 The coastline is slightly indented with bays, interspersed with rocky outcrops and headlands. The shore is generally low-lying, particularly at the heads of the bays which often have coconut palms fronted by sandy beaches. The rocky headlands and cliffs, frequently of a red colour, are only of a very moderate height. Parts of the coast are densely wooded with coconut palms, other isolated areas appear quite barren.

#### Traffic Separation Scheme

##### 3.14

- 1 A TSS is established S of Dondra Head (5°55'N, 80°35'E) (3.20), orientated E–W, with an Inshore Traffic Zone between Dondra Head and the W-going traffic lane. For details see the chart. The scheme is IMO-adopted and Rule 10 of the *International Regulations for Preventing Collisions at Sea* (1972) applies.

#### Currents

##### 3.15

- 1 Currents within 2 miles of the coast and W of Dondra Head (3.20) are irregular; there is often an indraught into Matara Bay (3.28).
- 2 The currents E of Dondra Head are generally weak and set parallel with the coast. During the survey, in 1908–1909, the currents were found to be weak and, although sometimes variable in direction, to set generally with the prevailing wind. The greatest rate observed was less than 1 kn; the average rate was ½ kn.
- 3 Currents farther offshore; a report (1994) from sea indicated a W-going current during the NE monsoon of between 1 and 3 kn whilst on passage S of Sri Lanka. See also 3.6.

#### Principal marks

##### 3.16

#### Landmarks:

- 1 Hindelnattu (mountain) (6°07'N, 80°24'E). Fronted by gradual slopes, the mountain has a large rounded summit and a small pointed shoulder on its NE flank; an excellent landmark all round the S and SW coasts.
- 2 Gongola (mountain) (6°26'N, 80°34'E). In clear weather the mountain is visible above the intervening hills.  
Dondra Head Light (white 8-sided tower, 49 m in height) (5°55'N, 80°35'E).
- 3 Waulugalakanda (a hill with a bare summit) (6°01'N, 80°42'E). The hill forms a good mark for vessels coasting but, because of other hills behind it, shows up less well to vessels farther offshore.

#### Major light:

Dondra Head Light—as above.

#### Other aid to navigation

##### 3.17

- 1 Racon (5°55'N, 80°35'E), at Dondra Head Light.  
For details see *Admiralty List of Radio Signals Volume 2*.

#### Directions

(continued from 4.17)

*Charts 3700 and plan of Weligama Bay, 3265, 813*

#### Rassamunai Point to Dondra Head

##### 3.18

- 1 **Caution.** In depths of less than 9 m the bottom is rocky and uneven; vessels on passage should normally keep in depths over 30 m.

##### 3.19

- 1 **Rassamunai Point to Prinz Heinrich Patch.** From a position S of Rassamunai Point (5°57'N, 80°25'E), with prominent red cliffs either side which reportedly give good radar returns, to a position S of Dondra Head (3.20) the route leads 10 miles ESE, passing (with positions from Rassamunai Point):

- 2 SSW of Palapana Gala (1¼ miles SE), the SW extremity of a reef with above and below-water rocks which extends 5 cables SSW of Mirissa Point (3.23), thence:

- 3 SSW of Prinz Heinrich Patch (3 miles SE), which lies 1¼ miles SSW of Talarambee Point which is rocky and slightly elevated. Close inland a dagoba, elevation 37 m, shows above the tree tops. Kalcotta Rocks, three heads from 0.3 to 0.6 m in height, lie 2½ cables S of the point.

#### Clearing bearings:

- 4 Galgodiya (5°56'N, 80°32'E) (3.20), an islet, in line with Brown's Hill (red triangular patch on its SW slope) (1¼ miles ENE), bearing 074°, clears Prinz Heinrich Patch (3.19) to the S and also dangers, over which the sea always breaks, which extend SE from Kola Point (3.23).
- 5 Mirissa Point (3.23) in line with Hindelnattu (3.16) bearing 347° clears Prinz Heinrich Patch (3.19) to the W.

*Charts 3265, 813*

##### 3.20

- 1 **Prinz Heinrich Patch to Dondra Head.** From a position S of Prinz Heinrich Patch (5°55'N, 80°27'E) the route continues E, passing (with positions from Dondra Head (5°55'N, 80°35'E)):

- 2 S of Atalahua Point (6 miles WNW) which is low and conspicuous with Tanna Rocks, 0.9 to 1.5 m in height, 2½ cables S of it, thence:

- 3 S of Moolkalle Point (5 miles WNW), a rocky point covered in low bushes with a dagoba close W. The point contrasts with surrounding coconut palms. Thence:

- 4 S of Galgodiya (3¼ miles WNW), an islet covered with coconut palms. It is connected with the coast by a causeway in bad repair. Several rocks, two of which are about 2 m high, lie 3 cables S of the islet. Thence:

- 5 S of Madumora Reef (2¾ miles W), with depths of 2 m or less over its N edge and a least depth of 2.7 m near its S edge; entering the E-bound lane of the TSS, or the Inshore Traffic Zone if appropriate, thence:

- 6 S of Sleet Rock (1½ miles WSW) which, together with Madumora Reef, are the outermost dangers in the entrance to Matara Bay (3.28). Thence:
- 7 S of Dondra Head, the S point of Sri Lanka, with Dondra Head Light (3.16) standing 6 cables E. Dondra Head, a low headland with tall coconut trees at its W extremity, which appears as an islet, has been reported to give good radar returns.

### Dondra Head to Nilewelli Point

#### 3.21

- 1 There are no charted dangers to navigation outside a distance of 1¼ miles offshore.
- From a position S of Dondra Head, in the E-bound lane of the TSS (3.14), or in the Inshore Traffic Zone if appropriate, to a position S of Nilewelli Point, the route leads 9 miles E, passing (with positions from Dondra Head):
- 2 S of a detached rocky islet lying close offshore (1½ miles ENE) and S of Gandura Point, a rocky point, (2¼ miles ENE), thence:
- 3 S of Etawa Reef (4½ miles ENE) and Bambri Rocks, above-water rocks, 5 cables farther NE, and off which there are several below-water rocks. Thence:
- 4 S of Nilewelli Point (steep-to, rocky with tall coconut trees, appears as an islet from E or W) (8½ miles ENE). A narrow strip of land, over which the surf washes in a moderate swell, connects the point with the mainland.
- 5 **Clearing bearing.** The W end of the beach in Nuron Cove (5°57'N, 80°37'E) at the head of Gandura Bay (3.31), bearing 271° and open well S of the SW end of Kottagoda Point (3.31), clears S of Etawa Reef.

### Useful marks

#### 3.22

- 1 Beacon (white pyramid, elevation 14 m), about 4½ cables NE of Dondra Head (5°55'N, 80°35'E).  
Banyan tree (elevation 58 m), 1½ miles NE of Dondra Head.  
Banyan tree (elevation 69 m), 2¼ miles NE of Dondra Head.
- 2 White dagoba, 1 mile N of Nilewelli Point (5°58'N, 80°43'E).  
(Directions continue for coastal passage at 3.38)  
(Directions for Weligama Bay are given at 3.24 and for Matara Bay at 3.29)

### Weligama Bay

Charts 3700 plan of Weligama Bay, 3265

### General information

#### 3.23

- 1 Weligama Bay (5°57'N, 80°26'E) lies between Rassamunai Point (3.19) and Mirissa Point (3.23), 1½ miles ESE. The land at the head of the bay is very low and not visible from seaward.
- 2 From Weligama Point, 3 cables NE of Rassamunai Point, a sandy beach fronting coconut palms extends round the head of the bay to the mouth of the Polatu Ganga, 2 miles E. The reef fronting the coast between about 5 cables W and 6 cables N of Rassamunai Point has a few rocky heads above water; the sea always breaks on this reef.
- 3 Weligama is a scattered town on the NW side of the bay.
- Mirissa Point forms the W end of a fairly high peninsula partly covered with coconut palms; Kola Point, 6½ cables SE, is the SE point of the peninsula. A reef, on which the

sea always breaks, with rocks above-water and awash, extends 2 cables SW from the peninsula.

- 4 A sandy bight, with Mirissa village at its head, lies between Mirissa Point and Wera Point (red cliffs, 27 m high), 7½ cables NE.

The E shore of the bay between Wera Point and Kada Point (red cliffs, 22 m in height), the S entrance point of Polatu Ganga (3.23), is mainly composed of moderately high red cliffs.

### Directions

#### 3.24

- 1 **Approach from W.** Vessels should pass at least about 7½ cables S of Rassamunai Point (3.19) to avoid Yala Rock (4.16).
- Approach from E.** Vessels should pass S and W of Prinz Heinrich Patch (3.19). Clearing bearings to avoid the patch are described at 3.19.
- 2 **Caution.** There are many islets and dangers in the bay and a swell from SW may break on any shoal patch with a depth of 5.5 m or less.
- Leading line.** The alignment (352°) of Parei Duwa (rocky islet, 16 m in height, covered in scrub) (5°58'N, 80°26'E) with a gap in the hills to the N leads into Weligama Bay, passing (with positions from Rassamunai Point (5°57'N, 80°25'E)):
- 3 About 2½ cables W of Palapana Gala (1¼ miles SE) (3.19), thence:  
W of Diyumba Alut Rock (1¼ miles ESE), the W extremity of shoals extending W from Mirissa Point (3.23), thence:
- 4 E of Pares Shoal, Sealark Rock and Kada Rock (1 mile ESE), which extend ESE from the reefs fronting Rassamunai Point, thence:  
About 1 cable E of Karamas Rock (9 cables E).
- 5 When NE of Karamas Rock the track leads NW, passing: SW of Prompt Shoal (1 mile ENE) and SW of Puhumodal Rock (1 mile NE).

### Useful marks

#### 3.25

- 1 Weligama Bay Light (grey masonry column, elevation 9 m; used by fishing craft) (8 cables NNE of Rassamunai Point (5°57'N, 80°25'E) (3.19)), on the NW shore of the bay.  
Small white house (elevation about 11 m), (7 cables NNE of Rassamunai Point (5°57'N, 80°25'E), on a cliff point which breaks the beach.

### Anchorage

#### 3.26

- 1 Anchorage may be found, as shown on the chart, in about 10 m, in the SE part of the bay off the village of Mirissa (3.23) with the red cliffs of Kada Point (3.23) bearing 039°, distant 8 cables. When NW of Diyumba Alut Rock (3.24) the track leads ENE for the anchorage. Note that Diyumba Rocks lie 1¼ cables N and NW of the berth.
- 2 A second anchorage may be found SE of Ruwana Rock (1.8 m in height) (6 cables NE of Rassamunai Point), in depths from 9 to 11 m, sand and rock. A rock awash lies close E of Ruwana Rock. Although no reliable information has been obtained, it is probable that the anchorage can be used during the SW monsoon.

### Landing

#### 3.27

- 1 The best landing place is on the SW side of a drying sandy strip which extends SE from the NW shore towards Gan Island (9 cables NNE of Rassamunai Point). Gan

Island, 12 m in height, is planted with coconut palms and is not easily distinguished from the coastal background. Wahu Rock, (drying), lies close SW of the island.

### Matara Bay

Chart 3265

#### General information

##### 3.28

- 1 Matara Bay (5°56'N, 80°33'E), formed by the curve of the coast between Galgodiya (3.20) and Dondra Head (3.20), 3¼ miles ESE, is mostly foul and entirely open to the S.
- 2 Matara, the town at the head of the bay, is of considerable size, being next in importance to Galle in the Southern Provinces. Matara is the residence of an Assistant Government Agent and an important centre for agricultural produce. It is a good example of a former Dutch colonial fortress town.
- 3 Nilwala Ganga flows into the sea, through a small opening in the sand obstructed by rocks, 5 cables NE of Galgodiya.

#### Directions

##### 3.29

- 1 Matara Bay is entered between shoal ground which extends 1¼ miles SE from Galgodiya, the principal feature of which is Madumora Reef (3.20), and shoal ground which extends 1¾ miles W from Dondra Head. Dependent on draught, vessels should keep clear of Sleet Rock (3.20).
- 2 Matara is not easily seen from seaward, although in favourable light, the clock tower, which stands 1 mile NE of Galgodiya, shows up well between bearings 347° and 302°.
- 3 An islet, 12 m high, is connected to the foreshore close E of the clock tower by a causeway on which the sea generally breaks. Prominent red cliffs, the highest 37 m in height, stand about 1 mile farther E and front Brown's Hill (3.19).
- 4 Landings on the beach at Matara or the causeway are seldom safe for ships' boats.

#### Other bays, anchorages and landings

Chart 3265

#### Landing place in the vicinity of Dondra Head

##### 3.30

- 1 The safest place to land is on the N side of the W beach in the first small bay close N of Dondra Head Light (5°55'N, 80°35'E). The bay is rocky and a reef, with sufficient depth for a ship's boat, lies across the entrance. An anchor must be used over the stern to keep the boat from being driven too violently onto the beach by the swell.
- 2 A second bay, close NE, is also sandy and looks more inviting, but is less safe because of the swell and is not recommended.

#### Gandura Bay

##### 3.31

- 1 Gandura Bay (5°56'N, 80°37'E) lies between Gandura Point (3.21) and Kottagoda Point, a rocky headland with boulders, 1½ miles ENE. The village of Kottagoda stands behind a sandy bight fringed by Gull Rocks (above-water), which extend 1½ cables NE of Kottagoda Point.  
The shores of Gandura Bay are fairly high and rocky, and are fringed by a reef, broken for about 5 cables by

Nuroni Cove (3.21) in which there is a sandy beach and coconut palms. Gandura village lies close N of Gandura Point.

- 2 **Landing** may be made at Gandura.

**Anchorage.** There is anchorage in the W part of the Gandura Bay in a depth of 18 m, sand, with Gandura Point bearing 248°, distant 5½ cables, but it is not protected from the swell.

#### Dikwella Bay

##### 3.32

- 1 Dikwella Bay lies 2 miles W of Nilewelli Point (3.21). The village of Dikwella stands close behind the beach. A reef bars the entrance of the bay to boats.

#### Other names

##### 3.33

- 1 Katahella Rock (5°56'N, 80°31'E).  
Veragalle Point (5°56'N, 80°28'E).

### NILEWELLI POINT TO HAMBANTOTA

#### General information

Chart 3265, including plan of Hambantota

#### Route

##### 3.34

- 1 From a position SSE of Nilewelli Point (5°58'N, 80°43'E) the route leads 28 miles ENE to a position SE of Hambantota Point.

#### Topography

##### 3.35

- 1 The coast between Nilewelli Point (3.21) and Hambantota Point, 28 miles ENE (3.39), is generally low with sandy and rocky stretches. Between Nilewelli Point and Tangalla Point, 6 miles NE (3.38), the coast becomes rocky, fairly high and indented by bays. E of Tangalla Point to Kalametiya Point, 9 miles ENE (3.38), the coast is low, sandy and backed by coconut palms. Thereafter, to Hambantota Point, 12 miles ENE, the coast is low, barren and sandy, interrupted by only a few cliffy points.

#### Currents

##### 3.36

- 1 See 3.15.

#### Principal marks

##### 3.37

- 1 **Landmark:**  
Dondra Head Light (5°55'N, 80°35'E) (3.16).  
**Major light:**  
Dondra Head Light (3.16).

#### Directions

(continued from 3.22)

Chart 3265

#### Nilewelli Point to Kalametiya Point

##### 3.38

- 1 There are no charted dangers to navigation outside a distance of 1¼ miles offshore.  
From a position S of Nilewelli Point (5°58'N, 80°43'E) (3.21) to a position SSE of Kalametiya Point, the route leads about 20 miles ENE, passing (with positions from Nilewelli Point):
- 2 SSE of a rocky peninsula (1 mile NE), which has 2 detached above-water rocks close S. Kolonna Point forms the E extremity of the peninsula. Thence:



- 3 SSE of Mahawelli Point (2½ miles NE), the E end of a steep rocky peninsula, fairly high and almost bare of trees. Mahawelli Rock, awash, lies 2 cables E of the point. Thence:  
SSE of Middle Rock (3.49) and Unaeria Rocks (3.49) (¾ miles NE), thence:
- 4 SSE of Tangalla Rock (6¾ miles NE), awash and steep-to on its S and E sides, and which is the ESE extremity of foul ground extending 1.4 miles E from Tangalla Point. An old white fort stands on the point with a white dagoba a further 6 cables NW. Good radar returns have been reported from Tangalla Point. Thence:
- 5 SSE of Rekawa Point (10 miles ENE), rocky and barren. The point is fringed by a reef, parts of which are above-water, which extends 2½ cables offshore. Thence:
- 6 SSE of Kahandawa Rocks (above-water) (12 miles ENE), and a shoal patch, depth 8.7 m, which lies 4 cables S of the rocks. Thence:
- 7 SSE of Kalametiya Point (14½ miles ENE) which is rocky, fairly high and on which stands a dagoba. The point terminates in a large boulder from which a chain of rocky islets and shoal ground extends 1 mile SE. Watta Rock, a barren islet, with light colouring on its upper part, is prominent. Kalametiya Rock, awash, lies 4 cables E of Kalametiya Point. Rocky patches over which there are depths of less than 10 m lie within 6 cables of Watta Rock to the SW, S and E. A rock awash, on which the sea usually breaks, lies 2 cables SE of Watta Rock.

### Kalametiya Point to Hambantota

#### 3.39

- 1 From a position SSE of Kalametiya Point (3.38) to a position SSE of Hambantota Point (6°07'N, 81°08'E), the route leads 12 miles ENE, passing (with positions from Hambantota Point):
- 2 SSE of Swell Rock (10 miles WSW), over which the sea breaks in a moderate swell, thence:  
SSE of Ulandhe Point (steep, red cliffs) (9½ miles WSW). Depths, out to 1 mile offshore, between Ulandhe Point and Kalametiya Point (3.38) are very irregular over a rocky bottom. Thence:
- 3 SSE of Rattan Point (8½ miles WSW), which resembles Ulandhe Point. Rocks, above water and awash, extend nearly 4 cables offshore between the points. Rattan Point has been reported to give reasonable radar returns. Thence:
- 4 SSE of Ibha Rock (dangerous, steep-to) (4¾ miles WSW), over which the sea does not always break. Godawaye Point (rocky, a dagoba close within), stands 8 cables NNW of the rock. A reef, with rocks awash, and shoal ground extends E and SE from the point to 7 cables offshore. Thence:
- 5 SSE of Nehindi Rock (¾ miles WSW), awash and steep-to, thence:  
SSE of Hambantota Point. The point lies at the SE end of a rocky promontory with red, sandy soil from which a bare rocky ledge, with islets, extends ¾ cables SE. A large white martello tower (elevation 33 m), with a disused lighthouse (squat white tower) close by, and some houses stand on the promontory. Good radar returns have been reported from Hambantota Point.

### Useful marks

#### 3.40

- 1 Temple (red roof), 6 cables NW of Kolonna Point (5°59'N, 80°44'E).  
Banyan tree (6°01'N, 80°46'E), SW of Tangalla (3.41).  
Two radio masts (obstruction lights) (6°10'N, 80°45'E), about 9 miles NNW of Tangalla.  
(Directions continue for coastal passage at 3.59)  
(Directions for Tangalla Bay are given at 3.42 and for Mahawelli Bay at 3.49)

### Tangalla Bay

### General information

#### 3.41

- 1 Tangalla Bay (6°02'N, 80°50'E) lies between Tangalla Point (3.38) and Rekawa Point (3.38), 4 miles ENE. The coast between these points is low, sandy and backed by coconut palms. A rocky reef fronts the shore, just below-water.
- 2 The town of Tangalla, with an old white fort, stands on Tangalla point.  
Kirama Oya, the entrance to which is usually blocked, lies 4 cables N of Tangalla Point.

### Directions

#### 3.42

- 1 From a position at least 5 cables E of Tangalla Rock (3.38), the track leads about 021°, passing (with position from Tangalla Rock (6°01'N, 80°49'E)):  
Three cables ESE of Ma Rock (4 cables NE).
- 2 When about 6 cables NE of Ma Rock, the alignment (265°) between the coconut palms on the SW bank of Kirama Oya (3.41) and a small white dagoba (3.38), 6 cables NW of Tangalla Point (3.38), leads into the W part of the bay and an anchorage, passing:  
About 2 cables N of Ma Rock, thence:  
N of Tangalla Rock, thence:  
Three cables N of Kadul Rock (2 cables NNW).

### Anchorage and landing

#### 3.43

- 1 Anchorage may be obtained with Tangalla Rock bearing between 167° and 149° in depths of about 10 m.  
Landing may be conducted 1¾ cables S of the entrance to Kirama Oya (3.41).

### Hambantota

#### Chart 3265 plan of Hambantota

### General information

#### 3.44

- 1 Hambantota (6°08'N, 81°08'E), a town and port, lies close NW of Hambantota Point (3.39) and is the seat of the Assistant Government Agent who is also Master Attendant of the port.
- 2 **Weather.** W or SW winds prevail from April to November. For further details see climatic table 1.207.

### Anchorage

#### 3.45

- 1 Anchorage may be obtained in the bay formed between Hambantota Point and Pitawatan Point, 1¼ miles NE (3.59). The best berth, shown on the chart in depths of 10 m, is ¾ cables NE of Hambantota Point.  
There is seldom much protection from swell in the bay even with favourable winds.



**Landing****3.46**

- 1 Landing can be carried out on the beach close N of a ruined jetty, extending 80 m NE, 3 cables NW of Hambantota Point. The sea often breaks outside the jetty.

**Other bays and anchorages**

Chart 3265

**Nilewelli Bay****3.47**

- 1 Nilewelli Bay (5°58'N, 80°44'E) lies between Nilewelli Point (3.21) and the S end of a rocky peninsula about 1 mile NE.

- 2 **Anchorage**, shown on the chart, may be obtained in the bay in a depth of about 16 m, sand, about 4 cables NE of Nilewelli Point.

The NE part of Nilewelli Bay is foul.

**Sureya Tree Bay****3.48**

- 1 Sureya Tree Bay (5°59'N, 80°44'E) is a small sandy bay in the W part of the bight between Kolonna Point (3.38) and Mahawelli Point (3.38).

- 2 **Anchorage** for small craft may be obtained close to the beach in Sureya Tree Bay, in depths of 9 m, sand.

**Mahawelli Bay****3.49**

- 1 Mahawelli Bay (6°00'N, 80°45'E), which offers an anchorage for mariners with local knowledge, lies immediately N of Mahawelli Point (3.38).

- 2 **Directions.** Approach the anchorage between Mahawelli Rock (3.38) and Middle Rock, 5 cables ENE. Middle Rock is nearly awash and always breaking. Unaeria Rocks, consisting of four distinct heads 0.3 to 1.8 m in height, stand close E of Middle Rock.

There are depths of 13 m between Mahawelli Point and Mahawelli Rock.

- 3 **Anchorage** may be obtained, in depths of about 11 m, sand, close N of Mahawelli Rock.

**Anchorage, vicinity of Watta Rock****3.50**

- 1 Anchorage may be obtained by mariners with local knowledge from 3 to 5 cables ENE of Watta Rock (6°04'N, 80°56'E) (3.38) in depths of about 11 m, sand and rock.

**Other names****3.51**

- 1 Veralawinha Point (6°07'N, 81°06'E).  
Walawe Ganga (6°06'N, 81°01'E), a river.

**HAMBANTOTA TO LITTLE BASSES REEF****General information**

Charts 3265, 1583, 813

**Route****3.52**

- 1 From a position SSE of Hambantota Point (6°07'N, 81°08'E) the offshore route leads about 45 miles ENE thence NE to a position ESE of Little Basses Reef.

- 2 **Offshore route.** For vessels on passage along the coast the usual route is to seaward of both Great Basses Ridge (3.60) and Little Basses Ridge (3.61), passing at least 2 miles SE of the lighthouses marking the reefs at the E end of both ridges.

- 3 **Inshore route.** In clear weather, with natural landmarks visible, a light draught vessel would probably find less sea by making passage between the shore and both Great Basses Ridge and Little Basses Ridge. The proximity of shoal ground at places along the route demands careful attention to navigational position.

**Topography****3.53**

- 1 The coast between Hambantota (6°07'N, 81°08'E) and Illukatiya Point (3.67), 6 miles NNW of Little Basses Light (3.58), is sandy and barren with points from 15 to 50 m high. The land between and behind the points is low, with occasional hills which usually rise abruptly. In clear weather the mountain district of Sri Lanka can be seen in the background.

- 2 The area enclosed by the N boundary of the Southern Province and the rivers of Menik Ganga (6°22'N, 81°32'E) and Kumbukkan Oya, 14 miles NE (3.67), is preserved as a game sanctuary. The latter river forms the E boundary of the Southern Province.

**Controlling depth, inshore route****3.54**

- 1 Allowing for normal navigational inaccuracies, especially inherent with natural landmarks, the controlling depth is about 7 m at the NE end of the inshore route, NW of Little Basses Reef. At the SW extremity of Little Basses Ridge a least charted depth of 2.7 m lies 4 cables clear of the track.

**Anchorages****3.55**

- 1 Although open anchorage over a bottom of rock and sand may be obtained off almost any part of this stretch of coast, none of the bights afford shelter during either monsoon. However, during the SW monsoon, if the wind is well W, the sea is less disturbed off the E part of the coast.

**Currents****3.56**

- 1 See 3.15.  
Observations made during the survey by HMS *Sealark* between October 1908 and May 1909 tend to show that the currents between Hambantota and Illukatiya Point (3.67) are strongly influenced by the prevailing wind.

- 2 During the period of the survey, currents were experienced as follows:

October/November; NE-going and SW-going experienced equally, maximum rate 1 kn.

November to March; WSW to SSW-going with little variation and maximum rate 2 kn.

December; After a cyclonic storm in the Bay of Bengal the NE wind was replaced by a light SW wind and the direction of the current became NNE to ENE-going. When the SW wind ceased the current reverted to SW-going.

- 3 The following observations of the current near Little Basses Reef (3.61) were made onboard the light-vessel formerly in that position:

|         |                   |
|---------|-------------------|
| January | SSW 2 kn to 2½ kn |
|---------|-------------------|

- 4 February SSW 2 kn, but at times slacker

|       |                                           |
|-------|-------------------------------------------|
| March | Generally SSW, variable and weak at times |
|-------|-------------------------------------------|

|       |                                                                    |
|-------|--------------------------------------------------------------------|
| April | Variable, occasionally SW, usually weak but strong when setting SW |
|-------|--------------------------------------------------------------------|

|     |              |
|-----|--------------|
| May | NE 1 to 3 kn |
|-----|--------------|

|   |                   |                                                         |
|---|-------------------|---------------------------------------------------------|
| 5 | June to September | NNE 1 to 3 kn                                           |
|   | October           | NNE, changing about the middle of the month to SSW 5 kn |
|   | November          | SSW 4 to 5 kn                                           |
|   | December          | SSW 5 kn                                                |

## Winds and sea

### 3.57

- 1 W and SW winds prevail from April to November.  
**Caution.** In January the sea is rough, vessels bound NE should remain well offshore and clear of dangers along the SE coast of Sri Lanka. In March the sea is much calmer.

## Principal marks

### 3.58

#### 1 Landmarks:

Kataragama (6°23'N, 81°20'E), 20 miles NE of Hambantota, the summit of a mountain range, pointed as viewed from SW but flat-topped from SE or E.

Rocky Knob (6°19'N, 81°25'E), 6½ miles SE of Kataragama, is a remarkable pillar of rock forming part of a rocky ridge.

- 2 Akasachetiya (6°22'N, 81°28'E), a prominent mass of bare rock, 4 miles NE of Rocky Knob.

Great Basses Light (white granite tower, two galleries 20 m apart, conical roof, 38 m in height) (6°11'N, 81°29'E).

Little Basses Light (white granite tower and cupola, black band, two galleries; 38 m in height) (6°24'N, 81°44'E).

#### 3 Major lights:

Little Basses Light—as above.

Great Basses Light—as above.

## Directions

(continued from 3.40)

Chart 3265

## Hambantota to Patirajja Point

### 3.59

- 1 From a position SSE of Hambantota Point (6°07'N, 81°07'E) (3.39) to a position SSE of Patirajja Point, the route leads 6 miles ENE, passing (with positions from Hambantota Point):

SSE of Pitawatan Point (1 mile NE), the NE extremity of the bay of Hambantota, thence:

SSE of Gurugudu Point (2¾ miles ENE) which is rounded, not easily distinguished, and has some detached rocks close offshore, thence:

SSE of Patirajja Point (reddish colour) (6 miles ENE) which terminates in a rocky ledge 0.6 m in height.

(Directions for the inshore route are given at 3.63)

Charts 3265, 1583, 813

## Offshore route

### 3.60

- 1 A brief description of the offshore route is at 3.52.  
 From a position SSE of Patirajja Point (3.59) to a position SE of Atlas Rock (6°25'N, 81°45'E), the route leads about 20 miles ENE, thence about 20 miles NE, passing (with positions from Great Basses Light (6°11'N, 81°29'E)):
- 2 SSE of the WSW extremity of Great Basses Ridge (12 miles WSW). The ridge, 13½ miles in length,

is narrow, rocky and steep-to. Except within 2 miles of Great Basses Light, no depth of less than 12 m has been found on the ridge. Thence:  
 At least 2 miles SSE of Great Basses Reef which lies on Great Basses Ridge 2 miles from its E end. Some parts of the reef, about 2½ cables in length, are above water and Great Basses Light (3.58) stands on the highest part. Vessels should not approach within 2 miles of the lighthouse from either a ENE or WSW direction. Good radar returns have been reported from the lighthouse. Thence:

- 4 SSE of Ship Rock (5½ miles ENE) which lies in the centre of a detached rocky shoal. A series of detached shoals, with depths of less than 20 m, extending NE, lie between 2 and 6 miles farther NE.

### 3.61

- 1 From a position SSE of Ship Rock (3.60) the route continues NE, passing (with positions from Little Basses Light (6°24'N, 81°44'E)):

- 2 SE of Little Basses Ridge which is 17 miles long, mostly very narrow and steep-to, and with depths of not more than 10 m. An extensive bank lies S of the W part of Little Basses Ridge with a least depth of 10.1 m (9 miles SW). Thence:

- 3 At least 2 miles SE of Little Basses Reef (0.6 m in height), on which stands Little Basses Light (6°24'N, 81°44'E) (3.58) and which lies 1½ miles within the NE end of Little Basses Ridge. The approach to the reef is steep-to on its S and SE sides; the 100 m contour lies about 1 mile SE of the reef. Good radar returns from the lighthouse have been reported. A stranded wreck, broken in two, lies 3½ miles SW of the light. Thence:

- 4 SE of Atlas Rock (1½ miles NE) (charts 1583, 813) and SE of the E extremity of Little Basses Ridge (3 miles NE).

### 3.62

#### Cautions:

- 1 There are many rocky heads on Little Basses Ridge (3.61), particularly towards the SW end, on which the sea often breaks. The sea may break on any part of the ridge with a moderate swell where depths do not exceed 5.5 m, and probably in greater depths.

- 2 Only light draught vessels should attempt to cross any part of the ridge, passing between 2 and 6 miles SW of Little Basses Light, noting the existence of the stranded wreck (3.61).

- 3 An area of shoal ground, with irregular depths, lies NNW of Little Basses Reef (3.61) and vessels should not approach within 1½ miles of the reef with Little Basses Light bearing between 148° and 185°. If a close approach is required from a position NW of the reef, vessels should close the lighthouse between bearings of 134° and 109° only.

- 4 Depths beyond the E end of Little Basses Ridge, 1½ miles NE of the lighthouse, are irregular and overfalls occur.

(Directions continue for coastal passage at 3.79)

Chart 3265

## Inshore route

(continued from 3.59)

### 3.63

- 1 Brief comment on the limiting conditions and controlling depth for the inshore route are at 3.52 and 3.54.

From a position SSE of Patirajja Point (3.59) to a position NNE of Little Basses Light (6°24'N, 81°44'E) (3.58), the route leads about 36 miles ENE thence generally NE, passing (with positions from Dorava Point (6°12'N, 81°19'E)):

- 2 About mid-way between Urani Point (isolated coconut palm grove close within) (3 miles WSW) and the WSW extremity of Great Basses Ridge (4 miles SW) (3.60). Thence:  
About 6 cables SSE of Dorava Rock (8 cables SE), the outermost danger lying off Dorava Point, which is bare and rocky. Foul ground and rock islets extend about 1 mile W from Lansiya Rock (above-water) (4 cables SSW).

### 3.64

#### 1 Dorava Point to Amaduwa Point

Sandhills and rocky formations of moderate height lie close behind the coast between Dorava Point and Butawa Point, 12 miles NE.

- 2 From a position 6 cables SSE of Dorava Rock (3.63), the track leads 054°, passing (with positions from Dorava Point (6°12'N, 81°19'E)):

SE of Palatupana Point (3½ miles NE) which lies at the end of a sandy elevation, thence:

- 3 Six cables SE of shoal ground which extends 6 cables SSE of Mutugala Point (5½ miles NE). The point is similar in appearance to Palatupana Point. A rock 1.8 m in height stands close off the point. Two bushy summits, elevations 60 m and 39 m, lie, respectively, 1¼ miles NW and 6 cables NNW of Mutugala Point. The latter summit (3.66) is used as a leading mark for the passage inside Little Basses Ridge. Thence:

- 4 Between Amaduwa Point (8 miles NE), low and rocky at its extremity, and an offshore shoal bank with a least charted depth of 11 m (9 miles ENE). Two above-water rocks stand 1¼ cables S of the point with a rocky shoal a further 4 cables E. Between the point and Mutugala Point, a rocky reef, its outer part awash, extends 3 cables offshore. Thence:

- 5 SE of two above-water rocks (8¾ miles NE), standing 2¼ cables off the coast between Amaduwa Point and Butawa Point (3.65). Shoal water extends 4½ cables offshore between the points.

- 6 **Landing** may be carried out in a small bight close N of Amaduwa Point; it is the first convenient landing place E of Hambantota.

### 3.65

- 1 **Leading line.** The alignment (011°) of Transit Hill (bare, rocky with two summits of similar height and joined by a slightly lower ridge; W summit elevation 50 m) (6°20'4N, 81°29'5E), and Dematagala (the higher of two summits) (10 miles NNE), leads NNE, passing (with positions from Patanagala Point (6°20'N, 81°30'E)):

- 2 Four cables W of the W extremity of Little Basses Ridge (3.61) (2¼ miles SSW), which has a least charted depth of 2.7 m and usually breaks, thence:  
Across Chiddle Rock (2 miles SSW) which is steep-to with a charted depth of 9.6 m.

- 3 When immediately clear NW of Chiddle Rock, gradually open Dematagala E of Transit Hill, altering ENE, to achieve the next leading line, passing (with positions from Patanagala Point):

- 4 Two cables SE of Butawa Rock (above-water, steep-to on its SW and SE sides) (2 miles SW). The rock lies 2 cables SE of Butawa Point which is rounded

and moderately high; depths less than 10 m extend 3 cables SE of the point.

- 5 **Caution.** For cautions concerning Little Basses Ridge see 3.62

### 3.66

- 1 **Leading line.** The alignment, (241°), astern, of Butawa Rock (3.65) and a bush summit (6°15'6N, 81°23'8E), elevation 39 m, which stands 6 cables NNW of Mutugala Point (3.64), leads 061° along the track, passing (with positions from Pillinawa Point (6°22'N, 81°34'E)):

- 2 SE of Patanagala Point (conically-shaped, standing at the extremity of a bare rocky hill, elevation 42 m) (4½ miles WSW). Elephant Rock, above-water, stands 4 cables ESE of the point. Rocky shoal ground, with uneven depths, extends 8 cables SSE and S of the point to within 2 cables of the track. Thence:

- 3 Four cables NW of the WSW part of Little Basses Ridge (3.61); thereafter the ridge diverges from the track, thence:

- 4 About 8 cables SE of Pillinawa Point, the NE of 2 rocky points 8 cables apart with a sandhill, elevation 33 m, between the 2 points. Pillinawa Point is backed by low land and appears from a distance as an island. Rocky shoal ground extends 3 cables SE and 1½ miles SW of Pillinawa Point. Thence:

- 5 SE of Uda Point (4 miles NE). Shoal ground, with depths of less than 10 m, extends about 6 cables off the point.

- 6 **Landing** is sometimes practicable between some rocky ledges, forming a slight breakwater, N of Patanagala Point (3.66) and the coast to the W. Landing may also be possible in a small bight N of Uda Point (3.66).

*Charts 3265, 1583, 813*

### 3.67

- 1 When Mandagala (summit has a light-coloured rock precipice facing E, the top of which, when seen from SE, appears clear of the summit; Mandagala is not easily seen from the vicinity of Great Basses Reef and is sometimes obscured by haze) (6°31'N, 81°37'E) bears 330° with Pahala Point (6°27'N, 81°40'E) nearly in line but just open E, and about 2½ miles SSE of the point, the track leads about 051°, passing (with positions from Pahala Point):

- 2 SE of Pahala Point which lies at the end of a sandhill slope. For about 1 mile on each side of the point, rocky ledges and shoal ground extend about 1½ cables offshore, thence:

- 3 Between shoal ground, with irregular depths, extending 2¼ miles NW from Little Basses Light (3.58) (5 miles SE) and rocky shoal ground that extends 3 miles S from the N shore, thence:

- 4 About 6 cables SE of Daedalus Rock (3 miles ENE) and its shoal ground extending S. Lewin Rock lies 6 cables NNW of Daedalus Rock. Thence:  
NW of Atlas Rock (3.61) (5¾ miles ESE) and the E extremity of Little Basses Ridge (7½ miles ESE), thence:

- 5 SE of Illukatiya Point (4 miles NE) which is ill-defined and forms the S entrance point of Kumbukkan Oya. The river is fronted at its mouth by patches of below-water reef extending about 2 cables offshore.

- 6 **Caution.** For cautions concerning Little Basses Ridge and the dangers of closing Little Basses Light see 3.62.



**Useful marks****3.68**

- 1 Mayagala (cone-shaped when seen from E) (6°30'N, 81°29'E).  
Dematagala (6°30'N, 81°31'E) (3.65).  
Chimney Hill (6°39'N, 81°30'E) (3.78).  
Mandagala (6°31'N, 81°37'E) (3.67).  
(*Directions continue at 3.79*)

**Kirinde***Chart 3265***General information****3.69**

- 1 The village of Kirinde is situated close N of Kirinde Point (6°13'N, 81°20'E), at the W end of a sandy bay formed between the point and Palatupana Point (3.64), 2½ miles NE. Patches of below-water rock extend about 1 cable to seaward from the shore of the bay.  
Kirinde Point is rocky with a ledge extending 2¾ cables ESE which terminates in Korha Rock, above-water.
- 2 Kirinde Rock (a group of boulders onshore, elevation 34 m) (2½ cables SW of Kirinde Point), when seen from SW over the land inside Dorava Point (3.63), appears as a conical summit.
- 3 A rock with a least depth of 2.3 m, lies 2½ cables E of Kirinde Point and a dangerous rock, about 2 cables in

diameter, over which the sea always breaks, lies a further 3 cables NE. A channel about 1 cable wide runs between the two rocks.

**Fishing harbour****3.70**

- 1 There is a fishing harbour at Kirinde, protected by a breakwater 395 m long, but, in 1988, the harbour had silted beyond use. A project involving dredging and realigning the breakwater is planned.
- 2 Within the harbour is a jetty, 125 m long, and a wharf, 150 m long. The harbour used to provide shelter for about 100 fishing vessels of up to 10.4 m in length.

**Anchorage****3.71**

- 1 Only open anchorage, as elsewhere on the coast, can be obtained. The best anchorage is S of Kirinde Point, in depths between 13 m and 16 m. The bottom E of the point is rocky.
- 2 **Directions.** If approaching the anchorage keep Kataragama (6°23'N, 81°20'E) (3.58) bearing about 359°, well open E of Kirinde Rock (3.69); this leads about 2 cables E of Dorava Rock (3.63).

**Other name****3.72**

- 1 Bundala (6°11'N, 81°16'E), a village.

**LITTLE BASSES REEF TO TRINCOMALEE****GENERAL INFORMATION***Charts 813, 1583***Navigation restriction****3.73**

- 1 See 3.8.

**Currents****3.74**

- 1 The currents off the E coast of Sri Lanka are variable. During the period January to April, they are likely to set onshore between the latitudes of 6°30'N and 8°00'N.  
In November and December, under normal weather conditions, S-going sets of 5 kn have been experienced E of the 200 m depth contour.
- 2 Between Little Basses Reef (6°24'N, 81°44'E) and Trincomalee, 130 miles NNW, the direction of the inshore current often changes during the period March to August. Although the direction of the currents are usually parallel with the coast, frequent reversals, N-going and S-going, occur without any apparent reason. Between 3 and 10 miles off the coast, N-going and S-going currents often exist side by side, with more than one current setting in each direction.
- 3 **Caution.** The unpredictable nature of the currents between Little Basses Reef and Trincomalee requires great care. Continuous sounding should give warning of any approach to danger.

**LITTLE BASSES REEF TO SANGAMA KANDA POINT****General information***Charts, 813, 1583***Route****3.75**

- 1 From a position SE of Little Basses Reef Light (6°24'N, 81°44'E) (3.58) the route leads about 43 miles NNE to a position E of Sangama Kanda Point (3.79).

**Topography****3.76**

- 1 The coast between Illukatiya Point (3.67), 6 miles NNW of Little Basses Reef, and Sangama Kanda Point, 33 miles NNE, is nearly all sandy and backed by jungle on low, flat ground, which extends well inland to isolated hills.  
Depths off the coast between Illukatiya Point and Arugam Bay (3.80), 22 miles NNE, are fairly regular, gradually decreasing towards the shore. N of the bay, to Sangama Kanda Point, shoals extend up to 5 miles offshore.

**Currents****3.77**

- 1 See 3.74.  
In the vicinity of Egeria Patch (6°57'N, 81°56'E) (3.79), during the SW monsoon period of 1908, the current was S-going at 1½ kn.
- 2 Near Komari Ridge (3.79), 5 miles NNW of Egeria Patch, currents are reported to be variable and often set towards the coast.



**Principal marks****3.78****1 Landmarks:**

Kongala (hill) (6°34'N, 81°42'E).

Chimney Hill (truncated cone surmounted by a vertical rock, resembling a chimney) (6°39'N, 81°30'E). This isolated and prominent hill may be seen outside 4 miles offshore, showing above the low intervening land.

Asses Ears (6°39'N, 81°44'E).

2 Nilagalahela (isolated hill with two summits, the NE and higher summit) (6°50'N, 81°42'E). From E the hill appears as a single peak, steep-to on the S side. It is a good landmark, as it is the highest in the vicinity and darker than its surroundings.

3 Westminster Abbey (remarkable tower-like mountain, elevation 558 m at its NW point) (7°02'N, 81°33'E), conspicuous from E or S.

Kumburahela (isolated sugar loaf peak) (7°03'N, 81°40'E).

Little Basses Light (3.58).

**4 Major light:**

Little Basses Light (6°11'N, 81°29'E) (3.58).

Oluvil Light (7°17'4N, 81°51'9E) (3.88).

**Directions**

(continued from 3.62 and 3.68)

Charts 813, 1583

**Little Basses Reef to Sangama Kanda Point****3.79**

1 From a position SE or NNW of Atlas Rock (6°25'N, 81°45'E) to a position E of Sangama Kanda Point, the route leads about 43 miles NNE, passing (with positions from Little Basses Light (6°24'N, 81°44'E)):

ESE of Atlas Rock (1½ miles NE), thence:

ESE of Marescaux Rocks (9 miles NNE), above-water and awash, thence:

2 ESE of Monro Rocks (13 miles NNE), awash. Foul ground extends up to 7½ cables offshore between Monro Rocks and Marescaux Rocks. Thence:

ESE of Panawa (22 miles NNE), a sandy ridge, covered with jungle, which terminates in a point covered with scrub. The point appears as a flat-topped islet from S or N. Thence:

3 ESE of Bolt Point (25 miles NNE), a rock 28 m in height and covered with scrub, thence:

ESE of shoal ground (depth 8.7 m) (28½ miles NNE), that extends 2 miles offshore, ENE of Arugam Bay (3.80), thence:

ESE of Egeria Patch (36 miles NNE), a narrow ridge of sand and coral. The bottom has been seen clearly in a depth of 16 m. Thence:

4 E of Sangama Kanda Point, on which stands Sangama Kanda Point Light (white concrete tower, brown base). A white martello tower (6 m in height, grey topmark) stands near the point. Good radar returns have been reported from the point. The N end of Komari Ridge, rocky, lies 1½ miles E of Sangama Kanda Point. To seaward of the ridge, for about 3 miles, the bottom is very uneven and heavy breakers may be experienced, caused by winds and currents.

**Landing****3.80**

1 Arugam Bay (6°51'N, 81°50'E) affords good landing in its S corner.

**Useful marks****3.81**

1 Mayagala (6°30'N, 81°29'E) (3.68).

Dematagala (6°30'N, 81°31'E) (3.65).

Mandagala (6°31'N, 81°37'E) (3.67).

Kongala (6°34'N, 81°42'E) (3.78).

Kudumbegala (6°40'N, 81°44'E).

White Sand Hill (6°42'N, 81°48'E) and Split Rock, a further 1 mile NNE.

Maragalakanda (long, rounded mountain) (6°52'N, 81°23'E).

(Directions continue at 3.89)

**Other names****3.82**

1 Chen Point (6°36'N, 81°46'E).

Davidson Rock (6°56'N, 81°51'E), awash.

Dunlop Hill (6°37'N, 81°44'E), elevation 72 m.

Komari (6°59'N, 81°52'E), a village.

Patten Rock (6°53'N, 81°51'E), awash.

Umbrella Rock (6°34'N, 81°44'E), onshore, elevation 46 m.

Yakkala (6°32'N, 81°43'E), a small village.

**SANGAMA KANDA POINT TO TRINCOMALEE****General information**

Charts 815, 1583, with plan of Batticaloa Roads

**Route****3.83**

1 From a position E of Sangama Kanda Point (7°02'N, 81°53'E) (3.79) to a position off Trincomalee Bay, the route leads about 100 miles N and NNW.

**Topography****3.84**

1 The coast between Sangama Kanda Point and Batticaloa Roads, 45 miles NNW, is cultivated with coconut palms in many places; the hinterland is low and flat, with hills about 10 miles inland. From Batticaloa Roads to Elephant Point (3.91), 16 miles NNW, coconut palms again dominate with several distinctive hills in the background. Thereafter, to Trincomalee, the coast is covered in jungle with only a few, unimportant inland hills.

**Depths****3.85**

1 Depths off the coast are fairly regular except for a few rocky patches within 1 mile of the shore. Occasional patches of shoal ground, with depths less than 10 m, extend 2 miles offshore. Generally the 100 m depth contour line lies between 4 and 10 miles offshore. Less water than charted was reported (2001); see legend on chart.

2 **Caution.** In reduced visibility it is advisable to remain in depths of 40 m or more.

**Overfalls****3.86**

1 Outside the 100 m depth contour depths increase suddenly, and heavy overfalls can occur even in good weather.

**Currents****3.87**

- 1 See 3.74.

**Principal marks****3.88**1 **Landmarks:**

Wadinagala Peak (precipitous summit forming a sharp peak) (7°06'N, 81°31'E), shows up well from all directions.

Friar's Hood (7°26'N, 81°30'E), aptly named and unmistakable amongst surrounding hills; usually the first landmark made from N.

Gunner's Quoin (large wedge-shaped mountain) (7°51'N, 81°08'E), a good mark.

2 **Major light:**

Oluvil Light (7°17'4N, 81°51'9E) (white round tower, 24 m in height).

**Directions**

(continued from 3.81)

*Chart 1583, with plan of Batticaloa Roads*

**Sangama Kanda Point to Batticaloa Roads****3.89**

- 1 From a position E of Sangama Kanda Point (7°02'N, 81°53'E) (3.79) to a position off Batticaloa Roads, the route leads about 50 miles N and NNW, passing (with positions from Sangama Kanda Point):

- 2 E of the N extremity of Komari Ridge (1 mile ENE) (3.79), thence:

E of Oluvil Light (15½ miles N) (3.88), thence:

- 3 E then ENE of Alphée Shoal (24 miles N), which extends 2 miles offshore from Kalmunai, thence: ENE of Beacon Rock (depth 2-7 m) (46 miles NNW), the outermost danger off Batticaloa Roads (3.94), and:

- 4 Clear of the dangerous wreck of HMS *Hermes* (aircraft carrier, 11 000 tonnes, sunk in 1942) in position 7°50'N, 81°50'E.

**Useful marks****3.90**

- 1 Sangama Kanda Point Light (7°02'N, 81°52'E) (3.79). Westminster Abbey (7°02'N, 81°33'E) (3.78). Thompson Hill (7°07'N, 81°44'E). Sharp Hill (7°09'N, 81°45'E). Bennington Hill (wooded, wedge-shaped) (7°13'N, 81°41'E). A cluster of red roofs (position approximate) (7°12'N, 81°51'E).
- 2 White tower, conspicuous, at Kalmunai (7°25'N, 81°50'E). Tower (framework, red obstruction light) (7°43'N, 81°41'E), conspicuous within Batticaloa. Batticaloa Light (white tower, 28 m in height) (7°45'N, 81°41'E), standing on the W side of the entrance to Batticaloa Lake (3.94).

**Batticaloa Roads to Panditivo Point****3.91**

- 1 From a position off Batticaloa Roads (7°46'N, 81°41'E) (3.94) to a position ENE of Panditivo Point, the route

continues about 28 miles NNW, passing (with positions from Vendloos Point (7°55'N, 81°35'E)):

- 2 ENE of Punnaikkula Point (6 miles SSE), from which shoal ground extends 1 mile NE, thence:

ENE of Baker Rocks (below-water reef) which extend 1½ miles NE from Vendloos Point. A stranded wreck lies at the extremity of the reef, with another dangerous wreck a further 1½ miles N. Thence:

- 3 ENE of Elephant Point (low, fringed by rocks and foul ground) (4½ miles NNW). Elephant Rock (light-coloured, above-water) stands close N of the point and wrecks lie a further 1 mile NE and 3 miles N. Thence:

ENE of Challitivu (islet, wooded) (13½ miles NW), thence:

- 4 ENE of Panditivo Point (sharp and rocky) (18 miles NNW), which has a small islet standing 5 cables NE.

- 5 **Caution.** Foul ground, caused by dumped mines, lies between positions 2¾ miles ENE of Challitivu and 1¼ miles ENE of Panditivo Point.

**Useful marks****3.92**

- 1 Tower Hill (hog-backed) (7°43'N, 81°24'E), with a prominent rock, like a tower, on its summit. Baron's Cap (sugar-loaf hill) (7°50'N, 81°23'E); prominent when clear of other hills, especially from about due E, but from NE its top appears broader and merges with hills farther S.
- 2 Kirimechiodai Malai (8°00'N, 81°26'E); only seen between bearings 247° and 292° when it appears as a low, wedge-shaped hill with a small peak, rising steeply from S and sloping N.
- 3 Kunchan Kallū (8°00'N, 81°22'E); from SE it appears wedge-shaped and moderately steep to the S; from NE it has no well-defined summit. Small Quoin (from SE slopes to a single summit) (8°02'N, 81°18'E).

*Charts 815, 1583*

**Panditivo Point to Trincomalee****3.93**

- 1 From a position ENE of Panditivo Point (8°11'N, 81°26'E) to a position off Trincomalee Bay, the route leads about 24 miles NNW, passing (with positions from Panditivo Point):
- 2 ENE of Kadeawella Point (2 miles NNW), which is fronted by a series of above-water rocks, thence: ENE of Virgel Rocks (above and below-water) (4¼ miles NNW), standing 1 mile offshore. Foul ground lies about 3½ miles E of the rocks. Thence:
- 3 ENE of Tree Rock (above-water, surmounted by a tree) (7 miles NNW), with another above-water rock 5 cables E, thence: ENE of Alligator Rock (8½ miles NNW), the outermost of several above-water rocks, the most prominent being Ship Rock. Onshore, abreast the rocks, is a conspicuous patch of rock. Thence: ENE of a group of islets (the highest 18 m high, some trees, prominent) (11½ miles NNW), which stand off the entrance to Ullackalie Lagoon, thence:
- 4 ENE of Heming Rocks (above-water and awash) (15 miles NNW) which extend NE from the

vicinity of White Rock (onshore, conspicuous during the forenoon). The outermost danger lies 1¼ miles offshore. Thence:

ENE of Coral Point (20 miles NNW), fronted by a coral reef, thence:

At least 2 miles NE of Kevuliya (Foul Point) (22 miles NNW), the SE entrance point of Trincomalee Bay. Depths of less than 10 m extend up to 7 cables offshore between Coral Point and Kevuliya.

*(Directions continue for coastal passage at 3.166 and for Trincomalee at 3.109)*

## Batticaloa Roads

*Chart 1583 plan of Batticaloa Roads*

### General information

#### 3.94

- 1 Batticaloa Roads (7°46'N, 81°41'E), an open roadstead, off the entrance to Batticaloa Lake, affords good anchorage during the SW monsoon but is dangerous during the NE monsoon.
- 2 The town of Batticaloa, situated 3 miles within the entrance to Batticaloa Lake, is the Headquarters of the Civil Administration of the Eastern Province. The Government Agent is Master Attendant.
- 3 Batticaloa Lake, about 25 miles long, is accessible to small vessels only, up to about 30 dwt. A bar, with depths from 0.9 to 1.8 m, fronts the entrance to the lake but its formation changes with each monsoon. The bar is almost inaccessible during the NE monsoon. A bridge, 2½ miles above the entrance, presents height restrictions.

### Weather

#### 3.95

- 1 West or SW winds prevail from February to November. Depressions from the Bay of Bengal may affect Batticaloa at the close of the SW monsoon. The NE monsoon sets in towards the end of November.
- 2 The wind is usually light and variable during the night and morning, particularly during the SW monsoon and in the transitional periods between monsoons. In the afternoon sea breezes prevail; usually from between NE and SE.
- 3 During the SW monsoon a hot, dry Föhn wind, known locally as the Batticaloa Kachchan, may blow down from the hills, usually W or SW. These winds are most prevalent during June and July, averaging seven days a month, and replace the normal afternoon E sea breeze.

### Directions

#### 3.96

- 1 Batticaloa Roads offers two anchorages, marked on the chart, the SE with less sea-room for small light-draught vessels, the NW for larger vessels. Positions from Batticaloa Light (7°45'N, 81°41'E).

If approaching from the S, vessels should pass NE of Beacon Rock (1½ miles NE) (3.89).

- 2 **Clearing bearing.** To avoid the numerous dangers that lie between Beacon Rock and Batticaloa Light, it is advisable to remain in depths of more than 20 m until Batticaloa Light bears less than 199°.

- 3 **Southeast anchorage clearing bearing.** To clear Surveyor Rock (9 cables NNW) and Khandalla Rock (8½ cables NNW), approach to the anchorage should be made with Batticaloa Light bearing not less than 177°.

#### 3.97

- 1 **Useful marks:**

Framework tower (1½ miles SSE) (3.90).

Obelisk (7 m in height, position approximate) (7 cables NW).

### Anchorage

#### 3.98

- 1 A good berth for a large vessel is in a depth of about 12 m with Batticaloa Light bearing 154°, distant 10½ cables. The E extremity of Kalmunai Reef lies 4 cables W and Surveyor Rock and Khandalla Rock lie about 3 cables ESE.
- 2 A small vessel may anchor in a depth of about 12 m with Batticaloa Light bearing 177°, distant 7½ cables, in close proximity to the 10 m depth contour lines and 1½ cables SE of Surveyor Rock and Khandalla Rock. This is a convenient berth for communicating with the shore.

### Facilities

#### 3.99

- 1 A jetty at the fort in Batticaloa is used for small vessels to load and discharge cargo alongside. Fresh provisions are very scarce. There is an airfield at Batticaloa.

### Other names

#### 3.100

- 1 Borret Rock (8°21'N, 81°24'E).  
Brown Rock Point (8°29'N, 81°21'E).  
Kalkudah Bay (7°53'N, 81°35'E).  
Namunakuli (elevation 2033 m, chart 828) (6°56'N, 81°07'E), mountain.  
Valaichchenai River (7°56'N, 81°32'E).
- 2 Vendloos Bay (7°58'N, 81°34'E).  
Virgel Ganga (8°15'N, 81°24'E), river.



## TRINCOMALEE HARBOUR AND APPROACHES

### APPROACHES TO TRINCOMALEE

#### General information

Chart 816, 815

#### Route

##### 3.101

- 1 Trincomalee Harbour is approached through Trincomalee Bay which is entered between Kevuliya ( $8^{\circ}31'N$ ,  $81^{\circ}19'E$ ) (3.93) and Flagstaff Point (3.103),  $5\frac{1}{2}$  miles NW. The entrance to Trincomalee Harbour lies on the NW side of the bay.

#### Topography

##### 3.102

- 1 **General description.** The land backing the S shores of Trincomalee Bay and Koddigar Bay (3.104), which occupies the S part of Trincomalee Bay, is generally low-lying with the mouths of several rivers interrupting the coastline. Tambalagam Bay (3.104), a shallow lagoon, extends W from the NW corner of Koddigar Bay. Shoal ground, with depths of less than 10 m, extends up to 1 mile offshore.
- 2 The N shores of Trincomalee Bay are more abrupt and the land is more hilly, mainly consisting of ridges aligned NE/SW and often covered with jungle or forest.
- 3 The town of Trincomalee is situated at the N end of a peninsula which extends 3 miles S, forming the E side of Trincomalee Harbour.

#### Northwest side of the bay

##### 3.103

- 1 **Fort Frederick to Elephant Point.** Flagstaff Point ( $8^{\circ}35'0N$ ,  $81^{\circ}14'7E$ ) is the N point of Fort Frederick, a bold cliffy headland (also known locally as Koddai) which takes its name from the fort standing on the S part of the promontory; the headland presents a wedge-shaped appearance from N or S. Much of the historic fort remains but only the gateway (white) and a white building are prominent from S.
- 2 Rocky Point ( $8^{\circ}33'5N$ ,  $81^{\circ}14'6E$ ), is the NE termination of Ostenburg Ridge. A series of remarkable knife-edged rocks, reducing in height, extend 3 cables NE from the point, terminating in a dangerous below-water rock.
- 3 Chapel Point ( $8^{\circ}32'6N$ ,  $81^{\circ}14'5E$ ), is rocky and has a rounded base; Chapel Island stands 1 cable off the point and Chapel Rock lies 5 cables NE. The passage between Chapel Point and Chapel Island is shallow and foul, it is usable only by small craft.
- 4 Chapel Hill, backing Chapel Point, stands at the NE end of Elephant Ridge; it is covered in jungle. The remainder of Elephant Ridge is more sparsely wooded and between the trees, in places, are long vertical streaks and patches of red earth.  
The coast between Chapel Point and Elephant Point,  $1\frac{1}{4}$  miles SW, is fronted by low cliffs and narrow, sandy beaches strewn with boulders in places.
- 5 Elephant Pass ( $8^{\circ}32'1N$ ,  $81^{\circ}13'8E$ ), which separates Elephant Island from Elephant Point, is obstructed.

#### West side of the bay

##### 3.104

- 1 Diamond Point ( $8^{\circ}31'0N$ ,  $81^{\circ}12'5E$ ), 5 cables NNW of Marble Point, divides Marble Bay from Sweat Bay. White

Top Rock stands close NE of the point and another above-water rock, with surrounding foul ground, stands a further  $1\frac{1}{2}$  cables N. Diamond Hill, wooded and prominent, backs the point.

- 2 A broad rocky point, with numerous dangerous and above-water rocks extending 1 cable offshore, lies 5 cables NNW of Diamond Point and separates Sweat Bay from Dead Man's Cove. Hatam Urita Kalle, a dangerous rocky patch, lies 3 cables E.

- 3 A white mosque stands on a small hill on the NW side of the head of Dead Man's Cove, and Clappenburg Hill, 6 cables W, rising to a double summit named Kari Malai Utu Malai is covered by dense jungle.

The outermost dangers off Dead Man's Cove and Sweat Bay are described at 3.140; Clappenburg Island, NE of Dead Man's Cove, is described at 3.139.

- 4 Koddigar Bay is entered between Norway Point ( $8^{\circ}30'4N$ ,  $81^{\circ}16'7E$ ) and Marble Point, 4 miles W. The dangers off Norway Point and a landing site close to Fisherman's Rocks, on the E side of the bay, are described at 3.110 and 3.114.

- 5 Several rivers flow into the head of the bay. After heavy rains depths off the rivers Mahaweli Ganga and Koddigar Aru may be less than charted; a shoal depth seaward extension of  $\frac{1}{2}$  cable has been recorded. The outermost danger at the head of the bay is Brown Shoal.

- 6 Tambalagam Spit, which partly dries, extends 8 cables SE from the S entrance point of Tambalagam Bay (see below). Tambalagam Shoal lies a further 8 cables SE.

- 7 Naditivu, an islet with trees and bushes on its summit, standing 2 cables off the NW shore of Koddigar Bay, is surrounded by drying shoals and rocks. Depths less than 5 m extend about 3 cables offshore between the islet and Marble Point, 8 cables NE. The point appears from the E as a small, rounded hill 30 m high, connected by a low flat neck of land with Diamond Hill, 5 cables NW.

- 8 Niger Rock, awash and detached, lies 4 cables SE of Marble Point with Elizabeth Island a further 6 cables SE; except for its E side, Elizabeth Island is surrounded by dangers.

Tambalagam Bay is a shallow lagoon, over 4 miles long and surrounded by low-lying wooded country. Local knowledge is required by vessels entering this bay.

#### Restricted areas

##### 3.105

- 1 All anchorages and landings in the approaches to Trincomalee, and those within the harbour, are subject to security clearance from the Sri Lanka Navy and prior notification to the Pilot Station.

#### Currents

##### 3.106

- 1 Near Trincomalee the current sets as follows:

|                        |                                                                                   |
|------------------------|-----------------------------------------------------------------------------------|
| October to February    | Usually S-going at $\frac{1}{2}$ to 3 kn.                                         |
| March and April        | N-going at $\frac{1}{2}$ to $1\frac{1}{4}$ kn.                                    |
| May to July, September | Generally not appreciable, but irregular currents set strongly N and sometimes S. |
| August                 | N-going at $\frac{1}{2}$ to $1\frac{1}{4}$ kn.                                    |

- 2 See also 1.167



A NE-going current at a rate of 2 kn has been experienced off Norway Point (8°30'N, 81°17'E), setting out of Koddiyar Bay.

### Tidal streams

#### 3.107

- 1 See caution at 3.111.

### Principal marks

#### 3.108

##### 1 Landmarks:

- 1 Round Island Light (white round tower, 21 m high) (8°31'N, 81°13'E), standing on the summit of the island.
- 2 Dome (church, white) (8°34'N, 81°14'E), showing above the trees.  
Government Agent's (previously known as the Naval Commissioner's) House (white, flat-topped, two storeys, pillared verandah) (¾ cable N of church dome), standing amongst trees.  
Chapel Hill Light (white structure on a building, 8 m in height) (8°33'N, 81°14'E), standing on Chapel Hill (3.103). A conspicuous building (not charted) stands NW of the light.

### Directions

(continued from 3.93)

Charts 815, 816

#### 3.109

- 1 From a position off Trincomalee Bay the track leads through the bay to the pilot boarding position, N of Round Island (8°31'N, 81°13'E); this island should not be approached by vessels until cleared by the Pilot Station so to do.
- 2 **Approach from S.** From a position NE of Kevuliya (8°31'N, 81°19'E) (3.93), the track leads about 2 miles NW.  
**Clearing bearing.** To avoid Munayai Paru (below-water coral rock, steep-to) and a reef extending 1 mile NNW from Kevuliya, alteration to the W or SW should not be made until Round Island Light (3.108) bears 247°, or less, when the light changes to the white sector.
- 3 **Approach from N.** From a position about 6 miles N of Kevuliya the track leads S until Round Island Light (3.108) bears about 236°, when course should be altered SW.  
**Clearing bearing.** Flagstaff Point (3.103) bearing not more than 340° clears Chapel Rock and shoal water off Rocky Point to the E.

#### 3.110

- 1 From a position in the white sector (226°–247°) of Round Island Light (3.108) the track leads SW, passing (with positions from Round Island Light (8°31'N, 81°13'E)):
- 2 NW of Munayai Paru (5¼ miles NE) (3.109), thence: NW of Northesk Rocks (4 miles ENE), with a least depth of 1-2 m, lying 1 mile offshore, thence: SE of Chapel Rock (above-water) (2½ miles NE) which has a rocky ridge, awash at its outer end, extending 1½ cables NE, and:
- 3 NW of Norway Island (3 miles ESE) which stands 4 cables WSW of Norway Point. Other smaller islets stand 2 cables NW and SW of the point. Foul ground, to a distance of 4 cables offshore, fronts the point. Beacon Rock (above-water), standing 1½ cables SW of Norway Island, is the outermost danger to the W. Thence:
- 4 SE of Chapel Island (2 miles NE) which stands 1 cable off Chapel Point (3.103). The island is flat, with trees and bushes, in its N part; the higher part is bare with a large boulder at its summit. A chain of above-water rocks extends SW and NE from the island. Thence:  
SE of Elephant Island (1¼ miles NNE). Shoals, with dangerous rocks, extend 2½ cables NE of the island.

#### 3.111

- 1 **Clearing bearing.** Beacon Rock (above-water) (2¾ miles ESE), close SW of Norway Island, bearing not more than 220° (and just open NW of Norway Island) clears Northesk Rocks and Munayai Paru to the NW.
- 2 When about 7½ cables NE of Round Island, known locally as Patalamalai, with Kevuliya headland bearing 086½°, astern, the track leads W, passing into the red sector (226°–170°) of Round Island Light, to the vicinity of the pilot boarding position, 2 cables N of Round Island, or the designated anchorage to await a pilot.  
By day, Clappenburg Point Beacon (8°31'·9N, 81°12'·7E) (3.139) may make a convenient heading mark whilst manoeuvring to pick up the pilot.
- 3 **Caution.** Near Round Island a stream, apparently tidal, runs ESE and WSW sometimes attaining a rate of 1½ kn.  
**Anchorage,** for vessels awaiting a pilot, may be found 5 cables NW of Round Island as shown on the chart. See also 3.105.

### Useful marks

#### 3.112

- 1 Hood's Tower (8°32'·4N, 81°13'·7E).



Round Island Lighthouse bearing 170°, 1 mile (3.108)

(Original dated 1981)

(Photograph – HMAS Brisbane)

Elizabeth Island (bare rock, well defined summit, appears conical from N) (8°30'N, 81°13'E). A beacon (metal frame, radar reflector) stands on the N side of the island.

(Directions continue at 3.140)

### Anchorage and landing

Chart 815

#### Anchorage

##### 3.113

- 1 **General information.** Anchoring in the approaches to Trincomalee Harbour is only permitted, during daylight, for vessels awaiting a pilot, see 3.111, but vessels may find sheltered and convenient anchorage in Dutch Bay and Back Bay (8°36'N, 18°14'E). See also 3.105.
- 2 **Dutch Bay** (8°34'N, 81°15'E) is entered between the S side of Fort Frederick (3.103) and Dutch Point, 6 cables S. The shore of the bay is low and sandy, the flat land behind being occupied by part of the town of Trincomalee.  
Dutch Point, 33 m high to the tops of the trees, has a rocky sea face. The N part of the bay is shallow and rocky; Pra Malai, a small rocky islet stands ½ cable offshore.
- 3 **Anchorage.** During the height of the SW monsoon, Dutch Bay will be found a more convenient anchorage for boat work than Trincomalee Harbour and it is near the town. The best anchorage, shown on the chart in a depth of 12 m, is with Dutch Point bearing 174°, distant 2 cables.
- 4 **Landing.** This is not generally permitted; however, there is an excellent lee for landing anywhere along the shore of the bay and, normally, there is no swell. For details of security clearance see 3.114.

Charts 815, 816

#### Landings

##### 3.114

- 1 **General information.** Landing is not permitted except in an emergency; if this occurs and it is necessary to land, the Pilot Station and the Sri Lanka Navy Department are to be informed before a landing is made. See also 3.105
- 2 **Shell Bay** (8°31'N, 81°18'E), about 8 cables SW of Kevuliya (3.93), affords good landing during the SW monsoon in its NE corner, behind some detached rocks.  
**Koddiyar Bay** (3.104). Landing can be conducted, during the NE monsoon, in the shelter of Fisherman's Rocks (8°29'4N, 81°16'8E), which are above-water rocks with a tree standing on top, elevation 8 m.
- 3 **Round Island** (8°31'N, 81°13'E) (3.111). Landing can be conducted on either the E or SW sides, according to the monsoon. There is a narrow boat passage between the island and an islet standing ½ cable SW.

### Other names

##### 3.115

- 1 Sambore Bay (8°28'N, 81°16'E).  
Smooth Islet (8°30'N, 81°17'E), close S of Norway Point.  
Koddiyar Sand (8°28'N, 81°15'E).  
Uppu Aru (8°28'N, 81°12'E), a river.

## TRINCOMALEE HARBOUR

### General information

Chart 816

#### Position

##### 3.116

- 1 Trincomalee Harbour (8°33'N, 81°13'E) is situated on the NE coast of Sri Lanka.

#### Function

##### 3.117

- 1 It is the only entirely sheltered natural harbour in the South Asian sub-continent and acts as the main naval base for the Sri Lankan navy, the harbour is also under development as a commercial port, including improved alongside berthing. Vessels of almost any size can obtain anchorage in the harbour but there are only a limited number of alongside berths. See also 3.105.
- 2 **Trade.** The principal imports are cement, clinker and wheat in bulk; the main export is mineral sands and wheat bran peller in bulk.  
The town of Trincomalee, with an estimated population of 399 200 in 2004, lies on an isthmus in the NE part of the harbour.

#### Topography

##### 3.118

- 1 Trincomalee Harbour, about 3 miles in length, encloses a number of small islands and the shoreline is indented with picturesque bays and coves, separated by wooded ridges of moderate height, often aligned in an NE/SW direction. The entrance channel is deep and depths within the harbour gradually shoal into the various bays and coves.

#### Terrorism

##### 3.119

Acts of terrorism have occurred in Trincomalee Harbour, see 3.4.

#### Port limits

##### 3.120

- 1 The seaward limit of the harbour is a line between Clappenburg Point (8°31'9N, 81°12'7E) and Elephant Point, 8 cables ENE.

#### Approach and entry

##### 3.121

- 1 Trincomalee Harbour is approached through Trincomalee Bay and entered through the channel between Clappenburg Point and Elephant Point.

#### Traffic

##### 3.122

- 1 In 2003 the port was used by 115 vessels with a total dwt of 2 287 383.

#### Port authority

##### 3.123

- 1 The port is administered by the Sri Lanka Ports Authority, Inner Harbour Road, Trincomalee.

### Limiting conditions

#### Depths

##### 3.124

- 1 The entrance channel is deep, with a least depth about 22 m WSW of Elephant Point (3.140), and depths of more than 30 m may be found 1½ miles within the harbour. Elsewhere, the majority of the navigable waters in the harbour vary between about 11 m and 30 m.

**Deepest and longest berth****3.125**

- 1 Prima Jetty (3.147).

**Tidal levels****3.126**

- 1 The mean spring range is about 0.6 m and mean neap range about 0.2 m. See *Admiralty Tide Tables Volume 3*.

**Weather****3.127**

- 1 During the NE monsoon there is a heavy swell on the outer beaches; short duration but violent wind and rain storms occur; calms are frequent in the morning.

**Arrival information****Port radio****3.128**

- 1 See *Admiralty List of Radio Signals Volume 6(4)*.

**Notice of ETA required****3.129**

- 1 ETA should be sent 5, 3 and 1 day in advance; for details see *Admiralty List of Radio Signals Volume 6(4)*.

**Outer anchorages****3.130**

- 1 See 3.113.

**Pilots and tugs****3.131**

- 1 Pilotage, which is conducted by the Deputy Harbour Master, is compulsory. Pilotage is not available at night. Vessels arriving between 1800 and 2100 (local time) may be brought in at the Deputy Harbour Master's discretion. The pilot boards 2 cables N of Round Island (3.111).
- 2 See *Admiralty List of Radio Signals Volume 6(4)* for further details of pilotage.
- Tugs are available.

**Local knowledge****3.132**

- 1 Local knowledge is required by vessels entering Tambalagam Bay (3.104).

**Regulations concerning entry****3.133**

- 1 Vessels may enter during the hours of daylight only.

**Quarantine****3.134**

- 1 Pratique: The Port Health Officer boards vessels after arrival at the inner anchorage or at the berth. Pratique for a vessel arriving from another port in Sri Lanka is automatic. The following signals, from the *International Code of*

*Signals* where indicated, are to be shown by all vessels arriving off the port:

*Signal**Meaning*

- |   |                                                                               |                                             |
|---|-------------------------------------------------------------------------------|---------------------------------------------|
| 2 | Day: Flag Q<br>Night: Red and white lights, vertically disposed               | Vessel has not yet received pratique        |
|   | Day: House flag under ensign at stern<br>Night: White light under stern light | Vessel has been granted Restricted Pratique |
|   | Day: Flags QQQ<br>Night: Three green lights vertically disposed               | Vessel is infected                          |

**Harbour***Chart 816***Harbour layout****3.135**

- 1 The W side of Trincomalee Harbour is indented by four principal bays, each containing a number of coves, and is dominated by Great Sober Island (3.154) in its S part. The oiling berth and the bulk-grain berth lie, respectively, W and SW of Round Point (8°33'3N, 81°12'2E), on the W side of the harbour.
- 2 The E side of the harbour has one large bay, divided by Powder Island (3.157), with smaller coves lying to N and S. Depths of less than 5 m are more predominant and there are no alongside deep water berths. The Naval Yard (3.157), with its installations and facilities, lies on the N side of Ostenburg Ridge (3.103), in the SE part of the harbour.
- 3 In fair weather, good anchorage can be obtained in almost any part of Trincomalee Harbour. See also 3.105.

**Submarine cable****3.136**

- 1 A submarine cable crosses the E side of the harbour in a NW direction from the Naval Yard (3.157).

**Currents****3.137**

- 1 During November and December, the months with the greatest average rainfall, the current normally sets out of Trincomalee harbour; between ½ and 1 kn, in the centre of the channel and with greater rates near the shore. S of Elephant Point (3.140) the current sets SE at about 1 kn.
- 2 At a depth of 18 m, and probably less, the water flows inward at about half the rate of the outgoing surface flow. Little is known of currents inside Trincomalee Harbour during the SW monsoon.

**Weather****3.138**

- 1 The dry season is from April/May to September during the SW monsoon, although there is a tendency for showers in the afternoon and evening. A wind sometimes develops in the harbour causing small breaking waves which can endanger boats. See 3.127.
- 2 The climate of Trincomalee is generally healthy. See climatic table 1.211.

**Principal marks****3.139**

- 1 **Landmarks:**  
Round Island Light (8°30'8N, 81°13'4E) (3.108).



Clappenburg Point Beacon (masonry structure 3 m in height, disc topmark) ( $8^{\circ}31'9\text{N}$ ,  $81^{\circ}12'7\text{E}$ ), standing on Clappenburg Point. The point is the E extremity of Clappenburg Island, a narrow serrated ridge with two summits, shrubs on the crest, and straight bare cliffs on its S side. The cliffs terminate abruptly  $3\frac{1}{2}$  cables WSW of the beacon, where a causeway joins the island to the W shore.

2 Water tower (red obstruction light) ( $8^{\circ}32'4\text{N}$ ,  $81^{\circ}11'5\text{E}$ ).

Silos (red obstruction lights) ( $8^{\circ}33'2\text{N}$ ,  $81^{\circ}12'1\text{E}$ ), standing 2 cables SW of Round Point (3.143).

3 Building ( $8^{\circ}32'6\text{N}$ ,  $81^{\circ}13'2\text{E}$ ), standing  $\frac{3}{4}$  cable N of Ostenburg Point (3.141).

Norfolk House ( $8^{\circ}32'9\text{N}$ ,  $81^{\circ}13'5\text{E}$ ), the official residence of the Deputy Harbour Master.

4 Navy House (large white building, white flagstaff on top of flat roof) ( $8^{\circ}33'5\text{N}$ ,  $81^{\circ}13'8\text{E}$ ).

Beacon (white, conical) ( $8^{\circ}33'9\text{N}$ ,  $81^{\circ}13'2\text{E}$ ), marking Little Powder Island (3.157).

Government Agent's (previously known as the Naval Commissioner's) House ( $8^{\circ}34'2\text{N}$ ,  $81^{\circ}14'1\text{E}$ ) (3.108).

### Directions

(continued from 3.112)

#### Chart 816

#### 3.140

1 From a position N of Round Island Light ( $8^{\circ}30'8\text{N}$ ,  $81^{\circ}13'4\text{E}$ ) (3.108), in the vicinity of the pilot boarding position and in the white sector ( $165^{\circ}$ – $170^{\circ}$ ) of Round Island Light, bearing about  $167\frac{1}{2}^{\circ}$ , astern, the track leads 2 miles NNW, passing (with positions from Clappenburg Point Beacon ( $8^{\circ}31'9\text{N}$ ,  $81^{\circ}12'7\text{E}$ )):

2 ENE of Diamond Point (9 cables SSW) (3.104), which has White Top Rock (3.104) close NE. Thence:

3 ENE of Grommet Rock (awash) ( $4\frac{1}{2}$  cables S), which is seldom visible on a calm day but usually breaks during the SW monsoon. Thence:

4 About 3 cables ENE of Minden Rock, below-water, and Nade Munai Paar, a shallow patch (3 cables SE); both dangers are steep-to and are seldom marked by breakers or show in any way. Another shoal patch (depth 2.3 m), marked on its N side by a buoy (port hand), lies a further 1 cable SSW. Thence:

5 WSW of Elephant Rock (dangerous) ( $9\frac{1}{2}$  cables E), the outermost danger of shoals extending  $1\frac{1}{2}$  cables SW from Elephant Island (3.110) and marked  $\frac{1}{2}$  cable S by a buoy (starboard hand, with top mark). Thence:

6 Between Clappenburg Point (3.139) and Elephant Point (low-lying, the remains of an old fort stand on the point) (8 cables ENE). Shoals extend  $\frac{3}{4}$  cable SW from Elephant Point. Thence:

About 3 cables ENE of Pandi Aricha Munai Paar ( $1\frac{3}{4}$  cables ENE), a shoal patch.

#### 3.141

1 From a position in the white sector of Round Island Light (3.108) and close N of the S boundary of Trincomalee Harbour, the track continues NNW, passing (with positions from Eagle Point ( $8^{\circ}32'6\text{N}$ ,  $81^{\circ}12'9\text{E}$ )):

2 About  $1\frac{1}{4}$  cables WSW of Ostenburg Point (3 cables ESE) which lies at the SW extremity of Ostenburg

Ridge (3.103). A dangerous rock lies close SW of the point. Thence:

3 About  $1\frac{1}{4}$  cables ENE of Eagle Point, the E extremity of Small Sober Island, with a beacon (pole, black and white bands, triangle topmark) standing close S of the point. A light-buoy (port hand) is moored close E. Thence:

4 WSW of Dockyard Shoal (dangerous rocks, foul ground, shoals) ( $3\frac{1}{2}$  cables NE), marked S by a buoy (port hand), SW by a light-buoy (starboard hand) and NW by a buoy (starboard hand). Obstructions lie between the shoal and the shore SE. Thence:

5 About 1 cable ENE of a shoal patch (existence doubtful, depth 12.8 m) (2 cables NNW) and ENE of a wreck (the remains of a floating dock) and foul ground (3 cables NNW).

6 **Foul ground**, caused by a line of sunken moorings and ground tackle, extends  $1\frac{1}{4}$  cables SW and 3 cables NE from the mooring buoy 5 cables NE of Eagle Point.

#### 3.142

1 From a position in the white sector of Round Island Light (3.108) and about 8 cables ESE of Round Point ( $8^{\circ}33'3\text{N}$ ,  $81^{\circ}12'2\text{E}$ ), the track, for vessels bound for either No 1 Oiling Berth (3.147) or Prima Jetty (3.147), leads NW, passing (with positions from Round Point):

2 SW of York Shoal (dangerous rocks) (9 cables ESE), the WSW extremity of a spit extending 4 cables from York Island (3.157). The shoal is marked close SE by a buoy (starboard hand) and close W by a light-buoy (starboard hand); the positions of both buoys are approximate. Keroela Rock (below-water) lies  $\frac{1}{2}$  cable N of York Shoal. Thence:

3 SW of Powder Rocks (above and below-water, black in colour) (9 cables ENE); a beacon (masonry, white, conical) stands on the SW above-water rock and shoal ground surrounding the rocks is marked S by S Powder Light-buoy (port hand). Thence:

4 SW of Powder Spit buoy (starboard hand) (7 cables ENE) which marks the W extremity of shoal ground surrounding Powder Rocks.

5 **Foul ground**. From a position 7 cables E of Round Point, a line of sunken mooring buoys and ground tackle extends NE into Town Bay (3.157); and, from a position about 4 cables NE of the same point, a line of ground tackle and heavy chains extend up to 4 cables NE.

#### 3.143

1 Prima Jetty (3.147) is approached S of Round Point, the E end of a promontory, passing N of Sister Shoal (3 cables SSW) with a least depth over it of 0.6 m, which is marked NE by a buoy (port hand), and N of Forrester Rock (below-water) (3 cables SW), marked S by a buoy (safe water). There is a shoal patch  $\frac{3}{4}$  cable S, and foul areas close W and  $1\frac{1}{4}$  cables SSW, of Sister Shoal.

#### 3.144

1 No 1 Oiling Berth (3.147) is approached N of a light-buoy (port hand), moored  $\frac{1}{4}$  cable N of Round Point (3.143), and passing clear of Round Point Shoals (1 cable N and 2 cables NW of Round Point), which consists of 2 detached shoals marked SE by 2 buoys (starboard hand) and NW by a buoy (starboard hand).

### Useful marks

#### 3.145

1 Four radio masts ( $8^{\circ}32'5\text{N}$ ,  $81^{\circ}12'0\text{E}$ ), SE of Southampton Hill.



Two radio masts (red obstruction light) (8°32'6N, 81°13'3E), close within Ostenburg Point (3.141). Flagstaff (8°32'6N, 81°12'5E), standing on Gravel Hill, the wooded summit of Great Sober Island (3.154).

Bare slope (8°32'4N, 81°12'6E), on the SE shore of Great Sober Island.

## Berths

### Anchorage

#### 3.146

- 1 In fair weather, good anchorage can be obtained in almost any part of Trincomalee Harbour, but see 3.105 for details of security clearance.

### Alongside berths

#### 3.147

- 1 **Prima Jetty.** A T-headed jetty situated 1½ cables SW of Round Point (3.143), fronting a flour mill and silos, for use by bulk-grain carriers. The jetty, about 1 cable long, is flanked by dolphins and can accommodate vessels up to 229 m in length and 70 000 dwt. There is a depth alongside of about 13 m (1985).
- 2 **No 1 Oiling Berth.** A T-headed jetty, used for discharging tankers and bunkering, lies 3 cables W of Round Point; a mooring buoy is moored at each end of the jetty. Maximum size of vessel which can be accommodated is LOA 200 m, draught 9.75 m.  
No 2 and No 3 oiling berths, on the NW and SE sides of a pier, 2 cables long, 2 cables NW of No 1 Oiling Berth, are in ruins.
- 3 **Cod Bay.** Tokyo Cement Company Jetty, a detached dolphin jetty with a mooring buoy off each end, 185 m long, with a conveyor extending NW to the shore, is situated in Cod Bay (8°34'3N, 81°11'9E). The berthing length is 156 m, depth alongside 8.5 m.

## Port services

### Repairs

#### 3.148

- 1 Minor repairs can be undertaken.  
There is a slipway, for the use of naval craft only, in the Naval Yard situated close NE of Surgery Pier (3.157).

### Other facilities

#### 3.149

- 1 The Government Hospital is near the beach at the S end of Dutch Bay (3.113).  
There are a limited number of lighters for ships at anchor discharging cargo.

### Supplies

#### 3.150

- 1 Marine fuels at No 1 Oiling Berth (3.147), 24 hours notice; fresh water by barge; limited provisions.

### Communications

#### 3.151

- 1 The airport, for limited service of domestic flights only, is 16 km from Trincomalee.

### Harbour regulations

#### 3.152

- 1 There are a number of areas, some onshore, within the port into which entry is prohibited; some of these areas are described in the text for the approaches and for the port

but others may exist. Full details should be obtained from the local authority.

- 2 All anchorages and landings in the approaches to Trincomalee, and those within the harbour, are subject to security clearance from the Sri Lanka Navy and prior notification to the Pilotage Station before use.

## Shallow water alongside berths and landings

### Trincomalee Harbour—west side

#### 3.153

##### 1 Cautions:

For restrictions see 3.105.

Entry into Clappenburg Bay and Orlando Cove is prohibited without prior clearance from the Sri Lanka Naval Authorities.

- 2 **Clappenburg Bay** is entered between Clappenburg Island (8°32'N, 81°12'E) (3.139) and French Point, 4 cables NW. Biggs Point, 1 cable SW of French Point, has a spit with foul ground extending 1 cable SW. Clappenburg Wharf lies at the head of the bay, with a mosque standing close SW and a jetty ¾ cable N. There is a small pier and fishing club house close NW of Biggs Point; yachts can anchor off the pier. Two small ruined piers lie on the N side of Clappenburg Island.

- 3 **French Pass** (8°32'5N, 81°12'2E) lies S of a ruined causeway that joined the NW part of Great Sober Island to a spit, above-water and drying, extending NE from the W shore of the pass. The area is reserved as a pearl culture project.

#### 3.154

- 1 **Snug Cove** (8°32'3N, 81°12'0E). Bambara House Pier extends from the N side of the cove and there is a slipway on the S side.

- 2 **Orlando Cove** (8°32'7N, 81°12'8E) which lies between Great Sober Island, known locally as Pambuttivu, and Small Sober Island (3.141). The 2 islands are connected by a ruined causeway.

- 3 At the head of the cove, on the N side, there is a small stone jetty with depths of about 2 m alongside. Another small jetty projects NW from the N side of Small Sober Island.

- 4 **Malay Cove** (8°33'N, 81°12'E) is entered between the N side of Great Sober Island and Round Point (3.143). Sister Shoal and Forrester Rock, close within the entrance, are described at 3.143. Sri Lanka Air Force Jetty lies on the S side of the cove with a boatyard and slipway close W. Cat Cove, fringed with mangroves and coconut palms, lies at the head of Malay Cove.

#### 3.155

- 1 **China Bay** lying between Round Point (8°33'3N, 81°12'2E) (3.143) and Cod Point (3.156), 1 mile NNW, is divided, by Harden Point, into Boom Cove to the S and Railway Cove to the N. Round Point Shoals and No 1 Oiling Berth are described at 3.144 and 3.147. Boom Jetty extends N from the S shore, 4 cables W of Round point; a light is exhibited from a building a further 1¼ cables SW. A detached shoal patch with foul ground lies 2 cables E of Harden Point.

- 2 Waaf Pier (L-shaped) and Railway Pier, are situated in Railway Cove; both piers are disused.

- 3 Trincomalee Tea Traders Association Jetty, on the NW side of China Bay, is constructed on reclaimed land, with a large warehouse, and the wharf faced with concrete. There are 2 berths, the NE 117 m long, the SW 126 m long; the jetty is used by harbour tugs and pilot launches, one berth may be obtained for small craft up to 60 m in length and draught 2 m. An area of foul ground fronts the wharf. A

detached shoal, marked  $\frac{1}{2}$  cable SE by Railway Spit Buoy (port hand) lies 3 cables ENE of the wharf.

- 4 There is a mooring buoy situated in the centre of the bay with foul ground close W.

### 3.156

- 1 **Cod Bay** ( $8^{\circ}34'2N$ ,  $81^{\circ}11'9E$ ) is entered between Cod Point and Middle Point, 2 cables SE. The bay is divided into three coves Mangrove Cove, North Cove and Mud Cove, lying to the W, N and NE, respectively.

- 2 Foul ground lying close off Middle Point is marked by a buoy (starboard hand); the shoal ground extending NE from Cod Point is marked by a buoy (port hand). The detached dolphin jetty, central in the bay, is described at 3.147.

- 3 On the S side of Mangrove Cove there is a quay, about 1 cable in length, used by fishing vessels. A boat pier and a refrigerated store lie close W. Mud Cove pier is suitable for shallow draught vessels less than 60 m in length.

## Trincomalee Harbour—east side

### 3.157

- 1 **Caution.** The entire area, surrounding the Naval Yard, enclosed by a line joining Ostenburg Point ( $8^{\circ}32'6N$ ,  $81^{\circ}13'2E$ ), York Shoal Light-buoy, Keroela Rock, the N point of York Island and Pepperpot Jetty is prohibited, see 3.105.

- 2 **Naval Yard** extends 1.1 miles NE from Ostenburg Point (3.141) to Navy House (3.139). York Island, surrounded by shoal water which terminates SW in York Shoal (3.142), stands off the NE end of the Naval Yard and is separated from the shore SE by York Creek. See 3.141 and 3.136 for details of Dockyard Shoal (off the SW end of Naval Yard), off-lying foul ground and a submarine cable.

- 3 **Landing places** and jetties within the Naval Yard are as follows (positions from Three Fathom Jetty ( $8^{\circ}32'7N$ ,  $81^{\circ}13'2E$ )):

| Name                 | Position                 | Depth (m)/<br>Remarks               |
|----------------------|--------------------------|-------------------------------------|
| 4 Three Fathom Jetty | —                        | Sunken wrecks at berth              |
| Two Fathom Jetty     | $\frac{1}{2}$ cable NE   | Stranded and sunken wrecks at berth |
| Yard Steps           | $1\frac{1}{2}$ cables NE | 0.9                                 |
| Navy Office Landing  | 2 cables NE              | 1.5                                 |
| 5 Saigang            | $2\frac{1}{2}$ cables NE | Works in progress 1992              |
| Surgery Pier         | 4 cables NE              | 1.4                                 |
| CNAD Pier            | 6 cables NE              | 2.3 at its S corner                 |

| Name | Position | Depth (m)/<br>Remarks |
|------|----------|-----------------------|
|------|----------|-----------------------|

Civil Engineer's Jetty 7 cables NE 1.8 at its head

- 6 Navy House Pier 9 cables NE Light exhibited at head

- 7 **Town Bay** lies between Powder Island ( $8^{\circ}33'7N$ ,  $81^{\circ}13'5E$ ) and York Island (3.157), 6 cables S. Powder Island, which is covered in shrub, elevation about 2 m to the shrub-top; is connected to the mainland by a causeway and forms part of a broad rocky spit, mainly below-water, that extends SW, terminating in Powder Rocks (see 3.142). Various government offices, including the Port Authority building, stand at the head of Town Bay.

- 8 Several detached rocky shoals lie between the 5 and 10 m depth contour lines. For details of foul ground see 3.142.

- 9 Pepperpot Jetty extends 1 cable WNW from the shore in the SE corner of Town Bay; a light is exhibited from the jetty head. Town Pier, partly in ruins, lies a further 3 cables N. Passenger Pier stands at the NW end of the bay; a light, difficult to distinguish against floodlights, is exhibited from the pier head.

- 10 **Powder Bay** ( $8^{\circ}34'N$ ,  $81^{\circ}13'E$ ) lies between Powder Island and Plantain Point, 1 mile W. A beacon (masonry, white, cylindrical) stands on the point with a lookout tower about  $1\frac{1}{2}$  cables NE. Shoals and rocks (dangerous and drying) extending 1 cable SW from the point are marked by Plantain Buoy (starboard hand).

- 11 A number of ruined piers lie NE of Plantain Point on the N shore of the bay and a buoy (yellow, special) is moored  $3\frac{1}{2}$  cables SE of the point.

Submarine cable, see 3.136.

- Little Powder Island (above-water rock) stands  $2\frac{1}{2}$  cables W of Powder Island with Mangrove Island, a small sandy islet, close N and a beacon (3.139) close E.

- 12 For Powder Rocks see 3.142.

Powder Boat Passage lies between Little Powder Island and Powder Rocks. The NE side of the passage is marked, at its NW end in Powder Bay, by Mid Powder Buoy (starboard hand).

- 13 Vegetable Pier, L-shaped with a wreck at its head, and a beacon,  $1\frac{1}{2}$  cables NNW, stand at the head of the bay.

## Other names

### 3.158

- 1 Engineer Ridge ( $8^{\circ}34'3N$ ,  $81^{\circ}12'2E$ ).  
Mount Challenger ( $8^{\circ}33'2N$ ,  $81^{\circ}11'9E$ ).  
Nicholson Cove ( $8^{\circ}32'5N$ ,  $81^{\circ}13'4E$ ).  
Orr's Hill ( $8^{\circ}34'5N$ ,  $81^{\circ}13'1E$ ).  
Pinnacle Rock ( $8^{\circ}33'8N$ ,  $81^{\circ}13'5E$ ).  
Wemyss Point ( $8^{\circ}34'4N$ ,  $81^{\circ}11'8E$ ).  
Yard Cove ( $8^{\circ}34'3N$ ,  $81^{\circ}12'5E$ ).

## TRINCOMALEE TO POINT PEDRO

### TRINCOMALEE TO MULLAITTIVU

#### General information

*Charts 1583 with plan of Pulmoddai Roads, 815, 1584*

#### Route

##### 3.159

- 1 From a position off Trincomalee Bay (8°32'N, 81°16'E) (3.101) the route leads 52 miles NW to a position NE of Mullaittivu (3.169).

#### Topography

##### 3.160

- 1 Between Elizabeth Point (8°38'N, 81°13'E) (3.171) and Koduwakattumalai (3.168), 17 miles NW, the coast consists of long sandy beaches fronting several lagoons, with shallow bars at their entrances. The shore is generally wooded and backed by low hills.
- 2 Reefs and foul ground extend up to two miles offshore between Elizabeth Point and Ava Point (3.167), 7 miles NNW, and for about 1¼ miles offshore between Ava Point and Shoulder Point (3.168), 16 miles farther NW.
- 3 The coastline between Shoulder Point and Mullaittivu (3.169), 23 miles NW, is very straight and generally low with occasional lagoons backing the shore.

#### Depths

##### 3.161

- 1 The depths off the coast are fairly regular except for rocky patches within the 10 m depth contour line which extends to 2 miles off the coast, and to 5 miles when Mullaittivu Shoals (3.169) are approached; less water than charted was reported (2001); see legend on chart.

#### Navigational restriction

##### 3.162

- 1 See 3.8.

#### Currents

##### 3.163

- 1 See 3.106 and 1.167.  
Along the NE coast of Sri Lanka currents are dominated by circulation in the Bay of Bengal with S sets from July to January and N sets from February to June. They can often be strong, although the average rate is 1 kn.

#### Positional datum

##### 3.164

- 1 See note on chart 1584.

#### Principal marks

##### 3.165

- 1 **Landmarks:**  
Framework tower (61 m in height) (8°51'N, 81°04'E), 7½ cables SW of Koduwakattumalai (3.168).  
Mullaittivu Light (metal framework tower, 20 m in height) (9°16'N, 80°49'E).

#### Directions

(continued from 3.93)

*Charts 1583 with plan of Pulmoddai Roads, 815, 1584*

#### Caution

##### 3.166

- 1 A number of unexamined rocks and shoals within the 20 m depth contour lie off the coast between Elizabeth Point (8°38'N, 81°13'E) (3.171) and Pulmoddai Roads,

22 miles N. Other uncharted dangers may also exist both farther offshore between Elizabeth Point and Pulmoddai Roads and farther N between Pulmoddai Roads and Mullaittivu (9°16'N, 80°49'E) (3.169).

- 2 It is advisable to remain in depths of more than 40 m by day and more than 50 m by night, or in thick weather, between Elizabeth Point and Mullaittivu.

### Trincomalee to Pulmoddai Roads

#### 3.167

- 1 From a position off Trincomalee Bay (8°32'N, 81°16'E) the route leads about 30 miles NW to a position off Pulmoddai Roads (3.174), passing (with positions from Pura Malai (8°43'N, 81°12'E)):
  - NE of Flagstaff Point (3.103) (8½ miles SSE), the N extremity of Fort Frederick. Klahati Paar, a shoal patch, lies 5 cables NE of the point. Thence:
- 2 NE of Lively Rocks (above and below-water) (5¾ miles SSE), the outermost danger of a rocky shoal spit extending 4½ cables E from Elizabeth Point (3.171) (low, not easily distinguished). Two of the rocks are always above water; the sea nearly always breaks on one of the below-water rocks. Thence:
- 3 NE of Malai Porru Putta Paar (dangerous shoal, steep-to) (5 miles SSE), over which the sea does not always break.
- 4 **Clearing bearing.** The E extremities of Fort Frederick (3.103) and Chapel Island (8°33'N, 81°15'E) (3.110) in line bearing 179° clears Malai Porru Putta Paar to the E.
- 5 NE of Pura Malai (small rocky island), with shoals extending E and a rocky islet 6 cables SSE. Many rocks (above-water, drying, awash and below-water) lie SE, S and SW of Pura Malai; the outermost of these dangers is a 3 m shoal (2½ miles SE) lying 1½ miles offshore. A 7.3 m shoal lies a further 4 cables E. Thence:
- 6 NE of Ava Point (2 miles NW) which has foul ground extending 1½ miles ENE.

*Charts 1583 with plan of Pulmoddai Roads, 1584*

#### 3.168

- 1 From a position NE of Ava Point (3.167) the route continues NW, passing (with positions from Koduwakattumalai (8°52'N, 81°05'E)):
  - NE of Kokupeahykalla (above-water rock) (5 miles SE), thence:
- 2 NE of Koduwakattumalai, the NE of two rocky headlands separated by a sandy bay. A tower (3.165) stands 7½ cables SW and a group of above-water rocks stand 2 miles NW of the point. Thence:
- 3 NE of Shoulder Point (5¾ miles NW), a low rocky headland fringed by a reef with a stranded wreck showing the bridge and the top of two deck cranes and an above-water rock lying, respectively, about 9 and 3 cables ENE of the point. An un-examined dangerous reef, on which the sea breaks, lies 1 mile SE. A light (elevation 18 m) is exhibited from a beacon 3 cables SW.

### Pulmoddai Roads to Mullaittivu

#### 3.169

- 1 **Caution.** When passing Mullaittivu Shoals (3.169), it is advisable to remain in depths of more than 40 m by day



and more than 50 m by night, or in thick weather. See 3.166.

- 2 From a position off Pulmoddai Roads (8°58'N, 81°01'E) (3.174) to a position NE of Mullaivittu the route leads 23 miles NW, passing (with positions from Black Point (9°06'N, 80°54'E)):
- 3 NE of a 9.1 m shoal (11½ miles SE), thence:  
Dependent on draught clear of a 11.3 m shoal (8½ miles SE), thence:  
NE of Black Point (reddish cliffs); the entrance to a lagoon (2 miles NW) is also distinctive. Thence:
- 4 NE of Mullaivittu Shoals (12 miles NNW). Mullaivittu Light (3.165) stands within the village of Mullaivittu. The shoals extend 4 miles SE, 3½ miles ENE and 5 miles NE from the light, with a dangerous wreck lying on the SE edge of the shoal and dangerous rocks closer inshore. During the NE monsoon the sea breaks heavily on the N side of the shoals. Depths of less than 9.4 m extend a further 13 miles NW, forming a shoal bank lying about 5 miles offshore.

### Useful marks

#### 3.170

- 1 Chapel Hill Light (8°33'N, 81°15'E) (3.108).  
Radio mast on Fort Frederick (8°35'N, 81°15'E) (3.103).  
Back Bay Light (mast at the NW corner of a house, elevation 8 m; shown during the SW monsoon) (8°35'N, 81°14'E).  
Nilaveli Hill (sugar loaf shape) (8°40'N, 81°12'E).
- 2 Four radio masts (8°42'N, 81°11'E), 1½ miles NNW of Nilaveli Hill.  
Pinnacle Rock (hill, sharp finger-like peak) (8°46'N, 81°06'E).  
Pulmoddai Pier Light (at pier head, elevation 6 m) (8°56'6N, 80°59'8E).
- 3 Light (exhibited from a beacon, elevation 18 m) (8°57'3N, 80°59'2E), 9 cables NW of Pulmoddai Pier light.  
(*Directions continue at 3.185*)

### Anchorage and landings

#### Chart 815

#### Back Bay

##### 3.171

- 1 Back Bay, used extensively during the SW monsoon by local craft trading with Trincomalee, lies between Flagstaff Point (8°35'N, 81°15'E) (3.103) and Elizabeth Point, 3 miles NNW.
- 2 The NW side of Fort Frederick (3.103), which forms the SE side of the bay, is rocky at sea-level with steep wooded and grassy slopes above. The W shore of Back Bay consists of a smooth sweep of sand fringed with coconut palms and backed by a range of low, wooded hills without distinctive peaks. The W shore is interrupted in its S part by Bazaar Rock (above-water), standing at the outer end of a drying reef and surrounded by foul ground.
- 3 Red Bluff (2 patches of bare earthy cliff, covered in jungle), at the N end of the bay, stands at the N entrance point of a large salt water lagoon. Elizabeth Point, the N point of the bay, is low, not easily distinguished, and backed by coconut trees. A drying coral reef fronts the point and Lively Rocks (3.167) stand 4½ cables E.  
Back Bay Light (3.170) stands 7 cables WSW of Flagstaff Point.

- 4 **Anchorage** may be obtained anywhere in Back Bay during the SW monsoon but it is dangerous in the NE monsoon. The most convenient berth is with Flagstaff Point (3.103) bearing 137°, distant 6 cables, in a depth of 14 m, sand.

- 5 **Landing** can be carried out anywhere in Back Bay during the SW monsoon; during the NE monsoon, when the surf is not too high, landing can be conducted at the mouth of the salt water lagoon.

#### Charts 1583, 1584

#### Koduwakattumalai

##### 3.172

- 1 **Anchorage.** In the SW monsoon vessels may obtain sheltered anchorage up to 2 miles offshore S of Koduwakattumalai (8°52'N, 81°05'E) (3.168) in depths from 18 m to 27 m, mud, and farther NW along the coast in depths from 16 m to 18 m.

**Landing** can be carried out at Koduwakattumalai during the SW monsoon, although the swell is liable to be heavy. Landing during the NE monsoon is dangerous.

#### Chart 1584

#### Mullaivittu

##### 3.173

- 1 **Landing.** The most sheltered landing, N of Back Bay (3.171), may be found close S of Mullaivittu Light (9°16'N, 80°49'E) (3.165) but, as elsewhere, landing is dangerous during the NE monsoon.

### Pulmoddai Roads

#### Chart 1583 plan of Pulmoddai Roads

##### 3.174

- 1 **General information.** Pulmoddai Roads (8°57'N, 81°01'E), an open roadstead lying off the village of Pulmoddai, is used by vessels embarking ilmenite and rutile ores by lighter, during the loading season from April to September.

Shoulder Point and its off-lying dangers are described at 3.168; three lights are exhibited at Pulmoddai, see 3.168 and 3.170.

- 2 **Traffic.** International traffic is negligible; in 2003 no vessels called at the Roads.

**Notice of ETA** is required by the Plant Manager Mineral Sands Corporation to facilitate the arrangement of labour from Trincomalee.

- 3 **Berth.** A pier 76 m long, is situated 7 cables NW of Shoulder Point; the ore is transported along the pier by conveyor belt for lighterage.

- 4 **Facilities:** Eight steel lighters (six of 100 tonnes and two of 200 tonnes capacity), loading rate up to 2600 tonnes/day in good weather; medical practitioner employed by the Corporation who also grants pratique.

**Communications.** A launch service is available, it is run to the Corporation Schedule.

- 5 **Landing** can be carried out during the SW monsoon close N of the entrance to Kokkilai Lagoon 4 miles NNW of Shoulder Point; the swell is liable to be heavy. A ferry crosses the entrance to the lagoon.

### Other names

##### 3.175

- 1 Andambanmalai (8°46'N, 81°05'E), a hill.  
Dhow Chan Rock, 7 cables NW of Fairlie Rocks, see below.  
Diomedes Rock, 1½ miles NNW of Fairlie Rocks, see below.



Fairlie Rocks (8°40'N, 81°13'E).  
 Nilapannikanmalai (8°49'N, 80°59'E), a hill.  
 Yan Oya (8°55'N, 81°01'E), a river.

## MULLAITTIVU TO POINT PEDRO AND POINT CALIMERE

### General information

*Charts 2197, 1584*

#### Route

##### 3.176

- 1 From a position NE of Mullaittivu (9°16'N, 80°49'E) (3.169) the route leads NW to a position either NE of Point Pedro (9°50'N, 80°15'E) (3.184), within Pedro Channel (3.187), for vessels bound for Palk Bay (3.216), or to a position E of Point Calimere Light (10°17'N, 79°52'E) (3.204), passing to seaward of Point Pedro Shoal (3.187), for vessels bound for the Bay of Bengal.

#### Topography

##### 3.177

- 1 The coast is straight with occasional gaps breaking the shoreline, some of which are distinctive. Extensive lagoons lie close inland and the surrounding land is generally low, much of it covered in trees. A number of churches and shrines are scattered along the coast, many of which are visible from seaward.

#### Controlling depth, Pedro Channel

##### 3.178

- 1 The controlling depth in the SE approaches to Pedro Channel (3.187) and its continuation W into West Channel (3.206) is 10.1 m. See also 3.161.

#### Navigational restriction

##### 3.179

- 1 See 3.8.

#### Terrorism

##### 3.180

Acts of terrorism have occurred in waters off Point Pedro (3.184), see 3.4.

#### Anchorage

##### 3.181

- 1 Anchorage in Pedro Channel (3.187) between positions 6½ miles SE and 2½ miles WNW of Point Pedro (3.184), is prohibited.  
 In cases of necessity, good anchorage may be obtained elsewhere in the channel.  
**Traffic** In 2003, 5 vessels with a total dwt of 66 063 used the anchorage.

#### Currents

##### 3.182

- 1 See 3.163.

#### Horizontal datum

##### 3.183

- 1 See note on chart 1584.

#### Principal marks

##### 3.184

- 1 **Landmarks:**  
 Mullaittivu Light (9°16'N, 80°49'E) (3.165).  
 Pedro Channel South Obelisk (white structure, white diamond topmark, elevation 22 m) (9°35'N, 80°28'E), which may be partly obscured by trees.

- 2 Point Pedro Light (white masonry tower, elevation 31 m) (9°50'N, 80°15'E) standing on Point Pedro, the NE point of Sri Lanka. The coast for about 1 mile SE of Point Pedro is lined with tall trees, about 20 m high.
- 3 Point Calimere Light (white round masonry tower, red bands, 16 m in height) (10°17'N, 79°52'E) (3.204).  
 Kodiyakkarai Light (white round masonry tower, red bands, 45 m in height) (10°16'8N, 79°49'4E) (3.204)
- 4 **Major lights:**  
 Point Calimere Light—as above.  
 Kodiyakkarai Light—as above.

#### Directions

*(continued from 3.170)*

*Charts 2197, 1584, 2069*

#### Directions, vessels bound for the Bay of Bengal 3.185

- 1 From a position NE of Mullaittivu (9°16'N, 80°49'E) (3.169) to a position E of Point Calimere Light (3.204), the route leads 70 miles NW passing NE of Point Pedro Shoal (3.187), and NE of South Banks (3.206) and Middle Banks (3.208), which are the shallowest parts of the shoal ground lying in Palk Strait (3.197).
- 2 **Caution.** Between Mullaittivu and Point Calimere Light, it is advisable to remain in depths of more than 40 m by day and more than 50 m by night.  
*(Directions are continued in the Bay of Bengal Pilot)*

*Charts 2197, 1584*

#### Directions, Pedro Channel

##### 3.186

- 1 From a position NE of Mullaittivu (9°16'N, 80°49'E) (3.169) to a position NE of Point Pedro Light (3.184), the route leads about 50 miles NW, passing (with positions from Pedro Channel South Obelisk (9°35'N, 80°28'E)): NE of Mullaittivu Shoals (3.169) (29 miles SE) and the shoal bank, with depths of less than 9.4 m, extending 13 miles NW from Mullaittivu Shoals.
- 2 **Leading mark.** The line of bearing 280° of Pedro Channel South Obelisk (3.184) leads to the SE entrance point of Pedro Channel (3.187), passing:  
 NNE of the NW extremity (15 miles ESE) of the shoal bank extending NW from Mullaittivu Shoals, thence:  
 SSW of the SE extremity (6½ miles ENE) of Point Pedro Shoal (3.187).
- 3 The best time to make the obelisk is during the forenoon, arriving at the SE end of Pedro Channel about noon, thereby retaining the obelisk visually from N until the high trees and lighthouse at Point Pedro (3.184) are identified.
- 4 **Cautions.** Shallower depths than charted and discoloured water have been reported in the approaches to Pedro Channel. Although it is unlikely that Pedro Channel South Obelisk will be visual initially, until the coast has been closed, it is advisable to use the leading mark, as described.  
 During SW winds a red sand-haze forms over the land which may reduce coastal visibility to about 3 miles.  
 See also 3.169.

##### 3.187

- 1 Once clear SSW of the SE extremity of Point Pedro Shoal the route leads NW, through Pedro Channel, passing about mid-way between the coast and Point Pedro Shoal, to a position NE of Point Pedro Light (3.184). The channel, gradually narrowing to 2 miles wide at its NW end, has

depths of between 10·4 and 17·4 m but shallower depths have been reported. Point Pedro Shoal, with depths between 9·1 and 1·8 m, has two shallow heads, Ethiopia Shoal and Stork Shoal, lying, respectively, 9 miles SE and 6 miles ESE from Point Pedro Light (3.184).

- 2 Two stranded wrecks, the positions of which are approximate, lie on Point Pedro Shoal, one towards its SE end the other abreast Point Pedro, as shown on the chart.

### Useful marks

#### 3.188

- 1 Hillock (9°20'N, 80°45'E).  
Gap in the coast with a conspicuous tree close NW (8 miles NW of the hillock); distinctive between bearings 200°–248°.  
Distinctive gap in the coast with a conspicuous tree close SE (11 miles NW of the hillock).
- 2 Church in the village of Kaddaikadu (9°34'N, 80°29'E), prominent between bearings 180°–200°.

Saint Mary's Church (red roof) in the village of Kudarappu (9°41'N, 80°21'E), visible at intervals between the trees.

- 3 Pedro Channel Middle Beacon (masonry, black and white bands, elevation 17 m) (9°41'·4N, 80°20'E). Sand dunes, 4 miles NW of Pedro Channel Middle Beacon.  
Church (red roof), 5 miles NW of Pedro Channel Middle Beacon.
- 4 Church in the village of Manatkadu (9°46'·5N, 80°16'·3E), reported (1948) distinctive between bearings 188°–270°.

*(Directions continue at 3.206)*

### Other names

#### 3.189

- 1 Chalai (9°25'N, 80°40'E), a village.  
Chundikulam (9°28'N, 80°35'E), a village.  
Katkovalam (9°49'N, 80°15'E), a village.

## PALK STRAIT AND PALK BAY

### GENERAL INFORMATION

*Charts 2197, 69, 1584*

### International maritime boundary

#### 3.190

- 1 The international boundary between Sri Lanka and India, which approximately bisects the strait and the bay, is shown on the charts; geographical co-ordinates are at 1.92.

### Tidal streams

#### 3.191

- 1 The tidal streams in Palk Strait and Palk Bay are generally irregular, being influenced by the prevailing winds. However during February, March and April they are more predictable, changing about every 6½ hours at HW and LW in the bay. In Palk Strait the tidal streams set WSW on the falling tide and ENE on the rising tide at Trincomalee.
- 2 Within Palk Bay tidal streams follow the general direction of the coast in a broadly anti-clockwise movement on the rising tide, setting NE west of Delft Island (3.224) and NW through Delft Channel (3.224), and clockwise, reversing direction, on the falling tide.
- 3 Spring rates of nearly 1 kn in Delft Channel and about ¾ kn in West Channel (3.206) may be found.  
See also information on the charts.

### Currents

#### 3.192

- 1 See note on charts 2197 and 69.  
The current in Palk Strait generally sets with the wind, except in May and October when it is variable. During February, March and April, in a calm, there is no current in the strait. A set out of Palk Strait usually occurs when the current outside the strait is setting N; the reverse may take place with a S offshore current.
- 2 The rate and direction of the inshore tidal stream varies the strength of the current near Middle Banks (3.208).  
In the middle of Palk Bay the current sets to leeward in both monsoons.

### Winds

#### 3.193

- 1 The NE monsoon prevails from the end of November until February and the SW monsoon from mid-May until October; SE winds prevail during March until mid-April.

### Horizontal datum

#### 3.194

- 1 See note on charts 2197 and 69.

## PALK STRAIT

### General information

*Charts 2197, 69*

### Routes

#### 3.195

- 1 There are 4 principal routes through Palk Strait:  
Pedro Channel leading to West Channel (3.206), used by large vessels.  
East Channel leading to West Channel (3.207), normally used by local vessels.  
Middle Channel (3.208), which is out of sight of land.  
North Channel (3.209), normally used by local vessels.

### Channel depths

#### 3.196

| Channel        | Least depth (m) |
|----------------|-----------------|
| West Channel   | 10·1            |
| East Channel   | 7·3             |
| Middle Channel | 5·6             |
| North Channel  | 4·0             |

### Topography

#### 3.197

- 1 Palk Strait, forming the NE entrance to Palk Bay, lies between the N coast of Sri Lanka and the E coast of India.
- 2 The S shore of the strait, formed by the N coast of Jaffna Peninsula, is sandy and backed by salt water lagoons and stony plains. The coast is low, much of the land given over to cultivation and plantations, with many tall trees

close inland, and some cliffs and sandhills visible from seaward. A drying reef, extending up to 1 cable offshore, fringes much of the coast.

- 3 The NW shore of Palk Strait is formed by the low-lying coast between Point Calimere (3.204) and a low point close S of Vellār River mouth, 39 miles WSW of Point Calimere. The coast consists of mangrove covered mud flats which flood during heavy rains and at HW springs. The land near Point Calimere is a forest reserve and landing is prohibited.
- 4 Palk Strait is largely occupied by an extensive shoal bank, with depths of less than 10 m, on which lie Middle Banks (3.208) and South Banks (3.206), with depths of less than 5 m.

### **Terrorism** **3.198**

Acts of terrorism have occurred in waters off Point Pedro (3.184), see 3.4.

### **Hazard** **3.199**

- 1 There are many fish traps, with large blocks of wood and strong moorings attached, laid off the N coast of Sri Lanka which are a danger to vessels, especially at night.

### **Navigational restriction** **3.200**

- 1 See 3.8.

### **Prohibited anchorage** **3.201**

- 1 See 3.181.

### **Tidal streams** **3.202**

- 1 See 3.191.

### **Currents** **3.203**

- 1 See 3.192.

### **Principal marks** **3.204**

- 1 **Landmarks:**  
Point Pedro Light (9°50'N, 80°15'E) (3.184).  
Western Bastion Light (round masonry tower, 22 m in height, obscured by trees when bearing less than 090°) (9°49'N, 80°03'E).
- 2 Chimney (elevation 61 m) (9°49'N, 80°02'E), 8½ cables SW of Western Bastion light.  
Sand hill (9°47'N, 79°57'E).  
Kovilan Light (white masonry tower, 30 m in height) (9°46'N, 79°52'E), standing on Kovilan Point, the NW point of the island of Karaitivu (3.213).
- 3 Obelisk (white, 24 m in height) (9°41'N, 79°47'E), standing at the N point of the island of Analaitivu (3.222).  
Point Calimere Light (white round masonry tower, red bands, 16 m in height) (10°17'N, 79°52'E), standing close within Point Calimere.
- 4 Kodyakkarai Light (white round masonry tower, red bands, 45 m in height) (10°16'8N, 79°49'4E), 2¾ miles WSW of Point Calimere Light.
- 5 **Major light:**  
Point Calimere Light—as above.  
Kodyakkarai Light—as above.

### **Other aid to navigation**

#### **3.205**

- 1 Racon (10°17'N, 79°52'E), at Point Calimere Light. For details see *Admiralty List of Radio Signals Volume 2*.

#### **Directions** (continued from 3.188)

Chart 2197

#### **Pedro Channel to West Channel**

##### **3.206**

- 1 **Caution.** It is advisable to keep at least 5 cables off the coast between Thondaimanaru, 7 miles W of Point Pedro Light, and Kankasanturai, a further 5½ miles W. See also 3.199.
- 2 From a position NE of Point Pedro Light (9°50'N, 80°15'E) (3.184), at the NW end of Pedro Channel, to a position at the W end of West Channel, the track leads generally W for about 35 miles, passing (with positions from Western Bastion Light (9°49'N, 80°03'E)):
- 3 N of Palmyra Point (10 miles E), thence:  
N of Kankasanturai (6 cables W) (3.212), thence:  
Clear of a dangerous wreck (about 1½ miles NNW), thence:
- 4 S of South Banks (11 miles NNW), consisting of four separate shoals with depths of 5 m and less. Depths of less than 10 m extend ESE to join Point Pedro Shoal (3.187) and SW to form the N side of West Channel (3.206). Thence:
- 5 N of shoal ground (7 miles W), with depths of less than 5 m, extending up to 2 miles offshore from the NW coast of Jaffna Peninsula (3.197), thence:  
N of Kovilan Light (3.204) (11 miles WSW) which stands on the NW point of Karaitivu (3.213).
- 6 At the E entrance to West Channel, with Kovilan Light (3.204) bearing about 158° and the obelisk (3.204), on the N end of Analaitivu, bearing about 207°, the track leads 281°, passing through West Channel. The channel, with a least width of 1 mile at the W end, is formed by the shoals extending 13 miles SW from South Banks and shoal ground (hard sand, probably overlying coral), with isolated patches less than 5 m, extending 8½ miles WNW from Kovilan Point (3.204).

#### **East Channel to West Channel** **3.207**

- 1 From a position in the vicinity of 10°02'N, 80°09'E, with an isolated shoal, depth 7·3 m, 4 miles E, the track leads 185° for about 7 miles through East Channel. The channel is poorly defined, crossing the shoal bank which joins South Banks (3.206) and Point Pedro Shoal (3.187).
- 2 **Leading mark.** When identified, the lagoon entrance close W of the village of Thondaimanaru (7 miles W of Point Pedro Light 3.184), bearing 185°, makes a convenient heading mark.
- 3 When depths have increased to about 11 m the directions at 3.206 should be joined; the track leading W to the entrance to West Channel (3.206).

#### **Middle Channel** **3.208**

- 1 From a position in the vicinity of 10°08'N, 80°03'E the track leads about 20 miles WSW through Middle Channel, which is about 3 miles wide, then crosses extensive shoal ground, with depths of less than 10 m, lying W of the channel, passing (with positions from Point Calimere Light (10°17'N, 79°52'E)):
- 2 Between the N shoal (depth 4·9 m) (14½ miles SSE) of South Banks (3.206), and:



The S shoal (depth 5 m) (11½ miles SSE) of Middle Banks, which consists of numerous shoals of less than 5 m and includes, in their N part, Eight Foot Patch.

### North Channel

#### 3.209

- 1 **Caution.** Approaching from the SE and E, it is advisable to remain in depths of more than 10 m until Point Calimere Light (10°17'N, 79°52'E) (3.204) has been identified.
- 2 North Channel lies between Eight Foot Patch (3.208) and the shore bank fronting Point Calimere (3.204), it is about 3 miles wide at this point, but two patches of 4.5 m and 4.0 m situated, respectively, 4¼ miles SE and 3¾ miles S of Point Calimere Light lie close to the centreline of the channel.
- 3 From a position about 10 miles E of Point Calimere Light the track leads 27 miles; first W, then SW through North Channel and across the shoal ground lying SW of the channel, Thence pass:  
Southeast of a spit of hard sand, with depths of less than 5 m, that extends 12½ miles E from the low point close S of Vellār River mouth (10°04'N, 79°15'E).
- 4 **Caution.** A heavy sea generally runs over the spit described above. It is advisable to remain in depths greater than 11 m in its vicinity.

### Useful marks

#### 3.210

- 1 A light, exhibited from the pierhead at the town of Point Pedro (9°49'·6N, 80°13'·9E) (3.211), 7½ cables W of Point Pedro (3.184).  
Radio mast (red obstruction lights, elevation 22 m), stands close SW of the above pierhead light.
- 2 Radio mast (red obstruction lights, elevation 22 m) (9°49'·4N, 80°10'·2E).  
Sandhill (with some palm trees on it, elevation 6 m) (9°45'·9N, 79°53'·6E), at the NE point of Karaitivu (3.213), prominent from NW.  
(Directions continue at 3.222)

### Anchorage and harbours

#### Chart 2197

#### Point Pedro

#### 3.211

- 1 Point Pedro Town. A town with a port which is open from mid-February to mid-October, lies 7½ cables W of Point Pedro (9°50'N, 80°15'E) (3.184). In 1991, the port recorded 7 international movements, totalling 13 714 grt.
- 2 The port has a small pier and a custom house, with a prominent red roof, is close by. A light is exhibited at the pierhead.  
A boat channel leads through the reef abreast the custom house.

#### Chart 2197, with plan of Kankesanturai Harbour

#### Kankesanturai Harbour

#### 3.212

- 1 **General information.** Kankesanturai (9°49'N, 80°02'E) is the chief port of call on the N coast of Sri Lanka and has substantial trade with ports in S India. The open roadstead is only operational during the SW monsoon, March to October, loading and discharging being carried out by lighters.

- 2 **Traffic.** In 2003 the port was used by 42 vessels with a total dwt of 114 825.

**Authority.** Kankesanturai Ports Authority, Customs View, Kankesanturai.

**Rescue,** see 3.218.

**Notice of ETA.** Five, three and one day before arrival.

- 3 **Harbour.** A breakwater extends 5¾ cables NW from the shore with two spurs, extending W, towards its outer end. The outer spur is about 2¼ cables long.

Stranded wrecks, the positions of which are approximate, lie close SW of the breakwater, about 2 cables from its root.

- 4 Western Bastion Light (3.204) and a tall chimney, 8½ cables SW of the light, are conspicuous. Two radio masts stand at Jaffna airport, about 2½ miles SE.

There is a clear approach from seaward to both the anchorages and the berths.

- 5 **Anchorage.** In good weather, vessels not supplying the cement works anchor, in a depth of 9 m, with Western Bastion Light (3.204) bearing 203°, distant 3½ cables. Between the lighthouse and the breakwater the bottom is foul.

Vessel supplying the cement works and waiting to berth alongside should anchor about 6 cables NW of the breakwater head.

Both anchorages are shown on the chart.

- 6 **Pilots.** Pilotage is reported to be compulsory; pilots board in the anchorage as shown on the chart.

- 7 **Berths:**

Quay, 183 m long, depth alongside 6 m, on the S side of the outer spur of the breakwater, used for vessels discharging coal and gypsum for the cement works.

- 8 Quay, about 40 m long, maximum draught 4.2 m, for coastal vessels, on the SW side of the breakwater near its root.

Two mooring buoys, close W of the breakwater, can accommodate a vessel up to 20 000 dwt with a draught of 7.3 m.

- 9 **Other facility:** customs.

**Supplies:** provisions available, water not available.

### Minor Harbours

#### Chart 2197

#### 3.213

- 1 There are breaks in the reef fringing the S shore of Palk Strait at Palmyra Point (9°50'N, 80°13'E) (3.206) and Valvettithurai, 2½ miles WSW, which provide good boat entrances.

- 2 **Karaitivu** (9°45'N, 79°52'E), which exhibits a light (3.204) at its NW point and with a conspicuous sandhill (3.210) at its NE point, is joined to Jaffna Peninsula (3.197) by a causeway on its E side.

The channel between the NW point of the peninsula and the NE point of Karaitivu is shallow and encumbered by rocks and shoals, but usable by boats.

- 3 Within the bay, formed by the causeway, is a low coral island covered with trees to an elevation of 27 m.

A drying sandbank, inside which local craft find shelter in bad weather, extends about 1½ miles NE from Point Calimere (10°17'N, 79°52'E) (3.204).

### Other name

#### 3.214

- 1 Mathagal (9°47'N, 79°58'E), a village.



## PALK BAY

## General information

Charts 2197, 69, 1584

## Routes

## 3.215

- 1 From a position at the W end of West Channel in the vicinity of 9°50'N, 79°40'E, routes serving the shallow-water ports on the E and SE side of Palk Bay lead S, passing either through Delft Channel (3.224) or W of Delft Island (3.224). From the initial position the route for Pāmban (3.236) or Pāmban Pass (4.147) leads about 42 miles SW.

## Topography

## 3.216

- 1 Palk Bay is bounded on the E by the coast of Sri Lanka, on the S by Mannār Island, Adam's Bridge and Pāmban Island and on the W by the Tamilnadu State of India.
- 2 The E side of the bay is indented by two smaller bays and contains numerous islands, many of which lie on a shallow flat extending SW from the W end of Jaffna Peninsula (3.197).  
The W shore of the bay, consisting of a smooth sweep punctuated by river mouths, is generally low and flat.
- 3 Depths within the bay range from 10 to 15 m but depths less than 5 m lie up to about 6 miles offshore on its E and W side.

## Prohibited anchorage

## 3.217

- 1 Submarine cables are laid and anchoring is prohibited in a large area, shown on the charts, N of Adam's Bridge (9°05'N, 79°33'E).

## Rescue

## 3.218

- 1 A lifeboat is stationed at Jaffna (9°40'N, 80°00'E). See 1.55.  
For further information of rescue see *Admiralty List of Radio Signals Volume 5*.

## Tidal streams

## 3.219

- 1 See 3.191.

## Currents

## 3.220

- 1 See 3.192.  
**Adam's Bridge** (9°05'N, 79°33'E) (4.131) lies between the W end of Mannār Island and Land's End, the E point of Pāmban Island. During the SW monsoon a strong current sets N over the Adam's Bridge; a confused sea is generally experienced near Mannār Island which, together with the current, weakens W towards Land's End.

## Principal marks

## 3.221

- 1 **Landmarks West Channel to Jaffna:**  
Kovilan Light (9°46'N, 79°52'E) (3.204).  
Obelisk (9°41'N, 79°47'E) (3.204).  
Fort (9°40'N, 79°51'E).  
Temple (red roof) (9°36'N, 79°46'E).
- 2 Beacon (white, iron framework, disc topmark facing W, elevation 18 m) (9°33'N, 79°39'E), standing on Amanakamunai, the NW point of Delft Island (3.224). There are tall palm trees on the NE and

W parts of the island, which appears as two islands from N.

- 3 Trees (9°35'N, 79°48'E).  
Urimunai Beacon (white brick tower) (9°29'N, 79°43'E).  
Punkudutivu Light (stone building, elevation 11 m) (9°34'N, 79°51'E), standing at the SE point of Punkudutivu.
- 4 Beacon (white framework, white disc topmark, facing W, 16 m in height) (9°26'N, 79°53'E) standing on the SW side of Kakerativu (sandy, covered in scrub, elevation 5 m).  
Tree (9°38'N, 79°52'E).  
Jaffna Obelisk Light (white concrete tower, elevation 6 m) (9°38'N, 80°02'E).

5 **Landmarks West Channel to Pāmban Pass:**

Mannār Island Light (white concrete tower, 19 m in height (9°06'N, 79°44'E), at the root of the pier at Talaimannar (3.235).

- 6 Temple at Rāmeswaram (appears as a large square tower when viewed from NE and as a narrow pinnacle from NW) (9°17'N, 79°19'E).

Pāmban Island Light (white masonry tower, black bands, 20 m in height) (9°17'N, 79°13'E), stands on a sandhill at the NW point of Pāmban Island.

7 **Other landmarks:**

Old Light Tower (black, steel framework tower) (9°06'N, 79°42'E), at the W end of Mannār Island.  
Shaullavanaigenpatam Column (10°16'N, 79°18'E), conspicuous and visible at 15 miles.

## Directions

(continued from 3.210)

Chart 2197

**Palk Bay entrance to Delft Channel**

## 3.222

- 1 From a position in the vicinity of 9°50'N, 79°40'E to a position at the SE end of Delft Channel, the route leads about 20 miles SSE and SE through Delft Channel, passing (with positions from the obelisk (3.204) standing at the N point of Analaitivu (9°41'N, 79°47'E)):
- 2 WSW of Eluvativu (low and covered in tall trees) (2 miles NE), thence:  
WSW of Analaitivu covered in tall trees and which is joined, on its NE side by a drying reef, to Parititivu and, at its S point by a bridge, to Puliyantivu.

## 3.223

1 **Useful mark:**

Fort Hammenhiel Light (structure on the fort, elevation 11 m) (9°43'N, 79°51'E).

**Delft Channel**

## 3.224

- 1 The route through Delft Channel, with a controlling depth of about 9 m on the bar at its N entrance, leads SE, passing (with positions from the obelisk (9°41'N, 79°47'E)):
- 2 SW of Nayinativu (5 miles SSW) on which stands tall trees. A narrow detached shoal ridge of sand and coral lies up to 8 cables off the W side of Nayinativu. Thence:
- 3 NE of Neduntivu Shoal (9 miles SSW), which lies about 1½ miles off the NE coast of Delft Island. The island has beacons standing at its at its NW and SE point (3.221); Delft Island Light (metal beacon) is exhibited, for fishing craft, at the NE point of the island.

**Delft Channel to Jaffna****3.225**

- 1 From a position at the SE end of Delft Channel to a position off Jaffna Obelisk Light (3.221), the route leads 16 miles E and ENE, passing (with positions from Punkudutivu Light (9°34'N, 79°51'E)):
- 2 S of the ESE point of Punkudutivu (3.221), on which stands a light. Some conspicuous palm trees stand 3 miles WNW of the light. A bight, formed by the E side of Punkudutivu, the S side of Velanai and the causeway joining the two islands is occupied by foul ground and shellfish beds, fronted by drying reefs. Thence:
- 3 N of Kakerativu (8 miles SSE), on which stands a beacon (3.221), thence:  
N of a shoal patch (depth 3·7 m) with dangerous rocks (6½ miles SE), thence:
- 4 NNW of Palativu (11 miles SE), an island covered with coarse grass scrub up to 6 m in height, and which has a beacon (white tower, 8 m in height) on its E side. Thence:
- 5 SSE of Mandaitivu (8 miles ENE) which is separated from Velanai by a very shallow, narrow channel and is fronted by a drying reef on its S side, thence:
- 6 NNW of Kalmunai Point (12 miles ENE), the NW extremity of a long peninsula consisting of sand dunes. A beacon (white tower, 8 m in height) stands on the point. Thence:  
Close by Jaffna Obelisk Light (3.221) (11¼ miles ENE), which marks the W side of the entrance to the channel leading to the port of Jaffna (3.232).

**3.226**

- 1 **Useful mark:**  
Radio mast (red obstruction light, elevation 22 m) (9°40'N, 80°01'E), in Jaffna.

**Delft Channel to the ports of Mannār, Pesalai and Talaimannar****3.227**

- 1 From a position at the SE end of Delft Channel (9°33'N, 79°47'E) (3.224) the route to the SE ports of Palk Bay leads generally S across open water, passing E of Delft Island (3.224), W of Kakerativu (3.221) and W of Iranativu North and Iranativu South (9°17'N, 80°00'E), a pair of low coral islands joined by a drying reef. A tower, elevation 16 m, stands close to the N point of the N island.

**Charts 3581 plan of Pāmban Pass and Approaches, 2197, 69 Palk Bay entrance to Pāmban and Pāmban Pass 3.228**

- 1 From a position in the general vicinity of 9°50'N, 79°40'E to a position off Pāmban the route leads about 40 miles SW across open water, passing NW of Delft Island (3.224), which has a beacon at its NW and SE point, NW of Kachchaitivu (9°23'N, 79°32'E), an island covered with scrub; and NW of Devil's Point, the N extremity of Pāmban Island, which is low and sandy with many coconut trees towards its W end.
- 2 The temple, see 3.221, at Rāmeswaram is the first landmark raised when making Pāmban Pass (4.147) from N but it can be confused with Gandhamāna Temple (elevation 44 m) (1¼ miles NW of Rāmeswaram). A large clump of trees (elevation 33 m) about 7½ cables ENE of Gandhamāna Temple appears, with the temple, like a pair of hills when the land is raised from N.

- 3 Storm signals are displayed at Rāmeswaram; the brief system is used. See 1.47.

**3.229**

- 1 The N part of Pāmban Pass, lying between Kanthe Thuki Reef (close off the NW shore of Pāmban Island) and shoal ground W, is well marked by buoys and beacons, the outermost of which is Outer Fairway Buoy (black and white chequered). A dangerous wreck lies 5 cables NW of the fairway buoy.
- 2 A boat channel lying between Kanthe Thuki Reef and the shore SE is used by pilots boarding vessels during the NE monsoon.  
The N face of The Great Dam (4.147) is steep-to and at LW appears like a wall.

**3.230**

- 1 **Useful marks:**  
Two radio masts stand 4 cables and 1¼ miles, respectively, SW of Rāmeswaram temple (9°17'N, 79°19'E).
- 2 North East Port Beacon (white, 6 m in height), close N of Pāmban Island Light (9°17'N, 79°13'E). Beacon, marking a drying shoal (9°17'N, 79°11'E).
- 3 North Toni Beacon (white, 9 m in height) (9°17'N, 79°11'E).  
Pillar (9 m in height) (9°17'N, 79°09'E).  
North Beacon (8 m in height) (9°17'N, 79°09'E).  
For marks at Mandapam see 4.144.  
(Directions south of Pāmban Pass and for the Gulf of Mannār are given at 4.152. Directions for Pāmban Pass are given at 4.147)

**Anchorage and harbours***Chart 2197***Kayts****3.231**

- 1 **General information.** Kayts (9°42'N, 79°51'E), at the N end of Velanai, is open as a port throughout the year but is most frequented during the SW monsoon.
- 2 The island of Velanai is separated, in the N, from Karaitivu (3.213) by a narrow channel, which is crossed by a ferry, and, farther S, is joined to Punkudutivu (3.221) and Jaffna Peninsula (3.197) by causeways.
- 3 **Directions.** The line of bearing 146° of Fort Hammenhiel, the quarantine station standing at the SW point of Karaitivu (3.213) and which exhibits a light (3.223), leads SE across the shoal flats in the deepest water.
- 4 When the fort is at a distance of about 1 mile and in a depth of 2·4 m, the centre of the channel, should be followed passing SW of the fort. When E of the fort the greatest depths will be found on the N side of the channel. The least depth along the track is 1·8 m.
- 5 **Anchorage.** The outer anchorage, with a depth of about 7·3 m, sand, is with the N point of Eluvativu (3.222) bearing 142°, distant 1¼ miles.  
Small local vessels anchor from 1½ to 3 miles N of Fort Hammenhiel and discharge part of their cargo before entering port.
- 6 The inner anchorage is abreast the customs house, marked on the chart.

**Jaffna****3.232**

- 1 **General information.** Jaffna (9°40'N, 80°01'E) is the principal town of Jaffna Peninsula, lying on its SW coast. The entrance to Jaffna Lagoon, between the NE extension

of Kalmunai Point (3.225) and the coast 1½ miles NE, lies 4 miles SE of Jaffna. The lagoon is large and shallow.

**Port Authority.** Sri Lanka Ports Authority, PO Box 595, No 19, Church Street, Colombo 1.

- 2 The Government Agent is Master Attendant and Collector of Customs; there are special regulations governing the hire of boats to land and embark cargo.

**Tidal levels.** Mean spring range about 0.6 m; mean neap range about 0.2 m. For further information see *Admiralty Tide Tables Volume 3*.

- 3 **Notice of ETA.** Five, three and one day before arrival. **Rescue;** see 3.218.

**Pilotage** is compulsory.

- 4 **Anchorage.** Vessels up to 3.7 m draught can load and discharge in the stream near the town. Larger vessels, up to 15 200 dwt, have been reported loading cargoes of bagged salt.

- 5 **Supplies.** Provisions and water are reported to be available.

*Charts 2197, 1586*

### Mannār

#### 3.233

- 1 The port of Mannār (8°59'N, 79°55'E) is situated at the SE end of Mannār Island (4.131), on the NW side of a boat channel which separates the island from the mainland of Sri Lanka.

- 2 The channel is crossed by a railway bridge and a road bridge, both of unknown clearances.

At each end of the channel there is a bar where a customs officer is stationed for vessel inspection.

*Chart 2197*

### Pesalai

#### 3.234

- 1 Pesalai (9°05'N, 79°49'E), a small port on the N coast of Mannār Island (4.131), affords good shelter during the SW monsoon.

An old brick watch tower, 16 m in height, stands 2½ miles ESE of the port.

*Chart 2197, 69*

### Talaimannar

#### 3.235

- 1 Talaimannar (9°06'N, 79°44'E), a small port with an alongside berth, lies near the W end of Mannār Island (4.131) on the N coast.

- 2 A pier extends 264 m N, carrying a double railway track, with depths of 3 m at its head. A light (3.221) stands at the root of the pier and another light (metal column, 6 m in height) is exhibited from the pierhead when the pier is in use. A disused lighthouse (3.221) stands 2 miles WSW.

- 3 Prohibited anchorage; see 3.217. Current and confused sea W of Mannār Island; see 3.220.

*Chart 3581 plan of Pāmban Pass and Approaches*

### Pāmban

#### 3.236

- 1 **General information.** Pāmban (9°17'N, 79°13'E), a small town and roadstead port, lies along the NW coast of Pāmban Island (3.228), SW of Pāmban Island Light (3.221). The port is administered by a Conservator and has a Superintendent of Customs.

- 2 Storm signals; displayed from a flagstaff close to Pāmban Island Light (3.221), the general system is used. See 1.45.

- 3 **Anchorage** may be obtained in depths of about 7 m, mud and good holding, with Pāmban Island Light bearing

between 122° and 134°, distant 1 mile, noting the wreck (3.229) about 2½ cables SW. Farther offshore, good anchorage may be obtained in depths of 10 m with the lighthouse bearing 135°, distant ¾ miles.

- 4 **Facilities:** hospital.

**Supplies:** water, in casks, by boat; limited fuel oil.

*Chart 69*

### Tondi

#### 3.237

- 1 Tondi (9°44'N, 79°01'E) is a small port confined to local coasting craft. Two white masonry beacons, 5 m in height, mark the limits of the port.

- 2 **Anchorage** may be obtained in a depth of about 6 m, mud, 5 miles ESE of Tondi as shown on the chart, but this position is exposed to all except offshore winds. Small vessels may anchor nearer the town in depths of about 4 m, stiff mud.

### Local craft

*Chart 2197*

#### 3.238

- 1 **The shallows** (9°39'N, 79°49'E) enclosed by the islands of Punkudutivu (3.221), Nayinativu (3.224), Analaitivu (3.222), Eluvativu (3.222) and Velanai (3.231) can be accessed by small craft through a number of channels. Some of the dangers are marked by beacons.

- 2 Nayinativu (9°36'N, 79°46'E) has two small jetties on its E side, one close to the NE point, the other 1¼ miles S.

*Charts 69, 2197*

- 3 **Delft Island.** A small boat harbour lies close W of Delft Island Light (9°32'N, 79°43'E) (3.224). There is a least depth of 1.8 m in the approaches to the harbour entrance which is marked by two small beacons. Within the harbour, which has a small jetty, depths shoal rapidly.

*Chart 3581 plan of Pāmban Pass and Approaches*

- 4 **Boat channel.** Kathi Vallimuni Reef and Vella Pertumuni Reef (both of scattered coral heads some of which dry) together extend 4½ miles WNW from Ramen Point (9°16'.9N, 79°11'.5E) (4.153), lying parallel to the N coast and up to 5 cables offshore.

- 5 A narrow boat channel with a depth of 1.5 m separates the two reefs. Two beacons stand close NE of the entrance to the channel.

- 6 **Leading lights** The alignment (206°) of the following lights leads to the entrance of the boat channel:

Front leading light (beacon) (9°16'.9N, 79°09'.7E).

Rear light (beacon) (124 m SSW of front beacon).

- 7 Another boat channel lies between the reefs and the coast, extending 2½ miles WNW from Ramen Point.

### Other names

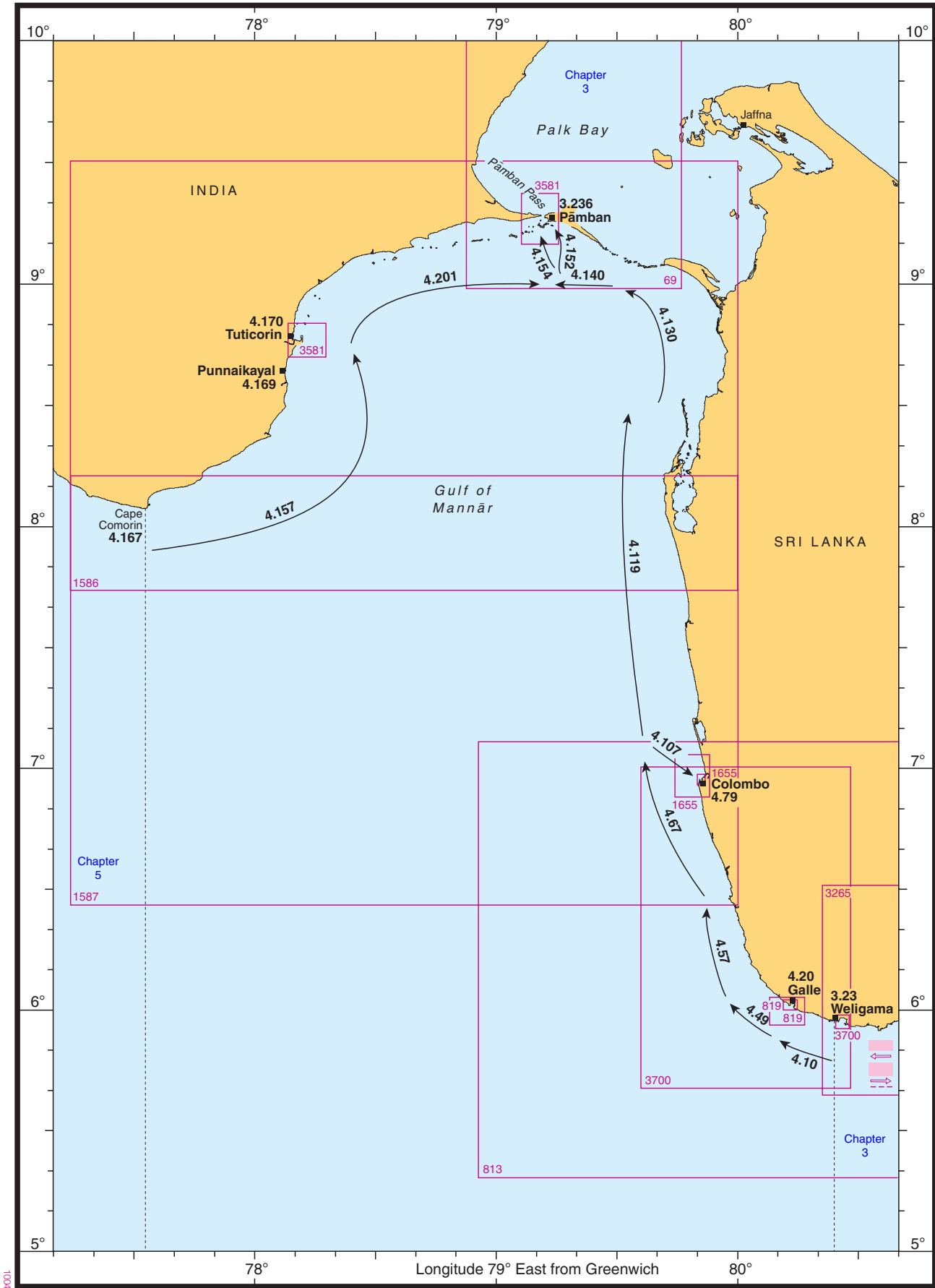
#### 3.239

- 1 Ammāpattinam (10°01'N, 79°14'E), a town.  
Attangarai (9°21'N, 79°00'E), a town.  
Devil's Point (9°24'N, 80°03'E), on the E side of Palk Bay.  
Dhanushkodi (9°11'N, 79°25'E), a small disused port.  
Kottaippattanam (9°58'N, 79°12'E), a town.
- 2 Kottakkaraīār River (9°38'N, 78°57'E).  
Munaikkādu Point (9°17'N, 79°08'E).  
Pāmbār River (9°51'N, 79°07'E).  
Pasipattanam (9°49'N, 79°05'E) a mosque.  
Vaigai River (9°20'N, 79°00'E).





Chapter 4 - Gulf of Mānnār, including Colombo



## CHAPTER 4

## GULF OF MANNĀR, INCLUDING COLOMBO

## GENERAL INFORMATION

*Charts 813, 1586, 1587, 828*

**Scope of chapter****4.1**

- 1 This chapter describes the Gulf of Mannār, which lies NE of a line joining Rassamunai Point (5°57'N, 80°25'E) and Cape Comorin, the S point of India, 215 miles NW. Adam's Bridge, a chain of islets and rocks forms the head of the gulf. The gulf is described in two parts, the W coast of Sri Lanka followed by the SE coast of India. The ports of Galle (4.20), Colombo (4.79) and Tuticorin (4.170) are also described.

**Topography****4.2**

- 1 The W coast of Sri Lanka is low and almost everywhere planted with coconut trees. The foothills of the mountain districts abreast Colombo rise from about 20 miles inland. Adam's Peak (6°49'N, 80°30'E), the highest land visible from the offing, can be seen during the NE monsoon but rarely at other times. The SE coast of India is generally low, sandy and fringed with coconut trees.

**Depths****4.3**

- 1 Throughout the greater part of the gulf there are depths of more than 100 m, within this contour depths shoal rapidly and form a coastal bank around the perimeter of the gulf. The steep edge of the coastal bank is a useful guide when making a landfall in thick weather or at night.
- 2 An isolated shoal with a depth of 27 m over it, the position of which is approximate, lies 6 cables seaward of the 100 m depth contour in position 5°53'N, 79°59'E. Less water is reported in an area lying approximately 9 miles off Galle and runs parallel to the coast for about 20 miles, as marked on Chart 813.
- A bank marked by discoloured water, over which a sounding of 62 m was obtained, was reported in 1924 to lie 93 miles WSW of Point de Galle (4.24).

**Positions****4.4**

- 1 Positions obtained from adjoining charts and from charts of different scales may differ; the mariner's attention is drawn to notes on charts.

**Tidal streams****4.5**

- 1 Details of tidal streams may be found in the relevant sections of the chapter.

**Currents****4.6**

- 1 Currents are monsoonal in character. Off the coast in the S part of the gulf the predominant current sets SE from May until the end of September (SW monsoon), the average rate being highest, about ½ kn, from June to August. In December and January (NE monsoon) the predominant current sets W to WSW, with an average rate of about ½ kn. In October and from February until the end of April the current is variable.
- 2 During the SW monsoon there is a current branching, towards the NE, from the N flank of the generally SE flow across the entrance to the gulf; this continues as a N flow through the narrow channels connecting the N part of the gulf with Palk Bay (3.216). In December and January (NE monsoon) the flow is S through these channels which implies a mainly SW flow across the gulf, turning more W as it converges with the W to WSW flow in the more open waters to the S. In Pāmban Pass (4.147) the current sometimes reaches 6 kn.
- 3 The currents may, on occasions, be markedly different from the average conditions and rates up to 2 kn can occur with prolonged strong winds; during lulls in the monsoon the current sets into instead of across the gulf.
- 4 See also 1.167.

**Climate and weather****4.7**

- 1 For climate and weather see 1.178.

**Navigational control****4.8**

- 1 For the regulations which control navigation in the territorial waters of Sri Lanka see 1.42; and for India see 1.39.

**Firing practice areas****4.9**

- 1 Firing practice areas are centred 24 miles SW and 34 miles WNW of Colombo Harbour (6°57'N, 79°51'E). see 1.7.

## RASSAMUNAI POINT TO COLOMBO

## RASSAMUNAI POINT TO GALLE

**General Information**

*Chart 3700*

**Route****4.10**

- 1 From a position S of Rassamunai Point (5°57'N, 80°25'E) the route leads 13 miles WNW to a position S of Galle.

**Topography****4.11**

- 1 The coast between Rassamunai Point (3.19) and Galle consists of an irregular sandy beach backed by a thick belt of coconut trees through which runs the railway between Galle and Matara (3.28). This stretch of coast is fronted by reefs and foul ground, over which the sea always breaks, extending in places 3½ cables offshore. Seaward of the breakers depths are irregular but there are no charted off-lying dangers outside of the 50 m depth contour.

**Rescue****4.12**

- 1 For details see 4.46.

**Currents****4.13**

- 1 Currents are subject to large changes in set and rate during the course of a year, see 4.6.

During the SW monsoon, the current sets E along the coast; and during the NE monsoon in the opposite direction.

**Principal marks****4.14**

- 1 **Landmarks:**

Hindelnattu (6°07'N, 80°24'E) (3.16).

Galle Tower (black and white, 15 m in height) (6°01'N, 80°15'E), stands on the summit of Rumassala Kanda, a large wooded hill 75 m high.

Hiniduma Kanda (6°20'N, 80°18'E); a mountain, which appears from all directions to have a round summit, is rarely obscured.

For marks at Galle see 4.37.

- 2 **Major light:**

Point de Galle Light (6°01'N, 80°13'E) (4.37).

**Other aid to navigation****4.15**

- 1 Racon (6°01'N, 80°13'E) at Point de Galle Lighthouse (4.37).

For details see *Admiralty List of Radio Signals Volume 2*.

**Directions**

(continued from 3.19)

**4.16**

- 1 From a position S of Rassamunai Point (5°57'N, 80°25'E) the route leads 13 miles WNW to a position S of Galle, passing (with positions from Kotavanni Rock (5°59'N, 80°20'E)):

- 2 SSW of Yala Rock (5½ miles ESE), a steep-to rock, thence:

SSW of Debaha Rock (1 mile ESE), an isolated rock surrounded by depths of 8 to 11 m, thence:

SSW of a 9.1 m shoal patch (6 cables SSW), thence:

- 3 SSW of Goda Gala (5 miles W), a rocky patch with depths of 2 m or less, over which the sea always breaks; it is the outermost of the dangers and foul ground which front the coast between Ereminia Gala Point and Unawátuna Point, situated respectively, 8 cables ENE and 6 cables NNW of Goda Gala.

**Useful marks****4.17**

- 1 Yakinigeduwa (elevation 39 m to the top of its tufted top trees) (5°58'N, 80°23'E), an islet with steep cliffs on all sides which is joined to the mainland by a causeway. A prominent reddish cliff 21 to 30 m high stands 6 cables W of Yakinigeduwa.
- 2 Kotavanni (5°59'N, 80°20'E) a solitary black rock stands 3½ cables W of the outlet of Koggala Lake (4.18).
- 3 Malagoda Kanda (6°01'N, 80°16'E), a conical hill with a prominent tree standing on its summit; the peak of the shoulder that extends SW from the hill is also prominent.

(Directions continue for coastal passage at 4.53)

(Directions for Galle are given at 4.38)

**Inland lake****4.18**

- 1 **Koggala Lake**, a fresh water lake, lies close within the coast 4½ miles ESE of Erminia Gala Point (6°00'N, 80°16'E). Two red lights displayed vertically about 5 m apart are exhibited from a position close inside the lake.

**Small craft****4.19**

- 1 A landing place for small boats is situated 1 mile W of Kotavanni Rock (4.17) and another may be reached through the reef 5 cables ESE of the rock.

**GALLE HARBOUR AND APPROACHES****General information**

*Chart 819*

**Position****4.20**

- 1 Galle Harbour (6°02'N, 80°13'E) lies at the head of a small bay on the SW coast of Sri Lanka.

**Function****4.21**

- 1 The port imports mainly: rice, flour, fertilisers, cement clinker and gypsum. There are no exports.

The population of Galle is estimated to be about 94 800 in 2004.

**Topography****4.22**

- 1 The town of Galle is built on the S part of the peninsula, projecting 5 cables S from the coast, which forms the W side of the harbour, it is surrounded by a fortification wall and joined to the mainland by a low flat isthmus. There are coconut palms and other trees among the houses but the W side of the peninsula is clear and covered with grass. To the N of the harbour are extensive low wooded hills. On the E side of the harbour the slopes of Rumassala Kanda (4.14) rise from the shore.

**Historical background****4.23**

- 1 In 1505 the Portuguese fortified Galle, which then stood on the site of a fishing village; during the Dutch occupation, the present fortifications were added in 1667. The fortress town was surrendered to the British in 1795.

**Approach and entry****4.24**

- 1 The port is approached through one of three channels and entered between Point de Galle (6°01'.4N, 80°12'.9E) and Watering Point (1 mile ESE).

**Traffic****4.25**

- 1 In 2003 the port was used by 103 vessels with a total dwt of 1 210 239.

**Port authority****4.26**

- 1 The port is administered by the Sri Lanka Ports Authority, Closenburg Jetty, Magalle, Galle.

**Development****4.27**

- 1 In 1997 it was reported that plans to transform the port to a major container terminal have been submitted, the plan includes the construction of a breakwater to protect the enlarged port from the SW monsoon.

- 2 In 1996 it was reported that the fishing industry is to be expanded and the facilities redeveloped.

### Limiting conditions

#### 4.28

- 1 **Controlling depths.** The approach channel leading to the artificial harbour, from a position 4 cables SW of the head of Gibbet Island Breakwater (4.37), is maintained at a depth of 9.8 m. The S part of the artificial harbour has a maintained depth of 8.9 m.
- 2 **Deepest and longest berth** is Closenburg Pier (4.40) in the artificial harbour.
- Tidal levels** see information in *Admiralty Tide Tables Volume 3*. Mean spring range about 0.5 m; mean neap range about 0.1 m.
- 3 **Maximum size of vessel handled** in the artificial harbour is length overall 130 m and draught 7.3 m.
- 4 **Local weather.** The predominate winds are W and NW from April to November and E and NE from December to March.

In May and June very disturbed conditions, accompanied by a swell as high as 4.3 m, may be experienced in the harbour; sometimes this phenomenon lasts for up to three days.

### Arrival information

#### Notice of ETA

##### 4.29

- 1 Twenty-four hours notice of ETA is required to the vessel's local agents; see *Admiralty List of Radio Signals Volume 6(4)*.

#### Outer anchorages

##### 4.30

- 1 During the SW monsoon the best berth is in a depth of 27 m, sand, with Point de Galle Lighthouse (4.37) bearing 012° distant 1¼ miles.
- During the NE monsoon vessels usually anchor in depths of 18 m, sand, with Point de Galle Lighthouse bearing 335° distant 1¼ miles.
- 2 Both anchorages are shown on the chart.
- Vessels should anchor well clear of the port approach channels.

#### Pilots and tugs

##### 4.31

- 1 **Pilotage** is compulsory and only available by day; pilot boarding position is close WSW of the fairway buoy (safe water) (6°00'5N, 80°13'2E).
- 2 A pilot ladder, rigged in accordance with SOLAS Regulations, should be prepared on the lee side. The pilot will board from a white launch bearing the name "Galle Pilot" in black letters on the bow, a mooring boat will also be in attendance.
- See *Admiralty List of Radio Signals Volume 6(4)* for further details of pilotage.
- 3 **Tugs.** A tug is available.

#### Local knowledge

##### 4.32

- 1 Local knowledge is required for entering harbour via the Western Channel.

### Regulations concerning entry

#### 4.33

- 1 Vessels are not permitted to enter the harbour at night. Sailing from the harbour can be arranged at night in good weather conditions.

### Quarantine

#### 4.34

- 1 Vessels without qualified medical officers may not have communication with the shore nor may any person, except the pilot, board until the health officer has given permission; in no circumstances may cases of infectious disease be landed without the consent of the Government Health Officer.
- 2 The regulations for vessels having plague, cholera or yellow fever onboard, and the signals required for vessels arriving off the port, are the same as those for Colombo; see 4.101.

### Harbour

#### Layout

##### 4.35

- 1 The harbour, with two anchorage areas and a berthing area protected by two breakwaters, is approached via three channels which converge about 5 cables ESE of Point de Galle. The E part of the harbour is entered between Gibbet Island (4.37) and Watering Point (4.37); the bay at the head of the harbour is entered between Schwarte Fort (6°01'7N, 80°13'0E) and the W point of Gibbet Island (5½ cables ENE); the berthing area extends N from Gibbet Island.

### Climate

#### 4.36

- 1 The climate is hot and humid in March and April before the SW monsoon breaks; but at no time can it be considered unhealthy.

### Principal marks

#### 4.37

- 1 **Landmarks:**
- Kachcheri (6°01'6N, 80°13'0E) a bluff coloured building.
- Chapel (elevation 41 m) (6°02'1N, 80°12'6E), a large white building with two towers on its front facing S and a dome behind.
- 2 Tower (white stone, 3 m in height) standing near the extremity of Watering Point (6°01'0N, 80°14'0E), a cliff, with an elevation of 30 m. The structure shows up well in afternoon sunlight.
- Clock tower (6°01'8N, 80°12'8E), which stands on the highest part of the peninsula.
- 3 Harbour Inn (6°01'2N, 80°14'3E).
- Gibbet Island (6°01'8N, 80°13'7E) breaks the centre of the sandy beach at the head of the harbour; it is joined to the mainland at its E end. Several warehouses stand on the island.
- 4 Water tower (6°02'2N, 80°13'6E).
- Trawler pier tower (1¼ cables S of above water tower).
- Residency Hill (6°02'3N, 80°13'0E).
- Hotel (6°01'7N, 80°12'9E).
- Dutch Church (⅓ cable S of above hotel).
- 5 All Saints Church (¾ cable SSE of above hotel), with a square tower surmounted by a 4-sided pointed red roof and large weathercock.
- Mosque (6°01'4N, 80°13'0E), a large white two-storeyed building with two small domes and some low minarets.



## 6 Major light:

Point de Galle Light (white round tower on fort, 27 m in height) (6°01'4N, 80°13'0E) stands on Utrecht Bastion.

### Directions

#### Approach channels

##### 4.38

1 The approach channels leading into Galle Harbour are the Eastern, Central and Western Channels. The Central Channel is marked by buoy; the positions of the buoys cannot be relied upon, but the local authority will inform vessels of buoys which are known to be out of position. When vessels are leaving harbour at night, certain buoys are lighted as required by the Assistant Master Attendant.

2 **Eastern channel.** From a position about 3½ cables SW of Unawátuna Point (6°00'3N, 80°14'5E), the alignment (322°) of the N end of Kachcheri (4.37) with Chapel (4.37) leads NW towards the harbour, passing (with positions from Point de Galle Light (6°01'4N, 80°13'0E)):

3 NE of Alut Ground (1.15 miles SE), a shoal patch, thence:

NE of Gal Pare (7 cables SE), a shoal consisting of several heads, over which there is a least depth of 7.9 m. Thence:

4 NE of Bloomfield Rock (6 cables SE), and:  
SW of Imbue Ranne Gala (7 cables ESE), a shoal patch, thence:

SW of Diya Mudawa (5 cables ESE), a shoal over which the sea breaks during the SW monsoon.

Thence follow the directions for Central Channel (see below).

5 **Central channel.** From a position SE of the pilot boarding position (4.31) follow the recommended track (003°), as shown on the chart, passing (with positions from Point de Galle Light):

E of the safe water buoy (9½ cables S), thence:

6 E of Kadda Rocks (6 to 7 cables SSE), three shoal patches over which there is a least depth of 3.4 m. During the SW monsoon the sea breaks heavily along the whole length of the shoal, but during the NE monsoon the surface is seldom disturbed. A stranded wreck lies just below the surface on Inner Kadda Rock in position 6°00'9N, 80°13'2E. And:  
7 W of Secundra Rock (7 cables SSE), a rock on which *SS Secundra* struck in 1905; a buoy (starboard hand) is moored about 50 m SW of the rock. Thence:

8 E of Sealark Rock (5¾ cables SSE); a buoy (port hand), the position of which is approximate, is moored about 60 m NNE of the rock. Thence:

W of Bloomfield Rock (5¾ cables SE), a buoy (starboard hand) is moored about ⅓ cable NW of the rock. Thence:

9 E of Polkote Gala (2½ cables SE) a dangerous rock on which the sea breaks during the SW monsoon, a buoy (port hand) is moored ¾ cable SE of the rock.

10 Thence from between Belikatu Wawa and Matte Mada, two shoals lying respectively, 2¼ and 3½ cables ESE of Point de Galle Light, and marked by buoys (lateral); the route leads N to the charted dredged area, passing (with positions from Schwarte Fort (6°01'7N, 80°13'0E)):

11 W of Outer Katta (5 cables ESE), a shoal patch, thence:

W of Katta Gala (5 cables ESE), a rocky patch, and:

W of a foul area (3¾ cables ESE), thence:

E of Welihukka (1½ cables SE), a rocky patch over which there is a least depth of 0.9 m.

12 Thence to a position NW of the head of the breakwater extending 200 m WNW from the W end of Gibbet Island (4.37).

13 **Western channel.** The western channel is unmarked and used only by local craft. The channel leads NE passing between Mee Meti Yawa, the S extremity of foul ground extending S from Point de Galle (4.24) and Kadda Rocks; it joins Central Channel ESE of Point de Galle.

### Basins and berths

#### Anchorage

##### 4.39

1 Anchor berths are nominated by the pilot. During the NE monsoon the largest vessel which can anchor is length 152 m and draught 9.1 m and during the SW monsoon length 145 m and draught 7.6 m. The bottom at the anchorages is good holding ground in sand and mud.

2 Vessels moor head and stern, bow S, using both bower anchors at open hawse with their port anchor laid E. The stern moorings are laid by the Assistant Master Attendant, some being used as required, and others kept ready with their ends secured to small white conical buoys. Vessels are required to be ready to veer cable when required to do so by the port authorities, and must have their main engines ready for use at short notice.

3 **Caution.** There are several detached shoals, whose positions are shown on the chart, in the E part of the harbour; and a rocky spit, with depths from 2.5 to 5.0 m, extends 1 cable SW from the W end of Gibbet Island (4.37). Throughout the harbour, within the 5 m depth contour, there are numerous shoals and rocks both above and below the surface.

#### Alongside berths

##### 4.40

1 **Closenburg Pier** fronts the N side of Gibbet Island (4.37), it is 427 m long and can accommodate two vessels, each of length 130 m and draught 7.3 m.

**Fisheries Quay**, from which Trawler Pier extends 91 m S, is situated 2½ cables N of Closenburg Pier, vessels drawing up to 5.5 m can berth.

2 **Piers.** Three concrete piers, each with depths of 1.8 m for about 30 m from their outer ends, lie at the N end of the town W of Schwarte Fort (4.35):

No 1 Pier, 88 m long, is best sheltered and is used for passengers and cargo.

Nos 2 and 3 Piers, respectively, 65 and 76 m long are used for cargo.

3 Leading lights are exhibited from No 1 Pier, the E pier; the alignment (237°) of these lights indicates the channel of approach for boats and lighters.

A new pier (2001) extends about 160 m W from the E end of the harbour and provides 3 berths; maximum size of vessel 130 m LOA and draught 7.3 m.

#### Basin

##### 4.41

1 A small craft basin lies between Schwarte Fort and No 1 Pier.

### Port Services

#### Repairs

##### 4.42

1 It is reported that a slipway is available for small craft.

**Other facilities****4.43**

- 1 Hospital.  
Lighters for vessels at anchor.  
The fisheries quay has extensive cold storage, processing and packaging units.

**Supplies****4.44**

- 1 Fuel and fresh water at berths in the artificial harbour. Fresh water at No 1 Pier, but the supply is unreliable and the quality poor. Supplies of water are limited in April and May.
- 2 Fresh provisions.

**Communications****4.45**

- 1 There is frequent communication by sea through Colombo with India.

**Rescue****4.46**

- 1 A lifeboat is maintained. See 1.55.  
For further information of rescue see *Admiralty List of Radio Signals Volume 5*.

**Small craft****4.47**

- 1 There is anchorage, for about 20 yachts, within the artificial harbour.

**Other name****4.48**

- 1 Sailor's Bastion (6°01'·6N, 80°13'·1E).

**GALLE TO HIKKADUWA POINT****General Information**

*Charts 819 Approaches to Galle Harbour, 3700*

**Route****4.49**

- 1 From a position S of Galle (6°02'N, 80°13'E) the route leads about 13 miles NW to a position SW of Hikkaduwa Point.

**Topography****4.50**

- 1 Between Galle and Hikkaduwa Point (4.53) the coast consists of a brown sandy beach with rocky projections at intervals, it is backed by low hills rising to heights of 45 to 70 m about 5 cables inland. The entire coastline is thickly planted with coconut trees and the hill slopes are densely wooded. Within, or on the edge, of foul ground fronting this stretch of coast are several rocks above water, but none is conspicuous.

**Currents****4.51**

- 1 Currents are subject to large changes in set and rate during the course of a year, see 4.6.  
During the SW monsoon, the current sets E along the coast; and during the NE monsoon in the opposite direction.

**Principal marks****4.52**

- 1 **Landmarks:**  
Hindelnattu (6°07'N, 80°24'E) (3.16).

Hiniduma Kanda (6°20'N, 80°18'E) (4.14).

Government hospital (6°02'·3N, 80°12'·1E); a long two-storeyed building, light buff in colour with a pillared verandah, stands on the coast 1¼ miles NW of Point de Galle.

**Major lights:**

Point de Galle Light (6°01'N, 80°13'E) (4.37).  
Barberyn Light (6°28'N, 79°58'E) (4.61).

**Directions**

(continued from 4.17)

**4.53**

- 1 From a position S of Galle (6°02'N, 80°13'E) the route leads about 13 miles NW to a position SW of Hikkaduwa Point, passing (with positions from Dodanduwa Point (6°06'N, 80°07'E)):
  - Clear of Galu Gala (7 miles SSE), a bank much frequented by fishermen, and:
  - SW of Alu Gala (6½ miles SE), a steep-to rock, thence:
  - SW of Ala Gala (5½ miles SE), a rocky patch with depths of 2 m or less, over which the sea always breaks. A dangerous wreck lies 3½ cables E of Ala Gala. Thence:
  - SW of Mada Gala (4 miles SSE), a steep-to rocky patch with depths of 2 m or less, over which the sea occasionally breaks, lies near the W end of a bank with depths of less than 20 m, and:
  - Clear of an isolated shoal (16 miles SW), the position of which is approximate, with a depth of 27 m over it, thence:
  - SW of Kopata (2¾ miles SE), a rocky shoal extending SW from shore, thence:
  - SW of Goda Gala (1½ miles SSW), a rocky patch, thence:
  - SW of Hikkaduwa Gala (1¼ miles WNW), a rock, with a depth of 2 m or less over it, lies at the SW end of a shoal extending from shore. Angala, three rocks awash, lies 7 cables E of Hikkaduwa Gala. Thence:
  - To a position SW Hikkaduwa Point (6°08'N, 80°06'E), which is low, flat and covered with coconut trees, almost concealing a rest house.

**Useful marks****4.54**

- 1 Kurundu Kanda (6°05'N, 80°14'E), a flat topped hill.  
Nindan Godella (6°02'·5N, 80°11'·5E), a rocky projection; upon which stands the Public Works Department bungalow (white, 9 m in height).  
Pedruana Gala (6°03'N, 80°10'E), two rocks standing close together.
- 2 Mada Gala (6°06'N, 80°07'E), the outer islet of two, it can be identified by a clump of coconut trees near its shoreward end.

(Directions continue at 4.62)

**Inland lake****4.55**

- 1 **Ratgama Lake**, lies close within the coast NE of Dodanduwa Point (4.53)

**Small craft****4.56**

- 1 Gin Ganga River (6°04'N, 80°10'E) can seldom be entered, even by canoes, on account of shallow rocky flats and the surf at its mouth. However, inside the river is navigable for about 50 percent of its length. Bataina Gala, a

rocky bluff 14 m high, stands on the coast at the S entrance point of the river.

- 2 Boats can land in good weather, during the NE monsoon, in a small bay N of Dodanduwa Point (4.53); the approach to the landing is rocky and there is always considerable surf.

## HIKKADUWA POINT TO BERUWALA POINT

### General information

Chart 3700

#### Route

##### 4.57

- 1 From a position SW of Hikkaduwa Point (6°08'N, 80°06'E) the route leads about 25 miles NNW to a position WSW of Beruwala Point.

#### Topography

##### 4.58

- 1 The coast between Hikkaduwa Point and Beruwala Point consists of several rocky points and sandy beaches backed by coconut trees. The coast is fronted by rocks, reefs and shoals extending in places up to 1½ miles offshore.
- 2 The coast between Balapitiya Point (6°16'N, 80°02'E) and Beruwala Point is reported as being radar conspicuous to a range of 35 miles.

#### Depths

##### 4.59

- 1 Seaward of the 50 m depth contour there are 2 off-lying shoals with depths of 18.3 m and 37 m which lie, respectively, 12 miles WSW and 13 miles W of Hikkaduwa Point (4.53); both depths were reported in 1944.

#### Currents

##### 4.60

- 1 Currents are subject to large changes in set and rate during the course of a year; see 4.6.

#### Principal marks

##### 4.61

- 1 **Landmarks:**  
Hiniduma Kanda (6°20'N, 80°18'E) (4.14).  
Barberyn Light-tower (white round tower, 34 m in height) (6°28'N, 79°58'E) standing on the summit of Welmaduwa Island (4.62).
- 2 **Major light:**  
Barberyn Light—as above.

#### Directions

(continued from 4.54)

##### 4.62

- 1 From a position SW of Hikkaduwa Point (6°08'N, 80°06'E) the route leads about 25 miles NNW to a position WSW of Beruwala Point, passing (with positions from Ahungalla Point (6°19'N, 80°02'E)):
- 2 WSW of Waal Islet (12 miles SSE), the largest rock of a group of flat topped rocks. Thence:  
WSW of Debaha Rock (10 miles SSE) and:  
Clear of a shoal patch (15½ miles SSW) with 18.3 m of water over it (4.59), thence:
- 3 WSW of Passi Rock (7½ miles S), a dark coloured five headed rock, one of the heads is above water over which the sea always breaks; the bottom is irregular for about 4 cables W of the rock which should be given a wide berth. The deep channel

between Passi Rock and the coast should not be attempted for shoals and foul ground extend about 4 cables WSW from Akurala Point (1 mile E). Thence:

- 4 WSW of Attupella (5½ miles SSE), a shoal patch lying close offshore. Thence:  
WSW of Genawana (5 miles SSE), a rocky islet with a square top and a small amount of vegetation. Thence:
- 5 WSW of Mainbapara Rock (2½ miles S), thence:  
WSW of Kupata (1½ miles S), a dangerous rock with a shoal patch extending 1 mile SSW. Thence:  
WSW of an isolated rock (1½ miles NW), the rock is awash and steep-to. Thence:
- 6 WSW of Dodampara Rocks (4 miles NNW), two small above water rocks which form part of a group of rocks and reefs extending from shore. Thence:  
WSW of Handran Gala (6¾ miles NNW), a bare rock surmounted by a boulder. Thence:
- 7 WSW of Welmaduwa Island (9½ miles NNW), an island covered with tall coconut palms, with a rocky cliff (14 m in height) on its seaward facing side. The island is surmounted by a light-tower (4.61). Thence:  
To a position WSW of Beruwala Point (10 miles NNW), a point with a rocky promontory at its N end that lies on the W side of a small bay.

#### Useful marks

##### 4.63

- 1 Telwatta Point (6°09'N, 80°05'E), a rocky point surmounted by the ruins of a large temple.  
Galgoda (6°13'N, 80°05'E) a hill, with a single tree on its summit, which can be seen through a wide gap in the coastal belt of coconut trees; the gap itself is also clearly visible from seaward.
- 2 A large boulder (6°17'N, 80°02'E), standing on the coast 9 cables N of Balapitiya Point (6°16'N, 80°02'E) (4.64).
- 3 Ahungalla Point (6°19'N, 80°02'E), a cliff covered with coconut palms; Kola Islet, with a few palm trees on it, lies close S of the point to which it is joined by a narrow strip of drying sand.
- 4 Duwemodera Hill (6°21'N, 80°02'E), an isolated hill with a ridge extending E, lies 1 mile E of Arangala Point. A small hill, situated between Duwemodera Hill and Arangala Point, is surmounted by a temple and monument which are obscured by trees from some directions.
- 5 Galboda Kanda (6°23'N, 80°01'E), a flat topped hill surmounted by a white monument and temple which are prominent in afternoon sunlight.  
(Directions continue at 4.74)

#### Inland lakes

##### 4.64

- 1 There are several inland lakes along this stretch of coast, however, only the interconnecting lakes of Madu Ganga and Randombe can be entered by small boats. The common entrance to the lakes lies 4 cables NNE of Balapitiya Point (6°16'N, 80°02'E), a low flat double point.

#### Small craft

##### 4.65

- 1 Boats may land, in good weather, in a small bay N of Waal Islet (4.62) passing through or over the coral reef that lies across its entrance.



2 The N side of Genawana Islet (4.62) provides a landing place for boats in fair weather; however, between the islet and the coast there is foul ground over which the sea breaks even in fair weather.

3 During the NE monsoon, boats may land on a sandy beach lying between two points of rock immediately S of Ambalangoda Rest House (6°14'N, 80°03'E); although the sea appears to break close offshore a small boat may enter with care.

4 Bentota Ganga a small river, which flows into the sea 1½ miles NNW of Godagala Point (6°25'N, 80°00'E), can be entered only by canoes.

Landing is generally possible at two small piers located on the E side of Welmaduwa Island (4.62).

#### Other names

##### 4.66

- 1 Deba Gala (6°25'N, 79°59'E), a rock.  
Hirae (6°14'N, 80°02'E), a rock.  
Kaikawalagala Point (6°22'·5N, 80°00'·5E).  
Patiagala Point (6°14'N, 80°03'E).  
Pelagas Kanda (6°21'N, 80°03'E), a hill.  
Yakgahagala Point (6°24'N, 80°00'E).

### BERUWALA POINT TO COLOMBO

#### General Information

*Chart 1655, 3700*

#### Route

##### 4.67

- 1 From a position WSW of Beruwala Point (6°28'N, 79°58'E) the route leads about 29 miles NNW, thence about 3 miles N to a position W of Colombo.

#### Topography

##### 4.68

- 1 The coast between Beruwala Point and Galbokka Point (6°56'N, 79°50'E) is generally featureless, low and straight with sandy beaches backed by dense groves of coconut trees; the hinterland is densely wooded and there are numerous towns and villages. Several stone-coloured railway stations are prominent, during afternoon sunlight, on the edge of the beach along the N part of the coast. South of Galbokka Point a narrow ridge of rock about 6 miles long, having the appearance of a barrier reef which is awash in places, lies about 1 cable offshore.

#### Depths

##### 4.69

- 1 Seaward of the 50 m depth contour there are no charted dangers.

#### Prohibited anchorage

##### 4.70

- 1 For prohibited anchorage see 4.98.

#### Currents

##### 4.71

- 1 Currents are subject to large changes in set and rate during the course of a year, see 4.6.

In the approaches to Colombo the current is variable, its rate seldom exceeding ½ kn; but near the shoal water it usually sets N at a rate of 1½ kn during the NE monsoon.

#### Principal marks

##### 4.72

#### Landmarks:

- 1 Temple (white dome) (6°35'N, 79°58'E), the dome is floodlit and a fixed green light is exhibited from its top.  
Immanuel Church (red square tower) (6°47'N, 79°53'E). A conspicuous grey water tower stands 5 cables ESE of the church.  
2 Mount Lavinia Hotel (6°50'N, 79°52'E), a large white building standing on a rocky point; behind the hotel the land rises to form a dark background making the hotel visible, in a favourable light condition, up to 12 miles offshore. The hotel is radar conspicuous.  
3 Colombo Town Hall (6°55'N, 79°52'E), a building with a white dome.  
Radio masts (93 m in height) (6°55'N, 79°53'E), two framework radio masts; both exhibit red air obstruction lights.  
4 Galle Face Hotel (6°55'N, 79°51'E), a large red building standing on the coast SW of Slave Island.  
Colombo Lighthouse (6°56'·2N, 79°50'·4E) (4.105).  
5 **Major lights:**  
Barberyn Light (6°28'N, 79°58'E) (4.61).  
Colombo Light—as above (4.105).

#### Other aid to navigation

##### 4.73

- Racon (6°58'·3N, 79°50'·1E), at No 2 Light-buoy (preferred channel to starboard), which marks the seaward end of the buoyed approach channels to Colombo Harbour.  
1 For details see *Admiralty List of Radio Signals Volume 2*.

#### Directions

(continued from 4.63)

##### 4.74

- 1 From a position WSW of Beruwala Point (6°28'N, 79°58'E) the route leads about 29 miles NNW to a position WSW of Galbokka Point, passing (with positions from Gona Gala (6°42'N, 79°53'E)):  
2 WSW of Madda Gala and Prompt Rock (14 miles S), the two outermost of numerous dangers lying W and NW of Beruwala Point; both dangers are steep-to and soundings give no warning of approach to them. Thence:  
WSW of Tria Gala (12½ miles SSE) a steep-to above water rock; with a rock, over which the sea always breaks, lying 4 cables SSE of it. Thence:  
3 WSW of Módara Muduwa Rock (9 miles SSE), a dangerous rock lying close S of Pallaipara and Pittaniya Rocks, thence:  
WSW of Uheliya Reef (8 miles SSE), a reef lying at the outer end of an area of shoals and uneven ground, thence:  
4 WSW of Uan Gala and Kaluwatte Gala (4 miles S), two steep-to shoals, thence:  
WSW of Po Gala and Nilkete Rock (1½ miles S), the outermost of several dangers lying SW of Panadura (2½ miles NE). Thence:  
5 WSW of Alut Gala (5 cables SSW), a shoal patch, thence:  
WSW of a rocky patch (4½ miles NNW), with a depth of 18·3 m over it, which lies to seaward of the town of Moratuwa, thence:



- 6 Clear of a dangerous wreck (7½ miles NNW), thence:  
Clear of 2 dangerous wrecks, the positions of which are approximate, lying in the vicinity of Ekveni Gala (10 miles NNW), thence:  
Clear of a shoal patch (15 miles NW) with a least depth of 18.3 m of water over it.
- 7 Thence from a position WSW of Galbokka Point (6°56'N, 79°50'E) the route leads 8 miles N to a position W of Colombo Harbour, passing (with positions from the point):  
W of Galua (Drunken Sailor Rock) (4 cables SW), a shoal with 2 rocky heads over which the sea breaks during the SW monsoon. Thence:  
8 W of Galbokka Point, a black rocky knoll connected by a short sandy isthmus on its E side to the coast at the S end of Colombo Harbour. Several detached rocks lie close off the point. Thence:  
Clear of a dangerous wreck (1½ miles W), thence:  
9 W of Pala Gala (Tartar Rock) (4 cables NW); a pinnacle of rock, which is steep-to and never breaks. Thence:  
W of Kelani Gala (2 miles NW), a narrow sandy bank, thence:  
W of the restricted area around an oil tanker SBM (4½ miles NW) (4.98).

### Useful marks

#### 4.75

- 1 Maggona Point (6°30'N, 79°58'E), a point fronting a village of the same name.  
Weragela Kanda (6°31'N, 79°59'·5E), a hill surmounted by a white dagoba.  
Gona Gala (6°42'N, 79°53'E), the outer of two round-topped rocks.
- 2 Ratmalana Aero Light (elevation 22 m) (6°49'N, 79°53'E) is exhibited from the airfield control tower.  
(Directions continue for coastal passage at 4.126)  
(Directions for Colombo are given at 4.107)

### Inland lakes and waterways

#### 4.76

- 1 Kalu Ganga, with its mouth at Kalutara (6°35'N,

79°58'E), connects with Colombo through a system of canals, rivers and lakes.

- 2 Panadura Ganga, a long and irregular-shaped fresh water lagoon about 2 miles inland, forms a link in the canal system. When the lake is full from the rains it flows into the sea abreast Panadura (6°43'N, 79°54'E).
- 3 The waterways are only suitable for local small craft or canoes.

### Small craft

#### 4.77

- 1 A landing place for small craft lies 3 cables E of Beruwala Point (6°28'N, 79°58'E) (4.62); landing is possible during the NE and SW monsoon. It is inadvisable to anchor off Beruwala, in depths less than about 11 m, because of off-lying dangers and the swell which is generally encountered off the point.
- 2 Boats can land at Maggona (6°30'N, 79°58'E) (4.75) in fine weather but it is neither easy nor safe.

### Anchorage

#### 4.78

- 1 Small craft may anchor off Kalutara (6°35'N, 79°58'E) (4.76) in depths of about 10 m. Approach to the anchorage is made by passing between Uheliya Reef (6°35'N, 79°55'E) (4.74) and Pittaniya Rocks (6°34'N, 79°56'E) (4.74).
- 2 Anchorage, sheltered by a reef, may be obtained by small craft about 6 cables N of Mount Lavinia Hotel (6°50'N, 79°52'E) (4.72).
- 3 **Leading lights:**  
Front mark (white concrete beacon, 6 m in height) (6°50'·6N, 79°51'·8E).  
Rear mark (coconut tree) (54 m E of front beacon).
- 4 The alignment (099°) of these marks leads through a passage in the reef, with a depth of about 3.7 m, towards the anchorage which is predominantly used by local fishing vessels.
- 5 **Caution.** Local knowledge is required by small craft anchoring off Kalutara or N of Mount Lavinia Hotel.

## COLOMBO HARBOUR AND APPROACHES

### General information

Chart 1655, 3700

### Position

#### 4.79

- 1 Colombo Harbour (6°57'N, 79°51'E) lies in a small bay on the W coast of Sri Lanka.

### Function

#### 4.80

- 1 Colombo is a major container transshipment port and the principal port of Sri Lanka. The main imports are crude oil, machinery, iron and steel and manufactured goods; exports include sawn timber, crude rubber, machinery, textiles and manufactured goods.

- 2 The population of Colombo was estimated to be 2 372 400 in 2004.

### Topography

#### 4.81

- 1 The land near Colombo is low-lying and does not show up far to seaward, although in exceptionally clear weather Adam's Peak (6°49'N, 80°30'E) and the other mountains of Sri Lanka may be visible from a great distance. When closing the port the skyline is cluttered; the most readily identified features may be Colombo Lighthouse, the Bank of Ceylon building with two adjacent taller office blocks and the flour mill (4.105).

### Depths

#### 4.82

- 1 There are soundings of 200 m about 13 miles W of Colombo, with depths of 50 m close E of them reducing to 20 m about 3 miles off the port.



SW Breakwater Head

Buddha Jayantha  
Chaitaya Monument

## Colombo Harbour, S part, from W (4.79)

(Original dated 1997)

Certain areas in the approaches to Colombo have not been systematically surveyed and depths are from old leadline surveys; uncharted shoals may exist. See note on Chart 1655.

### Piracy

#### 4.83

- 1 Incidents of piracy have occurred off Colombo, for possible preventative measures see 1.56.

### Port limits

#### 4.84

- 1 The limits of the port of Colombo extend about 9 miles offshore in a rectangular area, seawards from the entrance to the port as shown on the chart 1587.

### Approach and entry

#### 4.85

- 1 The port is approached from the NW and entered through one of two entrances, which lie either side of a detached breakwater, situated between Galbokka Point (4.74) and Mutwal Point (1¾ miles NE).

### Traffic

#### 4.86

- 1 In 2003 the port was used by 3938 vessels with a total dwt of 102 216 312.

### Port authority

#### 4.87

- 1 The port is administered by the Sri Lanka Ports Authority, 19 Church Street, PO Box 595, Colombo 1.  
The offices of the Port Commission and the Master Attendant are located in the Port Commission Building standing near the root of Bandaranaike Quay (4.112).

### Historical background

#### 4.88

- 1 The town of Colombo was originally founded as a European settlement by the Portuguese, who arrived with a fleet of 19 ships under Lopez Suarez Albergaria, in 1518, and erected a fort. The Sinhalese name, Kolamba, was modified by the Portuguese to Colombo, possibly in honour of Columbus. Colombo, together with the maritime provinces of Sri Lanka, fell into Dutch hands in May 1656, and was surrendered to the British in February 1796.
- 2 The Fort (6°56'N, 79°51'E), so called on account of the old Portuguese and Dutch fortifications which entirely encircled it in former days but are now removed, is laid out as a modern European town.

### Development

#### 4.89

- 1 Plans to expand the port have been formulated (1997). The plans include the construction of a new harbour, including container berths, and the provision of additional berths in the present harbour.

### Limiting conditions

### Controlling depths

#### 4.90

- 1 **West entrance.** There is a least depth of 16.8 m in the approach channel within the sectors of directional light (4.108). The buoyed channel in the inner part of the approach has a dredged depth (2003) of 16 m.  
**North entrance.** The buoyed channel has a dredged depth (2003) of 13 m. A shoal depth of 8.6 m lies 1 cable N of the head of North East Breakwater.
- 2 Within the breakwaters, the central part of the harbour has a large dredged area (2003), the N part to 14 m and the S part to 15m. Several sections of the area surrounding the central part are dredged to lesser depths, the limits and depths of these sections may be seen from the chart.
- 3 The S end of the harbour is connected to Colombo Lake by a canal with locks; the canal is dredged to 3 m.
- 4 **Cautions:**  
Ascend of up to 1 m can be experienced within the harbour thereby reducing depths accordingly.  
Depths in parts of the harbour, as indicated on the chart, have been reported to be up to 3 m shoaler than charted.

### Deepest and longest berth

#### 4.91

- 1 South Asian Gateway Terminal Berth Nos 3 to 6 (4.111).

### Tidal levels

#### 4.92

- 1 See information in *Admiralty Tide Tables Volume 3*. Mean spring range about 0.6 m; mean neap range about 0.2 m.

### Density of water

#### 4.93

- 1 Density of water is 1.025 g/cm<sup>3</sup>.

### Maximum size of vessel handled

#### 4.94

- 1 The maximum size of vessels handled is:  
Harbour 54 700 dwt, LOA 300, draught 14 m;  
SBM 180 000 dwt.

## Local weather and sea state

### 4.95

- 1 **Weather.** The SW monsoon brings heavy rain and winds which occasionally may reach gale force.

**Visibility.** During the SW monsoon the visibility is often poor.

**Swell.** During the SW monsoon a disturbed swell, combined with an E set, may be experienced across the W entrance of the harbour.

- 2 **Current.** During the NE monsoon a current, setting N along the coast with a rate of up to 1½ kn, may be experienced off the harbour; this results in an E set across the W entrance of the harbour.

## Arrival information

### Port radio

#### 4.96

- 1 A port radio service is operated; berthing schedules are broadcast. For details see *Admiralty List of Radio Signals Volume 6(4)*.

### Notice of ETA

#### 4.97

- 1 ETAs should be sent 5 and 3 days and 24 hours before arrival, see *Admiralty List of Radio Signals Volume 6(4)*.

### Outer anchorages and moorings

#### 4.98

- 1 **Anchorages.**  
Vessels arriving off Colombo should anchor in Negombo Waiting Area (4.122) off Negombo Point in the vicinity of 7°12'N, 79°45'E, until instructed to proceed to anchor or wait off the harbour.
- 2 There are no designated anchorages off the harbour entrance and the roadstead can be very crowded. Whilst awaiting a pilot, vessels either anchor or drift, exhibiting two red lights disposed vertically.
- 3 **Prohibited anchorage.** Anchorage is prohibited in an area shown on the chart S of the parallel of Galbokka Point (4.74) on account of submarine cables.
- 4 **Moorings.** An SBM for oil tankers is moored in position 6°58'7N, 79°46'5E; a light is exhibited from the buoy and a restricted area is established, radius 1-2 miles centred on the buoy. A submarine pipeline is laid ESE from the buoy to a position near the root of North East Breakwater, close W of Mutwal Point.
- 5 Another SBM for oil tankers is moored in position 7°01'7N, 79°48'8E; a light is exhibited from the buoy. A restricted area is established, radius 4¼ cables, centred on the buoy.
- 6 An offshore mooring for gas tankers is situated in position 7°00'9N, 79°49'8E. The facility consists of four mooring buoys with a light exhibited from No 4 buoy. A restricted area is established, radius 1000 m, centred on the pipeline end manifold (charted as an obstruction).
- 7 Submarine pipelines extend SE thence E from the above two berths and with restriction areas between 300 m and 500 m on either side of the pipelines.
- 8 **Caution.** Entry into these restricted areas is only for vessels using the tanker terminals, and vessels should neither anchor nor trawl in the vicinity of the pipelines, see also 1.11.

## Pilots and tugs

### 4.99

- 1 **Pilotage** is compulsory for all merchant vessels except those exempted by the Master Attendant.

The port is open day and night and pilots are available throughout the 24 hours.

- 2 The vessel's name and draught should be communicated to the pilot station as soon as possible. The pilot will board, about 2 miles NW of North West Breakwater, in the position shown on the chart; until a pilot has boarded, vessels should remain W of this position and not approach the port unless requested to do so.

- 3 In the event of adverse weather precluding the vessel being boarded outside the harbour, the vessel may, at the discretion of the Master Attendant, be given the option of proceeding into harbour and picking up the pilot inside; the vessel being instructed whether to run in or stand off. The option to enter is not given at night under normal circumstances.

- 4 If, at any time, assistance is required from the Master Attendant's department the signal should be made for a pilot.

See *Admiralty List of Signals Volume 6(4)* for details.

- 5 **Tugs** are available.

## Regulations concerning entry

### 4.100

- 1 **Entry.** Vessels may enter or leave harbour by whichever entrance is more convenient, subject to the depth limitation for the N entrance. At night vessels should pass midway between the red and green lights on the breakwater heads.
- 2 **Draught.** Vessels are not permitted to navigate the harbour, or lie at berths, with less than 0.6 m under keel clearance; except by special sanction of the Master Attendant.
- 3 **Speed.** When a large red flag is displayed on a floating crane, all vessels passing or in the vicinity are to proceed at such speed that they cause no wash or any kind of disturbance affecting the crane.
- 4 **Dangerous cargoes.** To avoid risk of fire or accident, vessels discharging dangerous petroleum are surrounded, at a distance of not less than 30 m, by a rope boom floated on red wooden buoys and displaying:  
By day; a red flag over a green flag.  
By night; four lights, red and green alternately vertically disposed.

## Quarantine

### 4.101

- 1 The quarantine signal is to be displayed by all vessels arriving in the harbour and no person except the pilot is to be allowed to board or leave the vessel until pratique is given.
- 2 Vessels having, or have had within 10 days before arrival, any infectious disease, are placed in quarantine for a period decided by the Chairman of the Board of Immigration and Quarantine. In such a case, the vessel may have to anchor in the roadstead or other place as directed by the Master Attendant.
- 3 Vessels in quarantine must display the necessary signals.

## Harbour

### General layout

#### 4.102

- 1 The harbour is artificially formed by three breakwaters which enclose an area between the N side of The Fort (4.88) and Mutwal Point (4.85) as follows:



- 2 South West Breakwater extends 8½ cables N from the shore at the S end of the harbour; about 2½ cables S of the outer end of this breakwater an arm extends 1 cable NNE, there is a landing jetty at this arm where the port signal station and pilot station are sited together. The signal station maintains a day watch only.
- 3 North East Breakwater extends 2 cables W from Mutwal Point.  
North West Breakwater is detached and protects the harbour between the above breakwaters.
- 4 The main berthing areas for general cargo vessels are located at piers in the N and S parts of the harbour; container vessels on the inner side of South West Breakwater; tankers berth on the inner side of North West Breakwater and in the NE part of the harbour. Trawler and fishing harbours are located close NE of Mutwal Point.

### Harbour signals

#### 4.103

- 1 The following special signals are used in the harbour:

| <i>By day*</i> | <i>At night</i>                      | <i>Signification</i>                                                                                                                                |
|----------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Red ball       | Red light                            | Shown from the pilot station flagstaff when vessels are required to run out extra mooring ropes to the buoys and prepare to let go a second anchor. |
| Flags UM       | Four red lights, vertically disposed | Displayed from the pilot station flagstaff when weather conditions are such as to preclude vessels being boarded by the pilot outside the harbour.  |
| Flags GOU      |                                      | Shown by a vessel indicates that the vessel or its cargo is being fumigated.                                                                        |

- 3 \*Flags from the International Code of Signals.

### Natural conditions

#### 4.104

- 1 For details see climatic table 1.208.

### Principal marks

#### 4.105

- 1 **Landmarks:**  
Monument (82 m in height) (6°56'·3N, 79°50'·5E), a white monument (to Buddha Jayantha Chaitiya) standing on four yellow curved legs, is situated at the S part of the harbour.  
Colombo Lighthouse (black and white chequered round stone tower, 15 m in height) (6°56'·2N, 79°50'·4E).
- 2 The Bank of Ceylon, a round building, stands about 2½ cables SSE of Colombo Lighthouse; there are two other taller buildings in its vicinity.

Flour mill (64 m in height) (6°57'·7N, 79°51'·4E) marked by red obstruction lights.

### Major light:

Colombo Light—as above.

### Other aid to navigation

#### 4.106

- Racon (6°58'·3N, 79°50'·1E) at No 2 Light-buoy (4.73).
- 1 For details see *Admiralty List of Radio Signals Volume 2*.

### Directions

#### 4.107

- 1 From a position NW of Colombo the track leads SE, passing (with positions from Galbokka Point (6°56'·2N, 79°50'·4E)):  
NE of the restricted area around the oil tanker SBM (4½ miles NW) (4.98), and
- 2 SW of the restricted area around the oil tanker SBM (5¾ miles NNE), thence:  
SW of the restricted area around the gas tanker moorings (4½ miles N), thence:
- 3 SW of Ona Gala (3½ miles N), a narrow ridge, marked near its S end by No 11 buoy (special), and with its least depth over a head named Galwala; there is a foul patch 7 cables WSW of Galwala. During the SW monsoon vessels are cautioned against being set towards Ona Gala. Thence:
- 4 SW of Kalapu Gala (4 miles N), a narrow reef lying about 5 cables offshore, which extends parallel to the coast for about 4 miles from a position close NE of Mutwal Point (4.85); the sea breaks over the reef during the SW monsoon and even in calm weather blind rollers occur.
- 5 Thence either proceed to the N entrance; keeping SW of an area restricted to the exclusive use of fishing vessels, which extends 1½ miles NW from the head of North East Breakwater and E to the shore, as shown on the chart; or proceed to the W entrance, the primary entrance, as described below.

### Entrances

#### 4.108

- 1 **Caution.** If entering the harbour by the W entrance, vessels should be aware of the set (4.95) which may occur.
- 2 **West entrance.** This entrance is approached from NW in the white sector of the Directional light (134·7°/137°·4), which stands on North-West Breakwater, about 1 cable NNE of its S head; the approach is through a 16 m dredged channel (4.90) marked by light-buoys, entered between No 2 Light-buoy (preferred channel to starboard, racon) (6°58'·3N, 79°50'·1E) and No 1 light-buoy (starboard hand), 1¾ cables WSW. A shoal patch with a depth of 4·8 m over it lies 1 cable SW of the South West Breakwater Head. The harbour is entered between the South West and North West Breakwaters; the entrance is about 1¼ cables wide, see view page 164.
- 3 Lights are exhibited from the breakwaters on each side of the W entrance (South West Breakwater Head, concrete tower, 19 m in height; North West Breakwater S Head, round stone tower, 12 m in height).  
Lights are also exhibited from the Pilot Station Arm located close inside the W entrance.





Colombo Harbour – W entrance, from NE (4.108)

(Original dated 2003)

(Photograph – Crown Copyright)

- 4 **North entrance.** This entrance, situated between North West and North East Breakwaters on which stand lights (North West Breakwater N Head, round stone tower, 11 m in height; North East Breakwater Head, concrete tower, 10 m in height), is about 1 cable wide.

The entrance is approached through a 13 m dredged channel (4.90) marked by light-buoys, the entrance marked by the entrance marked by No 2 Light-buoy (preferred channel to starboard, racon) ( $6^{\circ}58'3N$ ,  $79^{\circ}50'1E$ ) and No 8 light-buoy (port hand)  $3\frac{1}{4}$  cables NNE.

- 5 This entrance is closed by a boom from about 1600 to 0800 hours daily.

### Useful marks

#### 4.109

- 1 The following are useful marks (positioned from the pilot station ( $6^{\circ}57'2N$ ,  $79^{\circ}50'7E$ )):  
 Saint James Church ( $1\frac{1}{2}$  miles ENE), twin towers.  
 Christ Church Cathedral (8 cables E), square tower.  
 Saint Lucia's Cathedral ( $1\frac{1}{4}$  miles ESE), dome.  
 Water tower (8 cables SE).
- 2 Wolfendahl Presbyterian Church (1 mile SE), red conical dome.  
 All Saints' Church ( $1\frac{1}{4}$  miles SE), tall spire.  
 High Court ( $1\frac{1}{2}$  miles SE), round pagoda.
- 3 Light (1 mile S) exhibited from a white mast at an elevation of 15 m.  
 Clock tower (1 mile SSW), which stands on the highest part of The Fort (4.88).  
 Water tower (8 cables SSW).

### Basins and berths

Chart 1655, plan of Colombo Harbour

### General information

#### 4.110

- 1 **Caution.** The depths at some berths have been reported to be less than charted; for up to date information the Port Authority should be consulted.
- 2 **Mooring responsibility.** When a vessel has been moored to the satisfaction of the Master Attendant, the responsibility for ensuring mooring hawsers are properly tended becomes that of the Master of the vessel.

### Principal berths on the breakwaters

#### 4.111

- 1 **South Asian Gateway Terminal (SAGT)** about  $6\frac{1}{2}$  cables in length, there are 4 berths at the N end, for container vessels, with depths of about 15 m alongside; and 2 berths in the central part for passenger and general cargo vessels, with depths of about 9.3 to 10.5 m alongside. Small vessels berth at the S end of this quay.
- 2 **Dolphin Tanker Berth** about 50 m in length, which is flanked by dolphins, is located on the SE side of North West Breakwater; there is a dredged depth of about 14 m alongside and it is reported that vessels of up to 60 000 tonnes can be handled.
- 3 **Prince Vijaya Quay** 330 m in length, is located on the S side of North East Breakwater; there are 2 berths for cargo vessels with depths of about 8.9 m alongside.

### Principal berths on the E and S sides of the harbour

#### 4.112

- 1 Berths (positioned from the pilot station ( $6^{\circ}57'2N$ ,  $79^{\circ}50'7E$ )):
- 2 **Samagi Jetty (Unity Container Terminal)** (5 cables ENE), is 370 m long on its S side only providing berths on both sides, with a maximum draught of 10.4 m. A light (pedestal) is exhibited from its head.
- 3 **South Pier** ( $5\frac{1}{2}$  cables ENE), is 270 m long and provides a berth for a vessel with maximum length 228 m and draught 9.5 m.
- 4 **North Guide Pier** ( $5\frac{1}{2}$  cables ENE), which forms the S side of South Pier, is used to load coconut oil; the berth has depths of about 9 m alongside. Vessels berthed have to be moved clear of the berth when other vessels are entering or leaving the dry docks situated near its root.
- 5 **Jaye Container Terminal** ( $5\frac{1}{4}$  cables SE), is about 1300 m long and provides 4 berths with extensive container handling facilities. Nos 1 and 2 Berths, the N berths, are dredged to 12.0 m and 13.0 m respectively; Nos 3 and 4 berths, the S berths, are dredged to 14.0 m.
- 6 **Bandaranaike Quay** ( $6\frac{1}{2}$  cables S), is 420 m long and 130 m wide providing berths on each side and across its head; depths alongside range from about 6.7 to 10.3 m.
- #### 4.113
- 1 **Harbour craft.** There are several berths along the SE side of the harbour for small vessels; vessels secure with

their sterns to buoys and lie to either 1 or 2 anchors heading according to the monsoon.

Local craft are berthed on the S side of the harbour inside the above berths for small vessels, or they lie to their own ground tackle.

- 2 The water barge moorings are located in the SW corner of the harbour.

- 3 **Fishing vessels.** On the NE side of Mutwal Point (4.85) there is a trawler harbour, with a fishery harbour close E; both harbours are protected from W by breakwaters. A light is exhibited from a metal column at the head of the fishery harbour's rubble breakwater.

### Port services

#### Repairs

##### 4.114

- 1 Major repairs can be carried out. Colombo Dry Docks Limited operate 4 dry docks of varying sizes and a slipway; the largest dry dock, No 4 Dock, length 263 m, breadth 44 m with a depth on its sill at MHWS of 9.27 m, will accommodate vessels up to 125 000 dwt. The dry docks and slipway are all entered between North Guide Pier and the N end of Jaye Container Terminal.
- 2 There are slipways for small vessels located in the SE part of the harbour.

## COLOMBO TO PĀMBAN PASS

### COLOMBO TO KUDREMALAI POINT

#### General information

*Charts 1587, 1586*

#### Route

##### 4.119

- 1 From a position NW of Colombo (6°57'N, 79°51'E) the route leads 35 miles NNW, then, 56 miles N to a position W of Kudremalai Point.

#### Topography

##### 4.120

- 1 The coast N of Colombo to Chilaw Point (7°36'N, 79°47'E) is almost featureless with sandy beaches and generally covered with coconut palms, except for a break in its fringe about 4 miles N of Negombo, marking the entrance to Maha Oya. North of Chilaw Point the coast is formed by the seaward side of a narrow peninsula with a sandspit and several islands extending NNE from its N extremity.

#### Depths

##### 4.121

- 1 Charted soundings, particularly in deep water, are very sparse; in places along this stretch of coast the depth reduces from 200 m to 10 m, or less, in 1 mile. Mariners are cautioned to navigate accordingly.

#### Waiting area

##### 4.122

- 1 Negombo Waiting Area, whose limits are shown on the chart, is situated between Negombo Point and the 14.2 m shoal which lies about 7¾ miles WSW. It is used by vessels waiting instructions to enter Colombo.

#### Other facilities

##### 4.115

- 1 Hospital and ambulance launch.  
Divers.  
Fire-fighting and salvage appliances.  
Oily waste reception.  
De-ratting and exemption certificates issued.

#### Supplies

##### 4.116

- 1 Marine fuels, at main alongside berths or by lighter.  
Fresh water from hydrants at the main alongside berths and dry docks, or by lighter.  
Fresh provisions.

#### Communications

##### 4.117

- 1 International airport 24 km.

#### Rescue

##### 4.118

- 1 Rescue facilities are in the form of 3 powered lifeboats; three tugs are also available for this purpose. See 1.55.  
For further information of rescue see *Admiralty List of Radio Signals Volume 5*.

#### Local knowledge

##### 4.123

- 1 Local knowledge is required by vessels anchoring N of Negombo Point (4.126), in Dutch Bay (4.129) and in Portugal Bay (4.129); and for those entering the inland lakes.

#### Currents

##### 4.124

- 1 Currents are subject to large changes in set and rate during the course of a year, see 4.6.

#### Principal marks

##### 4.125

- 1 **Landmarks:**  
Kenpungoda Church (7°07'N, 79°50'E), with a red roof and low twin towers, stands on the coast about 1 cable SSE of a schoolhouse.  
Banyan tree (7°24'N, 79°49'E).
- 2 **Major light:**  
Colombo Light (6°56'2N, 79°50'4E) (4.105).

#### Directions

*(continued from 4.75)*

##### 4.126

- 1 From a position NW of Colombo (6°57'N, 79°51'E) the route leads 35 miles NNW to a position W of Chilaw Point, passing (with positions from Negombo Point (7°12'N, 79°49'E)):
- 2 WSW of 3 dangerous wrecks (lying, respectively, 11 miles, 10 miles and 5¾ miles S); thence:  
Clear of a shoal patch (8 miles WSW) forming part of a coral reef, about 3 miles long and unexamined (1944), thence:
- 3 WSW of Negombo Point. An obstruction, which dries 2 m, lies 7¼ cables NW of the point. Attention is drawn to the Negombo Waiting Area, see 4.122. Thence:

- 4 WSW of a dangerous wreck (1¼ miles NNW), thence:  
WSW of a shoal patch (2¾ miles NNW) with 2·7 m of water over it, thence:  
Clear of a dangerous wreck (23 miles NNW).
- 5 Thence from a position W of Chilaw Point (7°36'N, 79°47'E) the route leads 56 miles N to a position W of Kudremalai Point, passing (with positions from Mampuri (8°00'N, 79°44'E)):  
W of a reef (20 miles S) with above and below-water rocks, thence:
- 6 W of a shallow flat (7 miles SW), an area of rock and sand, with a least charted depth of 3·7 m, extending about 7 miles SW from the coast. The flat is steep-to and soundings give little warning of approach to the danger; to ensure avoiding this shoal, vessels passing the peninsula should keep at least 7 miles offshore and in depths of more than 200 m. Thence:
- 7 W of a reef (11 miles NNW) consisting of a chain of rocks, lying close offshore, about 5 miles long. Thence:  
W of Bar Reef (22½ miles N), a drying sandbank 1½ miles long. Thence:
- 8 To a position W of Kudremalai Point (33 miles NNE), which is steep and rocky.

### Useful marks

#### 4.127

- 1 Beacon (white, 8 m in height) (7°01'N, 79°52'E) (chart 1655) stands near the coast 2 miles N of the entrance to Kelani Ganga River; a stranded wreck lies 1¼ cables SSW of the beacon. Both marks were reported not visible in 1993.  
Chilaw Point (7°36'N, 79°47'E) may be identified by a sandhill and a round hummock nearby.
- 2 Aruakalu Tower (white) (8°16'N, 79°50'E) stands on the summit of a hill 79 m high.  
Kudremalai Tower (white, elevation 69 m) (8°30'N, 79°52'E) stands on the highest of three long sand mounds.
- 3 Beacon (black tripod with diamond topmark, elevation 38 m) (8°32'N, 79°52'E) stands on Kudremalai Point.

*(Directions continue at 4.136)*

### Inland lakes

#### 4.128

- 1 There are 3 inland lakes on this stretch of coast which have access, for small craft, from sea.
- 2 **Negombo Lagoon** is entered between Negombo Point (7°12'N, 79°49'E) and the town of Negombo situated close E across a narrow channel.  
**Chilaw Lake** (7°32'N, 79°49'E) is entered by a narrow channel that leads 3 miles S from its estuary, situated close E of Chilaw Point, to the lake.
- 3 **Puttalam Lagoon** (8°08'N, 79°47'E) is entered at its N end from Dutch Bay (4.129).

### Anchorage

#### 4.129

- 1 **Negombo Point.** There is anchorage for small vessels with local knowledge, about 5 cables offshore in a depth of 6 m, 2½ miles NNE of Negombo Point (7°12'N, 79°49'E). Vessels approaching the anchorage must give the dangers shown on the chart a wide berth.

- 2 **Chilaw Estuary.** There is anchorage for small vessels near the mouth of Chilaw Estuary, 1¼ miles NW of Chilaw Point (4.127), in a depth of 11 m. Vessels approaching this anchorage from S should keep 4 to 5 miles offshore, passing clear of a dangerous wreck (7°34'N, 79°40'E) and W of a buoy (red can) moored 3½ miles WSW of Chilaw Point, then close to the anchorage.
- 3 **Dutch Bay.** Anchorage, with shelter from SW winds, can be obtained in Dutch Bay by small vessels with local knowledge. The bay is entered E of Bar Reef (4.126), between the S end of the southern part of Karaitivu Island (8°22'N, 79°48'E) and the N end of a sandspit 1½ miles SW; the bay is shallow and the position of the sandspit is liable to change. In suitable weather conditions small vessels may also obtain anchorage about 1 mile W of the N end of the sandspit.
- 4 **Portugal Bay** (8°30'N, 79°50'E), which lies E of the N part of Karaitivu Island is generally shallow; however, anchorage for vessels with local knowledge and draught not exceeding 4·3 m, may be found in depths of 5·5 m, about 2 miles W of Kudremalai Point (4.127).

## KUDREMALAI POINT TO PĀMBAN ISLAND

### General information

*Charts 69, 1586*

### Route

#### 4.130

- 1 From a position W of Kudremalai Point (8°32'N, 79°52'E) the route leads about 22 miles N, thence WNW to a position S of Land's End, the SE extremity of Pāmban Island.

### Topography

#### 4.131

- 1 The coastline NNE of Kudremalai Point is indented with several shallow bays and forms the E part of a large bay in the NE corner of the gulf. The NE part of the bay is enclosed by Mannār Island, which is wooded with low sandhills on its SW side for a distance of about 5 miles from its SE end; at the W end, there are coconut or other palms near the villages. In the bight between Kal Aru (8°39'N, 79°57'E) and Adam's Bridge, 35 miles NW, there are pearl banks extending up to 10 miles offshore. The N part of the bay consists of Adam's Bridge, a narrow ridge of rocks and shifting sandbanks with intricate channels between them, extending WNW from the W point of Mannār Island to Pāmban Island.

### International boundary

#### 4.132

- 1 The international boundary between Sri Lanka and India crosses Adam's Bridge about 10 miles W of the W end of Mannār Island. See 1.92.

### Depths

#### 4.133

- 1 Charted soundings, particularly in deep water, are very sparse; in places in this bay the depth reduces from 200 m to 30 m, or less, without warning. Less water than charted was reported (2002) in the S approaches to Pāmban as shown on the chart. Mariners are cautioned to navigate accordingly.

### Natural Conditions

#### 4.134

- 1 **Currents.** Currents are subject to large changes in set and rate during the course of a year, see 4.6.



In the SW Monsoon a strong current sets N over Adam's Bridge; it is less strong towards the W end of the bridge.

**Overfalls.** A confused sea is generally met near Mannār Island.

### Principal marks

#### 4.135

##### 1 Landmarks:

- Railway and road bridge (8°58'N, 79°54'E).  
Mannār Island Old Light Tower (9°06'N, 79°42'E) (3.221).

### Directions

(continued from 4.127)

#### 4.136

- 1 From a position W of Kudremalai Point (8°32'N, 79°52'E) the route leads about 22 miles N to a position WSW of Mannār, passing (with positions from Doric Beacon (white masonry tower) (8°47'N, 79°56'E)):
- 2 W of a shoal (14 miles SW), the N extremity of a bank extending 5 miles N of Karaitivu Island; shoaling was reported in 1928 at the N end of this bank. Thence:  
W of Cheval Bank (12 miles SW). In 1958 a below-water obstruction, dangerous to navigation, was reported on this bank. Thence:
- 3 W of Silavatturai Reef (4 miles SW), a reef with depths of 2 m or less over it. Thence:  
W of Arripu Reef (5 miles W), a reef with depths of 2 m or less over it; the reef is marked by a beacon (tripod, diamond topmark) at its N end. Thence:
- 4 Clear of a well (16 miles W), thence:  
W of a shoal (8 miles WNW) with 0.9 m of water over it, thence:  
WSW of Vankalai Reef (12 miles NW).
- 5 **Caution.** It is not advisable to close the coast of Sri Lanka N of Kudremalai Point because of the extensive shoal banks described above. Great caution should be exercised if obliged to navigate in depths of less than 6 m, for a distance of about 10 miles N of Moderegam Point (8°36'N, 79°55'E), because of several uncharted coral heads with depths of less than 0.6 m in this area.
- 6 Thence from a position WSW of Mannār (8°59'N, 79°55'E) the route leads WNW to a position S of Land's End, the SE extremity of Pāmban Island, passing SSW of Adam's Bridge; for this route the chart is sufficient guide. Attention is drawn to currents in the area, see 4.134.

### Useful marks

#### 4.137

- 1 White obelisk (8°34'N, 79°56'E), stands on the coast 5 cables N of Moderegam Aru (4.139).  
White obelisk (8°39'N, 79°57'E), stands at the N entrance point of Kal Aru.  
(Directions continue at 4.145)

### Small boat channel

#### 4.138

- 1 Mannār Island is separated from Sri Lanka by a small boat channel.

### Anchorage

#### 4.139

- 1 Small vessels can anchor in depths of about 6 m from 2 to 3 miles W of the obelisk standing close N of the mouth of Moderegam Aru (8°34'N, 79°55'E). Vessels should approach this anchorage passing N of Cheval Bank (4.136).

- 2 Anchorage can be obtained in a depth of 5.5 m, mud, with the railway bridge between Mannār Island and Sri Lanka bearing 099° distant about 5 miles.
- 3 There is good anchorage during the NE monsoon for a vessel drawing not more than 4.3 m 3¼ miles S of Mannār Island (Talaimannār) Light-tower (3.221).

## PĀMBAN ISLAND AND PASS

### Approaches general information

Chart 69

### Route

#### 4.140

- 1 From a position S of Land's End (9°10'N, 79°26'E) the coastal route leads 19 miles W to a position SSW of Pāmban Island.

### Topography

#### 4.141

- 1 Pāmban Island, lying between Adam's Bridge and Ramen Point on the Indian mainland, is generally low and featureless with no hills and few conspicuous landmarks from the offing; at its W end coconut plantations extend N and NE from Kundugāl Point. The islands fringing the coast in the vicinity of Pāmban Pass are very low.

### Natural conditions

#### 4.142

- 1 **Currents.** Currents are subject to large changes in set and rate during the course of a year, see 4.6.

### Local weather

#### 4.143

- 1 During the SW monsoon haze often hangs over the islands lying in the approaches to Pāmban Pass and obscures them.

### Principal marks

#### 4.144

##### 1 Landmarks:

- 1 Rāmeswaram Temple (9°17'N, 79°19'E), appears as a narrow pinnacle when viewed from SE and as a large square tower from the SW.  
Radio mast (9°17'N, 79°19'E) stands close SW of Rāmeswaram Temple.
- 2 Radio tower (elevation 307 m) (9°18'N, 79°18'E) stands 9 cables WNW of Rāmeswaram Temple.  
Radio mast (9°16'N, 79°18'E).
- 3 Beacon (white with black band, triangular, 9.4 m in height) (9°14'N, 79°14'E), stands on the E point of Shingle Tivu.  
Pāmban Lighthouse (9°17'N, 79°13'E) (3.221).  
Water tower (9°17'N, 79°10'E).
- 4 Water tower (red square tower on a framework structure) (9°17'N, 79°08'E), the tower is conspicuous except when bearing more than 050°. Beacon (9°13'N, 79°08'E), a white beacon standing close NE of Manalli Tivu.

### Directions

(continued from 4.137 and 4.207)

### Coastal route

#### 4.145

- 1 From a position S of Land's End (9°10'N, 79°26'E) the coastal route leads 19 miles W to a position SSW of Pāmban, passing (with positions from Pāmban Light (9°17'N, 79°13'E)):



- 2 S of Margarita Shoal (15 miles SE) and a dangerous wreck lying 2 miles NNE of the shoal, thence:  
S of Mansfield Patch (9 miles SSE), the NNE-most of a group of detached patches which lie close together. Thence:
- 3 S of Arundel Shoal (10 miles SSE), which consists of coral patches. Thence:  
S of Batt Patch (7 miles SSE), a shoal patch over which the sea breaks in a fresh breeze. Thence:  
S of Manalli Shoal (8½ miles SW).

### Useful marks

#### 4.146

- 1 Lands End (9°10'N, 79°26'E), the SE point of Pāmban Island; a small but prominent building stands near the point.  
Temple (9°11'N, 79°25'E).  
Gandhamāna Temple (9°18'N, 79°18'E) (3.228).  
(*Directions continue for coastal passage at 4.206*)  
(*Directions for Pāmban Pass SE approach are given at 4.152*  
*and for SW approach at 4.154*)

### Pāmban Pass

*Chart 3581 plan of Pāmban Pass and Approaches*

#### General information

##### 4.147

- 1 **Position.** Pāmban Pass (9°17'N, 79°12'E) lies at the W end of Pāmban Island and crosses the banks which lie between that island and the Indian continent.
- 2 **Function.** Pāmban Pass is a navigable channel, partly artificial, connecting the Gulf of Mannār with Palk Bay; it is of great advantage to coasting craft trading between ports on the W coast of India and those in the Bay of Bengal.
- 3 **Topography.** Between the W coast of Pāmban Island and Ramen Point (4.153) a rocky barrier extends in a nearly straight line. Pāmban Viaduct, carrying the South India Railway and a road, is built on this barrier.
- 4 About 2½ cables W of Pāmban Island is a cutting, 61 m wide, carrying Pāmban Pass through the rocky barrier, over which there is a rolling lift bridge, and road bridge with a vertical clearance of 22.3 m.
- 5 On the W side of the cutting the barrier is named The Great Dam. The barrier consists of a large mass of rocks, having a flat surface, which were formerly portions of a causeway that extended from Pāmban Island to Ramen Point; the rocks are sufficiently separated to allow a free passage to the water. About 1½ cables E of Ramen Point there is an opening in the rocks; it is however, so small, and has such a rush of water through it, that even fishing canoes never attempt to pass through.
- 6 The approach to Pāmban Pass from N together with the port of Pāmban are described at (3.228) and (3.236).
- 7 **Approach and entry.** Pāmban Pass is entered from the NE end of The Basin (4.152).  
**Local authority.** The Pass is administered by the Port Conservator, Port Office, Pāmban.

### Limiting conditions

#### 4.148

- 1 **Draught.** In 2002 it was reported that the depth in Pāmban Pass was 3.6 m.

**Maximum size of vessels handled.** Small coasting vessels from 200 to 800 tonnes and about 61 m in length.

**Local weather.** Pāmban Pass is well protected from the full force of the SW monsoon by Pulli Reef to the S.

### Arrival information

#### 4.149

- 1 **Bridge opening notice.** The lift bridge is under the control of the Port Conservator, who normally requires 30 minutes notice to open it for shipping; however, in an emergency it can be opened immediately.
- 2 **Pilotage** is compulsory for merchant vessels navigating Pāmban Pass. The licensed pilots at Pāmban are under the orders of the Pāmban Port Conservator; they are stationed at Kundugāl Point (9°15'4N, 79°13'1E), Mundel Point (9°16'3N, 79°12'5E) and on the N side of the pass to look out for vessels approaching Pāmban. There are no signals for vessels requiring a pilot but local craft usually display a red or white flag. The pilot boards in a position 7½ cables S of Mundel Point.
- 3 Pilots can also be obtained at Kilakkarai (4.210).

### The Pass

#### 4.150

- 1 **Layout.** The Pass is well marked with beacons and buoys and is easy to navigate.
- 2 **Tidal streams.** In the approaches, the in-going tidal stream sets W through Kundugāl Channel (4.152) thence W along the N edge of Pulli Reef (4.154) where it joins with the in-going stream setting N through Puma Channel (4.154), the combined streams then set N; but they are weak unless accelerated by strong S winds.
- 3 In Pāmban Pass the stream is only noticeable at the change of the monsoon in March, April and October; at other times it is masked by the S-going current during the NE monsoon and by the N-going current during the SW monsoon, these often attain rates of 6 kn, making passage of the pass difficult even for powered vessels.
- 4 **Bridge signals.** Flag P of the International Code of Signals is displayed from the port office's flagstaff to denote that the bridge is fully open; displayed from the N yardarm this flag denotes that vessels from N may pass through, and from the S yardarm, that vessels from S have priority.
- 5 It has been reported in the past that the bridge was opened only twice a day: from 0800 until 1000, and 1600 until 1800.
- 6 **Principal marks.** See 4.144. However, when approaching Pāmban Pass from S the first identifiable object is a clump of palm trees at the W end of Pāmban Island.

### Directions

#### 4.151

- 1 **Caution.** Vessels approaching Pāmban Pass with a draught of more than 4.6 m should not approach within depths of 15 m until their position has been accurately determined, see also 4.148. Less water than charted was reported (2002) in the S approaches as shown on the chart.

### From South-east

#### 4.152

- 1 **Kundugāl Channel** (9°15'N, 79°15'E) is the better and more direct approach to Pāmban Pass from S. Having

passed the outlying dangers (4.145), steer to pass E of Kallaru Reef for a position ESE of Kundugāl Point from where the channel leads W into Kundugāl Gut, passing (with positions from Pāmban Light (9°17'N, 79°13'E)):

- 2 N of Kallaru Reef (3 miles SSE), upon which the sea breaks heavily along its SW edge. Shingle Tīvu, a low island covered with scrub is situated on the reef. Thence keep to the deep water channel, passing:
- 3 N of Kursadi Tīvu (2¼ miles S), a long narrow island with a fishery research station situated at its E end. And:  
S of Kundugāl Point (1¾ miles S), a low and sandy point. Thence bring Kursadi Beacons in line astern.
- 4 **Kursadi Beacons:**  
Front beacon No 1 (5 m in height) (9°14'·9N, 79°12'·8E), stands near the edge of Pulli Reef.  
Rear beacon No 2 (7 m in height) (1½ cables SE of front beacon), is situated in the centre of Kursadi Tīvu.
- 5 The alignment (130° astern) of these beacons leads through Sand Bank Channel, passing (with positions from the front beacon):  
Close SW of a buoy (black and white, spherical) (5¾ cables NW), thence:  
Close SW of a buoy (red and white, pillar) (8 cables NW), thence:
- 6 Follow the channel, marked by beacons, which crosses Horseshoe Bank to a position between Elbow Buoy (conical) (1¼ miles NW) and the buoy (red and white, pillar) marking the shoal ground on the W side of the deeper water at the junction of Sand Bank Channel and The Basin, moored 2¾ cables SW of Elbow Buoy.
- 7 From a position W of Elbow Buoy the route leads NE through The Basin, a narrow channel marked on its NW side by beacons, towards the S entrance of Pāmban Pass.

### Useful marks

#### 4.153

- 1 South East Port Beacon (white, 5 m in height) (9°15'·6N, 79°14'·9E), stands 1¾ miles E of Kundugāl Point. Another beacon stands on the coast 4 cables W of South East Port Beacon.  
Beacon (white with black band, triangular, 9·4 m in height) (9°14'·4N, 79°14'·4E), stands on the E point of Shingle Tīvu.
- 2 Thonithurai Temple (9°16'·8N, 79°11'·4E), a temple now in ruins stands near the E end of a narrow tongue of land, named Thonithurai.  
South Toni Beacon (white, 7 m in height) (9°16'·8N, 79°10'·9E), stands 6½ cables W of Ramen Point.  
(Directions for Palk Bay are given at 3.222)

### From South-west

#### 4.154

- 1 **Puma Channel** lying between Pulli Shoal and Manalli Reef demands navigation by eye to negotiate the reefs described below. From the vicinity of 9°09'N, 79°12'E the route leads initially NNW before turning NE through Puma East Channel to join Kundugāl Channel (4.152).

### 2 Leading Lights:

- Front light (white beacon, elevation 12 m) (on the foreshore 5 cables W of Mandapam Dry Dock (9°16'·6N, 79°09'·4E)).
- Rear light (white beacon, elevation 15 m) (stands on a low hill 2 cables NNW of front light).
- 3 The alignment (338°) of these lights leads through Puma Channel, passing (with positions from the front light):
- 4 ENE of Manalli Reef (3¾ miles S), a coral reef which dries in places and is well marked on its S and E side by breaking seas. New Islet and Manalli Tīvu lie 1½ and 2 miles W, respectively, from the E edge of the reef. Thence:  
WSW of Pulli Shoal (4 miles SE), an isolated shoal over which the sea breaks. Thence:
- 5 WSW of Pulli Reef (3 miles SE), an extensive coral reef which dries in places; its N edge is well defined at low water but its S edge is much indented and the sea breaks onto it. Three islands are situated on the reef: Pumurichan Tīvu along the W edge, has a conspicuous beacon (10 m in height) standing on its SW side; to the SE is Kovi Tīvu and at the E end is Kursadi Tīvu (4.152).
- 6 Thence when the beacon on the SW side of Pumurichan Tīvu bears 060° alter course NE to pass through Puma East Channel which lies NW of Pulli Reef, it is unmarked and has a least depth of 2·8 m.  
When clear of Puma East Channel steer to pass along the N edge of Pulli Reef into the channel marked by beacons, lying between this reef and Horseshoe Bank (4.152), which leads to Sand Bank Channel (4.152).

### Useful marks

#### 4.155

- 1 Beacon (10 m in height) (9°14'·5N, 79°10'·8E).  
Beacon (white) (9°12'·9N, 79°08'·1E) standing close NE of Manalli Tīvu.

### Anchorage and harbours

#### 4.156

- 1 **Anchorage** may be obtained in Kundugāl Channel in depths of 5·8 to 7 m. Small vessels can anchor W of Kundugāl Gut, with protection in all weathers, in depths of 3 to 3·4 m.
- 2 **Landing place.** There is a small pier located at the E end of Kursadi Tīvu, adjacent to the fishery research station, with a depth of 1·2 m at its head; the pier should be approached from W.  
**Mandapam** (9°16'·6N, 79°09'·4E), is a harbour for small craft.
- 3 **Directions.** Vessels should pass through Puma Channel (4.154) as described, thence: pass 2½ cables ENE of Cana Paru Reef (9°14'·2N, 79°09'·6E), and continue on the 338° leading line until 1¼ miles from the front light; from this point onwards local knowledge is necessary.
- 4 **Berths.** There is a small boat basin.  
**Repairs.** Dry dock, length 81 m, width 15 m.  
**Facilities.** Hospital; de-ratting exemption certificates issued.  
**Supplies.** Some provisions in emergency only.

## CAPE COMORIN TO PĀMBAN PASS

## CAPE COMORIN TO TUTICORIN

## General Information

Chart 1586

## Route

## 4.157

- 1 From a position S of Cape Comorin (8°05'N, 77°33'E), the S point of India, the route leads about 54 miles ENE, thence 27 miles N to a position E of Tuticorin.

## Topography

## 4.158

- 1 The coast ENE of Cape Comorin to Manappād Point (8°22'N, 78°04'E) is higher than that in other parts of the W side of the Gulf of Mannār, with undulating sandhills up to 60 m in height; the hinterland is mostly reddish soil and rises gradually to the foot of the Southern Ghāts, a few miles inland. Many villages and whitewashed churches lie along this stretch of coast. The coastline is fronted by isolated dangerous rocks which in some places extend up to 1 mile offshore.
- 2 From Manappād Point to Tuticorin (8°48'N, 78°09'E) the coast is low, sandy and fringed with coconut trees.

## Depths

## 4.159

- 1 Seaward of the 30 m depth contour there are no charted off-lying dangers. Within the 20 m depth contour, and from 10 to 13 miles offshore, there are pearl banks lying between Kāyalpattinam (8°33'N, 78°07'E) and Tuticorin.

## Piracy

## 4.160

- 1 Incidents of piracy and armed robbery have occurred off Cape Comorin and Tuticorin; for possible preventative measures see 1.56.

## Local knowledge

## 4.161

- 1 Some of the small ports and anchorages situated on this stretch of coast require local knowledge for entry.

## Currents

## 4.162

- 1 Currents are subject to large changes in set and rate during the course of a year, see 4.6.

## Tidal streams

## 4.163

- 1 Off Cape Comorin the in-going tidal stream sets E and the out-going W, their strength and direction is much affected by the monsoon currents.

## Local weather

## 4.164

- 1 Vessels rounding Cape Comorin from W during the NE monsoon, having been sheltered by the land as far as Muttam Point (14 miles W), may suddenly pass from a calm into the strength of the monsoon; similar conditions are met by vessels even if well offshore.

## Principal marks

## 4.165

- 1 **Landmarks:**  
Mahendra Giri (8°23'N, 77°29'E) (5.16).

Ganabi Memorial (28 m in height) (8°05'N, 77°33'E) stands near the end of Cape Comorin; another memorial stands on an islet close E of the cape.

The cape is reported to be radar conspicuous.

- 2 Church (54 m in height) (8°05'N, 77°33'0E).  
Observatory (elevation 52 m) (8°10'N, 77°42'E).  
Chimney (red and white bands) (8°35'N, 78°06'E), a flame is emitted.  
Vallanad (elevation 313 m) (8°43'N, 77°53'E), a red hill.

## Major lights:

Cape Comorin Light (white square masonry tower, red bands, 30 m in height) (8°05'N, 77°33'E), stands about 2½ cables NW of the cape.

Manappād Point Light (white round tower, red masonry diagonal stripes, elevation 45 m) (8°22'N, 78°04'E), stands at the extremity of the point.

- 4 Pāndiyan Tivu Light (8°47'N, 78°12'E) (4.186).



Cape Comorin Light-tower (4.165)

(Original dated 1997)

(Photograph – Dave Burnell, Taunton)

## Other aid to navigation

## 4.166

- 1 Racon (8°47'N, 78°12'E) at Pāndiyan Tivu Lighthouse (4.186).  
For details see *Admiralty List of Radio Signals Volume 2*.



## Directions

### 4.167

- 1 Cape Comorin (8°05'N, 77°33'E), a low and sandy point N of which the coast rises gradually so that from a distance it appears as a sandy promontory.
- 2 From a position S of the foul ground extending about 5 cables S and SE of Cape Comorin the route leads, 34 miles ENE, to a position S of Manappād Point a high sandy promontory based on rock; for this part of the coastal passage the chart is sufficient guide. Thence:
- 3 From a position S of Manappād Point the route leads about 20 miles farther ENE to a position ESE of that point, thence about 30 miles N to a position E of Tuticorin, passing (with positions from Manappād Point (8°22'N, 78°04'E)):
- 4 SSE of Manappād Outer Shoal (8 miles SE) with a least charted depth of 7.3 m. Between the outer shoal and the coast shoals, some rocky, with less than 10 m of water exist. Thence:
- 5 SSE then E of a number of shoals (10 to 17 miles in an arc from ENE to ESE and offshore of the 20 m depth contour of the coastal bank), with depths between 10 and 20 m reported between 1958 and 1976. Thence:
- 6 W of ODAS OT1 Light-buoy (special) (31 miles ESE (8°12'2N, 78°33'3E)); mariners are advised not to anchor or trawl within 500 m of this buoy, thence: E of Ālantalai Shoals (8 miles NE) with 6.4 m of water over them. A shoal with 3.6 m over water over it lies 1¼ miles SW. Thence:
- 7 Clear of a bank (17 miles ENE) with 17.3 m of water over it, reported by SS *Winkfield* in 1928. Thence:
- 8 Clear of ODAS SW5 Light-buoy (special)) (30 miles NE), moored in position 8°47'4N, 78°21'0E; mariners are advised not to anchor or trawl within 1000 m circle of this buoy.
- 9 **Cautions:**  
Vessels should avoid passing through the area of the above shoals, and in thick weather are advised give it a wide berth.
- 10 Large vessels should not navigate off this coast, N of latitude 8°15'N, in depths less than 35 m because the area is imperfectly surveyed and is a fishing ground.  
The attention of small vessels coasting is drawn to:
- 11 An area of foul ground and rocks, over which there are heavy breakers during the NE monsoon, extends 3 miles offshore between Manappād Point and a position 5 miles NE. And:
- 12 Numerous shoals and rocks, over which the sea breaks in heavy weather, lie up to about 2 miles offshore between Tiruchchendūr Point (4.168) and a position 7 miles NNE.

### Useful marks

#### 4.168

- 1 Pagoda (white) (8°04'N, 77°33'E) surrounded by a high wall, above which the pagoda top may be seen, stands on the S tip of Cape Comorin.
- 2 Lipuram Obelisk (8 m in height) (8°07'N, 77°34'E) stands close to the coast abreast a stranded wreck which it serves to mark.  
East Cape (8°12'N, 77°47'E), a prominent cape, 28 m in height, overlooking a coastal reef which extends about 1 mile offshore.
- 3 Beacon (white with black bands, 11 m in height) (8°24'N, 78°04'E).

Tiruchchendūr Point (8°30'N, 78°08'E), is a low rock bluff headland with a prominent dark-coloured tall temple standing near its point.

*(Directions continue for coastal passage at 4.206)*

*(Directions for Tuticorin Zone A (New Port) are given at 4.187, and for Tuticorin Zone B (Minor Port) at 4.195, and for the passage NW from Cape Comorin at 5.17)*

## Anchorage and harbours

### 4.169

- 1 **Cape Comorin Bay.** Anchorage giving shelter from W winds may be found in the bay between Cape Comorin (4.167) and East Cape (15 miles ENE), but during the SW monsoon boat landing should not be attempted for the swell rolls round into the bight.
- 2 **East Cape.** Small vessels may anchor in the bight N of East Cape (4.168) in a depth of 7.6 m; the anchorage is partially protected from W winds and swell by the coast SW, but landing in a ship's boat is always difficult and dangerous.
- 3 **Talai** (8°20'N, 77°58'E). Good anchorage, during the NE monsoon, may be obtained about 1 mile offshore in a depth of 11 m between the town of Talai and Manappād Point (6 miles ENE). From June to August inclusive, when the SW monsoon is strong, a heavy sea rolls into this part of the coast; during this period the anchorage should not be used. Landing in a ship's boat is difficult and dangerous at all times.
- 4 **Kulasekarappattinam** (8°24'N, 78°03'E), is a small port at which coasting vessels sometimes call; the port may be identified by the ruins of a large church which is partially buried in sand.
- 5 **Ālantalai** (8°28'N, 78°06'E), a small village where vessels can anchor in a depth of 7.3 m, mud, with the village church bearing 292° distant 1¼ miles; the reef S offers some protection from SW winds.
- 6 **Virapāndiyanpattinam** (8°31'N, 78°07'E) is a small fishing town.  
Anchorage for small vessels, in depths of 2.7 to 3.7 m, may be obtained off the town but local knowledge is necessary; the anchorage is partially protected by the coastal reef.
- 7 **Directions.** The line of bearing of 241° of the town centre leads through a gap in the reef to the anchorage.  
**Kāyalpattinam** (8°34'N, 78°08'E), a small port which is sometimes used by coasting vessels.
- 8 **Punnaikayal** (8°38'N, 78°07'E), a small fishing village located about 1 mile inland, may be identified by the ruins of a church and by a group of palmyra trees on the beach; the village can be approached through a creek.  
Anchorage for small vessels, in depths of 7.3 m, can be found off Punnaikayal about 1½ miles offshore with the clump of trees bearing 258°; but local knowledge is necessary. The coastal reef S gives shelter from S winds.

## TUTICORIN—ZONE A

### General information

*Chart 3581 plan of Tuticorin Harbour*

#### Position

#### 4.170

- 1 Tuticorin Zone A (New Port) (8°45'N, 78°13'E) is an artificial harbour which lies on the W shore of the Gulf of Mannār.



**Function****4.171**

- 1 Tuticorin is the largest commercial port on the W side of the Gulf of Mannār. The principal exports include salt, dried fish, cement, cotton yarn and clean waste; chief imports are coal, machinery, raw cotton, wheat, timber and fertilizers.

**Topography****4.172**

- 1 The coast surrounding the port is low, sandy and covered with coconut trees; there are few conspicuous landmarks from the offing outside of the port area. In the vicinity of the port there are several outlying shoals and reefs.

**Port limits****4.173**

- 1 The port limits are approximately as follows:  
North boundary; from shore, a line drawn E along the parallel of latitude 8°50'N to 78°22'E.
- 2 South boundary; from shore, a line drawn E along the parallel of latitude 8°41'7N to 78°20'3E.  
East boundary; a line joining positions 8°50'N, 78°22'E and 8°41'7N to 78°20'3E.

**Approach and entry****4.174**

- 1 The port is approached from SE through a buoyed channel, it is entered between the end of a short spur extending S from North Breakwater and East Breakwater head.

**Traffic****4.175**

- 1 In 2003 the port was used by about 1270 vessels with a total dwt of 21 273 887.

**Port authority****4.176**

- 1 The port is administered by the Tuticorin Port Trust, Bharathi Nagar, Tuticorin 628 004.

**Development****4.177**

- 1 Plans to deepen the port to a depth of 10.7 m have been submitted. Other plans include the construction of an outer breakwater and an increase in container and general cargo facilities.

**Limiting conditions****4.178**

- 1 **Controlling depth.** The maximum permissible draught in the port is 8.23 m. However, a dredging project (for 1998) was reported.
- 2 **Deepest and longest berth** is South Wharf, 877 m long with a depth of 10.5 m alongside; however, less water was reported in 1988.  
**Tidal levels** see information in *Admiralty Tide Tables Volume 3*. Mean spring range about 0.7 m; mean neap range about 0.2 m.
- 3 **Maximum size of vessel handled** in 1991 was 64 978 dwt.

**Arrival information****Port radio****4.179**

- 1 There is a port radio station at the port. For details see *Admiralty List of Radio Signals Volume 6(4)*.

**Notice of ETA****4.180**

- 1 At least 72 hours, followed by 24 hours, notice of ETA is required; confirmation or amendment must be made not less than 6 hours prior to arrival.

**Outer anchorages****4.181**

- 1 **General anchorage.** The recommended anchorage is 5 miles SE of Pāndiyan Tivu Light (4.186); the holding is good in mainly sand and shingle.  
**Dangerous cargo anchorage.** The explosive anchorage is situated 3¼ miles SE of Pāndiyan Tivu Light.
- 2 **Caution.** In the NE monsoon vessels should have a good scope of cable and a second anchor always ready. In the SW monsoon, from about mid-May to mid-August, the wind, though sometimes violent, is invariably offshore and the sea calm or slight.

**Pilots and tugs****4.182**

- 1 **Pilotage** is compulsory; it is available 24 hours for cargo vessels and between 0600 and 1800 for tankers.  
The pilot boards about 5 cables E of Fairway Light-buoy (8°43'9N, 78°14'6E) while the vessel is underway.  
For details see *Admiralty List of Radio Signals Volume 2*.
- 2 **Tugs** are available.

**Harbour****General layout****4.183**

- 1 The artificial harbour extends ESE from a peninsula at the S end of Pāndiyan Island; it is protected on its N side

by North Breakwater and on its S side by South Breakwater and East Breakwater, the entrance lies 3 miles SE of Pāndiyan Tivu Light (4.186).

- 2 The main berthing areas are on the inner sides of South and East Breakwaters, and within a recess located towards the E end of North Breakwater on its inner side.
- 3 There is a turning basin situated close within the harbour entrance.

## Signals

### 4.184

- 1 **Storm signals** are displayed from a signal station with a flagstaff (32 m in height) standing near the NE end of East Breakwater; the general system is used. See 1.45.



Signal Station E Breakwater from N (4.184)

(Original dated 2000)

(Photograph – Captain M Reeves)

## Current

### 4.185

- 1 Currents along the coast, in the vicinity of the port, generally set with the wind at rates between 1 and 2 kn; at the change of monsoons they are weak and variable.

## Principal marks

### 4.186

- 1 **Landmarks:**  
Two chimneys, orientated E/W, (red and white lights, 121 to 210 m in height) (8°45'·7N, 78°10'·6E).



Chimneys from E (4.186)

(Original dated 2000)

(Photograph – Captain M Reeves)

Water tower (29 m in height) (8°45'·0N, 78°11'·2E).

Water tower (22 m in height) (8°45'·1N, 78°10'·2E).

Spic Tower (68 m in height) (8°44'·4N, 78°08'·6E).

### 2 Major light:

Pāndiyan Tivu Light (white round concrete tower with black diagonal stripes, 23 m in height) (8°47'·1N, 78°11'·9E), stands 2 cables S of the N extremity of Pāndiyan Island.

For principal marks at Tuticorin (Zone B) see 4.194.



Pāndiyan Tivu Light Tower from SE (4.186)

(Original dated 2000)

(Photograph – Captain M Reeves)

## Directions

### 4.187

- 1 If making the port from S or NE, particularly at night, the approach should be made from well to seaward of all off-lying dangers that extend from the coast; the ship's position should be accurately determined before closing the anchorage (4.181), see view on page 174.

From the vicinity of 8°43'N, 78°16'E the route leads NW passing close NE of Fairway Light-buoy No 18.

### 2 Leading lights:

Front light (white metal framework tower, with red bands, elevation 20 m) (on North Breakwater near the root of Coal Jetty (8°45'·3N, 78°13'·1E)).

Middle light (425 m from front light).

Rear light (white metal framework tower, black bands, elevation 59 m) (on the reef 1½ miles NW of the front light).

- 3 The alignment (311½°) of these lights leads, through a channel marked by light-buoys at its inner end, to the harbour entrance which is about 1 cable wide and lies between a spur projecting SW from North Breakwater and the head of East Breakwater. From the entrance there is a direct approach to the berths.

- 4 Lights are exhibited from the heads of North and East Breakwaters and from the head of the spur which forms the N entrance point; two more lights are exhibited, one on each side of the breakwater, 7 cables WSW of East Breakwater head.

## Useful marks

### 4.188

- 1 The following are useful marks (positioned from Pāndiyan Tivu Light (4.186)):

Obelisk (white) (2·1 miles S).

Statue (½ cable NE).

Disused lighthouse (1 cable N).

- 2 For useful marks at Tuticorin (Zone B) see 4.196.



Approaches to Tuticorin Harbour from SE (4.187)

(Original dated 2000)

Pāndiyan Tivu  
Light Tower

(Photograph – Captain M Reeves)

### Berths

#### 4.189

- 1 Alongside berths in Zone A (positioned from North Breakwater head light (8°44'·8N, 78°13'·8E)):
- 2 **South Wharf** (5 cables WSW) provides 4 berths, VOC 1-4 numbered from SW, for general cargo and container vessels; the berth is 877 m long, it can accommodate vessels of 168 m in length at Nos 1 and 2 berths and vessels of 192 m in length at Nos 3 and 4 berths.
- 3 **Berths AB 1 and 2** (8 cables W), each 168 m long, are situated on the SE side of a quay 495 m long with a depth of 9·1 m alongside; the berths are used by container vessels. Works were in progress (1997) on the NW side of this quay.
- 4 **Finger Jetty** (1·4 miles W) provides berthing and facilities for the Colombo ferry.  
**Coal Jetty** (8 cables WNW). The coaling jetty, flanked by dolphins, can accommodate a vessel of 50 000 dwt and 235 m in length.
- 5 **Oil Jetty** (6 cables NW) will accommodate tankers from 150 m to 228 m in length.  
**Second coal jetty** (4 cables NW), is served by a conveyor and flanked by dolphins; it can accommodate a vessel of 50 000 dwt and 235 m in length.

### Port services

#### 4.190

- 1 **Repairs:** Minor repairs only. See 1.155.  
**Supplies:** Fresh water at quays, by lighter in anchorages; all kinds of provisions; fuel by road tanker, and by pipeline at oil and coal jetties.  
**Facilities:** See 4.198.
- 2 **Communications:** The port is served by road and railway.

### Tuticorin—Zone B

Chart 3581 plan of Tuticorin Harbour

#### General information

##### 4.191

- 1 **Position.** Tuticorin Zone B (Minor Port) (8°48'N, 78°10'E) lies at the head of a shallow bay close NW of Tuticorin (Zone A—New Port).
- 2 **Function.** The town of Tuticorin, also known as Tüttukkudi, is the largest commercial town on the W side of the Gulf of Mannār. The port exports include salt, dried

fish, cement, cotton yarn and clean waste; chief imports are coal, machinery, raw cotton, wheat, timber and fertilizers.

The population of Tuticorin was about 228 900 in 2004.

- 3 **Approach and entry.** The port is approached through a channel, 135 m wide, and entered S of Horseshoe Spit.

**Traffic.** In 2003 the port was used by 4 vessels with a total dwt of 73 476.

**Port authority.** See 4.176.

### Limiting conditions

#### 4.192

- 1 **Controlling depth.** There is a least depth of about 2·0 m in the approach channel. In 1992 it was reported that the channel could only be used by vessels with a maximum draught of 1·5 m, and that most of the cargo handling is by lighter from vessels at anchor.
- 2 **Deepest and longest berth** is 219 m long with a least depth of 3 m.  
**Tidal levels** see information in *Admiralty Tide Tables Volume 3*. Mean spring range about 0·7 m; mean neap range about 0·2 m.

### Arrival information

#### 4.193

- 1 The arrival information for Tuticorin (Zone B) is the same as that for Tuticorin (Zone A), see 4.179.

### Harbour

#### 4.194

- 1 **Layout.** The port lies on the W coast of a large shallow bay which is open NE but well protected from the SW monsoon. The main berthing area is partially protected from the NE monsoon by the N harbour wall, but it is exposed to the E.
- 2 **Storm signals.** are displayed from a signal station with a flagstaff (29 m in height) standing at the N end of Pāndiyan Island; the general system is used. See 1.45.  
**Currents.** See 4.185.
- 3 **Landmarks:**  
Church (34 m in height) (8°47'·9N, 78°09'·5E).  
Sacred Heart Cathedral (yellow spire, 51 m in height) (8°48'·2N, 78°09'·4E).  
Harvey Chimney (8°48'·3N, 78°09'·6E).
- 4 For principal marks at Tuticorin (Zone A) see 4.186.

### Directions

#### 4.195

- 1 There are numerous dangers lying N of the anchorage areas (4.181) and in the E approach to the entrance



channel; throughout the approach a vessel's position should be verified frequently to ensure a safe passage.

- 2 From the general anchorage area the route leads N passing, with positions from Pāndiyan Tivu Light (8°47'·1N, 78°11'·9E):

Clear of a wreck with 6·8 m of water over it (3¼ miles ESE), and:

Clear of a dangerous wreck, the position of which is approximate, (4 miles ESE), to:

A position ENE of the light.

- 3 Thence the track leads W on the leading line to the entrance channel, passing clear of the charted wrecks.

#### 4 Leading lights:

Front light (metal framework tower, elevation 9 m) (standing at the head of Landing Pier (8°48'·0N, 78°09'·7E)).

Rear light (metal framework tower, elevation 14 m) (259 m W of front light).

- 5 The alignment (277½°) of these lights leads through the buoyed channel to the port. Several rocks and drying shoals, some marked by buoys, lie either side of the channel; their positions are shown on the chart.

### Useful marks

#### 4.196

- 1 Water tower (19 m in height) (8°47'·6N, 78°09'·5E).  
Statue (8°48'·6N, 78°09'·7E).  
For useful marks at Tuticorin (Zone A) see 4.188.

### Berths

#### 4.197

- 1 There are piers in Zone B of from 42 to 145 m long and wharves from 87 to 219 m long.

### Port services

#### 4.198

- 1 **Repairs.** A small dry dock; length 42 m, width 15 m, capacity 200 dwt with a depth on sill at MHWS of 2 m is available for local port vessels. Minor repairs can be effected.

**Facilities.** A small government hospital; divers.

- 2 **Supplies.** Limited supply of fresh water at berths or by barge; provisions are plentiful; fuel is not available.

**Communications.** There is regular sea communication with all of the principal ports of India and with Karāchi. Locally, the town is connected to the general railway system.

### Small craft

#### 4.199

- 1 Berthing for small vessels, protected by a breakwater from E, is situated 5 cables S of the town and adjoins the main berthing area.

### Other names

#### 4.200

- 1 Kariapar (8°47'·9N, 78°12'·5E), a rock.  
Middle Bank (8°47'·5N, 78°10'·7E).  
Orripar (8°47'·5N, 78°11'·8E), a rocky shoal.  
Seltive Reef (8°48'·6N, 78°11'·6E).  
Sevandapar Rock (8°49'·1N, 78°12'·3E).

## TUTICORIN TO PĀMBAN ISLAND

### General information

*Charts 69, 1586*

#### Route

##### 4.201

- 1 From a position E of Tuticorin (8°48'N, 78°10'E) the route leads 22 miles NE, thence 28 miles E to a position SSW of Pāmban Island.

#### Topography

##### 4.202

- 1 Between Tuticorin and Mandapam (65 miles ENE) the coast is generally low, sandy and covered with palm trees. Detached shallow flats, on some of which low islands are situated, lie up to 5 miles offshore along much of this stretch of coast.

#### Depths

##### 4.203

- 1 The area in general is imperfectly surveyed and vessels should navigate accordingly. Between Tuticorin and Valinokkam Point (37 miles NE) many outlying shoals lie within the 10 m depth contour, seaward of the shoals there are extensive pearl banks. South of the islands extending E of Valinokkam Point (4.210), depths are fairly regular but in places overfalls occur.
- 2 Less water than charted was reported (2002) in the S approaches to Pāmban as shown on the chart.

#### Currents

##### 4.204

- 1 Currents are subject to large changes in set and rate during the course of a year, see 4.6.

#### Principal marks

##### 4.205

#### Landmarks:

For principal marks at Tuticorin see 4.186 and 4.194.  
Vallanad (8°43'N, 77°53'E) (4.165).

Large trees (8°56'N, 78°12'E).

Water tower (18 m in height) (8°58'N, 78°12'E).

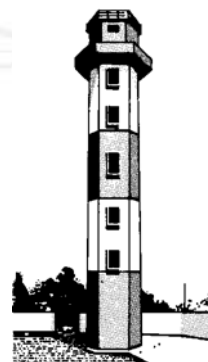
Sand patch (9°15'N, 78°52'E).

Pāmban Lighthouse (9°17'N, 79°13'E) (3.221).

#### Major lights:

Pāndiyan Tivu Light (8°47'N, 78°12'E) (4.186).

Kilakkarai Light (white 6-sided concrete tower, red bands, 30 m in height) (9°13'N, 78°47'E).



Kilakkarai Light Tower (4.205)

(Original dated prior to 1981, Checked 2004)



**Directions**

(continued from 4.168 and,  
in reverse direction from 4.146)

**4.206**

- 1 From a position E of Tuticorin the route leads about 22 miles NE to a position S of Valinokkam Point, passing: SE of a string of islands which extend about 11 miles NNE of Tuticorin. The islands are fringed with reefs and detached rocks. Thence: SE of a stranded wreck (9°01'N, 78°23'E), thence:
- 2 From a position S of Valinokkam Point (9°09'N, 78°40'E), the route leads about 28 miles E to a position SSW of Pāmban Island, passing (with positions from Valinokkam Point): S of a shoal patch (6 miles SE), with 9 m of water over it, thence: S of the chain of islands which extend E from the point, and clear of a shoal patch (20 miles E) with 4.6 m of water over it.
- 3 **Caution.** Large vessels should not navigate in depths of less than 22 m and therefore may not sight any of the islands of which the chains are composed.

**Useful marks****4.207**

- 1 Obelisk (grey, elevation 10 m) (8°50'N, 78°13'E) standing on the S side of Vān Island. Uppu Tanni Island (9°05'N, 78°29'E).
- 2 Shalli Island (9°06'N, 78°32'E), a low islet fringed by a reef with another island lying close E. Nalla Tanni Island (9°06'N, 78°35'E). Beacon (6 m in height) (9°09'N, 78°40'E) standing on Valinokkam Point.  
(Directions continue in reverse for coastal passage at 4.145)  
(Directions for Kilakkarai Channel are given at 4.211)

**Anchorage****4.208**

- 1 An anchorage is charted 5½ miles E of Pattanamurudur (8°55'N, 78°11'E).

**Other names****4.209**

- 1 Kariya Shulli Island (8°57'N, 78°15'E). Koswari Island (8°52'N, 78°14'E). Vaippār (9°02'N, 78°15'E), a village. Vaippār River (9°01'N, 78°16'E). Vān Island (8°50'N, 78°13'E). Vembār (9°05'N, 78°22'E), a town. Vilangu Shulli Island (8°56'N, 78°16'E).

**Kilakkarai Channel**

Charts 3581 plan of Pāmban Pass and Approaches, 69, 1586

**General information****4.210**

- 1 Kilakkarai Channel leads between the coast and the chain of islands extending 28 miles E from Valinokkam Point (9°09'N, 78°40'E). The channel, which affords smooth passage for about half the distance between Tuticorin and Pāmban, is only suitable for small vessels with a shallow draught.
- 2 **Controlling depths.** There are numerous shoals, with depths of 1.8 m or less over them, some of which have narrow and undefined channels lying between them. **Pilotage.** Pilots for this channel and for Pāmban Pass (4.147) are stationed at Kilakkarai (9°13'N, 78°47'E).
- 3 **Local knowledge** is necessary for passage through the channel and for its anchorages. **Storm signals** are displayed at Kilakkarai; the brief system is used. See 1.47.

**Directions****4.211**

- 1 From a position S of Valinokkam Point the route leads N to enter the channel between that point and Ānaipār Island, 2 miles ESE, then steer to pass S of a below-water rock marked by a beacon (4 miles ENE of Valinokkam Point); when clear of the rock, follow the deep water passage NE to the vicinity of Kilakkarai Anchorage (4.212). Thence:
- 2 From a position S of Kilakkarai steer ENE until the W end of Talairi Island (9°11'N, 78°54'E) bears 126° and alter course towards it keeping two white leading beacons on the coast NW in line, this alignment (306° astern) leads over a shoal with a depth of 4.1 m; then the channel follows the deeper water ENE and crosses a bar with a least depth of 4.3 m. Thence:
- 3 The route leads E, keeping clear of the shoals lying N of Musal Tivu (9 miles E of Talairi Island) and follows the deep water passage to the W entrance of Puma Channel, passing between the foul ground extending N from Manalli Tivu (9°13'N, 79°08'E) and S of Kolimuruka Reef (9°14'N, 79°09'E).  
(Directions for Puma Channel are given at 4.154)

**Anchorage****4.212**

- 1 **Valinokkam Point.** There are charted anchorages 2½ miles S and 2 miles NE of Valinokkam Point (4.210); vessels anchoring in the NE anchorage should keep well clear of a dangerous underwater rock that lies about 7 cables WSW of the anchorage.
- 2 **Kilakkarai.** Small vessels may anchor off Kilakkarai (4.210), the best berth is with a detached ruin E of the town bearing 000° and some large terraced houses bearing 315°, in a depth of about 5 m, stiff mud.
- 3 **Muttupettai.** Anchorage for small vessels, with some shelter from the SW monsoon, may be found in depths from 5 to 9 m SE of Muttupettai (9°16'N, 78°55'E).



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## CHAPTER 5

## MALABAR COAST—CAPE COMORIN TO MOUNT DILLI

## GENERAL INFORMATION

*Chart 708***Scope of chapter****5.1**

- 1 This chapter describes the Malabar Coast of India from Cape Comorin (8°05'N, 77°33'E), the S point of India, to Mount Dilli, 275 miles NNW. The port of Cochin (5.65) and the minor harbours and anchorages on the coast are also described.

**Topography****5.2**

- 1 The Western Ghāts lie almost parallel to the coast between 10 and 30 miles inland except for Pālghāt Gap, a striking feature on this coast, which lies between the parallels of 10°35'N and 10°51'N. Between Cape Comorin and Pālghāt Gap there is an extensive hill area diminishing in height towards the coast, the coastal plain is covered with an almost unbroken belt of coconut and areca palms; N of the gap, gentle slopes and gradually widening valleys succeed the forest clad uplands, until near the coast where they shelve into rice plains and backwaters fringed with coconut palms. This stretch of coast is well lit, having numerous lights with ranges of 15 miles or more.

**Tidal streams****5.3**

- 1 Details of tidal streams may be found in the relevant sections of the chapter.

**Currents****5.4**

- 1 The currents are of monsoonal origin, but tend to follow the trend of the coast. In December and January, sets are

NW with rates up to 1 kn. In July and August when the SW Monsoon is well established, SE sets with rates up to 2 kn are experienced. Exceptionally, onshore sets up to 1.5 kn are experienced during the NE Monsoon and up to 3 kn during the SW Monsoon.

**Climate and weather****5.5**

- 1 For climate and weather see 1.178.

**Firing practice area****5.6**

- 1 A firing practice area is centred 11½ miles SW of the entrance to Cochin Harbour (9°58'N, 76°15'E). see 1.7.

**Submarine exercise areas****5.7**

- 1 Submarine exercise areas are centred 25 miles W and 100 miles SW of the entrance to Cochin Harbour (9°58'N, 76°15'E). A good lookout should be maintained when passing through these areas. See 1.8.

**Navigational control****5.8**

- 1 For the regulations which control navigation in the territorial waters of India see 1.39.

**Piracy****5.9**

- 1 Several recent incidents of piracy and armed robbery in and off the ports in this chapter, and up to 30 miles offshore, have been reported by vessels. It is particularly prevalent in the Cochin area. For possible preventative measures see 1.56.

## CAPE COMORIN TO COCHIN

## CAPE COMORIN TO TRIVANDRUM

**General information***Chart 1566***Route****5.10**

- 1 From a position S of Cape Comorin (8°05'N, 77°33'E) the route leads about 17 miles WNW, thence about 35 miles NW to a position SW of Trivandrum.

**Topography****5.11**

- 1 This stretch of coast is generally straight and sandy, it is fringed with coconut tress and backed by hills, with the Western Ghāts standing in the distant background. From Kolachel (8°10'N, 77°15'E) to Trivandrum, about 28 miles NW, it is safe to approach the coast except near Enciam Islet (8°13'N, 77°11'E) (5.16); a little E of this islet the coast is steep with a reddish appearance. Between the village of Karichāl (8°21'N, 77°02'E) and Kovalam Point, 4 miles NW, the coast is low and level; thence to

Trivandrum, a further 7 miles NW, the hinterland is hilly and undulating.

**Depths****5.12**

- 1 Seaward of the 50 m depth contour there are no charted dangers. Wadge Bank, lying 25 miles SW of Cape Comorin, has a least charted depth of 42 m 19 miles S.

**Hazard****5.13**

- 1 Many small fishing craft may be encountered up to 9 miles SW of Viliñjam (8°23'N, 76°59'E).

**Obstruction and foul ground****5.14**

- 1 **Caution.** An obstruction, dangerous to navigation, with a least depth over it of 11.4 m, lies in position 8°02'8N, 77°24'7E.

An undefined area of foul ground lies 1½ miles offshore, about 6 miles W of Cape Comorin.



## Natural conditions

### 5.15

- 1 **Surf.** A heavy surf prevails all along the coast between Cape Comorin ( $8^{\circ}05'N$ ,  $77^{\circ}33'E$ ) and Muttam Point, 14 miles WNW, landing from a ship's boat should not be attempted.
- 2 **Currents.** The currents have a seasonal variation related to the monsoon. From February to September the most frequent set is SE with the greatest constancy during June to August; during October currents are variable in direction, but from November to January the most common set is NW. Rates are mostly less than 1 kn but 2 kn may be encountered at times, mainly during July, August and December. Exceptionally the current has a significant onshore component.
- 3 **Local weather.** For details of the effects of the monsoon on local weather see (4.164).

## Principal marks

### 5.16

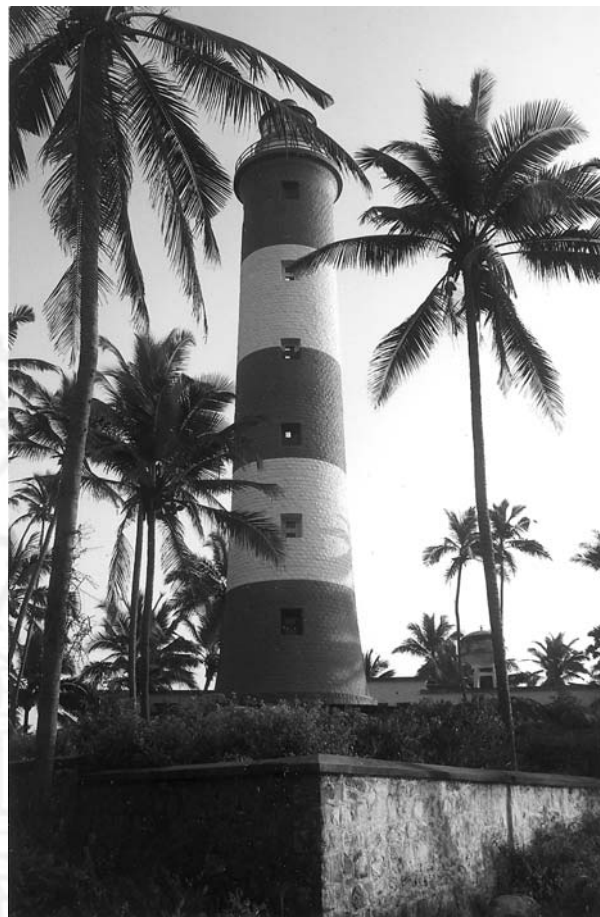
- 1 **Landmarks:**  
Mahendra Giri ( $8^{\circ}23'N$ ,  $77^{\circ}29'E$ ), a mountain, 1657 m in height, stands 19 miles N of Cape Comorin. However, mariners are cautioned that from a great distance this mountain may be mistaken either for Marutva Malai, 369 m in height, which appears as a pointed cone except when seen from E or S, standing about 4 miles NW of Cape Comorin; or for a range of mountains, with heights up to 1041 m and resembling a camel's hump, about 10 miles farther N.
- 2 Memorials ( $8^{\circ}05'N$ ,  $77^{\circ}33'E$ ) (4.165).  
Cape Comorin Lighthouse ( $8^{\circ}05'N$ ,  $77^{\circ}33'E$ ) (4.165).  
Church (54 m in height) ( $8^{\circ}05'.5N$ ,  $77^{\circ}33'.0E$ ).  
Muttam Point Lighthouse (white 6-sided masonry tower, black bands, 20 m in height) ( $8^{\circ}07'N$ ,  $77^{\circ}19'E$ ).
- 3 Church (12 m in height) ( $8^{\circ}13'N$ ,  $77^{\circ}11'E$ ), standing on Enciam Islet.  
Vilinjam Lighthouse (white round masonry tower, red bands, 36 m in height) ( $8^{\circ}23'N$ ,  $76^{\circ}59'E$ ).
- 4 Building (red roof, 58 m in height) ( $8^{\circ}24'N$ ,  $76^{\circ}58'E$ ) standing on Kovalam Point; the point is reported to be radar conspicuous at 19 miles.  
White house ( $8^{\circ}29'N$ ,  $76^{\circ}55'E$ ), which stands close NW of a palace in the form of a white rectangular building with a dull red roof.
- 5 **Major lights:**  
Cape Comorin Light ( $8^{\circ}05'N$ ,  $77^{\circ}33'E$ ) (4.165).  
Muttam Point Light—as above.  
Vilinjam Light—as above.  
Trivandrum Aero Light (control tower) ( $8^{\circ}29'N$ ,  $76^{\circ}55'E$ ).

## Directions

(continued from 4.167)

### 5.17

- 1 From a position S of Cape Comorin ( $8^{\circ}05'N$ ,  $77^{\circ}33'E$ ) (4.167) the route leads about 17 miles W or WNW to a position SSW of Muttam Point ( $8^{\circ}07'N$ ,  $77^{\circ}19'E$ ), passing (with positions from Cape Comorin):



Vilinjam Light-tower (5.16)

(Original dated 1997)

(Photograph – Dave Burnell, Taunton)

- Clear of the obstruction (9 miles WSW) (5.14), thence:  
SSW of Muttam Point, a point, 35 m in height, fronted by steep red cliffs, with a lighthouse (5.16) and a village standing on it.
- 2 Thence the route leads about 35 miles NW to a position SW of Trivandrum, passing (with positions from Enciam Church ( $8^{\circ}13'N$ ,  $77^{\circ}11'E$ )):  
SW of Crocodile Rock (10 miles SE), which lies  $1\frac{1}{2}$  miles SW of Adunda Rock, 3 m in height. The sea does not break over Crocodile Rock in calm weather, although the depth over it is 2 m or less.  
Thence:
- 3 SW of Kota Rock (8 miles SE) which is 6 m in height and steep-to on its W side, thence:  
SW of foul ground (7 miles ESE), thence:  
SW of Enciam Rocks (Close SW), thence depending on draught:
- 4 SW of a 14.6 m shoal (20 miles NW) which was reported in 1940 to be extending NW; a 16.4 m patch lies 1 mile farther NNW.

## Cautions

### 5.18

- 1 Vessels in the vicinity of Muttam Point (5.17) at night should not approach into depths of less than 45 m on account of several dangers lying close SW and W of the point.
- 2 Adunda Rock (5.17) is difficult to identify from seaward and foul ground extends  $1\frac{1}{2}$  cables NNW from it; Kota

Rock (5.17) has foul ground and shoal water extending about 1½ cables N and 3½ cables E and S from it. No vessel should attempt to pass inshore of these rocks.

- 3 At night, when near Enciam Islet (5.16), vessels should not approach into depths of less than 35 m which are encountered barely 2 miles seaward of Enciam Rocks (5.17).

### Useful marks

#### 5.19

- 1 Agastya Malai (8°37'N, 77°15'E), the highest peak in the Western Ghāts, stands about 20 miles NE of Trivandrum.  
A grove of palm trees (8°09'N, 77°19'E) standing on high red ground, about 1½ miles N of Muttam Point Lighthouse (5.16), is often visible above mist which may obscure the lighthouse.
- 2 Church (24 m in height) (8°10'N, 77°17'E).  
Anai Parai Hills SE summit (8°15'N, 77°15'E).  
Building (about 3 miles NW of Enciam Islet (8°13'N, 77°11'E)), a large light grey coloured building with three towers at its N end, is reported to stand near the coast.
- 3 Mukkunni Mala (8°28'N, 77°01'E), its round summit which slopes gradually, is visible from S.  
(Directions continue at 5.35)

## Kolachel

Chart 1566

### General information

#### 5.20

- 1 **Position.** Kolachel (8°10'N, 77°15'E) is a small open roadstead anchorage, which lies about 5 miles NW of Muttam Point (5.17).  
**Function.** The port is important for the export of ilmenite sand.
- 2 **Port limits.** The limits of the port are reported to be as follows:
- |   |           |            |                   |
|---|-----------|------------|-------------------|
| a | 8°10'·37N | 77°14'·82E | (boundary pillar) |
| b | 8°09'·80N | 77°14'·25E |                   |
| c | 8°09'·23N | 77°15'·60E |                   |
| d | 8°10'·19N | 77°15'·63E | (boundary pillar) |

- 3 **Port authority.** The port is administered by the Port Conservator, Kolachel.

**Maximum size of vessels handled.** Vessels of about 15 000 dwt have used the port.

- 4 **Storm signal station.** Storm signals are displayed from a flagstaff standing 4 cables E of Kolachel Lighthouse (8°10'N, 77°15'E) (5.22); the brief system is used. See 1.47.

### Dangers in approach

#### 5.21

- 1 Pulleri Rock (about 2 m in height) lies 3¾ cables SSE from Kolachel Lighthouse (8°10'N, 77°15'E) (5.22), it is the SE of several dangers in the approach.
- 2 Patna Rock and Constance Rock, both with depths of 2·1 m, lie about 1 cable WNW and 2 cables NW of Pulleri respectively.  
Several rocks, above and below-water, lie up to about 3 cables S and SW from Kolachel Lighthouse.
- 3 Kurusukal Islet (4 m in height) stands about 1 cable S of Kolachel Lighthouse, it is surmounted by a

small white shrine carrying a black patriarchal cross adding about 1·2 m to the height of the rock.

- 4 Ahnakal, the S of three rocks lying close together, lies close SSE of Kurusukal with a rock awash close SE.

Sudukal Islet, 1½ cables SW of Kurusukal has a rock, above water, ¼ cable NW of it.

Chadikal Islet lies 1¼ cables NW of Sudukal.

- 5 **Caution.** Vessels approaching near or inside the dangers require local knowledge.

### Useful marks

#### 5.22

- 1 Kolachel Lighthouse (white platform) (8°10'N, 77°15'E) stands on a mound close to the foreshore SW of the town.  
Church ¼ cable NW of Kolachel Lighthouse.  
A low godown 2¼ cables E of Kolachel Lighthouse.
- 2 A small house with a tiled roof 1 cable ESE of the godown with a white cross standing close ESE of it.  
A white masonry pillar (5 m in height, black bands) stands close ESE of the white cross; from mid-September to mid-May a light is exhibited from a wooden platform on the pillar.

### Roadstead

#### 5.23

- 1 **Mooring buoys.** Six mooring buoys, partially protected by islets, are moored about 3 cables SE of Kolachel Lighthouse (8°10'N, 77°15'E) (5.22).

**Anchorage** may be obtained with Kolachel Lighthouse bearing 060° distant 1¼ miles in depths of about 21 m or, for small vessels, with the lighthouse bearing 327° distant 7 cables in depths of about 13 m 5 cables offshore, sand.

- 2 **Landing** is fairly easy during the fine season for the rocks lying offshore act as a partial breakwater to the heavy surf on the coast.

### Port services

#### 5.24

- 1 Medical facilities; limited provisions.

## Trivandrum

Chart 1566

### General information

#### 5.25

- 1 **Position.** Trivandrum (8°29'N, 76°55'E) an open roadstead lying off a stretch of straight coast about 6 miles NW of Kovalam Point (5.16).

**Port Authority.** Port Conservator, Trivandrum Port Authority, Valiathura, Thiruvananthapuram 695008.

- 2 **Description.** Trivandrum is a large city and the capital State of Kerala, it lies about 1 mile inland. There is no port and vessels lie off at the anchorage.

The population is estimated to be about 789 000 in 2004.

- 3 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 0·6 and 0·3 m.

**Pilotage.** A pilot is available.

- 4 **Storm signal station.** Storm signals are displayed from the flagstaff of the signal station, which stands near the root of the ruined pier (5.26), the brief system is used. See 1.47.

**Natural conditions,** see climatic table at 1.210.

**Useful marks****5.26**

- 1 Radio mast (red lights) (8°30'·5N, 76°59'·7E).  
Radio mast (red lights) (8°32'·3N, 76°54'·1E).  
The ruins of a pier extend to the low-water line  
5 miles NW of Kovalam Point (8°24'N, 76°58'E).  
Pondera Church stands about 5 cables NE of the root  
of the above pier.

**Roadstead****5.27**

- 1 **Anchorage** can be obtained, with the storm signal station flagstaff bearing 077° distant 3¼ cables, in a depth of about 18 m.  
**Landing** should not be attempted by ships' boats because of the surf which generally runs even during the NE monsoon.

**Port services****5.28**

- 1 **Facilities:** two hospitals.  
**Supplies:** small quantities of fresh provisions available locally; larger quantities are obtainable from Cochin, 7 days notice is desirable.
- 2 **Communications.** The town is connected with the railway system and by canals to the great backwater system of Kerala.
- 3 Regular communication by sea is maintained with other ports on the Malabar Coast, also with Colombo and Mumbai (Bombay).

**Fishing harbour****Vilinjam****5.29**

- 1 There is a small fishing harbour at Vilinjam (8°22'N, 76°59'E), the harbour is protected by 2 breakwaters. A prominent fish factory stands near the shore at the head of the harbour.
- 2 Anchorage can be obtained about 3½ cables SSW of the harbour entrance in a depth of 15 m, sand.

**Other name****5.30**

- 1 Kadiapattanam (8°08'N, 77°18'E), a village.

**TRIVANDRUM TO QUILON****General information***Chart 1566***Topography****5.31**

- 1 The coast is virtually straight, sandy and fringed with palms. The hinterland is hilly and undulating. Between Trivandrum (8°29'N, 76°55'E) and Anjengo, 15 miles NW, patches of red tableland, when seen from a distance of about 7 miles or more, appear as red cliffs above the fringe of palms along the coast. The large backwater situated about 5 miles SE of Quilon (8°52'N, 76°36'E) is marked by a gap in the fringe of the palms, several more backwaters lie close inshore along the coast.

**Depths****5.32**

- 1 Seaward of the 50 m depth contour there are no charted dangers.

**Currents****5.33**

- 1 See 5.15.

**Principal marks****5.34****Landmarks:**

- 1 Vilinjam Light (8°23'N, 76°59'E) (5.16).  
White house (8°29'N, 76°55'E) (5.16).  
Anjengo Lighthouse (white round concrete tower, black bands, 36 m in height) (8°40'N, 76°46'E).  
Tangasseri Point Lighthouse (white round masonry tower, red diagonal stripes, 41 m in height) (8°53'N, 76°34'E).  
Kovilthottam Lighthouse (8°59'N, 76°32'E) (5.49).
- 2 **Major lights:**  
Vilinjam Light (8°23'N, 76°59'E) (5.16).  
Trivandrum Aero Light (8°29'N, 76°55'E) (5.16).  
Anjengo Light—as above.  
Tangasseri Point Light—as above.  
Kovilthottam Light (8°59'N, 76°32'E) (5.49).

**Passage directions***(continued from 5.19)***5.35**

- 1 From a position SW of Trivandrum (8°29'N, 76°55'E) the route leads 32 miles NW to a position SW of Tangasseri Point; for this route the chart is sufficient guide.
- 2 **Caution.** Vessels should give the dangerous wreck, the position of which is approximate, lying about 3½ miles SW of Anjengo in position 8°38'N, 76°43'E, a wide berth.

**Useful marks****5.36**

- 1 Perumātura Light (elevation 13 m) (8°37'N, 76°48'E).  
Boundary pillar (8°51'N, 76°37'E) (5.40) stands close SE of a chimney 32 m in height.  
Chimney (8°53'N, 76°35'E) (5.40).  
*(Directions continue at 5.51)*

**Quilon***Chart 3461 plan of Quilon Anchorage***General information****5.37**

- 1 **Position.** Quilon (8°52'N, 76°36'E) is a small anchorage in Quilon Road situated in the bight lying close SE of Tangasseri Point (8°53'N, 76°34'E).
- 2 **Function.** Quilon is a commercial and industrial centre of growing importance, it is one of the larger towns of Kerala State. The town lies between the coast and the S end of the Ashtamudi Backwaters, about 1 mile inland; the chief industry is tile manufacture.  
Principal exports are coconut oil, processed cashew nuts, coir mats, timber and fish; main imports are processed nuts, paddy, rice, tobacco, salt and tea.
- 3 **Topography.** From close E of Tangasseri Point to about 3 miles NNW of it, the coast is rocky with groves of palms growing close to the high-water line. Situated on Tangasseri Point there is a settlement and the ruins of old fortifications; among the ruins are British, Dutch and Portuguese Cemeteries.



- 4 **Port authority.** The port is administered by the Conservator, Quilon.

### Tidal levels

#### 5.38

- 1 See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 0.6 and 0.3 m.

### Harbour information

#### 5.39

- 1 **Port operations.** The port is open from 15th September to 14th May; it is then closed during the SW monsoon.  
**General signals** for vessels at anchor are made from a flagstaff standing near the tile works (8°52'6N, 76°35'4E).  
 2 **Storm signals** are displayed, the brief system is used. See 1.47.

**Landing**, except in local boats, is dangerous on account of the heavy surf.

### Directions

#### 5.40

- 1 **Caution.** Vessels approaching the anchorages should, when nearing Tangasseri Point, keep to seaward of the charted 20 m depth contour in order to avoid foul ground extending about 1 mile SW and 1½ miles W from the point.  
 2 **South-west approach.** The line of bearing 044° of the tile work's prominent red chimney (35 m in height) (8°52'6N, 76°35'4E), leads between Gamaria Rock (8°51'9N, 76°35'1E) and Pallikall Shoal (8°52'2N, 76°34'7E), to the vicinity of the anchorage shown on the chart.  
 3 **West approach.** The line of bearing 095° of the boundary pillar (11 m in height) (8°51'4N, 76°36'8E), leads clear of the dangers extending from Tangasseri Point and joins the SW approach line about 8 cables SW of the anchorage.

### Anchorage

#### 5.41

- 1 Anchorage off Quilon is open to all winds from NW through W to SE. The port is little frequented during the SW monsoon when communication with the shore is practicable only by signal; during this season vessels should anchor about 1¼ miles SSE of Tangasseri Point as shown on the plan, in depths of about 13 m.  
 2 Between October and May small vessels can anchor in the inner anchorage, shown on the plan, with Tangasseri Point Lighthouse bearing 302° distant 1¼ miles in a depth of 8½ m, sand A position about 2½ cables SW of this anchorage may prove more comfortable for a larger vessel.

### Port services

#### 5.42

- 1 **Repairs** of a minor nature to engines.  
**Facilities:** hospital; tugs; barges of 50 tonnes capacity; local divers.  
**Supplies:** fuel; water; fresh provisions, all in small quantities.  
 2 **Communications.** The town is connected with the railway system and has continuous water communication, by backwater and canal, with Trivandrum to the S and to the N with Alleppey and Cochin.  
 By sea there is regular communication with Colombo, Mumbai and other ports on the Malabar Coast.

### Fishing harbour

### Anjengo

#### 5.43

- 1 There is a small fishing port at Anjengo (8°40'N, 76°45'E).  
 The port is seldom visited as its coast is exposed to surf at all times. Nor is it easily identified, even from a short distance, its fort and other buildings are screened by trees; however, a white-fronted church on the coast NW of the fort and a bungalow on the hills 2 miles N are visible. A patch of red tableland, about 4 miles N of the village, may be of assistance in identifying it.  
 2 Anchorage may be obtained abreast the port about 1 mile offshore in depths of about 21 m, sand and shell. Vessels anchoring closer inshore are cautioned that the bottom is foul and rocky in depths of less than about 18 m.

### QUILON TO COCHIN

### General information

*Chart 65, 1566*

### Route

#### 5.44

- 1 From a position SW of Tangasseri Point (8°53'N, 76°34'E) the route leads 46 miles NNW, then 28 miles N to a position W of Cochin.

### Topography

#### 5.45

- 1 South of Alleppey (9°30'N, 76°19'E) the coastline is generally low, straight, sandy and fringed with palms. From Alleppey to Cochin, 29 miles N, the coast is low and sandy; near Cochin it is thickly fringed with palms and densely populated. There is no high land near the coast, the highest peaks of the great range of the Western Ghāts stand about 50 miles inland but can only be distinguished in clear weather.

### Depths

#### 5.46

- 1 Seaward of the 50 m depth contour there are no charted dangers.

### Currents

#### 5.47

- 1 The currents have a seasonal variation related to the monsoon. From February to September the most frequent set is SE with the greatest constancy during June to August; during October currents are variable in direction, but from November to January the most common set is NW. Rates are mostly less than 1 kn but 2 kn may be encountered at times, mainly during July, August and December. Exceptionally the current has a significant onshore component.  
 2 During the NE monsoon, a S current may be experienced from 2 to 50 miles offshore.

### Local weather

#### 5.48

- 1 Between Alleppey (9°30'N, 76°19'E) and Cochin, 29 miles N, haze settles over the land after sunrise, even in the fine season the coast usually remains indistinct until mid-day, making it difficult to discern objects otherwise conspicuous.



**Principal marks****5.49****1 Landmarks:**

Tangasseri Point Lighthouse (8°53'N, 76°34'E) (5.34).  
Church (15 m in height) (8°55'N, 76°33'E).  
Silos (21 m in height) (8°58'N, 76°32'0E).

- 2 Kovilthottam Lighthouse (white square masonry tower, black bands, 19 m in height) (8°59'N, 76°32'E); A signal station stands 1½ cables S of the lighthouse.



Kovilthottam Light Tower (5.49)  
(Original dated prior to 1981, Checked 2004)

- 3 Alleppey Lighthouse (white round masonry tower, red bands, 28 m in height) (9°29'N, 76°19'E).  
Church (spire, 46 m in height) (9°30'N, 76°20'E).  
Manakkodam Lighthouse (white square tower, red bands, 34 m in height) (9°45'N, 76°17'E).
- 4 White house (9°51'N, 76°16'E), stands close SW of the village of Kandakkadavu.  
Cochin Lighthouse (10°00'N, 76°13'E) (5.92).  
Azhikod Lighthouse (10°12'N, 76°10'E) (5.112).

For landmarks at Cochin see 5.92.

**5 Major lights:**

Anjengo Light (8°40'N, 76°46'E) (5.34).  
Tangasseri Point Light (8°53'N, 76°34'E) (5.34).  
Kovilthottam Light—as above.  
Alleppey Light (9°29'N, 76°19'E)—as above.  
Manakkodam Light—as above.

6 Cochin Light (10°00'N, 76°13'E) (5.92).  
Azhikod Light (10°12'N, 76°10'E) (5.112).

**Other aid to navigation****5.50**

- 1 Racon (10°00'N, 76°13'E) at Cochin Lighthouse (5.92).

For details see *Admiralty List of Radio Signals Volume 2*.

**Directions**

(continued from 5.36)

**5.51**

- 1 From a position SW of Tangasseri Point (8°53'N, 76°34'E) the route leads about 46 miles NNW to a position W of Alleppey, passing (with positions from Rāmancheri Tura (9°10'N, 76°27'E)):
- 2 WSW foul ground extending up to 2 miles offshore for a distance of about 10 miles NNW of Tangasseri Point, and:

WSW of a dangerous wreck (15 miles S), which lies in the approaches to Nindakara (5.53). Thence: WSW of a dangerous wreck (8 miles SSE), thence: Depending on draught clear of a 21 m patch (8 miles WSW), thence:

WSW of a mud bank (14 miles NW), lying off the town of Porakād, the bank was reported in 1934 to be extending seaward. Thence:

Depending on draught clear of a 20.1 m patch (19 miles NW), which lies 3 miles S of a 18.3 m patch. Thence:

- 4 From a position W of Alleppey the route leads about 28 miles NNW to a position W of Cochin.

**Useful marks****5.52**

- 1 Pillar (9 m in height) (8°55'N, 76°33'E).  
Padiyamkara Tekku (9°14'N, 76°25'E), a light is exhibited near the town during the SW monsoon, its position is dependent on the movement of the mud bank (5.60).  
Radio mast (red lights, 175 m in height) (9°33'N, 76°20'E).
- 2 For useful marks at Nindakara, see 5.55.  
(Directions continue for coastal passage at 5.114)  
(Directions for Cochin are given at 5.94)

**Nindakara**

Chart 1566

**General information****5.53**

- 1 **Position.** Nindakara (8°56'N, 76°33'E) is a small port with an open roadstead anchorage lying off the entrance to Ashtamudi Backwaters, through which it is connected to the inland canal system.

**Traffic.** In 2003 no traffic was reported to have used the port.

**Harbour information****5.54**

- 1 **Port operations.** The port is seasonal, operating between mid-November and mid-April.  
**Storm signals** are displayed, the brief system is used. See 1.47.

**Directions****5.55**

- 1 The port is approached direct from seaward, passing (with positions from the S breakwater head (8°56'N, 76°32'E)):

Clear of a dangerous wreck (2¾ miles W), thence:  
Clear of a 4.4 m shoal (1¾ miles SW), and:  
Remain seaward of shoal patches extending about 8 cables W from the harbour entrance and from the coast N and S of it.

- 2 **Useful marks:**

A break in the palms fringing the shore marks the port.

A bridge (8°56'N, 76°33'E) spans the entrance to Ashtamudi Backwaters.

- 3 **Caution.** There are no night marks. Vessels approaching in darkness should not proceed into depths of less than about 27 m.

**Basin and anchorages****5.56**

- 1 **Basin.** A basin, protected by two breakwaters, has a wharf on its N side at which barges load ilmenite sand; a bar with a least depth of 1.2 m fronts the wharf.

- 2 **Anchorage.** In fine weather vessels working cargo in the offing can anchor about 1¼ miles WNW of the narrow entrance in a depth of about 7 m, as shown on the chart. Vessels anchoring farther offshore, in depths of about 15 m, should keep well clear of the dangerous wreck lying in position 8°56'0N, 76°29'4E.

### Port services

#### 5.57

- 1 **Repairs** of a minor nature to engines.  
**Facilities**, barges and tugs.  
**Supplies**, small quantities of fuel oil.

## Alleppey

*Charts 1565, 1566*

### General information

#### 5.58

- 1 **Position.** Alleppey (9°30'N, 76°19'E) is an open roadstead port lying off a stretch of straight coast about 29 miles S of Cochin.
- 2 **Description.** The town of Alleppey, lying between the coast and paddy-fields bordering the backwater, is one of the largest cities in Kerala State; it is connected by a canal, passing through its centre, with the backwater system. The population is estimated to be about 187 600 in 2004.
- 3 **Function.** Exports through Alleppey include principally, coir and its products, copra and ginger; main imports are salt, grain, metals and piece-goods. Cargo handling in the port has been declining over the years and during 2003 no vessels used the port.

#### 4 **Port limits:**

North, a line drawn W from the N boundary pillar (9°29'7N, 76°19'1E) to a 12.8 m depth.

South, a line drawn generally WSW from a position near the shore, about 9½ cables SSE of N boundary pillar, to a 12.8 m depth.

West, a line joining the positions of the above 12.8 m depths.

**Port authority.** The port is administered by the Port Officer, Alleppey.

### Limiting conditions

#### 5.59

- 1 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 0.8 and 0.3 m.
- Maximum size of vessels handled.** Vessels of any size can anchor off the port according to draught.
- 2 **Swell.** Between Alleppey and a position about 2 miles N, there is reported to be a swell during the SW monsoon; but to the S, the swell is quite deadened by the shifting mud bank (5.60).

**Current.** At the anchorage the current usually sets S with a rate of up to 2 kn; from October to February a N-going set, usually weak, is sometimes experienced.

### Harbour information

#### 5.60

- 1 **Port Radio.** There is a port radio station, for details see *Admiralty List of Radio Signals Volume 6(4)*.  
**Port operations.** The port is closed during the SW monsoon from 15th May to 15th September.  
**Pilots** are not available.
- 2 **Signal station** (9°29'5N, 76°19'2E). Day and night communication is conducted by International Code flag

signals or by a flashing lamp mounted on a pillar, elevation 16 m. When vessels are in the port a continuous VHF listening watch is maintained.

**Storm signals** are displayed from the signal station; the general system is used. See 1.45.

- 3 **Mud bank.** It is possible to carry out trading all the year round in the vicinity of Alleppey owing to the peculiar softness of a mud bank which lies off it. The bank is so stirred up by the swell that it breaks the force of the waves and causes a large extent of smooth water, on the outer part of which vessels may anchor. The mud is dark green and fine and oily to the touch; the smoothness is probably caused by the oil which the mud has been found to contain. The bank is subject to so-called mud volcanoes, which bubble up bringing dead fish, roots and trunks of trees to the surface.

- 4 The mud bank shifts its position from year to year; it is sometimes as far S as Padiyamkara Tekku (9°14'N, 76°25'E) and at other times as far N as Alleppey. In calm weather this bank is not perceptible.

- 5 The bank develops towards the end of June, after the backwater is swollen by rain. It has been stated that the cause of the mud bank is the greater elevation, about 1 m, of the water level in the vast backwater over that of the sea; thus the hydraulic pressure forces out mud and vegetable matter through the several outlets, during the SW monsoon, forming mud banks along the beaches and in the shallow water along the shore. Evidence, it is said, has been found of a subterranean communication through mud between the backwater and the sea.

#### 6 **Landmarks:**

Alleppey Lighthouse (9°29'N, 76°19'E) (5.49).

Church (9°30'N, 76°20'E) (5.49).

### Directions

#### 5.61

- 1 The port is approached direct from seaward.  
**Caution.** The town of Alleppey is difficult to distinguish from seaward, therefore it is advisable to make a landfall while it is still dark to ensure identifying the lighthouse.

#### 2 **Useful marks:**

Signal station flagstaff (37 m in height) (9°29'5N, 76°19'2E).

North boundary pillar (9 m in height) stands 2½ cables N of the above flagstaff.

### Anchorage and pier

#### 5.62

- 1 **Anchorage.** During the NE monsoon vessels of moderate size can obtain anchorage with Alleppey Lighthouse (9°29'N, 76°19'E) bearing 077° distant 2 miles, in depths of about 8 m, but sounding is essential for the mud bank (5.60) shifts frequently and charted depths are not reliable.
- 2 During the SW monsoon the best anchorage is farther offshore with the lighthouse bearing 056°, in a depth of about 9 m, but this anchorage depends upon the position of the mud bank which cannot be determined until after the monsoon.
- 3 Larger vessels anchor with the lighthouse bearing 077° distant 3 miles, in depths of about 12 m, as shown on the chart.
- Pier.** A pier, 387 m long, extends W from a position on the coast close S of the Signal Station; there is a reported depth (1992) of about 1.8 m at its head. The pier is radar conspicuous at a range of 10 miles.

- 4 **Caution.** Vessels anchoring close inshore, or berthing at the pier, should keep well clear of a dangerous wreck lying 5½ cables NW of Alleppey Light.

#### Port services

##### 5.63

- 1 **Facilities:** tug; barges; hospital.  
**Supplies:** provisions.  
**Communications:** limited communication by sea; Cochin airport 60 km; rail.  
**Rescue:** co-ordination centre; no lifeboat.  
 For further information of rescue see *Admiralty List of Radio Signals Volume 5*.

#### Small craft anchorages

##### 5.64

- 1 **Kovilhottam.** In fine weather vessels may anchor about 1 mile W of Kovilhottam Lighthouse (8°59'N, 76°32'E) (5.49), in a depth of about 9 m, mud, sand and shell.  
**Padiyamkara Tekku.** Anchorage can be obtained about 1¼ miles W of Padiyamkara Tekku (9°14'N, 76°25'E) as shown on the chart, in a depth of about 9 m, mud.  
 2 **Tottapalli** (9°19'N, 76°23'E). Vessels sometimes anchor off the town when Alleppey is closed during the SW monsoon or when the mud bank (5.60) has moved elsewhere. Local knowledge is necessary for anchoring.

## COCHIN HARBOUR AND APPROACHES

### General information

Chart 65

#### Position

##### 5.65

- 1 Cochin Harbour (9°58'N, 76°15'E) comprises the three towns of Fort Cochin, Mattāncheri and Ernākulam and the S part of the great estuary of Periyār River; this estuary and its backwater form a fine natural harbour able to shelter large numbers of vessels at all seasons in the inner harbour of up to 9 m draught.

#### Towns and historical background

##### 5.66

- 1 The town of Cochin, comprises Fort Cochin and Mattāncheri. Fort Cochin is believed to be the site of the first European settlement in India, the Portuguese having raised their flag there in 1500 and Vasco da Gama landed in 1502.  
 2 Cochin contains several public buildings and churches including Saint Francis Church built in 1510 and a synagogue in Mattāncheri, built in 1568, is still used by descendants of the Jewish communities which, since the 6th century BC, took refuge in Kerala from successive persecutions in the Middle East and Europe.  
 3 Ernākulam is a large town lying on the E side of Cochin Harbour, it contains the Government offices of the State of Kerala and the main oil storage facilities for the Port of Cochin.

Vypin is a small town lying on the peninsula on the N side of the harbour entrance.

#### Function

##### 5.67

- 1 Cochin is the main deep water harbour on the W coast of India S of Mumbai and is a base for the Indian Navy. The main imports are mineral oils, chemical fertilizers, oilseeds, copra, groundnuts, chemicals and raw cotton; exports include iron ore, coir products, cashew kernels, tea, rubber and coconuts.

#### Topography

##### 5.68

- 1 The great estuary or backwater on which Cochin stands extends for about 80 miles from Alleppey, 29 miles S of Cochin, to Ponnāni, about 51 miles NNW; its breadth varies from 8 miles to a few hundred metres and its channels communicate with other inland waters. It has a least depth of 1.8 m and it is affected by tidal influence.  
 2 Several rivers, having their source in the mountains to the E, flow into the backwater making it brackish. During the SW monsoon, which brings heavy rainfall to the

seaward side of the Western Ghāts, the watershed drainage of these rivers increases greatly and, entering the sea through numerous openings into the backwater, probably causes the constant shifting of the soft mud banks off this part of the coast.

- 3 The coast in the vicinity of Cochin is low, sandy and thickly fringed with palms.

#### Depths

##### 5.69

- 1 The approaches to Cochin are clear of outlying banks and shoals, except for the shoal water of the bar through which the approach channel has been dredged.  
 2 That part of the shoal area lying N of the dredged channel includes a spoil ground which is awash in places; S of the channel a shoal, with a depth of less than 2 m on which the sea breaks, extends about 9 cables W from the coast on the S side of the harbour entrance.  
 3 A continuous dredging operation is carried out throughout the year but depths in general, can reduce rapidly during and after a monsoon.

#### Piracy

##### 5.70

- 1 Piracy and armed robbery are particularly prevalent in the anchorage off Cochin and at the berths, see 5.9.

#### Port limits

##### 5.71

- 1 The seaward limits of the port extend 8½ miles from the coast and are shown in full on Chart 1565.  
 The port area includes the harbour and its backwater, together with the creeks and channels connecting to them and as much of their shores, whether of the mainland or of islands as may lie within 46 m of the Spring tide high-water mark.

#### Approach and entry

##### 5.72

- 1 The port is approached direct from seaward through the dredged approach channel and entered between Fort Cochin and Vypin (2¼ cables N) (5.66).

#### Traffic

##### 5.73

- 1 In 2003 the port was used by 821 vessels with a total dwt of 16 593 972.

#### Port authority

##### 5.74

- 1 The Port Authority is the Cochin Port Trust, PO Box 15, Indira Gandhi Road, Willingdon Island, Kochi 682 009.



The Harbour Master's office and other offices of the Port Administration are grouped on the N end of Willingdon Island (9°58'N, 76°16'E).

### Limiting conditions

#### Controlling depths

##### 5.75

#### 1 Cautions:

The depth in the buoyed channel was reported in 1997 to be between 1 and 2 m less than charted.

The heavy monsoon rains from mid-June to mid-September causes silting in the access channel and the harbour.

- 2 The approach channel across the bar was dredged (1996) to 13.9 m; the entrance channel, N of Fort Cochin and Willingdon Island, was dredged (1996) to 12.8 m. The inner part of Ernākulam Channel is maintained to a project depth of 8 m. The local authority should be consulted for prevailing depths in the channels and at alongside berths.

#### Deepest and longest berths

##### 5.76

- 1 Cochin Oil Terminal (5.102).  
Fertiliser Berth (5.102).

#### Tidal levels

##### 5.77

- 1 See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 0.6 and 0.2 m.

#### Density of water

##### 5.78

- 1 The density of the water within the harbour varies, between 1.000 g/cm<sup>3</sup> and 1.020 g/cm<sup>3</sup>, according to tidal and seasonal factors.

#### Maximum size of vessel handled

##### 5.79

- 1 A partly loaded tanker of 115 000 dwt, maximum draught 10.6 m, has used the port.

#### Local weather and sea state

##### 5.80

- 1 **Visibility.** Haze settles over the land after sunrise, even in the fine season the coast usually remains indistinct until mid-day, making it difficult to discern objects otherwise conspicuous.
- 2 **Wind.** Cochin is outside the cyclone area, but during the SW monsoon, short gusts of 50 to 55 kn are sometimes experienced.
- 3 **Sea State.** When the ebb sets strongly against a sea breeze, a short choppy sea develops; this makes the bar dangerous for ships' boats.

### Arrival information

#### Port radio

##### 5.81

- 1 A port radio service is operated. Vessels inward bound should contact Cochin Port Control 2 hours before arrival at the fairway buoy; and a listening watch should be kept by vessels awaiting berthing instructions. For details see *Admiralty List of Radio Signals Volume 6(4)*.

#### Notice of ETA required

##### 5.82

- 1 Forty-eight hours notice of ETA is required, the message should be sent direct to the Harbour Master. Amendments to the ETA should be made at least 12 hours in advance. For details see *Admiralty List of Radio Signals Volume 6(4)*.

#### Outer anchorages and moorings

##### 5.83

- 1 **Anchorage** off the port in the fine weather season is about 4½ miles offshore, with Cochin Lighthouse (9°59'8N, 76°13'3E) (5.92) bearing about 077° in a depth of about 13 m, mud, good holding ground; as shown on the chart.
- 2 During the SW monsoon the best anchorage for good communication with Cochin is about 2 miles NNW of Fairway Light-buoy (safe water) (9°57'7N, 76°08'9E), in a depth of about 14½ m, mud, good holding ground.
- 3 Vessels awaiting a pilot should anchor N of Fairway Light-buoy well clear of the axis of the channel, mud, good holding ground.

**Examination anchorage.** For details see 1.41.

- 4 **Moorings.** Transhipment of petroleum products is carried out from large storage tankers moored 7 miles SW, 14 miles WNW and 11 miles NW of the entrance to Cochin Harbour.

#### Pilots and tugs

##### 5.84

- 1 **Pilotage** is compulsory for all merchant vessels exceeding 100 gt and is advisable for smaller vessels and is reportedly available 24 hours.  
Government pilots board vessels off the Fairway Light-buoy from a boat with a red hull, white superstructure and yellow funnel. Deep-draught vessels should wait for the pilot about 5 cables W of the buoy.
- 2 For details see *Admiralty List of Signals Volume 2*.  
**Tugs** are available.

#### Regulations concerning entry

##### 5.85

- 1 **General.** Vessels can enter or leave harbour by day or night at almost any state of the tide, except for crude oil tankers which may enter only by day
- 2 **Tankers** in ballast are subject to draught restrictions:  
Tankers less than 152.4 m in length must have a minimum draught forward of 4.3 m (plus or minus 0.6 m, but trimmed by the stern) and 4.9 m aft.
- 3 Tankers of 152.4 m in length and over must have a minimum draught forward of 4.9 m (plus or minus 0.6 m) and 6.1 m aft.  
Tankers over 213.4 m in length are subject to a maximum draught of 8.5 m.

#### Quarantine

##### 5.86

- 1 When plague is prevalent in Northern India vessels must obtain pratique before communicating with the shore.

### Harbour

#### General layout

##### 5.87

- 1 The entrance channel divides 5 cables within the harbour entrance into Mattācheri Channel and Ernākulam Channel leading W and E of Willingdon Island respectively. The principal berthing areas are located on each bank of



Ernākulam Channel and on the E bank of Mattāncheri Channel.

- 2 Establishments of the Indian Navy are situated at Vendurutti on the E side of Willingdon Island.

### Signal station

#### 5.88

- 1 A signal tower 20 m in height, painted white on its seaward side, stands the S side of the harbour entrance, 2½ miles SSE of Cochin Lighthouse; it is surmounted by a flagstaff with an elevation of 37 m. The signal station communicates with vessels by flags during daylight and by Morse when necessary.

### Storm signals

#### 5.89

- 1 Storm signals are displayed from the signal station; the general system is used. See 1.45.

### Port signals

#### 5.90

- 1 The following flags of the International Code should be displayed by vessels entering or leaving Cochin:

| Flags                   | Meaning                                                     |
|-------------------------|-------------------------------------------------------------|
| F                       | Am about to enter harbour and berth in Mattāncheri Channel. |
| F over First Substitute | Am about to enter harbour and berth in Ernākulam Channel.   |
| N                       | Am leaving a berth in Mattāncheri Channel.                  |
| N over First Substitute | Am leaving a berth in Ernākulam Channel.                    |

- 3 An oil tanker should display a red ball below the above flags.

A vessel must not enter harbour until the signal has been repeated by the signal station; vessels leaving harbour must obtain approval to do so before unberthing.

- 4 The following signals may be displayed from the signal station:

| Flags | Meaning                                                        |
|-------|----------------------------------------------------------------|
| E M   | Vessel shifting from Ernākulam Channel to Mattāncheri Channel. |
| M E   | Vessel shifting from Mattāncheri Channel to Ernākulam Channel. |
| D N   | Port's dredge (Gunga) proceeding to sea.                       |
| D F   | Port's dredge (Gunga) entering harbour.                        |

- 5 A vessel shifting berth within the harbour must display a black ball or shape at least 0.6 m in diameter at half mast.

### Natural conditions

#### 5.91

- 1 **Climate.** For details see climatic table 1.212.

**Tidal streams.** The maximum rate of the out-going stream at Springs throughout the year is from 2 to 3 kn and at Neaps from ¾ to 1¼ kn. The rate of the in-going stream at Springs throughout the year varies from 1½ to 2 kn and at Neaps from about ¾ to 1¼ kn.

- 2 Both streams run for a considerable time after the predicted times of high and low water, from 1 to 2 hours

on the in-going, and from 2 to 3 hours on the out-going, according to the season.

- 3 After heavy inland rains the out-going stream may run continuously for many days, while the in-going stream enters the harbour under the surface out-going stream. On very rare occasions, and after inland floods, the tidal stream in the harbour and channels may have a rate of 5 kn or more; this was observed in 1924 and again in 1996.

- 4 In January and February the effect of the out-going stream is not noticeable W of the outer channel buoys, and no appreciable current is experienced off the coast in the vicinity of Cochin.

In 1949, under monsoon conditions, strong eddies and cross currents were experienced in the harbour entrance, and also off the NW point of Willingdon Island.

- 5 During the out-going stream, between the harbour entrance and the NW point of Willingdon Island, there is a strong set across the channel from the N part of the harbour; the limits of this stream are marked by tide-rips which cause a vessel to sheer.

### Principal marks

#### 5.92

- 1 **Landmarks:**

Tower (13 m in height) (9°57'·1N, 76°14'·4E), the NW-most of three towers.

Tower and flagstaff (9°57'·7N, 76°14'·3E) (5.88).

Building (9°58'·0N, 76°14'·7E) situated near N end of Fort Cochin.

Building (9°58'·0N, 76°15'·5E) standing at the W point of Willingdon Island.

- 2 Tower (9°58'·1N, 76°15'·6E) situated close SW of the Port Office, near the NW extremity of Willingdon Island.



Cochin Port Office from E (5.92)

(Original dated 2000)

- 3 Building (9°58'·3N, 76°16'·2E) standing on the W end of Cochin Oil Terminal.

- 4 Flagstaff (35 m in height) (9°57'·1N, 76°16'·9E) stands in Vendurutti.

Cochin Shipyard Flagstaff (21 m in height) (9°57'·25N, 76°17'·25E).

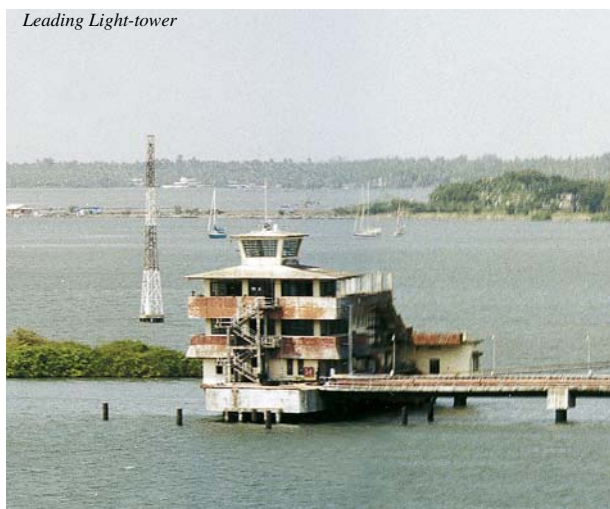
- 5 Three water towers (positioned from Cochin Shipyard Flagstaff): 1.2 cables NE, 2.0 cables ENE, 2.9 cables E.

Statue (9°59'·0N, 76°16'·5E) (chart 1565).

Chimney (9°59'·5N, 76°16'·5E) (chart 1565).

Cochin Lighthouse (white round concrete tower, red bands, 46 m in height) (9°59'·8N, 76°13'·3E).

- 6 **Major light:**  
Cochin Light—as above.



Cochin Oil Terminal, Building W end, from S (5.92)  
(Original dated 2000)

### Other aid to navigation

#### 5.93

- 1 Racon (10°00'N, 76°13'E) at Cochin Lighthouse (5.92).  
For details see *Admiralty List of Radio Signals Volume 2*.

### Directions

#### General

##### 5.94

- 1 When making Cochin vessels should keep in depths of not less than 14 m and W of the Fairway Light-buoy (5.83).

#### Approach channel

##### 5.95

- 1 **Caution.** It was reported (1997) that the channel buoys are liable to drag out of position due to the prevailing weather. Early morning haze can be a problem and its unlikely that the initial headmarks will be seen until ship is 1½ miles into the channel.
- 2 The approach channel, 1 cable wide has been dredged across the bar from a position 4½ miles WSW of Cochin Lighthouse. The channel is marked in accordance with the IALA Maritime Buoyage System (Region A), with 5 pairs of light-buoys (lateral).
- 3 The channel passes close S of a dangerous wreck and a small foul area lying, respectively, about 3 miles and 2 miles W of Nos 9 and 10 Light-buoys.
- 4 Vessels enter the channel close E of the Fairway Light-buoy (5.83), thence a line of bearing 087° of the Port Office building, situated at the N extremity of Willingdon Island, leads through the buoyed approach channel.

#### Entrance channel

##### 5.96

- 1 **Leading lights:**  
Front light (white metal framework tower, red bands, elevation 16 m) (9°58'4N, 76°15'9E).  
Rear light (similar structure, elevation 26 m) (498 m ENE of front light).
- 2 The alignment (078½°) of these lights leads from the inner pair of approach channel buoys, through the harbour

entrance between Fort Cochin and Vypin, to a position NNW of the NW end of Willingdon Island.

- 3 East of Builders Point, the SE point of Vypin (5.66), the shoal water N of the channel is marked by light-buoys (port hand).

#### Mattāncheri channel

##### 5.97

- 1 **Caution.** The channel in 2000 was being widened and buoyage can be expected to be moved accordingly.
- 2 Vessels entering Mattāncheri Channel from the entrance channel alter course as necessary, after passing Builders Point (5.96), to follow the deep water channel which is about 1 cable wide and lies towards the Willingdon Island side of the channel. The channel is marked by 3 light-buoys (black, conical) on its W side and 2 light-buoys (red, can) on its E side. Thence the alignment (162¾°) of the following beacons leads past Mattāncheri Wharf (5.101):
- 3 Front beacon (9°57'1N, 76°16'0E).  
Rear beacon (230 m SSE of front mark).
- 4 Thence, the channel leads S to a road bridge, with a lifting span, which connects the SW end of Willingdon Island to the mainland W.

#### Ernākulam channel

##### 5.98

- 1 **Caution.** The channel is being widened and buoyage can be expected to be moved accordingly.
- 2 Ernākulam Channel, a continuation of the entrance channel, passes between Willingdon Island and the mainland; it is well marked by light-buoys and leads to the main berthing area.
- 3 **Leading lights:**  
Front light (white metal framework tower, red bands, elevation 9 m) (9°57'9N, 76°16'7E).  
Rear light (similar structure, elevation 15 m) (360 m ESE of front light).
- 4 From a position NNW of the Port Office, the alignment (107¼°) of these lights leads N of Ernākulam Wharf and S of Cochin Oil Terminal (5.102); thence to the SE part of the channel.
- 5 **Leading lights:**  
Front light (white metal framework tower, red bands, elevation 7 m) (9°58'3N, 76°16'3E).  
Rear light (similar structure, elevation 12 m) (468 m NW of front light).
- 6 The alignment (321° astern) of these lights, leads past the Naval Jetty and towards Cochin Shipyard (5.103). Thence:
- 7 The channel leads SSE to a road and rail bridge which connects the E side of Willingdon Island with the mainland E, under the bridge there is a navigable opening marked by lighted dolphins.

#### Useful marks

##### 5.99

- 1 The following are useful marks (positioned from the tower (9°58'1N, 76°15'6E)):  
Red roof house (¼ miles WSW).  
Beacon (elevation 9 m) (4 miles WNW), concrete pile.
- 2 Beacon (elevation 3 m) (¾ miles WNW), wooden pile.  
Dufferin Point Tower (white, 6-sided concrete tower, 4 m in height) (¾ cable NNE); it was reported in 1997 that this light can be confused with the lights

of a vessel berthed at Cochin Oil Terminal, 7 cables ENE of the light.

- 3 Government Buildings (1¼ miles E), surmounted by two towers.

## Berths

### Moorings

#### 5.100

- 1 There are numerous berths at mooring buoys throughout the harbour, their positions and depths may be seen on the chart; a vessel LOA 172 m can be accommodated. It is reported (2001) that the mooring buoys have been removed from the SW side of Mattāncheri channel.

### Mattāncheri channel

#### 5.101

- 1 The principal berths are located on the E side of the channel on Willingdon Island (positioned from the tower (9°58'·1N, 76°15'·6E)):
- 2 **Oil Berth** (2 cables SSE), a T-headed berth flanked by dolphins, has a depth of 7.6 m (1999) alongside.
- 3 **North Coal Berth** (3 cables SSE) has a reported (2003) depth alongside of 8.5m. At this berth in 1997 a tidal stream rate of about 3 kn was experienced during the out-going stream.
- 4 **Mattāncheri Wharf** (8 cables SSE) has 4 berths, numbered Q 1 to Q 4 from S, with a least depth of 7.6 m (1999) alongside.
- 5 **South Coal Berth** (1 mile SSE), with a reported depth (1999) of 7.6 m alongside, has been adapted for the import of liquid ammonia; a prominent storage tank with a red and white chequered top stands in the vicinity of the berth.
- 6 Each berth can accommodate a vessel up to 168 m in length, and each berth is faced with timber.

### Ernākulam channel

#### 5.102

- 1 The principal berths on the NE side of the channel are for tankers (positioned from the tower (9°58'·1N, 76°15'·6E)):
- 2 **Cochin oil terminal** (7 cables ENE) a berth flanked by dolphins; the face of the berth adjoins the 12.8 m dredged channel, however there is a maximum depth of 10.9 m close SSW of the berth. The maximum permitted draught alongside the berth is reported (2001) to be 11.6 m, see also 5.75.
- 3 **Tanker berths** (1¼ miles E). There are 2 T-headed berths, each flanked by dolphins, for tankers handling refined products:
- 4 The N berth can accommodate tankers of up to 30 000 dwt, 213 m in length in a depth of 9.1 m (2001).  
The S berth can accommodate partly loaded tankers of up to 18 000 dwt, 198 m in length in a depth of 9.1 m (2001).
- 5 Vessels berth, heading SE, on the out-going stream with the aid of a tug.

The principal berths on the SW side of the channel are for container, general cargo and naval vessels (positioned from the tower (9°58'·1N, 76°15'·6E)):

- 6 **Ernākulam Wharf** (5 cables E) is about 900 m long and has 5 berths, numbered Q 5 to Q 9 from W; there are depths of 9.1 m (1999) alongside. Ro-Ro vessels can berth at Q 5 to Q 8 berths; Q 9 berth (Rajiv Gandhi Container Terminal) is a container terminal with a berthing length of 244 m; containers can also be handled at Q 6 and Q 7 berths.
- 7 **Fertilizer Berth** (1 mile ESE) numbered Q 10 is 217 m long, 15 m wide and stands 35 m offshore to which it is connected by an approach bridge at its SE end. The berth, which is flanked by dolphins, has a maximum charted depth alongside of 10 m, although it reportedly (2001) can accommodate a vessel with a draught of 10.3 m. See also 5.75.
- 8 **Naval Jetty** (1½ miles ESE) is a T-headed berth with a depth of about 7.6 m alongside.  
Caution is necessary when berthing at Naval Jetty for the out-going stream sets strongly off and the in-going stream sets strongly onto the jetty.
- 9 **Vendurutti Jetty** (1¾ miles SE) is a T-headed berth with a berthing face about 350 m long; it is located on the SW side of an extensive dredged area with a maintained depth of 8 m.

## Port services

### Repairs

#### 5.103

- 1 There are several dry docks and slipways where normal running, hull and engine repairs can be carried out.
- 2 **Cochin Shipyard** (9°57'·3N, 76°17'·3E), where major repairs can be undertaken, is situated on the E bank of Ernākulam Channel, it has building and repair docks.  
Largest dry dock: length 270 m; width 45 m; depth on its sill of 9.07 m at MHWS. The dock will accommodate a vessel of 125 000 dwt, length 265 m, beam 39.5 m and draught 7 m.
- 3 **Mattāncheri Channel Repair-yard** ((9°56'·6N, 76°16'·1E), there is a dry dock and slipway with a fitting out wharf 91 m long, situated on the W side of Willingdon Island.

### Other facilities

#### 5.104

- 1 Hospital; divers; de-ratting and exemption certificates issued; lighters and cargo handling gear; oily waste reception.

### Supplies

#### 5.105

- 1 Marine fuels by pipeline or barge.  
Fresh provisions, notice is required; fish is plentiful.  
Fresh water by pipeline or barge, if by barge, water should be boiled before drinking; when naval vessels are in port no water may be available for commercial vessels.

### Communications

#### 5.106

- 1 There is regular communication by sea with ports in India and Sri Lanka and many foreign ports.



The national airport is situated on Willingdon Island. The railway terminus on Willingdon Island connects with the general railway system.

### Harbour regulations

#### 5.107

- 1 **Speed.** A vessel shifting berth within Cochin Harbour must not proceed at more than one half of her full speed.
- 2 **Engines.** The immobilization of main engines is not permitted without written consent by the Port Authority.

### Small craft

#### 5.108

- 1 An anchorage area for sailing vessels, marked by buoys (white, spherical), lies E of Vypin between the entrance channel and Waller Pat Reclamation area (9°58'·6N, 76°15'·0E).
- 2 A boat basin is situated towards the NNW end of Ernākulam, 5½ cables ENE of Cochin Oil Terminal (9°58'·2N, 76°16'·3E) (5.102).  
There are boat pens situated 1¾ cables SSE of the Naval Jetty (9°57'·5N, 76°16'·8E) (5.102).

## COCHIN TO MOUNT DILLI

### COCHIN TO BEYPORE

#### General information

Chart 1565

#### Topography

##### 5.109

- 1 This stretch of coast is generally straight, low, sandy and fringed with palms which are only broken by the entrances to rivers and backwaters. Between Cochin and the mouth of the Periyār River, about 13 miles N, the coast is densely populated and the hinterland flat. Thence about 18 miles ENE of Chetwai (10°32'N, 76°03'E) a range of hills over 305 m high in their highest part, stand between the Western Ghāts and the coast, they terminate abruptly towards the S; the NW summit of the range is radar conspicuous. Between Ponnāni (10°46'N, 75°55'E) and Beypore, 24 miles NNW, the fringe of palms along the coastline is backed by red laterite hills. A tableland (about 90 m in height) with a few scattered trees on it, is situated about 9 miles N of Ponnāni.

#### Depths

##### 5.110

- 1 Seaward of the 30 m depth contour there are no charted dangers, however less water than charted is reported.

#### Natural conditions

##### 5.111

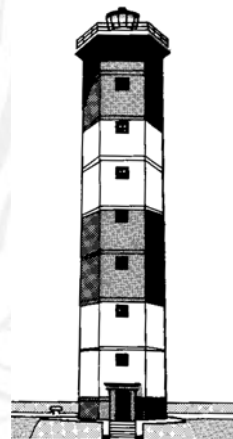
- 1 **Surf.** In the vicinity of Mālipuram (10°01'N, 76°13'E), at the start of the SW monsoon, there is always a swell and surf on this coast but after about one week it becomes smooth, though a confused sea will often persist offshore.
- 2 **Currents.** The currents are of monsoonal origin but tend to follow the trend of the coast. From November to January the sets are NW with rates of up to 1 kn. In July and August, when the SW monsoon is well established, SE sets with rates of up to 2 kn are experienced. Exceptionally, onshore sets of up to 1·5 kn may be found during the NE monsoon and up to 3 kn during the SW monsoon.

#### Principal marks

##### 5.112

- 1 **Landmarks:**
- 2 Cochin Lighthouse (10°00'N, 76°13'E) (5.92).  
Chimney (red and white bands, 82 m in height) (10°05'N, 76°18'E).  
Azhikod Lighthouse (white square concrete tower, black bands, 34 m in height) (10°12'N, 76°10'E).
- 3 Kollengode Bluff (chart 708) stands about 42 miles NE of Cochin at the NW end of the Anaimalai Hills (10°31'N, 76°35'E), it is conspicuous during the NE monsoon. The bluff forms the S side of Pālghāt Gap (5.2).

- 4 Chetwai Lighthouse (white round concrete tower, red bands, 30 m in height) (10°33'N, 76°01'E).  
Boundary pillar (white, 6 m in height) (10°46'N, 75°55'E), stands close to the coast about 1 mile SSE of the entrance to Ponnāni River; a similar pillar stands on a ridge of sand about 5 cables N of the entrance.
- 5 Ponnāni Lighthouse (white round concrete tower, black bands, 30 m in height) (10°46'N, 75°55'E).  
Urot Mala (11°05'N, 76°01'E), a hill which makes a good landmark from NW; it is radar conspicuous.
- 6 Olavattūr Kunnu (11°11'N, 75°56'E), a hill standing among other isolated hills E of Beypore.  
Tree (11°08'N, 75°51'E).  
Beypore Lighthouse (white 8-sided masonry tower, red bands, 30 m in height) (11°09'N, 75°48'E).



Beypore Light Tower (5.112)

(Original dated prior to 1981, Checked 2004)

- 7 Vavul Mala (11°25'N, 76°08'E) (5.131).  
For landmark at Beypore see 5.119.
- 8 **Major lights**  
Manakkodam Light (9°45'N, 76°17'E) (5.49).  
Cochin Light (10°00'N, 76°13'E) (5.92).  
Azhikod Light—as above.  
Chetwai Light—as above.  
Ponnāni Light—as above.
- 9 Beypore Light—as above.  
Kadalūr Point Light (11°28'N, 75°38'E) (5.131).

#### Other aids to navigation

##### 5.113

- 1 Racon (10°00'N, 76°13'E) at Cochin Lighthouse (5.92).  
Racon (12°00'·4N, 75°12'·2E) (chart 1564) at Kotte Kunnu Light.



Racon (11°09'·4N 75°48'·4E) at Beypore Light.

For details see the *Admiralty List of Radio Signals Volume(2)*.

### Passage directions

(continued from 5.52)

#### 5.114

1 From a position W of Cochin (9°58'N, 76°15'E) the route leads about 73 miles NNW to a position WSW of Beypore.

2 **Caution.** Vessels in depths of less than 30 m should give the dangerous wreck (10°46'·5N, 75°48'·0E), the position of which is approximate, lying about 7 miles W of Ponnāni, a wide berth.

### Useful marks

#### 5.115

1 Chetwai S boundary pillar (white, 6 m in height) (10°29'N, 76°03'E).

Chetwai N boundary pillar (two black and white bands, 6 m in height) (10°32'N, 76°02'E).

2 **Caution.** The existence of the above pillars is doubtful. Tānūr Nagaram Light (10°59'N, 75°52'E) is exhibited from the village of Tānūr Nagaram; a tableland covered with palms is situated about 1 mile NE of the light.

3 Kota Kunnu (11°08'N, 75°51'E) a hill standing about 1¼ miles ENE of Beypore S Boundary Pillar (5.120).

(Directions continue at 5.133)

## Beypore

Chart 3461 plan of Calicut and Beypore Anchorages

### General information

#### 5.116

1 **Position.** Beypore (11°10'N, 75°48'E) is an open roadstead port and the river port for Calicut, 5 miles NNW; the town of Beypore stands on the NW side of the entrance to Beypore River. The river is navigable up to about 20 miles from its mouth at all seasons; however, large quantities of timber are floated down river from the forests to the port.

2 **Function.** The principal exports are tiles and timber.

**Approach and entry.** The river mouth is approached between two breakwaters which extend SW from the N and S entrance points as shown on the chart.

**Traffic.** International traffic is negligible.

### Limiting conditions

#### 5.117

1 **Depth.** There is a least charted depth (1990) of 3·5 m between the breakwaters; however, the Port Conservator should be consulted for the latest information on depths.

2 **Tidal levels.** See information in *Admiralty Tide Tables*. The average maximum and minimum tidal ranges are about 0·9 and 0·3 m.

3 **Local weather.** A NW wind makes crossing the bar unsafe at low water.

### Arrival information

#### 5.118

1 **Anchorages.** Small vessels may obtain anchorage about 1¼ miles WSW of Beypore Light, in a depth of about 6 m, mud, as shown on the chart; moderately sized vessels usually anchor about 5 cables farther SW. Large vessels anchor farther seaward according to draught.

2 **Pilotage.** Pilotage is not compulsory, but pilots are available for entering the river.

### Harbour information

#### 5.119

1 **Storm signals** are displayed from the signal station; the general system is used. See 1.45.

#### Landmark:

Beypore Lighthouse (11°09'·4N, 75°48'·4E) (5.112).

2 **Major light:**

Beypore Light—as above.

#### Other aid to navigation

3 Racon at Beypore Light, see above.

For details see the *Admiralty List of Radio Signals Volume(2)*.

### Directions

#### 5.120

1 **Caution.** Fishing stakes or poles may be encountered in the approaches to the breakwaters and within the harbour.

2 **Approach.** Vessels anchoring, or those approaching the breakwaters from seaward, should keep well clear of the dangerous wreck (5.133) which lies about 1¼ miles W of the river entrance.

3 Vessels approaching from S should pass W of Black Rocks which lie towards the SE end of a reef that extends about 8 cables S of the river entrance. A rock with a depth of 1·5 m over it lies 5 cables SSW of Black Rocks.

At night vessels should not enter depths of less than 15 m.

4 **Useful marks:**

Pillar (6 m in height) (11°07'N, 75°50'E) Chart 1565.

Kota Kunnu Hill (11°08'N, 75°51'E) (5.115)

Chart 1565.

### Berths

#### 5.121

1 There is a wharf 152 m long, for use by lighters, situated on the N bank of the river about 4 cables inside its entrance and close NE of the custom house; another wharf is situated about 4 cables NNE.

### Landing

#### 5.122

1 At times when the bar is unsafe for passage, good landing for boats may be found in the small bays S of Beypore.

### Port services

#### 5.123

1 **Repairs:** slipway of 150 tonnes capacity.

**Facility:** lighterage between anchorage and wharf.

**Barge tugs:** from Calicut.

**Water barge:** from Calicut.

**Communication:** rail.

## Rivers

Chart 1565

### Periyār River

#### 5.124

1 Periyār River entrance (10°11'N, 76°10'E) is generally easy to identify from W because of the gap in the coastal fringe of palms. Small vessels can cross the bar but local knowledge is necessary.

2 Periyār Lake is formed upstream by a dam laid across the river, the lake houses a game sanctuary which may be reached by road from Cochin.

## Ponnāni River

### 5.125

- 1 **General information.** Ponnāni River entrance ( $10^{\circ}47'N$ ,  $75^{\circ}55'E$ ) is wooded and prominent from S, its extensive backwater forms a wide gap in the line of coastal palms when viewed from SW.

The town of Ponnāni lies about 5 cables within the river entrance on the S side, it is a much used by local craft except during the SW monsoon when it is closed.

- 2 **Port authority.** The port is administered by a Port Conservator responsible to the Port Officer at Calicut (5.135).

**Pilotage.** There are unlicensed pilots for the Ponnāni River.

**Storm signals** are displayed, the brief system is used. See 1.47.

- 3 **Directions.** The bar has a depth of not more than 2.1 m, but small vessels with local knowledge can enter at high water.

**Facility:** boats for transferring cargo are available.

- 4 **Communications.** Rail communication by the Indian State Railway is available at Tirūr, a town located about 13 km N of the port.

There is communication by sea with other ports on the Malabar Coast and occasionally with Colombo, Mumbai and Karāchi.

## Small vessels anchorages and harbours

### 5.126

- 1 **Mālipuram** ( $10^{\circ}01'N$ ,  $76^{\circ}13'E$ ), is a small open port under the superintendence of the Kerala State Port Officer; most of its trade passes to and from Cochin through the backwater.

**Periyār River to Ponnāni** anchorage in smooth water off this coast depends entirely on the positions of oily mud banks, similar to those described at 5.60.

- 2 **Chetwai** ( $10^{\circ}32'N$ ,  $76^{\circ}03'E$ ), the town lies about 1 mile within the entrance to a backwater; anchorage off this entrance, in a depth of 11 m, mud, is suitable for small vessels with local knowledge.

**Tānūr Nagaram** ( $10^{\circ}59'N$ ,  $75^{\circ}52'E$ ) is an important fishing port.

## BEYPORE TO BADAGARA

### General information

*Charts 3461 plan of Calicut and Beypore Anchorages, 1565*

### Route

#### 5.127

- 1 From a position WSW of Beypore ( $11^{\circ}10'N$ ,  $75^{\circ}48'E$ ) the route leads about 28 miles WNW to a position WSW of Badagara.

### Topography

#### 5.128

- 1 The coastline is slightly indented with bays, interspersed with rocky outcrops and headlands. The shore is generally low, sandy and fringed by palms with red laterite hills in the background. To the E and N of Quilāndi ( $11^{\circ}26'N$ ,  $75^{\circ}42'E$ ) the hinterland is hilly and undulating.

### Depths

#### 5.129

- 1 Seaward of the 30 m depth contour there are no charted dangers.

## Currents

### 5.130

- 1 See 5.111

## Principal marks

### 5.131

- 1 **Landmarks:**

Vavul Mala ( $11^{\circ}25'N$ ,  $76^{\circ}08'E$ ), the highest mountain of the Kundah Hills (5.146), is visible far to seaward in clear weather. The Kundah Hills end rather abruptly S of this mountain.

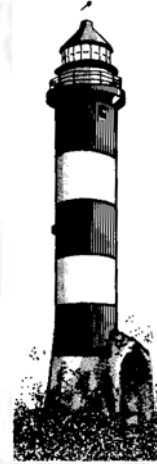
Dome of the Roman Catholic Cathedral (44 m in height) ( $11^{\circ}15'N$ ,  $75^{\circ}47'E$ ) stands about  $4\frac{1}{2}$  cables SE of Calicut Lighthouse (5.134).

- 2 Radio mast (127 m in height) ( $11^{\circ}18'N$ ,  $75^{\circ}46'E$ ), red obstruction lights are exhibited.

Pukkunnu ( $11^{\circ}24'N$ ,  $75^{\circ}49'E$ ), a hill with a conspicuous summit.

Water tower ( $11^{\circ}26'N$ ,  $75^{\circ}42'E$ ).

- 3 Kadalūr Point Lighthouse (white round masonry tower, black bands, 34 m in height) ( $11^{\circ}28'N$ ,  $75^{\circ}38'E$ ).



Kadalūr Point Light Tower (5.131)

(Original dated prior to 1981, Checked 2004)

- 4 Flat Topped Hill ( $11^{\circ}37'N$ ,  $75^{\circ}38'E$ ) situated about 3 miles ENE of Badagara.

- 5 **Seamark:**

Sacrifice Rock ( $11^{\circ}30'N$ ,  $75^{\circ}32'E$ ) standing  $6\frac{1}{2}$  miles WNW of Kadalūr Point is composed of granite with a white appearance.

- 6 **Major lights:**

Beypore Light ( $11^{\circ}09'N$ ,  $75^{\circ}48'E$ ) (5.112).

Kadalūr Point Light—as above.

## Other aid to navigation

### 5.132

- 1 Racon ( $11^{\circ}09'N$ ,  $75^{\circ}48'E$ ) at Beypore Light.

For details see the *Admiralty List of Radio Signals Volume(2)*.

## Directions

(continued from 5.115)

### 5.133

- 1 From a position WSW of Beypore ( $11^{\circ}10'N$ ,  $75^{\circ}48'E$ ) the route leads about 28 miles NNW to a position WSW of Badagara, passing (with positions from the water tower ( $11^{\circ}26'N$ ,  $75^{\circ}42'E$ )):

- 2 WSW of a dangerous wreck (17 miles SSE), the position of which is approximate, thence:  
WSW of Gillham Rock (14 miles SSE), thence:

WSW of Calicut Reefs (13 miles SSE), a group of rocky shoals. Thence:

WSW of Coote Reef (12 miles SSE), which is marked by a buoy (black and white striped, can) moored 3½ cables W of the reef. Thence:

WSW of Anchorage Reef (11½ miles SSE), a shoal with a least depth of 3·6 m over it. A light-buoy (black and white striped, can) is moored close WNW of the reef from October to May. Thence:

WSW of Reliance Shoal (10 miles S), the shoal is rocky but the adjacent bottom is soft mud. Thence:

WSW of Rocky Islet (8½ miles SSE), thence:

WSW of Elattūr Cape (7 miles SSE), a low and rocky point of land with coconut palms close inland and several rocks lying close offshore. Thence:

WSW of Kadalūr Point (4 miles WNW), a low point covered with coconut trees, over which can be seen a large round tree and Kadalūr Point Lighthouse (5.131); the point is reported to be radar conspicuous at 22 miles. The coastal reef, on which lies stranded wreck, extends up to 1½ miles from shore; the SW and W ends of this reef are known, respectively, as Kadalūr Reef and Trikodi Reef. Close NW of the reef there is a shoal with a swept depth of 2·8 m which lies about ¼ miles WSW of the village of Tikkoti. Thence:

Clear of Sacrifice Rock (10½ miles WNW) (5.131). The channel between this rock and the mainland is free from dangers, but a vessel using it should pass at a safe distance from the rock, but not proceed into depths of less than 13 m. A vessel passing W of the rock at night should not proceed into depths of less than 27 m which will be found about 2½ miles W of it. Thence:

To a position WSW of Badagara (12 miles NW).

### Useful marks

#### 5.134

Calicut Lighthouse (white masonry tower, 15 m in height) (11°15'·5N, 75°46'·2E), stands near the Port Office.

West Hill (39 m high) (11°17'·3N, 75°46'·3E) is surmounted by a tank with an elevation of 49 m. The hill, with houses on it showing amongst the trees, provides a good landmark in the morning. Calicut Port N boundary pillar (white, 6 m in height) (11°19'N, 75°45'E).

Hill (11°33'N, 75°37'E); a prominent round red hill, 54 m high, stands on the S bank of the Mūrāt River (5.142) about 1 mile from its mouth.

Kodakkad Kunnu (11°36'N, 75°37'E), a hill.

Tirumana (11°38'N, 75°37'E), a hill.

(Directions continue at 5.151)

### Calicut

Chart 3461 plan of Calicut and Beypore Anchorages

#### General information

##### 5.135

**Position.** Calicut (11°15'N, 75°46'E), also known as Kozhikode, stands on the N bank of the Kallāyi River near its mouth.

**Historical background.** Calicut was the first port in India to be visited by Europeans when the Portuguese landed in 1498. Now it is the second largest city of the State of Kerala.

**Function.** Exports through Calicut include principally, pepper, coir yarn, copra, timber, coconuts, oils, tea, rubber and coffee; principal imports are grains, piece goods, hardware, machinery, metal and ores.

**Traffic.** International traffic is negligible.

**Port authority.** The port is administered by the Port Officer, Post Box 1108, Calicut.

#### Tidal levels

##### 5.136

See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 1·0 and 0·4 m.

#### Harbour information

##### 5.137

**Pilotage** is not available.

**Signal station** (11°15'·7N, 75°46'·1E), stands close N of Calicut Light (5.134); it communicates with shipping by flags of the International Code of Signals or by Morse Code.

**General signals.** Flags of the International Code of Signals are used to indicate the practicability of landing as follows:

| Flag | Meaning                                            |
|------|----------------------------------------------------|
| K    | Surf is impassable.                                |
| M    | Communication with the shore is dangerous by boat. |
| N    | Boats can leave harbour.                           |
| F    | Boats can enter harbour.                           |

**Storm signals** are displayed from the signal station; the general system is used. See 1.45.

**Natural conditions.** For details see climatic table 1.213.

**Landmarks:** see 5.131.

#### Anchorage

##### 5.138

Anchorage may be obtained with Calicut Lighthouse bearing 078° at a distance according to ship's draught; vessels should not anchor S of this bearing for the bottom is foul and rocky.

The light-buoy off the W side of Anchorage Reef (5.133) marks the S and E limits of the anchorage for vessels of moderate size.

There are 3 recommended anchorages shown on the chart.

Small vessels, with local knowledge, can anchor S and E of Coote Reef in depths of about 3 m, soft mud; the reef affords protection from NW.

#### Berths

##### 5.139

There are 2 piers, one abreast Calicut Lighthouse and the other 6 cables SSE. Both piers are 236 m long, with a depth of 2·4 m alongside; they are used by lighters only.

Lights are exhibited from the heads of these piers; N pier (post), S pier (white masonry tower, black bands, white dwelling).

#### Landing

##### 5.140

When the sea breeze is strong, it is more convenient to ship cargo to and from the beach abreast West Hill (11°17'·3N, 75°46'·3E) (5.134), where the surf is less than near the town.

A bank of very soft mud, abreast a village about 3 miles N of Calicut, makes landing easier there than at Calicut.



The mud bank, although normally abreast the village, has been known to shift S as far as Calicut.

### Port services

#### 5.141

- 1 **Facilities:** hospital; tugs and lighters; divers.  
**Supplies:** fresh provisions and fuel with ample notice; water of uncertain quality and maximum quantity 15 tonnes per day.
- 2 **Communications:** regular by sea with ports of India and Sri Lanka; by canal to Elattūr River 6½ miles NNW.

### Anchorage

*Chart 1565*

#### Badagara

#### 5.142

- 1 **General information.** The open roadstead port of Badagara lies on the coast, abreast the town of that name, about 2 miles NNW of the mouth of the Mūrāt River (11°34'N, 75°35'E).
- 2 **Function.** Principal exports are coconuts, pepper, dry ginger, canes and timber scantlings; main imports are salt and groundnut oil cakes.
- 3 **Port limits.** The N and S limits of the port are lines, extending W from positions 1½ miles N and S of the Custom House which stands near the Signal Station flagstaff (11°36'N, 75°35'E), to a depth of 16.5 m; the W limit is a line joining the two 16.5 m depths.
- 4 **Anchorage:** can be obtained abreast the town about 2¼ miles WSW of the above flagstaff in a depth of about 9 m, mud, as shown on the chart. Vessels anchoring should keep well clear of a wreck, with a swept depth of 10.3 m, lying in position 11°36'N, 75°32'E.
- 5 **Storm signals:** are displayed at the Signal Station, the brief system is used. See 1.47.  
**Facilities:** hospital; small quantities of fresh water; small boats for cargo.
- 6 **Communications:** by sea with India and Sri Lanka ports; by road and rail locally.

### Small craft

#### 5.143

- 1 **River.** The Elattūr River (11°21'N, 75°44'E) is shallow and rocky; however, it is navigable by small boats with local knowledge.
- 2 **Landing.** Good landing can be effected by boat on the S side of a large black rock, which has a tree on its top, situated about 3 miles N of the entrance to the Elattūr River.
- 3 **Anchorage** for small craft may be found off the village of Quilāndi (11°26'N, 75°42'E) where the roadstead is protected by a mud bank. The coast in this vicinity, being generally free from surf, affords easy landing for ships' boats.

### Other names

#### 5.144

- 1 Kattakkal (11°33'N, 75°36'E), a village.  
Kollam (11°27'N, 75°41'E), a village.

### BADAGARA TO MOUNT DILLI

### General information

*Chart 1564*

#### Route

#### 5.145

- 1 From a position WSW of Badagara (11°36'N, 75°35'E) the route leads about 30 miles NW to a position SW of Mount Dilli.

### Topography

#### 5.146

- 1 The coastline is generally sandy and fringed with coconut palms except between Tellicherry (11°45'N, 75°30'E) and Cannanore, 9 miles NW, where it is formed of alternate cliffs and sandy beaches. There are numerous above and below-water rocks, lying close offshore, in several places along this stretch of coastline. The coast is backed by undulating hills, with elevations from 30 to 120 m, which rise inland to the remarkable and lofty peaks of the Kundah Hills; many of the peaks are prominent and their positions are shown on the chart.

### Depths

#### 5.147

- 1 Seaward of the 30 m depth contour there are no charted dangers.

### Currents

#### 5.148

- 1 The currents have a seasonal variation related to the monsoon, from February until September the most frequent set is SE with the greatest constancy during June to August; during October currents are variable in direction, thence from November until January the most common set is NW. The rate is mostly less than 1 kn but at times 2 kn may occur, usually during July, August and December. Exceptionally, the current has a significant onshore component.

### Principal marks

#### 5.149

- 1 **Landmarks:**  
Vavul Mala (11°25'N, 76°08'E) (5.131).  
Tellicherry Port S boundary pillar (11°43'N, 75°31'E) stands at the end of Punuli Point.  
Flagstaff (11°44'.5N, 75°29'.5E) standing on rising ground near the coast.  
House (elevation 43 m) (11°46'N, 75°29'E).  
2 Redoubt (11°47'N, 75°28'E), the ruins of a redoubt stand on a bare hill about 6 cables NE of Dharmadam.  
Casuarina Trees (11°51'N, 75°24'E), a clump of casuarina trees stand on low hills 1¼ miles E of Fort Saint Angelo.

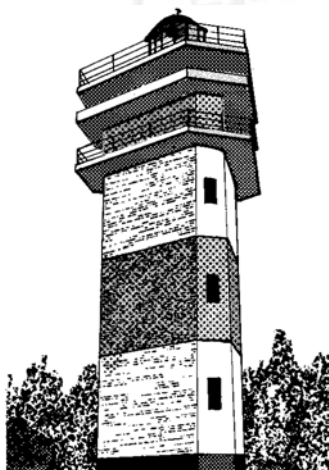


- 3 Cannanore Lighthouse (white round concrete tower, red bands, 23 m in height) (11°52'N, 75°21'E).



Cannanore Light Tower (5.149)  
(Original dated prior to 1981, Checked 2004)

North Point (11°54'N, 75°19'E), a headland.  
Kotte Kunnu (52 m in height) (12°00'N, 75°12'E) is a radar conspicuous bluff point joined to Mount Dilli by a low neck of land, a lighthouse and a ruined fort stand on the point.



Kotte Kunnu Light Tower, Mount Dilli (5.149)  
(Original dated prior to 1981, Checked 2004)

- 4 **Major lights:**  
Kadalūr Point Light (11°28'N, 75°38'E) (5.131).  
Cannanore Light—as above.  
Kotte Kunnu Light (white triangular masonry tower, red bands, 18 m in height) (12°00'N, 75°12'E).

#### Other aid to navigation 5.150

- 1 Racon (12°00'·4N, 75°12'·2E) at Kotte Kunnu Light.  
For details see the *Admiralty List of Radio Signals Volume(2)*.

#### Directions (continued from 5.134)

##### 5.151

- 1 From a position WSW of Badagara (11°36'N, 75°35'E) the route leads about 30 miles NW to a position SW of Mount Dilli, passing (with positions from Cannanore boundary pillar (11°50'·5N, 75°24'·0E)):  
2 Clear of a wreck (5.142) with a swept depth of 10·3 m (17 miles SSE). Thence:  
3 SW of Chombakulu (14 miles SE), an islet lying about 6 cables offshore and fringed with several rocks. Thence:

- 4 SW of Kurchikulu Rock (10 miles SE), which lies about 7 cables SSE of Talayi Rock, the rocks have depths over them of 0·9 and 1·5 m respectively; a buoy (black, spherical) moored on the S side of Talayi Rock is removed during the SW monsoon. Thence:  
5 Clear of a dangerous wreck (mast) (10½ miles S), the position of which is approximate. Thence:  
SW of Nukudiankulu (6½ miles SE), a drying rock which lies close NW of Bilikulu (5.157) and Shorukulu basalt ridges. Thence:  
6 SW of Green Island (5½ miles SSE), an islet covered with tall trees which lies close off the W point of Dharmapattanam Island. Thence:  
SW of Cannanore Lighthouse (2½ miles WNW) (5.149), thence:  
7 Clear of a dangerous wreck (12½ miles NW) (5.168), thence:  
8 To a position SW of Mount Dilli (16 miles NW), which is, the summit of a conspicuous headland that is separated by a narrow creek from the low-lying mainland. Kotte Kunnu Lighthouse (5.144) stands close by.

#### Useful marks

##### 5.152

- 1 Mahe Lighthouse (white mast, masonry base, 13 m in height) (11°42'N, 75°32'E).  
Tellicherry Lighthouse (white masonry) (11°45'N, 75°29'E); it stands on the NW bastion of a fort which was built in 1708.  
Chimney (43 m in height) (11°51'N, 75°22'E).  
2 Azhikkal Lighthouse (11°57'N, 75°18'E).  
(Directions continue at 6.14)

#### Tellicherry

Chart 1564

#### General information

##### 5.153

- 1 **Position.** Tellicherry (11°45'N, 75°29'E), is an open roadstead port situated 24 miles SE of Mount Dilli; the town of that name, backed by hills which are thickly covered with coconut palms and other trees, lies about 1 mile inland.  
2 **Function.** Principal exports are pepper, coffee, tea, coconuts and timber; chief imports are rice, paddy, grains, salt, piece goods and metals.  
3 **Port limits.** The port limits are defined by lines extending SW, to a depth of 16·5 m, from the boundary pillar (11°43'N, 75°31'E) (5.149) and from another pillar standing on the SE point of Dharmapattanam Island, 4¼ miles NW.  
4 **Port authority.** The port is administered by a Conservator.

#### Tidal levels

##### 5.154

- 1 See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 1·0 and 0·6 m.

#### Harbour information

##### 5.155

- 1 **Operations.** The port is normally open throughout the year.  
2 **Signals.** Communication with shipping is by flags of the International Code from the flagstaff (11°44'·5N, 75°29'·5E), or by Morse Code from the Port and Customs Office situated near the flagstaff.

- 3 **Storm signals** are displayed from the above flagstaff, the brief system is used. See 1.47.

**Landmarks:** see 5.149.

### **Anchorage**

#### **5.156**

- 1 Anchorage for large vessels in unsettled weather is well offshore in depths of about 12 m. In the fine season a vessel can anchor about 2 miles WSW of Nilot Point (11°44'N, 75°30'E) in a depth of about 9 m, soft mud, as shown on the chart.

### **Berth**

#### **5.157**

- 1 A T-headed pier, 171 m long with depths of 1.8 to 3.0 m alongside, extends SW from the shore close W of the Port Office; there are landing steps on both sides.
- 2 The berth is protected by Bilikulu, a natural breakwater of basalt which lies parallel to the coast W of the berth; between Bilikulu and the coast there are two similar but shorter ridges these, together with the numerous detached above and below-water rocks, serve to shelter the pier at low water during NW winds making it accessible when other ports are closed.

### **Port services**

#### **5.158**

- 1 **Facilities:** hospital; customs.  
**Supplies:** fresh water; fresh provisions.  
**Communications:** by sea with Europe, India and Sri Lanka ports; rail; airport near Mangalore, 130 km NW.

### **Small craft**

#### **5.159**

- 1 Small craft with local knowledge can anchor NW of Talayi, a village situated 1½ miles SE of Nilot Point (11°44'N, 75°30'E), vessels using this anchorage must pass S of Talayi Rock (11°43'N, 75°30'E).

## **Cannanore**

*Chart 1564*

### **General information**

#### **5.160**

- 1 **Position.** Cannanore (11°51'N, 75°23'E) is a military cantonment with an open roadstead port located in Moplah Bay 9 miles NW of Tellicherry, Vasco da Gama landed here in 1598.
- 2 **Topography.** The old town of Cannanore which lies N of Moplah Bay is almost hidden by coconut trees.  
**Function.** Principal exports are black pepper, sandalwood, coconuts, salt fish, timber, coir yarn and fibre; chief imports are rice, paddy, grains, sugar, piece goods and metals.
- 3 **Port limits.** The limits are defined by lines drawn in a reported direction of 270°, to depths of 16.5 m, from the boundary pillar (11°50'5N, 75°24'0E) and from another pillar situated in the vicinity of Cannanore Lighthouse (11°52'N, 75°21'E) (5.149).
- 4 **Port authority.** The port is administered by a Port Conservator who is responsible to the Port Officer at Calicut.

### **Tidal levels**

#### **5.161**

- 1 See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 1.0 and 0.4 m.

### **Harbour information**

#### **5.162**

- 1 **General.** There are no berths or docks.  
During the SW monsoon vessels may only work cargo when weather conditions permit.
- 2 **Landmarks:** see 5.149.  
**Useful mark.** The flagstaff on Fort Saint Angelo Tower (24 m in height) (11°51'0N, 75°22'5E). The fort is an old Portuguese fort standing on a low rocky point at the S end of the town.
- 3 **Signals.** Communication with shipping is from the above flagstaff.  
**Storm signals** are displayed from the same flagstaff, the brief system is used. See 1.47.

### **Anchorage**

#### **5.163**

- 1 Anchorage, with good holding ground, can be obtained about 1¾ miles SSW of Fort Saint Angelo in depths of about 9 m; as shown on the chart.

### **Landing**

#### **5.164**

- 1 Landing can be effected in a small bight ENE of Fort Saint Angelo at the N end of Moplah Bay; ships' boats should use the beach fronting the Port and Customs office, thus avoiding the rocks awash in the E part of the bay.
- 2 In fine weather the steps on the E side of the rocky point close E of Fort Saint Angelo may be used.  
When the SW monsoon blows strongly a heavy swell makes landing impracticable.

### **Port services**

#### **5.165**

- 1 **Facilities:** hospital; closed cargo shed.  
**Supplies:** fresh provisions; water, of doubtful quality and in small quantities.  
**Communications:** by sea with India and Sri Lanka ports; rail.

### **Small craft**

#### **5.166**

- 1 Small craft may anchor in the inner part of Moplah Bay (5.160). A buoy (red, conical), moored 3 cables SSE of the point on which Fort Saint Angelo stands, marks the approach to the anchorage; it is in position from October to May.
- 2 The Port is closed to sailing vessels from the beginning of June until the end of August.

## **Coastal towns and anchorages**

### **Mahe**

#### **5.167**

- 1 **General information.** Mahe, formerly a French settlement, lies on the S side of the entrance to Mahe River (11°42'N, 75°32'E). Some old forts and houses stand on the detached hills behind the town.  
The population is estimated to be about 39 000 in 2004.
- 2 **Function.** Exports are coconuts, pepper and dried figs. All descriptions of small commodities are imported.  
**Directions.** The harbour, which is considered good for small vessels with local knowledge, is approached between rocks extending offshore from both sides of the river entrance to the 4 m depth contour.
- 3 During the dry season, November to March, the channel leading into the river lies close to the rocks on the S side of the entrance and has a depth of 0.6 m; the sea does not break over these rocks.

The bar is considered dangerous except when the sea is very smooth.

- 4 **Anchorage:** can be obtained about 2½ miles offshore in a depth of 9 m, mud, WSW of Mahe Lighthouse (5.152) which stands on the S point of the river entrance.

**Kallāyi**, a small local trading port, with a customs house, lies close upstream of a bridge spanning Mahe River about 2½ cables from its entrance.

- 5 **Communication:** rail.

### Azhikkal

#### 5.168

- 1 **General information.** The town of Azhikkal (11°57'N, 75°18'E) lies on the S bank of Valapattanam River about 1 mile within its entrance, it is not visible from seaward.

**Function.** Timber for export is floated down the river from the forests of Coorg and Mysore.

- 2 **Port limits.** Boundary pillars, defining the N and S limits of the port, stand on the coast 1¼ miles NW and 7 cables SE of the river mouth; the W limit is about 7 miles seaward of the coast as shown on the chart.

**Port authority.** The port is administered by a Deputy Conservator.

- 3 **Pilots.** Local unlicensed pilots are available.

**Storm signals** are displayed near Azhikkal Lighthouse (5.152), the brief system is used. See 1.47.

**Useful marks.** The entrance to Valapattanam River is marked on its N side by a clump of casuarina trees, and at its S entrance point by Azhikkal Lighthouse.

- 4 **Directions.** Vessels approaching the port should give the dangerous wreck lying close N of the N port limit, 4¾ miles WNW of Azhikkal Lighthouse, a wide berth.

The channel over the bar at the entrance to Valapattanam River has a shallow depth which is subject to seasonal change, there are numerous shoal patches near the river mouth and passage across the bar should not be attempted without a local pilot.

- 5 Close within the entrance, Talipparamba River joins from the N, the confluence of the two rivers forms a sandy bar with a least depth of 1.8 m.

- 6 **Anchorage** may be obtained about 2½ miles WSW of the entrance to Valapattanam River in depths of 9 m, sand and mud; as shown on the chart.

**Lighter berth.** A wharf, 42.7 m long, is available for cargo operations.

- 7 **Facilities:** hospital; local divers.

**Supplies:** limited quantities of fresh water; fuel and provisions.

### Mount Dilli

#### 5.169

- 1 Anchorage with moderate shelter from NW winds may be obtained, with the summit of Mount Dilli (12°02'N, 75°12'E) (5.151) bearing 330° distant 2½ miles, in depths of 7 m, mud; as shown on the chart.

- 2 Small vessels may find convenient shelter, during the NW winds which prevail from February to May, off the mouth of the creek lying SE of Mount Dilli in depths of about 4 m; a slight S-going set will be found here and often a short confused sea.

- 3 **Caution.** Vessels approaching the anchorages from S should give the dangerous wreck (5.151); lying 4¼ miles SSE of Mount Dilli a wide berth.

### Small craft rivers

#### 5.170

- 1 **Dharmadam River** entrance lies 1¼ miles E of Green Island (11°46'N, 75°27'E), it is known locally as Dharmadam Puzha; the entrance is used by sailing craft to lay up for repairs or for shelter in bad weather.

- 2 **Anjarakandi River** entrance lies about 5 cables NNE of Green Island (11°46'N, 75°27'E), it is obstructed by a sandbank over which the sea always breaks.

- 3 Both rivers, which join N of Dharmadam Island, are navigable only by small craft with local knowledge.

### Other names

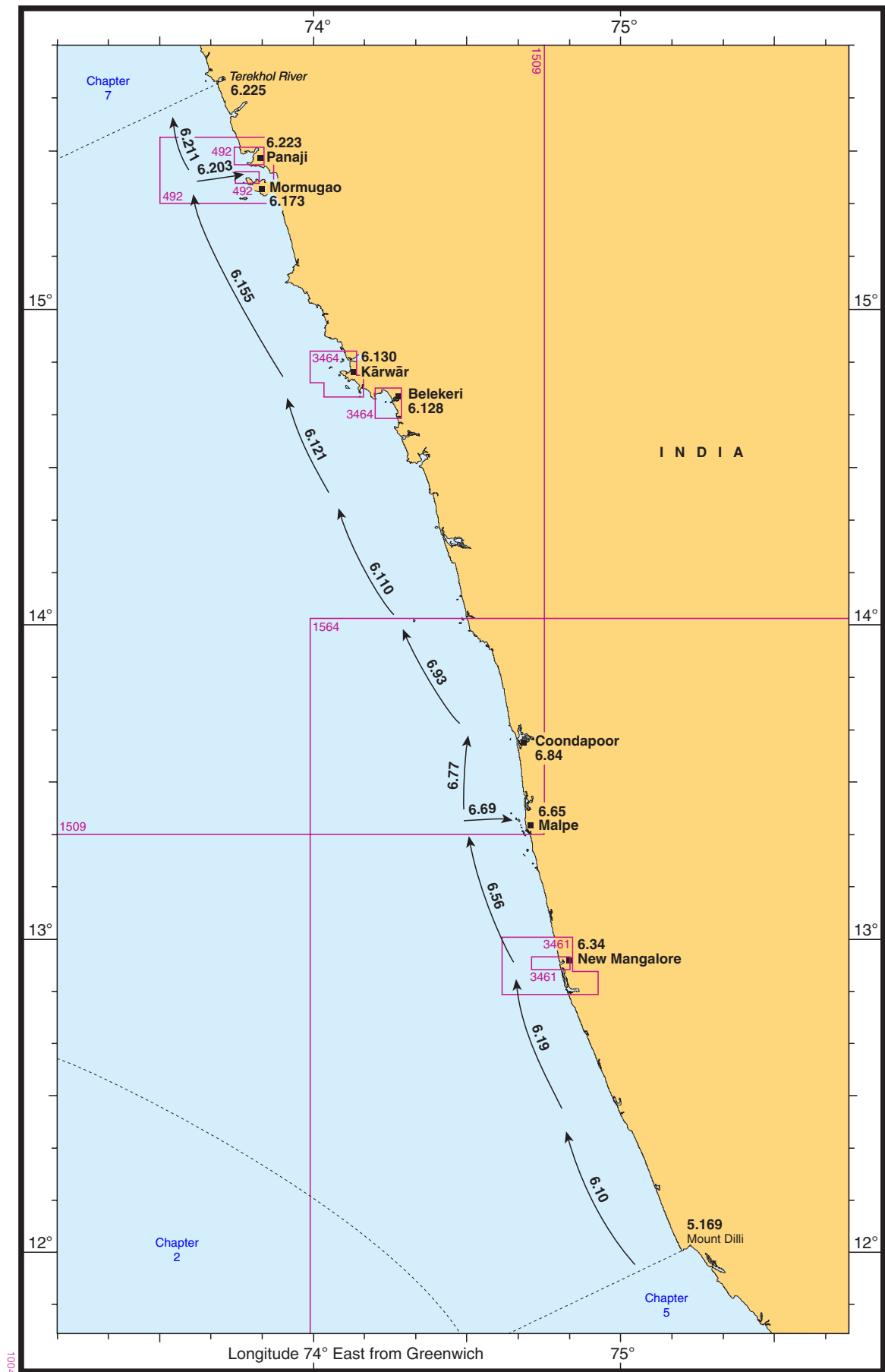
#### 5.171

- 1 Banasuram (Buffaloes Hump) (11°42'N, 75°55'E), a mountain.  
Nādāpuram Mudi (11°44'N, 75°47'E), a mountain.  
Perali Mala (11°54'N, 75°39'E), a mountain.





Chapter 6 - Malabar Coast - Mount Dilli to Terekhol River



## CHAPTER 6

## MALABAR COAST—MOUNT DILLI TO TEREKHOL RIVER

## GENERAL INFORMATION

*Chart 708***Scope of chapter****6.1**

- 1 This chapter describes the Malabar Coast of India and the coast of Goa from Mount Dilli (12°02'N, 75°12'E) to the Terekhol River, 240 miles NNW. The ports of New Mangalore (6.34), Kārwār (6.130), Mormugao (6.173) and the minor harbours and anchorages on the coast are also described.

**Topography****6.2**

- 1 The Western Ghāts lie almost parallel to the coast between 15 and 30 miles inland; the N part of this range is a clearly defined watershed with few passes or prominent heights, the central part is intersected by deep valleys with forest clad spurs and in the S, a broken laterite plateau slopes gradually W from the Ghāts to the coast; the plain at its base is strewn with boulders and miniature ranges of hills.
- 2 The coast mainly consists of sandy bays separated by bold rocky capes and it is often bordered by tableland. There are a number of rivers mostly having their sources in the Western Ghāts; these rivers, although raging torrents forming backwaters near the coast during the SW monsoon, become mere shallow streams in the dry season.

**Navigational lights****6.3**

- 1 This stretch of coast is normally well lit, having numerous lights with ranges of 15 miles or more.
- Lights may be found to be extinguished in parts of India, in particular on N part of the Malabar Coast. For details, see *Admiralty List of Lights and Fog Signals Volume F*.

**Off-lying dangers****6.4**

- 1 ODAS buoys may be encountered well seaward of this coastline; a minimum berth of 1 mile is requested and vessels should not anchor nor trawl within 500 m.

**6.5**

- 1 Details of tidal streams may be found in the relevant sections of the chapter.

**Currents****6.6**

- 1 The currents are of monsoonal origin, but tend to follow the trend of the coast. In December and January, sets are NW with rates up to 1 kn. In July and August when the SW Monsoon is well established, SE sets with rates up to 2 kn are experienced. Exceptionally, onshore sets up to 1.5 kn are experienced during the NE Monsoon and up to 3 kn during the SW Monsoon.

**Climate and weather****6.7**

- 1 For climate and weather see 1.178.

**Submarine exercise areas****6.8**

- 1 Submarine exercise areas are centred 65 and 45 miles W and 30 miles SW of Mormugao Head (15°24'N, 73°48'E), a good lookout should be maintained when passing through these areas. See 1.8.

**Navigational control****6.9**

- 1 For the regulations which control navigation in the territorial waters of India see 1.39.

## MOUNT DILLI TO NEW MANGALORE

## MOUNT DILLI TO KĀSARAGOD

**General information***Chart 1564***Topography****6.10**

- 1 The coastline presents a fringe of coconut palms broken here and there by the mouth of a river or a prominent headland. Kavvāyi Backwater, lying close within the coast, extends from a position abreast the NW slopes of Mount Dilli NNW for about 11 miles to the confluence of Ariakaduva and Nīleswaram Rivers.

**Depths****6.11**

- 1 Seaward of the 30 m depth contour there are no charted dangers.

**Currents****6.12**

- 1 See 6.6.

**Principal marks****6.13**

- 1 **Landmarks:**

Wreck (12°02'N, 75°11'E), which stranded in 1979.  
Chimney (12°29'N, 74°59'E), 46 m in height.

- 2 **Major lights:**

Kotte Kunnu Light (12°00'N, 75°12'E) (5.149).  
Kāsaragod Light (white 8-sided concrete tower, black bands, 30 m in height) (12°30'N, 74°58'E).

**Passage directions***(continued from 5.152)***6.14**

- 1 From a position SW of Mount Dilli (12°02'N, 75°12'E) the route leads about 34 miles NNW to a position WSW of Kāsaragod; for this route the chart is sufficient guide.

**Useful marks****6.15**

- 1 Hosdrug Fort (12°19'N, 75°06'E).  
Manjampadi (12°20'N, 75°07'E), a bare hill.  
Bekal Fort (12°24'N, 75°02'E), an old fort with a tall central bastion.  
(*Directions continue at 6.25*)

**Coastal villages and anchorages**

Chart 1564

**Bekal****6.16**

- 1 **General information.** Bekal (12°23'N, 75°02'E), a small open anchorage for local craft, is formed by a rocky promontory which may be identified by a rest house situated at its foot.

**Kāsaragod****6.17**

- 1 **General information.** Kāsaragod (12°30'N, 74°59'E), a large village situated on the N side of the entrance to Chandragiri River (6.18).  
2 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 1.0 and 0.4 m.  
3 **Port limits.** Two posts, each 6 m in height and surmounted by a white ball are erected periodically near the mouth of Chandragiri River, they serve to mark the N and S limits of the port. The posts are removed during the SW monsoon.  
4 **Anchorage** may be found 1¾ miles offshore in a depth of about 9 m, mud, as shown on the chart.  
**Storm warnings** are received at the port but no signals are hoisted.  
5 **Communications:** national railway system.

**Minor rivers****6.18**

- 1 **Thurti Pane** (12°12'N, 75°07'E), the entrance to the Ariakaduva and Nīleswaram Rivers, is only used by local craft.  
**Chandragiri River** passes S of the village of Kāsaragod and enters the sea between the two hill forts at Chandragiri (12°28'N, 75°00'E) and Kāsaragod 1½ miles NNW. The river bar dries and is very changeable; it can only be crossed by local craft at high water.

**KĀSARAGOD TO NEW MANGALORE****General information**

Chart 1564

**Route****6.19**

- 1 From a position WSW of Kāsaragod (12°30'N, 74°59'E) the route leads about 29 miles NNW to a position WSW of New Mangalore.

**Topography****6.20**

- 1 The coastline presents a fringe of coconut palms broken here and there by the mouth of a river or a prominent headland; offshore, numerous isolated rocks lie within 5 cables of the coast.

**Depths****6.21**

- 1 Seaward of the 30 m depth contour there are no charted dangers.

**Currents****6.22**

- 1 See 6.6.

**Principal marks****6.23**

- 1 **Landmarks:**  
Pasavadigumpa Mala (12°40'N, 75°01'E), a sloping mountain with a flattish summit.  
Radio tower (12°47'N, 74°52'E).  
Konaje Kallu (13°05'N, 75°03'E).  
For landmarks at Mangalore see 6.30 and for those at New Mangalore see 6.50.  
2 **Major lights:**  
Kāsaragod Light (12°30'N, 74°58'E) (6.13).  
Airfield light (elevation 114 m) (12°58'N, 74°53'E), is exhibited occasionally from the control tower.  
Suratkal Point Light (13°00'N, 74°47'E) (6.60).  
Kāp Light (13°13'N, 74°44'E) (6.60).

**Other aid to navigation****6.24**

- 1 Racon (12°55'.7N, 74°49'.5E) at New Mangalore middle leading light No 24 (6.51).  
For details see *Admiralty List of Radio Signals Volume 6(4)*.

**Directions**

(continued from 6.15)

**6.25**

- 1 From a position WSW of Kāsaragod (12°30'N, 74°59'E) the route leads about 29 miles NNW to a position WSW of New Mangalore, passing (with positions from Manjeshvar (12°42'.7N 74°53'.2E) (6.55)):  
Clear of a wreck with a swept depth of 13 m (13½ miles S). Thence:  
2 WSW of a dangerous wreck (7 miles NNW) and 2 other dangerous wrecks lying in the approach to Mangalore (6.31), thence:  
Clear of a dangerous wreck (9½ miles WNW), thence:  
To a position WSW of New Mangalore Fairway Light-buoy (14½ miles NW).

**Useful marks****6.26**

- 1 Tower (12°31'N, 74°59'E), at Kāsaragod.  
Kumbala Fort (12°36'N, 74°57'E).  
Mudipina Padavu (12°48'N, 74°57'E).

- 2 Mangalore Light (white round masonry tower, black bands, 11 m in height) (12°51'N, 74°50'E); the tower is attached to a house and resembles a small chapel.  
(*Directions continue for coastal passage at 6.62*)  
(*Directions for New Mangalore are given at 6.51*)

## Mangalore

*Chart 3461 plan of Approaches to New Mangalore and Mangalore Harbour*

### General information

#### 6.27

- 1 **Position.** Mangalore (12°51'N, 74°50'E) is situated on the E bank of the Gulpūr River, 5 miles S of New Mangalore (6.34).  
**Function.** The port is an open roadstead port of declining importance following the opening of New Mangalore.
- 2 The principal industries are tile making, hand weaving and coffee curing.  
In 2004, the population is estimated to be about 422 400.
- 3 **Topography.** The town is almost concealed from seaward by the dense casuarina plantation growing on the spit forming the W bank of the Gulpūr River; however, a number of conspicuous marks are visible from the offing. The hills behind the town are undulating and separated from each other by valleys. The surf off the coast on each side of the harbour entrance breaks about 100 m from the beach in fine weather, extending up to 400 m in squally weather and during the SW monsoon.
- 4 **Approach and entry.** The harbour is approached from WNW and entered between two low sandy spits.  
**Traffic.** The port is used mainly by fishing and sailing vessels but continues to handle a limited number of cargo vessels; in 2003, 4 international vessels with a total dwt of 61 638 used the port.
- 5 **Port authority** is exercised by the Port Officer Mangalore 575 001.

### Limiting conditions

#### 6.28

- 1 **Depths.** There is a least charted depth of 2 m in the channel over the bar, but depths of 1.5 m or less lie close on each side. Within the harbour, depths are subject to constant change and much of the backwater dries.  
The Port Officer should be consulted for the latest information on depths.
- 2 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 1.2 and 0.6 m.
- 3 **Density of water** is about 1.022/3 g/cm<sup>3</sup>, except in September when, following the monsoon it is about 1.016 g/cm<sup>3</sup>.  
**Local weather.** The SW monsoon makes the bar impassable.
- 4 **Visibility.** Haze settles over the land after sunrise, even in the fine season the coast usually remains indistinct until mid-day, making it difficult to discern objects otherwise conspicuous.

### Arrival information

#### 6.29

- 1 **Port operations.** The port is closed from June to August inclusive.

**Notice of ETA required.** See the details at New Mangalore (6.45). At least 48 hours notice of ETA is required.

- 2 **Pilotage.** Pilotage is compulsory for all vessels over 100 grt entering the inner harbour; night pilotage is not available. For details see *Admiralty List of Radio Signals Volume 6(4)*.

**Requirement for local knowledge.** Local knowledge is necessary for vessels using the harbour boat channels between the entrance and the wharves.

## Harbour

### 6.30

- 1 **General layout.** The inner harbour lies within the backwater formed by the confluence of the Gulpūr and Netrāvati Rivers.  
The harbour entrance, about 2 cables wide, lies between low sandy spits and is fronted by a bar which undergoes change every year during the monsoon.
- 2 **Signal station.** A signal station, located close S of Mangalore Lighthouse (12°50'·8N, 74°50'·3E) (6.26), communicates with vessels in the offing.  
**Storm signals** are displayed from the signal station; the general system is used. See 1.45.
- Natural conditions.** For details see climatic table 1.214.
- 3 **Landmarks:**  
White building (12°50'·1N, 74°50'·0E), the tallest of a group of buildings forming part of a boat building yard.  
Flagstaff (12°50'·8N, 74°50'·3E), known locally as the Port Officer's Flagstaff.
- 4 Roman Catholic Cathedral (12°51'·3N, 74°50'·2E), its dome is surmounted by a spire.  
Building (12°52'·2N, 74°50'·7E).  
Chimney (12°52'·3N, 74°49'·9E).
- 5 Tower (12°52'·4N, 74°50'·7E), standing on Saint Aloysius College.  
Radio tower (12°53'·4N, 74°50'·3E).  
North boundary pillar (12°53'·6N, 74°48'·9E).

## Directions

### 6.31

- 1 **Approach.** From a position WNW of the harbour entrance the route leads ESE, passing (with positions from Mangalore Lighthouse (12°50'·8N, 74°50'·3E)):  
Clear of a dangerous wreck (2½ miles WSW), thence:  
Clear of a dangerous wreck (1¾ miles WSW), marked close N by a buoy (green, spherical).  
Thence:
- 2 NNE of a buoy (black and white chequers, spherical) (1¼ mile WSW) which marks the bar from September to May. Thence:  
Follow the channel across the bar to the harbour entrance.
- 3 **Harbour channels.** There are 2 backwater channels which are dredged to maintain boat traffic between the wharves and vessels at anchor:
- 4 Gulpūr Channel, a narrow channel with a least depth of 2.1 m and marked by 2 buoys, leads from the harbour entrance to the wharves NNW of the Port Office (12°50'·8N, 74°50'·3E).
- 5 Netrāvati Channel, which has a least depth of 1.2 m and is marked by a buoy, leads from the harbour entrance to the railway bridge which spans the river about 1½ miles upstream.  
Both channels are only navigable by small boats with local knowledge.



**6 Useful marks:**

- Church (12°51'6N, 74°51'3E), twin towers.  
 Old lighthouse (12°52'3N, 74°50'7E).  
 Building (12°53'3N, 74°51'1E), yellow with a red roof.  
 White cross (12°53'8N, 74°49'9E).

**Anchorage****6.32**

- 1 Anchorage may be obtained with Mangalore Lighthouse bearing about 073° distant 2 miles in a depth of 9 m, mud; as shown on the chart.
- 2 Vessels anchoring should keep well clear of the dangerous wrecks (6.31) lying S of the anchorage, and the shoal water of the bar.

**Port Services****6.33**

- 1 **Repairs:** minor repairs can be effected. There is a small dry dock: length 33.5 m; width 9.1 m; depth on sill at MHWS 2.44 m.
- 2 **Facilities:** hospital; lighterage between anchorage and wharves.  
**Supplies:** fresh provisions; fresh water by barge, 48 hours notice is required. Fuel oils are not available.
- 3 **Communications:** weekly by sea with Mumbai (Bombay), except during the SW monsoon; airport at Bajpe, 13 km NNE; rail.

**NEW MANGALORE****General information**

*Chart 3461 plan of New Mangalore*

**Position****6.34**

- 1 New Mangalore (12°56'N, 74°49'E) is a large port situated within a bay on an otherwise straight stretch of coastline.

**Function****6.35**

- 1 New Mangalore is all weather port developed to complement the limited facilities which exist in the neighbouring port of Mangalore, 5 miles S, and to serve an adjacent fertilizer factory. The principal exports include manganese ore, chrome ore, iron ore, granite, machinery, coffee, ethanol and phenol; main imports are petroleum products, fertilisers, steel pipes, steel scrap, liquid ammonia, phosphoric acid, machinery, edible oil, wood pulp and coal.

**Topography****6.36**

- 1 The coast each side of the port is straight, low and sandy with a fringe of coconut and other palms. The surf off the coast on each side of the harbour entrance breaks about 100 m from the beach in fine weather, extending up to 400 m in squally weather and during the SW monsoon.

**Piracy****6.37**

- 1 Recent incidents of piracy and armed robbery at New Mangalore have been reported by vessels. For possible preventative measures see 1.56.

**Port limits****6.38**

- 1 The port limits are shown on the chart (plan of Approaches to New Mangalore and Mangalore Harbour).

**Approach and entry****6.39**

- 1 The port is approached through a buoyed channel and entered between breakwaters.

**Aids to navigation****6.40**

- 1 **Cautions.** Certain aids to navigation are reported to be unreliable and may be missing, unlit or out of position. The mariner should navigate with due caution.

**Traffic****6.41**

- 1 In 2003 the port was used by 852 vessels with a total dwt of 33 832 703.

**Port authority****6.42**

- 1 The port is under the direct control of the Union Government, it is administered by the New Mangalore Port Trust, Panambur, Mangalore 575010, South India.

**Development****6.43**

- 1 Construction of a power station was in progress (1996); two coal handling terminals, each with a jetty, are to be built in the port to supply the power station.

**Limiting conditions****6.44**

- 1 **Controlling Depth.** Within the breakwaters there is a maintained depth of 14 m in the approach to the iron ore berth.

**Deepest and longest berths.** No 10 Berth (Oil Jetty) is the deepest; the Iron Ore Berth (No 8 Berth) is the longest, see 6.53.

**Tidal levels,** see 6.28 for details at the nearest port.

- 2 **Density of water** is normally about 1.025 g/cm<sup>3</sup> but during the SW monsoon may fall to 1.010 g/cm<sup>3</sup>.

**Maximum size of vessel handled** is 147 468 dwt, length 274 m.

**Visibility.** Haze settles over the land after sunrise, even in the fine season the coast usually remains indistinct until mid-day, making it difficult to discern objects otherwise conspicuous.

**Arrival information****6.45**

- 1 **Vessel traffic service.** A VTMS is in operation, see *Admiralty List of Radio Signals Volume 6(4)* for details

- 2 **Port operations.** The port is an all weather port which is normally open throughout the year.

**Port radio.** There is a port radio service at the port, for details see *Admiralty List of Radio Signals Volume 6(4)*.

- 3 **Notice of ETA required.** Five days and 48 hours notice of ETA is required.

**Anchorage.** Vessels awaiting a pilot may obtain anchorage 1.1 miles N of the Fairway Light-buoy (6.51), in a depth of about 16 m; as shown on the chart. ODAS SW4 Light-buoy (special) lies 1½ miles NNW of the anchorage, see 6.4.

- 4 **Pilots.** Pilotage is compulsory for vessels of over 200 gt and is available by day and night. For vessels with a maximum draught up to 10 m the pilot will board 1¼ miles ENE of the Fairway Light-buoy, and for vessels with a draught in excess of 10 m the pilot will board 2½ cables NW of the light-buoy. For details see *Admiralty List of Radio Signals Volume 6(4)*.

- 5 **Tugs** are available.

## Harbour

## General layout

## 6.46

- 1 The harbour is protected by breakwaters that project about 3½ cables from the shore on each side of the entrance.

The main berthing areas are a berthing basin in the NE, a deep water berth in the SE, and oil berths and 2 berths under construction in the S arm of the bay.

- 2 There is a turning basin situated in the middle of the harbour.

## Depths

## 6.47

- 1 Within the harbour there is a maintained depth of 15.1 m leading from the entrance to the turning circle and thence to the oil berths. The depth ESE to the iron ore berth is 14 m, and in the NE basin is 9.7 to 11.0 m as shown on the chart

It has been reported (1995) that considerable silting, as a result of the SW monsoon, may occur.

## Signals

## 6.48

- 1 **Port control.** There is a signal station standing on the N side of the harbour entrance.

**Storm signals** are displayed from the above signal station; the general system is used. See 1.45.

## Natural conditions

## 6.49

- 1 For details see climatic table for Mangalore 1.214.

## Principal marks

## 6.50

- 1 **Landmarks:**

Water tower (12°55′.0N, 74°48′.7E).  
Signal station (12°55′.8N, 74°48′.5E).  
Fertilizer tower (12°56′.1N, 74°49′.4E).  
Water tower (12°56′.3N, 74°49′.4E).  
Water tower (12°56′.6N, 74°49′.2E).

## Directions

## 6.51

- 1 The port is approached by a channel 4 miles long and and 1¼ cables wide; it has a maintained depth of 15.4 m and is marked by light-buoys (lateral).
- 2 The channel is entered at the Fairway Light-buoy (safe water) (12°54′.8N, 74°44′.5E) and passes (with positions from the Fairway Light-buoy):
- 3 N of a stranded wreck (1½ miles E), the position of which is approximate, marked by a light-buoy (starboard hand) ½ cable NW, thence:  
N of several shoal patches with a least depth of 7.5 m (2 miles E), thence:  
N of a dangerous wreck (2¾ miles E).

- 4 **Leading lights:**

Front light (white square concrete tower, elevation 17 m) (12°55′.7N, 74°49′.3E).

Middle light-beacon (24 m in height, racon) (375 m E of front light).

Rear light (red square concrete tower, white bands, elevation 27 m) (640 m E of front light).

- 5 The alignment (079°) of these lights leads through the entrance channel, between the unlit breakwaters and towards the head of the harbour in the dredged area.

## Useful marks

## 6.52

- 1 Oil tank (12°55′.3N, 74°48′.6E).  
Lattice radio tower (12°56′.0N, 74°49′.2E).
- 2 Pillars. There are several pillars to aid fixing, turning or berthing which stand in the vicinity of the harbour, as shown on the chart.

## Berths

## 6.53

- 1 The positions of berths and their approximate depths alongside are shown on the chart. The principal berths are described below (positioned from the front leading light (12°55′.7N, 74°49′.3E)):

**Fertiliser berth.** Berth No 1 (1 cable NW).

- 2 **Multi purpose.** Berths Nos 2, 3 and 5 (3 cables NNW).

**Container berths.** Berths Nos 5, 6 and 7 (3 cables NW), each berth is about 190 m long.

**Caution.** Works are in progress S of Berth 7 (2004) and are expected to be completed by 2005.

- 3 **Iron ore berth.** Berth No 8 (2½ cables SW), about 290 m long with a depth of 14 m alongside for vessels up



Leading Lights

Iron Ore Berth from WNW (6.53)  
(Original dated 1999)

to 60 000 dwt. The berth is exposed to swell during the SW monsoon.

- 4 **Oil jetties** Berth No 9 (7½ cables WSW), can accommodate oil and LPG tankers up to 30 000 dwt and 183 m in length; Berth No 10, 1½ cables farther S, is for crude oil tankers up to 100 000 dwt and LOA 275 m.

Two mooring buoys (7 cables SW) are moored in the S arm of the harbour.

### Port services

#### 6.54

- 1 **Repairs:** general running repairs can be effected.

**Facilities:** hospital; water barge.

**Supplies:** fresh water; fuel oil; provisions.

### Other harbours

#### Chart 1564

#### 6.55

- 1 **Kumbbla** (12°36'N, 74°56'E), a village lying at the mouth of the Shiriya River has a small harbour for local craft; the river estuary is subject to change annually during the SW monsoon. The village is connected with the railway system.
- 2 **Manjeshvar** (12°42'·7N 74°53'·2E) is a small customs port which, except for local vessels, is barely used.

## NEW MANGALORE TO BHATKAL

### NEW MANGALORE TO MALPE

Saint Mary Isles Light (white square masonry tower, elevation 28 m) (13°21'N, 74°41'E), stands on the summit of North Island.

### General information

#### Chart 1564

#### Route

#### 6.56

- 1 From a position WSW of New Mangalore (12°56'N, 74°49'E) the route leads about 30 miles NNW to a position W of Malpe.

### Topography

#### 6.57

- 1 The coastline is almost straight and fringed with coconut trees. Inland, Kudremukh (13°08'N, 75°15'E) the highest peak on this stretch of coast dominates the background; another mountain, Valkunji 1039 m high and shaped like a buffalo's hump, stands 16 miles NW.

### Depths

#### 6.58

- 1 Seaward of the 30 m depth contour there are no charted dangers.

### Currents

#### 6.59

- 1 See 6.6.

### Principal marks

#### 6.60

- 1 **Landmarks:**  
Konaje Kallu (13°05'N, 75°03'E).  
Water tower (13°21'N, 74°42'E).  
For landmarks at Malpe see 6.68.
- 2 **Major lights:**  
Airfield light (12°58'N, 74°53'E) (6.23).  
Suratkal Point Light (white square masonry tower, red bands, 36 m in height) (13°00'N, 74°47'E).
- 3 Kāp Light (white masonry tower, black bands, 27 m in height) (13°13'N, 74°44'E), stands on a rock near the shore; the ruins of Kāp Battery stand nearby on the coast.

### Other aid to navigation

#### 6.61

- 1 Racon (12°55'·7N, 74°49'·5E) at New Mangalore middle leading light No 24 (6.51).

For details see *Admiralty List of Radio Signals Volume 2*.

### Directions

(continued from 6.26)

#### 6.62

- 1 **Cautions:**

In addition to the dangers described below, vessels should pass well clear of the many dangerous wrecks, whose positions are shown on the chart, lying between the 5 m and 30 m depth contours from New Mangalore to Malpe.

- 2 At night vessels in the vicinity of Mūlki Rocks, see below, should keep in depths not less than 25 m.

Vessels in the vicinity of Outer Rocks or Black Rocks, see below, should keep in depths not less than about 15 m by day or 22 m by night.

#### 6.63

- 1 From a position WSW of New Mangalore (12°56'N, 74°49'E) the route leads about 30 miles NNW to a position W of Malpe, passing (with positions from Kāp Lighthouse (13°13'N, 74°44'E)):

WSW of a rock (13½ miles SSE), with other rocks lying 1½ miles N and 8 cables S. Thence:

WSW of a shoal patch (2½ miles SW), thence:

- 2 Clear of Mūlki Rocks (4 miles WSW), a group of above and below-water black basalt rocks, 12 m in height. Thence:

WSW of Kāp Rock (1½ miles NW), 12 m in height, and the rocky shoal extending ¼ miles SW of it. Thence:

- 3 WSW of Outer Rocks (3½ miles NW); Black Rocks, a group of 4 above water rocks, the highest 12 m in height, lie 1 mile NNE. Thence:

WSW of Saint Mary Isles (6.65) (8 miles NNW), thence:

- 4 WSW of Coconut Island (10 miles NNW). The island, 25 m in height, is mostly covered with trees and it



is surrounded by foul ground extending about 7 cables WNW to a rock which dries. Thence: To a position W of Malpe (8 miles NNW) (6.65).

### Useful mark

#### 6.64

- 1 Kunjar Gudde (13°16'N, 74°47'E).  
(*Directions continue at 6.82*)

## Malpe

Chart 1564 (see 1.14)

### General information

#### 6.65

- 1 **Position.** Malpe (13°21'N, 74°42'E) stands on the N bank of the Udiyāvara River close within its entrance.  
**Function.** The port is an open roadstead port used for the export of silica sand and bricks; chief imports are salt, bentonite lumps, soda ash and cement.
- 2 **Topography.** Malpe is fronted by the Saint Mary Isles (Darya Bahādurgarh Islands) which lie in a semicircle N and S of the approach to the port. The coastline is low and sandy with a fringe of coconut trees; its hinterland is well populated and backed by a number of low hills.
- 3 **Port limits.** The port limits, seaward of Saint Mary Isles, extend about 2¾ miles W from South Island (6.69) and Middle Rock (6.69) to the 12·8 m depth contour; E of the Isles, the limits converge from South Island and Middle Rock towards the port.  
**Approach and entry.** The port is approached between North Island (6.69) and Entrance Rock (6.69) and entered between the breakwaters which boarder the Udiyāvara River estuary.
- 4 **Port authority** is exercised by the Deputy Port Conservator, Port Office, Malpe 576 118.

### Limiting conditions

#### 6.66

- 1 **Depths.** The entrance, which is liable to constant change, had a least charted depth (1996) of 3·4 m between the breakwaters, and 2·6 m in parts of the berthing basin.  
It was reported in 1994 that the entrance channel has a maintained depth of about 4·5 m.
- 2 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 1·1 and 0·3 m.

### Arrival information

#### 6.67

- 1 **Pilots and tugs.** The services of a licensed pilot can be obtained from Coondapoor 17 miles N, for details see 6.86. Unlicensed pilots are available to take sailing vessels in and out at HW.  
Tugs are available from Coondapoor.

### Harbour

#### 6.68

- 1 **General layout.** The small inner harbour lies close within the breakwaters on the N bank of the Udiyāvara River estuary. The harbour and its entrance are afforded some protection from W winds by Saint Mary Isles.
- 2 **Storm signals** are displayed from the signal station flagstaff (38 m in height) (13°21'N, 74°42'E), the brief system is used. See 1.47.

- 3 **Landmarks** (positioned from the N breakwater light (13°21'·0N, 74°41'·5E)):
  - White house (7 cables ESE).
  - Ice plant (6 cables ESE).
  - Building (6 cables E).

### Directions

#### 6.69

- 1 **Caution.** Passage between the Saint Mary Isles, except as described above, is obstructed by numerous rocks and should not be attempted without local knowledge of the channels.
- 2 **Approach from seaward.** From a position W of the port the route leads E, passing (with positions from the N breakwater light (13°21'·0N, 74°41'·5E)):
  - 3 Clear of a dangerous wreck (4 miles WSW), thence: N of North Island (5 cables SW) with several rocks standing on a rocky ledge extending 1½ cables NW, there is a rock 8 m high near the end of the ledge; a rock with a depth of 3·3 m over it lies ¾ cable WNW of the ledge. And:
    - 4 S of Entrance Rock (6½ cables NW). A ridge of below and above water rocks extends about 4 cables N from Entrance Rock to Middle Rock; foul ground lies up to 2½ cables NW and W of the ridge. Thence the route leads ESE to the breakwaters passing:
      - 5 SSW of a rock which dries 0·3 m (5½ cables NW), thence:
        - SSW of Adjakal Rock (7 cables NNW), a rock with a depth of 0·3 m over which the sea often breaks. A number of below-water rocks lie between Adjakal Rock and Coconut Island 1¼ miles NW. Thence:
          - 6 To a position between the breakwater heads from which lights are exhibited from September to May inclusive.
          - 7 **Small craft channel.** There is a channel, about 2 cables wide, leading from a position S of the port to the entrance; it passes between the S part of Saint Mary Isles and a dangerous wreck lying near a rock 2 cables SSE of South Island (13°20'·0N, 74°41'·5E), and the drying sandspit extending W from the S bank of Udiyāvara River about 5 cables NE. In 1988 there was a least charted depth of 2·7 m in the channel lying about 2 cables NE of Darya Bahādurgarh Island (13°20'N, 74°41'E).
    - 8 **Useful marks:**
      - North boundary pillar (white, 4 m in height) (13°21'N, 74°42'E).
      - Darya Bahādurgarh Island Fort (ruin) (13°20'N, 74°41'E).

### Udiyāvara River

#### 6.70

- 1 Udiyāvara River (13°20'·5N, 74°42'·5E) is navigable only by small boats, there is a bar with a depth of about 0·7 m close upstream of Malpe and the channel, which is sparsely marked, is liable to constant change in depth. Local knowledge is required.

### Anchorage

#### 6.71

- 1 Anchorage can be obtained about 1½ miles WNW of North Island Lighthouse as shown on the chart.  
Small vessels may anchor about 4 cables WNW of the N breakwater light; or about 5 cables E of the summit of South Island. Both anchorages are in a depth of 6 m, sand and mud.



- 2 Small craft can anchor with shelter from W winds, in depths of 3 to 4 m, sand and mud, in the channel E of North Island and Darya Bahādurgarh Island.

### Basin and berths

#### 6.72

- 1 A small craft basin is situated close SE of the N breakwater.

A landing jetty 33 m long, with a depth of about 3.7 m alongside, lies 1 cable SE of the basin. There is another jetty nearby with a depth of 1.8 m alongside.

### Landing places

#### 6.73

- 1 Landing is not generally possible on the seaward side of Saint Mary Isles but can be effected, in moderate weather, on the E sides of North Island or Darya Bahādurgarh Island; it is also possible on the mainland coast in the lee of the islands. Elsewhere on the open coast landing is only possible in calm weather.

### Port services

#### 6.74

- 1 **Repairs:** small slipway; minor repairs.  
**Facilities:** hospital; cargo lighters.  
**Supplies:** fuel and fresh water are not available.

### Landing place

#### 6.75

- 1 Landing can generally be effected in the lee of a ledge of rocks which extend about 5 cables NW from Kāp Lighthouse (13°13'N, 74°44'E).

### Other names

#### 6.76

- 1 Mülki (13°05'N, 74°47'E), a town.  
 Mülki River (13°05'N, 74°47'E).

## MALPE TO COONDAPOOR

### General information

*Chart 1564*

### Route

#### 6.77

- 1 From a position W of Malpe (13°21'N, 74°42'E) the route leads about 17 miles N to a position W of Coondapoor.

### Topography

#### 6.78

- 1 The coastline is flat, straight and sandy, it presents a fringe of coconut trees broken only by the mouths of rivers; the hinterland consists of low hills. The Western Ghāts extend roughly parallel with the coast about 20 miles inland.

### Depths

#### 6.79

- 1 Seaward of the 20 m depth contour there are no charted dangers.

### Currents

#### 6.80

- 1 See 6.6.

### Principal marks

#### 6.81

##### 1 Landmarks:

Chimney (42 m in height) (13°39'N, 74°40'E).

##### 2 Major lights:

Suratkal Point Light (13°00'N, 74°47'E) (6.60).

Kāp Light (13°13'N, 74°44'E) (6.60).

Saint Mary Isles Light (13°21'N, 74°41'E) (6.60).

Bhatkal Light (13°58'N, 74°32'E) (6.97).

### Directions

(continued from 6.64)

#### 6.82

- 1 From a position W of Malpe (13°21'N, 74°42'E) the route leads about 17 miles N to a position W of Coondapoor, passing (with positions from the village of Kota (13°31'N, 74°42'E)):

W of a rock (8 miles SSW), with a chain of above and below-water rocks extending 3½ miles NNE.

Thence:

- 2 Clear of the dangerous wreck (8¾ miles NW).

### Useful marks

#### 6.83

- 1 Coondapoor Light (metal mast, 12 m in height) (13°37'N, 74°40'E), on the S side of the river mouth. It is difficult to distinguish this light from other white lights nearby.

Chimney (grey, 40 m in height) (13°38'N, 74°41'E), stands 1 mile E of the harbour entrance.

- 2 Tippu Sultan Gudda Light (6-sided column on a round hut, 9 m in height) (13°40'N, 74°40'E).

Both lights above are exhibited from mid-September to mid-May.

(Directions continue at 6.98)

### Coondapoor

*Chart 1564 (see 1.14)*

### General information

#### 6.84

- 1 **Position.** The town of Coondapoor (13°38'N, 74°41'E) lies, close SE of the harbour entrance, at the confluence of Hālādi and Chakra Rivers. Gangoli (13°39'N, 74°40'E), a small town, lies on the N side of the entrance.

**Function.** The port is an open roadstead port used for the export of manganese and iron ores, timber, tiles and dried fish; chief imports are salt, kerosene, lubricating oil and consumer goods.

- 2 **Topography.** The coastline is low, sandy and fringed with coconut trees.

**Approach and entry.** The port is approached from WSW and entered between two low lying spits of land which form the estuary of the Hālādi and Chakra Rivers.

- 3 **Traffic.** In 2003 the port was used one with a dwt of 43 469.

**Port authority** is exercised by the Port Officer, Gangoli Post, Kundapura 576.

### Limiting conditions

#### 6.85

- 1 **Depths.** The bar across the entrance to Coondapoor is continually changing; in 1999 there was a charted depth of 1.6 m in the entrance.

- 2 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 1.2 and 0.4 m.

**Arrival information****6.86**

- 1 **Port operations.** The port is closed between 16th May and 14th September.

**Outer anchorage.** Vessels of deep draught anchor as far as 5 miles from the harbour entrance, see also 6.89.

**Pilot and tugs.** The Port Officer is a licensed pilot. Small tugs are available.

**Harbour****6.87**

- 1 **General layout.** The small berthing area lies about 3 cables NE of the harbour entrance.

**Storm signals** are displayed from a mast standing close N of the harbour entrance, the brief system is used. See 1.47.

**Directions****6.88**

- 1 **Caution.** Gangoli Shoals, an area of foul ground and numerous other rocky patches, charted and uncharted, with depths from 3.2 to 10 m over them, lie in the outer approaches to the port seaward of the 5 m depth contour. The inner approaches to the port, between W and the coastline N, are encumbered by numerous rocks both drying and above water; these dangers extend up to 2 miles from the coast. Mariners should exercise utmost caution when navigating in the area.
- 2 **Outer anchorages.** Vessels should approach the anchorages from S keeping well clear of the dangerous wrecks (6.82), that lie in the port approaches, as shown on the chart.
- 3 **Inner harbour.** With W winds the surf breaks continuously over the bar and it is advisable to enter only with the aid of the local pilot; inside the bar there are depths of 6.4 to 8.3 m. A channel, about 1¼ cables wide, leads NNE from the harbour entrance to the berth; E of the channel the entire area dries at low water.

**Anchorage****6.89**

- 1 Anchorage can be obtained about 4 miles WSW and 11 miles SSW of the harbour entrance, as shown on the chart.
- 2 Small vessels and sailing craft can anchor in the fairly deep water, within the harbour entrance, E of the town of Gangoli (13°39'N, 74°40'E).

**Berth****6.90**

- 1 There is a stone wharf, situated 3 cables NE of the harbour entrance, with a depth of about 1.8 m alongside.

**Port services****6.91**

- 1 **Facility:** hospital.
- Supplies:** provisions, in small quantities. Fuel and water are not available.

**Coastal port**

*Chart 1564*

**Hangarkatta****6.92**

- 1 **General information.** Hangarkatta (13°26'N, 74°42'E) stands at the mouth of the Sita River.

**Function.** The port has a substantial trade in rice and paddy.

**Port limits** are defined by N and S boundary pillars.

**Dangers in approach.** There are several rocks lying between the coast S, and a position 1¾ miles W, of the harbour entrance.

- 2 **Directions.** There is a clear approach to the port from NW. The bar is very shallow and local knowledge is required before a crossing is made.

**Port authority** is exercised by the Port Officer Coondapoor 12 miles N (6.84).

**COONDAPOOR TO BHATKAL****General information**

*Charts 1564, 1509*

**Route****6.93**

- 1 From a position W of Coondapoor (13°38'N, 74°41'E) the route leads 20 miles NNW to a position W of Bhatkal.

**Topography****6.94**

- 1 The coastline from Coondapoor to Baidūr, 14 miles N, is straight, low and sandy. North of Baidūr the coast, though generally low, sandy and fringed with coconut palms, is rocky in places with bold headlands and much broken by the estuaries of numerous rivers. Several rocks, above and below-water, lie close offshore. A narrow strip of flat country, up to 15 miles wide, lies between the coast and a range of low flat-topped hills; the latter are traversed here and there by the densely wooded and rugged spurs of the Western Ghāts which converge towards the coast N of Coondapoor.

**Depths****6.95**

- 1 Seaward of the 30 m depth contour there are no charted dangers.

**Currents****6.96**

- 1 See 6.6.

**Principal marks****6.97****Landmarks:**

- 1 Chimney (13°39'N, 74°40'E) (6.81).  
Kodachātri (13°51'N, 74°52'E), an impressive isolated sugar-loaf peak which, is conspicuous from S; however, when bearing more than 090° it is obscured by Male Gudda a prominent mountain standing 9 miles W.
- 2 Huddi Point (13°57'N, 74°33'E), is a cliffy promontory rising to 52 m about 5 cables inland; a small rounded hill, 35 m high, stands at the end of the point. A tower stands 3 cables NNW of Huddi Point.

**Major light:**

- 3 Bhatkal Light (white square masonry tower, red bands, 14 m in height) (13°58'N, 74°32'E) stands on the ruined site of Bhatkal Fort situated on a rocky point on the N side of Bhatkal River mouth. An auxiliary light is exhibited from a metal mast, 2 m in height, located below the main light. These lights are obscured by Shirali (Hog) Island (14°01'N, 74°29'E) on bearings between 129° and 132°.

**Directions***(continued from 6.83)***6.98**

- 1 **Caution.** Although the area inside the dangers described below has been examined, further dangers may exist. Vessels should therefore keep outside of the charted dangers and it is recommended they keep in depths of more than 20 m throughout this stretch of coast.

**6.99**

- 1 From a position W of Coondapoor (13°38'N, 74°41'E) the route leads about 25 miles NNW to a position W of Bhatkal, passing (with positions from Baindūr Head (13°52'N, 74°36'E)):
- 2 WSW of an area of foul ground (11 miles S), consisting of above and below-water rocks, extending 3½ miles SSE to Coondapoor Harbour entrance and up to 2 miles offshore in places. Thence:
- 3 WSW of Nancowry Rock (5 miles SW) which consists of two adjacent rocky shoals with another rocky patch lying 3 miles ESE, an above water rock stands near the W end of the latter patch. Thence:
- 4 WSW of Two White Rocks (4 miles WNW); these two rocks standing close together are very prominent when the sun is on them. There are other rocks awash and several shoals in this vicinity. Thence:
- 5 WSW of a dangerous wreck (6½ miles WNW), the position of which is approximate, thence:  
WSW of Single White Rock (5½ miles NW), thence:  
Clear of a dangerous wreck (12 miles WNW).

**Useful marks****6.100**

- 1 Madalbarē Gudda (1027 m high) (13°54'N, 74°43'E).  
Yademale Gudda (13°59'N, 74°40'E).  
Baindūr Head (13°52'N, 74°36'E) is the W point of a tableland that extends some distance inland.  
*(Directions continue at 6.115)*

**Other name****6.101**

- 1 Yedamavina River (13°48'N, 74°38'E).

**Bhatkal***Charts 1509, 1564 (see 1.14)***General information****6.102**

- 1 **Position.** Bhatkal (13°59'N, 74°33'E), a small town port, lies within the entrance to Bhatkal River.  
**Function.** Chief exports are timber, firewood and tiles; imports include grain, pulses, salt, onions, hardware, kerosene and vegetable oils.
- 2 **Topography.** Cliffs, up to 60 m high, extend 1½ miles S of the port; N of the port the coast is low and sandy.  
**Approach and entry.** The port is approached from W and entered via the river.
- 3 **Traffic.** Local vessels use the port regularly.  
**Port authority** is exercised by the Assistant Port Conservator, Bhatkal.

**Limiting conditions****6.103**

- 1 The channel over the bar is very narrow and shallow; it is dangerous for ships' boats to attempt a crossing.

**Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 1.0 and 0.4 m.

**Pilotage****6.104**

- 1 There are no local pilots, but if required a pilot can be arranged from Honāvar (6.118).

**Harbour information****6.105**

- 1 **Depths.** The Assistant Port Conservator should be consulted for the latest information of depths over the bar and in the port.
- 2 **Storm signals** are displayed from a flagstaff, 56 m in height, standing close E Bhatkal Lighthouse (13°58'N, 74°32'E); the brief system is used. See 1.47.

**Directions****6.106**

- 1 **Caution.** When closing the port vessels should not proceed in depths of less than 20 m unless local knowledge is available, for dangers, in addition to those described below, lie in or near the approaches.
- 2 **Approach from SW.** From a position SW of the port the route leads NE then E to a position SW of the mouth of the river, passing (with positions from Bhatkal Light (13°58'N, 74°32'E)):
- 3 NW of a rocky shoal (1 mile SW), thence:  
S of a shoal (7 cables W), thence:  
To the inner anchorage.
- 4 **Approach from NW.** From a position NW of the port keep the summit of Shirāli Island (14°01'N, 74°29'E) (6.116) bearing 006° or more and alter course for the anchorage when Bhatkal Lighthouse bears 090°, passing (with positions from the lighthouse):
- 5 S of a shoal (3 miles WNW), thence:  
S of a shoal (2 miles W), thence:  
As for the SW approach to the inner anchorage.

**Anchorage and berth****6.107**

- 1 **Small vessels** can anchor about 2½ cables SSW of Bhatkal Lighthouse in a depth of 8 m, sand and shell, as shown on the chart; the bottom here shelves sharply.  
**Larger vessels** may anchor about 1 mile WSW of Bhatkal Lighthouse, in a depth of about 10 m, mud and rock.
- 2 **Berth.** There is a small craft quay in the port.

**Port services****6.108**

- 1 **Supplies:** fresh provisions and meat. Fuel oils and water are not available.

**Other harbour***Chart 1564***6.109**

- 1 **Baindūr** (13°51'N, 74°38'E) is a small port used by local craft, it is situated on the E side of the entrance to Baindūr River.  
**Port authority** is exercised by the Port Officer Coondapoor 14 miles S (6.84).



## BHATKAL TO KĀRWĀR

## BHATKAL TO TADRI

## General information

Chart 1509

## Route

## 6.110

- 1 From a position W of Bhatkal (13°59'N, 74°33'E) the route leads 32 miles NNW to a position WSW of Tadri.

## Topography

## 6.111

- 1 The coast is low and sandy with some rocky points, it is broken only by the estuaries of a number of rivers and a 2 mile long ridge situated 15 miles NNW of Bhatkal; the ridge, which attains an elevation of about 150 m, is covered with brushwood contrasts strongly with the sandy beach, the cliffs at its base are 46 m high and prominent. Inland, spurs of the Western Ghāts sweep to within a few miles of the coast.

## Depths

## 6.112

- 1 Seaward of Netrani Island (14°01'N, 74°20'E) and the 30 m depth contour there are no charted dangers.

## Currents

## 6.113

- 1 The currents have a seasonal variation related to the monsoon. From February to September the most frequent set is SE with the greatest constancy during June to August; during October currents are variable in direction, but from November to January the most common set is NW. The rates of the currents are mostly less than 1 kn, but rates of about 2 kn occur at times, mainly during July, August and December. Exceptionally the current has a significant onshore component.

## Principal marks

## 6.114

## 1 Landmarks:

Two chimneys (14°15'·5N, 74°26'·3E).  
Lattice mast (14°16'·5N, 74°26'·5E).  
Monument (14°17'N, 74°27'E) standing on a hill.  
Kalti Gudda (14°22'N, 74°33'E), the highest peak of a small mountain range orientated WSW/ENE.  
Parvat Gudi (Danson Peak) (14°32'N, 74°28'E).

## 2 Offshore mark:

Basavarajadurg Island (14°19'N, 74°24'E), which is covered with trees and brushwood; it is the site of an ancient ruined fort which was formerly a stronghold of the Kings of the Carnatic.

## 3 Major lights:

Bhatkal Light (13°58'N, 74°32'E) (6.97).  
Oyster Rocks Light (14°49'N, 74°04'E) (6.125).

## Directions

(continued from 6.100)

## 6.115

- 1 **Caution.** Vessels in the vicinity of Shirāli Island and the coastal reef which extends seaward up to 2 miles in places, lying between Bhatkal and a position 6½ miles NNW, should not enter into depths of less than 20 m.

## 6.116

- 1 From a position W of Bhatkal (13°59'N, 74°33'E) the route leads 32 miles NNW to a position WSW of Tadri,

passing (with positions from the isolated peak of Kāsaragode (14°13'·5N, 74°26'·7E)):

- 2 WSW of Shirāli Island (Hog Island) (13 miles S), which is surrounded by rocks, some of which dry. Kerekund, a rocky islet also surrounded with above and below-water rocks, stands 7½ cables NNE of Shirāli Island. And:
- 3 Clear of Netrani Island (Pigeon Island) (14 miles SSW), which is wooded with a prominent flat topped summit; except for an above water rock lying off its S end and a rocky shoal close off the E side, the island is steep-to. Thence:
- 4 WSW of a dangerous wreck (11 miles S), thence: WSW of Dart Rock (8½ miles S); Hawkins Reef, Murdeshvar and Hādīmādi Islands lie, respectively, 1¼ miles NE, 2 miles E and 1¼ miles ESE of the rock. This area is backed by the village of Māvalli. Thence:
- 5 WSW of Indravati Patch (6 miles NNW), thence: WSW of Snail Rock (13½ miles NNW), which resembles a snail when seen from N; a rock awash lies 5 cables N of it. Thence:  
To a position WSW of Tadri.

## Useful marks

## 6.117

- 1 Radio tower (13°59'·5N, 74°33'·1E).  
Hudel Gudda (14°05'N, 74°36'E), which is easily identified by its long flat summit.  
Nisāna Gudda (14°08'N, 74°31'E), with a saddle-shaped summit, is connected at its lower levels to a long sharp ridge that extends about 2 miles inland; it is very prominent from S.
- 2 Honāvar Lighthouse (mast, 15 m in height) (14°16'·5N, 74°26'·6E), it is obscured by trees when bearing less than 035°; the light is exhibited from mid-September to mid-June.  
Haravalli (14°17'N, 74°34'E), an isolated peak.
- 3 Rāmangundi (14°21'·5N, 74°24'·8E), a rocky headland with two summits, when seen from the W it is saddle-shaped and prominent; it is reported to show up well on clear nights.  
Banbikauguda (14°24'N, 74°26'E) a wedge-shaped reddish hill.
- 4 Kumta Point Lighthouse (white round hut, 4 m in height) (14°25'N, 74°23'E), it is obscured by high land when bearing more than 160°; the light is exhibited from mid-September to mid-June.  
Devate Gudda (Pagoda Hill) (14°28'N, 74°23'E) stands close to the coast, the temple on its summit is prominent from N.
- 5 Tadri Lighthouse (black and white stone tower, elevation 38 m) (14°31'N, 74°21'E), stands on the NW entrance point of Aghnāshini River; the light is exhibited from mid-September to mid-June.  
Koli Gudda (14°33'N, 74°25'E) is dome-shaped and prominent from W.

(Directions continue at 6.126)

## Coastal ports

Chart 1509 (see 1.14)

## Honāvar

## 6.118

- 1 **General information.** The town of Honāvar (14°16'·5N, 74°26'·6E) stands on the N side of the Sharāvati River about 1 mile SE of its entrance.



**Function.** As an open roadstead port Honāvar enjoys some importance with a considerable export of iron ore, timber, tiles and betel nuts.

- 2 **Traffic.** The port is used regularly by local vessels during the fine season.

**Pilotage.** A licensed pilot is available.

**Storm signals** are displayed from a flagstaff standing near the S end of the town and from Kāsarkod, 2 miles S; at both places the brief system is used. See 1.47.

**Landmarks:** see 6.114.

- 3 **Directions.** The anchorage is approached direct from seaward.

The bar across the river mouth is constantly changing so that no reliable directions can be given; at low water there are heavy breakers, but at high water small craft with local knowledge can enter.

- 4 **Useful marks:**

Honāvar Lighthouse (14°16'5N, 74°26'6E) (6.117); another light (round hut on white metal tower) stands 1½ cables SW. Both lights are exhibited from mid-September to mid-June.

- 5 **Anchorage.** Good anchorage may be found 1½ miles offshore in a depth of about 9 m, mud and fine sand, as shown on the chart.

**Supplies:** provisions in small quantities; limited fresh water for which there are no delivery arrangements. Fuels are not available.

## Tadri

### 6.119

- 1 **General information.** Tadri (14°31'N, 74°21'E), a town and minor port lies on the N bank of the Aghnāshini River, about 1 mile within its entrance.

**Largest vessel.** A vessel of 5000 dwt has used the roadstead port.

- 2 **Storm signals** are received at the port, but they are not displayed.

**Directions.** The anchorage is approached direct from seaward with two beacons, standing well up on a hill 1½ miles E of Tadri Light (14°31'N, 74°21'E) (6.117), bearing about 070°.

- 3 **Useful marks** (positioned from Tadri Light):

Rajaman Fort (1¼ miles ESE), in ruins, standing at the SE entrance point of the river.

Flagstaff (elevation 33 m) 6 cables NE.

Gull Rock (2 m in height) (4 cables NE).

Kudle Hill (135 m high) (6½ cables NW).

Temple (1¾ miles WNW).

- 4 **Anchorage** may be obtained about 1½ miles SW of Tadri Light, in a depth of 8 m, mud; as shown on the chart.

**Dangers.** Local knowledge is required before entering the port, the following dangers exist:

Foul ground extends 2½ cables S from Tadri Light.

The river bar is subject to constant silting.

- 5 **Berths.** There is a wharf and T-shaped pier suitable for small craft situated 1 mile NE of Tadri Light.

**Aghnāshini River** (Tadri River) is navigable, by small boats with local knowledge, to Kagal a distance of 12 miles upstream.

**Supplies:** fresh fish and vegetables.

**Facilities:** nil.

## Anchorage and river

### 6.120

- 1 **Netrani Island** (14°01'N, 74°20'E); anchorage in a depth of 27 m, mud, with some shelter from NW winds might be found off the SE side of the island.

**Venkatāpur River** (14°02'N, 74°30'E) is shallow and can only be used by boats with local knowledge.

- 2 **Basavarajadurg Island** (14°19'N, 74°24'E); small craft may anchor, with shelter from NW winds, between the island and the coast in about 5 m. Local knowledge is required.

- 3 **Kumta Point** (14°25'N, 74°23'E) lies at the N entrance to a creek with the town of Kumta situated about 1½ miles inland. Small craft may anchor, with some shelter from NW winds, S of Kumta Point in depths of about 6 m. Kumta is the chief commercial town of North Kanara; local vessels call frequently.

## TADRI TO KĀRWĀR

### General information

*Charts 3464, 1509*

### Route

#### 6.121

- 1 From a position WSW of Tadri (14°31'N, 74°21'E) the route leads 24 miles NNW to a position WSW of Kārwār.

### Topography

#### 6.122

- 1 The coast is formed by a number of bays and creeks interspaced by rocky headlands and broken by river estuaries, many of the bays have sandy beaches fringed with palms or backed by cliffs; inland, there are several small hills with higher mountains in the farther distance. Kandani Halla, a low valley lying 13 miles NNW of Tadri, extends for several miles NE from Belekeri Creek (14°43'N, 74°16'E) and contrasts strongly with the high land flanking it.

### Depths

#### 6.123

- 1 Seaward of the 20 m depth contour there are no charted dangers.

### Currents

#### 6.124

- 1 See 6.113.

### Principal marks

#### 6.125

- 1 **Landmarks:**

Tulsi Gudda (14°42'N, 74°21'E), a mountain with a black peak.

Conical Hill (14°43'N, 74°20'E), is named from its appearance.

- 2 Guddadevara Betta (Aversa Hills) (14°44'N, 74°17'E), a hill with twin peaks.

Guddehali Betta (14°47'N, 74°10'E) appears, with an adjacent summit, as a saddle-back shaped hill when seen from S.

For landmarks at Belekeri see 6.128; and for those at Kārwār see 6.145.

- 3 **Major light:**

Oyster Rocks Light (red round masonry tower, white bands and cupola, 19 m in height) (14°49'N, 74°04'E), stands on the summit of Devgadgudda Island.

### Directions

*(continued from 6.117)*

#### 6.126

- 1 From a position WSW of Tadri (14°31'N, 74°21'E) the route leads 24 miles NNW to a position WSW of Kārwār,

passing (with positions from Kukra Island Light (14°43'N, 74°14'E)):

- WSW of a promontory (12 miles SSE), with above water rocks lying 6 and 8 cables ESE and 3 cables N of it. Thence:
  - 2 WSW of Kusuldiva Gudda (5 miles SSE), a table-topped hill standing on a promontory, with foul ground extending about 1 mile from the coast SE and NE of it. An islet, height 2 m, lies 4 cables NNE. Thence:
  - 3 WSW of Button Rock (5½ miles W), a small black rock 16 m in height; with another rock lying 1 mile NE. Arge Island, 47 m in height and wooded, lies 9 cables NNE of Button Rock. Thence:
  - 4 WSW of Anjadip Island (8 miles WNW). A flagstaff stands near the NW end of the island with a church 1 cable ENE of it; there are forts standing near the centre and at the SE end of the island, both are in ruins. The island is cliffy with coconut trees near its N end. Thence:
  - 5 WSW of Mogeragudda Island (Elephant Island) (10 miles WNW), a rocky island covered with jungle; with a shoal patches extending 4 cables SSW and Gudsar Sunv (Kārwār Rock) lying 6 cables WNW. Thence:
- To a position SW of Oyster Rocks (12½ miles WNW).

### Useful marks

#### 6.127

- 1 Moti Gudda (Achuvi) (14°37'N, 74°30'E), a hill with a sugar loaf-shaped summit.  
Hulikkal Gudda (14°37'N, 74°22'E) has a well-defined isolated summit.  
Belekeri Hill (14°45'N, 74°15'E) lies at the SW end of a mountain range which rises from the NW side of Kandani Halla (6.122).
  - 2 Dauglish Peak (14°47'N, 74°18'E) is the highest summit in the above range.  
Golikodlu Peak (14°48'N, 74°13'E) can be identified by its sharp peak.
- (Directions continue for coastal passage at 6.164)  
(Directions for Kārwār are given at 6.146)

### Coastal port

Charts 3464 plan of Belekeri Anchorage, 1509

#### Belekeri

##### 6.128

- 1 **Position.** Belekeri (14°42'N, 74°16'E) lies at the head of Belekeri Bay on a promontory extending W from the S side of Belekeri Creek.  
**Function.** The port is an open roadstead port from which iron ore is shipped in substantial quantities. Shipping operations are however suspended during the SW monsoon.
- 2 **Port authority** is exercised by a Port Conservator.  
**Maximum size of vessel.** The largest vessel to have used the port was 23 678 grt.  
**Pilotage** is available on application to the Port Officer at Kārwār, 10 miles NW.
- 3 **Signal station.** There is a signal station situated 4½ cables ESE of Belekeri Point.  
**Storm signals** are received at the port, but they are not displayed.

### Landmark:

Kukra Island (14°42'5N, 74°14'4E), a wooded island with a tower standing near its N point. A drying rock lies close SE of the island.

### Useful marks:

Kukra Light (white tower with black bands) is exhibited from mid-September to mid-May from the S part of Kukra Island.  
Belekeri Point (14°42'4N, 74°15'5E) is low flat and rocky with a large prominent bungalow standing among trees. The point is surrounded by a number of islands, and has foul ground and rocks awash extending 9 cables S and 7 cables W.

### Anchorage:

Belekeri Roads lie between Kusuldiva Gudda (14°38'N, 74°16'E) (6.126) and Kwada Point (6½ miles NW); vessels at anchor load iron ore from lighters in the N part of the roads.

- 6 Anchorage for medium draught vessels may be obtained with Kukra Island Light bearing about 080° distant 2½ miles in depths of 11 m, mud; shallower draught vessels can anchor with the light bearing 055° distant 2 miles in depths of 10 m, mud, as shown on the chart.

- 7 **Caution.** Within the 5 m depth contour there are numerous shoal patches, rocks and areas of foul ground; a 4.1 m shoal patch lies 6 cables SW of Kukra Island.

**Berth.** There is a quay, for lighters loading iron ore, in Belekeri Creek.

**Supplies:** provisions; water by barge from Kārwār. Bunkers are not available.

### Other names

#### 6.129

- 1 Gangāvali River (14°36'N, 74°18'E).  
Gokarn (14°33'N, 74°19'E), a town with several large temples.  
Mudhulla Point (14°53'N, 74°06'E).

### KĀRWĀR

### General information

Charts 3464 plan of Kārwār Harbour and Approaches, 1509

#### Position

##### 6.130

- 1 Kārwār (14°49'N, 74°08'E), a town which gives its name to the anchorage offshore and to the port of Kārwār, is situated on the SE shores of Kārwār Bay.

#### Function

##### 6.131

- 1 Kārwār comprises an all weather intermediate port with an open roadstead anchorage. The principal exports include iron and manganese ores, granite stone, hydrochloric acid, phosphoric acid and marine products; imports are fertilisers, rock phosphate, industrial salt and timber. The port also has the capacity for transshipment traffic.

#### Topography

##### 6.132

- 1 **Kārwār Peninsula.** The town of Baitkol (Baitkal) lies in a valley situated near the centre of the peninsula forming the S side of Kārwār Bay. The coastline of the SW side of this promontory is indented with numerous bays, most of which have rocky headlands; the salient features of this stretch of coast are described from Kwada Point (14°43'N, 74°12'E) to Kārwār Head 8½ miles NW.

- 2 Kwada Bay lies between Kwada Point and Arge Cape, 3½ miles NW. Golāri Creek (Manzel Creek) enters the NW part of the bay and extends inland to the NE; the valley and the low lying land NW of the creek give Arge Cape and Hebattu Gudda, its highest point at 137 m in height, the appearance of an island.

- 3 Binge Bay, the largest bay on this coast, extends 2½ miles NW from Arge Cape to Binaga Point.

Baitkol Point (14°47'·1N, 74°06'·7E) separates two small sandy bays; an unnamed bay lies SE, and Baitkol Bay lies NW of the point.

Another small bay lies between Machhli Bandar Reef (14°47'·5N, 74°06'·1E) and Kārwar Head.

#### 6.133

- 1 **Kārwar Bay** lies between the peninsula that extends W from the SE head of the bay to Kārwar Head (14°48'N, 74°06'E), and Shimisgudda Island and Kurmagadgudda Island situated 1¼ miles W of the NE head of the bay. Shimisgudda Island is wooded. Kurmagadgudda Island is encircled by fortifications and is wooded; it is surrounded by shoal water but there is a safe narrow channel between the two islands.

#### 6.134

- 1 **Oyster Rocks**, a prominent group of islands and rocks which extend about 5 cables SW and 9 cables E from Oyster Rocks Lighthouse (14°49'N, 74°04'E), should be given a wide berth.

- 2 Devgadgudda Island has Mandālgudda Island 2 cables SW and Karkaigudda Island close E, with East Islet about 3 cables farther E; Devgadgudda and Karkaigudda Islands are covered with jungle, East Islet is a bare rock.

- 3 Karkaigudda Island, on which stands a customs house and several other buildings, is surrounded by foul ground; a detached shoal lies midway between the dangers extending from the E end of this island and East Islet.

- 4 A rock which dries lies 1 cable E of East Islet, during the fine season the sea does not break over this rock at high water. Detached shoals lie ½ cable E and ¾ cable SE of the rock.

### Port limits

#### 6.135

- 1 The port limits are shown on the chart.

### Approach and entry

#### 6.136

- 1 Kārwar Bay is entered between Badchidhar Point (14°48'·3N, 74°05'·6E), the NW point of Kārwar Head, and Dayamada Point, 2¾ miles NNE.

The port is approached through a buoyed channel and entered between the W and E headlands of Baitkol Cove (14°48'N, 74°07'E) (6.151).

### Traffic

#### 6.137

- 1 In 2003 the port was used by 113 vessels with a total dwt of 1 708 456.

### Port authority

#### 6.138

- 1 The port is administered by the Port Officer, Kārwar Port Office, Kārwar 581 301.

The Port Office and Custom House stand near Kārwar Lighthouse (14°48'·2N, 74°07'·4E).

### Development

#### 6.139

- 1 In 2001 it was reported that construction of a major naval base, including shipbuilding and repair facilities, were in progress in Binge Bay (14°46'N, 74°08'E).

There are plans to develop facilities for a deep sea fishing harbour within the Kārwar Port complex.

### Limiting conditions

#### 6.140

- 1 **Controlling depth.** There is a least dredged depth (1986) of 10·1 m in the inner part of the approach channel, the turning area and the approach to Baitkol Cove.

**Deepest and longest berth.** Baitkol Cove No 2 Berth, see 6.151.

- 2 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 1·6 and 0·7 m.

**Maximum size of vessel handled** is length 182 m and draught 8 m.

- 3 **Local weather and sea state.** During the SW monsoon, the wind and sea state, precludes cargo operations in the open roadstead anchorage.

### Arrival information

#### 6.141

- 1 **Port operations.** The port has an all weather capacity located in Baitkol Cove, which is reported to be one of the few safe berthing areas between Cochin and Mumbai.

**Port radio.** There is a port radio service at the port, for details see *Admiralty List of Radio Signals Volume 6(4)*.

- 2 **Notice of ETA.** Forty-eight hours notice of ETA is required, ETA and pratique messages should be sent through Mumbai coast radio stations.

**Outer anchorage.** Vessels awaiting a pilot may obtain anchorage 6½ cables SSE of Oyster Rocks Light (14°49'·2N, 74°03'·7E) (6.125), in a depth of about 12 m, soft mud and sand.

- 3 **Prohibited area.** Entry and fishing are prohibited in Binge Bay (6.150) in an area bordered to seaward by 14°43'·0N and 74°06'·0E, as shown on the chart, see also 6.139.

**Pilotage** is compulsory; it is provided by the Port Officer.

- 4 **Tug.** One tug is available.

### Harbour

### General layout

#### 6.142

- 1 The alongside berthing area consists of a narrow cove facing NE with a turning basin situated close off its entrance.

- 2 The principal anchorage area is located near the middle of Kārwar Bay.

### Depths

#### 6.143

- 1 Within Baitkol Cove there is a dredged area (1986) of 9·1 m abreast the berthing area, thence depths reduce rapidly towards the SW part of the cove which dries.



- 2 The principal anchorage area, N of the approach channel, has depths of between 7 and 9 m over an extensive area.

### Storm signals

#### 6.144

- 1 Storm signals are displayed from a flagstaff standing close NW of Port Kārwar Lighthouse (14°48'·2N, 74°07'·4E); the general system is used. See 1.45.

### Principal marks

#### 6.145

- 1 The following are marks (positioned from Port Kārwar (Koney) Lighthouse (white metal framework tower, red bands, 16 m in height) (14°48'·2N, 74°07'·4E); the light is exhibited during the fine season, September to June):
- 2 Tower exhibiting red lights (1½ miles SE).  
Tanks (5 cables WSW).  
Flagstaff (close NW).  
Tower exhibiting red lights (7 cables NNE).  
Tower (1¼ miles NNE); another tower, exhibiting red lights, standing 1½ cables WNW of it.

### Directions

### General

#### 6.146

- 1 **Cautions:**  
Vessels approaching from N should give Parker Rock (14°51'N, 74°02'E) (6.148) a wide berth.
- 2 Vessels carrying dangerous cargoes should contact the Port Authority for restrictions that apply to their approach.
- 3 A vessel should have no difficulty in approaching or entering Kārwar Bay by day of night, having first made Oyster Rocks Lighthouse (14°49'·2N, 74°03'·7E) (6.125).

### Baitkol Cove

#### 6.147

- 1 Baitkol Cove (14°48'N, 74°07'E) (6.151) is approached by a channel about 2½ miles long and ¾ cable wide; it has dredged depths (1986) of 10·7 m in its outer part, reducing to 10·1 m at its inner end. The inner part of the channel is marked by buoys (lateral).
- 2 Deep draught vessels should approach the channel from a position SW of Oyster Rocks Lighthouse and enter at its W end about 1 mile ESE of the lighthouse, passing N of Gudsar Sunv (14°47'·9N, 74°04'·7W). Thence:
- 3 **Leading beacons:**  
Front beacon (elevation 7 m) (14°48'·6N, 74°07'·6E).  
Rear beacon (elevation 15 m) (180 m E of front beacon).
- 4 The alignment (090½°) of these beacons leads through the channel to a position N of Ambari Sunv (Fisherman's Rock) (14°48'·4N, 74°06'·4E). Thence:
- 5 **Leading beacons:**  
Front beacon (elevation 7 m) (14°48'·4N, 74°07'·6E).  
Rear beacon (elevation 12 m) (100 m ESE of front beacon).
- 6 The alignment (103¼°) of these beacons leads in the channel ESE to the N edge of the turning basin 4 cables NNE of the cove. Thence:

- 7 The dredged channel leads SW to the cove, passing SE of Baitkol Rock (14°48'·3N, 74°06'·8E) which is marked on its NE side by a buoy (black, conical).

### Principal anchorage, approaches

#### 6.148

- 1 The principal (inner) anchorage in Kārwar Bay (14°49'·0N, 74°06'·3E) can be approached direct by vessels of suitable draught passing S or N of Oyster Rocks.
- 2 **South approaches:**  
From SE, between Mogeragudda Island (14°47'·7N, 74°05'·4E) and Kārwar Head (5 cables NE). Or:  
From SW, between Mogeragudda Island and Mandālgudda Island (2 miles NW), passing well clear of Gudsar Sunv (14°47'·9N, 74°04'·7E).
- 3 **North approaches:**  
From NW, vessels should pass clear of Parker Rock (14°51'N, 74°02'E), a shoal, with 4·7 m of water over it, consisting of rock sand and shell, lying 2½ miles NW of Oyster Rocks Lighthouse; this danger is unmarked. A detached patch lies 1 cable E of the rock. Thence:
- 4 Between East Islet (14°49'·1N, 74°04'·3E) and Shimisgudda Island (1½ miles NE) (6.133). An area of foul ground lies 4 cables SSE of the island, for details see 6.150.
- 5 **Clearing bearing.** The W extremity of Anjadip Island (14°45'·2N, 74°06'·6E) in line with the E extremity of Mogeragudda Island (14°47'·7N, 74°05'·4E) bearing 154° clears E, but only by about 1½ cables, the dangers lying E of East Islet. Or:
- 6 From NNW.  
**Caution.** Small vessels approaching from NNW, or leaving the port, and passing between Parker Rock and the coast NE should pass seaward of the following islets and dangers lying close offshore, (positioned from Loliem Point (14°55'N, 74°03'E)):
- 7 WSW of Loliem Rocks (1 mile S), a group of above water rocks with a rock awash 2¼ cables NNE. Thence:
- 8 WSW of Black Rock (2 miles SE) which is fringed with reefs, thence:  
WSW of an unnamed islet 3½ miles SE), thence:  
WSW of Kāngiguda Islet (4 miles SE), a densely wooded islet. Thence:  
WSW of Kāngi Islet (5 miles SE).
- 9 **Clearing bearing.** The SW end of Kurmagadgudda Island (14°50'N, 74°06'E) (6.133) in line with Guddehalli Betta (14°47'N, 74°10'E) (6.125), bearing 131°, clears the dangers just described to the SW. Thence:
- 10 WSW of Shimisgudda Island (14°50'·2N, 74°05'·7E); or, pass through the channel between Shimisgudda Island and Kurmagadgudda Island (3 cables NE).

### Useful marks

#### 6.149

- 1 Kārwar Head (14°48'·2N, 74°05'·6E), a promontory covered with dense jungle.  
Baitkol Gudda (14°48'·0N, 74°06'·4E).  
Banāra Gudda (14°47'·8N, 74°07'·2E).
- 2 Sadashivgarh Hill (14°50'·8N, 74°08'·0E) stands close within the entrance to Kālīnadi Creek, the ruins of an old fort stand on its summit. The ruins of another fort on a hill lie about 3 cables ENE.



## Berths

### Anchorage

#### 6.150

##### 1 Cautions:

An area of foul ground, the site of a wreck, lies in position 14°49'·7N, 74°05'·8E, about 8 cables NNW of Kārwar Bay's principal anchorage.

##### 2 Binge Bay and Anjadip Island (see below) are in a prohibited area (6.141).

A submarine pipeline is laid 2 miles WSW from the unnamed bay lying immediately SE of Baitkol Point (14°47'N, 74°07'E).

##### 3 Outer (14°48'·6N, 74°04'·0E). Pilotage anchorage, for details see 6.141.

##### 4 Inner (14°49'·0N, 74°06'·3E). The principal anchorage, for working cargo, lies in the SE part of Kārwar Bay in a depth of about 7 m, soft mud; as shown on the chart.

##### 5 Binge Bay (14°46'N, 74°08'E). Anchorage, with shelter from NW winds, may be obtained by small vessels in the N part of the bay in depths of about 6 m, soft mud.

##### 6 Anjadip Island (14°45'N, 74°07'E). Off the NW side of this island anchorage may be obtained in depths of 9 m, mud and sand. The island forms a good breakwater and vessels have ridden out the SW monsoon here.

##### 7 Karkaigudda Island (14°49'N, 74°04'E). During the SW monsoon there is anchorage NE of the island with Oyster Rocks Lighthouse bearing 248° distant about 8 cables, in a depth of 10 m, soft mud.

##### 8 Baitkol Cove (14°48'N, 74°07'E). Small vessels, with local knowledge, may anchor near the head of the cove in a depth of 2·7 m.

### Alongside berths

#### 6.151

##### 1 Baitkol Cove (14°48'N, 74°07'E). There is a quay,

355 m long, situated close inside the entrance of the cove on its SE side. The quay provides two general cargo berths with a dredged depth (1986) of 9·1 m alongside; No 1 Berth is 122 m long and No 2 Berth 172 m long.

##### 2 There are wharves in the cove, with depths up to 2·4 m, which will accommodate small vessels.

### Landing place

#### 6.152

##### 1 Landing in small boats can be effected on the E side of Devgadgudda Island in fine weather; it should not be attempted on the W side of the island which is steep-to.

### Port services

#### 6.153

##### 1 Facilities: cargo lighters; hospital.

**Supplies:** limited provisions; fresh water by barge; fuel oil for small craft only.

### Other harbours

#### 6.154

##### 1 There is ample shelter for small craft in Kālīnadi Creek (14°50'·5N, 74°07'·5E) which is situated on the NE side of Kārwar Bay. The entrance to the creek is much encumbered by sandbanks and the channels between which are subject to frequent change. Local knowledge is desirable.

##### 2 About 2½ cables E of Shitta Point (14°50'·3N, 74°07'·6E), the S entrance point of the creek, there is a pier; 1½ cables farther SE there is small jetty from which a ferry crosses the creek to a another jetty located between two beacons on the N bank. The coastline on the S side of the creek is low.

## KĀRWĀR TO TEREKHOL RIVER

### KĀRWĀR TO MORMUGAO HEAD

### General information

*Charts 492, 1509*

#### Route

#### 6.155

##### 1 From a position WSW of Kārwar Head (14°48'·2N, 74°05'·6E) the route leads 44 miles NNW to a position W of Mormugao Head.

### Topography

#### 6.156

##### 1 The coast between Kārwar and Betul, 23 miles NNW, consists of sandy bays fringed with palms and separated by rocky capes which are backed by low hills. From Betul to Cola Bay, 14 miles NNW, the coastline is low, straight and cultivated with several churches standing on small hills. From Cola Bay a large promontory extends WNW to Mormugao Head.

### Depths

#### 6.157

##### 1 Seaward of the 30 m depth contour there are no charted dangers.

### Prohibited anchorage

#### 6.158

##### 1 A prohibited anchorage is established off the W end of Saint George's Islands (15°21'N, 73°46'E), see also 6.195.

### Prohibited areas

#### 6.159

##### 1 Anchoring and trawling are prohibited in the vicinity of underwater obstructions in the following locations (positions from Grāndi Island Light (15°21'·1N, 73°45'·8E): 2½ miles ENE, marked by 5 buoys; 2¾ miles E, marked by 5 buoys; 5 miles SW.

##### 2 The obstructions, which comprise concrete piles and sensors, may extend 0·5 m above the sea bed, and any vessel damaging them could face an immediate hazard.

Submarine cables extend from the obstructions to the shore in the vicinity of Bimbade Point (15°22'·5N 73°48'·5E).

## Currents

### 6.160

- 1 See 6.113.

## Local weather

### 6.161

- 1 During the thick weather of the SW monsoon there are frequent periods when parts of this coast are not visible beyond a distance of 4 or 5 miles.

## Principal marks

### 6.162

- 1 **Landmarks:**  
Velim Church (15°09'N, 73°58'E).  
Building (15°22'N, 73°50'E) (charted as a radar tower on Chart 1509).
- 2 For landmarks at Mormugao see 6.202.
- Major lights:**  
Oyster Rocks Light (14°49'N, 74°04'E) (6.125).  
Mormugao Breakwater North Head Light (15°25'·1N, 73°47'·5E) (6.202).  
Aguada Light (15°30'N, 73°46'E) (6.216).

## Other aid to navigation

### 6.163

- 1 A racon (15°25'N, 73°47'E) transmits from the signal station.  
For details see *Admiralty List of Radio Signals Volume 6(4)*.

## Directions

(continued from 6.127)

### 6.164

- 1 From a position WSW of Kārwār Head (14°48'·2N, 74°05'·6E) (6.149) the route leads 44 miles NNW to a position W of Mormugao Head, passing (with positions from Cape Rāma (15°05'N, 73°55'E)):
- 2 WSW of Parker Rock (16 miles SSE) (6.148), thence: WSW of Loliem Point (12½ miles SE) which is steep, rocky and well wooded. Loliem Rocks lie 1 mile S of the point and several other dangers, lying near the coast, extend SE to Kārwār Bay; for details see 6.148, thence:
- 3 Clear of a dangerous wreck (13 miles S), thence: WSW of a stranded wreck (10 miles SE); the wreck, which stranded in 1955 has since broken in two, lies close offshore about 1 mile S of the entrance to the Talpona River, thence:
- 4 WSW of Pandigat Point (6 miles SE) a steep projecting headland with a village on its N side, thence:
- 5 WSW of Cape Rāma, with a ruined fort standing above Rāma False Bluff about 5 cables E. Cape Rāma point is reported to be radar conspicuous, thence:
- 6 WSW of a stranded wreck (7 miles NNE); the wreck, a barge, is visible at all states of the tide, thence: Well clear of an obstruction (18 miles NW) (6.159), thence:
- 7 WSW of Saint George's Islands (18 miles NNW), a group of three islands of which the two S islands, Grāndi Island, are joined by a narrow reef of rock and shingle, which dries in part; Pikene Island, the third island in the group, lies 1½ miles NE. The

islands are covered with vegetation and surrounded by foul ground with numerous shoal patches and dangers lying within the 10 m depth contour. These off-lying dangers include: Martha Patches lying about 8 cables N of the island, which are mostly covered by the red sector of Grāndi Island Light (15°21'·1N, 73°45'·8E) between bearings 185° to 225°; Saint George's Reef lies 3½ cables off the E point of Grāndi Island and Sail Rock, a pillar of rock which can be mistaken for a sail, stands about 5 cables SSW of the light.

- 8 Thence the route continues NNW, passing (with positions from Grāndi Island Light):

WSW of Saint George's Bank (8 cables WNW), with a least depth of 6·5 m over it, thence:

Clear of a dangerous wreck (3¼ miles WNW), the position of which is approximate, thence:

To a position W of Mormugao Head (4 miles NNE).

## Useful marks

### 6.165

- 1 Barren Hill (15°03'N, 74°03'E) is the W summit of a range of hills extending E.
- Chandreshwar Bhūtnāth Temple (15°13'N, 74°02'E), a temple standing on a hill.
- 2 Grāndi Island Lighthouse (white round concrete tower, black stripes, 16 m in height) (15°21'·1N, 73°45'·8E), stands on the W summit of Grāndi Island.
- 3 Pikene Island summit (15°22'·5N, 73°47'·8E) is round and precipitous with a flat top.  
(Directions continue for coastal passage at 6.218)  
(Directions for Mormugao are given at 6.203)

## Coastal anchorages and landing places

Charts 492 plan of Approaches to Mormugao and Panaji, 1509

### 6.166

- 1 **Rāma Bay** (15°06'N, 73°55'E) is entered between Cape Rāma and Moliem Point, 1½ miles NNE. Anchorage may be obtained about 5 cables NNE of Cape Rāma in a depth of about 11 m, mud.
- 2 This bay is sandy with a landing place in its S part; there is a warm and a cold water spring near the landing place close NE of Cape Rāma Fort.

### 6.167

- 1 **Canaguinim Bay** (15°07'N, 73°56'E) indents the coast between Moliem Point and Canaguinim Point, 1¼ miles NE. Anchorage may be obtained 5 cables NNE of Moliem Point in a depth of about 9 m, mud.
- 2 A concrete jetty projects from the shore about 1 mile ENE of Moliem Point, a prominent flagstaff stands near the root of the jetty.

### 6.168

- 1 **Betul Point** (15°08'N, 73°57'E) is flat and rocky; anchorage can be obtained from 1¼ to 2¼ miles W of the point in depths of about 10 m, mud. The position of the outer anchorage is shown on the chart.

### 6.169

- 1 **Cola Bay** (15°22'N, 73°52'E) affords sheltered anchorage during NW winds in depths of about 7 m, mud.

### 6.170

- 1 **Grāndi Island** (15°21'N, 73°47'E). Anchorage for large vessels, with shelter from NW winds, may be obtained about 4 cables SW of the SE point of the island in a depth of about 18 m, mud. Smaller vessels may anchor 1½ cables ESE of the same point in depths of about 17 m, as shown on the chart.

- 2 Landing can be made on the N side of the island; or on the S coast, near its E end, in a small cove which is fronted by the wreck of a vessel that stranded in 1960 and is now broken in two.

### River

#### 6.171

- 1 **Sāl River** (15°08'N, 73°57'E), with its entrance close N of Betul Point, can only be used by small craft at high water and in fine weather; local knowledge is required. A wharf on the S side of the river entrance is used by lighters to tranship iron ore to vessels lying in Betul Point Anchorage (6.168).

### Other name

#### 6.172

- 1 Kānkon Bay (15°00'N, 74°01'E).

## MORMUGAO HARBOUR AND BAY

### General information

*Chart 492 plans of Mormugao and Approaches to Mormugao and Panaji*

#### Position

##### 6.173

- 1 Mormugao Port (15°25'N, 73°48'E) lies on the NE side of Mormugao Head in the SW part of Mormugao Bay.

#### Function

##### 6.174

- 1 Mormugao is the principal iron ore loading port of India; it provides deep water accommodation, where there is safe anchorage for up to 50 vessels, in the outer and inner anchorages during the fair season; and some sheltered anchorage during the SW monsoon. The port offers a number of alongside berths and mooring buoys for vessels working cargo in the stream.
- 2 In addition to the iron ore trade, the port has facilities for the handling of petroleum products and general cargo. Exports include manganese ore, oil cake, alumina and frozen shrimps; imports include bulk oil, fertiliser, petroleum products, chemicals, machinery, iron and steel.
- 3 In 2004, the population is estimated to be about 422 400.

#### Topography

##### 6.175

- 1 **Mormugao Head** (15°24'N, 73°48'E) consists of a peninsula with steep sides, especially its W side, which rise to a tableland that is connected to the mainland SE by a narrow neck of low ground.

##### 6.176

- 1 **Mormugao Bay—entrance.** Several rocks, wrecks and shoal patches, including Outer Patches (15°28'N, 73°46'E), Albuquerque Rocks, Marivel Patches, Sunchi Reefs, Amee Shoals, marked on its SW edge by a light-buoy (white can), and Mormugao Rocks extend from N to S across much of the entrance to the bay. The details of these dangers are shown on the chart.

##### 6.177

- 1 **Mormugao Bay—south side.** The shore is mostly bold and rocky between Mormugao Head and the mouth of the Zuvāri River, 3½ miles E; it comprises of a number of headlands and bays which dry in places.

Vāsko Bay is entered between the E end of Mormugao Head and Alparqueiros Point, 7½ cables E.

- 2 Vādem Bay is entered E of Alparqueiros Point; there are barge slipways and repair facilities located at the head of the bay.

- 3 Chikālīn Point lies 7½ cables ENE of Vādem Bay. Vereg Islet, lying 7½ cables ESE of Chikālīn Point, is connected to the shore by a causeway; a stranded wreck lies about 5 cables N of the islet.

- 4 Saint Jāsīntu Island (15°24'·3N, 73°51'·8E) is flat-topped, precipitous and covered with dense jungle. The island is the S entrance point of the Zuvāri River.

#### 6.178

- 1 **Mormugao Bay—north side.** The shore comprises alternating stretches of sand and rock backed by low hills, which are covered in jungle, from Nazaret Point (15°25'·7N, 73°51'·7E) to Cābo Rajniwas, the W end of the island of Goa, 4¾ miles WNW.

- 2 Cāncara Point lies 1½ miles NW of Nazaret Point; the shore is fringed with a reef between the two points and there are several isolated rocks lying off Nazaret Point. A stranded wreck, marked close SW by a buoy (white can) lies 9 cables S of Cāncara Point.

- 3 Odshel Point lies 1½ miles WNW of Cāncara Point, between the points a reef extends up to 1¾ cables offshore in places.

Dona Paula Bay lies between Odshel Point and Cankarso Island, 8 cables W. A jetty, with a least depth of 2·4 m alongside, projects E from Cankarso Island into the bay.

- 4 Searle Patch lies at the outer edge of foul ground extending 3½ cables SW from Cankarso Island; Pascoe Rock lies in the foul ground 2 cables SSW of the island.

Cābo Rajniwas has foul ground extending 6 cables W and 9 cables S from it.

### Piracy

#### 6.179

- 1 Recent incidents of piracy and armed robbery at Mormugao have been reported by vessels. For possible preventative measures see 1.56.

### Port limits

#### 6.180

- 1 The seaward limits of the port are shown on the chart. The inshore limit is defined as follows:

East limit, on Zuvāri River, is a line joining Agacaim Point (15°25'·0N, 73°54'·0E) and Cortalin Point (15°24'·5N, 73°54'·0E); a bridge spans the river between the two points.

### Approach and entry

#### 6.181

- 1 Mormugao Bay is entered between Mormugao Point (15°25'N, 73°47'E) and Cābo Rajniwas, 3 miles N. The port, including its inner anchorage, is approached through a buoyed channel which passes close N of Mormugao Head.

### Traffic

#### 6.182

- 1 In 2003 the port was used by 689 vessels with a total dwt of 32 989 191.

### Port authority

#### 6.183

- 1 The port is administered by the Mormugao Port Trust, Mormugao Harbour, Goa 403803.



**Development****6.184**

- 1 In 1996 it was reported that a development project had started to construct an outer harbour consisting of a number of breakwater berths, detached breakwater berths and LPG mooring berths.

**Limiting conditions****Controlling depths****6.185**

- 1 The buoyed approach channel, which leads to the berthing areas and the inner anchorage, has a maintained depth of 14.4 m, but less water was reported in 2002. The maintained depth in the turning circles off the berths is 13.1 m. The port authority apply an under-keel clearance of 1.2 m and a swell allowance of 0.5 m.
- 2 It was reported (1997) that the maximum draught for vessels berthing at and sailing from Berths No 10 and 11 is 11 m in conjunction with the tide.

**Deepest and longest berths****6.186**

- 1 The deepest berth is No 9 Berth, the longest berth is No 11 Berth.

**Tidal levels****6.187**

- 1 See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 1.7 and 0.8 m.

**Density of water****6.188**

- 1 The density of water is normally about 1.025 g/cm<sup>3</sup>, however it is slightly fresher during the monsoon season.

**Maximum size of vessels handled****6.189**

- 1 Vessels up to 70 000 dwt and 12 m draught can be berthed alongside; and vessels up to 275 000 dwt can be handled in mid-stream. The largest vessel handled was 299 000 dwt.

**Local weather and sea state****6.190**

- 1 From about the middle of February until the end of March occasional strong NE winds cause a heavy swell in the bay; these winds usually last from three days to one week, they fall light from sunset to sunrise.
- 2 It was reported in 1991 that heavy swell conditions, associated with the SW monsoon, often close the port to shipping and can significantly reduce the limiting draught of vessels using the port.

**Arrival information****Vessel Traffic Service****6.191**

- 1 A VTMS controls traffic in the approaches to Mormugao, see *Admiralty List of Radio Signals Volume 6(4)* for details.

**Port radio****6.192**

- 1 There is a port radio station at Mormugao; see *Admiralty List of Radio Signals Volume 6(4)* for details.

**Notice of ETA required****6.193**

- 1 At least 24 hours notice of ETA is required.

**Outer anchorages****6.194**

- 1 **Caution.** A spoil ground enclosing an obstruction, a dangerous wreck and a wreck with a least depth of 10.5 m lies about 2½ miles WNW of Mormugao Point (15°25'N, 73°47'E); the limits of the area are shown on the chart.
- 2 **General anchorage.** During the fine weather season about 50 vessels can lie at anchor off the port. For details of anchorages off Aguada Head see 6.220.
- 3 **Sheltered anchorage.** For details of sheltered anchorages see 6.170.
- 3 **Pilotage anchorage.** Vessels awaiting a pilot may anchor about 2 miles WNW of Mormugao Point in a depth of about 13 m, mud; as shown on the chart. An area of foul ground lies about 6 cables SW of the anchorage.
- 4 **Examination anchorage.** For details see 1.41.

**Prohibited anchorages****6.195**

- 1 **Approaches.** A prohibited anchorage is established off the W end of Saint George's Islands (15°21'N, 73°46'E); the limits of the area, which lie partially within the port limits, are shown on the chart.  
Anchoring and trawling are prohibited around the obstructions off Saint George's Islands, see 6.159.

**Pilots and tugs****6.196**

- 1 **Pilotage** is compulsory. The charted boarding position is ¾ miles W of the breakwater, off the entrance to the buoyed channel to the port (6.204). In adverse weather conditions, when the pilot cannot embark, a launch will guide vessels until boarding becomes possible.
- 2 It is reported (2001) that pilotage is available 24 hours during the fair weather season (October to May), but there is no night pilotage during the SW monsoon.  
See *Admiralty List of Radio Signals Volume 6(4)* for further details of pilotage.
- 3 **Tugs** are available.

**Quarantine****6.197**

- 1 Quarantine messages should be sent between 12 and 4 hours before arrival. Until pratique is granted the quarantine signal must be hoisted by all vessels entering Mormugao Bay.

**Harbour****General layout****6.198**

- 1 The alongside berthing area, protected by a breakwater and a mole at its W end, is situated on the NE side of Mormugao Head. There is a turning basin, for vessels using the deep water berths, enclosed within the dredged area about 6 cables ESE of the breakwater head. A DB Area lies outside the dredged area close N of the turning basin; a shoal, with a depth of 4.2 m, marked by a buoy (can), lies on its E side. The inner anchorage area is located in the bay NE of the breakwater and clear of the buoyed channel.

**Depths****6.199**

- 1 **Approaches.** See 6.185.



2 **Caution.** The depths at all alongside berths were reported (1995) to be 3 m less than charted.

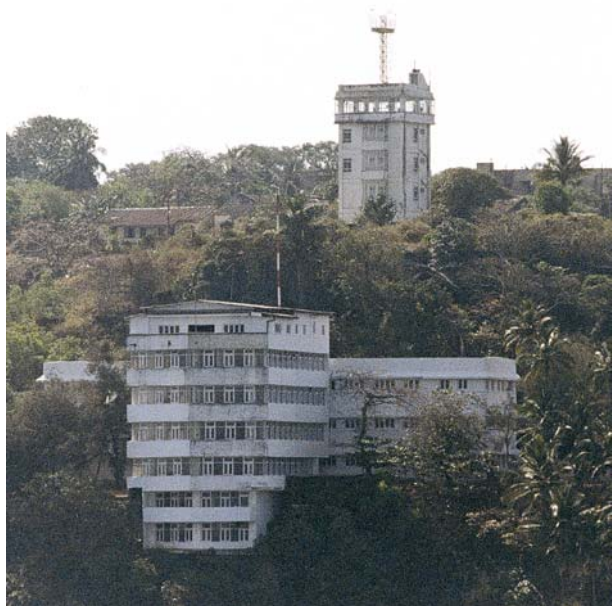
3 **Berths.** The principal berths, in the SE part of the berthing area, are located within maintained depth areas appropriate to the berth. Secondary berths, and the floating dock, are situated in the W part of the area in depths of between about 6 to 8 m. At the W end of the harbour, within about 1 cable of the breakwater, depths are shoal.

4 **Anchorage.** The inner anchorage has general depths of 6 to 7 m. However, it should be noted there are lesser depths surrounding the area and there is a shallow patch, shown on the chart, about  $4\frac{3}{4}$  cables ENE of the breakwater head, with a depth of 4.3 m, which is marked by a mooring buoy moored close W of it. The stranded wreck of a fishing vessel (lighted) lies in position  $15^{\circ}25'.5N$ ,  $73^{\circ}48'.7E$  about  $1\frac{1}{4}$  miles ENE of the breakwater head on the E side of the anchorage area.

### Signal stations

#### 6.200

1 The port signal station stands  $4\frac{1}{4}$  cables SSE of the breakwater head.



Mormugao Signal Station from N (6.200)  
(Original dated 1997)

2 Storm signals are displayed from a flagstaff standing above Mormugao Point; the general system is used. See 1.45.

### Natural conditions

#### 6.201

1 **Climate.** For nearest details see climatic table 1.215.

### Principal marks

#### 6.202

1 **Landmarks in Mormugao Bay:**

Tower ( $15^{\circ}23'.7N$ ,  $73^{\circ}48'.9E$ ).

Dome ( $15^{\circ}25'.7N$ ,  $73^{\circ}51'.8E$ ); in 1992 the dome was obscured by trees.

Radio masts ( $15^{\circ}27'.5N$ ,  $73^{\circ}50'.9E$ ).

Meteorological radar dome ( $15^{\circ}27'.3N$ ,  $73^{\circ}48'.2E$ ).

Church spire ( $15^{\circ}27'.7N$ ,  $73^{\circ}47'.4E$ ).

2 **Landmarks in Mormugao Harbour** (positioned from the radio masts exhibiting red lights ( $15^{\circ}24'.7N$ ,  $73^{\circ}47'.2E$ )):

Water tank (dome) (2.0 miles E).

3 Water tank (2.1 miles ESE).

Radio masts (1.0 miles ESE).

Water tower (9 cables SE).

Water tower ( $3\frac{1}{2}$  cables SE).

Building ( $2\frac{1}{2}$  cables SE).

4 **Major Light:**

Breakwater North Head Light (white concrete tower, 23 m in height) ( $15^{\circ}25'.1N$ ,  $73^{\circ}47'.5E$ ), is exhibited from the N point of the main breakwater.

### Directions

#### 6.203

1 **Cautions:**

At night, vessels approaching the port should not proceed into depths of less than 13 m.

A set S may be experienced when approaching the dredged channel.

2 During the SW monsoon, when there may be heavy swells in the approaches, care should be taken to maintain adequate steerage way when making the turn around the breakwater head to avoid being set E; also sufficient under keel clearance should be allowed for swell manoeuvring.

Depths towards the edge of the charted channel, on both sides, are less than those shown on the chart.

3 The buoys marking the approach channel may be removed without notice.

#### 6.204

1 The port is approached by buoyed channel about 3 miles long and 250 m wide by marked by light-buoys (lateral); the port hand buoys are positioned N of the charted channel limit. For depths see 6.185.

2 The channel leads ENE and is entered about  $2\frac{1}{2}$  miles W of Mormugao Head radio masts ( $15^{\circ}24'.7N$ ,  $73^{\circ}47'.2E$ ) and passes clear of the following dangers (positioned from the foregoing radio masts):

3 N of ODAS SW3 Light-buoy (special) ( $2\frac{1}{4}$  miles WSW). Vessels should not anchor nor trawl within 500 m of the buoy. Thence:

N of Kambariam Island (Buffalo Rock) (1 mile SW), an island surrounded by rocks with a reef and foul ground extending 2 cables NNE; these dangers are covered by the red sector ( $185^{\circ}$ – $225^{\circ}$ ) of Grāndi Island Light ( $15^{\circ}21'.1N$ ,  $73^{\circ}45'.8E$ ). Thence:

4 N of Sawyers Patches (6 cables SW), a group of isolated patches which are covered by red sector of Grāndi Island Light, as above. Thence:

5 S of Mormugao Rocks (6 cables N), with the dangers in the entrance to Mormugao Bay extending further N, see 6.176; these dangers are covered by the red sectors of Grāndi Island Light, and by Breakwater North Head Light ( $15^{\circ}25'.1N$ ,  $73^{\circ}47'.5E$ ) ( $120^{\circ}$ / $197^{\circ}$ ). Thence:

6 From a position N of the breakwater head, vessels should follow the buoyed channel to the berth. Or:

Proceed clear of the isolated shoal ( $9\frac{1}{2}$  cables NE), marked on its W side by a mooring buoy, to the inner anchorage.

### Useful marks

#### 6.205

1 Breakwater East Head Light (white masonry tower, 6 m in height) is exhibited from the head of a mole that extends about  $1\frac{1}{2}$  cables E from a point near the head of the main breakwater.

2 Stranded wreck (lighted) ( $15^{\circ}25'.5N$ ,  $73^{\circ}48'.8E$ ).

Stranded wreck ( $15^{\circ}24'.1N$ ,  $73^{\circ}48'.7E$ ).

Stranded wreck (lighted) ( $15^{\circ}24'.9N$ ,  $73^{\circ}49'.2E$ ).

Water tower (15°24'N, 73°50'E) stands onshore close SE of Vādem Bay.

- 3 Tower (15°24'6N, 73°50'5E) stands on Chikālin Point.

Tower (15°24'3N, 73°51'8E) stands on Saint Jāsīntu Island; a stranded wreck lies 7 cables NW of the tower.

## Berths

### Anchorage

#### 6.206

- 1 **Inner harbour.** Anchorage may be obtained in depths of 6 to 7 m, N of the dredged channel NE of Breakwater North Head Light (15°25'1N, 73°47'5E), fine silt and sand. During the SW monsoon up to 15 vessels can obtain shelter in this area clear of the shoals shown on the chart.
- 2 **Vāsko Bay.** Small vessels may anchor in the bay, in depths of about 3½ m.

### Mooring buoys and dolphins

#### 6.207

- 1 On the E side of channel is a mooring area, with a maintained depth of 14.1 m; there are three mooring dolphins (lighted) in the area. To the W of Turning Circle No 1 there are two mooring buoys which are normally allocated to vessels working cargo.
- 2 Another mooring buoy (lighted) is situated in shallow water NE of Vāsko Bay in position 15°24'9N, 73°49'2E.

### Alongside berths

#### 6.208

- 1 **Cautions:**  
Depths at all berths were reported (1998) to be 3 m less than charted.  
The draught permitted at berths should be confirmed with the Port Authority.
- 2 Continuous berthing extends E, SE thence S for 1½ miles from the root of the breakwater; it affords 10 numbered berths the positions of which, and their main usage, may be seen from the chart. Works are in progress (2004) off Berth No 5. The principal berths are described below (positioned from Breakwater North Head Light (15°25'1N, 73°47'5E)):
- 3 **Oil berth.** Berth No 8 (7 cables SE) a T-headed berth, flanked by dolphins, has an overall berthing length of about 260 m. The maximum size of vessel permitted to use the berth in the fine season is draught about 12.5 m and LOA 260 m; during the SW monsoon, vessels with draught about 10.4 m and length 198 m may be accepted. Bulk petroleum and phosphoric acid liquids are handled.
- 4 **Ore berth.** Berth No 9 (9 cables SE) a purpose built berth, with dolphins at its NW end, has an overall berthing length of 335 m. The maximum draught permitted at the berth is normally about 12.3 m for vessels up to 305 m in length, this draught is sometimes increased to about 13.0 m according to conditions. Synthetic mooring ropes are to be used for berthing.
- 5 **General cargo berth.** Berth No 10 (1¼ miles SE), with a berthing face of about 230 m is used by vessels up to 35 000 dwt; the future use of the berth is for container traffic. No 11 Berth, of similar dimensions to No 10 Berth, lies S of it.  
Four light beacons stand in the SW corner of Vāsko Bay, as shown on the chart, the E pair indicate the E limit of the dredged area off No 10 and 11 Berths; the W pair indicate the centreline of the dredged area.

## Landing

### 6.209

- 1 There are landing steps on the main breakwater.

## Port services

### 6.210

- 1 **Repairs.** Numerous firms are available in the port area for minor repairs. There is a floating dock, length 210 m and width 42 m which reportedly can accommodate vessels up to 60 000 dwt with a 8 m draught. There are numerous dry docks and slipways for vessels up to 1000 tonnes, length 100 m and draught 3 m.  
**Facilities:** hospital; de-ratting exemption certificates.  
**Supplies:** fuel oils; fresh provisions; fresh water.  
**Communications:** by sea, regular world wide; by air, national airport at Dabolin, 8 km SE.

## MORMUGAO HEAD TO TEREKHOL RIVER

### General information

*Charts 492, 1509*

### Route

#### 6.211

- 1 From a position W of Mormugao Head (15°24'N, 73°48'E) the route leads 17 miles NNW to a position WSW of Terekhol River.

### Topography

#### 6.212

- 1 The coast between Aguada Head (5 miles N of Mormugao Head) and the Terekhol River, 15 miles NNW, is generally low, sandy and fringed with coconut palms. Close N of Aguada Head a heavy surf always runs along the foreshore.

### Depths

#### 6.213

- 1 Seaward of the 20 m depth contour there are no charted dangers.

### Rescue

#### 6.214

- 1 For details see 6.220.

### Currents

#### 6.215

- 1 See 6.113.

### Principal marks

#### 6.216

- 1 **Landmarks:**  
Three banyan trees (15°31'5N, 73°46'7E) stand on Kandoli Hill (Condolim Hill).  
Church (15°34'N, 73°45'E) stands on Bāga Point.
- 2 For landmarks at Mormugao Bay see 6.202 and for those at Aguada Bay see 6.220.
- Major lights:**  
Mormugao Breakwater North Head Light (15°25'1N, 73°47'5E) (6.202).
- 3 Aguada Light (white rectangular concrete tower, 22 m in height) (15°30'N, 73°46'E), is exhibited, from September to May, from close NW of the fort that stands on the S side of Aguada Head.  
Vengurla Point Light (15°51'N, 73°37'E) (7.26).  
Vengurla Rocks Light (15°53'N, 73°28'E) (7.26).

**Other aid to navigation****6.217**

- 1 A racon (15°30'N, 73°46'E) transmits from Aguada Lighthouse.

For details see *Admiralty List of Radio Signals Volume 6(4)*.

**Directions**

(continued from 6.165)

**6.218**

- 1 From a position W of Mormugao Head (15°24'N, 73°48'E) the route leads 17 miles NNW to a position WSW of the mouth of the Terekhol River, passing (with positions from the church (15°34'N, 73°45'E)):
- 2 WSW of a spoil ground (8 miles S), for details see 6.194. And:  
WSW of the shoal patches and rocks (8 miles SSE) fronting Mormugao Bay (6.176), thence:  
Clear of an obstruction (7½ miles SSW), the depth of water over the obstruction is not known. Thence:
- 3 WSW of Aguada Head (4 miles SSE), a bold bluff headland which appears from seaward to have a flat summit; it is fortified along the N side and on its S side stands a fort with a flagstaff. The W extremity of the headland should be given a berth of at least 1 mile. Thence:
- 4 WSW of a shoal patch (2 miles NW), thence:  
WSW of a dangerous rock (7 miles NNW), thence:  
To a position WSW of Terekhol River.
- 5 **Clearing marks.** The alignment (168°) of Kambariam Island (15°24'0N, 73°46'5E) (6.204) with the E end of Grāndi Island (3 miles SSE) (6.164) leads small craft, using the inshore route N of Mormugao Head, clear of the dangers extending across much of the entrance to Mormugao Bay (see 6.176).

**Useful mark****6.219**

- 1 Chāpora Fort (15°36'N, 73°44'E) stands on a high bluff at the S entrance to Chāpora River, it is easily identified by its black walls.  
(Directions continue at 7.27)

**Aguada Bay**

Chart 492 plan of Panaji

**General information****6.220**

- 1 **Position.** Aguada Bay is entered between Cābo Rajniwas (15°28'N, 73°47'E) and Aguada Head 1¼ miles NW.
- 2 **Topography.** The coastline of Kārānjhālen Bay, a shallow bay which forms the SE part of Aguada Bay lying between Cābo Rajniwas and Gaspar Dias 1¼ miles NE, is low, sandy and covered with coconut palms. The N coast of Aguada Bay consists of Aguada Head (6.218) lying W of Mama Point at the S entrance to Sinquerim River (15°30'N, 73°47'E); and the coastline extending 1¼ miles E of the river mouth to Raj Māgus Point, this stretch of coastline is backed by low hills and fringed by a reef with isolated rocks lying up to about 1¼ cables offshore.
- 3 **Depths.** The main part of the bay, outside of the 5 m depth contour, is free from dangers.
- Local weather and sea state.** Westerly winds raise a heavy swell in the bay.
- Tidal streams.** The out-going stream sets strongly out of the Mandāvi River into the head of Aguada Bay, but at the entrance to the bay the stream is weak; the in-going stream is barely perceptible throughout the bay.

4

**Landmarks:**

Aguada Lighthouse (15°29'5N, 73°46'4E) (6.216).  
Television tower (15°29'2N, 73°49'7E), a conspicuous water tower stands 1¼ cables ENE of the television tower.

5

**Useful marks** (positioned from Gaspar Dias Beacon (15°28'9N, 73°48'6E)):

Light (white round tower, 12 m in height) (2 miles WNW) stands 1¼ cables SE of Aguada Lighthouse; the light is exhibited from September to May.

San Lorenzo Chapel (1¼ miles WNW) stands on a hill.

Stranded wrecks (1½ and 1¼ miles WNW).

6

Raj Māgus Fort (9 cables N).

Raj Māgus Light (white round tower, 12 m in height) (1 mile N); the light is exhibited from 15th September to 31st May.

Flagstaff (1½ miles SW) stands close NNE of the church spire at Cābo Rajniwas.

For landmarks on the N side of Mormugao Bay see 6.202.

7

**Anchorage.** During the fine season, large vessels may anchor about 2 miles W of Aguada Head, in a depth of about 14 m, mud; a moderate sized vessel may anchor about 1 mile SE of the same head, in a depth of 6-2 m, mud, as shown on the chart.

**Sinquerim River** (15°30'N, 73°47'E) is shallow and navigable by boats, with local knowledge, at high water only.

8

**Rescue.** A lifeboat is stationed at the mouth of the Sinquerim River. See 1.55.

For further information of rescue see *Admiralty List of Radio Signals Volume 5*.

**Mandāvi River**

Chart 492 plan of Panaji

**General information****6.221**

- 1 **Position.** The Mandāvi River flows into the head of Aguada Bay close SW of Panaji (15°30'N, 73°50'E).

**Pilotage** is not compulsory in the river, but it is advisable to employ a local guide who may be engaged by telegram to the Captain of the Port, Panaji.

2

**River bar.** The bar, which extends from the river mouth into the NE part of Aguada Bay, is subject to frequent change. In the SW monsoon heavy breakers across the river mouth render the bar impassable.

3

**Channel.** The entrance channel, which is less than 1 cable wide in many places, lies between sandbanks extending about 9 cables SW from Raj Māgus and 5 cables SW from Gaspar Dias. There is a charted depth (1996) of 2-6 m in the channel on the bar.

4

**Prohibited anchorage.** Vessels may not anchor near a submarine cable which crosses the river at Penha di Frāns (Malim) (15°30'3N, 73°50'1E); the cable is marked at its landing points by posts, black and white stripes, surmounted by white boards.

**Directions****6.222**

- 1 **Caution.** The dangers in the channel are not marked.  
From a position NW of Cābo Rajniwas (15°28'N, 73°47'E) a vessel should pass well clear N of the dangers at the S end of Aguada Bay and join the track shown on the chart which leads through the SE part of the bay to the river entrance channel.



2 **Leading lights:**

Campal front light (white round masonry tower, 22 m in height) (15°29'·6N, 73°49'·1E).

3 

Rear light (white triangle, red band, on white concrete tower, 11 m in height) (1¼ miles NE of front light), is exhibited on a dwelling at Penha di Frâns (Malim).

4 

The alignment (054°) of these lights, which are exhibited from 1st September to 31st May, leads from a position NE of Outer Patches (15°27'·8N, 73°46'·5E) and clear of the shoal ground extending W and WNW of Cābo Rajniwas. Thence:

5 

The leading line passes NW of a dangerous wreck (15°28'·5N, 73°47'·8E), marked on its WNW side by a buoy (black and white chequers, conical), and across the bar to a position N of Tejo, about 4 cables SW of Campal front light.

6 **Leading lights:**

Tejo front light (white column on a white concrete round tower, black bands, 9 m in height) (15°29'·3N, 73°48'·7E).

Rear light (white triangle, black band, on white pyramidal tower on white concrete square tower, black bands, 12 m in height) (90 m SSW of front light).

7 

The alignment astern (191¼°) of these lights, which are exhibited from 15th September to 31st May, leads through the channel between Raij Māgus Point and a bank lying NW of Campal front light; the bank is marked by a buoy (black and white chequered, conical) moored near its NW point. Thence:

8 

Vessels should keep in the deep water channel which leads N of Reis Sand (15°30'·0N, 73°49'·1E), a patch which dries, to the berths on the S bank of the river at Panaji.

**Panaji**

*Chart 492 plan of Panaji*

**General information****6.223**1 

**Position.** Panaji (15°30'N, 73°50'E) stands on the S bank of the Mandāvi River 1½ miles within the entrance.

**Function.** Panaji is the capitol and seat of government of Goa, Daman and Diu.

**Topography.** The city is well established with prominent public buildings along the water front. A bridge spans the river at the E end of the city.

2 

**Trade.** The principal exports are cotton, salt and seeds; piece goods and kerosene form the main imports.

**Storm signals** are displayed at the port, the brief system is used. See 1.47.

**Climate.** For details see climatic table 1.215.

**Directions** see 6.222.

3 

**Berths** for small vessels are available; Steamer Jetty is reported to have a depth of 4·3 m alongside.

**Facility:** hospital.

**Communication** by sea is regularly maintained with other Indian ports during the fair season.

**Other name****6.224**1 

Māpuca River (15°31'N, 73°51'E).

**Rivers**

*Chart 1509*

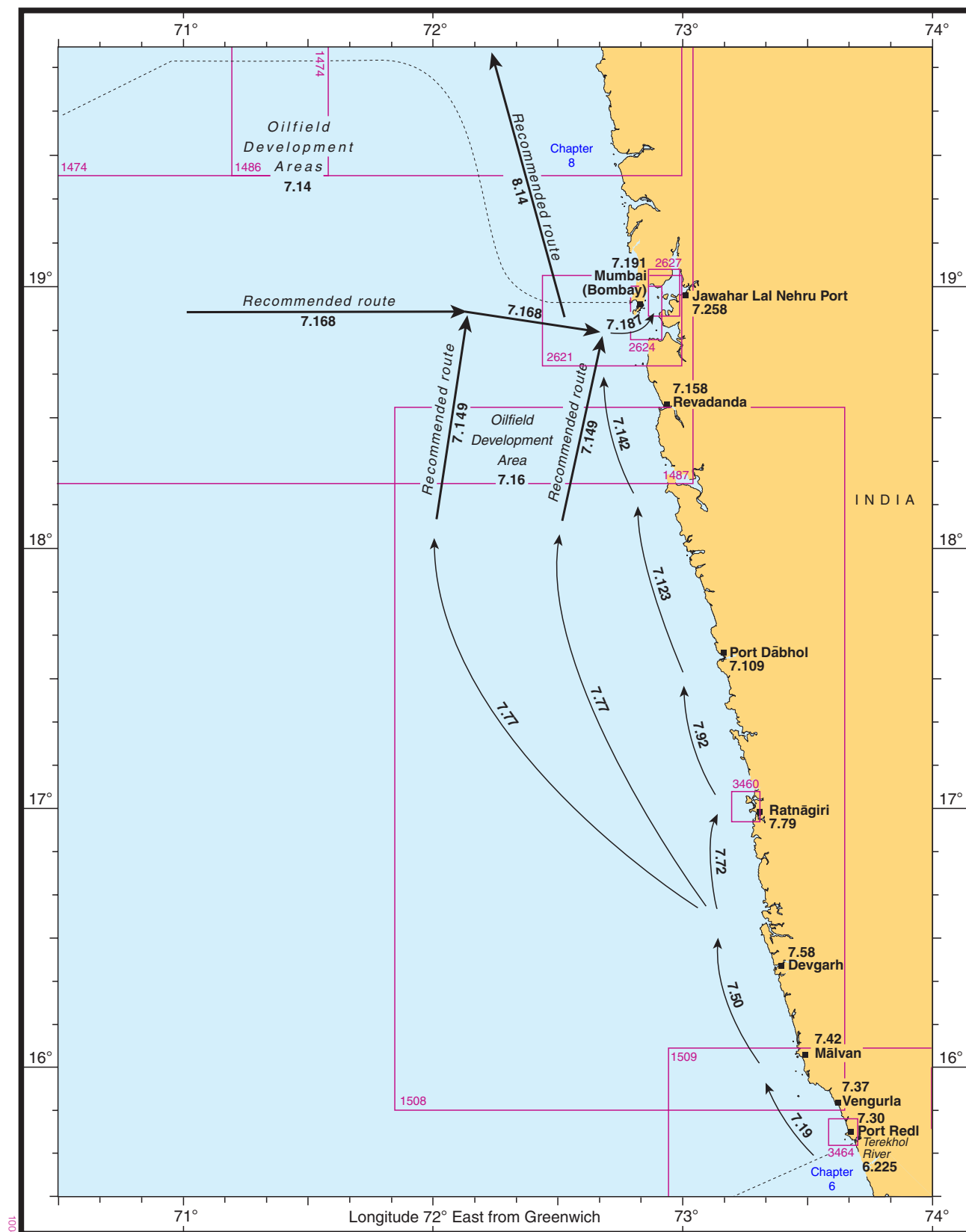
**6.225**1 

**Chāpora River** (15°37'N, 73°44'E), small vessels may cross the bar at its entrance but local knowledge is necessary.

**Terekhol River** (15°43'N, 73°42'E) (7.49) represents the boundary between the coast of Goa and Konkan coast to the N.



## Chapter 7 - Konkan Coast; including Mumbai (Bombay)



## CHAPTER 7

## KONKAN COAST, INCLUDING MUMBAI (BOMBAY)

## GENERAL INFORMATION

*Charts 1508, 1509, 708*

**Scope of chapter****7.1**

- 1 This chapter describes the Konkan Coast of India from the Terekhol River (15°43'N, 73°42'E) to Mumbai, 196 miles NNW. The ports of Mumbai (7.191), Jawahar Lal Nehru Port (7.258) and the minor harbours and anchorages on the coast are also described. The chapter also covers the offshore oilfields situated in the approaches to Mumbai.

**Topography****7.2**

- 1 The Western Ghāts, which lie almost parallel to the coast about 30 miles inland, stand like a wall backing the entire coastline covered by this chapter; the coastline consists mainly of sandy bays separated by bold rocky capes. There are numerous rivers, mostly having their sources in the Western Ghāts, which empty into the sea at intervals along the coast. This stretch of coast is well lit, having numerous lights with ranges of 15 miles or more.

**Off-lying banks and shoals****7.3**

- 1 **Angria Bank**, an extensive off-lying shoal about 70 miles W of Parweka Point (16°32'N, 73°19'E) has a least depth of 20.1 m and is composed of sand, shells and coral; a mooring buoy is moored near the centre of the bank. The bank is steep-to on all sides with great depths close off it.
- 2 A stranded wreck, radar conspicuous, was reported (2001) to lie in position 16°27'4N, 72°04'3E, 1¼ miles SSW of the mooring buoy.  
The in-going tidal stream sets NE and the out-going stream sets SW across Angria Bank.
- 3 **Direction Bank**, lying 40 miles SW of Mumbai, is formed by a tongue of the 50 m depth contour within which there are patches with depths from 40 to 47 m.
- 4 **The Fifty Fathoms Flat**, lying between 60 and 120 miles WSW of Mumbai, is an extensive flat with depths from about 80 to 100 m, the bottom is generally fine sand; however, muddy bottom has occasionally been found between this flat and Direction Bank.
- 5 **Shoals**. Two known isolated shoals, as described below, lie off this stretch of coast:  
A depth of 33 m was reported (1866) to lie about 58 miles W of Jaigarh Head (17°18'N, 73°12'E).
- 6 A depth of 23 m was reported (1987) to lie close W of the 200 m depth contour in the vicinity of 19°00'N, 69°55'E.

**Off-lying dangers****7.4**

- 1 ODAS buoys may be encountered well seaward of this coastline: DS1 Light-buoy (special) is moored in position 15°33'2N, 69°10'4E and SW2 Light-buoy (special) at 17°01'0N, 72°29'2E.
- 2 A minimum berth of 1 mile is requested from the buoys, and mariners are advised not to anchor nor trawl within 1000 m.

**Tidal streams****7.5**

- 1 Details of tidal streams may be found in the relevant sections of the chapter.

**Currents****7.6**

- 1 The currents are of monsoonal origin, but tend to follow the trend of the coast. In December and January, sets are NW with rates up to 1 kn. In July and August when the SW Monsoon is well established, SE sets with rates up to 2 kn are experienced. Exceptionally, onshore sets up to 1.5 kn are experienced during the NE Monsoon and up to 3 kn during the SW Monsoon.

**Climate and weather****7.7**

- 1 For climate and weather see 1.178.

**Submarine exercise areas****7.8**

- 1 A submarine exercise area is centred 146 miles WSW of Ratnāgiri (16°59'N, 73°16'E); 2 more areas, centred about 100 miles WNW of the same point, lie between Angria Bank and The Fifty Fathom Flat. A good lookout should be maintained when passing through these areas. See 1.8.

**Navigational control****7.9**

- 1 For the regulations which control navigation in the territorial waters of India see 1.39.

## OFFSHORE OILFIELDS

**General information**

*Charts 1486, 1487, 1508*

**Development areas****7.10**

- 1 Three Oil Development Areas are situated in the approaches to Mumbai. Numerous production platforms and a number of tanker mooring buoys exist in the areas shown on the chart.
- 2 In developing areas, underwater construction work on well-heads and pipelines takes place; drilling rigs, diving tenders and support vessels may be encountered. Numerous structures, usually carrying lights, other unlit objects and submerged obstructions, sometimes marked by buoys exist. As these installations are not all charted, special caution should be exercised by vessels navigating in the vicinity. For details of lights see *Admiralty List of Lists Volume F*.
- 3 The Government of India has established a 500 m safety zone around each installation which should not be entered; mariners not associated with oilfield operations are strongly advised not to approach within 2½ miles of production platforms.
- 4 The Indian authorities advise all mariners to keep a constant listening watch on VHF Channel 16 when within 25 miles of all oilfields on the W coast.

**Oil and gas field regulations****7.11**

- 1 For details see 1.12.

**Pipelines****7.12**

- 1 For details see 1.11.

**Distress****7.13**

- 1 Any vessels in distress within 50 miles of any production platform or drilling rig, towards which they are likely to drift, should ask for assistance through Mumbai coast radio station on 500 Khz and contact standby offshore supply vessels on VHF.

**Bombay High oilfield development area****7.14**

- 1 Bombay High oilfield development area is situated with its centre about 90 miles WNW of the entrance to Mumbai (Bombay) Harbour. The area extends 25 miles in an E/W direction and 47 miles in a N/S direction. There are numerous production platforms within this area, as shown on the chart.
- 2 Three tanker mooring buoys, from which lights are exhibited, are situated close together in the N part of the area; flares are burnt from this vicinity. Another tanker mooring buoy, from which a light is exhibited, is situated about 10 miles SSE of the above three tanker mooring buoys.
- 3 Oil and gas pipelines are laid ESE from the centre of the area towards Mumbai.

**Mukta—Panna and Bassein oilfield development area****7.15**

- 1 Mukta—Panna and Bassein oilfield development area is situated with its centre about 50 miles NW of the entrance to Mumbai Harbour. The area extends 21 miles in an E/W direction and 34 miles in a N/S direction. There are several production platforms within this area, as shown on the chart.
- 2 The submarine oil and gas pipelines from Bombay High oilfield development area are laid through the centre of the area thence to Mumbai, with a gas pipeline branching 115 miles NNE to the vicinity of Dānti (21°03'N, 72°44'E).

**Neelam Heera and Ratna oilfields development area****7.16**

- 1 Neelam Heera and Ratna oilfields development area is situated with its centre about 35 miles SW of the entrance to Mumbai Harbour. The area extends 14 miles in an E/W direction and 40 miles in a N/S direction. There are numerous production platforms within this area, as shown on the chart.
- 2 A submarine oil and gas pipeline is laid from the N part of the area NE to Mumbai.

**Isolated dangers****7.17**

- 1 An unlit oil platform is situated in the approximate position 18°36'N, 71°21'E and a lit platform 5½ miles NNW.
- 2 A well-head, forming an obstruction, lies in position 19°44'N, 72°01'E, about 10 miles N of the N extremity of the Mukta—Panna and Bassein oilfield development area and 4 miles N of a lit oil platform.
- 3 A well-head, forming an obstruction with a least depth of 13 m, lies in position 19°51'N, 71°00'E, about 10 miles WNW of the NW extremity of the Bombay High oilfield development area.
- 4 A lit oil platform is situated in position 18°56'N, 72°18'E, 6 miles W of the lighterage operation area (7.179).

**Recommended routes****7.18**

- 1 Recommended routes are charted in the approaches to Mumbai to assist mariners navigate safely in the vicinity of the development areas. One route leads in an E/W direction passing S of Mumbai and Mukta—Panna and Bassein oilfield development areas and N of Neelam Heera and Ratna oilfields development area. Other routes lead, in NNE/SSW directions passing E and W of Neelam Heera and Ratna oilfields development area, and in a NNW direction passing E of Mukta—Panna and Bassein oilfield development area. The routes are shown on the chart.
- 2 Mariners are advised to keep 1 or 2 miles to starboard of the centre-lines of these routes while approaching or leaving Mumbai, consistent with the *International Regulations for Preventing Collisions at Sea (1972)*.

**TEREKHOL RIVER TO MIRYA HEAD****TEREKHOL RIVER TO MĀLVAN BAY****General information**

Chart 1509

**Route****7.19**

- 1 From a position WSW of Terekhol River (15°43'N, 73°42'E) the route leads 25 miles NNW to a position WSW of Mālvān Bay.

**Topography****7.20**

- 1 The coastline is in the form of a shallow bights within which, there are rocky capes and sandy bays intersected by creeks and rivers.

**Depths****7.21**

- 1 Seaward of the 30 m depth contour there are no charted dangers; however, an area of foul ground exists in position 15°40'N, 73°30'E.

**Tidal streams****7.22**

- 1 Between Vengurla Roads (15°50'N, 73°34'E) and Chaldea Rock, 9 miles NW, the in-going tidal stream sets N and the out-going stream sets S with a spring rate of about 1 kn.

**Overfalls****7.23**

- 1 Between the S end of Vengurla Rocks (15°53'N, 73°28'E) and Mālvān Rock, 9 miles N, except at the N end of Kāril Kachal Channel (7.28), sudden overfalls may occur.

**Currents****7.24**

- 1 See 7.6.

**Storm signals****7.25**

- 1 Storm signals are reported to be displayed at Niuti Fort (15°56'N, 73°31'E), the brief system is used. See 1.47.

**Principal marks****7.26**

- 1 **Landmark:**  
Radio tower (16°04'N, 73°33'E).
- 2 **Major lights:**  
Mormugao Breakwater North Head Light (15°25'1N, 73°47'5E) (6.202).  
Aguada Light (15°30'N, 73°46'E) (6.216).  
Vengurla Point Light (white 6-sided masonry tower, black bands, 13 m in height) (15°51'N, 73°37'E).
- 3 Vengurla Rocks Light (white metal tower, red bands, 20 m in height) (15°53'N, 73°28'E) stands on the NW point of an unnamed islet; the light is obscured on some bearings by islets nearby. A disused lighthouse stands on an islet 3 cables W of Vengurla Rocks Lighthouse.  
Devgarh Light (16°23'N, 73°22'E) (7.55).

**Directions***(continued from 6.219)***Outer route (W of Vengurla Rocks)****7.27**

- 1 **Caution.** Between Chaldea Rock (15°57'N, 73°28'E) and Mālvan Rock, 5 miles NNW, vessels should keep in depths of more than 20 m by day and 30 m at night.  
From a position WSW of Terekhol River (15°43'N, 73°42'E) the route leads 25 miles NNW to a position WSW of Mālvan Bay, passing (with positions from Vengurla Point (15°51'N, 73°37'E)):
- 2 WSW of Havelock Rock (8½ miles SSE), a sharp pinnacle awash with another rock, also awash, 4 cables NE and 1½ cables WSW. Thence:  
WSW of Redi Rock (7¾ miles SSE), 12 m in height, and clear of the islets, rocks and drying reefs lying off Redi Point (7.32), about 1 mile NNW. Thence:
- 3 WSW of Vengurla Rocks (Burnt Islands) (9 miles WNW); lying between Tapti Rock and Kārīl Rock situated, respectively, near the S and N ends of the area of foul ground. Thence:  
WSW of Square Rock (12 miles NW) with rocks lying SSW and NNE of it and foul ground extending E to the coast. Thence:
- 4 WSW of Mālvan Rock (15 miles NW), with a swept depth of 2.5 m over it, is marked by a buoy (green, conical) moored close SW. Mandel Rock, with numerous detached shoals and rocks, lies about 1½ miles ESE of Mālvan Rock. Thence:  
To a position WSW of Mālvan Bay.
- 5 **Clearing bearing.** Vengurla Rocks Light bearing less than 158° clears the offshore dangers between Niuti Fort and Mālvan Bay.

**Inner route (Kārīl Kachal Channel)****7.28**

- 1 **Caution.** At night do not use this channel but pass W of Vengurla Rocks.  
From the vicinity of Vengurla Roads (15°50'N, 73°34'E) small craft intending to proceed through Kārīl Kachal

Channel should steer to pass (with positions from Vengurla Point (15°51'N, 73°37'E)):

- 2 E of Vengurla Rock (9 miles WNW) and the foul ground extending about 3 miles N of it. And:  
SW of Bhubra Rock (7½ miles NW), a rock awash lying 3½ cables SW of Niuti Fort (ruin); the rock is marked by a buoy (black, can) moored close off its SSW side during the fine weather season, the position of the buoy is not reliable. Thence:
- 3 Follow the moderate depth channel between Kārīl Rock (9¾ miles WNW) and Chaldea Rock, 1¼ miles NNE; the latter rock, which is awash and lies near the S end of foul ground extending to the shore NNE, is marked by a buoy (black, conical) moored 5 cables WSW of it during the fine weather season. A line of bearing 093° astern, of Niuti Fort, leads through the channel. Thence:
- 4 As described in the outer route above.

**Useful marks****7.29**

- 1 Terekhol Fort (15°44'N, 73°41'E), elevation 22 m, stands on the brow of a hill near the N bank of Terekhol River.  
Redi Fort (15°45'N, 73°40'E) stands at an elevation of 35 m 1 mile ENE of the flat rocky projection of Redi Point.  
Machlimar Point (15°48'N, 73°39'E), with a small hill, which rises about 1 mile NNW of the entrance to Talavda River.
- 2 Wagh-giri (Tiger Hill) (15°53'N, 73°42'E).  
Hill (158 m high) (15°58'N, 73°31'E) standing 2 miles N of Niuti Fort is prominent.  
Sindhudrug Janjira Light (16°02'N, 73°28'E) (7.45).  
*(Directions continue at 7.56)*

**Port Redi***Chart 3464 plan of Redi Anchorage***General information****7.30**

- 1 **Position.** Port Redi (15°45'N, 73°40'E), an iron ore mining town, stands on the S side of a shallow creek about 2 miles NNW of the entrance to the Terekhol River.
- 2 **Function.** The port is an open roadstead port used by vessels loading iron ore from self propelled lighters; in 1991, 527 972 tonnes were loaded at a rate of between 3000 and 6000 per day. The port is closed during the SW monsoon from mid-September to mid-May.
- 3 **Traffic.** In 1991, the port was used by 14 vessels with a total grt of 110 915; however, it was reported (1993) that the number of vessels using the port has reduced, and in 2003 no vessels were reported using the port.
- 4 **Port authority** is exercised by the Port Officer, Redi, Vengurla, Maharashtra State.  
**Tidal levels.** For tidal levels off Vengurla, 7 miles NW, see 7.38.

**Arrival information****7.31**

- 1 **Notice of ETA.** Vessels should send their ETA 48 hours in advance to the Port Officer Vengurla through Mumbai coast radio station.
- 2 **Pilotage** is compulsory, it is carried out by the Port Officer in daylight hours only. The pilot boards in the general anchorage and conducts vessels to a loading anchorage.



**Harbour information****7.32**

- 1 **General layout.** There is a small harbour with depths of less than 2 m and 2 lighter jetties at Redi Point situated W of the town. The harbour is protected from N winds and currents, during the fine weather season, by cliffs and islands which almost surround it.
- 2 **Storm signals** are displayed at the port, the brief system is used. See 1.47.

**Landmark****7.33**

- 1 White cross 15°46'·1N, 73°39'·8E.

**Anchorage****7.34**

- 1 **General anchorage.** On arrival vessels should anchor in the general anchorage area about 2 miles W of Redi Point, in a depth of 13 m, mud; as shown on the chart. Akhāli Island, 17 m in height, lies close W of the point, and Poras Rock, a small islet, a further 2 cables W, with shoals and rock extending up to 3 cables on all sides.
- 2 **Loading anchorages.** There are 2 anchorages situated NW and SW of Redi Point, they are known as Jetty One and Jetty Two; at these anchorages, vessels with a draught of up to 10·4 m can load safely.

**Port services****7.35**

- 1 **Facilities:** hospital at Vengurla, 14 km N; first aid facilities only at the port.  
**Supplies:** nil.

**Development****7.36**

- 1 SE of Redi Point works were in progress (1997) to build alongside berths which will accommodate vessels of up to 60 000 dwt.

**Vengurla***Chart 1509***General information****7.37**

- 1 **Position.** The town of Vengurla lies about 7 cables NE of Vengurla Point (15°51'N, 73°37'E).  
**Function.** It is an open roadstead port with vessels anchoring S and SW of Vengurla Point in Vengurla Roads. The port is closed during the SW monsoon.
- 2 **Traffic.** Local vessels call regularly.  
**Port authority** is exercised by a Port Officer.

**Tidal information****7.38**

- 1 **Tidal levels.** See information in *Admiralty Tide Tables*. The average maximum and minimum tidal ranges are about 1·5 and 0·8 m.  
**Tidal streams,** see 7.22.

**Harbour information****7.39**

- 1 **Storm signals** are displayed from a mast on the signal station at Vengurla Point, the brief system is used. See 1.47.
- 2 **Offshore dangers** (positioned from Vengurla Point):  
South Rock (4 cables S) with a depth of 3 m over it lies close NE of a 4·8 m shoal, a buoy (black, conical) is moored between these dangers.

- 3 East Rock (3½ cables SE) with a depth of 1·7 m over it is marked by a buoy (black, conical) moored close NE.
- 4 South West Point Rock (3 cables W) with a depth of 1·3 m over it is marked by a buoy (red, can) moored close SSW.  
A shoal patch (2 cables S) with a depth of 4·8 m over it is unmarked and unnamed.
- 5 **Caution.** The buoys off Vengurla are only in position between October and May.

**Anchorage****7.40**

- 1 **Large vessels** may anchor in Vengurla Roads with Vengurla Point Lighthouse (7.26) bearing 036° distant about 7 cables, in a depth of 9 m, mud; as shown on the chart.
- 2 **Small vessels** with local knowledge may anchor, with some shelter from NW winds, in the bight on the ESE side of Vengurla Point in depths of about 4·5 m.

**Port services****7.41**

- 1 **Facility:** hospital.  
**Supplies:** fresh provisions and fuel oils in small quantities can be obtained; fresh water is not available.

**Mālvan***Chart 1509***General information****7.42**

- 1 **Position.** The town of Mālvan (16°03'N, 73°28'E) stands on the N side of Mālvan Bay, it is almost hidden from view by coconut palms.
- 2 **Function.** Mālvan is an open roadstead port with deep draught vessels anchoring seaward of the dangers in the bay. The port is closed during the SW monsoon.  
The main export is dried fish, imports include tiles and wood.
- 3 **Traffic.** Local vessels call regularly.

**Limiting conditions****7.43**

- 1 **Depths.** Mālvan Bay is much encumbered by rocky shoals and is only accessible by shallow draught vessels.  
**Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 1·5 and 0·7 m.

**Harbour information****7.44**

- 1 **Offshore dangers** (positioned from the front leading light (16°03'N, 73°28'E)):  
Johnston Castle Rock (1 mile WSW), a rocky shoal which is marked by a buoy (green, can) moored 1¾ cables WSW.
- 2 Rājkot Rock (8 cables W), a rocky shoal lying close NNW of the fairway, is marked by a light-buoy (red, can) moored close SW.  
Perch Rock (6 cables W), an isolated rock with a depth of 1·6 m over it lies close NNW of the fairway, it is unmarked.
- 3 For Mālvan Rock and other dangers farther offshore see 7.27.  
**Caution.** The buoys and lights described above are only in position and operating during the fine weather season.
- 4 **Storm signals** are displayed from the flagstaff at Fort Rājkot, the brief system is used. See 1.47.

**Directions****7.45**

- 1 The alignment ( $075\frac{1}{2}^\circ$ ) of the leading lights at the head of Mālvan Bay lead through the buoyed fairway to the head of the bay:

Front light (white mast, 4 m in height) ( $16^\circ03'N$ ,  $73^\circ28'E$ ).

Rear light (red and white chequered metal framework tower, 14 m in height) (220 m ENE of front light).

- 2 **Caution.** The rear mark is reported obscured by palm trees by day.

The lights are shown from 16th September to 15th June when the weather permits. It should be noted that the rear light has only a narrow green sector which leads towards the anchorage.

A tower, surmounted by a white cross, standing close S of the leading lights aids identification of the transit.

- 3 Vessels entering Mālvan Bay should maintain the leading line in order to keep clear of the foul ground which, in addition to the named dangers described above, lies both N and S of the fairway.

There is a least charted depth of 3.1 m on the centreline of the fairway.

- 4 **Useful marks** (positioned from the front leading light):  
Sindhudrug Janjira Light (9 cables SW) is exhibited from September to May inclusive at the W end of Sindhudrug Janjira, a fortified island, situated on the S side of the entrance to the bay.  
Padmagarh Fort (ruin) ( $3\frac{1}{2}$  cables SW).  
Fort Rājkot (7 cables WNW), a flagstaff, 23 m in height, stands at the fort.

**Anchorage and berth****7.46**

- 1 **Outer anchorage.** Vessels may anchor off the entrance to Mālvan Bay with the N end of Sindhudrug Janjira bearing  $097^\circ$  distant about 1 mile, in a depth of 15 m, mud; as shown on the chart.

**Inner anchorage.** Shallow draught vessels may anchor within Mālvan Bay, on the  $075\frac{1}{2}^\circ$  leading line, with Padmagarh Fort bearing  $163^\circ$ ; in a depth of 4 m, sand.

- 2 **Berth.** A jetty is located at the customs house  $3\frac{1}{2}$  cables NW of the front leading light.

**Port services****7.47**

- 1 **Facility:** hospital.  
**Supplies:** fuel and fresh provisions, both in small quantities.

**Coastal anchorages**

Chart 1509

**7.48**

- 1 **Havelock Rock** (7.27) ( $15^\circ43'N$ ,  $73^\circ40'E$ ), anchorage can be obtained about  $7\frac{1}{2}$  cables SE of the rock in a depth of about 8 m, mud, as shown on the chart.
- 2 **Vengurla Rock** ( $15^\circ53'N$ ,  $73^\circ28'E$ ), anchorage with shelter from NW winds may be obtained  $1\frac{1}{2}$  miles ESE of the S end of the rock in depths of about 21 m, mud; as shown on the chart. A bank with a depth of 8.4 m extends  $8\frac{1}{2}$  cables SE of the rock.

**Rivers**

Charts 1508, 1509

**7.49**

- 1 **Terekhol River** ( $15^\circ43'N$ ,  $73^\circ42'E$ ) which is entered  $2\frac{1}{2}$  miles SE of Port Redi, is fronted by a bar with a least charted depth in a narrow channel of 2.6 m, but this is subject to change.
- 2 **Kārli River** ( $15^\circ57'N$ ,  $73^\circ30'E$ ) which is entered  $1\frac{1}{2}$  miles NNW of Niuti Fort can only be used by small boats.

**MĀLVAN BAY TO VIJAYADURG****General information**

Chart 1508

**Route****7.50**

- 1 From a position WSW of Mālvan Bay ( $16^\circ03'N$ ,  $73^\circ28'E$ ) the route leads about 33 miles NNW to a position WSW of Vijayadurg.

**Topography****7.51**

- 1 The coastline consists of bold rocky capes and small sandy bays which are entered by numerous rivers, creeks and streams. The coast between Kālāvali Creek ( $16^\circ05'N$ ,  $73^\circ28'E$ ) and the Achra River, 7 miles NNW, is sandy and fringed with coconut palms which are backed about 4 miles inland by a range of hills with no conspicuous summits. North of Achra River to Vijayadurg, steep abrupt cliffs are backed by flat land which rises farther inland to bare laterite hills which are almost devoid of vegetation except during the rainy season.

**Depths****7.52**

- 1 Seaward of the 20 m depth contour there are no charted dangers.

**Currents****7.53**

- 1 See 7.6.

**Storm signals****7.54**

- 1 Storm signals are displayed at Achra Point ( $16^\circ12'N$ ,  $73^\circ26'E$ ), the brief system is used. See 1.47.

**Principal marks****7.55**

- 1 **Landmarks:**

Windmill ( $16^\circ22'N$ ,  $73^\circ23'E$ ).

Flagstaff ( $16^\circ23'N$ ,  $73^\circ22'E$ ).

Round Hill ( $16^\circ25'N$ ,  $73^\circ23'E$ ).

- 2 **Major lights:**

Vengurla Point Light ( $15^\circ51'N$ ,  $73^\circ37'E$ ) (7.26).

Vengurla Rocks Light ( $15^\circ53'N$ ,  $73^\circ28'E$ ) (7.26).

Devgarh Harbour Light (white round masonry tower, black bands, 11 m in height) ( $16^\circ23'N$ ,  $73^\circ22'E$ ) stands on the NW bastion of the fort situated on Fort Point.

- 3 Wagapur Point Light ( $16^\circ36'N$ ,  $73^\circ19'E$ ) (7.75).  
Ratnāgiri Light ( $16^\circ59'N$ ,  $73^\circ16'E$ ) (7.75).

**Directions**

(continued from 7.29)

**7.56**

- 1 From a position WSW of Mālvan Bay ( $16^\circ03'N$ ,  $73^\circ28'E$ ) the route leads about 33 miles NNW to a position

W of Vijayadurg Harbour, passing (with positions from Devgarh Hill (16°19'N, 73°24'E)):

- 2 WSW of Kura Islet (13 miles S), the largest of three rocks standing in the centre of a group of rocks, with shoal water extending about 1½ miles S. Thence:
- 3 WSW of Kura Patches (8½ miles S), thence:  
WSW of Mumbri Point (3¾ miles NNW) forming the N arm of Mumbri Bay, thence:
- 4 WSW of Parweka Point (15 miles NNW), a low rocky point with foul ground extending 3 cables SW and 5 cables NE. Thence:
- 5 To a position W of Vijayadurg Harbour.

### Useful mark

#### 7.57

- 1 Achra Point Light (framework tower, 9 m in height) (16°12'N, 73°26'E) standing on the point of that name is exhibited during the fine weather season. (*Directions continue at 7.77*)

## Devgarh

Chart 1508

### General information

#### 7.58

- 1 **Position.** The town of Devgarh (16°22'·4N, 73°22'·5E) is situated at the head of a bay lying on the E side of a peninsula on the S bank of the Kharāda River.
- 2 **Topography.** Fort Point, 37 m high, forms the NW extremity of the rocky peninsula which appears as an island. The Western Ghāts, some 20 miles inland, may be seen in good visibility against the skyline.
- 3 **Function.** The port provides a fishing harbour on the NE side of the peninsula which gives shelter to small craft from N and S winds. In addition to the fishing trade, other cargoes handled at the port include mangoes, tiles, salt and timber.
- 4 **Approach and entry.** The port is approached from W and entered between Fort Point and the N entrance point, 6 cables NW.  
**Traffic.** The port is used regularly by coasters and local craft.
- 5 **Port authority.** The harbour is in the charge of an Assistant Port Supervisor.

### Tidal information

#### 7.59

- 1 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 1·6 and 0·8 m.
- 2 **Tidal streams.** In the offing tidal streams are irregular, both in strength and direction, being much influenced by the wind; on several occasions they have been observed to set, NW on the in-going stream and SSW on the out-going stream, with a rate of up to 1½ knots.
- 3 At the harbour entrance, the out-going spring stream attains a rate of 1 to 1½ kn.

### Harbour information

#### 7.60

- 1 **Storm signals** are displayed from the flagstaff standing on Fort Point, the brief system is used. See 1.47.
- 2 **Landmarks:**  
Devgarh Harbour Light (16°23'·3N, 73°22'·4E) (7.55).

Flagstaff (standing close S of the above light).  
For other landmarks see 7.55.

### Directions

#### 7.61

- 1 The alignment (090°) of the N side of the fort on Fort Point with Saddle Hill (16°23'N, 73°25'E) leads towards the harbour; thence, when about 1 mile from Fort Point with Mumbri Point (16°22'N, 73°22'E) bearing about 153°, steer to pass through the fairway N of Fort Point, passing:
- 2 S of the foul ground and depths of 5 m that extend 3 cables SW from the N entrance point of the harbour, and:  
N of a rocky patch that extends 1 cable N from Fort Point, thence:  
To the anchorage.
- 3 **Useful marks** (positioned from the S end of a ruined fort (16°23'·1N, 73°22'·4E)):  
Light beacon (1½ cables ESE) standing on the E coast of the peninsula.  
Tower (1¾ cables SSE) (39 m in height).  
Tower (3 cables S).  
Tower (5 cables SSW) (36 m in height).

### Anchorage and berth

#### 7.62

- 1 **General anchorage.** The recommended anchorage is with Devgarh Harbour Light bearing 203°, distant 2½ cables, and the N entrance point of the harbour bearing 306°, in a depth of 6 m, mud.  
**Small vessels** can find more sheltered anchorage SE of Fort Point in depths of 3 to 4 m.
- 2 **Berth:** there is a T-shaped jetty with a 31 m berthing face, depth alongside about 2·4 m, on the E side of the fort.

### Port service

#### 7.63

- 1 **Facility:** hospital.

## Vijayadurg

Chart 1508

### General information

#### 7.64

- 1 **Position.** Vijayadurg (16°33'N, 73°20'E) is a small fishing village situated near the N end of the peninsula that forms the W bank of Vāghotan River.
- 2 **Function.** The port provides an open harbour, about 1½ miles wide at its entrance, in a bay on the N side of the peninsula. The anchorage is used during the fine weather season only; however, the river affords good shelter to small vessels during the SW monsoon.
- 3 **Traffic.** Fishing vessels, small coasters and pleasure craft use the port.

### Tidal information

#### 7.65

- 1 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 1·7 and 0·9 m.
- 2 **Tidal stream.** In the river the out-going spring stream attains a rate of about 4 kn in freshets.

### Storm signals

#### 7.66

- 1 Storm signals are displayed from a flagstaff standing on the fort situated at the N end of the peninsula, the brief system is used. See 1.47.



**Directions****7.67**

- 1 From a position W of the harbour vessels should steer towards the harbour, passing (with positions from Burmana Point (16°33'·5N, 73°19'·0E)):
- 2 N of Burmana Reef (between 2 cables WNW and 2½ cables N), over which the sea breaks; the reef, which extends from shore, is covered by the red sector (045°–090°) of Vijayadurg Light (16°33'·7N, 73°20'·0E). Thence:
- 3 N of Vijayadurg Fort (1 mile ENE) which stands on a rocky point, 26 m high, and forms the W entrance point to Vāghotan River; from S the fort is obscured by high land. Thence:  
Vessels should proceed to the anchorage, or:
- 4 Shallow draught vessels with local knowledge can follow the fairway, passing between the fort and a cliff surmounted by a ruin, 6½ cables ENE, to the river. Depths in the fairway are about 4·5 m but decrease sharply in the river. During the fine weather season, a light-buoy (red, barrel) and a buoy (red, barrel) are moored, respectively, 2¾ cables ESE and 4¾ cables SE of the storm signal flagstaff.
- 5 Vessels of 2·1 m draught can navigate the river as far as Vāghotan, a village 7½ miles ESE of the fort, where there is a stone jetty.
- 6 **Useful mark:**  
Vijayadurg Light (white metal tower, red bands, 6 m in height) (16°33'·7N, 73°20'·0E), stands on the NE corner of the fort.

**Anchorage and berth****7.68**

- 1 **General anchorage**, during the fine weather season, can be obtained anywhere in the harbour according to draught; a convenient cargo handling anchorage lies 5 cables NNE of Vijayadurg Light in depths of about 8 m, mud.
- 2 **Shallow draught vessels** can enter the river and lie in smooth water about 5 cables ESE of Vijayadurg Light; a long vessel should be moored head and stern to face the out-going stream.
- 3 **Berth:** there is a T-shaped jetty with a 69 m berthing face 5 cables SE of Vijayadurg Light.

**Landing****7.69**

- 1 Landing may be effected on the S shore of Chiwallyachi Bandar Bay (16°04'N, 73°27'E), but during NW winds landing is better in Mālvan Bay, 1 mile S.
- 2 Foul ground and shoal patches extend up to 3 cables NW and SW, respectively, from the S and N entrance points of Chiwallyachi Bandar Bay.

**River****7.70**

- 1 Achra River (16°12'N, 73°26'E) is accessible by small boats only.

**Other names****7.71**

- 1 Girye Bay (16°31'N, 73°19'E).  
Tokul Point (16°32'N, 73°19'E).

**VIJAYADURG TO MIRYA HEAD****General information**

*Charts 3460, 1508*

**Topography****7.72**

- 1 The coastline consists of bold rocky capes and small sandy bays which are entered by numerous rivers, creeks and streams, it is backed inland by a range of undulating hills which rise gradually from the coast. In the S part, between Vijayadurg Harbour (16°34'N, 73°19'E) and Rājāpur Bay, about 2 miles NNW, the cliffs are faced with large masses of laterite; farther N, between Wada Vetye (16°41'N, 73°20'E) and Pavas Bay, 13 miles NNW, the coast consists of a rocky tableland.

**Depths****7.73**

- 1 Within the 10 m depth contour isolated rocks and foul ground fringe the coast up to about 5 cables in places, seaward of the 20 m depth contour there are no charted dangers.

**Currents****7.74**

- 1 See 7.6.

**Principal marks****7.75**

- 1 **Landmarks:**  
Thimba Palace (16°59'N, 73°19'E).  
Bhagwati Temple (17°00'N, 73°16'E).  
Mirya Peak (17°01'·5N, 73°15'·8E).  
Tree (17°02'N, 73°18'E).
- 2 **Major lights:**  
Devgarh Harbour Light (16°23'N, 73°22'E) (7.55).  
Wagapur Point Light (white square concrete tower, black bands, 20 m in height) (16°36'N, 73°19'E).  
Ratnāgiri Light (white round concrete tower, black bands, 15 m in height) (16°59'N, 73°16'E); an auxiliary light is exhibited from a concrete pedestal standing nearby.  
Jaigarh Head Light (17°18'N, 73°12'E) (7.99).

**Other aid to navigation****7.76**

- 1 Racon (16°59'N, 73°16'E) at Ratnāgiri Lighthouse (7.75).  
For details see *Admiralty List of Radio Signals Volume 2*.
- 2 Certain aids to navigation are unreliable and may be missing, unlit or out of position. The mariner is advised to navigate with caution.

**Passage directions**

*(continued from 7.57)*

**7.77**

- 1 From a position W of Vijayadurg Harbour (16°34'N, 73°19'E) the route leads about 28 miles N to a position W of Mirya Head; for this route the chart is sufficient guide.  
Vessels proceeding to Mumbai (Bombay) or further N may proceed direct NNW or NW to the recommended offshore routes (7.149), passing W of a dangerous wreck (17°17'N, 72°58'E), the position which is approximate.

**Useful marks****7.78**

- 1 Holī Hill (89 m high) (16°36'·5N, 73°21'·5E), a round sloping hill presenting the same appearance from



all directions; it stands out from the tableland nearby which is faced with steep cliffs.

- 2 Musākāzi Point Light (framework tower, 9 m in height) (16°37'N, 73°20'E), is exhibited from 1st September to 31st May.
- 3 Lamblekri Hill (100 m high) (16°42'N, 73°19'E).
- 3 Purangad Bay Light (framework tower, 9 m in height) (16°49'N, 73°18'E), is exhibited from 1st September to 31st May.
- 4 Golap Hill (16°54'N, 73°17'E).
- 4 Dali Dongar (278 m high) (16°56'N, 73°26'E), a round wooded hill.
- 4 The Fort (16°59'·5N, 73°16'·5E), standing in the centre of the peninsula, is an old Mahratta structure which covers a bold laterite headland that appears from the distance as an island.
- 5 Mirya Head (17°02'N, 73°16'E), a headland which is lighter in colour than the land nearby consists of laterite rock with steep cliffs facing the sea, when seen from N or S it looks like an island.

(Directions continue at 7.100)

### Ratnāgiri

Chart 3460 plan of Ratnāgiri and Mirya Bays

#### General information

##### 7.79

- 1 **Position.** The town of Ratnāgiri (16°59'·5N, 73°18'·0E) stands on the brow of a flat ridge about 45 m high, close N of Bhatya Creek, at the NE side of Ratnāgiri Bay.
- 2 **Function.** Ratnāgiri Bay provides an open anchorage suitable for the landing of passengers or cargo during the fine weather season; however, during the SW monsoon the bay affords no shelter and trade is diverted to Kālabādevi Bay (7.117), about 5 miles N.
- 3 **Approach and entry.** Ratnāgiri Bay is entered between Kushipur Point (16°57'N, 73°17'E) and an unnamed peninsula surmounted by a fort (7.78), 2 miles NNW.
- 4 **Traffic.** In 2003, the port was used by 101 vessels with a total dwt of 913 544.

**Port authority** is exercised by the Port Officer.

#### Limiting conditions

##### 7.80

- 1 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 1·8 and 0·9 m.
- 2 **Local weather.** The port is exposed to the SW monsoon and W winds.

#### Harbour information

##### 7.81

- 1 **Port radio.** A coast radio station transmits from the port. For details see *Admiralty List of Radio Signals Volume 1(1)*.
- 2 **Fishing.** In January and February large numbers of canoes engage in sardine fishing.
- 2 **Storm signals** are displayed from Ratnāgiri Lighthouse (16°59'·2N, 73°16'·4E), the brief system is used. See 1.47.
- 3 **Climate.** For details see climatic table 1.216.
- 3 **Landmarks:** see 7.75.
- 3 **Offshore dangers:**
  - Brum Mudle Rock stands about 3 cables N of Kushipur Point, it is surrounded by a reef and shoal water, over which the sea breaks heavily during the SW monsoon.
- 4 A reef, over which the sea breaks heavily in bad weather, extends 3¼ cables S from the shore

4¾ cables ENE of the N entrance point of the bay; a disused jetty stands on the reef,

#### Anchorage and landing

##### 7.82

- 1 **Outer anchorage.** At the start and end of the SW monsoon, vessels should anchor with Ratnāgiri Lighthouse bearing 000° distant about 6 cables, in a depth of 11 m, mud; as shown on the chart.
- 2 **Inner anchorage.** During the fine weather season vessels can anchor with the same lighthouse bearing about 325° distant 6 cables, in a depth of 9 m, mud; as shown on the chart. A shallow draught vessel may anchor farther N.
- 3 **Landing:** in Ratnāgiri Bay, during the NE monsoon, is at a stone jetty near the Custom House about 7 cables E of Ratnāgiri Lighthouse. A good lookout must be kept for the reef described above and for isolated patches of rock; the latter, covered with kelp and seaweed, are nearly awash but the sea does not always break over them.
- 4 During W winds, which in the fine weather season may last for up to three days, there is often a considerable swell making landing here hazardous.

The SW monsoon raises a heavy surf in the bay making landing usually impracticable.

It is advisable to use local boats when conditions are marginal.

#### Port services

##### 7.83

- 1 **Facility:** hospital.
- Supplies:** fresh water; fresh provisions.
- Communications:** national airport.

#### Small craft

##### 7.84

- 1 At high water small craft can navigate Bhatya Creek.

### Mirya Bay

Chart 3460 plan of Ratnāgiri and Mirya Bays

#### General information

##### 7.85

- 1 **Position.** Mirya Bay (17°00'N, 73°16'E), situated close NW of the town of Ratnāgiri (7.79), lies between two peninsulas extending W from the N and S ends of an area of sand dunes which form the head of the bay.
- 2 **Function.** Mirya Bay provides anchorage and a harbour for small craft; the main export is frozen shrimp.
- Approach and entry.** Mirya Bay is entered between Galee Point (17°00'N, 73°16'E) and Miyet Point, 1½ miles NNW.

#### Harbour information

##### 7.86

- 1 **General layout.** Bhagwati Bunder Harbour is situated on the S side of the bay, it is protected by Commercial Breakwater which extends about 2½ cables N from Galee Point. A fishing harbour, also protected by a breakwater, is situated in the SE corner of the bay.
- 2 **Storm signals** are displayed from a position near the root of the fishing harbour breakwater, 4½ cables E of Galee Point.
- Landmarks:** see 7.75.
- 3 **Offshore dangers** (positioned from Galee Point):
  - Taylor Shoal (Mudle Shoal) (8½ cables N) over which the sea breaks at low water, is marked on its S side by a buoy (red, can).
- 4 An unnamed shoal (5 cables NE) is marked on its SW side by Mirkerwāde Buoy (red, conical).

A shoal patch (2 cables NNE), lying on the E side of Commercial Breakwater, is marked near its E extremity by a buoy (black, conical).

5 **Useful marks** (positioned from Galee Point):

Radio Mast (4½ cables E).

Pillar (1¼ miles NE).

Pillar (1½ miles NNE).

Pillar (1½ miles N).

### Berthing facilities

#### 7.87

- 1 **Anchorage.** Small vessels may anchor in the N part of Mirya Bay, with shelter from NW winds, in depths of about 6 m, sand.

**Berth.** Clinker Jetty, a finger jetty 200 m long, with a depth of about 6 m near its head is situated 1¾ cables E of Commercial Breakwater.

- 2 **Mooring buoy.** A mooring buoy is moored between Clinker Jetty and Commercial Breakwater from September to May inclusive.

**Development.** Berths are reported to be under construction in the vicinity of Clinker Jetty.

### Bays, rivers and anchorages

*Chart 1508*

#### Rājāpur Bay

##### 7.88

- 1 **Position.** Rājāpur Bay is entered between Wagapur Point (16°36'N, 73°19'E) and Musākāzi Point, 1 mile NE.

- 2 **Kodāvali River** flows into the head of Rājāpur Bay through Rājāpur Creek, the bar of the creek has charted depths from 1.0 to 1.5 m. The village of Jaitāpur stands at the head of the creek about 1½ miles within the bar; Rājāpur, a fairly important town, lies 15 miles farther inland but the river is not navigable so far upstream.

- 3 **Traffic.** Local vessels call regularly.

**Storm signals** are displayed at Jaitāpur, the brief system is used. See 1.47.

- 4 **Anchorage:** Rājāpur Bay affords anchorage in depths of about 8 m, mud, with protection from NW winds which may blow strongly during the fine weather season; however, this anchorage is not safe during W winds which raise a heavy short swell, at such times small craft can find anchorage in Rājāpur Creek. During SW winds Tulsunde

Cove, situated in the SE corner of the bay, affords good shelter in depths of about 2.5 m.

#### Ambolgarh Bay

##### 7.89

- 1 **Position.** Ambolgarh Bay is entered between Musākāzi Point (16°37'N, 73°20'E) on which stands a light (7.78) and Ambolgarh Point, 1 mile NNW.

- 2 **Topography.** The bay has a sandy beach fronting laterite ridges with the ruins of a large salt works situated in a valley on its S side.

- 3 **Ambolgarh Reef,** lying 2½ cables SW of Ambolgarh Point, has a small drying patch at its centre; the sea breaks heavily over this reef. A buoy (black, conical) is moored during the fine weather season near the SW extremity of the reef.

- 4 A dangerous wreck lies near the coast about 5 cables NNW of Ambolgarh Reef.

- 5 **Clearing marks.** The alignment (108¼°) of Musākāzi Point with Holi Hill (1¾ miles ESE) (7.78) leads S of Ambolgarh Reef.

#### Purangad Bay

##### 7.90

- 1 **General information.** Purangad Bay (16°48'N, 73°18'E) is entered at its head by Machkandi River, the town of Gaonkhadi lies on its S bank and a ruined fort stands on a bare hill on the N side of the river mouth.

- 2 **Storm signals** are displayed at Purangad Bay Light (16°49'N, 73°18'E) (7.78), the brief system is used. See 1.47.

#### Pavas Bay

##### 7.91

- 1 **Position.** Pavas Bay is entered S of Pavas Point (16°54'N, 73°17'E) and has an entrance 7 cables wide.

- 2 **Anchorage:** large vessels anchor 1 mile SSW of Pavas Point in depths of about 14 m, mud; as shown on the chart. Small craft can obtain anchorage in the bay, with shelter from NW winds, 7 cables ESE of Pavas Point in depths of about 8.5 m, mud and sand.

- 3 **Berth:** a T-shaped jetty extends about 180 m from a position on the N shore of the bay, close within its entrance; the jetty has an outer face 28 m long with four dolphins, two on each side, positioned 45 and 60 m from its head.

## MIRYA HEAD TO MUMBAI (BOMBAY)

### MIRYA HEAD TO PORT DĀBHOL

#### General information

*Charts 3460 plan of Ratnāgiri and Mirya Bays, 1508*

#### Route

##### 7.92

- 1 From a position W of Mirya Head (17°02'N, 73°16'E) the route leads about 33 miles NNW to a position WSW of Port Dābhol.

#### Topography

##### 7.93

- 1 The coastline consists of large and small sandy bays bounded by rocky points which are interspaced by several rivers; the hinterland rises to numerous hills with the Western Ghāts standing in the distance.

#### Depths

##### 7.94

- 1 There are 2 charted dangerous wrecks (7.100) seaward of the 20 m depth contour, otherwise there are no charted dangers.

#### Fishing stakes and vessels

##### 7.95

- 1 Between Boria Point (17°24'N, 73°10'E) and Kanhoji Angre Island (Chart 1487), 80 miles NNW, fishing stakes may be encountered in depths of less than 25 m. A good lookout should be maintained, and a wide berth given to them; they are normally removed each year during the SW monsoon.

- 2 Large numbers of wooden fishing vessels, giving poor radar returns, may be encountered off this stretch of coast particularly in the vicinity of Port Dābhol (17°35'N, 73°11'E).

**Measured distance****7.96**

- 1 There is a measured distance (1852 m) located on Jaigarh Head (17°18'N, 73°12'E):
  - South-south-east marks, 2 beacons in line bearing 070¾°;
  - North-north-west marks, 2 beacons in line bearing 070¾°;
- 2 Running track 340¾°.

**Currents****7.97**

- 1 See 7.6.

**Storm signals****7.98**

- 1 Storm signals are displayed at the village of Mālgund (17°10'N, 73°16'E), the brief system is used. See 1.47.

**Principal marks****7.99**

- 1 **Landmarks:**
  - Kaljondhi Hill (17°12'N, 73°19'E), a tree on its summit is prominent when viewed from S.
  - Boria Pagoda (17°24'N, 73°10'E), a small Hindu temple stands on the NW point of Boria Point.
- 2 Dome (17°35'N, 73°10'E), a temple with a green dome.
- Bālāpir Mosque (17°36'N, 73°13'E), a dome-shaped tomb standing on a conical hill, the summit of which, surmounts flat ridges of laterite rock.
- 3 **Major lights:**
  - Ratnāgiri Light (16°59'N, 73°16'E) (7.75).
  - Jaigarh Head Light (red cast iron tower, white bands, 21 m in height) (17°18'N, 73°12'E); a flagstaff stands close SSE of the light.
- 4 Tolakeswar Point Light (white square masonry tower, 14 m in height) (17°34'N, 73°09'E); because of its elevation this light may occasionally be obscured by cloud.

**Directions***(continued from 7.78)***7.100**

- 1 From a position W of Mirya Head (17°02'N, 73°16'E) the route leads about 33 miles NNW to a position WSW of Port Dābhol, passing (with positions from Jaigarh Head (17°18'N, 73°12'E)):
  - 2 WSW of Sookana Shoals (14 miles SSE), thence: WSW of Neori Point (12 miles SSE), a salient point 64 m high. Thence: WSW of Warori Bluff (6½ miles SSE), a small peninsula 70 m high. Thence:
  - 3 WSW of Boria Point (6½ miles NNW), a headland with several summits and a dangerous wreck lying 1½ miles SSE. Thence: WSW of a submerged current meter array (uncharted) (14¼ miles NNW) laid about 9 cables off the coast, in position 17°31'·5N, 73°08'·4E; the device is marked by a red float and, by two wave rider light-buoys (red, special) moored in the vicinity. Thence:
  - 4 WSW of a dangerous wreck (14 miles NNW), the position of which is approximate, thence: WSW of a dangerous wreck (16½ miles NW), the position of which is approximate, thence:
  - 5 To a position WSW of Port Dābhol.

**Useful marks****7.101**

- 1 Tonkul Peak (17°02'·6N, 73°15'·6E).
- Warori Bluff Light (framework tower, 9 m in height) (17°12'N, 73°15'E), is exhibited from 1st September to 31st May.
- 2 Boria Bay Light (framework tower, 9 m in height) (17°23'N, 73°12'E), is exhibited from 1st September to 31st May.
- 3 Pālshet Light (framework tower, 9 m in height) (17°27'N, 73°11'E), is exhibited from 1st September to 31st May; the light is obscured by high land when bearing more than 141°.
 

*(Directions continue at 7.129)*

**Jaigarh***Chart 1508***General information****7.102**

- 1 **Position.** The town of Jaigarh (17°18'N, 73°13'E) stands on the NE side of the peninsula which forms the SW bank of the Shāstri River.
- 2 **Function.** The river estuary forms a well sheltered harbour with fairly easy access, even during the SW monsoon, for vessels of about 3 m draught.
- 3 **Approach and entry.** Jaigarh Bay is entered between the N point of Jaigarh Head (17°18'N, 73°12'E) and Bhandār wādi Point 1¾ miles NE.

**Tidal information****7.103**

- 1 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 1·9 and 1·2 m.

**Harbour information****7.104**

- 1 **Storm signals** are displayed from Jaigarh Head, the brief system is used. See 1.47.
- 2 **Offshore dangers** (positioned from Damankul Light (white framework tower, 9 m in height) (17°18'·3N, 73°11'·8E), which is exhibited from 1st September to 31st May):
  - 3 Foul ground and isolated rocks (3 cables W) extend about 1½ cables from shore NE of Kardeshwar Point (7.105).
  - Katane Reef (1¾ miles NE); an area of foul ground, the site of a wreck, lies 2 miles WNW of the reef.
  - 4 Mora Sands (1¾ miles ESE) a drying sandspit that extends WSW from Tavsāl Point to the E edge of the channel abreast the town of Jaigarh.
  - Kurli Sand (3½ miles ESE) a drying spit of sand and mud (charted as an island) lies on the S bank of the river close E of the inner anchorage.
- 5 **Landmark:**
  - Jaigarh Head Lighthouse (17°18'N, 73°12'E) (7.99).

**Directions****7.105**

- 1 **Caution.** Depths over the bar are liable to change, local knowledge is required.
- 2 Vessels approaching Jaigarh Bay from S should not close Kardeshwar Point (17°18'·2N, 73°11'·6E) within 3 cables; the point appears as a level, almost barren, plateau ending in steep laterite cliffs upon which a Hindu temple stands. Thence, pass well clear of the foul ground lying NE of the point and steer towards Damankul Anchorage or to the channel which crosses the bar.



3 The bar of Shāstri River extends NNE, from shore, about 1 mile ESE of Damankul Light to a position just E of Katane Reef. A channel, with a least charted depth of 3.3 m (1986) leads across the S part of the bar about 2 cables offshore; there was a least charted depth of 2.1 m on the bar (1986) situated close N of the channel.

4 A navigable channel, about 1 cable wide, leads S then SE between the town of Jaigarh and Mora Sands to the inner anchorage. The channel is marked, during the fine weather season from September to May inclusive by 2 light-buoys (red, conical), moored on its E side. The channel continues E, passing N of Kurli Sand, and has a least depth of about 6.1 m in the fairway which lies about 1 cable off the N bank of the river; the channel S of Kurli Sand is shallow.

5 **Useful marks:**

North Bastion Light (17°18'·0N, 73°13'·3E) is exhibited from the NW corner of Jaigarh Fort.  
Custom House Light (17°17'·8N, 73°13'·4E) is exhibited from a post 2¾ cables SSE of N Bastion Light.

6 Jaigarh Fort (17°18'·0N, 73°13'·4E) is an old Mahratta fortress, within which are some houses, standing on a rocky point.

Trize Kila (17°18'·1N, 73°14'·5E), a ruined fort, stands on Tavsāl Point.

### Anchorage and berth

#### 7.106

1 **Damankul Bay.** The bay affords anchorage in a position 4 cables E of Damankul Lighthouse, in depths of about 8 m, mud; as shown on the chart.

2 **Shāstri River.** Small craft may obtain good sheltered anchorage close E of the town of Jaigarh; however, the best inner anchorage is W of Kurli Sand, about 7 cables SE of Custom House Light, in depths of 8 m.

3 **Berth.** A concrete jetty, 81 m long with a depth alongside of about 6.2 m, lies 3 cables S of Custom House Light.

### Port services

#### 7.107

1 **Supplies:** fresh provisions and water, both in small quantities.

### Small craft

#### 7.108

1 **Shāstri River** which flows into the head of Jaigarh Bay is navigable by small craft. The river is tidal as far as the important town of Sangameshwar, 28 miles from its mouth; it is shallow but free from dangers in the fairway. About 18 miles from its mouth the river is joined by three tributaries.

### Port Dābhol

*Chart 1508 (see 1.14)*

### General information

#### 7.109

1 **Position.** The town of Dābhol (17°35'N, 73°11'E) stands at the foot of the hills on the N bank of the Vāshishti River.

**Function.** The port provides an open roadstead anchorage and limited facilities in the river estuary for vessels carrying tiles.

2 **Topography.** The land on both sides of the river is hilly and undulating; the hills, from about 90 to 120 m high, slope steeply down to the coast and in places terminate in

cliffs from 5 to 25 m high. There are 2 bays on the S bank of the river situated near its mouth, Anjanvel Bay, the largest, lying E of Gopālgarh Fort (17°34'·3N, 73°09'·1E) with the town of Anjanvel situated close S, is shallow and a heavy swell runs at all times; Veldur Bay, also shallow, is located about 1 mile farther upstream.

3 **Approach and entry.** The anchorage is approached direct from seaward. The river is entered between Tolleshwar Point (17°34'·0N, 73°08'·5E), and Sil Point, 1¾ miles ENE; Churpulti Sand, a spit which dries, extends about 1¼ miles WSW from Sil Point.

4 **Traffic.** The port is used regularly by local small vessels.

5 **Development.** To facilitate access of construction traffic for a power station being built at the port, a buoyed channel, depth about 5.5 m and 100 m wide has been dredged over the sandbar near the entrance to the Vāshishti River. Additional wharf construction has also taken place.

### Tidal information

#### 7.110

1 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 2.0 and 1.2 m.

2 **Tidal streams** set NE over the bar on the in-going stream and SW on the out-going stream, each attaining a rate of about 1½ kn; inside the bar; the in-going stream sets into Anjanvel Bay and the out-going stream sets onto Churpulti Sand at a rate of 2 to 3 kn.

3 The in-going stream continues for about 1 hour after high water and the out-going stream for about 1 hour after low water; occasionally at neaps the out-going stream starts 1 hour before high water.

### Pilotage

#### 7.111

1 On application to the Sarkarkun (Customs and Port Officer) a local uncertified pilot may be obtained.

### Harbour information

#### 7.112

1 **Storm signals** are displayed from Dābhol Jetty, the brief system is used. See 1.47.

2 **Landmarks:**

Tolleshwar Point Lighthouse (17°33'·9N, 73°08'·5E) (7.99).

Dome (17°35'N, 73°10'E) (7.99).

Bālāpir Mosque (17°36'N, 73°13'E) (7.99).

### Directions

#### 7.113

1 **Cautions:**

Care must be taken to avoid fishing logs which are often moored both inside and outside of the river. Depths on the bar are subject to change.

Ferries cross the river in a SW and SE direction from Dābhol Jetty.

2 A dangerous wreck (17°32'·0N, 73°02'·0W), the position of which is approximate, lies S of the alignment of the leading lights and W of the SPM (7.114).

3 Vessels approaching the port should keep in depths of more than 9 m, thence from a position about 1½ miles W of Tolleshwar Point Lighthouse:

4 **Leading lights:**

Front light (triangle apex up, on a concrete post, 3 m in height) (17°34'·4N, 73°09'·2E) stands close N of the ruins of Gopālgarh Fort.



Rear light (white metal tower, 4 m in height) (7¼ cables E of front light) stands on the N slope of Veldūr Hill.

- 5 The alignment (081°) of these lights, which are exhibited during the fine weather season from September to June inclusive, lead across the bar in a least charted depth (1986) of 2.2 m towards the river estuary. A buoy (red, can) marking the W end of the bar is moored about 1¼ cables N of the alignment.

- 6 When N of Tolleshwar Point Lighthouse steer in deep water to pass, S of a buoy (port hand) moored off the WSW extremity of Churpulti Sand to a position about ¾ cable N of the front leading light.

- 7 When N of the front leading light alter course to keep in mid-channel passing S of Churpulti Sand which is marked, during the fine weather season, at its inner end by a light-buoy (port hand) moored 2 cables SW of Sil Point and N of the coastal reef which extends about ½ cable N of Veldūr Hill.

- 8 **Useful marks:**

Ranvi Point (17°33′.4N, 73°08′.3E) has a very large boulder and overhanging cliff close N of it.

- 9 Tolleshwar Point (17°34′.0N, 73°08′.5E), a bold point faced with cliffs about 90 m high; an ancient Hindu temple and a prominent clump of trees stand on its summit. A prominent pinnacle of rock, 6.1 m high, stands on a ledge fringing Tolleshwar Point.

- 10 Dābhol Light (wooden mast, 4 m in height) (17°35′.0N, 73°10′.6E) is exhibited from the SW corner of the jetty during the fine weather season mid-September to mid-June; the Custom House, a mosque and a flagstaff stand near of the light. Beacon (triangular topmark) (17°34′.3N, 73°09′.1E) standing near the N end of Gopālgarh Fort.

## Anchorage and berths

### 7.114

- 1 **Large vessels** may anchor in the roadstead, 1¼ miles WNW of Tolleshwar Point Lighthouse, in depths of about 10 m, clay; as shown on the chart.
- 2 **Single point mooring.** A SPM has been established in the roads in position 17°31′.9N, 73°04′.8E; a submarine pipeline connects the buoy to the shore E and lands in position 17°32′.2N, 73°09′.2E.

**Dābhol Jetty**, a T-headed pier about 50 m long stands on the N bank of the river in the close vicinity of Dābhol Light (17°35′.0N, 73°10′.6E).

- 3 **Small vessels** may anchor in mid-stream S of Dābhol Jetty in depths of about 8½ m, sand and clay.

**Veldur Bay Berth**, a dog leg-shaped jetty 76 m long stands near the NW corner of the bay; it is suitable for small craft.

## Port services

### 7.115

- 1 **Facility:** limited medical only.  
**Supplies:** fuel and fresh provisions, both in small quantities; fresh water is not available.
- 2 **Communication:** by sea is regularly maintained with Harnai (7.139), Port Bānkot (7.131) and Mumbai (7.191).

## Vāshishti River

### 7.116

- 1 **Vāshishti River** is navigable at all times by vessels of shallow draught as far as Kārbone, 16 miles within the

river entrance; and thence, at high water only, to Chiplūn, 10 miles farther upstream.

## Coastal bays and anchorages

*Charts 3460 plan of Ratnāgiri and Mirya Bays, 1508*

## Kālabādevi Bay

### 7.117

- 1 **Position.** Kālabādevi Bay (17°04′N, 73°16′E) is entered between Sookana Point, the NW point of Mirya Head, and Kurne Point, 45 m high, 2½ miles NE.

- 2 **Creeks:** Kālabādevi Creek enters the bay 1½ miles SE of Sookana Point, a village with several temples lies on the N side of the entrance; Shirgaon Creek has its confluence with Kālabādevi Creek S of the entrance, it is navigable by local craft at high water.

Both creeks and the entrance are crossed by ferries.

- 3 **Anchorage** may be obtained, with shelter from the SW monsoon, 7 cables E of Sookana Point in depths of about 8 m.

## Warori Bluff Bay

### 7.118

- 1 **Position.** Warori Bluff Bay (17°12′N, 73°14′E), a small bay lying on the N side of Warori Bluff.

- 2 **Anchorage** may be obtained by small vessels, with shelter from the SW monsoon, in the S part of the bay in depths of 5.5 m, mud.

## Ambwah Bay

### 7.119

- 1 **Position.** Ambwah Bay (17°16′N, 73°13′E), a small bay lying SE of Ambwah Point.

**Anchorage** may be obtained by small vessels, with shelter from NW winds, ESE of Ambwah Point in depths of about 7.3 m, sand and mud.

## Boria Bay

### 7.120

- 1 **Position.** Boria Bay (17°22′N, 73°12′E), a small bay lying SE of Boria Point.

- 2 **Anchorage** may be obtained by small vessels, with shelter from NW winds, in depths of about 8 m, mud.

## Pālshet Bay

### 7.121

- 1 **Position.** Pālshet Bay (17°26′N, 73°11′E), a small bay about 5 cables wide at its W facing entrance, indents a straight stretch of coast N of Boria Point.

- 2 **Function.** The bay provides a harbour for fishing vessels.

- 3 **Berth.** There is a small passenger jetty at Pālshet Port located near the head of the bay.

## Other name

### 7.122

- 1 Guhāgar (17°29′N, 73°12′E), a large village.

## PORT DĀBHOL TO KUMBARU POINT

## General information

*Chart 1508*

## Route

### 7.123

- 1 From a position WSW of Port Dābhol (17°35′N, 73°11′E) the route leads about 40 miles NNW to a position WSW of Kumbaru Point.

**Topography****7.124**

- 1 The coast is generally straight with numerous shallow bays bounded by rocky headlands and several rivers. Between Port Dābhol and Sāvitrī River, 25 miles NNW, the hinterland consists of a series of plateaux the seaward slopes of which, are for the most part abrupt, but in places there is a narrow strip of land between the plateaux and the coast; the vegetation consists of sparse bushes with very few trees. Towards the N part of this stretch of coast Kumbaru Point fronts densely wooded hills which rise to about 240 m.

**Depths****7.125**

- 1 There are no charted dangers seaward of the 20 m depth contour.

**Fishing stakes****7.126**

- 1 See 7.95.

**Currents****7.127**

- 1 See 7.6.

**Principal marks****7.128**

- 1 **Landmarks:**  
Temple (17°50'N, 73°06'E).  
Hareshwar Hill (17°59'N, 73°02'E), a small conical hill with a dark appearance.
- 2 Beacon (18°01'N, 73°00'E) standing on Srīvardhan Point.  
Bluff (18°13'N, 72°58'E).  
For landmarks at Port Dābhol see 7.112.
- 3 **Major lights:**  
Jaigarh Head Light (17°18'N, 73°12'E) (7.99).  
Tolkeshwar Point Light (17°34'N, 73°09'E) (7.99).  
Nānwel Point Light (18°17'N, 72°56'E) (7.147).

**Directions**

(continued from 7.101)

**7.129**

- 1 **Cautions:**  
Vessels proceeding close inshore between the entrances to Vāshishti River (17°35'N, 73°09'E) and Sāvitrī River, 25 miles NNW, should keep at least 2 miles offshore and in depths of more than 9 m thus avoiding all charted shoals lying between these two entrances.
- 2 Vessels should take care to avoid logs marking fisheries, which may be encountered during the fine weather season, about 5 miles W of the entrance to Jog River (17°50'N, 73°05'E).
- 3 From a position WSW of Port Dābhol (17°35'N, 73°11'E) the route leads about 40 miles NNW to a position WSW of Kumbaru Point, passing (with positions from Gogul Point (17°57'N, 73°02'E)):
- 4 WSW of Janjira Fort (8½ miles SSE), a fortified islet covered with vegetation; this islet, which is backed by a range of hills, is not easily distinguished from seaward. The channel between the islet and the mainland E is encumbered with rocks and passage should not be attempted. Thence:
- 5 WSW of an unnamed point (3 miles SSE) with a reef, over which the sea breaks heavily, extending about

8 cables NW. The point and its reef are surrounded by shoal water. Thence:

- 6 Clear of a dangerous wreck (15 miles NNW), thence: WSW of Shah Jehan Shoal (17 miles NNW), depths are irregular for a short distance W of this shoal and vessels in the vicinity should keep in depths of more than 11 m. Thence:
- 7 To a position WSW of Kumbaru Point (17 miles NNW).

**Useful marks****7.130**

- 1 Gimona Peak (17°48'N, 73°09'E).  
Harnai Light (white masonry tower, 10 m in height) (17°48'N, 73°05'E) stands on the S end of a promontory.
- 2 Kānte Peak (17°57'5N, 73°05'2E) 346 m high.  
Srīvardhan Bay Light (framework tower, 9 m in height) (18°03'N, 73°00'E) is exhibited from September to May inclusive.  
Madgarh Hill (18°09'0N, 73°01'5E).  
(Directions continue at 7.149)

**Port Bānkot**

Chart 1508

**General information****7.131**

- 1 **Position.** Port Bānkot (17°59'N, 73°03'E) lies from 1 to 2 miles within the bar at the entrance to Sāvitrī River.
- Function.** Bānkot, formerly an important town but now little more than a fishing village, provides an open roadstead anchorage and limited anchorage with some shelter inside the river.
- 2 **Topography.** Large plantations of mango and oondini trees lie on the hills backing the town of Bānkot; along the coast, in the vicinity of the port, there are patches of cultivation. A sandspit, covered with vegetation, fronts the coastline S of the river bar.
- 3 **Approach and entry.** The roadstead anchorage is approached direct from seaward. The river is entered between Rankuran Point (17°58'0N, 73°01'8E) and Devaghar Point 1½ miles NNW.
- 4 **Traffic.** Local vessels call regularly during the fine weather season.
- Port authority.** The port is administered by an Assistant Port Supervisor.

**Tidal information****7.132**

- 1 **Tidal levels.** See information in *Admiralty Tide Tables* Volume 3. The average maximum and minimum tidal ranges are about 2.1 and 1.2 m.
- 2 **Tidal streams:** these set NNE over the bar on the in-going stream and SSW on the out-going stream, each attaining a rate of ¾ kn at springs.
- Inside the bar, the in-going stream sets S'y towards the sandbanks on the N side of the channel, but the out-going stream follows the direction of the channel.
- 3 In the river, abreast Bānkot, the spring rate is about 2½ kn.

**Arrival information****7.133**

- 1 **Port operations.** The port is normally open from October to May only.
- 2 **Pilotage.** On application to the Sarkarkun (Customs and Port Officer) a local uncertified pilot may be obtained.

**Harbour information****7.134**

- 1 **Storm signals** are displayed at the port, the brief system is used. See 1.47.

**Sāvitri River Bar.** The bar extends about 1¾ miles seaward from the mouth of the river. Close off the river mouth a drying sandbank, over which the sea breaks heavily, extends N from the channel to the shore E of Devaghar Point. Inside the bar depths increase gradually to a position near the W end of Bānkot where there is a pool with depths of about 12·8 m.

**Directions****7.135**

- 1 **Cautions:**

The entrance channel is liable to change and passage into the river should not be attempted without local knowledge.

During strong W breezes heavy breakers are raised over the bar and there is always a cross sea.

- 2 The direction of the channel over the bar lies with the NW corner of Fort Victoria bearing 079° until about 9 cables from the fort; then from a position NW of Rankuran Point the channel leads NE and passes close NW of Panbruj Point, see below.

The least charted depth in the channel is 2·1 m, but this should be confirmed with the port authority before entry.

- 3 **Useful marks** (positioned from Rankuran Point (17°58'·0N, 73°01'·8E)):

Fort Victoria (7½ cables ENE), a fort in ruins with high black walls.

- 4 English Cemetery (6½ cables ENE) with a high pillar and a large pyramidal headstone stand close under the W wall of Fort Victoria.

Panbruj Point Beacon (10·4 m in height) (8 cables NE).

**Anchorage and berth****7.136**

- 1 **Outer anchorage.** Seaward of the bar, vessels may anchor about 3½ miles WNW of Fort Victoria in depths of 7½ m, mud; as shown on the chart.

**Inner anchorage.** In the river small craft may anchor off Bānkot in depths of about 8 m.

- 2 **Berth.** There is a small stone jetty situated near the centre of Bānkot waterfront which is used for working cargo.

**Small craft****7.137**

- 1 **Sāvitri River** (17°59'N, 73°02'E) becomes a narrow stream above Bānkot and fishing stakes impede navigation; however, a shallow draught vessel may reach Mahad, 30 miles upstream. The banks of Sāvitri River are steep and backed by hills covered with grass and scrub.

**Coastal bays and anchorages**

Chart 1508

**Burondi Bay****7.138**

- 1 Burondi Bay (17°43'N, 73°07'E) affords anchorage with some shelter from S winds in depths of about 5 m, sand.

**Harnai Anchorage****7.139**

- 1 **Position.** Harnai (17°49'N, 73°06'E) is a small town at which local vessels call regularly.

**Offshore danger:** an islet, from which below-water rocks extend 3 cables W, lies close S of the promontory projecting from the coast abreast Harnai.

- 2 **Storm signals** are displayed from Harnai Lighthouse (17°48'N, 73°05'E) (7.130), the brief system is used. See 1.47.

**Anchorage** may be obtained 8 cables S of Harnai Light in depths of about 3·3 m, mud. Harnai Promontory affords shelter, suitable only for small boats, from NW winds.

**Srīvardhan Bay****7.140**

- 1 **Position.** Srīvardhan Bay a shallow bay 1¾ miles wide at its entrance lies N of Srīvardhan Point (18°01'N, 73°00'E), the town of Srīvardhan is situated at its head. A shallow inlet, most of which dries, extends 2½ miles inland from its entrance at the S end of the bay.

**Offshore danger:** shoal water, with depths of less than 5·5 m, extends about 1 mile seaward from this part of the coast.

**Storm signals** are displayed, the brief system is used. See 1.47.

- 3 **Anchorage** off Srīvardhan for large vessels may be obtained 3 miles WNW of Srīvardhan Point in a depth of about 10 m, mud.

**Kumbaru Bay****7.141**

- 1 **Position.** Kumbaru Bay a large shallow bay lies between Kumbaru Point (18°13'N, 72°56'E) and an unnamed point, 5½ miles SSE.

**Offshore danger:** Shah Jehan Shoal (7.129) lies 1 mile SW of Kumbaru Point.

- 2 **Anchorage** for small vessels, with shelter from NW winds, may be obtained on the SE side of Kumbaru Point in depths of about 4·5 m.

**KUMBARU POINT TO MUMBAI  
APPROACHES****General information**

Charts 1508, 1487

**Route****7.142**

- 1 From a position WSW of Kumbaru Point (18°13'N, 72°56'E) the route leads about 33 miles NNW to a position W of Kanhoji Angre Island.

**Topography****7.143**

- 1 The coast between Kumbaru Point and Kundalika River (7.158), 20 miles N, consists generally of numerous small bays, with rocky headlands and sandy beaches, these are interspaced by Rājpuri Creek (7.152) and a few small streams; the hinterland is hilly and wooded, with high ranges standing behind the coastal hills.

- 2 Between Kundalika River and the village of Thal, 10 miles NNW, the coast is less indented and consists of a low ridge of sandhills, with dense groves of palm trees or jungle inland. The Sāgargarh Range of hills back this stretch of coastline; the highest peak of the range, 423 m high, stands 9½ miles ESE of Alībāg (7.164), it has a round summit and is faced with prominent high cliffs on its S side, a sharp rock peak stands close S.

- 3 The Hummocks of Thal are three high, bare, prominent cliffs at the NW end of this range; Parhur Peak, standing farthest S and 4 miles NW of Sāgargarh, is a sharp, conical peak 313 m high.



**Depths****7.144**

- 1 There are no charted dangers seaward of the 20 m depth contour. The coastline is fringed with a reef throughout much of its length and within the 5 m depth contour, which extends up to 4 miles seaward in places, there are numerous shoal patches and reefs.

**Fishing stakes****7.145**

- 1 See 7.95.

**Currents****7.146**

- 1 See 7.6.

**Principal marks****7.147**

- 1 **Landmarks:**

Janjira Fort (18°18'N, 72°58'E) stands on a rocky islet abreast the village of Rājpurī.  
Camp Hill (18°18'5N, 72°58'3E).  
Mosque (18°20'2N, 72°57'6E).  
Palace (18°20'3N, 72°56'9E).  
Murud Hill (18°21'4N, 72°57'8E).  
Building (18°31'N, 72°55'E).  
Hingladevi (18°34'N, 72°57'E) a white temple with Bhagat, another prominent temple, standing on the summit of a 172 m hill above it.  
Sāgargarh Fort (18°39'3N, 72°57'5E).  
Chimney (18°42'N, 72°52'E).

For landmarks at Mumbai see 7.188.

- 3 **Major lights:**

Nānwell Point Light (white 8-sided masonry tower, red bands, 19 m in height) (18°17'N, 72°56'E) stands near the W end of Nānwell Point, a cliffy wooded bluff. An auxiliary light is exhibited below the main light from the same structure.

- 4 Kanhoji Angre Island Light (8-sided tower on a flat-roofed house, 30 m in height) (18°42'N, 72°49'E). A flagstaff stands NE of the lighthouse from which, if a vessel is seen standing into danger, a rocket is fired and the appropriate International Code Signal hoisted.

- 5 Prongs Reef Light (18°53'N, 72°48'E) (7.185).

**Other aid to navigation****7.148**

- 1 A racon (18°42'N, 72°49'E) transmits from Kanhoji Angre Island Light-tower.  
For details see *Admiralty List of Radio Signals Volume 2*.

**Directions**

(continued from 7.130)

**Offshore routes****7.149**

- 1 Vessels on passage offshore may use either of the following recommended routes (7.18) as shown on the chart:

From the vicinity of 18°07'N, 72°28'E a recommended route leads NNE passing E of Neelam Heera and Ratna oilfields development area (7.16).

**Caution.** A stranded wreck (18°37'4N, 72°33'6E) lies 2½ miles WNW of the centreline of this route.

- 2 From the vicinity of 18°06'N, 71°59'E a recommended route leads NNE passing W of Neelam Heera and Ratna oilfields development area (7.16); thence it joins the recommended route from W to Mumbai (7.168).

**Coastal route****7.150**

- 1 From a position WSW of Kumbaru Point (18°13'N, 72°56'E) the coastal route leads about 33 miles NNW to a position W of Kanhoji Angre Island, passing (with positions from Dark Cliff, which projects from a sandy beach, (18°26'N, 72°54'E)):
- 2 WSW of Whale Reef (9½ miles S) which dries, is covered by the red sector (057°–075°) of Nānwell Point Auxiliary light (18°17'N, 72°56'E). Shoal water, with depths of less than 5 m extends 5 cables WNW and 3½ cables S of the reef. Thence:
- 3 WSW of a dangerous wreck (7¼ miles S), thence: WSW of Kansa Fort (6½ miles SSE), its walls 6 m high and partly in ruins, stands on a reef. Thence:
- 4 WSW of Chaul Kadu Reefs (10 miles NNW), a group of rocky patches over which the sea breaks heavily at low water. The reef is covered by the red sector (336°–001°) of Kanhoji Angre Island Light (18°42'N, 72°49'E) (7.147). Thence:
- 5 WSW of a dangerous wreck (11 miles NNW), thence: WSW of Alībāg Outer Reef (13 miles NNW); the reef is marked, during the fine weather season, by a buoy (red, conical) moored near its S end. The seaward part of the reef is covered by the red sector (336°–001°) of Kanhoji Angre Island Light and by the white sector (070°–145°) of Kolaba Fort Light (18°38'N, 72°52'E) (7.151). Thence:
- 6 WSW of Khānderi Flats (15 miles NNW), thence: WSW of Kanhoji Angre Island (17¼ miles NNW), an island with two hills which is sparsely covered with trees; Kanhoji Angre Island Light stands on the summit of the island's S and higher hill. Thence:
- 7 To a position W of Kanhoji Angre Island, from which, vessels proceeding to Mumbai follow the recommended route NNE as shown on the chart (7.18).

**Useful marks****7.151**

- 1 Bandar Hill Light (framework tower, 9 m in height) (18°18'9N, 72°57'6E) which stands on Bandar Hill, a small round headland with a grassy summit 70 m high, is exhibited from 1st September to 31st May.
- 2 Korlai Fort Light (white square masonry tower, black bands, 16 m in height) (18°32'3N, 72°54'5E) is exhibited from Korlai Fort.
- Chaul Kadu Reefs Light (white round masonry tower, 17 m in height) (18°36'N, 72°51'E) stands at the NE point of the reef.
- 3 Kolaba Fort Light (18°38'N, 72°52'E) is exhibited from 1st September to 31st May from Kolaba Fort. The fort, an ancient fortress with a temple of which the pagoda-shaped cupola is prominent from seaward, stands on a drying reef which surrounds it and connects with the coast NE.

(Directions continue for coastal passage at 8.21)

(Directions for Mumbai approaches are given at 7.187)



## Murud—Janjira Harbour

*Charts 1508, 1487*

### General information

#### 7.152

- 1 **Position.** Murud—Janjira Harbour (18°18'N, 72°58'E) lies at the entrance to Rājpurī Creek.
- 2 **Function.** The port provides an open roadstead anchorage and affords within the harbour, good shelter to vessels of moderate size from all winds except those from W to NW, during which, small craft may shelter in Rājpurī Creek. Fishing is the main activity of the port.
- 3 **Topography.** Murud, a town lying on the N shore of Rājpurī Creek, 2½ miles NNE of Nānwell Point Lighthouse (18°17'N, 72°56'E), is surrounded by a large grove of palm trees. Dighi, a village 2 miles ESE of the same lighthouse, situated on the S shore of Rājpurī Creek, has a bight SE of it which is fringed with mangroves; a drying mud-flat fills the bight.
- 4 **Approach and entry.** The harbour is approached from W and entered between Nānwell Point (7.147) and Vihur Point, 4 miles NNW.
- 5 **Traffic.** Local vessels use the harbour daily.

### Tidal information

#### 7.153

- 1 **Tidal levels.** See information in *Admiralty Tide Tables Volume*. The average maximum and minimum tidal ranges are about 2.5 and 1.4 m.

**Tidal streams** have a rate from 1 to 1½ kn at springs.

### Harbour information

#### 7.154

- 1 **Entrance channel.** There are general depths of about 5 m in the entrance channel, with a least charted depth of 4.4 m lying 2 miles E of Nānwell Point Lighthouse.
- Storm signals** are displayed from Nānwell Point Lighthouse, the brief system is used. See 1.47.

### Directions

#### 7.155

- 1 **Caution.** Fishing stakes, consisting of large poles or stripped palm trees, may be met within the harbour; however, they generally show well above high water.
- 2 Vessels approaching the harbour from S should keep in depths of more than 11 m and well to seaward of Whale Reef (18°16'3N, 72°54'9E) until Janjira Fort (7.147), standing 2 miles NE of Nānwell Point Lighthouse, is identified.
- 3 From a position W of Janjira Fort steer to pass S of a dangerous wreck, lying about 1½ miles NNW of Nānwell Point Lighthouse, to a position in the channel N of Nānwell Point; then alter course ESE and follow the channel to the anchorages.
- 4 **Useful marks** (positioned from Nānwell Point Lighthouse (18°17'N, 72°56'E)):
  - Murud—Janjira Fort Light (wood post, 2 m in height) (2 miles NE) is exhibited from 1st September to 31st May.
- 5 Sandy Point (¾ miles E).  
Dighi Hill (251 m high) (1½ miles SE) is the highest point on the peninsula.  
Conical Hill (232 m high) (2 miles SSE), is bare.  
Round Hill (231 m high) (¾ miles SSE), is thickly wooded.

## Anchorages and berths

### 7.156

- 1 **Outer anchorage,** vessels may anchor about 5 miles W of Janjira Fort, in depths of 10 m, mud; as shown on the chart.
- Caution.** The approaches to the inner anchorages described below are liable to obstruction by lines of fishing nets and, from November to April, by fishing stakes.
- 2 **Inner anchorages:** small vessels may anchor with Janjira Fort bearing 001° distant about 7 cables or, with the same fort bearing 330° distant about 1¾ miles; both anchorages are in depths of about 5 m but the latter one gives better shelter.
- Murud.** Local small craft may find anchorage, with some shelter from NW winds, in the bay close SE of Bandar Hill (18°18'8N, 72°57'6E).
- 3 **Jetties.** There is a jetty situated 2 cables E of Dighi, almost abreast the innermost anchorage, this jetty is surrounded by drying mud at low water. There are two jetties on the N side of Rājpurī Creek, one close SE of Bandar Hill and another on the point S of the village of Rājpurī, 1 mile SE of Bandar Hill.
- 4 A ferry plies between these jetties during the fine weather season.

### Port services

#### 7.157

- 1 Nil.

## Revadanda Port

*Chart 1487*

### General information

#### 7.158

- 1 **Position.** Revadanda Port (18°33'N, 72°54'E), is the name given to the broad estuary of the Kundalika River.
- Function.** The port provides an open roadstead anchorage and affords, within the port, shelter to vessels which are able to cross the bar.
- 2 **Topography.** The land on each side of the estuary is low-lying and, for the most part, covered at high water springs.
- 3 **Approach and entry.** The port is approached from SW and entered between Korlai Headland (18°32'5N, 72°54'5E) and Revadanda, a sixteenth century Portuguese fortress standing on the N side of the river, 1 mile ENE.
- 4 **Traffic.** In 2003, the port was used by 8 vessels with a total dwt of 63 272.

### Tidal information

#### 7.159

- 1 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 2.6 and 1.6 m.

### Harbour information

#### 7.160

- 1 **Storm signals** are displayed at Revadanda, the brief system is used. See 1.47.
- 2 **Chaul Bar,** extending about 3 miles W from the coast N of Revadanda Fort, obstructs the entrance to Kundalika River; its SE edge, named Bar Sand, lying about 5¾ cables WNW of Korlai Point Light (18°32'3N, 72°54'5E) has a least depth of 0.9 m and consists of sand and rock.
- 3 A light-buoy (safe water) is moored near the edge of the bar about 1½ miles WNW of Korlai Point Light.

**Directions****7.161**

- 1 Vessels approaching the port from SW should steer to pass in the channel between Bar Sand and Korlai Headland; Bhagat Temple (18°34'N, 72°57'E) (7.147) bearing about 055° leads towards the channel. When within the bar the depths quickly deepen to about 7.3 m.
- 2 The channel then leads SE and E, passing between a line of fishing stakes usually encountered on the S side of the entrance to the river and a drying sandbank which extends about 8 cables W of the fortress of Revadanda; the sandbank is generally marked by tide-rips and has a dangerous wreck with a mast showing near its SE edge.
- 3 **Useful marks** (positioned from Korlai Fort Light (18°32'·3N, 72°54'·5E) (7.151)):

Korlia Fort (close S) stands at the summit of a headland, red in colour, the N part of which slopes gradually down to a rocky point on the S side of the Kundalika River entrance; the headland connects with the mainland S by a low, narrow, sandy isthmus. The village of Korlia stands at the head of a small bay on the E side of the isthmus.

4 Chaul Knob (258 m high) (1¼ miles ESE) is the prominent summit of a range of wooded hills. Franciscan Church (1 mile ENE), its 30 m high tower stands within the walls of the fortress of Revadanda.

**Anchorage****7.162**

- 1 **Outer anchorage.** Vessels may anchor about 3½ miles WNW of Korlai Point Light in depths of 5 m.
- Inner anchorage.** Small vessels can obtain anchorage, in depths of about 4 m, off a landing place close ESE of the fortress of Revadanda and upstream of the bridge which crosses the river.

**Creeks and anchorage***Chart 1487***7.163**

- 1 **Paulo Creek** (18°34'·5N, 72°54'·5E), a creek which dries; however, at high water local boats can reach a fishing village 5 cables within its entrance.

**7.164**

- 1 **Alibāg Creek** (18°38'N, 72°53'E), a creek which is almost choked with sand, lies SE of the town of Alibāg; it

is built on a sandy point and is completely hidden by palm trees.

- 2 **Anchorage** for small vessels of shallow draught may be obtained, on the in-going tide, off the entrance to Alibāg Creek and fairly close to the S edge of the reef on which Kolaba Fort (18°38'N, 72°52'E) (7.151) stands; the S patch of rocks here is usually marked by stakes.

- 3 **Storm signals** are exhibited from Kolaba Fort, the brief system is used. See 1.47.

- 4 **Facility:** hospital.

**Channel E of Kanhoji Angre Island***Charts 2621, 1487***7.165**

- 1 **Caution.** The channel between Kanhoji Angre Island (18°42'N, 72°49'E) and Underi Islet, 1½ miles E, should only be used by small vessels with local knowledge.

- 2 **Dangers** (positioned from Kanhoji Angre Island Light (7.147)):

A drying rock (4 cables NNE) is marked by a beacon.  
A dangerous wreck (1 mile NE).

- 3 A reef (4 cables NE), which is awash at its centre, is marked by a beacon standing near its N end around which the sea is usually smooth.

A dangerous wreck (5 cables SSE).

- 4 **Storm signals** are displayed at the village of Thal (18°42'N, 72°52'E), the brief system is used. See 1.47.

**Landing** can be effected in a bight on the NE side of Kanhoji Angre Island.

- 5 **Leading lights** are exhibited occasionally on the E side of Kanhoji Angre Island from a position 1¼ cables NE of the main light; in line, bearing 168°, they lead W of the above dangers and to the landing place.

- 6 **Prohibited anchorage.** An area, shown on the chart, within which anchoring is prohibited extends E from Kanhoji Angre Island to the mainland.

**7.166**

- 1 **Underi Islet** (18°42'·5N, 72°50'·5E) is low, dark and rocky; it is surrounded by ruined fortifications within which are a few trees.

- 2 **Drying rocks**, surrounding most of the islet, extend up to 2½ cables leaving a very narrow channel between them and reefs extending W from the mainland coast.

**Other name****7.167**

- 1 Mazgaon (18°22'·5N, 72°56'·5E), a village.

**MUMBAI (BOMBAY) HARBOUR, JAWAHAR LAL NEHRU PORT AND APPROACHES****APPROACHES TO MUMBAI AND JAWAHAR LAL NEHRU****General information***Charts 2621, 2624, 1487***Routes****7.168**

- 1 The offshore recommended routes (7.18) for approaching Mumbai are shown on the chart.

**Approach from S.** The offshore and coastal routes from SSE are described, respectively, at 7.149 and 7.150.

- 2 **Approach from W.** From the vicinity of 18°52'N, 71°00'E the recommended route leads E passing S of Bombay High (7.14) and Mukta—Panna and Bassein (7.15)

oilfield development areas, and N of Neelam Heera and Ratna oilfield development area (7.16).

- 3 **Approach from N.** The offshore and coastal routes from N are described, respectively, at 8.14 and 8.21.

**Topography****7.169**

- 1 South of the entrance to Mumbai Harbour, the coast from the village of Thal (18°42'N, 72°52'E) to the S entrance point of the harbour, 6 miles N, is straight and consists of a low ridge of sandhills, backed by dense groves of palm trees or jungle, with a few isolated peaks standing farther inland. North of the harbour entrance the city of Mumbai stands on Bombay Island; the island consists of one of a number of islands, which are now joined together by causeways and reclamation, and form a

peninsula. Colāba, a narrow peninsula extending SW from Bombay Island, lies at the entrance to the harbour; it is covered with buildings.

- 2 The Western Ghāts form a backdrop to the port standing about 35 miles inland.

### Depths, wrecks and dangers

#### 7.170

- 1 Other than charted wrecks and the oilfield installations, there are no charted dangers seaward of the 20 m depth contour. Within this depth contour there are numerous wrecks, several of which lie in a semi-circle across the approach to the port. Reefs extend from shore both N and S of the entrance.
- 2 A stranded wreck (18°37'4N 72°33'6E), as shown on the chart, lies 2½ miles W of the recommended route (7.149) that passes E of Neelam Heera and Ratna oilfields development area (7.16).
- 3 The approach channel, from a position 4¼ miles SW of Prongs Reef Lighthouse (18°52'7N, 72°48'0E), is about 1 mile wide with a maintained depth of 11.1 m; it reduces gradually, to a width of 2 cables and a maintained depth of 10.9 m, 1¾ miles S of the same lighthouse.

### Fishing

#### 7.171

- 1 Numerous small fishing vessels, with buoyed nets, are likely to be encountered up to 25 miles offshore in the approaches to Mumbai.
- 2 Lines of strong fishing stakes, surmounted by baskets, and projecting about 6 m out of the water are laid, usually in depths of less than 25 m, N and S of the entrance to the port; the stakes are normally removed during the SW monsoon. Occasionally the heads of stakes are broken off, when they may not be visible above water.

### Vessel Traffic Management System

#### 7.172

- 1 When vessels arrive within 24 miles of Prongs Reef Light (18°52'7N, 72°48'0E) (7.185) and are bound for Mumbai or Jawahar Lal Nehru Ports they must contact the VTMS which controls traffic for both ports.  
For further details see *Admiralty List of Radio Signals Volume 6(4)*.

### Pilotage

#### 7.173

- 1 For pilotage for both ports see 7.212.

### Examination anchorage

#### 7.174

- 1 For details see 1.41.

### Dangerous cargoes

#### 7.175

- 1 For details see 7.213.

### Quarantine

#### 7.176

- 1 For details see 7.214.

### Signal station

#### 7.177

- 1 There is a Naval Signal Station at Colāba Point (18°53'7N, 72°48'7E) which may call vessels by signal lamp; answers are required by the same method.

### Traffic information

#### 7.178

- 1 Vessels navigating the recommended routes are advised to keep 1 or 2 miles to starboard of the centre-lines of these routes while approaching or leaving Mumbai, consistent with the *International Regulations for Preventing Collisions at Sea (1972)*.

### Cargo transhipment

#### 7.179

- 1 A lighterage operation area for the transhipment of oil and petroleum products is established, about 22 miles W of Prongs Reef Lighthouse, in position 18°56'N, 72°25'E; the area, which is circular with a diameter of 4 miles, is shown on the chart. Vessels in its vicinity should maintain listening watch on VHF, and give the area a wide berth. Tankers in the lighterage operation area maintain a watch on VHF.

### Prohibited anchorages

#### 7.180

- 1 Anchoring is prohibited in an area in the approaches to the harbour entrance, extending 4½ miles W from a position 2 miles SSE of Prongs Reef Lighthouse (7.185) as shown the chart).
- 2 Anchoring and fishing are prohibited in the vicinity of submarine oil and gas pipelines, which are laid from the offshore oilfield development areas (7.10) to the SW part of Karanja Island (18°52'N, 72°55'E), see also 1.11.  
Anchoring and fishing are prohibited in an area extending seaward NW and then W from Back Bay (18°56'N, 72°48'E).
- 3 Anchoring and fishing are prohibited in the vicinity of submarine cables extending WSW from Māhīm Bay (19°02'N, 72°49'E).
- 4 The limits of the above areas are shown on the chart.

### Spoil grounds

#### 7.181

- 1 A spoil ground (18°46'5N, 72°48'5E), encompassing a dangerous wreck, is marked by a buoy (black and yellow, can); it lies SSW of the harbour entrance. Another spoil ground (18°53'N, 72°44'E), marked by a buoy (black, conical) moored close off its NE corner, lies NW of the harbour entrance.
- 2 The limits of the spoil grounds are shown on the chart.

### Tidal streams

#### 7.182

- 1 **General.** Tidal streams in the approaches to Mumbai are much influenced by winds and heavy rains. The rate of spring streams, between Thal Shoal (18°48'5N, 72°49'0E) and Prongs Reef, 4½ miles NNW, is from 2½ to 3 kn and may attain 4 kn in the rainy season.  
The tidal stream does not set fairly through the channel but is generally as described below.
- 2 **In-going streams.** Off the SW end of Prongs Reef, the in-going stream sets first in an ESE direction, but as the rate increases it changes to NE; thence E of the reef as far as Sunk Rock (18°53'5N, 72°50'0E) it sets NNE.  
Between Thal Shoal and a position 4 miles WNW the in-going stream sets between ESE and ENE turning more N as the rate increases.
- 3 The in-going stream sweeps E over Thal Shoal.  
In East Channel Swatch (18°47'5N, 72°49'5E) the in-going stream sets NNE turning more E as it crosses the mouth of Dharamtar Creek, 6 miles ENE.
- 4 **Out-going streams.** During the SW monsoon rains, the out-going stream sets strongly W out of Dharamtar Creek.



On the N side of the entrance to the harbour, the out-going stream sets SW from Sunk Rock until abreast Prongs Reef, from where it sets W changing to SSW as the rate increases.

Between Thal Shoal and a position 4 miles WNW the out-going stream sets SW.

- 5 On the S side of the entrance to the harbour, the out-going stream first sets WSW across Dharamtar Creek entrance altering towards SSW on nearing Thal Shoal then almost S as it goes farther S.

## Currents

### 7.183

- 1 See 7.6.

## Local weather

### 7.184

- 1 During the SW monsoon, and during cold weather when a smoke haze often reduces visibility, the best time to approach Mumbai is about 1 hour before sunrise at which time the navigational lights are still visible.

## Principal marks

### 7.185

- 1 **Landmarks:**

North Pap Beacon (black, 26 m in height) (18°46'N, 72°56'E), stands at an elevation of 248 m on the N hummock of Ashuera Hill (7.188).

- 2 Thal Knob Beacon (white, 18 m in height) (18°48'N, 72°53'E), stands at an elevation of 72 m on Thal Knob; False Knob, 5 cables SSW, looks similar but lower. Being detached from the distant high land, in thick weather, these 2 hills stand out well among the coconut trees.

- 3 Air India Emblem (18°55'·7N, 72°49'·4E) with a building close E, a tower close S and another building 2½ cables SE.  
Television tower (19°00'·4N, 72°49'·2E), with a water tower 5 cables NNW.

- 4 For landmarks on the W side of Mumbai Harbour see 7.221.

For landmarks on the E side of Mumbai Harbour see 7.222.

- 5 **Major lights:**

Kanhoji Angre Island Light (18°42'N, 72°49'E) (7.147).

Prongs Reef Light (round tower, red, white and black bands, 52 m in height) (18°52'·7N, 72°48'·0E) stands near the SW end of Prongs Reef.

Santa Cruz Aero Light (19°05'N, 72°52'E) (8.20).

Utan Light (19°17'N, 72°47'E) (8.20).

## Aids to navigation

### 7.186

- 1 A racon (18°42'N, 72°49'E) transmits from Kanhoji Angre Island Light-tower.

For details see *Admiralty List of Radio Signals Volume 2*.

- 2 **Caution.** Certain aids to navigation are reported to be unreliable and may be missing, unlit or out of position, particularly during and after the SW monsoon. The positions of the charted buoys are frequently changed. Vessels should be navigated with due caution.

Some buoys and beacons in this area may not conform to the IALA system.

## Directions

### 7.187

- 1 For vessels approaching Mumbai via the charted recommended routes the chart is sufficient guide.

**Caution.** Throughout the approach a vessel's position should be verified frequently to ensure a safe passage.

- 2 From the vicinity of 18°50'N, 72°40'E, the focal point of the recommended routes, the route leads E then ENE through the maintained depth approach channel (7.170), passing (with positions from Prongs Reef Lighthouse (7.185)):

Clear of an 11 m shoal patch (7¾ miles WSW), thence:

- 3 Clear of a number of dangerous wrecks, many of which lie in a semicircle, radius about 6 to 8 miles, from W of Malabar Point to a position S of the approach channel; the positions of the wrecks may be seen from the chart. One wreck (5¾ miles W) is marked by a light-buoy (port hand) moored close W, and another wreck about 1¼ miles farther W is marked by a light-buoy (starboard hand) moored 6 cables WNW. A wreck (7 miles SSW) shows a mast. Thence:

- 4 Clear of an isolated foul area (4¼ miles WSW), thence to the approach channel; which passes: S of Eight Feet Patch (2 miles NW) which lies at the W edge of the dangers, including a dangerous wreck, extending W from Colāba Peninsula. Thence the route leads ENE, passing:

- 5 SSE of SW Prongs Reef Light-buoy (port hand) (1½ miles SSW) (not named on chart) moored 7 cables S of the dangers and coastal bank extending SSW from Prongs Reef, thence:

- 6 NNW of Thal Shoal (4½ miles SSE), which consists of several sand and rock patches, is marked by a buoy (black, conical) on its WNW side. Thal Reefs, with numerous detached heads and 2 stranded wrecks lying near their S extremity, extend about 1¼ miles W from the coast ESE of Thal Shoal. East Channel Swatch lies between these two dangers. Thence:

- 7 SSE of a dangerous wreck (1¾ miles S), the position of which is approximate, which lies on the N edge of the channel, thence:

NNW of South Entrance Light-buoy (starboard hand) (2½ miles SSE) (not named on chart), thence:

SSE of Prongs Reef Light-buoy (port hand) (1½ miles SSE) (not named on chart), thence:

To the pilot vessel cruising ground (7.212). A wreck with 8.5 m of water over it (2½ miles ESE) lies on the NE side of the cruising ground.

- 8 **Clearing bearings:**

Kanhoji Angre Island Lighthouse (18°42'N, 72°49'E) bearing 166° or less clears Eight Feet Patch and Prongs Reef to the W. And

- 9 Thal Knob Beacon (18°48'N, 72°53'E) (7.185) in line with North Pap Beacon, 3½ miles ESE, bearing 121½°, clears the same dangers to the S.

- 10 Prongs Reef Light in line with Malabar Point (3½ miles N) bearing 354°, clears Thal Shoal and the dangerous wreck situated within the spoil ground (7.181) to the W.

## Useful marks

### 7.188

- 1 Kankeshwar (18°44'·5N, 72°55'·2E), a mountain surmounted by a pagoda. Ashuera Hill, with two



hummocks named The Paps, stands 1¾ miles NNE of Kankeshwar.

Karanja Hill (18°51'N, 72°56'E), a mill stands on a shoulder of the hill 5 cables N of its summit.

Trombay Peak (19°02'N, 72°55'E) 303 m in height, a light is exhibited from its summit.

Kanheri (19°13'N, 72°55'E) (8.22).

Kamandurg (19°23'N, 72°57'E) (8.22).

Stranded wreck (radar conspicuous) (18°52'·5N, 72°47'·5E), the position of which is conspicuous.

*(Directions for Mumbai Harbour continue at 7.223)*

## **Anchorage and small craft harbour**

### **Anchorage**

#### **7.189**

- 1 An anchorage area lies 20 miles NW of the entrance to Mumbai Harbour, its limits are shown on the chart.

An anchorage for tankers was reported (2000) to lie 14 miles WSW of Prongs Reef Light.

- 2 It was reported (1993) that most vessels anchor within 2½ miles of a position about 6 miles W of Prongs Reef Light (18°52'·7N, 72°48'·0E). Attention is drawn to the charted navigational dangers in this vicinity, including dangerous wrecks, a spoil ground, submarine oil and gas pipelines, see 1.11, and disused submarine cables; in addition, the area is susceptible to a heavy ground swell.

### **Back Bay**

#### **7.190**

Back Bay (18°56'N, 72°49'E) is encumbered by dangers and only used by small craft.

Malabar Point (18°56'·3N, 72°47'·6E), the NW entrance point of Back Bay, lies at the S end of a low ridge on Bombay Island; a flagstaff stands on the point. The point provides an excellent radar target which is usually detected at 24 miles.

A dangerous wreck, with masts showing, lies in the approaches to Back Bay in a position about 2½ miles W of Malabar Point.

- 1 **Development.** An area in the SE corner of Back Bay is being reclaimed (1996).

## **MUMBAI (BOMBAY) HARBOUR**

### **General information**

*Charts 2621, 2624, 2627, 1487*

### **Position**

#### **7.191**

- 1 Mumbai Harbour (18°54'N, 72°49'E) is the premier port on the W coast of India; its fine harbour, about 14 miles long with a general width of about 5 miles, lies E of Bombay Island.

### **Function**

#### **7.192**

- 1 The port of Mumbai, formerly known as Bombay, has over 50 berths with modern equipment for handling general cargo vessels, container ships and tankers; it also has numerous anchor berths.
- 2 Mumbai is a major industrial centre. In 2004, the population was estimated to be about 12·6 million.

### **Topography**

#### **7.193**

- 1 Mumbai Harbour contains several islands, rocks and shoals; its coastline is heavily indented with small bays and inlets. The N and NW parts of the harbour are filled by a coastal bank upon which lies Butcher Big Reef (18°58'N, 72°53'E), the E and SE parts are also filled by another coastal bank upon which lie Karanja Reefs (18°54'N, 72°54'E). For details of topography in the approaches see 7.169.

### **Depths**

#### **7.194**

- 1 **Caution.** There are general depths of between 5 and 10 m over much of the central and S parts of the harbour, with lesser depths and large shallow or drying areas covering the E and N parts; a similar strip lies around the Colāba Peninsula in the W. Depths, including those in the maintained channels, are subject to change by situation and dredging. For the latest information mariners should consult the Port Authorities.
- 2 There are many dangerous and stranded wrecks, obstructions and rocks shown on the charts, and uncharted wrecks may exist.

### **Piracy**

#### **7.195**

- 1 Recent incidents of piracy and armed robbery at Mumbai have been reported by vessels. For possible preventative measures see 1.56.

### **Port Limits**

#### **7.196**

- 1 The limits of the Port of Mumbai are shown on the chart.

### **Approach and entry**

#### **7.197**

- 1 The port is approached from W and entered via a dredged channel, between Prongs Reef Lighthouse (18°52'·7N, 72°48'·0E) and an unnamed point of land 6 miles SE.

#### **7.198**

- 1 **Caution.** Certain aids to navigation are reported to be unreliable and may be missing, unlit or out of position. Vessels should be navigated with due caution.

### **Traffic**

#### **7.199**

- 1 In 2003, the port was used by 2228 vessels with a total dwt of 56 645 233.

### **Port authority**

#### **7.200**

- 1 The port is administered by the Mumbai Port Trust, Port House, Shoorji Vallabhdas Marg, Ballard Estate, Mumbai 400 001.

### **Historical background**

#### **7.201**

- 1 Mumbai (Bombay) was ceded to the Portuguese by the Sultan of Gujarat in the early sixteenth century; it later passed to Britain as part of the dowry of Catherine of Braganza on her marriage to Charles II of England. Mumbai's rise to the status of a major port began when ships of the East India Company started, in the eighteenth century, to make it a regular port of call; the port received further impetus with the establishment of cotton mills in England in the mid-nineteenth century.

## Limiting conditions

### Controlling depths

#### 7.202

- 1 There are maintained depths of 10.9 m in the channel from the E end of the approach channel, near the harbour entrance, to a position in the centre of the harbour, E of Middle Ground Islet (18°55'N, 72°51'E); thence there is a depth of 7.6 m in the channel leading WNW to the Port of Mumbai and 10.8 m in the channel leading NE to Butcher Island (Dia Deva) (Jawahar Dweep) (18°58'N, 72°54'E), (see 7.194).

### Deepest and longest berths

#### 7.203

- 1 Port of Mumbai, Indira Dock (7.241).  
Butcher Island (7.246).

### Tidal levels

#### 7.204

- 1 See information in *Admiralty Tide Tables*. Mean spring range about 3.6 m; mean neap range about 1.4 m.

### Density of water

#### 7.205

- 1 Mumbai is essentially a salt water port; however, the density varies with the state of the tide and major fluctuations occur during the monsoon season.

### Maximum size of vessels handled

#### 7.206

- 1 Port of Mumbai, reported (1994) to be, vessels up to 228 m in length and 9.1 m draught.  
Butcher Island, tankers up to 125 000 dwt.

### Local weather

#### 7.207

- 1 Visibility is considerably reduced during the SW monsoon, and during cold weather which produces a smoke haze.

**Weather advice.** The Port Meteorological Office at Indira Dock provides advice on request; weather information is broadcast daily at 0630 and 1030 local time.

## Arrival information

### Port operations

#### 7.208

- 1 Large vessels may enter Mumbai Harbour by day or night.  
Deep-draught vessels normally enter harbour 2 hours before high water.

### Port radio

#### 7.209

- 1 Port radio services are operated for Mumbai and Jawahar Lal Nehru ports. For details see *Admiralty List of Radio Signals Volume 6(4)*.

### Notice of ETA

#### 7.210

- 1 Vessels for Mumbai and Jawahar Lal Nehru should send ETA, 96 hours in advance with confirmation 48 hours in advance to their agents. For details, which differ slightly

between the two ports, see *Admiralty List of Radio Signals Volume 6(4)*.

### Outer anchorage

#### 7.211

- 1 See 7.189.

### Pilots and tugs

#### 7.212

- 1 **Pilotage** is compulsory for all vessels over 100 gt N of a line drawn E/W through Prongs Reef Lighthouse (18°52'.7N, 72°48'.0E) and available 24 hours; such vessels may not enter, leave or shift berths in the area N of this line without a pilot or harbour official onboard. The pilot boards in the vicinity of a position 2 miles ESE of Prongs Reef Lighthouse. For details see *Admiralty List of Radio Signals Volume 6(4)*. See also 7.172 for VTMS.

- 2 **Tugs** are available.

### Dangerous cargoes

#### 7.213

- 1 Vessels carrying certain types of dangerous cargo are required by Mumbai Port Rules, a copy which is supplied by the boarding pilot, to make certain signals to Prongs Reef Lighthouse, these are answered by day with corresponding signals at the lighthouse.

### Quarantine

#### 7.214

- 1 Quarantine Mumbai should be advised 24 hours before arrival using the standard form of message from the *International Code of Signals*.
- 2 Vessels liable to quarantine follow the same procedure as that for vessels carrying dangerous cargoes (7.213).

## Harbour

### General layout

#### 7.215

- 1 The principal alongside berths for general cargo vessels are situated on the W side of the harbour, with the Naval Dockyard located within the tidal basin close S of the cargo berths and Mazagaon Dockyard lying to the N of them.
- 2 Tankers are accommodated at Butcher Island or Pir Pau in the NE part of the harbour.  
Anchor berths, for general cargo vessels, are located in the middle of the harbour on both sides of the channel; those for naval vessels lie in the W part of the harbour, S of the tidal basin.
- 3 There are several mooring buoys in the harbour, most are situated in or near shallow water.

### Signal stations

#### 7.216

- 1 The Port Signal Station is situated in a conspicuous tower on the E side of the head of Ballard Pier (18°55'.7N, 72°50'.7E).
- 2 The Dock Signal Station stands on Bull's Nose at the entrance to Indira Dock, 4 cables N of the Port Signal Station, this station deals only with signals affecting the docking of vessels.
- 3 The Naval Signal Station is a conspicuous flagstaff which stands on the S point of the tidal basin, 6 cables SSW of the Port Signal Station. For details of the Naval Signal Station at Colāba Point see 7.177.
- 4 For communication details see *Admiralty List of Radio Signals Volume 6(4)*.

**Storm signals****7.217**

- 1 Storm signals are displayed from the Port Signal Station (18°55'·7N, 72°50'·7E) and from a flagstaff at the NE corner of Victoria Dock, 1½ miles N; the general system is used. See 1.45.

**Natural conditions****7.218**

- 1 For details see climatic table 1.217.

**Tidal streams****7.219**

- 1 **Harbour.** Tidal streams within the port of Mumbai set, with rates of ¾ to 3 kn, as follows.
- 2 **East side of the harbour, in-going stream:**  
The stream sets NE abreast Karanja Island, setting more ENE after passing Karanja Beacon. Between Butcher Island and Elephanta Island the stream sets N, but towards Trombay Island it becomes NE.
- 3 **West side of the harbour, in-going stream:**  
From Sunk Rock to Cross Island the stream sets NNE with a rate of 2 kn; N of Tucker Beacon (18°56'·1N, 72°52'·5E), where the stream separates, a branch of it turns N until abreast Mazagaon Dockyard; then the stream sets between NE and ENE to join the stream from the E side of the harbour N of Butcher Island.
- 4 **East side of the harbour, out-going stream:**  
The stream starts later here than on the W side of the harbour.  
From the channel between Butcher Island and Elephanta Island, the stream sets SW, along the NW coast of Karanja Island; when abreast the entrance to Dharamtar Creek it sets WSW.
- 5 **West side of the harbour, out-going stream:**  
The stream at ordinary tides starts 30 to 35 minutes earlier than on the E side of the harbour; during strong spring tides the stream on the W side may start 40 minutes to 1 hour earlier. Inshore and near Indira Dock Wall, during the SW monsoon, the stream starts about 45 minutes before high water Mumbai.
- 6 From Trombay Island to Mazagaon Dockyard the stream sets SW.  
From abreast Cross Island to W of Middle Ground Islet the stream sets SSW; in the middle of the harbour the set is S to SSW.  
From Middle Ground Islet to Sunk Rock the set is between S and SSW, but with the start of this stream the set off Sunk Rock is more W-going.

**7.220**

- 1 **Berthing area.** The tidal stream in the vicinity of the tidal basin, Ballard Pier and the wet docks is as follows:  
The in-going stream in the vicinity of the tidal basin and the wet docks is deflected by South Breakwater and runs parallel to it, joining the main in-going stream, which passes E of Middle Ground Islet. The stream then sets ENE past the entrance to the tidal basin. An eddy runs S along the E side of Ballard Pier, before turning W into the tidal basin; the effect of this eddy has been felt up to ½ cable E of the SE extremity of Ballard Pier.

- 2 The out-going stream flows close E of the head of South Breakwater, before turning SW parallel to it. See also information on the chart.

**Principal marks****7.221**

- 1 **Landmarks:**
- 2 The following marks on the W side of the harbour are positioned from the Taj Intercontinental Building (18°55'·3N, 72°50'·0E):  
Tower (7½ cables N).  
Building (4½ cables N).  
Building (6½ cables NNE).  
Building (2¾ miles NNE).
- 3 Lighting tower (6½ cables ENE) standing near the head of South Breakwater.  
Tower (4 cables ESE) standing near the root of South Breakwater.  
Dome (½ cable S).  
Chimney (7 cables SSW).
- 4 Building (9 cables SW) with another building of same height, 2 cables WNW.  
Saint Johns Church Spire (1¼ miles SW).  
Mast 1½ miles SW).  
Building (1¾ miles SW).  
Dome (2 miles SW).  
Tower (5 cables NNW).

**7.222**

- 1 The following marks on the E side of the harbour are positioned from Butcher Island water tower (18°57'·6N, 72°54'·2E), elevation 29 m:  
Flare (3¾ miles N).  
Chimney (3 miles N).  
Flare (3 miles N).
- 2 Pir Pau Tomb (2½ miles NNE), a small mosque with a white dome standing on the S end of Trombay Island.  
White dome (3 miles NNE) with a flare ¾ cable S).  
Fort (5 miles NNE) in ruins.  
Tower (4 miles SSE).  
Flare (6¼ miles SSE).

**Directions***(continued from 7.188)***7.223**

- 1 **Cautions:**  
An area in which less water was reported (1990) lies close N of the main channel in the vicinity of 18°52'N, 72°50'E.
- 2 Fishing stakes, often broken off just below the surface, extend about 5 cables ESE from Oyster Rock (18°54'·1N, 72°49'·7E); they are usually removed during the SW monsoon. Fishing stakes may also be encountered in other parts of the harbour.

**Main channel****7.224**

- 1 From a position SE of Prongs Reef Lighthouse (18°52'·7N, 72°48'·0E) the main channel leads ENE then NNE through the anchorage area, passing (with positions from Oyster Rock, a flat islet with a tower standing on its NW side (18°54'·1N, 72°49'·7E)):



SSE then ESE of Colāba Shoals (1 mile SSW), and:  
 ESE of Sunk Rock (8 cables SSE), which is awash  
 and marked by a light (red and yellow chequered  
 round tower) (28 m in height), thence:



Sunk Rock Light-tower (7.224)  
 (Original dated prior to 1981, checked 2004)

ESE of Nigger's Head (3 cables SSW), a shoal  
 extending SSW from Oyster Rock, thence:

ESE of Colāba Reef (7 cables NNE), a drying reef,  
 surrounded by a number of detached reefs which  
 also dry. The reef is marked by South Beacon  
 (stone cylinder, black with white bands) which  
 stands 1½ cables SW of the main reef; and by  
 North Beacon, of similar colour and construction,  
 standing close N of the reef. Thence:

ESE of Dolphin Rock (9 cables NE), which is  
 steep-to on its E side; the rock is marked by a  
 light (grey masonry tower, white cupola, 18 m in  
 height). Thence:

ESE of Middle Ground Islet (1½ miles NE), which is  
 rocky with two towers standing on it. Shoal water  
 extends about 1½ cables NE from the islet, a  
 light-buoy (port hand) marks the NE end of the  
 shoal. And:

WNW of Karanja Reefs (3 miles E) which extend  
 about 2 miles off the W end of Karanja Island.  
 There are 2 spoil grounds, marked by a light-buoy  
 (black and yellow, conical) moored close N,  
 situated between the SW end of the reefs and  
 South Karanja Buoy. Karanja Beacon (black, cone  
 topmark) stands on the NW part of the reefs.  
 Thence:

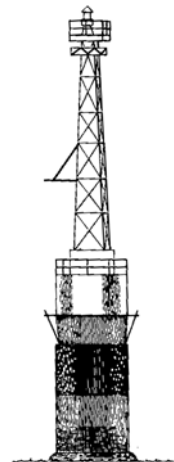
To a position W of North Karanja Light-buoy (starboard  
 hand) (3 miles ENE).

#### 7.225

The main channel then continues NE towards the oil  
 jetties S and SE of Butcher Island and to the approach  
 channel (7.262) for Jawahar Lal Nehru Port, passing:

SE of Tucker Light-beacon (white framework tower  
 on red masonry beacon, white and black bands)  
 (18°56'·1N, 72°52'·5E), which marks the edge of  
 the 5 m depth contour of the coastal bank SW of  
 Butcher Island; a dangerous wreck lies 2½ cables  
 SW of the beacon and North Tucker Beacon,  
 marking a shoal patch, stands 2¼ cables NNW.  
 Thence:

NW of Uran Light-beacon (round, black) (18°55'·7N,  
 72°54'·1E) which stands on a drying reef, and  
 Uran Patch Light-beacon (black framework tower)  
 standing 5 cables NNE, each marking shoal water.



Tucker Light-beacon, bearing 280° (7.225)  
 (Original dated 1980, Checked 2004)

(Submitted by S. Sisson, BP Tanker Co.)

**Leading lights** are exhibited from the SW side of  
 Elephanta Island (18°57'·4N, 72°55'·8E); the alignment  
 (055°) of these lights lead through the NE part of the  
 channel, near its SE edge, to a position SSE of Butcher  
 Island and to the vicinity of the W end of the approach  
 channel to Jawahar Lal Nehru Port.

#### Useful marks

##### 7.226

North Channel Beacon Light (white with red bands,  
 8 m in height) (18°57'·1N, 72°51'·2E).

Green Island (18°59'·6N, 72°53'·2E), upon which  
 stands a beacon, lies at the S end of a drying reef  
 extending from the S side of Trombay Island.

Two radio masts (19°00'·5N, 72°53'·5E), red  
 obstruction lights are exhibited from the top of  
 each mast.

Elephanta Patch Light (metal framework tower, black)  
 (18°58'·4N, 72°55'·3E) stands on Elephanta Patch.

Barrel beacon (18°58'·2N, 72°56'·3E) stands on the N  
 end of Elephanta Island (Gharapuri) which is  
 densely wooded with two hills separated by a  
 ravine.

Signal station flagstaff (18°57'·5N, 72°54'·3E) stands  
 on the SE end of Butcher Island.

Butcher Light-beacon (18°56'·8N, 72°54'·3E) stands  
 near the NW side of the channel S of Butcher  
 Island.

Kharavli Hill (18°54'·0N, 72°55'·5E) stands near the  
 NW extremity of Karanja Island.

Gull Islet (Kansa Rock) (18°50'·0N, 72°53'·8E) lies  
 off the entrance to Dharamtar Creek on a coastal  
 bank that fills the SE part of Mumbai Harbour, a  
 shoal patch lies 6 cables NNW of the islet. A light  
 (aluminium framework tower, 20 m in height) is  
 exhibited from the summit of the islet.

#### Anchorage, prohibited anchorages and restricted area

#### General information

##### 7.227

The harbour provides numerous anchorages and  
 individual anchor berths for several types of vessels. The  
 principal anchorage areas are shown on the chart, these,  
 and uncharted anchorages are described below.



## Merchant vessels anchorage

### 7.228

- 1 The anchorage berths for merchant vessels lie in the S and central parts of the harbour, on both sides of the dredged channel; individual berths are shown on the chart. For Jawahar Lal Nehru Port see also 7.264

- 2 A dangerous wreck (18°53'·3N, 72°52'·4E), the position of which is approximate, lies in anchorage A5.

A dangerous wreck (18°55'·9N, 72°52'·4E) lies 2 cables SSW of Tucker Beacon. An area of foul ground lies mid-way between C 1 and D 1 Berths.

- 3 As a general rule vessels should be moored SSW/NNE. During the fine weather season vessels should moor with 80 m of cable on each anchor, and for the rest of the year with 110 m of cable on the S anchor and 80 m on the N anchor; a vessel moored in the eddies off Middle Ground Islet should have 140 m of cable on the S anchor.

## Naval Anchorage

### 7.229

- 1 **Caution.** A submarine cable is laid SW across the Naval Anchorage area from Middle Ground Islet.

An area is reserved for naval vessels between Sunk Rock and the tidal basin, 2 miles N.

- 2 Mooring arrangements are similar to those for merchant vessels (7.228).

## Quarantine anchorage

### 7.230

- 1 Vessels subject to quarantine will be instructed to anchor as convenient for boarding by the Port Health Officer.

## Explosives anchorage

### 7.231

- 1 Vessels arriving with or embarking explosives or other dangerous cargoes will be anchored in the explosive anchorage located S of the main channel NNE of Karanja Beacon.

## Tanker anchorages

### 7.232

- 1 Two anchorages for tankers are situated SW of Butcher Light-beacon (18°56'·8N, 72°54'·3E); a buoy (port hand) is moored between the anchorages and shoal water NW.

## Emergency anchorage

### 7.233

- 1 An emergency anchorage is situated NE of Butcher Light-beacon.

**Caution.** A submarine cable is laid across the channel, between Butcher Island and Elephanta Island, close N of the Emergency Anchorage area.

## Dhow anchorage

### 7.234

- 1 There is an anchorage for dhows, in the NW part of the harbour, situated NNE of Malet Shelf (18°57'·5N, 72°51'·0E), a rocky drying patch marked by a beacon with an iron drum topmark.

## Prohibited anchorages

### 7.235

- 1 **Oyster Rock** (18°54'·1N, 72°49'·7E). A prohibited anchorage area is established SW of the rock; its SE corner is marked by a buoy (white, can).

**Middle Ground Islet** (18°55'·1N, 72°50'·9E). A prohibited anchorage area lies close E of the islet.

- 2 **Butcher Island** (18°58'N, 72°54'E). An extensive prohibited anchorage area, enclosing Butcher Island,

extends N from Butcher Light-beacon to the S coast of Trombay Island.

- 3 The limits of the above prohibited anchorage areas are shown on the chart.

For prohibited anchorages in the approaches to Mumbai see 7.180.

## Restricted area

### 7.236

- 1 A restricted area for Indian naval vessels lies between Middle Ground Islet (7.224) and South Breakwater 4 cables NW (7.238). Entry is prohibited for all other vessels; see note on the chart.

## Basins and berths

## General information

### 7.237

- 1 **Cautions:**

The maximum draughts quoted for alongside berths and depths at berths in the port are subject to change by situation and dredging. The Deputy Conservator of Bombay Port promulgates declared draughts monthly.

- 2 For details of the tidal streams in the berthing area see 7.220.

- 3 The alongside berths in the Port of Mumbai are situated in a series of jetties and wet docks on the W side of the harbour, the principal berths are described below.

- 4 **Directions.** The berthing areas are approached through a channel, with a maintained depth of 7·6 m and 2 cables wide, which leads NW from the main channel E of Middle Ground Islet towards Ballard Pier (18°55'·7N, 72°50'·7E).

- 5 **Leading lights:**

Front light (two white discs, black borders, on framework tower, elevation 8 m) (18°56'·0N, 72°50'·6E) stands near the root of Ballard Pier.

Rear light similar structure (elevation 12 m) (120 m NW of front light).

- 6 The alignment (305°) of these lights lead through the centre of the channel and S of Cross Island Reef (18°56'·5N, 72°50'·9E) which is marked at its S end by 'M' Light-buoy (black and white, conical).

## Naval Dockyard

### 7.238

- 1 **Caution.** The in-going and out-going streams flow strongly past the head of South Breakwater, causing vessels to sheer violently in this vicinity.

The Naval Dockyard lies within a tidal basin which is entered between the S end of Ballard Pier and the N end of South Breakwater, 2 cables S.

South Breakwater Light (metal mast on building, 13 m in height) is exhibited from the head of South Breakwater.

- 2 **Leading lights:**

Front light (18°55'·6N, 72°50'·2E) stands in the dockyard.

Rear light (183 m W of front light).

- 3 The alignment (about 265°) of these lights, which are exhibited occasionally, lead close S of Ballard Pier to the Naval Dockyard.

## Ballard Pier

### 7.239

- 1 Ballard Pier (18°55'·7N, 72°50'·7E) is the main terminal for passenger vessels, it is connected to the main railway system. The N part of the pier is operated as a container terminal. A light is exhibited from the head of the pier

- 2 It was reported (1994) that vessels up to 228 m in length and 9.1 m draught can be accommodated.

### Wet docks

#### 7.240

- 1 There are three wet docks, described below, which provide a total of 52 berths.

#### 7.241

- 1 **Indira Dock** (18°56'4N, 72°50'6E) is entered close N of Ballard Pier.

- 2 When a vessel is entering or leaving the dock by day a blue flag is hoisted at a flagstaff, near the dock entrance, on Bull's Nose; at night, the ship's name followed by the words "come on" are sent by light from the Port Signal Station (7.216).

- 3 Vessels up to 191 m in length and 9.1 m draught can enter Indira Dock which is well equipped for working general cargo including containers.

- 4 Berths on the S part of the outside wall of Indira Dock are maintained by dredging to a depth of 7 m; there is an approach channel to these berths, dredged to 6.1 m close W of Cross Island Reef. Vessels are berthed bows S on the outer wall, by swinging off Bull's Nose and being towed stern first to the berth; this operation is carried out during daylight hours only.

#### 7.242

- 1 **Victoria Dock** lies N of Indira Dock.

Vessels up to 140 m in length, 19 m in width and draught 5.8 m can enter Victoria Dock by day; at night only vessels up to 122 m in length can be accepted.

Victoria Dock is well equipped for working general cargo.

- 2 **Caution.** The lights described in the following directions are only exhibited when the dock gates are open.

- 3 **Directions.** The dock is approached from S through a fairway marked by 2 buoys (red, can), which passes E of Cross Island Reef Beacon (18°56'3N, 72°51'0E), with a dangerous wreck lying 1½ cables ESE, and E of Cross Island (18°56'8N, 72°51'1E). Thence:

- 4 The approach leads W through North Channel which has a maintained depth of 4.3 m. The N limit of this channel is defined by poles with cone topmarks and the S limit by poles with drum topmarks, these marks are located onshore at the W end of the channel. Lights are exhibited from the marks defining the N limit.

- 5 **Lights in line** for this channel, from a position E of North Channel Beacon (18°57'1N, 72°51'2E) (7.226):

Front light (18°57'2N, 72°50'9E) stands on the N side of Prince's Dock entrance (see below).

Rear light (427 m W of front light).

- 6 The alignment (280°) of these lights lead through the channel to a position N of North Channel Beacon, thence:

- 7 **Lights in line** after passing North Channel Beacon:

Front light (framework tower) (18°57'1N, 72°50'8E) stands on the N side of Victoria Dock entrance.

Rear light (pile beacon) (430 m W of front light).

- 8 The alignment (260°) of these lights lead close to the S side of the channel and towards the dock entrance.

#### 7.243

- 1 **Prince's Dock** is situated N of Victoria Dock.

Vessels up to 152 m in length, 18.5 m in width and draught 5.2 m can enter Prince's Dock by day; at night only vessels up to 140 m in length can be accepted.

- 2 Entry to Prince's Dock is limited from about 2¼ hours before, to 30 minutes after, high water. When leaving, although a tug is usually in attendance, vessels cannot be taken out of the dock after high water because the

out-going stream here starts 1½ hours before high water and sets onto Cross Island around the time of high water.

- 3 **Directions.** Prince's Dock is approached through North Channel (7.242) following the first pair of lights in line described for Victoria Dock which, in line bearing 280°, lead towards the entrance of the dock.

#### 7.244

- 1 **Ferry terminal to Mazagaon Dockyard.** Between the ferry terminal (18°57'3N, 72°51'0E) and Mazagaon Dockyard, 7 cables N, there are several drying basins the positions of which may be seen from the chart. A fish wharf stands close NNE of the ferry terminal.

- 2 **Directions.** A fairway, marked by light-buoys, leads N from North Channel to a position off Mazagaon Dockyard.

### Oil jetties

#### 7.245

- 1 The principal oil jetties are situated in the NE part of the port.

#### 7.246

- 1 **Butcher Island Berths** (18°57'5N, 72°54'5E) provide 4 berths for tankers in the NE part of the harbour.

A concrete jetty with 3 berths, each flanked by dolphins, extends from the E side of Butcher Island; this jetty carries a roadway and pipeline and provides Nos 1 to 3 Berths, for tankers up to 225 m in length, 9.7 m draught and 70 000 dwt.

- 2 Number 4 Berth, for a tanker up to 300 m in length, 12.7 m draught and about 125 000 dwt, is situated on the edge of the dredged channel 1 mile SSW of Butcher Island to which it is joined by a causeway.

- 3 **Berthing.** Loaded tankers berth at high water, two tugs are required to be in attendance.

It is compulsory to test astern power during the approach to the port and again before berthing at the terminal.

A turning basin is situated 3 cables SSE of Butcher Light-beacon.

- 4 **Tidal stream.** The out-going stream sets onto Nos 1, 2 and 3 Berths; however, these berths are partially protected from the effects of the in-going stream, but it is reported that a set off the berths may be experienced.

Number 4 Berth lies almost parallel to the tidal stream, however, a set off the berth may be experienced.

- 5 **Directions.** The berths are approached via the channel described at 7.225, and thence, Nos 1 to 3 Berths, by the channel between Butcher Island and Elephanta Island.

- 6 **Leading lights:**

Front light Uran Patch (18°56'1N, 72°54'3E) (7.225).

Rear light Uran Beacon (5 cables SSW of front light) (7.225).

The alignment (astern) (202¾°) of these lights lead to a position, E of Butcher Island Berths, in an area with a maintained depth of 10.8 m.

- 7 Leading lights situated on the NE point of Butcher Island, in line bearing 255°, lead towards a small explosives pier and a mooring buoy, this mooring buoy was not on station in 1996.

#### 7.247

- 1 **Pir Pau Berths** (18°59'4N, 72°54'5E), serving the refineries on Trombay Island, are an arrangement of named berths, marked by lights, situated on the S end of the island which project up to 4 cables SE of it; there is one long isolated finger pier, with a short T-head, about 1 mile ENE of the main berthing area. The berths are used by

vessels, up to 171 m in length, for discharging LPG, butane and petroleum in bulk.

- 2 **New Pir Pau Jetty** (an extension of Pir Pau Jetty) lies, with its two deck T-head and flanked by berthing and mooring dolphins, in Trombay Channel; there is a charted depth of 11.7 m alongside the berth. A turning basin, 450 m diameter with a maintained depth of 8.7 m, is located close SE of the berth; the berth is connected to a terminal, about 1½ miles NW, by a continuous jetty with a 5.15 m wide roadway.
- 3 The berth can accommodate 1 vessel at a time and is used for handling several POL products including LPG, and bulk liquid chemicals; corrosive chemicals are not handled at this berth.
- 4 Vessels between 97 and 197 m LOA, with a maximum displacement of up to 47 000 tonnes and draught of between 10.6 m and 11.1 m (depending on tidal conditions) may berth alongside. Berthing is available by day and night when weather conditions permit.

#### 7.248

- 1 **Directions.** The channel for tankers berthing at Pir Pau continues from the channel described at 7.246; it leads N passing W of W Elephanta Buoy (black, conical) to a position W of Elephanta Patch Light-beacon (18°58'4N, 72°55'3E), then NE to the new berth described above. There is a maintained depth in this channel of 8.7 m, over a width of 180 to 200 m, from E of Butcher Island to the turning basin SE of the new berth.
- 2 From the turning basin vessels berthing at the other named berths proceed NE then N, following the buoyed deep water through Trombay Channel, to the E end of Pir Pau Deep about 1 mile E of the berths.
- 3 Pir Pau Deep, a buoyed channel with a maintained depth of 5.5 m, leads W then WSW to the products berths. There is a turning basin situated close off the berths at the W end of the Deep.

**Caution.** See note on depths at 7.194. A submarine pipeline exists from Stanvac Jetty, lying N of the Pir Pau Deep channel and passes E across the Trombay Channel, see also 1.11.

#### 7.249

- 1 **Pir Pau small craft channel.** A channel, suitable for vessels with local knowledge, crosses the coastal bank in the NW part of the harbour from Bombay Island to Pir Pau. The coastal bank is encumbered with several isolated wrecks, many shoal patches and submarine cables; the positions of which are shown on the chart.
- 2 **Directions.** From a position about 7 cables E of North Channel Beacon (18°57'1N, 72°51'2E) (7.226) the channel leads NE to the Pir Pau Berths passing NW of Butcher Big Reef (7.193). This poorly defined channel, is only marked by a buoy (black, conical) near its mid point and by another buoy (white, conical) about 1 mile NNE of Butcher Big Reef; however, the stranded wrecks and mooring buoys shown on the chart may provide additional guidance.

### Creeks and river

#### Thāne Creek

##### 7.250

- 1 Thāne Creek flows into the NE part of Mumbai Harbour about 3 miles NNE of Elephanta Island (18°58'N, 72°56'E), the tidal stream in its middle attains a rate of 1 kn at springs; depths in the creek decrease gradually from about 5 m at its mouth to 1 m off the town of Thāne, about 13 miles N of Elephanta Island. At low water the creek is

lined with mud banks, save on the E side for a short distance abreast Trombay Island where there are rocky ledges; its shores are fringed with mangroves backed by cultivated land.

- 2 Storm signals are displayed at Thāne (19°11'N, 72°58'E), the brief system is used. See 1.47.
- 3 A custom house is situated about 5 cables downstream of the town of Thāne.
- 4 From the custom house to the junction of Thāne Creek with Bassein Creek, 2 miles upstream, the channel is rocky and dries in places.

#### Dharamtar Creek and Amba River

##### 7.251

- 1 Dharamtar Creek flows into the SE part of Mumbai Harbour between Naukhari Point (18°49'N, 72°56'E) and the S point of Karanja Island 1½ miles N.  
Revas Bandar Light (black wooden post, 3 m in height) (18°49'2N, 72°56'9E) is exhibited at the N end of a narrow strip of land 4 cables E of Naukhari Point.
- 2 Good anchorage for small vessels can be obtained in Dharamtar Creek about 7 cables NW of Revas Bandar Light in charted depths of 5 m.
- 3 Amba River, about 2 miles wide at its entrance and with depths of about 1.8 m, has a general upstream direction of SE and narrows to 5 cables between the mangroves fringing its banks. The least charted depth to Dharamtar, 7 miles up-river, is 1.2 m. A mid-channel course should be steered.
- 4 Fishing stakes will be encountered in the creek and the river.  
Dharamtar has a large wooden pier and 2 stone causeways; there is a regular ferry service to Mumbai.

### Port services

#### Repairs

##### 7.252

- 1 Repairs of all kinds can be effected. There are a number of dry docks, including Hughes Dry Dock: about 304 m long and 30.5 m wide with a depth over its blocks at the entrance of about 9.75 m; the dock, which is entered through Indira Dock (7.241), can accommodate a vessel up to 80 000 dwt.
- 2 Three slipways are available, the largest about: length 232 m, width 26 m, is suitable for vessels up to length 148 m, breadth 26 m and draught 4 m.
- 3 A few floating cranes are available.

#### Other facilities

##### 7.253

- 1 Hospital; and de-ratting and de-ratting exemption certificates.

#### Supplies

##### 7.254

- 1 Fuel oils at bunkering berths located in wet docks; fresh water at all berths and by water barges in the stream; fresh provisions.

#### Communications

##### 7.255

- 1 There is regular communication by sea with the main ports of the world, the principal ports of India and with islands in the Indian Ocean.  
The international and national airports are situated at Santa Cruz, 13 km N of Mumbai.
- 2 India State Railways connect with Mumbai.



## Small craft and landings

### Anchorage

#### 7.256

- 1 There is anchorage for yachts off the Bombay Yacht Club NNW of Dolphin Rock (18°54'·8N, 72°50'·2E).

### Landings

#### 7.257

- 1 Landing can be effected at the NW end of Elephanta Island on an intertidal groyne, the N end of which is marked by Beacon B (iron tripod, black cage topmark), standing on Shet Bandar. The landing is used by pleasure boats transporting visitors to and from the 2 caves situated on the island. A better landing place is available near the S point of Elephanta Island, see 7.266.

## JAWAHAR LAL NEHRU PORT

Chart 2627

### General information

#### 7.258

- 1 **Position.** Jawahar Lal Nehru Port (Port of Nhāva-Sheva) (18°57'N, 72°57'E) lies in the NE side of Mumbai Harbour, it is situated on the mainland SE of Elephanta Island (7.226).
- 2 **Function.** The port, which was developed as a satellite port for Mumbai, offers computerised facilities for handling of container and bulk cargo traffic. The principal imports are fertilisers, raw materials food grains and POL including chemicals.
- Port limits** are shown on the chart.
- 3 **Approach and entry.** The port is approached via Mumbai Harbour main channel and entered through a dredged channel S of Elephanta Island.
- Caution.** Certain aids to navigation are reported to be unreliable and may be missing, unlit or out of position. Vessels should be navigated with due caution.
- 4 **Traffic.** In 2003, the port was used by 1788 vessels with a total dwt of 52 436 075.
- 5 **Port authority.** The port is administered by Jawahar Lal Nehru Port Trust, Administrative Building, Sheva, Tal. Uran, 400 707, Dist. Raigad.
- 6 **Development.** Future development plans include more bulk berths, a bunkering terminal and a repair yard; when complete, it is expected that the port will have the capacity to handle about 12 million tonnes of container and bulk cargo per year. Construction work N of the berthing area and reclamation at the N end of Nhāva Island (Hog Island) (18°58'N, 72°58'E) was reported complete in 1997.

### Limiting conditions

#### 7.259

- 1 **Controlling depth.** There is a maintained depth of 10·8 m in the approach channel SSE of Butcher Island (7.225). See also 7.194.
- Deepest and longest berth** is the container berth (7.264).
- 2 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. Mora (18°55'N, 72°56'E), 3 miles SSW of Jawahar Lal Nehru Port, has a mean spring range about 3·5 m and a mean neap range about 1·6 m.

- 3 **Density.** The density varies with the state of the tide and major fluctuations occur during the monsoon season.
- 4 **Maximum draught.** The maximum draughts for vessels in the approach channel are, inbound 12·0 m and outbound 12·5 m.

### Arrival information

#### 7.260

- 1 For full details for Jawahar Lal Nehru Port and Mumbai see 7.208 to 7.210.
- Pilotage.** Overall control of shipping is vested in Mumbai Port. In addition to the information listed at 7.212, vessels should contact Jawahar Lal Port Control, for details see *Admiralty List of Radio Signals Volume 6(4)*.
- 2 **Tugs** join at the entrance of the approach channel.

### Harbour

#### 7.261

- 1 **Layout.** The berths are situated on reclaimed land at the NW end of Sheva Island (18°56'N, 72°58'E). A dredged channel, between 1¼ and 2½ cables wide with a maintained depth of 11 m, gives access to the berths and to an anchorage area situated NE of Elephanta Island; there is a turning basin, with a maintained depth of 11 m, situated at the N end of the channel S of the anchorage area, see also 7.194.
- 2 **Storm signals** are displayed from the signal station at Mumbai (7.217).
- 3 **Landmarks:**
  - Latticed mast (18°56'·7N, 72°56'·4E) standing at the SW end of the bulk berth.
  - Red building with dome (18°55'·8N, 72°57'·6E).
- 4 There are conspicuous cranes (not charted) in the vicinity of the port,
  - For details of landmarks in the area surrounding the port area see 7.222.
- 5 **Major Light:**
  - Sheva Island Leading Lights (centred on 18°56'·8N, 72°57'·6W), elevation 27 m.

### Directions

#### 7.262

- 1 **Caution.** For the latest information on depths in the channel the Harbour Master should be consulted; see also 7.194.
- 2 From the vicinity of the turning basin situated 3 cables SSE of Butcher Light-beacon (18°56'·8N, 72°54'·3E) the channel, known locally as JNP Channel, is marked by light-buoys and leads E then NE to the berths; thence N to the inner turning basin and anchorage (7.264).
- 3 Sheva Island leading lights (18°56'·8N, 72°57'·5E), elevation 27 m, in line bearing 084°, lead through the first part of the channel; thence vessels should follow the dredged channel to the berths or anchorage.

### Useful marks

#### 7.263

- 1 Uran Light-beacon (18°55'·7N, 72°54'·1E) (7.225).  
Uran Patch Light-beacon (18°56'·1N, 72°54'·3E) (7.225).
- 2 Sheva Beacon (pillar, black with pole and ball topmark) (18°56'·5N, 72°56'·5E).  
Barnacle Rock beacon (18°57'·8N, 72°56'·8E) standing on a rock which dries.  
Pillar (white) (18°58'·2N, 72°57'·4E).  
Pillar (white) (18°58'·2N, 72°57'·6E).



## Berths and anchorage

### 7.264

- 1 **Caution.** For the latest information on depths at the berths the Harbour Master should be consulted.

**Berths.** There are 2 principal terminals in the port; each lies within a maintained depth area of 13.5 m.

- 2 A container berth (18°57'3N, 72°56'9E), about 1280 m long, provides berthing facilities for 5 vessels; the container terminal borders the S bank of Nhāva Creek. And:
- 3 A bulk berth (18°56'9N, 72°56'5E), provides about 500 m of berthing for 2 bulk cargo vessels at its SW end and a multipurpose jetty about 212 m long at its NE end, providing berths on the outer and inner sides, including facilities for liquid cargoes.
- 4 The maximum size of vessel permitted to use the Container Terminal Berths Nos 1, 2 and 3 was reported in 2001 to be LOA 270 m draught 12 m and displacement 85 000 tonnes; at Berth Nos 1 and 2 there is a maximum

LOA or 270 m, the maximum beam for bulk vessels is 28 m for non-free flowing cargo and 32.5 m for free flowing cargo.

- 5 **Anchorage.** An anchorage, with a maintained depth of 13.5 m, lies at the W end of Panvel Creek (18°58'5N, 72°58'0E); the limits of the anchorage, which is marked by light-buoys, are shown on the chart.

## Port services

### 7.265

- 1 **Facility:** hospital, deratting and deratting exemption certificates are issued.

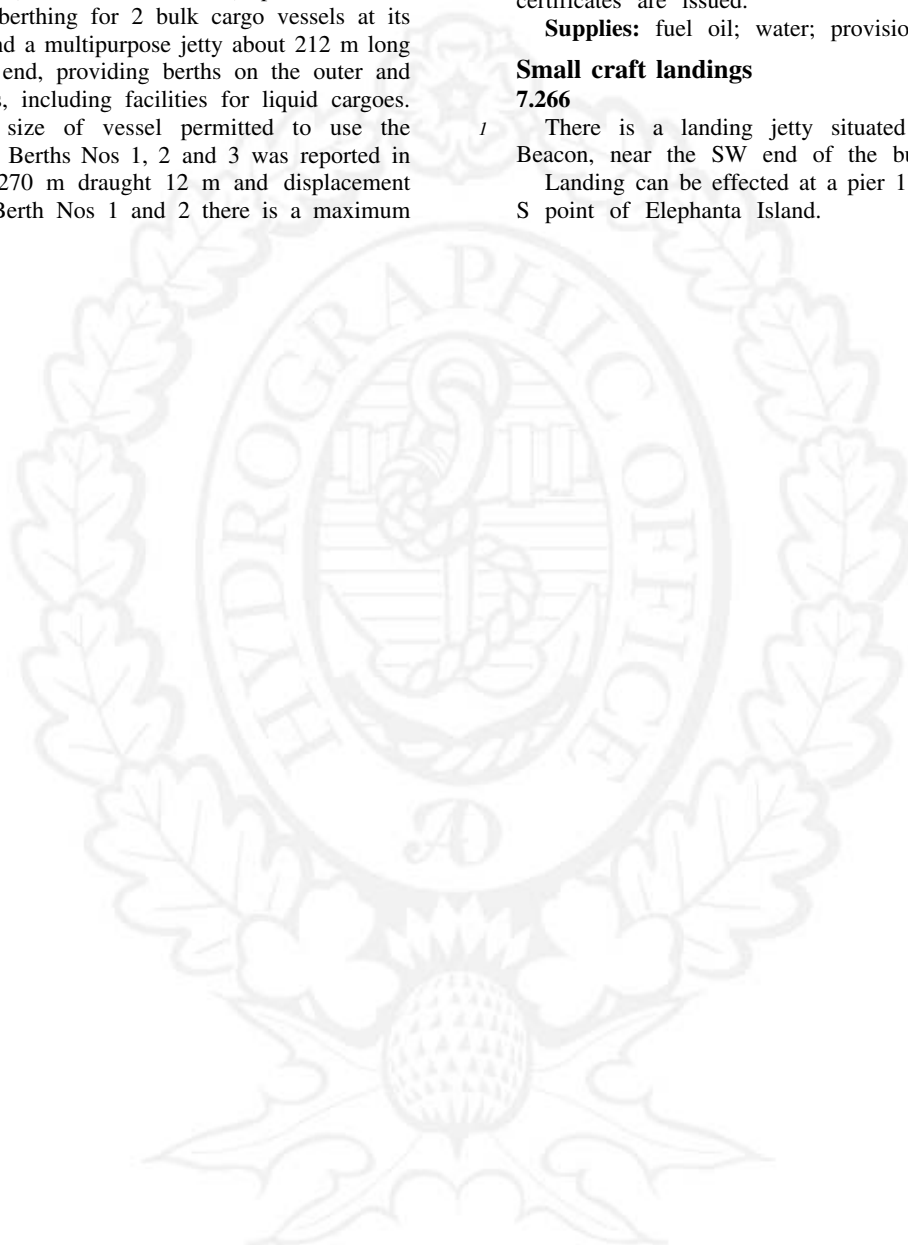
**Supplies:** fuel oil; water; provisions.

## Small craft landings

### 7.266

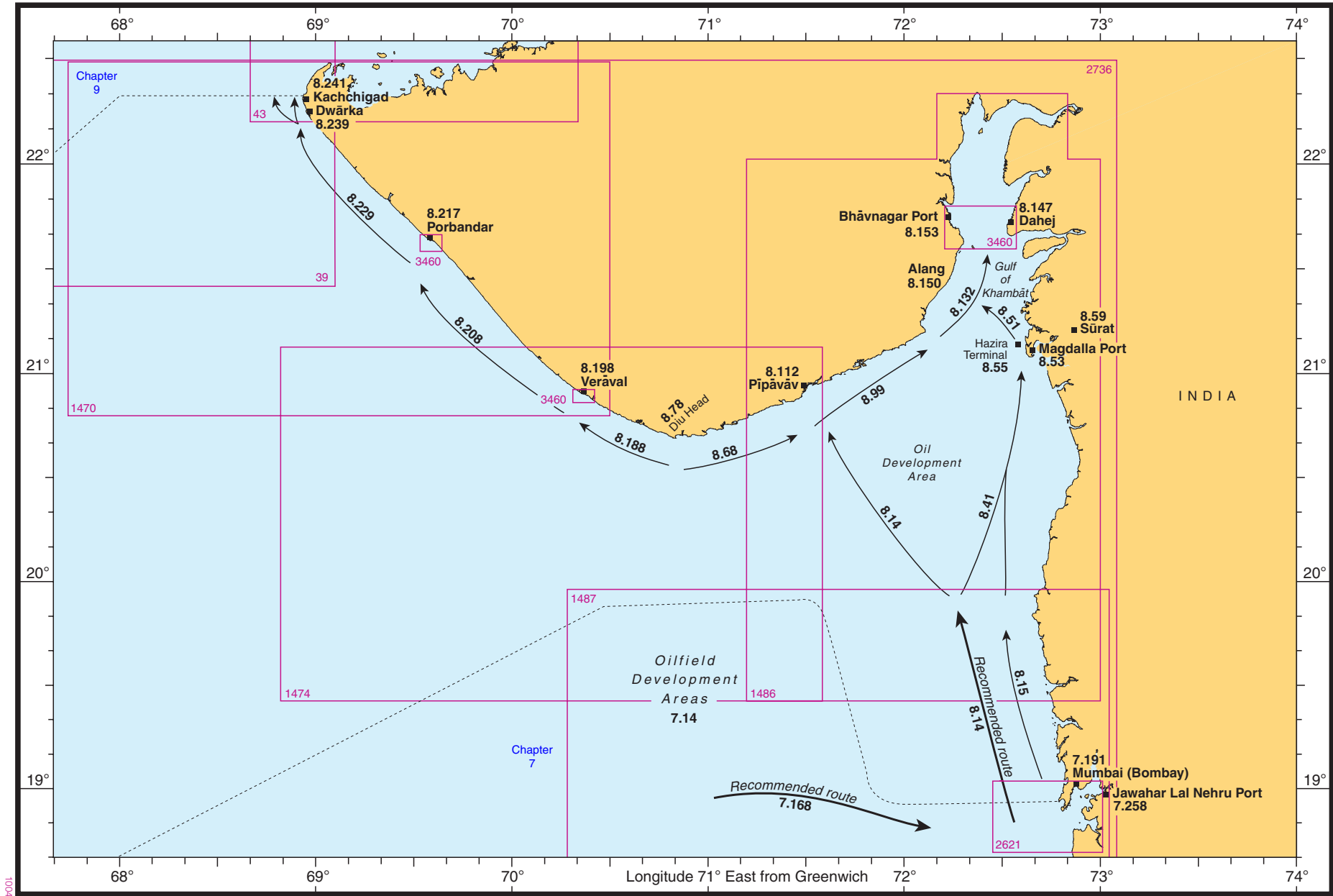
- 1 There is a landing jetty situated close N of Sheva Beacon, near the SW end of the bulk berth.

Landing can be effected at a pier 1½ cables NNE of the S point of Elephanta Island.





Chapter 8 - Mumbai (Bombay) to Dwārka, including the Gulf of Khambāt



## CHAPTER 8

## MUMBAI (BOMBAY) TO DWĀRKA, INCLUDING THE GULF OF KHAMBĀT

## GENERAL INFORMATION

Chart 2736

**Scope of chapter****8.1**

- 1 This chapter covers the Konkan and Kāthiawār Coasts of India from Mumbai (18°54'N, 72°49'E) to Kachchigadh, 300 miles NW. The Gulf of Khambhāt, a major feature of this coastline, and the minor harbours and anchorages on the coast are also described.

**Topography****8.2**

- 1 The Konkan Coast between Mumbai and the Gulf of Khambhāt consists mainly of numerous irregularly-shaped shallow creeks and bays, interspaced by rocky headlands and with several rivers that empty into the sea; inland there are a number of mountains and hills within about 20 miles of the coast.
- 2 The Gulf of Khambhāt is fringed throughout by reefs, and encumbered by extensive drying sandbanks lying on the E side and near its head; the coastline is mostly covered by mangrove jungle which extends well inland.
- 3 The Kāthiawār Coast is generally straight and fringed by a reef, it is composed chiefly of sandstone with perpendicular cliffs and overhanging rocks in many parts; the country along the seaboard is undulating and averages about 30 m high, farther inland there are a few prominent hills. During the rainy season, many streams flow into the sea but at other times they leave gaps in the coral reef at their mouths; these gaps furnish good landing places where small boats may lie aground in the mud.
- 4 The Konkan and Kāthiawār Coasts are well lit, having numerous lights with ranges of 15 miles or more.

**Tidal streams****8.3**

- 1 Details of tidal streams may be found in the relevant sections of the chapter.

**Currents****8.4**

- 1 In the general area covered by this chapter the currents are as follows. From November to January, during the NE monsoon, the most common sets are to the NW, usually at rates of less than 0.5 kn. From March to September, during the SW monsoon, the circulation is reversed with sets to the SE; rates are most commonly about 0.5 kn, but 2 kn may be attained at times. Occasional onshore currents of up to 1 kn occur, but there is considerable variability particularly during the NE monsoon.

**Climate and weather****8.5**

- 1 For climate and weather see 1.178.

**Submarine exercise areas****8.6**

- 1 Submarine exercise areas are centred 75 and 128 miles W of Diu Head (20°41'N, 70°50'E). A good lookout should be maintained when passing through these areas. See 1.8.

**Navigational control****8.7**

- 1 For regulations which control navigation in the territorial waters of India see 1.39.

**Piracy****8.8**

- 1 Recent incidents of piracy and armed robbery have been reported by vessels in the Gulf of Khambhāt and offshore approaches. For possible preventative measures see 1.56.

## OFFSHORE OILFIELDS

**General information**

Chart 1487

**Development areas****8.9**

- 1 Mukta—Panna and Bassein oilfield development area (7.15) and Bombay High oilfield development area (7.14) are situated, respectively, with their centres about 50 miles NW and 90 miles WNW of the entrance to Bombay Harbour. For details of these development areas see 7.10.
- 2 For details of the Tapti oilfield development area in the approaches to the Gulf of Khambhāt, S of Western Bank, see 8.44.
- Some of the platforms are marked by lights, for details see *Admiralty List of Lists Volume F*.

**Oil and gas field regulations****8.10**

- 1 For details see 1.12.

**Pipelines****8.11**

- 1 For details see 1.11.

**Distress****8.12**

- 1 For details see 7.13.

**Recommended routes****8.13**

- 1 For details see 7.18.

**Offshore route****8.14**

- 1 **Caution.** A dangerous wreck lies near the charted route E of Mukta—Panna and Bassein oilfield development area in position 19°13'N, 72°25'E.
- 2 The offshore recommended route leads 66 miles NNW from the vicinity of 18°51'N, 72°32'E, it passes E of Mukta—Panna and Bassein oilfield development area (7.15), as shown on the chart, to the vicinity of 19°55'N, 72°14'E.
- 3 Vessels proceeding to the N part of the Gulf of Khambhāt via Grant Channel (8.98), the recommended route, should take a NW track to S of Savāi Bet (20°54'·2N, 71°31'·6E), passing SW of Tapti Oil Development Area (8.43).

*(Directions continue at 8.49 and 8.109.**Directions for the coastal passage NW are given at 8.196)*



## SOUTH APPROACH TO GULF OF KHAMBHĀT

## WORLI POINT TO TĀRĀPUR POINT

## General information

Charts 2621, 1487, 2736

## Route

## 8.15

- 1 From a position W of Worli Point (19°01'·5N, 72°49'·0E) the route leads about 50 miles NNW to a position W of Tārāpur Point.

## Topography

## 8.16

- 1 The coast is generally low, fringed with rocky reefs and is heavily indented by bays and river mouths. North of Arnāla Island (19°28'N, 72°44'E) much of the foreshore is submerged at high water spring tides and reefs extend well offshore; the hinterland is thickly wooded.

## Depths and offshore dangers

## 8.17

- 1 An effluent diffuser is situated in position 19°01'·5N, 72°47'·4E, 1½ miles W of Worli Point (8.22). Two pairs of lighted dolphins lie 1½ miles N and S of the diffuser, as shown on the chart. Between the diffuser and each pair of dolphins, obstructions project 1·5 m above the seabed. Vessels are advised to keep at least 500 m clear.
- 2 Seaward of the 20 m depth contour there are isolated wellheads outside of the oilfield development areas, which form obstructions, also there are a number of dangerous wrecks; the positions of these dangers are shown on the chart.

## Fishing

## 8.18

- 1 A good lookout should be maintained for, and a wide berth given to, fishing stakes which may be encountered in depths of less than 25 m; they are normally removed each year during the SW monsoon.  
Vessels using the coastal route are advised not to hamper fishing activities.

## Currents

## 8.19

- 1 The currents are of monsoonal origin, but tend to follow the trend of the coast. In December and January, sets are NW with rates up to 1 kn. In July and August when the SW Monsoon is well established, SE sets with rates up to 2 kn are experienced. Exceptionally, onshore sets up to 1·5 kn are experienced during the NE Monsoon and up to 3 kn during the SW Monsoon.

## Principal marks

## 8.20

- 1 **Landmark:**  
Eskar Temple (19°14'·5N, 72°51'·2E) with a white dome stands on the N summit of a round hill.  
Chimney (19°58'N, 72°43'E) (8.47).  
For details of landmarks in the approaches to Bombay Harbour see 7.185.
- 2 **Major lights:**  
Prongs Reef Light (18°52'·7N, 72°48'·0E) (7.185).  
Santa Cruz Aero Light (control tower, elevation 25 m) (19°05'·4N, 72°52'·0E).

- 3 Utan Light (white square masonry tower, red bands, 15 m in height) (19°16'·5N, 72°46'·8E).  
Satpati Light (mast, elevation 22 m) (19°43'·3N, 72°42'·2E).
- 4 Tārāpur Point Light (white square masonry tower, black bands, 23 m in height) (19°50'·7N, 72°39'·5E); an auxiliary light is exhibited from the same structure.

## Directions

(continued from 7.151)

## Coastal route

## 8.21

- 1 **Cautions:**  
Reefs and foul ground front much of this stretch of coast. In fine weather vessels on passage should keep in depths of more than 15 m, giving due attention to the dangers described below; in adverse weather conditions a greater offing is advised.
- 2 The offshore area, between Vasai Creek (19°19'N, 72°47'E) and a position 9 miles N, has not been fully examined within the 5 m depth contour.
- 3 From a position W of Worli Point (19°01'·5N, 72°49'·0E) the route leads about 50 miles NNW to a position W of Tārāpur Point, passing (with positions from Arnāla Island (19°28'N, 72°44'E)):
- 4 WNW of the diffuser (26½ miles S) and its associated dolphins (8.17), thence:  
WNW of a rock awash (23½ miles S), the rock is part of a rocky head lying about 7 cables NW of Uarashi Beacon (8.22). Thence:
- 5 WNW of Hervey Patches (21½ miles S), a cluster of shoal patches over which the sea always breaks and which are marked, on their N side, by a buoy (red, conical) during the fine weather season; a small drying reef and other rocky dangers lie about 1½ miles ENE of these patches. Thence:
- 6 Clear of a dangerous wreck (21 miles S) with a light-buoy (starboard hand) moored close W, and:
- 7 WNW of Mehti Khada (20 miles S), a small basalt rock which is 4 m high and steep on its W side; the rock lies 5 cables W of Ambu Islet, a low islet covered with palms, with an old watch tower standing upon it. A fort, with a pagoda situated 1 mile N, stands at the S end of a promontory located close E of Ambu Islet. Thence:  
WNW of a dangerous rock (16 miles S) lying 8 cables WNW of Manori Point, thence:
- 8 WNW of Green Islet (13½ miles S) which is covered with short green scrub, and surrounded by a ledge of rocks that extend E to the mainland shore. Thence:  
WNW of Outer Islet (12 miles S), a sandy islet lying at the S end of a drying reef; High Rock, a sharp pinnacle, stands 1 mile N. The passage E of these features is foul and cannot be navigated. Thence:
- 9 WNW of Poshpir (8 miles SSE), a rocky islet with foul ground extending about 1 mile seaward. Thence:  
WNW of Arnāla Island which is encircled by rocks and has a small fort standing upon it; the island is reported to be radar conspicuous at 27 miles. Thence:

- 10 WNW of Ussapur Rock (5 miles NNW) and its drying reef which extends about 1 mile seaward, thence:
- 11 WNW of the reef which fringes the coast between Ussapur Rock and Tārāpur Point, 18 miles NNW. Thence:  
Clear of a dangerous wreck (25 miles NNW), a wreck with its mast showing. And:
- 12 To a position W of Tārāpur Point from which foul ground extends about 7½ cables W, with a narrow reef extending about 2 miles farther NNW.

### Useful marks

#### 8.22

- 1 Worli Point (19°01'5N, 72°49'0E), with a ruined fort standing close SSE of the point.  
Uarashi Beacon (10 m in height) (19°04'4N, 72°48'8E) stands on the S end of Uarashi Reef, a light is exhibited from the beacon from 1st October to 31st May.
- 2 Kanheri (19°13'N, 72°55'E), the highest peak on Salsette Island, appears from W to have a flat summit.  
Gorai Rock (19°15'N, 72°47'E) (not charted) a sharp pinnacle of black rock, 32 m high.
- 3 Shendur (19°15'5N, 72°56'5E) is a sharp detached peak, 459 m high, standing in the NE part of Salsette Island.
- 4 Dongri Point Light (metal column, 2 m in height) (19°18'3N, 72°47'7E) is exhibited from 16th September to 15th June from Dongri Point; the point, which rises to a hill with its summit about 5 cables S of the light, appears as a bluff point from seaward.  
Girij Hill (19°23'0N, 72°47'5E), a small round hill 51 m high.
- 5 Kamandurg (19°23'N, 72°57'E) a conical mountain surmounted by a fort, is easily identifiable; Tungar, a remarkable plateau, stands 4 miles NNW. These mountains provide prominent marks when making a landfall.
- 6 Arnāla Light (white metal framework tower, 15 m in height) (19°27'4N, 72°44'8E) stands, near the custom house, on a low point of land E of Arnāla Island. The light is partially obscured by Arnāla Island.
- 7 Kelve Māhīm Light (white mast, 15 m in height) (19°36'1N, 72°44'2E).  
Kāldurg (19°41'5N, 72°49'0E) is the S peak of a mountain range which runs parallel to the coast; it resembles a castle when seen from the NNW.  
Nāvāpur Light (Mast) (19°47'3N, 72°41'4E).  
(Directions continue at 8.49)

### Coastal bays, creeks and rivers — Worli Point to Vasai

Charts 2621, 1487

#### Māhīm Bay

##### 8.23

- 1 **Position:** Māhīm Bay (19°02'N, 72°49'E) is entered between Worli Point and Bāndra Point, 1 mile N, the bay forms the shallow rocky entrance to Māhīm River.  
**Caution.** Attention is drawn to the effluent diffuser 1½ miles W of the bay, see 8.17.

- 2 **Submarine cables** are laid within an area, in which anchoring and fishing is prohibited, extending WSW from Māhīm Bay as shown on the chart.

**General information:** Jamsetji Causeway crosses the river, at the head of Māhīm Bay, connecting Bombay Island with Salsette Island (19°10'N, 72°55'E).

- 3 **Anchorage:** Bāndra Point (19°03'N, 72°49'E) affords some shelter from NW winds to small vessels with local knowledge.

**Storm signals** are displayed, the brief system is used. See 1.47.

Chart 1487

#### Vesāva

##### 8.24

- 1 **Position:** Vesāva (19°08'5N, 72°48'5E), a minor port but a prominent centre for fishing, lies close inside the entrance of Mālād Creek (8.25) on its E side.

**Vesāva Light** (white mast, 15 m in height) (19°08'8N, 72°48'2E) stands, on an island, on the W side of Mālād Creek.

- 2 **Storm signals** are displayed near Vesāva Light, the brief system is used. See 1.47.

**Anchorage:** small vessels can anchor with shelter from N winds, close S of the point forming the W entrance to Mālād Creek, in depths of about 3-6 m, sand.

#### Mālād Creek

##### 8.25

- 1 **Position:** Mālād Creek (19°10'N, 72°49'E) is entered W of the SW extremity of shoal ground extending SW from Vesāva (8.24); the creek dries except for a narrow channel leading about 3 miles NE from its entrance.

**Channel.** The channel is navigable, at all states of the tide, from its entrance to a position about 1 mile upstream; at which point, a ferry crosses the creek. Local knowledge is required.

- 2 **Tidal streams** in Mālād Creek often attain a rate of 5 kn.

#### Manori Creek

##### 8.26

- 1 **Position:** Manori Creek is entered between Manori Point (19°12'N, 72°47'E), a bluff of dark bare rock, and a beacon standing 1 mile ESE of it; a custom house stands near the beacon.

**Manori Village**, with a church at its S end, stands 7½ cables N of Manori Point.

- 2 **Storm signals** are displayed, the brief system is used. See 1.47.

**Anchorage:** small vessels, with local knowledge, can obtain sheltered anchorage in Manori Creek E of Manori Church in a depth of 4-6 m, sand.

#### Utan

##### 8.27

- 1 **Position:** Utan (19°17'N, 72°47'E), a fishing village, stands on the shore of a bight close N of Utan Lighthouse (8.20).

**Storm signals** are displayed, the brief system is used. See 1.47.

#### Vasai

Chart 1487

#### General information

##### 8.28

- 1 **Position.** The town of Vasai (19°20'N, 72°48'E) stands on the N bank of Vasai Creek close within its entrance.

**Function.** Fishing vessels and small trading craft of about 60 tonnes are based at the port.

- 2 **Approach and entry.** Vasai Creek is entered between Dongri Point (19°18'·3N, 72°47'·7E) (8.22) and an unnamed point 1½ miles NE.

**Traffic.** The port is used by small coastal trading craft with shallow draught.

### Limiting conditions

#### 8.29

- 1 **Depth.** The depth in the fairway is reported to 0·9 m at low water springs, but this depth is approximate and should not be relied upon.
- 2 **Tidal levels.** See information in *Admiralty Tide Tables*. Mean spring range about 3·2 m; mean neap range about 1·5 m.

### Tidal streams

#### 8.30

- 1 The in-going and out-going tidal streams set, respectively, ENE and SSW across the entrance to Vasai Creek; they attain a rate of 3 kn at springs near the entrance, thence, about 5 miles upstream it decreases to about 1½ or 2 kn. The streams continue to set for about 1 hour after the times of high and low water; slack water lasts for about 20 minutes.

### Storm signals

#### 8.31

- 1 Storm signals are displayed, the brief system is used. See 1.47.

### Directions

#### 8.32

- 1 **Caution:** Drying rocks extend 1½ miles W from Dongri Point and sandbanks, which dry and probably shift their positions, extend about 2½ miles WSW from the N entrance point of the port; in calm weather there is no indication of these dangers for the sea does not break over them, but in adverse weather the sea breaks heavily. Local knowledge is required to navigate Vasai Creek, which, because of the tidal streams and its tortuous nature caused by the shoals, can only be used by small boats at slack water.
- 2 **Channels:**  
The main channel lies close to the S shore abreast Dongri Point, thence it leads ENE and follows the N shore ENE of Vasai Fort.  
A boat channel is reported to lead, from a position NE of Poshpir Islet (19°20'N, 72°46'E) (8.21), ESE to a position S of Vasai Fort.
- 3 **Useful marks:**  
Vasai Fort (19°20'N, 72°49'E).  
Vasai Light (metal post on masonry base, elevation 5 m) (19°19'·3N, 72°49'·3E) stands on a reef 4 cables SE of Vasai Fort.

### Anchorage and landing

#### 8.33

- 1 Good anchorage may be obtained abreast Vasai Fort in depths of about 10 m.  
There is a stone pier at Vasai and another at the village of Bhāyandar, 2½ miles SE. The latter pier has access to the railway system.

### Port services

#### 8.34

- 1 **Facility:** custom house.  
**Supplies:** limited provisions.  
**Communication:** railway.

### Small craft

#### 8.35

- 1 **General information.** A boat passage connects Vasai Creek, via Ulhās River (19°18'N, 72°53'E), with Thāne (19°11'N, 72°58'E) and thence S with Mumbai Harbour.
- 2 **Directions.** Boats proceeding through Vasai Creek should remain in the deepest part by keeping close to the NW side of the creek until abreast the W end of Panju Island (19°20'N, 72°51'E), thence keep in mid-channel N of the island until a large white domed temple in Ghod Bandar, a village on the S shore of the creek, bears 180°; from this position steer for the S side of the Ulhās River and keep from ½ to 1 cable offshore, following the bends and avoiding the points, as in most river navigation.

### Coastal bays, creeks and rivers — Vasai to Tārāpur Point

#### Chart 1487

### Agāshi Bay

#### 8.36

- 1 **Position:** Agāshi Bay (19°29'N, 72°44'E) lies N of Arnāla Island (8.21) and at the entrance to Vaitarna River.  
**General Information:** the bay is very shallow and being encumbered with shoals it can only be navigated by a small vessel at around high water.
- 2 **Storm signals** are displayed from Arnāla Island, the brief system is used. See 1.47.

### Dānda Creek

#### 8.37

- 1 **Position:** Dānda Creek (19°36'N, 72°43'E); this shallow creek extends about 3½ miles inland from a fort which stands on a detached rock at its entrance.  
**Kelve Village** stands on the N side of the creek E of Kelve Māhīm Light (8.22); there is a custom house here.
- 2 **Storm signals** are displayed at Kelve, the brief system is used. See 1.47.

### Māhīm Creek

#### 8.38

- 1 **General information:** Māhīm Creek (19°38'N, 72°44'E) is a shallow creek encumbered with rocks. The town of Māhīm stands on the N side of the creek.

### Dudh River

#### 8.39

- 1 **Position:** Dudh River, which is encumbered with rocks and very shallow, empties into the sea close N of the village of Satpati (19°43'N, 72°42'E); this part of the coast is particularly foul with reefs, which partly dry, extending about 2 miles offshore. Shirgaon Village, in which there is a fort, stands 2 miles SSE of Satpati Village.
- 2 **Storm signals** are displayed from a flagstaff on the foreshore at Satpati, the brief system is used. See 1.47.

### Ucheli Creek

#### 8.40

- 1 **Position:** Ucheli Creek (19°48'N, 72°42'E) is entered close N of Nāvāpur Light (8.22), it is shallow and encumbered with rocks.



- 2 **Storm signals** are displayed at Nāvāpur (19°47'N, 72°42'E), the brief system is used. See 1.47.

## TĀRĀPUR POINT TO SUVĀLI BANK

### General information

Chart 1486

#### Route

##### 8.41

- 1 From a position W of Tārāpur Point (19°50'N, 72°39'E) the route leads about 80 miles N or NNE to a position SW of Suvāli Bank.

#### Topography

##### 8.42

- 1 The coast in the S part of this stretch of coast is generally low, sandy and fringed with bushes, it is indented by shallow bays and creeks; inland, there are several prominent peaks.
- 2 North of Nāni Damān (20°25'N, 72°50'E) the coast is, in some places, watered by springs and thickly covered by vegetation or date palms. The tide runs up through the river mouths or creeks and behind small hillocks of drifted sand where it floods extensive salt marshes.
- 3 Towards the N end of this coastline, there is an alluvial belt through which the Tāpi River forms a deep and fertile delta.
- 4 The rivers, shallow bays and creeks on this coastline are mostly fronted by an extensive coastal bank making them accessible only at high water and with local knowledge.
- 5 Between Suvāli Point (21°05'N, 72°38'E) and the entrance to Tena Creek, 8 miles NNW, the coastal bank fringes the shore; W of Suvāli Point it dries and extends about 1 mile offshore. Suvāli Hills, a group of sandhills, stand on the coast about 5 miles N of Suvāli Point.

#### Off-lying shoals

##### 8.43

- 1 **Malacca Banks** consist of 4 long narrow banks, lying between the parallels 20°20'N and 21°20'N, which obstruct the entrance to the Gulf of Khambhāt their names, from E to W, are Eastern Bank, Breaker Bank, Narmada Bank and Western Bank; the positions and extent of these banks are shown on the chart.
- 2 Eastern Bank has very deep water close to shoal patches, some of which dry, and over which the sea breaks in its N part. A well lies on the W side in 21°03'9N, 72°31'6E.
- 3 Breaker Bank has extensive shoal patches, lying in a N/S direction on its N part, over which the sea breaks; the sandbank near its centre (20°45'N, 72°24'E) is visible at a good distance with the sun on it. A dangerous wreck lies, in the vicinity of 20°24'5N, 72°06'5E, near the S end of this bank.
- 4 Narmada Bank has an extensive patch of drying sand near its centre and a small patch and a well near its N end.
- Western Bank dries in places.

#### Development area

##### 8.44

- 1 The Tapti oilfield development area has been established in the approaches to the Gulf of Khambhāt (S of Western Bank) in an area centred on 20°35'N, 71°58'E, as shown on the chart (see also 1.12). Anchoring and trawling are prohibited within this area due to the presence of oil and

gas pipelines (see also 1.11), and submarine power cables (see also 1.33).

#### Depths

##### 8.45

- 1 To seaward of the 10 m depth contours lying off the Konkan Coast (1.114) and Eastern Bank (8.43) there are no charted dangers S of latitude 21°00'N, except dangerous wrecks at 19°50'1N, 72°31'3E and 20°02'0N, 72°36'2E (8.50).

#### Currents

##### 8.46

- 1 See 8.19.

#### Principal marks

##### 8.47

- 1 **Landmarks:**

Chimney (19°58'N, 72°43'E) 275 m in height, red obstruction lights are exhibited.

- 2 The following marks are positioned from the watch tower that is described below:

Watch tower (21°09'N, 72°44'E).

Building, water tower and chimneys (5½ miles WSW).

Chimney (2 miles WNW).

Towers (3 miles WNW).

Towers (2¼ miles NW).

Flare situated (5 cables NNE).

- 3 **Major lights:**

Tārāpur Point Light (19°50'7N, 72°39'5E) (8.20).

Umargām Light (white concrete tower, red bands, 30 m in height) (20°11'7N, 72°45'0E) stands close SSW of a ruined tower situated on the S side of the entrance to Varoli River. Storm signals are displayed in the vicinity of the light, the brief system is used. See 1.47.



Umargām Light Tower (8.47)

(Original dated prior to 1981, Checked 2004)

- 4 Damānganga River Light (white round concrete tower, black bands, 31 m in height) (20°24'6N, 72°49'9E), is situated on the S side of the river entrance (for storm signals see 8.63).
- 5 Māchhiwāda Light (white round concrete tower, black bands, 30 m in height) (20°48'7N, 72°49'7E) stands 6 cables NW of the N entrance point of Kānāi Creek.
- Wāsi Borsi Light (white square concrete tower, red bands, 34 m in height) (20°56'1N, 72°45'7E) stands 1 mile NNW of the N entrance point of Pūrna River.
- 6 Hāzira Light (white round masonry tower, 25 m in height) (21°05'5N, 72°38'6E) stands 6 cables NE of Suvāli Point. Vaux's Tomb, that of a former



Deputy Governor of Bombay accidentally drowned in Tāpi River, stands close SE of the lighthouse.

### Other aids to navigation

#### 8.48

- 1 Racon (21°05'·5N, 72°38'·6E) at Hāzira Light (8.47).  
Racon (20°11'·7N, 72°45'·0E) at Umargām Light (8.47).

For details see *Admiralty List of Radio Signals Volume 2*.

### Directions

(continued from 8.14 and 8.22)

### Cautions

#### 8.49

- 1 Extensive reefs and foul ground extend up to 4 miles offshore between Vādhavan Point (19°56'N, 72°40'E) and a position close S of Nāni Damān, 30 miles NNE; vessels should not approach this coast in depths of less than 20 m.
- 2 Malacca Banks Channels (8.43). It is inadvisable to use these channels which, although deep, are generally narrow and intricate towards their N ends; also, the channels are unmarked and too distant for fixing from objects on the coast at their S ends.
- 3 Malacca Banks are steep-to in places and, as soundings may not give sufficient warning, should not be approached on a falling tide. The N limit of the banks has not been closely examined.
- 4 The general alignment of the Malacca Banks is subject to change and less water than charted may be present. In 2002 Western Bank (8.43), Narmada Bank and Sandhayak Shoal (20°42'N, 71°53'E) were found to have shifted by various amounts.
- 5 Sutherland channel (8.51) should not be used without local knowledge.
- 6 The channels and depths shown on the chart are subject to frequent change, and the buoyage and other aids to navigation are adjusted accordingly. Mariners should navigate with caution and refer to the local authorities for the latest information.
- 7 Oil wells and platforms (lit and unlit) are situated on Malacca Banks, including the area of Surat Roads (8.54) and Sutherland Channel, as shown on the chart.

### Coastal route

#### 8.50

- 1 From a position well W of the reef surrounding Tārāpur Point (19°50'N, 72°39'E), and clear of a dangerous wreck (masts (2)), the position of which is approximate) lying 7½ miles W, the route leads about 65 miles N, or NNE from the offshore route, to a position SSW of Suvāli Point, passing (with positions from Udwāda (20°29'N, 72°52'E)):
- 2 W of Vādhavan Point (35 miles SSW), a low point covered with mangrove bushes, which is surrounded by foul ground extending nearly 3 miles from it. A dangerous wreck lies 6¼ miles NNW. Thence:  
W of Guler Point (27 miles SSW), a low point covered with coconut palms. Thence:
- 3 E of Eastern Bank (8.43) (26 miles WNW), which is steep-to and soundings give very little warning of approach to the danger. Thence:  
Clear of the narrow bank orientated NNE/SSW (16 miles WNW), and:

4

W of the shoal water and rocky patches in the shallow bight extending about 33 miles NNW of Udwāda, thence:

To a position about 10 miles SSW of Suvāli Point (21°05'N, 72°38'E), at the S boundary of Magdalla Port Limits, as shown on the chart.

### Sutherland Channel

#### 8.51

- 1 From a position SSW of Suvāli Point the passage through the approaches and S part of Sutherland Channel leads generally N through Magdalla Port (8.53), passing (with positions from Suvāli Point (21°05'N, 72°38'E)):  
E of Eastern Bank (5 miles WSW) (8.43), and:  
W of the drying coastal bank fringing Suvāli Point and extending to 2 miles offshore; and:
- 2 Noting the following dangers and relevant areas:  
LPG and Chemical Lighterage Area (7 miles S) (8.54),  
A drying patch reported to be of approximately 290 m wide centred on 20°57'·5N 72°31'·6E, General Lighterage Area (5 miles SSW) (8.54),
- 3 Dangerous wreck (4½ miles SSW),  
Dangerous wreck (3 mile S),  
Well (4 miles SW),  
Tanker anchorage (3½ miles W), thence passing:
- 4 W of Hāzira Offshore Terminal (5 miles NW) (8.55), and:  
E of a light-buoy (E cardinal) (6½ miles NW), marking the E side of a bank lying 9 cables E of Eastern Bank, thence:
- 5 W of a light-buoy (S cardinal) (6½ miles NW), marking the SW edge of Suvāli Bank which dries and is sandy at its edge with mud near the high water mark; it is just detached from the coastal bank E.
- 6 The route then leads NW towards the centre of the Gulf of Khambhāt, in the vicinity of position 21°21'N, 72°22'E, passing:  
NE of the N end of Eastern Bank where it dries (21°11'·2N, 72°30'·0E) and;  
Keeping well clear to the SW of Gulwala Bank (21°18'N, 72°29'E), which dries near its centre, and:  
NE of the N end of Malacca Banks (21°18'N, 72°23'E) (8.43).
- 7 This route should only be used by vessels with local knowledge.

### Useful marks

#### 8.52

- 1 Tower (19°51'N, 72°41'E).  
Mahalakshmi (19°56'N, 72°55'E) a mountain, with a pointed summit, which slopes gradually N and S from its centre.  
Dahānu Light (white metal framework tower, 12 m in height) (19°58'·5N, 72°43'·0E).
- 2 High Land of Saint John (Sunjan) (20°04'N, 72°50'E), a round-shaped mountain.  
Maroli Light (white metal framework tower, 11 m in height) (20°17'·8N, 72°46'·7E) is exhibited from 16th September to 15th June. Storm signals are displayed at Maroli, the brief system is used. See 1.47.
- 3 Pātia Hill (20°15'·5N, 72°47'·5E) with Maroli, Lākdīa and Sāmarvel Hills standing, respectively, 2¼ miles NNE, 2½ miles NE and 2 miles E.

Jogmāri Hill (20°19'5N, 72°51'0E) has a wooded summit.

Indragadh Hill (20°22'N, 72°51'E) is surmounted by a ruined fort.

- 4 Pārnera Hill (20°33'N, 72°57'E) has a ruined fort standing close NW of its summit.

Valsād Bay Light (white metallic trestle, 30 m in height) (20°37'8N, 72°53'2E) is exhibited from September to June at the S entrance point to Valsād Creek.

- 5 Monument (20°53'N, 72°48'E), reported to be a white domed tomb standing among dark green trees and especially prominent from SW.

- 6 Beacon (15 m in height) (21°03'0N, 72°43'7E) stands near the S entrance point of Mindhola River; a gas pipeline (see 1.11) from the offshore oilfields in the approaches to Mumbai (7.15) is landed on the W shore of Dānti, 1 mile SSW of the beacons. Storm signals are displayed at Dāntiware, the brief system is used. See 1.47

- 7 Beacon (21°05'0N, 72°42'5E) stands near the N entrance point of Mindhola River 1 mile WNW of the town of Bhimpur.

*(Directions for the route N through the Gulf of Khambhāt are given at 8.138)*

## Magdalla Port

Chart 1486

### General Information

#### 8.53

- 1 **Position.** Magdalla Port (21°08'N, 72°44'E), an official point of entry, lies on the E side of the Gulf of Khambhāt and includes Sutherland Channel (8.51), Surat Roads (8.54), Hazira offshore terminal (8.55) and the Tāpi River ports of Hazira (8.57) and Magdalla (8.58).

**Port Radio.** There is a port radio station at Hazira, for details see *Admiralty List of Radio Signals Volume 6(4)*.

- 2 **Port Limits** are as shown on the chart.

**Port authority:** Gujarat Maritime Board, Magdalla Port, Surat — 395 007.

### Sūrat Roads

#### 8.54

- 1 **Position:** Sūrat Roads (21°01'N, 72°38'E), situated about 4 miles S of Suvāli Point, is the anchorage for Tāpi River (8.56).

- 2 **Traffic.** In 2003, 261 vessels, with a total dwt of 2 859 849, used the area; for Hazira offshore terminal see 8.55.

- 3 **Weather.** In these roads unsettled weather with S winds, which precede the SW monsoon, occur earlier than at Mumbai. After mid-April and in early May strong S winds are common, raising a considerable sea during spring tides; the approach of a gale during this period may be heralded by dark cloudy weather, with a gloomy and black atmosphere visible to the SE which, is accompanied by lightning and weak variable breezes mostly from SE.

- 4 **Climate.** For details in the vicinity of the Tāpi River, see climatic table 1.218.

- 5 **Tidal streams.** The in-going stream sets N, continuing for 1 hour after the time of local high water. At the outer anchorage spring tidal streams are strong, especially the out-going stream, which sets S at a rate of from 4 to 5 kn; nearer the bar the streams are weaker. The tide often falls 2 m before the tidal stream turns S.

- 6 **Anchorage.** Anchorage is available in the roads in depths from 10 to 12 m, as shown on the chart, Dangerous wrecks lie NE and SW (8.51) Vessels anchoring need to veer additional cable because of the strong tidal streams, particularly on the out-going stream.

- 7 **Lighterage areas.** An area close S of Sūrat Roads, as shown on the chart, is an LPG and chemical lighterage area; another area close W of the roads, also shown on the chart, is a general lighterage area; lighterage operations are normally suspended from 15th May to 14th September.

- 8 Vessels using the areas should be guided by the information given above regarding weather and tidal streams. Vessels not involved in cargo transhipment operations are advised to keep well clear.

### Hāzira offshore terminal

#### 8.55

- 1 **General information.** Hāzira Offshore Terminal (21°09'N, 72°34'E), consists of an SPM (named Reliance) which is located in the N part of Sutherland Channel, as shown on the chart.

- 2 The berth, in a depth of about 25 m, was reported in 1996 as suitable to accommodate vessels of between 15 000 and 50 000 dwt with a maximum arrival draught of 13 m.

- 3 Anchoring and fishing is prohibited within 1 mile of the SPM and within 2½ cables of the pipeline that leads, from the SPM, to the shore, see also 1.11.

A fog signal is sounded from the mooring and a radar reflector is fitted.

- 4 **Traffic.** In 2003 the terminal was used by 229 vessels with a total dwt of 6 847 818.

**Tidal streams** in the vicinity of the SPM are reported to set in a N/S direction with a spring rate of about 5 to 6 kn; the tidal range is reported to be approximately 7 m.

- 5 **Approach and berthing.** The SPM is approached from S through Sutherland Channel (8.51).

**Pilotage.** The pilot normally boards in Sūrat Roads (21°01'N, 72°38'E) (8.54). Berthing at the SPM is only carried out during the daylight periods of slack high or low water; a tug is available to assist.

- 6 **Anchorage.** Tankers waiting to berth at the SPM anchor, as directed by the pilot, in an area shown on the chart near the S end of Sutherland Channel. A well lies 1¼ miles S (8.51).

### Tāpi River

#### 8.56

- 1 **Position.** Tāpi River (21°03'N, 72°40'E) is entered between Suvāli Point (21°05'N, 72°38'E) and the N entrance point of Mindhola River, 4 miles E.

- 2 **General information.** Tāpi River is about 450 miles long and tidal for a distance of 15 miles from its mouth. Small local craft ascend to Sūrat (21°12'N, 72°50'E) (8.59) and boats can reach Amroli, 11 miles farther upstream.

- 3 **Controlling depths.** Tāpi River bar dries; its entrance and the river are encumbered with numerous sandbanks, some of which dry. A vessel of about 1.8 m draught can only navigate in the river at more than half tide.

- 4 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. Mean spring range about 3.7 m; mean neap range about 2.0 m.

- 5 **Storm signals** are displayed at Magdalla (8.58), the brief system is used. See 1.47.

- 6 **Directions.** The navigable channel can only be pointed out by local pilots (non compulsory), for the sandbanks and channels are continually shifting. A light-buoy (safe water) is moored SW of the channel in the vicinity of its entrance.

**Facilities:** tugs and barges.

- 7 **Development.** A channel, 80 m wide and 11 miles long, was being dredged (1994) to a depth of 3 m.

### Tāpi River ports

#### 8.57

- 1 **Ligherage** for these ports is carried out at Surat Roads (8.54)

- 2 **Hāzira** (21°06'N, 72°39'E) is a large industrial port being developed, on Suvāli Point at the Tāpi River estuary, to bring gas ashore from the offshore oilfields NW of Mumbai (7.10). The port will also be used to relieve bulk cargo congestion at Mumbai (7.191).

#### 8.58

- 1 **Magdalla.** There are a number of berths, including Essar Steel, L & T, and Reliance on the N bank of the Tāpi River between the entrance and Magdalla Port, which is situated about 5 miles from the entrance and provides 4 small jetties on the S bank.

The largest berth, No 1, is 210 m in length, with a depth alongside of 21.0 m.

- 2 **Approach.** The port is approached through a buoyed channel, the positions of the channel buoys are changed without notice as required to conform to the channel; night navigation can be made available.

- 3 **Port services:** local airport, about 6 km distant; road and rail transport.

**Repairs:** There is a dry dock length 155 m, width 30 m, for vessels to 12 000 dwt and a maximum draught of 6.0 m.

#### 8.59

- 1 **Sūrat** (21°12'N, 72°50'E) a city, which extends about 1½ miles along the E bank of the Tāpi River, lies 13 miles NE of its entrance.

There is a pool, with depths from about 3.7 to 5.5 m, in the river abreast the port. The river is spanned by a magnificent iron girder bridge.

- 2 The city is connected with the general railway system.

A castle, with a mass of irregular fortifications and flanked at its corners by large round towers, stands in the centre of the city.

- 3 The tombs of early European residents, including the Dutch, and more recent tombs of the Mullahs of the Bohras, are of interest.

### Coastal ports, creeks, bays and anchorages

Chart 1486

### Tārāpur Harbour

#### 8.60

- 1 **Position:** Tārāpur Harbour (19°53'N, 72°39'E) is formed by barrier reefs extending NNW from Tārāpur Point (19°50'N, 72°39'E) and SSW from Vādhavan Point, 5½ miles N.

- 2 **Chinchani-Tārāpur Creek,** at the head of Tārāpur Harbour, is entered 1¼ miles NE of Tārāpur Point Lighthouse (19°50'7N, 72°39'5E); the towns of Tārāpur and Chinchani stand, respectively, S and N of the entrance to the creek.

- 3 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*; mean spring range about 3.9 m; mean neap range about 1.7 m.

**Storm signals** are displayed from a fort close N of Tārāpur, the brief system is used. See 1.47.

- 4 **Anchorage** for small vessels can be obtained in Tārāpur Harbour, as shown on the chart, in depths of less than 4 m; local knowledge is required.

### Vādhavan

#### 8.61

- 1 Plans have been formulated (1997) to develop a port at Vādhavan, some 65 miles N of Mumbai, with the capability of handling 250 million tonnes of cargo annually.

### Dahānu

#### 8.62

- 1 **Position:** The village of Dahānu (19°59'N, 72°43'E), lies on the N side of the entrance to Khondha Creek; the creek is entered 4 miles NE of Vādhavan Point (19°56'N, 72°40'E).

**Storm signals** are displayed from a fort at Dahānu, the brief system is used. See 1.47.

- 2 **Anchorage** for small vessels, with local knowledge, may be obtained about 3½ miles WNW of Dahānu Light (19°58'5N, 72°43'0E) (8.52) in depths of 3-6 m.

- 3 **Directions.** If proceeding to the above anchorage pass between a reef, which almost dries, extending N from the NW edge of foul ground NW of Vādhavan Point and a reef extending SW from Gulur Point (20°04'N, 72°42'E); the least depth in this approach channel is 3-6 m.

### Moti Damān

#### 8.63

- 1 **Position:** The town of Moti Damān (20°24'5N, 72°50'0E) lies on the S side of the entrance to Damānganga River, the town of Nāni Damān lies on its N side.

**General information.** Damān forms part of the Union Territory of Goa, Damān and Diu, all former Portuguese colonial enclaves.

- 2 **Off-lying dangers.** An area of foul ground is shown on the chart 2¾ miles WSW of the river entrance, its position is approximate; an underwater dangerous rock lies about 1 mile N of this foul ground.

- 3 **Controlling depths.** The bar off the mouth of the Damānganga River is flat and consists mostly of hard sand, but rocky ground with drying patches projects about 1¼ miles offshore from the river entrance; the bar has a least charted depth of 0.6 m. Inside the bar, between the forts flanking the entrance, there is a pool with a depth of 5.7 m; upstream from the entrance depths reduce rapidly.

- 4 **Storm signals** are displayed from a signal station situated in the vicinity of Damānganga River Lighthouse (20°24'6N, 72°49'9E) (8.47), the brief system is used. See 1.47.

**Landmarks:** the forts on each side of the entrance to Damānganga River; 2 square steeples and white buildings serve to identify the port.

- 5 **Directions.** Vessels not exceeding 500 tonnes may enter Damānganga River at high water in fine weather. Vessels should keep the river entrance open bearing about 090° and moor in mid-channel abreast the forts; local knowledge is necessary.

- 6 **Anchorage** may be obtained 4½ miles W of Damānganga River Lighthouse in a depth of about 9 m, mud.

**Supplies:** provisions.

**Communication:** general railway system.

### Umarsādi Creek

#### 8.64

- 1 **Position:** Umarsādi Creek (20°32'N, 72°53'E) lies at the entrance to Pār River.

- 2 **Controlling depths.** The bar at the entrance to Umarsādi Creek dries and there are depths of less than 1.8 m for a distance of 2 miles seaward of the entrance.



**Landmark.** A pagoda is situated 5 cables N of the N entrance point of the creek.

- 3 **Directions.** Although local knowledge is necessary to enter Umarsādi Creek the following directions may be of assistance to small vessels in an emergency:

- 4 Keep in depths of more than 5.5 m until a high white building in Pārdi (20°31'N, 72°56'E) bears about, but not more than, 112°. Thence:

- 5 Steer inshore keeping the entrance to Pār River open; when Pārnera Hill (20°33'N, 72°57'E) (8.52) bears 079° a vessel will be within the bar.

- 6 **Anchorage.** When within the bar a vessel may anchor when the land to the N is concealed behind the N entrance point of Umarsādi Creek.

### Valsād Bay

#### 8.65

- 1 **Position.** Valsād Bay (20°38'N, 72°53'E) lies inland of a straight stretch of coast and is entered 6½ miles N of Umarsādi Creek (8.64). The town of Valsād is situated about 3 miles ESE of Valsād Bay Light (20°37'·8N, 72°53'·2E) (8.52).

- 2 **Controlling depths.** Valsād Bay is fronted by an extensive flat of mud and sand, which dries, extending about 7½ cables seaward; vessels can only cross this flat at high water.

**Off-lying dangers.** Extensive shallow rocky patches lie 4½ miles SW and 3½ miles W of Valsād Bay Light.

- 3 **Auranga River** flows into the S part of Valsād Bay; its entrance nearly dries but within the river there are depths of 2.1 to 2.7 m.

**Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. Mean spring range about 5.1 m; mean neap range about 2.3 m.

- 4 **Tidal stream.** The in-going stream in the roadstead, abreast the entrance to Valsād Bay, sets for 1 hour after the time of high water in the estuary.

**Storm signals** are displayed, the brief system is used. See 1.47.

- 5 **Anchorage** can be obtained, by medium draught vessels, 8½ miles W of the entrance to Valsād Bay in depths of about 8 m.

**Communication:** general railway system.

### Ambika River and Kānāi Creek

#### 8.66

- 1 **General information.** Ambika River entrance (20°45'N, 72°51'E) is fronted by a shallow bar extending about 1½ miles offshore, Kānāi Creek flows into the sea about 3 miles N of the entrance to Ambika River; the area lying between these two features is a shallow muddy basin with numerous islands.

### Pūrna River

#### 8.67

- 1 **General information.** Pūrna River (20°56'N, 72°47'E) is navigable by large local craft as far as the towns of Jalālpur and Navsāri, both stand on the S bank about 8 miles E of the entrance; however, access through winding channels between sandbanks is difficult. Navigation of the river should not be attempted without local knowledge.

## WEST APPROACH TO GULF OF KHAMBHĀT

### DIU HEAD TO JĀFARĀBĀD

#### General information

Chart 1474

#### Route

#### 8.68

- 1 From a position S of Diu Head (20°41'N, 70°50'E) the route leads about 35 miles ENE to a position SSE of Jāfarābād.

#### Topography

#### 8.69

- 1 The coast is generally low and fringed in places by a rocky coastal reef, it is indented by bays and creeks into which empty several rivers. The coast, for about 2 miles W of the point on which Nawābandar (20°44'N, 71°05'E) stands is high with deep water close offshore. The hinterland is undulating and partly cultivated; there are several coastal hills, upon some of which, stand small watch towers.

#### Depths

#### 8.70

- 1 Seaward of the 15 m depth contour, which lies close offshore on the W part of this stretch of coast, there are no charted dangers.

#### Fishing vessels

#### 8.71

- 1 Large fleets of fishing vessels may be encountered, throughout the entire length of this coast, from 4 to 8 miles offshore; barrel buoys and logs mark their grounds and it is advisable to give them a wide berth. These fleets are based at several local coastal ports from October to the end of January.

#### Tidal stream

#### 8.72

- 1 A W set during the out-going tidal stream has been recorded, in the offing between Diu (20°43'N, 70°59'E) and Nawābandar, 5 miles ENE, to persist for 18 hours; at this time, the ingoing stream was barely perceptible over a period of several days.

#### Overfalls

#### 8.73

- 1 Eddies may be encountered close S of Diu Head (20°41'N, 70°50'E); overfalls and strong tide-rips occur at spring tides E of Mādhwād Bainsla, 1 mile E of Diu Head.

#### Currents

#### 8.74

- 1 The currents have a seasonal variation related to the monsoon. From February to September the most frequent set is SE with the greatest consistency during June, July and August; in October currents are variable in direction, but from November to January the most common set is NW. The rates of the currents are generally less than 1 kn



but may reach about 2 kn at times, mainly during July, August and December. Exceptionally, the current has a significant onshore component.

### Principal marks

#### 8.75

##### 1 Landmarks:

Temple (20°42'·5N, 70°52'·5E).

Palm tree (20°45'N, 71°00'E).

2 Nāndivela (21°02'N, 71°07'E), a mountain which is conspicuous from S; it stands at the SE end of Gir Range, a range of mountains, which attain an elevation of 648 m but cannot be seen from any great distance from SW. Gir Forest, a sanctuary for the few remaining Asiatic lions (1974), fringes the hills to the NW.

3 Palm trees (20°47'N, 71°12'E).

Tower (20°52'N, 71°24'E), with a chimney close E, stand at a cement factory on the E entrance point to Jāfarābād Harbour.

##### 4 Major lights:

Diu Head Light (white 6-sided masonry tower, red bands, 37 m in height) (20°41'·5N, 70°49'·7E), stands near the summit of Diu Head (8.78); Mādhwād Temple and two long dwellings stand near by.

5 Cavaleiro Light (white round concrete tower, black bands, 15 m in height) (20°42'·8N, 70°59'·8E), the S-most of 3 lights, stands near the centre of Forte do Diu Citadel; this fort, located on the E end of Diu Island, is prominent from seaward.

6 Jāfarābād Light (white round tower surmounting a 6-sided masonry tower on a square base, 19 m in height) (20°51'·4N, 71°22'·9E), stands close W of the SW entrance point of Jāfarābād Harbour.

7 Savāi Bet Light (20°54'·2N, 71°31'·6E) (8.107).

Jegri Island Light (21°02'·4N, 71°48'·2E) (Chart 1486) (8.107).

### Other aid to navigation

#### 8.76

1 Racon (20°54'·2N, 71°31'·6E) at Savāi Bet Light (8.107).

For details see *Admiralty List of Radio Signals Volume 2*.

### Directions

(continued from 8.197 in reverse)

#### 8.77

1 From a position S of Diu Head (20°41'N, 70°50'E) the route leads about 35 miles ENE to a position SSE of Jāfarābād, passing (with positions from Khāra Village (20°45'·5N, 71°07'·6E)):

2 SSE of Mādhwād Bainsla (16¾ miles WSW) a rock, 1 m in height, with foul ground and shallows extending N and to 3½ cables E over which the sea breaks heavily; foul ground also extends W from the rock to Diu Head. Thence,;

3 SSE of Rocky Shoal (15½ miles WSW), a rocky shoal over which the sea occasionally breaks, lies near the centre of Mādhwād Bay; it is steep-to with detached shoals lying between it and the coast NW. Thence:

4 SSE of Nagwa Point (13¾ miles WSW) a dark bluff with cliffs up to 12 m high rising to a summit 20 m high and marked by a bush; shoal water extends WSW and NW from the point. Thence:

5

SSE of Pānikota Islet (1½ miles E) which lies near the E end of a 2 mile long cliffy foreshore; the W end of the cliffs appears as a sharp bluff when seen from E. Sīmar Fort, with a white flat top and a flagstaff, stands at the N end of the islet; Sīmar Fort Light is exhibited from a square squat pyramid on the fort from 1st September to 15th June. Thence:

6

SSE of Bhesla Rock (3 miles E) a rocky islet, fringed, except SE, by a drying reef; a detached drying reef lies about 2 cables WSW. Thence:

7

SSE of Murex Bluff (10 miles ENE); Murex Reef, which extends about 1 mile E from the bluff, dries and has shoal water extending for about 2 cables farther E and SE. Thence:

8

To a position SSE of Jāfarābād Light (8.75).

### Useful marks

#### 8.78

1 Diu Head (20°41'N, 70°50'E) is a bluff rocky projection about 30 m high upon which stands a lighthouse (8.75).

Vanakbava Light (20°42'·5N, 70°52'·5E), white concrete bottle-shaped structure, 9 m in height, sited on a rescue control centre, off the W end of Diu Island, close S of the conspicuous temple (8.80).

2

Forte do Nagwa (20°42'N, 70°55'E) an old fort, which is prominent among palms in a village, stands on the point 1 mile E of Nagwa Point; a drying reef lies close E of the point.

3

Nawābandar Light (white round tower, 7 m in height) (20°44'·4N, 71°04'·8E) stands at the W entrance to Nawābandar Harbour.

Sīmar Light (framework tower, red and white bands, 30 m in height) (20°46'·5N, 71°09'·0E) is exhibited from a position 7½ cables N of Sīmar Fort Light (8.77).

4

Saiyad Rājpurābandar Light (stone column and hut, 5 m in height) (20°47'·5N, 71°12'·3E).

Lor Hill (20°57'·0N, 71°15'·5E) with Bārman Hill 3 miles E are both prominent.

(Directions continue at 8.109)

### Mādhwād Bay

Chart 1474 (see 1.14)

### General information

#### 8.79

1 **Position.** Mādhwād Bay is entered between Nagwa Point (20°42'N, 70°54'E) (8.77) and a cairn, 8 m high, standing on the rocky E point of Diu Head (8.78), 3½ miles W.

2

**General information.** Mādhwād Bay affords shelter from NW winds in good holding ground, however, a swell frequently sets in and with S or E winds the bay should not be used for anchorage.

3

**Topography.** Low sandhills fronting marshy land, partly submerged at high water springs, extend W from Kotranes (20°42'N, 70°52'E), a low rocky point with foul ground extending 3 cables E, to the entrance of Mādhwād Creek, 2¼ miles WSW; this entrance dries and is blocked by sandbanks close inside the creek. The SW end of Diu Island forms the NE side of the bay, it is fringed with sand dunes which extend inland to a thick belt of palm trees.

4

**Off-lying dangers.** Rocky Shoal (20°41'·5N, 70°52'·0E) (8.77) lies near the centre of the bay with Mādhwād Bainsla (8.77) 1½ miles W and Kāchbi Reef, which dries, 1¼ miles NE.

- 5 **Storm signals** are displayed, the brief system is used. See 1.47.

**Landmarks:** for details of marks in the vicinity of the bay see 8.75.

- 6 **Supplies:** fish at Brancawara (8.94).

## Directions

### 8.80

- 1 **Caution.** Vessels approaching the anchorage located NW of Rocky Shoal should note the in-going stream sets strongly towards Rocky Shoal and the out-going stream towards Mādhwād Bainsla.

- 2 **West anchorage — W approach.** Vessels approaching from W, intending to anchor NW of Rocky Shoal, should pass well clear of Diu Head and then alter course N for the anchorage; passing between Mādhwād Bainsla and Rocky Shoal and anchor with the cliffs at the S entrance point of Mādhwād Creek bearing about 270° distant 1.4 miles, taking care to avoid a 4.9 m shoal lying 1 mile SW of Kotranes Point.

- 3 **West anchorage — E approach.** Vessels approaching from E, intending to anchor NW of Rocky Shoal, should steer to pass S of Rocky Shoal; thence, when about 1½ miles from Diu Head Lighthouse (20°41'·5N, 70°49'·7E) (8.75) alter course N and proceed as for the W approach, see above.

- 4 **Clearing bearing.** The line of bearing 283° of Mādhwād Bainsla or the E point of Diu Head, open well N of Diu Head Lighthouse, passes S of Rocky Shoal.

- 5 **East approach.** Vessels approaching Brancawara Creek from SE should approach with the conspicuous temple (20°42'·5N, 70°52'·5E), standing at the NE entrance point of the creek, bearing 322°. See also 8.94.

## Anchorage and landing

### 8.81

- 1 **Caution.** Vessels should not anchor midway between Mādhwād Bainsla (8.77) and Rocky Shoal (8.77) because of the exposed position and strong tidal streams.

- 2 **General anchorage.** Moderate sized vessels may anchor NW of Rocky Shoal, about 1 mile ENE of the E point of Diu Head (8.78), in a depth of 8 m, sand and mud, as shown on the chart.

- 3 **Inshore anchorage.** Small vessels with shallow draught can anchor between Nagwa Point and Kāchbi Reef, in a depth of about 7 m, well sheltered from E winds and not affected by the tidal streams. This is a favourite anchorage for sailing craft awaiting the in-going stream to proceed to the Gulf of Khambhāt; dhows, usually without lights, may be found here at night.

- 4 **Landing** can be effected in calm weather through a gap in the coastal reef close N of Nagwa Point.

## Diu Harbour

## General information

### 8.82

- 1 **Position.** Diu Harbour (20°43'N, 70°59'E) lies between the E end of Diu Island and the mainland N.

**Function.** The port provides an open roadstead anchorage and sheltered anchorage for small fishing vessels.

**Port Radio.** There is a port radio station, for details see *Admiralty List of Radio Signals Volume 6(4)*.

**Population.** The island's inhabitants are chiefly occupied in the fishing industry; in 2004, the population was estimated to be about 22 900.

- 2 **Topography.** Diu Island is separated from the mainland by Sesalkhāda Creek, a narrow boat channel passing through a large swamp; sandstone cliffs form the seaward face of the island and there are some low hills standing on its W part.

- 3 The town of Diu lies at the E end of Diu Island, it is enclosed by an ancient wall which is much breached on its W side; Fort de Citadel lies close E (8.75).

## Harbour

### 8.83

- 1 **Storm signals** are displayed from a flagstaff in the citadel of Forte do Diu (8.80) and from Cavaleiro Lighthouse (8.75), the brief system is used. See 1.47.

- 2 **Tidal streams.** The in-going stream S of Diu sets E with a maximum rate at springs of 1½ kn; by the shore, it often runs for 2 hours after the time of high water.

The out-going stream sets W with a rate of 2 kn at springs, it often runs for 2½ hours after the water along the shore has begun to rise.

- 3 **Landmarks:**

Gogola North Temple stands 9 cables NNW of the E extremity of Diu Island; a red roofed guard house is situated 1 mile NE of the temple.

There are several prominent buildings in Diu.

For details of other landmarks in the vicinity of the harbour see 8.75.

- 4 **Lights:**

Couraça Light (white 6-sided tower, 4 m in height) (20°42'·9N, 70°59'·9E), is exhibited from 1st September to 31st May at the NE point of the citadel.

- 5 Forte do Mar Light (white round tower, 7 m in height) (20°43'·1N, 70°59'·8E), is exhibited from 1st September to 31st May from Forte do Mar which stands on the N side of the entrance to Sesalkhāda Creek.

- 6 **Dangers:**

A reef, which dries in places, extends about 5 cables NE from the NE point of Forte do Diu citadel; this reef forms a natural breakwater to Sesalkhāda Creek entrance.

- 7 A spit extends 3 cables NW from Forte do Mar to the mainland.

## Anchorage

### 8.84

- 1 **Caution.** Diu Harbour affords no protection from E and the holding ground, rock and sand, is indifferent. Vessels therefore should not anchor here during E winds.

- 2 **General anchorage.** The safest and best anchorage is with Cavaleiro Lighthouse (20°42'·8N, 70°59'·8E) (8.75) bearing 315° distant 5 to 6 cables in depths of about 15.5 m, mud, as shown on the chart; this position affords some protection from W winds and is the anchorage normally used by local vessels.

- 3 **Inshore anchorage.** Small vessels, with local knowledge, may find anchorage about 7 cables ENE of Forte do Mar in depths of about 6.5 m. This anchorage is approached NE of the shoals lying NE of Forte do Diu citadel (8.75) steering for Gogola North Temple bearing about 298° and anchoring when Couraça Lighthouse bears about 240°.

## Port services

### 8.85

- 1 **Facility:** hospital.

**Supplies:** fish, rice, limited fresh provisions and potable water.

- 2 **Communication:** is regularly maintained by sea with Mumbai and other ports.

### Small craft

#### 8.86

- 1 Small craft, with local knowledge, can enter Sesalkhāda Creek at any state of the tide by passing through a gap in the reef close E of Forte do Diu citadel; they may anchor in the creek, in depths of about 1.8 to 3.7 m, protected from S winds by the reef.
- 2 Shallow draught small craft can proceed through Sesalkhāda Creek from Diu to Brancawara (8.94), at the W end of Diu Island.

## Jāfarābād

### General information

#### 8.87

- 1 **Position.** Jāfarābād Harbour (20°52'N, 71°23'E) is situated in a shallow bay, approximately 1 mile across, at the entrance to Jāfarābād Creek.
- 2 **Function.** Jāfarābād is a minor commercial port and fishing harbour, it is open from mid-June to mid-September. Salt and clinker are exported.
- 3 **Topography.** Jāfarābād is a walled town standing, on rising ground, about 1 mile inland on the W bank of the creek of the same name; the town is visible from E and S over the intervening ground.
- 4 **Traffic.** In 2003 the port was used by 4 vessels with a total dwt of 10 283.

### Tidal levels

#### 8.88

- 1 See information in *Admiralty Tide Tables Volume 3*. Mean spring range about 1.9 m; mean neap range about 0.7 m.

### Pilotage

#### 8.89

- 1 Pilotage is not compulsory; pilotage information can be obtained from the Port Officer.

### Harbour

#### 8.90

- 1 **General layout.** The E breakwater, terminating in an L-shaped jetty, extends about 6 cables WSW from the shore near a cement factory situated on the E side of the harbour; a second breakwater extends about 3 cables ENE from the SW entrance point of the bay.
- 2 **Approach.** A channel about 40 m wide leads across the bar to a basin, 300 m in diameter, which surrounds the L-shaped jetty.
- 3 **Depths.** The basin and its approach channel were reported dredged to 5.5 m in 1986; elsewhere within the breakwaters the depth is shallow and much of the enclosed area dries.
- 4 **Storm signals** are displayed from near Jāfarābād Lighthouse (20°51'4N, 71°22'9E) (8.75), the brief system is used. See 1.47.
- 5 **Tidal streams.** The in-going tidal stream sets E and the out-going sets W along the coast outside of Jāfarābād Harbour.  
At springs, the in-going stream persists for 1 hour after high water and the out-going stream continues until 4 hours

before the time of the following high water; both streams attain a maximum rate of 4 kn when 3 hours old.

- 6 At neaps, the in-going stream persists for about 30 minutes after the time of high water and the out-going stream until 4½ hours before the time of the next high water; the maximum rate of the in-going stream is 1¾ kn and that of the out-going stream 1½ kn.

At neaps the stream changes from in-going to out-going in an anticlockwise direction and from out-going to in-going in a clockwise direction.

- 7 **Landmarks:**

Tower (20°52'N, 71°24'E) (8.75).

- 8 For details of landmarks NE of the port see 8.107.

### Directions

#### 8.91

- 1 **Leading lights:**

Front light (metal framework tower on concrete platform, elevation 17 m) (20°52'4N, 71°22'8E).  
Rear light (similar construction, elevation 23 m) (120 m NW of front light).

- 2 The alignment (about 322°) of these lights lead, in the approach channel and across the bar, to the berth at the head of the E breakwater.

- 3 **Useful marks** positioned from the light, (metal framework tower on concrete platform, elevation 17 m) (20°51'6N, 71°23'3E), standing at the head of W breakwater:

An auxiliary light (3 cables SW) is exhibited from a low rectangular hut situated on the SW entrance point.

Flagstaff (1¼ miles WNW) which stands on the highest of several round towers near the centre of the town of Jāfarābād.

### Berths

#### 8.92

- 1 **Anchorage.** In fine weather good anchorage may be obtained 5 cables SE of the auxiliary light structure in depths of about 13 m, soft mud.

**Berth.** The clinker berth, located at the W end of E breakwater, is about 200 m long; it is used by small vessels with local knowledge. The depth alongside the berth is reported to be 1.2 m (2004).

### Port services

#### 8.93

- 1 **Supplies:** limited fresh provisions.

**Communication:** there is regular communication by sea with Mumbai and Bhāvnagar (8.153) during the fine weather season.

## Coastal bays, anchorages and creeks

### Brancawara Creek

#### 8.94

- 1 Brancawara Creek enters the head of Mādhwād Bay NE of Kotranes Point (20°42'N, 70°52'E) (8.79), the entrance is encumbered with rocks, foul ground and a bar with a reported least depth of 0.6 m over it. It is inadvisable for boats to enter the creek except those with local knowledge and then only between the times of half in-going and out-going tides; at such time, boats should keep in the channel near the reef which is visible on the S side of the entrance.



- 2 The town of Brancawara lies about 5 cables within the entrance to the creek on its E side.

For information on fishing vessels operating out of Brancawara see 8.71.

### Nawābandar 8.95

- 1 **General information.** Nawābandar (20°44'N, 71°05'E) provides open roadstead anchorage for small vessels and accommodation for fishing craft. The town of Nawābandar stands, W of Nawābandar Lighthouse (8.78), on the promontory which forms the SW side of a shallow bay into which Baru Creek flows.

- 2 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. Mean spring range about 1.6 m; mean neap range about 0.5 m.

**Storm signals** are displayed at Nawābandar, the brief system is used. See 1.47.

- 3 **Anchorage.** Good anchorage can be obtained about 1 mile ENE of Nawābandar Lighthouse in a depth of 9 m, mud; as shown on the chart.

- 4 **Baru Creek**, partially protected by a drying reef lying 3 cables E of Nawābandar Lighthouse, can be entered by small vessels with local knowledge; the reef, which is fairly steep-to on its S edge, has a boat channel between it and the reef fringing Nawābandar Point to the W.

- 5 **Communications:** the port has communication by sea with Mumbai and other coastal ports; Delvāda, a town 5 km NW, is connected with the general railway system.

### Sīmar 8.96

- 1 **General information.** Sīmar (20°46'N, 71°10'E) provides a roadstead anchorage for small vessels.

- 2 **Tidal streams** at the anchorage, described below, set ENE and WSW; but W of Bhesla Rock (20°46'0N, 71°10'6E) (8.77), in the W entrance to the anchorage, they set NE and SW.

- 3 **Leading marks.** The alignment (250°) of the following marks leads from a position ENE of Bhesla Rock towards the anchorage:

Flagstaff on Sīmar Fort (20°45'7N, 71°09'1E) (8.77) and,

Khāra Triangulation Station (1 mile farther WSW) standing on a rocky ridge.

- 4 The deep channel between the detached reef lying close WSW of Bhesla Rock and the reef extending ENE from Pānikota Islet, 1 mile WSW, lacks leading marks and is not recommended.

- 5 **Anchorage:** may be obtained about 4 cables NNE of Bhesla Rock in a depth of 8 m, mud; as shown on the chart.

#### Landing:

Caution. If landing near Sīmar Fort care must be exercised as the passage between the reefs is narrow and a heavy surf usually runs over them.

- 6 Landing may be effected abreast a farm on a sandy beach near Sīmar Light (20°46'5N, 71°09'0E) (8.78).

### Small craft

#### Diu Island 8.97

- 1 Small craft may find shelter, close NE of Forte do Nagwa (20°42'N, 70°55'E) (8.78), at the W end of the bay lying near the centre of the S coast of Diu Island.

### Rājpurābandar 8.98

- 1 Rājpurābandar (20°48'N, 71°12'E) is a minor fishing harbour at which sailing vessels call regularly.

## JĀFARĀBĀD TO GOPNĀTH POINT

### General information

Chart 1486

#### Route 8.99

- 1 From a position SSE of Jāfarābād (20°52'N, 71°23'E) the route leads about 45 miles ENE to a position SSE of Gopnāth Point. At its E end, the route passes through Grant Channel (21°04'N, 72°00'E) which leads between the Kāthiawār Mainland Coast and Western Bank (8.43); the channel is steep-to on both sides with mud bottom towards the coast and sand towards the bank.

- 2 Grant Channel is the recommended route for vessels proceeding to the N part of the Gulf of Khambhāt.

#### Topography 8.100

- 1 The coast is composed of lime or sandstone cliffs and is indented by bays and creeks, into which, empty a few rivers. The coastline is fringed by a coastal reef which is steep-to in parts but extends, in some places, up to about 1 mile offshore; between Gādhāda (21°01'5N, 71°45'5E) and Islet Point, 5 miles WSW, the reef extends well offshore and fills a bight fronting sandhills. The hinterland is undulating and partly cultivated.

#### Depths 8.101

- 1 There are general depths of between 10 and 16 m along the route between the mainland and Western Bank except at its Grant Channel where less water was reported in 2002 (see 8.109).

#### Development area 8.102

- 1 For details of the Tapti oilfield development area S of Western Bank see 8.44.

#### Fishing vessels 8.103

- 1 Large fleets of fishing vessels may be encountered, off the W part of this coast. For details see 8.71.

#### Tidal streams 8.104

- 1 The tidal streams set in the general direction of the line of the coast; the in-going stream sets ENE and the out-going stream WSW.

- 2 Off Jegri Island (21°02'5N, 71°48'0E), to its S and W, the rate of the in-going stream is 2½ kn and that of the out-going is 1 kn.

- 3 Further information is shown on the chart.

#### Eddies 8.105

- 1 Strong eddies and a race form SE of Jegri Island.

#### Currents 8.106

- 1 See 8.74.



**Principal marks****8.107****1 Landmarks:**

Vārārūp Temple (20°53'N, 71°27'E) is conspicuous from S.

Chimney (20°54'·6N, 71°27'·7E).

Chachuda Temple (20°55'N, 71°29'E).

Circular tower (20°56'·5N, 71°31'·7E) (8.116).

**2 Chimney (21°06'N, 71°45'E).**

White house (21°03'·5N, 71°47'·5E).

Palitana Mountain (21°29'·5N, 71°48'·0E) stands 25 miles NW of Gopnāth Point.

Jhānjhmer Fort (21°11'N, 72°04'E), a square ruined fort which stands close S of the town of Jhānjhmer.

Tree (21°12'N, 72°05'E).

**3 Major lights:**

Jāfarābād Light (20°51'·4N, 71°22'·9E) (8.75).

Savāi Bet Light (white square masonry tower, red bands, 14 m in height) (20°54'·2N, 71°31'·6E), stands on the S side of Savāi Bet Islet; an auxiliary light is exhibited below the main light.

**4 Jegri Island Light (black square masonry tower, white bands, 29 m in height) (21°02'·4N, 71°48'·2E).**

Gopnāth Point Light (red and white square masonry tower, 34 m in height) (21°12'·2N, 72°06'·6E) stands on a hillock close NNW of the point.

**Other aid to navigation****8.108****1 Racon (20°54'·2N, 71°31'·6E) at Savāi Bet Light (8.107).**

For details see *Admiralty List of Radio Signals Volume 2*.

**Directions**

(continued from 8.14 and 8.78)

**Cautions****8.109****1 Malacca Banks Channels (8.43).** It is inadvisable to use these channels which, although deep, are generally narrow and intricate towards their N ends; also, the channels are unmarked and to distant for fixing from objects on the coast at their S ends.**2 Malacca Banks (8.43)** are steep-to in places and, as soundings may not give sufficient warning, should not be approached on a falling tide. The N limit of the banks has not been closely examined.**3** The general alignment of the Malacca Banks is subject to change and less water than charted may be present. In 2002 Western Bank (8.43), Narmada Bank and Sandhayak Shoal (20°42'N, 71°53'E) were found to have shifted by various amounts.**4 Grant Channel (8.99).** Depths in Grant Channel between Gopnāth Point (21°12'N, 72°07'E) and Western Bank, 6 miles SSE, were observed (2002) to be between 1 to 1·5 m less than charted.**5** The channels and depths shown on the chart are subject to frequent change, and the buoyage and other aids to navigation are adjusted accordingly. Mariners should navigate with caution and refer to the local authorities for the latest information.**Coastal route****8.110****1** From a position SSE of Jāfarābād Light (20°51'·4N, 71°22'·9E) (8.75) the route leads about 45 miles ENE, through Grant Channel (21°04'N, 72°00'E) (8.99), to a position SSE of Gopnāth Point, passing (with positions from Dosi Rock (21°02'N, 71°47'E)):**2** SSE of an islet (20½ miles WSW) which stands near the edge of the reef that fringes the coast ESE of Vārārūp Temple (8.107). Thence:**3** SSE of Savāi Bet (16½ miles), a barren rocky islet lying close E of Shiāl Bet (8.112); it has a small white-domed mosque standing near its centre which is prominent from seaward. A stranded wreck with its mast visible above water lies on Savāi Bet Reef, 5 cables E of Savāi Bet; the E edge of this reef is steep-to. A detached shoal of depth 8·9 m lies 10¾ miles SE from the point. Thence:**4** SSE of Bhensala Rock (15¼ miles WSW), which is a bluff rocky islet, steep-to on its E side. Sims Rock, which dries, lies at the W edge of foul ground extending 3 cables W from Bhensala Rock. Thence:**5** SSE of Islet Point (6½ miles WSW), a prominent hilly point fronted by several islets connected to each other and with the coast by a drying rocky reef; Paurādhār Islet, the N islet of the group, is the tallest. A shallow spit extends about 8 cables ESE from the islets. Thence:

SSE of Tāpan Island (5¼ miles WSW), an island with a reef extending 1¼ miles E and a 7·3 m shoal patch lying 1 mile SSE. Thence:

**6** SSE of Jegri Island (1¼ miles ENE); this island, known locally as Katpur Island, has bold rocky cliffs E and S and sandhills on its N part; it is sparsely cultivated. Thence:**7** SSE of an unnamed bluff (6½ miles ENE) with a bay NE in which the coastal reef covers at high water, thence:

SSE of Kotada Bluff (12 miles ENE), a prominent point standing at the W end of a sandy bay. Thence:

**8** SSE of Methla Point (14 miles ENE), a low rocky point which rises to the same level of the hinterland about 5 cables inland. Thence:

SSE of Bhensla Rock (17 miles ENE), a small rocky islet lying near the edge of the coastal reef. Thence:

**9** SSE of Pinnacle Rock (19¼ miles ENE) which stands, on the coastal reef, close SW of a point of land upon which there is a tower. Thence:**10** To a position SSE of Gopnāth Point (21°12'N, 72°07'E) which is fairly high and surmounted by its lighthouse (8.107) and a bungalow; a temple, 23 m high, stands 7½ cables NW of the point.**Useful marks****8.111****1** Temple (20°57'·5N, 71°34'·3E), with a palace standing 3 cables WSW, form a good landmark from S and SE; the buildings stand in a village 5 cables W of Chānch Point which itself, projects SE from about the centre of Chānch Island.

Bhawani Temple (21°04'N, 71°48'E) stands on top of a sandhill at the head of Jegri Bay near its centre.

- 2 Jhānjhmer Light (white concrete column and hut, 3 m in height) (21°10'·8N, 72°03'·7E) stands 2 cables S of Jhānjhmer Fort  
(*Directions continue at 8.138*)

### Pipāvāv Bandar and Pipāvāv Port

Chart 1486 (see 1.14)

#### General information

##### 8.112

- 1 **Position.** Pipāvāv Bandar (20°59'N, 71°34'E), a minor port, lies inland close NE of the junction of Devrāpura and Motapāt Creeks; Pipāvāv Port (8.117), 5 miles SW, is situated on the mainland NW of Shiāl Bet.
- 2 **Function.** Pipāvāv Bandar serves the important town of Dungar situated 6 miles N of the port. Only shallow draught small vessels, with local knowledge, can use the port.
- 3 Pipāvāv Port is being developed as an all season port, and imports and exports bulk cargoes including coal, cement and fertilisers, break-bulk and LPG.
- 4 **Topography.** Shiāl Bet (20°54'N, 71°31'E), an island standing close W of Savāi Bet (8.110), is mostly bounded by rocky cliffs but small bays on its NW and E sides are low and sandy. The ruins of large buildings and of fine temples cover much of the island; there are a few stunted trees and a quarry near its centre, a small village stands in the NW part.
- 5 Mushroom Rock 5 m high, with a lower rock close SW, stand on the coastal reef off the SW end of Shiāl Bet. Chānch Island, about 5 miles long with its centre located 5 miles NE of Shiāl Bet, runs parallel to the mainland coastline and a large mangrove swamp which is submerged at very high spring tides.
- 6 **Port Limits.** The seaward limits of the port are bound by:

|            |                    |
|------------|--------------------|
| 20°57'·20N | 71°34'·00E (shore) |
| 20°54'·03N | 71°34'·00E         |
| 20°53'·15N | 71°32'·08E         |
| 20°54'·06N | 71°28'·33E (shore) |

- 7 **Approach and entry.** Pipāvāv Port is approached from the S and entered through the buoyed channel in West Channel (8.115).

**Traffic** In 2003 the port was used by 824 vessels with a total dwt of 10 189 992.

**Port Authority.** Gujarat Pipāvāv Port Ltd, Post Ucchahiya, 365 560, Gujarat

#### Limiting conditions

##### 8.113

- 1 **Depths.** The controlling depth to Pipāvāv Port is reported (2001) to be 9·5 m.  
**Deepest and longest berth** is the main jetty, 725 m in length with a depth of 9·5 m (8.117).
- 2 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. Mean spring range about 2·7 m; mean neap range about 1·2 m.  
**Density of water** is 1·025 gm/cm<sup>3</sup>.
- 3 **Maximum size of vessel handled.** It was reported (2001) that Pipāvāv Port has handled a vessel of 225 m LOA.  
**Local weather.** A heavy swell occurs during the SW monsoon.

#### Arrival Information

##### 8.114

- 1 **Port Radio.** Port control should be contacted on VHF for pilotage and anchorage information.  
**Notice of ETA.** 72, 48, 24, 12 and 6 hours notice of ETA should be sent to the Harbour Master, for details see *Admiralty List of Radio Signals Volume 6(4)*.
- 2 **Outer anchorages.** Anchorage may be obtained 1½ miles S of Shiāl Bet (20°54'N, 71°31'E) (8.112), as shown on the chart.  
**Prohibited anchorage** area exists N of 20°52'·5N between 71°29'·4E and 71°30'·4E.
- 3 **Pilotage** is compulsory and available 24 hours. Pilots board in position 20°53'·0N, 71°30'·2E as shown on the chart or at the anchorage.  
**Tugs** are available.  
**Regulations concerning entry.** Vessels should not enter the buoyed channel without a pilot.

#### Harbour

##### 8.115

- 1 **West Channel** leads W of Shiāl Bet Island. Two beacons stand on drying reefs, one on each side of the channel entrance; the E beacon close WNW of Mushroom Rock and the W beacon 7¼ cables WSW of the E beacon. A stranded wreck lies near the edge of the reef about ¾ cable ENE of the W beacon. There are general depths of 10 m in the channel from its entrance towards the berths on the mainland and to the anchorage in the stream NW of the island.
- 2 **East Channel** leads N of Bhensala Rock, Savāi Bet and Shiāl Bet, this channel is shallow.
- 3 **Motapāt Creek**, separating the N side of Chānch Island from the mainland, is the outlet for waters covering an immense marsh at high water; and it provides a boat channel to Pipāvāv Bandar. The creek is fed by many small creeks of which the principal is Devrāpura Creek. Spit Sand, which dries in places, extends about 1¾ miles SW from the W end of Chānch Island; its SW edge is named The Spit.
- 4 **Storm signals** are displayed at Pipāvāv Bandar, the brief system is used. See 1.47.
- 5 **Tidal streams.** The in-going stream sets across the S approach to West Channel where it divides. One branch sets N through West Channel and thence NE towards Chānch Island with a spring rate of 1½ to 2½ kn and a rate of about 1½ kn at neaps; the other branch sets ENE past Savāi Bet Reef and thence towards Bhensala Rock (20°55'N, 71°33'E) (8.110) at a rate of 3 kn at springs and from 2 to 3 kn at neaps.
- 6 The out-going stream, with a SW set S of Chānch Island, divides N of Bhensala Rock. One branch sets W through East Channel and thence SW through West Channel attaining a rate of 2 kn at springs and 1 kn at neaps; the other branch sets towards Savāi Bet Reef and thence W along the coast with a rate of 2 to 2½ kn at springs and 1½ kn at neaps.
- 7 **Eddies.** Strong eddies form in West Channel at high and low water.  
**Landmarks:** for details of marks in the vicinity of the port see 8.107.

#### Directions

##### 8.116

- 1 **Caution.** If proceeding to anchor N or NW of Shiāl Bet vessels are recommended to use West Channel because of greatly decreased depths in East Channel.

## 2 West Channel

### Leading Lights:

Front light (metal framework structure, elevation 35 m) (20°55'10N, 71°30'24E),

Rear light (metal framework tower, elevation 45 m) (20°55'22N, 71°30'31E).

- 3 From a position about 2½ miles SW of Savāi Bet Light (20°54'2N, 71°31'6E) (8.107) the alignment (010°) of the leading lights leads into West Channel, passing:

About 3 cables E of the W beacon (8.115), thence:

- 4 Through a channel marked by buoys (lateral) which leads NNE for 2 cables thence NE to a position off the berths at Pīpāvāv Port. Thence alter course to bring the circular tower (20°56'5N, 71°31'7E), standing on the WSW edge of a drying reef that extends WSW from Chānch Island, to bear 034° and steer on this bearing for the anchorages described below. This recommended route is shown on the chart.

- 5 ODAS SW1 Light-buoy (special (not charted)) (20°53'3N, 71°29'7E) lies about 5 cables ENE of the charted light-buoy (special). Vessels should not anchor nor trawl within 500 m of the ODAS buoy.

**Developments.** It is proposed to lay a fairway buoy and additional channel buoys.

- 6 **East Channel.** This channel can only be used by shallow draught vessels with local knowledge, and only at low water. If proceeding through this channel steer to bring Chachuda Temple to bear 261° before Bhensala Rock bears 180°; keep on the bearing of 261° until the mosque on Savāi Bet bears 197° and thence steer direct for the anchorages. The 261° bearing on the temple must be carefully maintained in order to keep in depths not less than 3 m.

## Anchorages and berths

### 8.117

- 1 **Berths.** Pīpāvāv Port lies on the NW shore of West Channe. The main jetty, T-headed, extends 8 cables SE from the port area and provides 3 berths on its SE face, 725 m in length and a reported (2001) depth alongside of 9.5 m.
- 2 A spur extends 300 m NE providing an LPG berth 305 m in length, which can accommodate vessels to 45 000 dwt.
- 3 A cement factory, situated 1½ miles WSW of Chachuda Temple (20°55'N, 71°29'E), is served by a jetty which extends 1¼ miles E from the coast; the jetty terminates in a dog-leg berth, 400 m in length with a charted depth (1996) of about 11 m alongside.
- 4 **Anchorages.** There is good anchorage between the N point of Shiāl Bet and The Spit in a depth of about 9 m, mud and sand; this anchorage gives shelter from the SW monsoon. Vessels may also anchor with Chachuda Temple (8.107) bearing 261°, distant 1.4 miles, in depths of about 10 m.

## Port Services

### 8.118

- 1 **Fresh water** is available at Pīpāvāv Port in limited quantities.
- Communications.** Pīpāvāv Bandar is connected with the railway system.
- Shipbreaking.** There are demolition berths and facilities for 4 large vessels.

## Small craft

### 8.119

- 1 Small craft, with local knowledge, may anchor N of Bhensala Rock in depths of about 4.5 m, mud; the tidal streams are weak in this vicinity.

## Minor port

*Chart 1486 (see 1.14)*

## Mahuva Bay

### 8.120

- 1 **General information.** Mahuva Bay (21°02'N, 71°47'E) lies between a bluff point at the SW end of Jegri Island and another bluff point, situated on the mainland, 6 cables WSW. The bay nearly dries, showing a mass of rocks and stones; local knowledge is required before entry.
- 2 **Dangers in the approach.** Dosi Rock stands on a reef, with several other rocks which dry, 2 cables E of the WSW entrance point of the bay; a beacon, marking the N end of this reef, stands 2 cables NW of Dosi Rock. Two rocks awash and 2 rocks with depths of 2 m or less over them, lie in the entrance to the bay about 3 cables E of Dosi Rock.
- 3 **Landmarks:** for details of marks in the vicinity of the port see 8.107.
- Anchorage** for small vessels can be obtained with Jegri Island Light (21°02'4N, 71°48'2E) (8.107) bearing 040° distant 6 cables in a depth of about 13 m, mud.
- 4 **Mahuva Bandar,** about 3 cables N of the W end of Jegri Island, is approached from Mahuva Bay through a creek which nearly dries.
- Mahuva,** a walled town with a prominent temple near its centre, lies 2½ miles N of Mahuva Bandar; a large swamp, submerged at high water, separates the two places.
- 5 **Storm signals** are displayed at Mahuva, the brief system is used. See 1.47.
- Facility:** there is a custom house at Mahuva Bandar.
- Communications:** the port has regular communication by sea with Mumbai and other coastal ports during the NE monsoon (October to April); it is connected with the general railway system.

## Bays, anchorages and landings

## Patva Bay

### 8.121

- 1 **General information.** Patva Bay, a shallow bay most of which dries, lies between a bluff point (17 m high) (20°58'N, 71°38'E) with Square Rock standing close E and Islet Point (8.110), 2½ miles ENE.
- 2 **Anchorage** for small craft, with shelter from E winds, can be obtained in the E part of this bay W of Islet Point.

## Jegri Bay

### 8.122

- 1 **General information.** Jegri Bay is a shallow bight lying between Jegri Bluff (21°03'N, 71°48'E) and Cave Point, 2¼ miles NE; Pillar Rock stands close S of the latter point. There is a rocky patch lying about 7 cables ENE of the SE end of Jegri Island (8.110).
- Tidal stream.** Off Jegri Bluff the in-going stream sets NE but it is weak in the bay.
- 2 **Weather.** Strong squalls in NE winds raise a heavy sea in this bay.
- Anchorage** for small craft, with shelter from W winds, can be obtained about 4 cables NE of Jegri Bluff in depths of about 2 m, mud.



**Nikol Bandar****8.123**

- 1 **General information.** Nikol Bandar (21°05'N, 71°50'E) is a small indentation in the coast, the entrance to which is almost blocked by drying rocks; it is only used by local boats.

**Kotada Bluff****8.124**

- 1 **Landing.** During W winds boats can land, on the NE side of the peninsula of Kāthiawār to the W; it is entered between Gopnāth Point (21°07'5N, 71°58'5E) (8.110), at the W end of a sandy bay.

**Bagad River****8.125**

- 1 **General information.** Bagad River flows into a sandy

bay (21°08'N, 71°59'E) where boats may obtain shelter, from E winds, around the time of high water.

**Jhānjhmer****8.126**

- 1 **Position.** Jhānjhmer (21°11'N, 72°04'E) is a walled town situated near the coast.

**Useful mark.** Jhānjhmer Light (21°10'8N, 72°03'7E) (8.111).

**Landing.** Good landing can be effected near the town around the time of high water.

- 2 **Anchorage.** Small craft may obtain anchorage about 9 cables SE of Jhānjhmer Fort (8.107), which stands close S of the town, in a depth of 10 m; sand and mud.

**GULF OF KHAMBHĀT****GENERAL INFORMATION**

*Chart 1486*

**Position****8.127**

- 1 The Gulf of Khambhāt (21°21'N, 72°22'E) lies between the coast of Sūrāt and Broach Districts to the E and the E side of the peninsula of Kāthiawār to the W; it is entered between Gopnāth Point (21°12'N, 72°07'E) and Suvāli Point 30 miles ESE.

**Topography****8.128**

- 1 **Malacca Banks** (8.43) lie in the fairway of the approach to the Gulf of Khambhāt. The banks have deep channels on either side; Grant Channel (8.99), the W of these channels is the recommended approach to the gulf.
- 2 **East Side.** The coastline is heavily indented with creeks and rivers, it is fringed onshore with thick groves of trees; offshore it is fronted by extensive drying sandbanks and areas of shoal water which extend up to about 9 miles in places. The shoreline, between Tena Creek (21°13'N, 72°38'E) and the entrance to Sena River, 9 miles N, is covered with thick groves of palmyra trees. At its N end, the coast from Luhāra Point (21°39'N, 72°33'E) to Bān Creek, 5 miles N, consists of fairly high sandhills; thence to Gandhār Village which has a number of prominent buildings, 11 miles farther NE, the coast is low, sandy and muddy.
- 3 **West Side.** From Gopnāth Point to Mithivirdi, a small village 19 miles NNE, the coast is low and fringed with sandhills; thence to Kuda Point, 9½ miles farther NNE, it is fairly high with some ravines near the coast. This coastline is generally straight except for the bay, into which the Shetrunji River (8.149) flows, lying between Gopnāth Point and Alang, 13 miles NNE; N of Alang, it is fringed by a reef which extends about 1 mile offshore in places and 1¾ miles in the vicinity of Kuda Point.
- 4 **Head of Gulf.** Much of the head of the Gulf of Khambhāt is dominated by Mal Bank (21°55'N, 72°22'E) (8.177) which is surrounded by a channel; and by extensive drying coastal sandbanks which extend up to 5 miles off

the mainland. The coastline is generally covered with mangrove jungle which extends well inland.

**Depths****8.129**

- 1 The Gulf of Khambhāt is deep in its S part but much encumbered in its N part by sandbanks which shift under the influence of tidal bores and freshets borne down by rivers; for further details see 8.179.

- 2 **Cautions.** The channels and depths shown on the chart are subject to frequent change, and the buoyage and other aids to navigation are adjusted accordingly. Mariners should navigate with caution and are strongly advised not to navigate in the approaches to Bhāvnagar without local knowledge.

- 3 The chart for the area near and N of Mal Bank (21°55'N, 72°22'E) (8.177), is based on a very old survey, therefore reliance cannot be placed on the depths shown on this chart.

**Tidal stream****8.130**

- 1 Details of tidal stream may be found in the relevant parts of the section.

**Traffic****8.131**

- 1 Ocean going vessels can proceed into the Gulf of Khambhāt as far as Piram Island (21°36'N, 72°21'E).

**SOUTH PART OF GULF OF KHAMBHĀT****General information**

*Charts 3460 plan of approaches to Bhāvnagar Port, 1486*

**Route****8.132**

- 1 From a position SSE of Gopnāth Point (21°12'N, 72°07'E) (8.110) the route leads about 17 miles NE to the vicinity of position 21°21'N, 72°22'E, where it is joined by



the route from SE (8.51), then it leads about a farther 19 miles N to a position NE of Piram Island.

## Topography

### 8.133

- 1 For a general description of the topography on the W and E sides of the route see 8.128.

## Depths

### 8.134

- 1 The depths in the vicinity of the route fluctuate considerably and should be frequently verified; attention is drawn to the variation in depths which may be experienced, for details see 8.129.

## Tidal streams

### 8.135

- 1 Information for the S and W sides of the Gulf of Khambhāt is shown on the chart.

On the E side of the gulf, the in-going stream sets N and the out-going stream S except where the direction is altered by sandbanks.

## Principal marks

### 8.136

- 1 **Landmarks:**  
Temple (21°21'N, 72°02'E), stands on the conical summit of Talāja Hill which rises from a level plain.  
Palitana Mountain (21°29'5N, 71°48'0E) (8.107).  
Khokhra Hills (21°36'5N, 72°06'0E), the summit, 297 m high, standing near the N end of this range is conspicuous.
- 2 **Offshore mark:**  
Piram Island Light (white round masonry tower, black bands, 27 m in height) (21°35'9N, 72°21'2E) stands on the ruins of an old bastion near the middle of the island.
- 3 **Major lights:**  
Gopnāth Point Light (21°12'2N, 72°06'6E) (8.107).  
Piram Island Light—as above.  
Hāzira Light (21°05'5N, 72°38'6E) (8.47).

## Other aids to navigation

### 8.137

- 1 Racon (21°05'5N, 72°38'6E) at Hāzira Light (8.47).  
Racon (21°24'2N, 72°11'1E) at Alang Lighthouse (8.140).  
Racon (21°35'9N, 72°21'2E) at Piram Island Lighthouse (8.136).
- 2 For details see *Admiralty List of Radio Signals Volume 2*.

## Directions

(continued from 8.111)

## Cautions

### 8.138

- 1 Less water than charted was reported (1993) to exist about 5 miles SE of Gopnāth Point (21°12'N,

72°07'E), the general area is shown on the chart; see also 8.109.

- 2 For cautions regarding the Malacca Banks see 8.109 and in Gulf of Khambhāt see 8.129.

## Route

### 8.139

- 1 From a position SSE of Gopnāth Point the route leads about 17 miles NE to the vicinity of position 21°21'N, 72°22'E, where it is joined by the route from SE (8.51), then it leads a farther 19 miles NNE to a position NE of Piram Island, passing (with positions from Alang Light (21°24'2N, 72°11'1E) (8.140)):
- 2 SE of a stranded wreck (12 miles SSW), which is partly visible above water, lying close off the end of a drying reef that extends 1½ miles ENE of Gopnāth Point. Thence:  
SE of Gopnāth Shoals (10½ miles S), which consist of a drying reef with several shoal patches; they are steep-to on their E side. Thence:
- 3 SE of Sultānpur Shoals (6 miles S) consisting of drying rock, sand, clay and numerous shoal patches which extend W from their the N end to the coastal reef. A light-buoy (port hand) is moored off the S end, and a stranded wreck which is partly visible above water lies at the N end, of these shoals. And:  
NW of the N extremity of the Malacca Banks (13 miles ESE) to the vicinity of 21°21'N, 72°22'E, thence:
- 4 ESE of Piram Island (15 miles NE), an island composed of sand and surrounded by a reef. At the S end of the island are some trees and cultivation and, there are a few mangrove trees fringing the NE side; a village lies close N of the lighthouse which stands near the centre of its SW edge. Thence:  
WNW of an isolated shoal (19½ miles NE) with 9.9 m of water over it, thence:
- 5 To the vicinity of the pilot boarding place situated 5 miles NE of Piram Island.

## Useful marks

### 8.140

- 1 **West side of Gulf of Khambhāt:**  
Alang Light (white 6-sided masonry tower, black bands, 24 m in height) (21°24'2N, 72°11'1E).  
Nishkalank Mahadev Temple (21°36'0N, 72°17'5E) lies near the edge of foul ground extending from the coast.
- 2 Kuda Point (21°38'N, 72°18'E) has a thick clump of trees on it which are prominent from N or S and a white bungalow which shows up well from E during the forenoon.
- 3 **East side of Gulf of Khambhāt:**  
Towers of Silence (21°13'7N, 72°41'4E), two towers which stand on the N bank of Tena Creek.  
Bhagva Creek Light (metal framework tower, 26 m in height) (21°18'8N, 72°36'8E), stands 1 mile SW of Dāndi Village; the structure is reported to be difficult to distinguish, from a distance of a few miles, even in favourable light conditions.

- 4 Oil derrick (21°31'N, 72°33'E), in ruins.  
Luhāra Point Light (white metal tower, red spiral, 24 m in height) (21°39'·5N, 72°32'·9E), stands on Luhāra Point at the N entrance point of the Narmada River; it is backed by sandhills up to 24 m high and surrounded by low-lying terrain.  
(Directions for Bhāvnagar Port are given at 8.166)



Luhāra Point Light Tower (8.140)  
(Original dated prior to 1981, Checked 2004)

### Anchorage, creeks, rivers, and side channels on the east side of the Gulf of Khambhāt

Charts 3460 plan of approaches to Bhāvnagar Port, 1486

#### Tena Creek

##### 8.141

- 1 Tena Creek (21°13'N, 72°37'E), which leads to the Tāpi River (8.56) from a position N of Suvāli Bank, is shallow and suitable only for local boats.

#### Bhagva Channel

##### 8.142

- 1 Bhagva Channel (21°17'N, 72°33'E) is situated between Outer Bhagva Sand, a patch of sand orientated NNE/SSW which dries in places, lying about 6 miles offshore, and the coastal bank fringing the shore to the E; there is a shallow flat at the S end of the channel. The channel is used only by small vessels with local knowledge.
- 2 An unnamed channel situated W of Bhagva Channel and lying between Outer Bhagva Sand, with a well lying 5 cables W, and Gulwala Bank (8.51), 3 miles W, is not normally used. This channel is intricate because of numerous shoals, sandbanks and strong tidal streams; local knowledge is essential.

#### Kim River

##### 8.143

- 1 Kim River (21°27'N, 72°41'E) dries at its entrance, it is suitable only for local boats.

#### Narmada River

##### 8.144

- 1 **General information.** Narmada River enters the gulf between the N entrance point of Kim River (21°27'N, 72°41'E) and Luhāra Point, 14 miles NNW; the river is tidal to Ratnapur, 55 miles from its entrance, but it can only be navigated by vessels drawing more than 1·8 m about 3 hours either side of high water. The river's wide estuary, much of which dries, is encumbered with the following features.
- 2 **Alia Bet**, a large island occupying the centre of the estuary is low and covered with small scrub.
- 3 **Kerselea Bank**, on the N side of the estuary, is a large bank of mud and sand which dries.

A coastal bank which dries extends 2 miles SW from Luhāra Point (8.140) with offlying drying banks extending 1¼ miles further S.

#### Bharūch Roads

##### 8.145

- 1 **Position.** Bharūch Roads (21°35'N, 72°30'E) lie W of the entrance to Narmada River (8.144).
- 2 **Tidal stream.** The in-going stream at the anchorage sets N until about 1 hour after the time of local high water, the out-going stream sets S.
- 3 **Anchorage** in the roads may be obtained with Luhāra Point Lighthouse (21°39'·5N, 72°32'·9E) (8.140) bearing 028° distant 5 miles, in a depth of about 16 m, mud; as shown on the chart.
- 4 **Communication**, there is regular sea communication with Mumbai and Bhāvnagar.

#### Bharūch Channel

##### 8.146

- 1 **General information.** Bharūch Channel, (21°38'N, 72°33'E) forms the principal entrance to the Narmada River (8.144). The buoyed channel leads generally NNE passing between Nos 1 and 2 Buoys (21°36'·3N, 72°32'·0E), thence between Kerselea Bank (8.144) and the drying banks extending SW from Luhāra Point. The channel has a least charted depth (1998) of 1·1 m near its entrance. Within the bar the channel is navigable as far E as Āmbheta, a village 3¼ miles NE of Luhāra Point; above this point the channel is shallow and intricate.
- 2 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. For Āmbheta there is a mean spring range about 6·8 m and a mean neap range about 3·8 m.
- 3 **Tidal streams.** The in-going stream flows for 1 hour after the time of high water, sometimes attaining a rate of about 6 kn; the out-going stream sets strongly and occasionally runs for 1 hour after the time of low water.
- 4 Near Bharūch, 30 miles from the entrance, the in-going stream runs for 3 hours only and the out-going for 9 hours.
- 5 **Heavy overfalls** occur at the outer edge of the bar on the in-going stream.
- Pilotage.** Pilots for the river can generally be obtained at the bar.
- Storm signals** are displayed, the brief system is used. See 1.47.

#### Dahej

##### 8.147

- 1 **General information.** Dahej (21°42'N, 72°35'E), a large village with some prominent buildings which can be seen from well offshore, lies at the head of Bān Creek. Dahej N Anchorage, described below, is used solely for the unloading of bulk fertilisers by barges with a HW/HW cycle, which are discharged at the Birla Copper Jetty (21°42'·0N, 72°31'·0E). The GCPTCL Jetty, 6 cables S, is the chemical jetty and its anchorage lies 1½ miles WSW.
- 2 **Offshore features.** A drying flat, which is steep-to along its W edge, extends about 1½ miles from the shore, and the S part of Makra Bank lies 3 miles farther W.
- 3 **Port limits** are shown on the charts.
- Port radio** at GCPTCL Terminal, for details see *Admiralty List of Radio Signals Volume 6(4)*.
- 4 **Traffic.** In 2003 the port was used by 271 vessels with a total dwt of 6 303 836.

##### 8.148

- 1 **Tidal levels.** There is a mean spring range of about 7·7 m and a mean neap range of 5·3 m. The maximum spring range is reported to be 9·5 m.

- 2 **Tidal stream.** The tidal stream in the anchorage has a rate of 5 kn during spring tides and up to 7 kn at the berth.
- 3 **Pilotage** for the fertiliser anchorage is optional; if required, it is provided by the Assistant Port Officer. The pilot for the chemical jetty reportedly boards 1 mile NW of the jetty.
- 4 **Tugs** are available for berthing.
- Directions.** A daylight approach and anchoring at slack water is recommended.
- 5 **Anchorage** may be obtained off the village, between the drying flat and the S part of Makra Bank, with Luhāra Point Lighthouse (8.140) bearing 136° distant 5¼ miles, in a depth of about 17 m, sand, and 4 miles WNW in about 19 m, as shown on the chart. Self-propelled barges, each with a 550 tonnes capacity are used for discharging fertiliser from the anchorage.
- 6 **Berth.** The GCPTCL Jetty, a T-headed jetty for chemical tankers, can accept vessels up to 60 000 dwt with an LOA between 111 and 215 m and a maximum draught of 14.5 m. There are 4 breasting and 4 mooring dolphins.
- Anchorage facility:** self propelled barges each with a 550 tonnes capacity for discharging fertiliser.
- 7 **Storm signals** are displayed, the brief system is used. See 1.47.
- Services.** Fresh water at the berth, stores and minor repairs available.

**Port, anchorages, river, side channel  
and landing on the west side  
of the Gulf of Khambhāt**

*Chart 1486*

**Sultānpur  
8.149**

- 1 **General information.** Sultānpur (21°18'N, 72°06'E) is a small port about 1 mile within the Shetrunji River which enters the Gulf of Khambhāt W of Sultānpur Shoals (8.139); Talāja, another small port, lies about 4½ miles upstream.
- 2 **Tidal streams.** Within Sultānpur Shoals the in-going stream, at springs, does not turn for more than 1 hour after the time of high water and the out-going stream continues 1½ hours after low water; at neaps the in-going stream turns 2 hours after the time of high water.
- 3 **Caution.** Local knowledge is essential before approaching the anchorage.
- Anchorage.** A small vessel can anchor, between Sultānpur Shoals and the drying reef extending about 1½ miles from the coast on each side of the Shetrunji River entrance, in depths of 2½ to 3 m.
- 4 **Storm signals** are displayed near Talāja, the brief system is used. See 1.47.

**Alang  
8.150**

- 1 **General information.** Alang anchorage (21°30'N, 72°20'E) is a major shipbreaking area. Ships are beached for breaking twice a month at HW of over 10 m. There is no restriction on the size of vessel, but vessels must arrive free of cargo.
- 2 **Traffic.** In 2003 the port was used by 254 vessels with a total dwt of 6 084 544.
- Notice of ETA.** 72, 48 and 24 hours notice is required.
- Anchorage.** Anchorage is about 5 miles SSW of Piram Island in 11 m of water.
- Services.** Airport at Bhāvnagar, 50 km distant.
- 3 **Useful marks:**  
Alang Light (21°24'2N, 72°11'1E) (8.140).

**Other aids to navigation**

- Racon (21°24'2N, 72°11'1E) at Alang Lighthouse.  
Racon (21°35'9N, 72°21'2E) at Piram Island Lighthouse (8.136).
- 4 For details see *Admiralty List of Radio Signals Volume 2*.

*Charts 3460 plan of approaches to Bhāvnagar Port, 1486*  
**Channel W of Piram Island  
8.151**

- 1 This narrow channel lies between Piram Island (21°36'N, 72°21'E) (8.139) and Mallok Reef, a reef lying near the E edge of foul ground off Kuda Point.
- 2 The channel should not be used, without local knowledge, as the tidal streams run through at a great rate and there is little slack water.
- 3 A 6.1 m shoal patch lies in the fairway W of Piram Island Lighthouse.

**Piram Island—Landing  
8.152**

- 1 Landing is best effected near the N end of the island on its W side.

**BHĀVNAGAR PORT AND APPROACHES**

**General information**

*Chart 3460 plan of approaches to Bhāvnagar Port*

**Position  
8.153**

- 1 Bhāvnagar Port (21°45'N, 72°14'E) lies near the head of an inlet, which mostly dries, in the NW part of Gulf of Khambhāt; Bhāvnagar City is situated about 5 miles W of the port.

**Function  
8.154**

- 1 The principal imports include urea, rock phosphate, sulphur, shredded scrap and logs; the main exports are millscale and onions.
- 2 Local industries include the production of cotton goods, sugar processing, timber sawing and pressing, furniture making and boat building.
- 3 In 2004, the population is estimated to be about 541 300.

**Topography  
8.155**

- 1 The coast between Kuda Point (21°38'N, 72°18'E) (8.140) and Ghogha, 4 mile NNW, is low, marshy and fronted by drying reefs; abreast Ghogha the foreshore is mud and shingle this, and the land in its vicinity, floods at spring tides. Thence between Ghogha and Bhāvnagar Point, a farther 9 miles NNW, the coast consists of a mud flat overgrown by low mangrove bushes and intersected by many small drying creeks.
- 2 Channel Bank extends E from the N part of this stretch of coast, it is an extensive bank, which dries, and is covered with grass; the bank is joined NW by Entrance Bank which also dries.

**Depths and navigational aids  
8.156**

- 1 In the SE approach from the pilot boarding place (21°39'4N, 72°24'9E) towards the S part of Malcolm Channel, 7 miles NW, depths are irregular and there are numerous shoal patches as shown on the chart.
- 2 Malcolm Channel, the S part of which is generally deep, lies between Channel Bank on its W side and several



minor shoals to the E; the latter area has not been fully examined.

- 3 **Cautions.** The channels depths shown on the plan are subject to frequent change and the buoyage and other aids to navigation are adjusted accordingly. Such changes are not included in *Admiralty Notices to Mariners* for the area N of 21°39'4N where pilots is compulsory. The latest information should be obtained from the local Port Authorities.

- 4 Certain aids to navigation are unreliable and may be missing, unlit or out of position. The mariner is advised to navigate with caution.

### Tidal stream

#### 8.157

- 1 In the vicinity of 21°41'N, 72°22'E, about 4½ miles SE of Perigee Rock (8.167), the tidal stream is reported to attain a rate of about 5 kn at springs and set NNW/SSE. Further information is given on the chart.

### Approach and entry

#### 8.158

- 1 The port is approached through the S part of Malcolm Channel, then across the centre of Channel Bank and entered between lock gates.

### Traffic

#### 8.159

- 1 In 2003 the port was used by 44 vessels with a total dwt of 873 785.

### Port Authority

#### 8.160

- 1 Port authority is exercised by the Gujarat Maritime Board, Bhāvnagar, 364 002 through the Port Officer.

### Limiting conditions

#### 8.161

- 1 **Controlling depth.** The permissible draught is reported to be the height of the predicted high water less 5.2 m.  
**Deepest and longest berth.** An unnamed concrete jetty within the dock basin, see 8.170.  
**Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. Mean spring range about 8.8 m; mean neap range about 4.8 m.
- 2 **Density** of water is 1.025 g/cm<sup>3</sup>.  
**Mud content** of water is high.  
**Maximum size of vessel handled** is length 152 m and 19.5 m beam.

### Arrival information

#### 8.162

- 1 **Port radio.** There is a port radio service, for details see *Admiralty List of Radio Signals Volume 6(4)*.  
**Notice of ETA.** Forty-eight hours notice of ETA at the pilot station is required.

### Pilots and tugs

#### 8.163

- 1 **Pilotage** is compulsory for vessels bound for Bhāvnagar Port and they should arrive at the pilot boarding place, 4¾ miles NE of Piram Island (8.139), not less than 2½ hours before the time of high water at Bhāvnagar for berthing on the same tide; vessels are advised not to anchor when awaiting a pilot but to make a reciprocal course until

the pilot arrives. Berthing and unberthing is carried out during daylight hours only except for special circumstances.

- 2 The pilot vessel is a black-hulled tug with buff upper works and a buff funnel with a black top. The usual signals are displayed and, in addition, a searchlight is flashed from time to time at night.

For details see *Admiralty List of Radio Signals Volume 6(4)*.

- 3 **Tugs** are available.

### Requirement for local knowledge

#### 8.164

- 1 Due to the continuous shifting of banks and channels, depths in the approaches to Bhāvnagar change quite frequently; local knowledge of these changes is essential before entry.

### Harbour

#### 8.165

- 1 **General layout.** The harbour consists of a dock basin, with general depths of 7.6 to 9.1 m, which is located behind a 21 m wide lock gate. The maximum permissible draught is reported (2001) to be 8.53 m.  
**Traffic signals.** A signal station is situated in a tower near the S entrance point of Bhāvnagar Port.
- 2 **Storm signals.** There are no storm signals at Bhāvnagar Port, but signals are displayed at Ghogha, 5 miles SSE; the brief system is used. See 1.47.
- 3 **Lock gate information.** The lock gate is unusual in that it is lifted vertically before being swung clear. Successive heights of tide at high water springs can vary by up to 2 m resulting in unequal water levels. The initial lock gate lift, at any time between 2½ hours and 30 minutes before high water, can cause a surge within the dock basin.  
**Landmark:** Piram Island Lighthouse (21°35'9N, 72°21'2E) (8.136).

### Directions

### Cautions

#### 8.166

- 1 Mariners are strongly advised not to navigate in the approaches to Bhāvnagar without local knowledge or assistance.  
A wide berth should be given to the area around Perigee Light-float (21°42'1N, 72°18'4E) (8.168), within 3 hours of low water, because of excessive silting.

### Route

#### 8.167

- 1 **Approach.** From the vicinity of the pilot boarding position (21°39'4N, 72°24'9E) the route leads NW to a position E of Perigee Rock (21°42'9N, 72°18'5E), which dries, and at the lowest spring tides shows three heads. Thence, Malcolm Channel (8.156) should be followed to the route which leads across Channel Bank (8.155).
- 2 **Leading lights** are exhibited from the head of the inlet in which the port lies; in line, bearing about 251°, these lights lead through a dredged channel to a turning point off the wharf.
- 3 **General information.** Vessels arrive and depart at about slack high water with a tug secured ahead, another tug is available in the turning basin which is situated abreast the concrete jetty. Vessels are usually swung in the turning basin before being berthed, bow seaward, starboard side alongside the wharf.



**Useful marks****8.168**

- 1 Ghogha Bhandar Light (white square masonry tower, red bands, 16 m in height) (21°41'·5N, 72°16'·7E) stands on the S entrance point of Ghogha Creek.
- 2 Perigee Light-float (red, bell fog signal, height 12 m) (21°42'·1N, 72°18'·4E) is moored about 8 cables S of Perigee Rock (8.167).
- 3 A stranded wreck (21°43'·2N, 72°23'·6E) with a second stranded wreck lying about 3 cables WSW. Light on roof of tide gauge hut (4 m in height) (21°43'·9N, 72°15'·6E). Beacon (21°44'·2N, 72°15'·1E). Light (white framework metal tower, elevation 24 m) (21°44'·8N, 72°14'·0E).
- 4 Revāpuri Light (grey hut on piles, elevation 20 m) (21°46'·7N, 72°14'·0E) stands 1 mile NNW of the entrance to Bhāvnagar Port.

**Berths****Anchorage****8.169**

- 1 **Cautions:**  
Strong tidal streams, an irregular-shaped seabed and shipping congestion make the anchorage described below potentially hazardous; considerable care in anchoring is required and constant vigilance, particularly during cargo operations, is recommended.
- 2 Several vessels have lost anchors in the foul ground extending about 1½ miles E of Perigee Rock (21°42'·9N, 72°18'·5E) (8.167).
- 3 **Position and draught.** Anchorage for vessels unable to enter Bhāvnagar Port may be obtained E of Perigee Rock in the area shown on the chart. The maximum draught for vessels using parts of this anchorage was increased (1994) from 9·5 to 10·6 m on a trial basis.
- 4 **General information.** To prevent yawing during spring tidal streams, consideration should be given to the use of a second anchor and/or steering. The second anchor, if used, should be heaved up 1½ hours before the tidal stream changes and dropped again after the change to avoid fouling the first anchor. It is recommended that engines are kept on standby, to be available within 20 minutes, during spring tides.

**Jetties****8.170**

- 1 **Cautions:**  
Mooring and gangways require attention during periods of lock gate surge (8.165).  
Silt content at jetties becomes very high each side of low water and condensers are liable to become choked.
- 2 **Berths.** The main berths consist of a concrete jetty, 269 m long, which can accommodate two vessels up to 128 m in length; and North Quay, a steel jetty 141 m long, that is suitable for one vessel. There are two more jetties available for barges and other small craft.

**Port services****8.171**

- 1 **Repairs:** minor repairs can be effected; there is a small dry dock: length 74·4 m, width 13·7 m, depth on sill at

MHWS 3·18 m used for port vessels. A well equipped work-shop is available.

**Other facilities:** barges; hospital.

- 2 **Supplies:** limited fuel oil and fresh water.

**Communications:** general railway system; air and sea with Mumbai.

**Small craft****Ghogha****8.172**

- 1 **General information.** Ghogha (21°41'N, 72°17'E) is a walled town with a small drying creek at its N end; local trading craft may lie in safety in the custom house bandar.

**Bhāvnagar Creek**

*Chart 3460 plan of approaches to Bhāvnagar Port, 1486*

**8.173**

- 1 **General information.** Bhāvnagar Creek (21°47'N, 72°14'E), formerly provided the port for Bhāvnagar (8.153), it now provides a good safe harbour for sailing vessels and small craft.
- 2 **Topography.** The coast consists of mud flats overgrown by low mangrove bushes and intersected by many small drying creeks.
- 3 **Approach and entry.** The creek is approached through the S part of Malcolm Channel (8.156) and entered between Howarth Point (21°47'·6N, 72°14'·5E) and the mainland 1 mile SW; the harbour is entered between Johnston Point (21°48'·6N, 72°12'·8E) and Bhāvnagar Point, 1¼ miles WNW.
- 4 **Directions:**  
**Caution.** Depths in Bhāvnagar Creek are liable to change due to silting, and dredging operations are in constant progress; the banks and channels also change frequently making local knowledge essential. These constant changes to the channel prevent useful directions being given.
- 5 **Leading marks.** There are a number of beacons standing on the N side of the creek NW of Bhāvnagar Point which lead up to and around this point; another pair of beacons standing on the S bank, 1½ miles WSW of Bhāvnagar Point, lead across the drying sandbank situated in mid-channel W of the point. The positions of the beacons are subject to alteration as required to conform to the channel.
- 6 **Useful mark:**  
Revāpuri Light (21°46'·7N, 72°14'·0E) (8.168).
- 7 **Repairs:** there is a small dry dock length 76·2 m, width 12·3 m, depth on sill at MHWS 3·18 m.  
**Other facilities:** hospital; small tugs and lighters.  
**Supplies:** limited fresh water.

**HEAD OF THE GULF OF KHAMBHĀT****General information**

*Chart 1486*

**Position****8.174**

- 1 The head of the Gulf of Khambhāt, described below, lies between Howarth Point (21°47'·6N, 72°14'·5E) and the mouth of Dhādhār River 16 miles E.

**Topography****8.175**

- 1 For a general description of topography at the head of the Gulf of Khambhāt see 8.128.

**Depths****8.176**

- 1 The charted depths in Malcolm and Khambhāt Channels are based on a very old survey and cannot be relied upon.

The coastal and offshore banks in the head of the Gulf of Khambhāt are subject to constant change, for further details see 8.179 and the caution at 8.156.

**Off-lying banks and channels****8.177**

- 1 Mal Bank, a large sandbank in the centre of the head of the Gulf of Khambhāt, extends about 14 miles N from its S point (21°48'N, 72°21'E).
- 2 Malcolm Channel (8.156) continues N along the W and NW sides of Mal Bank into Khambhāt Channel which leads NE into the estuary of the Mahi Sāgar River in the NE part of the gulf.
- 3 Makra Bank, lying between the S part of Mal Bank and the coastal bank E, is a narrow shoal which almost dries near its centre.

**Local knowledge****8.178**

- 1 The channels, banks and rivers in the head of the Gulf of Khambhāt are liable to frequent change making local knowledge essential for their safe navigation.

**Tidal bores****8.179**

- 1 Tidal bores form near the entrance to the Sābarmati River in the NW part of the gulf; one travels up that river while another travels up Khambhāt Channel and the Mahi Sāgar River. Each sweeps through the channel and rivers as a line of disturbed and breaking water which tends to alter their configuration.
  - 2 The bore in the Mahi Sāgar River may be as much as 2.4 m in height and attain a rate of 10 kn at the highest spring tides. The magnitude of the bore varies with the range of the tide; at neap tides it is not perceptible but becomes increasingly prominent as spring tides approach. The bore preceding the higher high water is greater than that preceding the lower of two successive high waters.
  - 3 The in-going stream flows at a great rate during the passage of the bore, with the greatest rate being experienced about 45 minutes after the bore has passed, thence the rate diminishes.
- The bore in the Sābarmati River is similar but less pronounced.

**Directions****General information****8.180**

- 1 Channels and banks in the head of the Gulf of Khambhāt, being subject to great change as described previously, make directions for navigation of this part of the gulf as of general application only.

**Useful marks****8.181**

- 1 Devajagān Light (round stone column, 13 m in height) (21°55'0N, 72°32'9E) is exhibited from September to June.
- Towers of Silence (22°18'0N, 72°39'3E), two towers standing close together.

**Minor port and rivers**

*Chart 1486 (See 1.14)*

**Tankāri****8.182**

- 1 **General information.** The town of Tankāri (21°59'N, 72°40'E), with a small port, lies on the E side of a shallow creek branching off the N side of Dhādhār River (8.183), 6½ miles within its entrance; the creek is navigable only by small local craft.

A custom house stands near the entrance to the creek.

- 2 **Tankāri Road** (21°51'N, 72°29'E), the roadstead off the entrance to Dhādhār River, lies between the coastal bank E and the shoal patches on the E side of Makra Bank on its W side; the road can be identified by Devajagān Lighthouse (8.181).

**Tidal stream.** The in-going stream in Tankāri Road continues for about 1 hour after the time of high water; the streams attain a rate of 6 kn at springs.

- 3 **Anchorage** may be obtained in the roadstead, but attention should be given to possible depth changes in the channel which runs through the road and to the shifting of banks lying on either side of the channel. Local knowledge is advisable.

**Dhādhār River****8.183**

- 1 Dhādhār River is entered through a narrow channel between sandbanks 6 miles S of Tankāri Point (21°55'N, 72°32'E); in the fairway of the channel leading to the river, there are patches which nearly dry and in other places it is generally shallow with depths from 0.3 to 2.7 m.
- 2 Local knowledge is necessary to enter the river.

**Mahi Sāgar River****8.184**

- 1 **General information.** Mahi Sāgar River (22°14'N, 72°35'E) gives limited access to the vicinity of Khambhāt, a town, situated on the N bank of the river at the head of the Gulf of Khambhāt.
- 2 **Tidal streams.** The in-going stream sets NE into the Mahi Sāgar River, the out-going stream sets SW, with a rate of 4½ to 6 kn.
- 3 **Storm signals** are displayed at Khambhāt; the brief system is used. See 1.47.

**Sābarmati River****8.185**

- 1 **General information.** Sābarmati River (22°14'N, 72°22'E) enters the Gulf of Khambhāt in its NW corner; the river is about 200 miles long and near its estuary the shores are fairly high and well cultivated.
- 2 Bore Rocks (22°10'N, 72°24'E) lie in the entrance to the river near Khambhāt Channel.

Shikotar Māta, a pagoda with a flagstaff, lies on the E bank of the river 8½ miles N of Bore Rocks.

**8.186**

- 1 **Bhādar Creek** enters Sābarmati River 6½ miles WNW of Bore Rocks.
- 2 Dholera, 6 miles within the creek, is one of the chief cotton marts in the Gulf of Khambhāt but, because of silting, goods are stopped at Whittle Bandar, 1½ miles from the creek entrance, and thence connected with Dholera by road. Local craft work cargo alongside the bank.
- 3 **Developments.** A new port of Dholera is being developed (2000) in Malcolm Channel N of Bhāvnagar.

**8.187**

- 1 **Ahmedabad**, an important industrial city famed for its cotton mills, lies 50 miles from the Sābarmati River entrance on its E bank.

- 2 The city contains outstanding examples of Islamic, Jain and Hindu architecture as well as modern constructions by the controversial French architect Corbusier.

**KĀTHIAWĀR COAST—DIU HEAD TO KACHCHIGADH****DIU HEAD TO VERĀVAL****General information**

*Charts 3460, 1474*

**Route****8.188**

- 1 From a position S of Diu Head (20°41'N, 70°50'E) the route leads about 33 miles WNW to a position SSW of Verāval Lighthouse.

**Topography****8.189**

- 1 The coast is generally straight with a coastal reef that extends a short distance offshore.

Between Diu Head and Mul Dwarka, 10 miles WNW; the coast consists of rocky bays, some cliffs from 9 m to 12 m high, lying between rocky points. The hinterland is mostly wooded and in the vicinity of Chhāra (20°44'N, 70°43'E) the trees are tall and dense; Kodinār, a town 3 miles NE of Mul Dwarka, is just visible among the trees.

- 2 From Mul Dwarka to Sutrāpāra, 12 miles WNW, the coast is low and sandy with patches of cliff at intervals; some large rocks stand on the coastal reef in the vicinity of Sutrāpāra.

**Depths****8.190**

- 1 Seaward of the 30 m depth contour there are no charted dangers.

**Tidal streams****8.191**

- 1 Between Diu Head and Sutrāpāra the in-going stream sets ESE and the out-going WNW, both, though subject to irregularities, attain a rate from 1 to 1½ kn. In December and January the current setting along the coast reinforces the out-going stream and the in-going stream is consequently weakened and may become imperceptible.

**Currents****8.192**

- 1 The currents have a seasonal variation related to the monsoon. From February to September the most frequent set is SE with the greatest consistency during June, July and August; in October currents are variable in direction, but from November to January the most common set is NW. The rates of the currents are generally less than 1 kn but may reach about 2 kn at times, mainly during July, August and December. Exceptionally, the current has a significant onshore component.

**Principal marks****8.193**

- 1 **Landmarks:**

Tower (20°51'N, 70°28'E).

- 2 Somnāth Temple (20°53'·2N, 70°24'·1E) stands on the seaward side of Prabhās Pātan, a large town surrounded by a wall of dark coloured stone. The temple is a recent reconstruction of a series of shrines dedicated to Siva, the Hindu god of

destruction, dating from the first century AD. Several of these shrines were destroyed, from the eleventh century onwards, by the iconoclastic ravages of successive Moslem invasions.

- 3 Bhīrbhanjan Temple (20°53'·9N, 70°23'·0E).  
Tower (20°54'·0N, 70°22'·1E), 17 m in height, standing near the root of Verāval Breakwater.  
Idgah (20°54'·3N, 70°21'·6E).  
Chimney (20°55'·1N, 70°21'·3E).

For other landmarks at Verāval see 8.201.

- 4 **Major lights:**

Diu Head Light (20°41'·5N, 70°49'·7E) (8.75).

Verāval Light (white square masonry tower, black bands, 34 m in height) (20°54'·6N, 70°21'·2E).



Verāval Light Tower (8.193)

(Original dated prior to 1981, Checked 2004)

**Other aids to navigation****8.194**

- 1 Radio (20°41'·5N, 70°49'·7E) at Diu Head Lighthouse (8.75).  
Racon (20°54'·6N, 70°21'·2E) at Verāval Light (8.193).

For details see *Admiralty List of Radio Signals Volume 2*.

**8.195**

**Caution.** Certain aids to navigation are unreliable and may be missing, unlit or out of position. The mariner is advised to navigate with caution.

**Directions****8.196**

- 1 From a position S of Diu Head (20°41'N, 70°50'E) the route leads about 33 miles WNW to a position SSW of Verāval Lighthouse, passing (with positions from the town of Dhāmlej (20°47'N, 70°37'E)):

- 2 SSW of Shoal Bank (9 miles ESE). This rocky bank, about 6 miles long, lies parallel to the coast and about 1½ miles off; it has a least reported depth of 2 m near its ESE end. Vessels passing should keep in depths of more than 24 m. Thence:



- 3 SSW of Mul Dwarka (3 miles ESE), a small bluff point with white sandy cliffs and an old temple on its summit. Thence:

- 4 Clear of an 18.3 m patch (15½ miles WNW). Thence: To a position SSW of Verāval Light.

- 5 **Clearing bearings.** Diu Head Lighthouse (20°41'5N, 70°49'7E) (8.75) bearing less than 079° clears Shoal Bank to the S; and Mul Dwarka bearing more than 333° clears this bank to the W.

### Useful marks

#### 8.197

- 1 Gorakhnath (21°32'N, 70°32'E) is an immense, bare and isolated granite cone upon which stands many temples and monasteries. The mountain is prominent from SW of Diu Head to Porbandar, 90 miles NW; farther NW it is obscured by the Barda Hills (8.212).
- 2 White tomb, a tomb (not charted) stands close to the coast about 7½ cables W of Chhāra Village (20°44'N, 70°43'E).
- 3 Sutrāpāra Light (white square masonry tower, 4 m in height) (20°50'2N, 70°29'0E).  
(Directions continue NW at 8.215, and ENE from Diu Head at 8.77)

### Verāval

Chart 3460 plan of Verāval

### General information

#### 8.198

- 1 **Position.** The town of Verāval (20°54'N, 70°22'E) lies at the head of a small exposed bay indenting a straight stretch of coastline.
- 2 **Function.** The port provides a fair weather intermediate anchorage. The principal imports are fertiliser, wheat and coke; the main exports are oil cakes, soda ash and cement.
- Traffic.** In 2003 the port was used by two vessels with a total dwt of 1 650.
- 3 **Port authority** is exercised by the Port Officer, Gujarat Maritime Board, Bunder Road, Verāval 362 265.

### Limiting conditions

#### 8.199

- 1 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. Mean spring range about 1.6 m; mean neap range about 0.7 m.

**Maximum size of vessel handled** length 203 m, draught 9.5 m and 23 339 grt.

**Weather.** The port is adversely affected by the SW monsoon and is closed to shipping from mid-May to mid-September.

### Arrival information

#### 8.200

- 1 **Port operations.** Only three vessels can be worked at a time, when weather permits, between mid-September until mid May. Vessels lie at anchor in the roads and load and discharge by barges working to 2 basins in the inner harbour.

**Port radio.** There is a port radio station, for details see *Admiralty List of Radio Signals Volume 2*.

- 2 **Outer anchorages.** Good anchorage may be obtained with Bhīrbhanjan Temple (20°53'9N, 70°23'0E) bearing 054° distant 9 cables as shown on the chart.

- 3 **Pilotage** is not necessary for vessels to anchor.

**Local knowledge** is required by vessels using the enclosed and inner harbours.

### Harbour

#### 8.201

- 1 **General layout.** The port consists of an open roadstead anchorage, lying off a small harbour which is protected by two breakwaters; an inner harbour with two basins is situated N of the enclosed harbour, the inner harbour leads to East Harbour which is a shallow inland berthing area.
- 2 **Signal station.** There is a signal station with which signals may be exchanged by Morse or using the International Code of Signals.
- 3 **Storm signals** are displayed from a mast ½ cable SSE of Verāval light (8.193); the general system is used (see 1.45).
- 4 **Tidal streams** in the roadstead are not perceptible, but there is sometimes a surface drift of about ½ kn due to wind.
- Climate.** For details see climatic table 1.219.
- 5 **Landmarks:**  
The following marks are positioned from a conspicuous flagstaff (20°54'1N, 70°22'2E):  
Water tower (4½ cables NNW).  
Post office tower (2½ cables NNE).  
Chimney (4¼ cables NE).  
Chimney (4¾ cables ENE).
- 6 For details of other landmarks in the vicinity of the port see 8.193.

### Directions

#### 8.202

- 1 **Leading marks.** The alignment (041½°) of the following marks leads from SW towards the anchorage:  
Bhīrbhanjan Beacon Light (white square masonry tower, red bands, 6 m in height) (20°53'9N, 70°23'0E).  
Bhīrbhanjan Temple (8.193) (close NE).
- 2 A dangerous wreck (mast) lies 1½ cables SW of the leading mark alignment.

### Useful mark

#### 8.203

- 1 South-east Breakwater Head Light (20°53'84N 70°22'52E) (square concrete tower, 4 m in height), is exhibited from the SW end of the breakwater.

### Harbour

#### 8.204

- 1 **General information.** The enclosed harbour facilitates an all weather fishing port.
- 2 **Basins and berths.** There are 2 basins in the inner harbour, situated close N of the root of the main breakwater, with four quays. The quays, equipped with loading ramps, are normally used by barges working ships handling cargo at the anchorage. Petrol and oil cargoes are handled at a separate quay.
- 3 **Depths.** The harbour is generally shallow with several dangers. There are channels, maintained by dredging, leading to the basins where there are depths of 4 m at two quays and 2.1 m at the other two.
- 4 **East Harbour,** which has been dredged from swampy ground E of the town, is entered through a narrow channel in the N part of the inner harbour. East Harbour is used by trawlers and small craft.

### Port services

#### 8.205

- 1 **Repairs:** minor repairs can be effected; there is a small dry dock: length 41.15 m, width 10.67 m, capacity 840 dwt, depth on sill at MHWS 3.55 m.
- Facilities:** hospital; barges and tugs.



**Supplies:** fresh provisions; limited fresh water.

- 2 **Communications:** by sea with Mumbai and other ports, except when the port is closed; general railway system.

### Rivers, landing and anchorage

*Chart 1474* (See 1.14)

#### Rivers and landing

##### 8.206

- 1 **Singwāda River** has its mouth close E of Mul Dwarka (20°46'N, 70°40'E), the river is nearly dry except during the monsoon season.

**Landing.** There is a good landing place for boats on the S side of Mul Dwarka.

- 2 **Somat River** enters the sea through two mouths, 1 and 2 miles W of Mul Dwarka.

#### Anchorage

##### 8.207

- 1 Small craft may obtain anchorage, in a cove protected by a spit, close S of Sutrāpāra (20°51'N, 70°28'E); a bandar near the centre of the cove provides a good landing place.

High sandhills SE and cliffs, about 15 m high, NW help to identify this cove.

For details of Sutrāpāra Light see 8.197.

## VERĀVAL TO PORBANDAR

### General information

*Chart 1470*

#### Route

##### 8.208

- 1 From a position SSW of Verāval Lighthouse (20°54'·6N, 70°21'·2E) the route leads about 62 miles NW to a position SW of Porbandar Light-tower.

#### Topography

##### 8.209

- 1 The coastline is virtually straight with a steep beach in parts and a coastal reef that extends a short distance offshore. At intervals along the coast several small rivers empty into the sea during the rainy season, however, during the fine season most of the river mouths are usually blocked by sand.

- 2 Between Verāval Lighthouse and Chorwād Bandar, 9 miles NW, the coast is generally sandy with low cliffs in places; between Shīl Bandar (21°11'N, 70°02'E) and Mādhavpur, 6 miles NW, sandhills fringe the coast. From Navibandar (21°27'N, 69°47'E) to Porbandar, 16 miles NW, there are more sandhills with clumps of trees growing near the villages; an extensive swamp lying inland, which is flooded during the rainy season, abounds in waterfowl.

- 3 Surf and a rocky bottom in places makes landing difficult on this stretch of coastline.

#### Depths

##### 8.210

- 1 Except for a dangerous wreck (20°50'·5N, 70°00'·5E) seaward of the 30 m depth contour there are no charted dangers.

#### Currents

##### 8.211

- 1 See 8.192.

### Principal marks

#### 8.212

##### Landmarks:

- 1 Water tower (21°30'·0N, 69°49'·1E).  
New Hazur Palace (21°37'·7N, 69°36'·9E) stands about 1 mile SW of the town of Porbandar, a flagstaff stands close NW of the palace.
- 2 Kadar Pīr (21°38'·2N, 69°35'·2E) a conspicuous mosque stands W of Porbandar Harbour.  
Barda Hills (21°50'N, 69°43'E) may be seen from seaward for about 30 miles in good visibility.  
Details of chimneys, towers and other landmarks in the vicinity of Porbandar are given at 8.220.

##### Major lights:

- 3 Verāval Light (20°54'·6N, 70°21'·2E) (8.193).  
Māngrol Light (white 6-sided concrete tower, red bands, 35 m in height) (21°06'·5N, 70°06'·3E).
- 4 Porbandar Light (white round concrete tower, black bands, 41 m in height) (21°37'·3N, 69°37'·2E); it should be noted, that with off-shore winds, the lighthouse is sometimes obscured by emissions from a chemical factory which stands 3¼ cables NE.

### Other aids to navigation

#### 8.213

- 1 Racon (20°54'·6N, 70°21'·2E) at Verāval Light (8.193).  
Racon (21°37'·3N, 69°37'·2E) at Porbandar Light-tower (8.212).

For details see *Admiralty List of Radio Signals Volume 2*.

#### 8.214

**Caution.** Certain aids to navigation are unreliable and may be missing, unlit or out of position. The mariner is advised to navigate with caution.

### Directions

(continued from 8.197)

#### 8.215

- 1 From a position SSW of Verāval Lighthouse (20°54'·6N, 70°21'·2E) the route leads about 62 miles NW to a position SW of Porbandar Light-tower, passing (with positions from Mādhavpur, a small walled town standing near the coast, (21°15'·0N, 69°57'·5E)):
- 2 SW of an 8·3 m patch (28 miles SE), thence:  
Clear of a dangerous wreck (25 miles S) the position of which is approximate, thence:  
Clear of a wreck (5 miles S), thence:  
SW of a wreck (26 miles NW), thence:  
SW of a stranded wreck (29 miles NW), thence:
- 3 To a position SW of Porbandar Light-tower (8.212).

### Useful marks

#### 8.216

- 1 Chorwād Bandar Palace (21°00'·5N, 70°14'·0E).  
Gorakhnath (21°32'N, 70°32'E) (8.197).  
Navibandar Light (21°27'N, 69°47'E) (8.228).  
Tukda Temple (21°31'·4N, 69°43'·5E).  
(Directions continue at 8.236)

### Porbandar

*Chart 3460 plan of Porbandar*

### General information

#### 8.217

- 1 **Position.** Porbandar (21°38'N, 69°36'E), the largest town on the Kāthiawār coast, lies on the E side of the entrance to a narrow creek which flows out between the town and a point close W.

2 **Function.** The port is an all weather port. The principal imports are low ash coke, fertilisers, LPG and scrap; main exports include bauxite, cement, sesame seeds, abrasive cotton bales and mineral extracts.

3 **Population.** In 2004, the population is estimated to be about 141 000.

**Traffic.** In 2003 the port was used by 70 vessels with a total dwt of 1 938 421.

4 **Port authority** is exercised by the Port Officer, Gujarat Maritime Board, Bandar Road, Porbandar 360 575.

### Limiting conditions

#### 8.218

1 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. Mean spring range about 1.7 m; mean neap range about 0.9 m.

**Sea state.** Heavy swells are experienced during the monsoon season (June to September) and a 0.6 m high dangerous scend is generated within the breakwater.

2 **Maximum size of vessel handled** at the breakwater alongside berth is 200 m in length and draught 9.5 m.

**Inner harbour.** When the reef is covered, entry to the creek is limited to boats drawing 1 m or less; at high water boats drawing 1.8 m can enter.

### Arrival information

#### 8.219

1 **Port operations.** The alongside berth within the breakwater is normally used throughout the year. In good weather conditions, vessels anchored outside of the breakwater may work cargo by lighters using ships' gear; however, during the monsoon season cargo operations are impossible at anchor due to rough weather.

**Port radio.** There is a port radio station, for details see *Admiralty List of Radio Signals Volume 6(4)*.

2 **Pilotage** is compulsory for vessels proceeding to a berth within the breakwater. Pilotage is only available during daylight hours; it is conducted by the Harbour Master who normally boards about 3 cables S of the breakwater head. For details see *Admiralty List of Radio Signals Volume 6(4)*.

3 **Tugs** are available.

**Local knowledge** is required by vessels entering the main and inner harbours.

### Harbour

#### 8.220

1 **General layout.** The port is protected by an S-shaped breakwater which extends about 1¼ miles S from the W entrance point of the narrow creek described at 8.217. A light is exhibited from the head of the breakwater. The main alongside berth lies on the E side of the breakwater, with the Coast Guard jetty ¾ cable NNE. Anchorage may be obtained in deep water seaward of the breakwater head. The inner harbour lies NW of the town.

2 **Development.** Future plans, to facilitate additional alongside berths and mooring buoys on the E side of the harbour, include the extension of the existing breakwater 2 cables E and the construction of a second breakwater extending 1 mile S from the vicinity of Porbandar Light-tower.

3 **Depths.** North of the 10 m depth contour, the depth shoals gradually towards the shore. There are several drying patches in the vicinity of the breakwater and along the coastline; the entrance channel to the inner harbour creek, described below, also dries. An area of foul ground exists about 2½ cables E of berth located on the inner side of the breakwater.

4 **Wrecks.** Several stranded and dangerous wrecks lie within the harbour. Their positions are best seen on the chart.

**Channel.** A small craft channel leads from the main harbour N of the reefs fronting the creek, thence through the creek, to the inner harbour.

5 **Storm signals** are displayed from a conspicuous flagstaff standing near the E entrance of the creek; the general system is used. See 1.45.

6 **Tidal streams.** In the offing tidal streams are negligible. Within the creek, the out-going stream runs strongly and continues well after low water; if leaving the creek on the out-going stream, great care must be taken to avoid being set on to the reef at the entrance.

#### 7 Landmarks:

The following marks are positioned from the breakwater light (21°37'0N, 69°35'5E):

Towers, 39 m and 24 m in height (2½ miles NNE);

Kirti Mandir, 32 m in height (1½ miles NNE);

Minarets (1¼ miles NNE);

Maharana Mill chimney, 51 m in height (2 miles NE);

Tower, 30 m in height (1¼ miles NNE) with the water works tower and a clock tower, 34 m in height, standing close E.

8 Cement factory chimney (3 miles ENE);

Chemical factory chimney (1¾ miles ENE);

For details of other landmarks in the vicinity of the port see 8.212 and 8.234.

### Leading and useful marks

#### 8.221

1 **Inner harbour marks.** The alignments (given below) of the following marks lead through the channel towards the creek at the entrance of the inner harbour:

A pair of leading beacons (1¼ miles N), in line bear 291°, passing N of 2 buoys (white conical) (1.1 miles NNE).

A similar pair of beacons (1¼ miles NE), in line (astern) bear 111¼°.

### Anchorage and berths

#### 8.222

##### 1 Anchorages:

General. Large vessels may find anchorage 1 mile SSW of the breakwater head, in depths of 17 m; as shown on the chart.

Lighterage. There is an anchorage area E of the breakwater which is used for small craft lighterage operations.

#### 8.223

##### 1 Berths:

Main harbour. On the E side of the breakwater, about 2¼ cables NNW of its head, there is a quay 385 m in length with a reported maximum draught of alongside of 9.5 m. The top of the quay is 5.0 m above MHHW.

2 Inner harbour. Within the inner harbour there is 2800 m of quayage with a depth of 2 m alongside.

3 **Caution.** A considerable ground swell may be experienced at the breakwater berth, heavy fore and aft springs are essential for vessels berthed alongside.

### Port services

#### 8.224

1 **Repairs:** there is a small dry dock: length 56.08 m, width 12.19 m, depth on sill at MHWS 3.74 m for servicing port craft.

**Facilities:** hospital; barges and tugs.

- 2 **Supplies:** fresh provisions; fresh water; fuel oil at breakwater berth.

### Minor ports

*Chart 1470 (See 1.14)*

#### Chorwād Bandar

##### 8.225

- 1 **General information.** Chorwād Bandar (21°00'N, 70°14'E) provides anchorage for small craft.
- 2 **Megal River** flows into the sea, during the SW monsoon, about 5 cables SE of Chorwād Bandar.

#### Māngrol Bandar

##### 8.226

- 1 **General information.** Māngrol Bandar (21°06'N, 70°06'E) is a small fishing harbour, providing safe alongside berths for the local fishing fleet.
- 2 The town of Māngrol lies about 1 mile inland and a high tower (not charted) in the town may aid its identification from a distance of at least 10 miles. The mosque here is remarkable for a finely carved interior and because it was formerly a Hindu wedding hall.
- 3 **Topography.** In the vicinity of Māngrol are cotton and betel nut plantations and many trees.
- Port operations.** The port is closed from June to August.
- 4 **Storm signals** are displayed from the storm signal station located close NW of Māngrol Lighthouse (21°06'·5N, 70°06'·3E) (8.212); the brief system is used. See 1.47.
- Tidal streams** are not perceptible in the vicinity of the port.
- 5 **Useful mark:**  
West Breakwater Light (21°06'·3N, 70°06'·0E) (square concrete tower, 4 m in height).
- Supplies:** fresh provisions.
- Communications:** general railway system; by sea with Mumbai and other ports, except during the SW monsoon.

#### Shīl Bandar

##### 8.227

- 1 **General information.** Shīl Bandar (21°11'N, 70°02'E) lies at the mouth of a shallow creek; a square tower stands on a high sandy mound at the SE entrance point of the creek.
- 2 This bandar is available to local craft only and its use is limited to the rainy season.

#### Navibandar

##### 8.228

- 1 **Position.** Navibandar (21°27'N, 69°47'E) is a walled town situated close to the coast.
- Bhādar River** flows into the sea close NW of the town.
- 2 **Navibandar Light** (21°27'·0N, 69°47'·2E) is exhibited from the sea wall of the centre bastion of the town.
- Storm signals** are displayed; the brief system is used. See 1.47.
- Anchorage** may be obtained with the above light-structure bearing 099° distant 1 mile, in a depth of about 9 m, sand and mud; as shown on the chart.

## PORBANDAR TO KACHCHIGADH

### General information

*Charts 1470, 43*

#### Route

##### 8.229

- 1 From a position SW of Porbandar (21°38'N, 69°36'E) the route leads about 60 miles NW to a position NW of Dwārka.

#### Topography

##### 8.230

- 1 The coastline is virtually straight with a coastal reef that extends about 1 mile offshore in places.
- 2 Between Porbandar and the entrance to Meda Creek, 17 miles NW, the coast is low, rising gradually to the NW; thence to Okha Madhi, a farther 22 miles NW, it consists of a high sandy ridge, broken by intermittent gaps. Okha Rann, a salt marsh, extends 12 miles N from Okha Madhi to Pindara Bay in the Gulf of Kachchh (9.1); at high water springs and during the SW monsoon the submergence of this area almost isolates the Okhamandal Peninsula (see below) from the mainland.
- 3 From Okha Madhi to Dwārka, 12 miles NW, the coast is composed of sandhills.
- 4 The Okhamandal Peninsula, situated E and NE of Dwārka, has a cliffy coastline covered with cactus bushes; its hinterland is very low with a substratum of sandstone. The land is only cultivated near the villages and depends on the SW monsoon for water as wells are scarce; the prickly pear grows most profusely.

#### Depths

##### 8.231

- 1 Except for a dangerous wreck (22°06'·5N, 68°57'·8E) seaward of the 30 m depth contour there are no charted dangers; within this contour there are several isolated rocks with depths of about 18 to 19 m.

#### Tidal streams

##### 8.232

- 1 Abreast Rupen Bandar (22°16'N, 68°58'E) the in-going stream sets N with a rate sometimes exceeding 2 kn; the out-going stream sets SSE at about the same rate. Farther N the tidal streams are stronger.

#### Currents

##### 8.233

- 1 See 8.192.

#### Principal marks

##### 8.234

- 1 **Landmarks:**  
Barda Hills (21°50'N, 69°43'E) (8.212).  
Radio Mast (22°03'·5N, 69°10'·5E) from which a red obstruction light is exhibited.  
Television Tower at Dwarka (22°14'·9N, 68°58'·7E).
- 2 **Major lights:**  
Porbandar Light (21°37'·3N, 69°37'·2E) (8.212).  
Nāvadra Light (white round concrete tower, red bands, 35 m in height) (21°56'·5N, 69°13'·9E).
- 3 Dwārka Point Light (white square stone tower, black bands, 43 m in height) (22°14'·2N, 68°57'·5E).  
Kachchigadh Light (white round concrete tower, red bands, 30 m in height) (22°19'·8N, 68°56'·9E).

#### Other aids to navigation

##### 8.235

- 1 Racon (21°37'·3N, 69°37'·2E) at Porbandar Light-tower (8.212).



Racon (22°14'·2N, 68°57'·5E) at Dwarka Point Lighthouse (8.234).

Racon (22°19'·8N, 68°57'·0E) at Kachchigadh Lighthouse (8.234).

- 2 For details see *Admiralty List of Radio Signals Volume 2*.

### Directions

(continued from 8.216)

#### 8.236

- 1 From a position SW of Porbandar Light-tower (21°37'·3N, 69°37'·2E) the route leads about 62 miles NW thence N or NNW to a position NW of Dwārka, passing (with positions from Nāvadra Lighthouse (21°56'·5N, 69°13'·9E)):
- 2 SW of Meda Creek (10½ miles SE) (8.238), thence: SW of Okha Madhi (11½ miles NW), a village standing on elevated rocky land near the coast; a small temple with a dark appearance and an old tower stand near the village. Thence:
- 3 Clear of a dangerous wreck (18 miles NW), the position of which is approximate, thence: SW of Dwārka Point (24 miles NW) which stands, at the W end of a promontory, close SW of the town of Dwārka. The coastal reef extends up to 6 cables offshore over 3 miles NW of Dwārka Point, Thence:
- 4 To a position W of Kachchigadh in the vicinity of the SW entrance to the Deep Water Route as shown on the chart, or inshore of the Deep Water Route if applicable.

### Useful marks

#### 8.237

- 1 Pagoda (21°50'·5N, 69°22'·1E).  
Two small conical hills (22°03'·5N, 69°08'·3E).
- 2 Dwārkanath Temple (22°14'·2N, 68°58'·1E) surmounted by its conical spire stands, on an eminence, within Dwārka Fort close to the sea. The spire is supported by 60 columns and carved with figures from base to summit; non-Hindus may not enter the temple. A column stands near the edge of the cliff close W of this temple.
- 3 Three iron chimneys (22°14'·8N, 68°58'·2E) are prominent and give a good radar response.
- 4 A prominent square tower (not charted), but visible from well offshore, stands within the walled town of Varwāla (22°17'·4N, 68°57'·8E).

(Directions continue for coastal passage at 9.22)

(Directions for Gulf of Kachchh Deep-water route are given at 9.24 and those for the offshore route at 9.12)

### Minor ports

Charts 1470, 43

### Meda Creek

#### 8.238

- 1 **General information.** Meda Creek (21°50'N, 69°22'E),

which dries, forms the estuary to the Vartu Nadi and several other rivers. A large inland area, situated NE of the head of this creek, floods during the rainy season.

**Miyāni**, a small village with a fort, lies about 1 mile within Meda Creek on its E side; the bandar of this village lies abreast it on the W side of the creek.

### Dwārka

#### 8.239

- 1 **General information.** The town of Dwārka (22°14'N, 68°58'E), standing near the SW end of the Okhamandal Peninsula (8.230), is an important place of Hindu pilgrimage.
- Gomti Nadi** enters the sea through Gomti Creek, 5 cables SE of Dwārka Point Lighthouse (22°14'·2N, 68°57'·5E) (8.234), near an old temple which has a dark appearance and which is washed by the sea at high water.
- 2 **Landing.** There is a landing place on a steep sandy beach close W of the entrance to Gomti Creek; however, a swell from S raises too much surf here and boats should then proceed into Rupen Bandar (8.240), 1½ miles NNW.
- 3 **Anchorage** for large vessels may be obtained with Dwārkanath Temple (22°14'·2N, 68°58'·1E) (8.237) bearing 069° distant 1½ miles in depths of about 21 m, sand and rock.
- Caution.** Several vessels have lost anchors when anchored in this vicinity.
- 4 **Storm signals** are displayed; the brief system is used. See 1.47.
- Climate.** For details see climatic table 1.220.
- Communication:** general railway system.

### Rupen Bandar

#### 8.240

- 1 **Position.** Rupen Bandar (22°16'N, 68°58'E), the port of Dwārka, can be identified by a square flat-topped house standing on a sandy neck of land located on the N side of a creek.
- 2 **General information.** The bandar is shallow and its entrance is much obstructed by rocks. Small local vessels lie aground at low water, on a fine sandy beach, sheltered by a fringing reef about 5 cables W; small craft, with local knowledge, can also lie at a pier about 30 m long situated in the bandar.

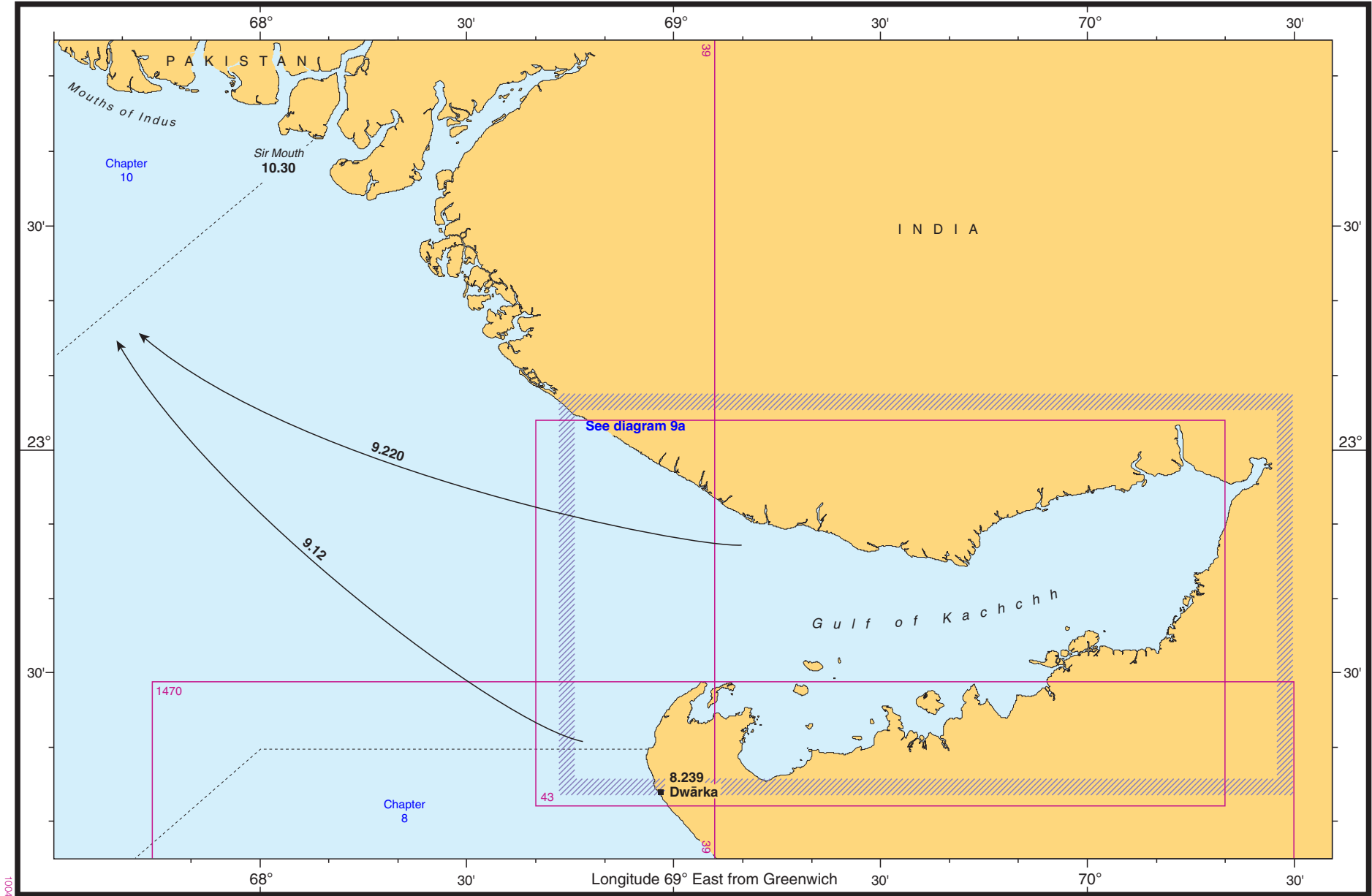
### Kachchigadh

#### 8.241

- 1 **General information.** Kachchigadh (22°20'N, 68°57'E) lies at the S end of a shallow bay which opens NW. A fort stands close S of Kachchigadh Lighthouse (22°19'·8N, 68°56'·9E) (8.234).
- 2 **Landing.** There is good landing on a beach N of the fort; the beach is frequented by turtle.



Chapter 9 - Dwārka to Sir Mouth, including the Gulf of Kachchh



## CHAPTER 9

## DWĀRKA TO SIR MOUTH, INCLUDING THE GULF OF KACHCHH

## GENERAL INFORMATION

*Charts 43, 39, 707*

**Scope of chapter****9.1**

- 1 This chapter covers the Okhamandal Peninsula N of Kachchigadh (22°20'N, 68°57'E) and the Gulf of Kachchh, which extends ENE for about 90 miles, from its entrance between Humani Point (22°29'N, 69°04'E) and Āsār Māta Temple (23 miles NNE), to its head in the salt marshes of The Little Rann (9.201); it also covers that part of the Kachchh District between the Gulf of Kachchh and Sir Mouth (82 miles WNW). The ports of Okha (9.28), Mundra (9.102), Kandla (9.156), the Vādīnār Offshore Terminal (9.121), Sikka (9.128), Reliance Jāmnager Marine Terminal (9.136) and the minor harbours and anchorages on the coast are also described.

**Topography****9.2**

- 1 The Okhamandal Peninsula is described at 8.230; its coastline, N of Kachchigadh, is fringed with sandhills and fronted by a coastal reef.
- 2 The shores of the Gulf of Kachchh are generally low. The S shore is fronted with islands and islets covered with brushwood and surrounded by coral reefs; the N shore consists mostly of sand and mud flats, many of which dry, these are interspaced by numerous rivers and fronted by several shoals.
- 3 The coast of the Kachchh District NW of the Gulf of Kachchh is generally low and straight, it is fronted by a narrow sandy ridge. Several small rivers empty into the sea along this stretch of coast.

These coasts are well lit, having many lights with ranges of 15 miles or more.

**Depths****9.3**

- 1 **Caution.** Following a serious earthquake in 2001 it is possible that some depths throughout the area covered in this chapter may have changed. Mariners are advised to navigate with caution.

**Off-lying bank****9.4**

- 1 **Lushington Shoal** (Unniāmor) (22°38'N, 68°47'E) lies in the fairway of the approach to the Gulf of Kachchh from W. The shoal, with a least charted depth of 4.3 m, has a bottom of sand, mud and rock; it can be usually identified by discoloured water over it.
- 2 Tidal streams near Lushington Shoal set ESE with the ingoing stream attaining a rate of 1¾ kn at neaps.

**Sand and mud in suspension****9.5**

- 1 In the entrance to the Gulf of Kachchh, between the meridians of 69°00'E and 69°30'E, large quantities of sand and mud are sometimes held in suspension; this lies either on the surface causing discolouration, or beneath the surface where it will be churned up by the ship's propellers and give the impression that the vessel is in shoal water.

**Tidal streams****9.6**

- 1 Details of tidal streams may be found in the relevant sections of the chapter.

**Currents****9.7**

- 1 Strong currents, setting in any direction for short periods, have been reported in the entrance to the Gulf of Kachchh.
- 2 West of the Gulf of Kachchh, in the general offshore area covered by this chapter the currents have a seasonal variation related to the monsoons; from February to September the most usual set is SE, with greatest constancy during June to August; during October currents are variable in direction but from November to January the most common set is NW. The rate of the current is mostly less than 1 kn, but rates of about 2 kn occur at times mainly during June to August and in December.
- 3 There is a good deal of variability in the directions of currents off the Indus Delta but there is some tendency for sets to parallel the coast.

**Buoyage and navigational aids****9.8**

- 1 The change from the Lateral System of Buoyage to the IALA Maritime Buoyage System (Region A) (1.16) has not yet been completed (2004) in all areas in this chapter, see notes on charts.

**Climate and weather****9.9**

- 1 For climate and weather see 1.178.

**Cyclone damage****9.10**

- 1 A cyclone passing through the Gulf of Kachchh in 1998 caused severe damage and left in its path numerous wrecks, buoys out of position, defective navigational aids, and the possible shift in seabed material and change in depths. The channels leading through the area were cleared for navigation later in the same year, but mariners are warned to exercise extreme caution when navigating in these waters under similar circumstances.

**Navigational control****9.11**

- 1 For regulations which control navigation in the territorial waters of India see 1.39.

**Offshore route west of Gulf of Kachchh**

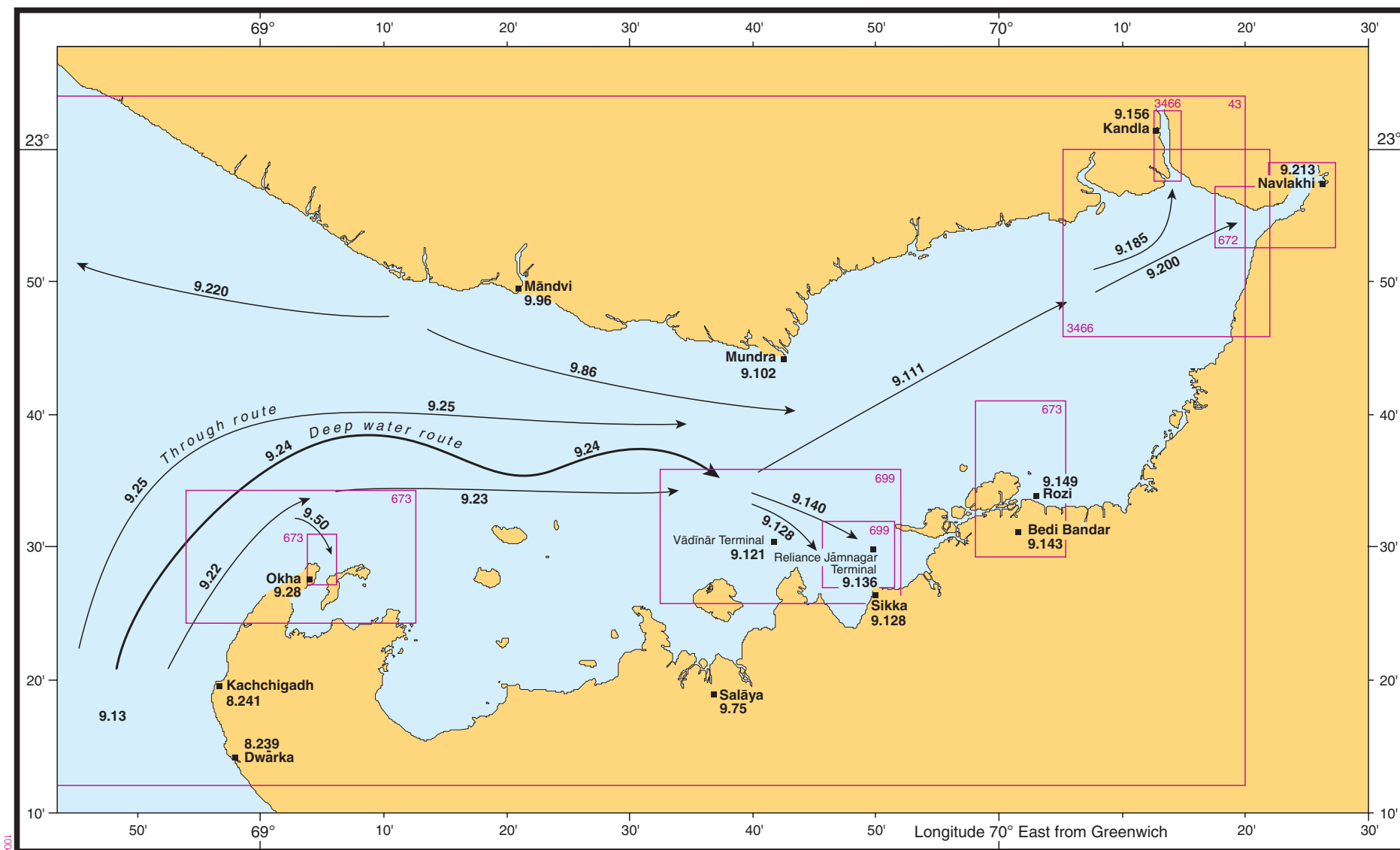
*(continued from 8.237)*

**9.12**

- 1 From a position NW of Dwārka (22°14'N, 68°57'E) the route leads about 75 miles NW, passing clear of Lushington Shoal (22°38'N, 68°47'E) (9.4) and a shoal patch (23°00'·5N, 68°23'·0E) (9.222); thence, to a position SSW of Sir Mouth (10.30). For this route the chart is sufficient guide.

*(Directions continue at 10.26)*

### Diagram 9a - Gulf of Kachchh



## WEST PART OF THE GULF OF KACHCHH—SOUTHERN SIDE

## APPROACH AND ENTRY

## General information

*Charts 673, 43, 39*

## Route

## 9.13

- 1 From a position NW of Dwārka (22°14'N, 68°57'E) the coastal route leads about 20 miles NNE, thence about 44 miles E to a position N of Narāra Bet.
- 2 The deep water route extends about 59 miles, through the SW approach and entrance to the Gulf of Kachchh, to the Kandla Port Limit (22°35'N, 69°38'E), and the approaches to Vādīnār Offshore Terminal (22°30'·6N, 69°42'·1E) (9.121) and Reliance Jāmānagar Marine Terminal (9.136) at Sikka; as shown on the chart.
- 3 **General information.** Vessels, except those constrained by their draught, should as far as possible avoid using the Deep water route (9.24) by keeping N of that route and passing S of Ranwara Shoals (9.25), as described below.

## Topography

## 9.14

- 1 The Okhamandal Peninsula NNE of Kachchigadh (22°20'N, 68°57'E), has a coastline fringed with sandhills; its hinterland, which is very low, is fully described at 8.230. From Humani Point, the N point of Okhamandal Peninsula, to Narāra Bet the coastline is heavily indented with bays and fronted by numerous large reefs.

## Depths

## 9.15

- 1 There is considerable variation in the depths throughout this route, see also 9.3.
- 2 For controlling depths in the deep water route see 9.24.

## Hazard

## 9.16

- 1 It is reported that numerous small fishing vessels may be encountered off parts of the S coast of the Gulf of Kachchh.

## Tidal streams

## 9.17

- 1 At the W edge of Gurur Shoal (22°33'N, 69°01'E) tidal streams set E when in-going and W when out-going, these streams attain a rate of 1½ kn at neaps.  
For details of the tidal streams in the vicinity of Okha Point (22°28'N, 69°05'E) see 9.48.  
Along the N face of Burāl Reef (22°30'N, 69°20'E) the tidal stream has a rate from 4 to 6 kn.

## Overfalls

## 9.18

- 1 Between Gurur Shoal and the mainland S and SE depths are irregular and heavy tide-rips are experienced, on each side of the intervening deep water channel, particularly on the out-going stream. It should be noted that the sea sometimes breaks in this channel even in calm weather.
- 2 In the vicinity of Chandri Reef (22°31'N, 69°08'E), Paga Reef (22°28'N, 69°13'E) and Burāl Reef to the E, the uneven bottom causes overfalls and tide-rips which are particularly heavy at springs.
- 3 Off the NE end of Burāl Reef heavy tide-rips occur when the tidal stream is strong.

## Currents

## 9.19

- 1 See 9.7.

## Principal marks

## 9.20

- 1 **Landmarks:**

Chimney (elevation 102 m) (22°24'N, 69°01'E).  
Āramda Beacon (22°26'N, 69°00'E) stands 1¾ miles W of the walled town of Āramda.  
Water tower (elevation 89 m) (22°24'N, 69°43'E).  
For landmarks at Sikka see 9.131.

- 2 The following landmarks, standing on the N coast of the Gulf of Kachchh, may be visible from parts of the route:  
Āsār Māta Temple (22°50'N, 69°13'E) (9.92).  
House (22°50'N, 69°17'E) (9.92).  
Tamachi Pir Tomb (9.92), which stands close E of above house.
- 3 Vijayvillas Palace (9.92) stands close N of above tomb.  
Radio mast (22°52'N, 69°24'E) (9.92).  
Rāwal Pir Tomb (22°49'N, 69°23'E) (9.92).

- 4 **Major lights:**

Dwārka Point Light (22°14'·2N, 68°57'·5E) (8.234).  
Kachchigadh Light (22°19'·8N, 68°56'·9E) (8.234).  
Humani Point Light (Okha) (22°28'·5N, 69°04'·2E) (9.49).  
Chhachhi Light (22°57'·2N, 69°00'·1E) (9.225).  
Māndvi Light (22°49'·7N, 69°20'·9E) (9.92).  
Mundra Marine Control Tower Light (22°43'·8N, 69°42'·4E) (9.92).  
Navīnāl Point Light (22°44'·4N, 69°42'·8E) (9.92).  
Pirothan Island NW Point Light (22°36'·2N, 69°57'·1E) (9.117).

## Other aids to navigation

## 9.21

- 1 Racon (22°19'·8N, 68°57'·0E) at Kachchigadh Lighthouse (8.234).  
Racon (22°28'·5N, 69°04'·2E) ½ cable SW of Humani Point Lighthouse, Okha (9.49).
- 2 Racon (22°32'·7N, 69°16'·2E) at Burāl Reef Lighthouse (9.27).  
Racon (22°49'·7N, 69°20'·9E) at Māndvi Light (9.92).  
Racon (22°30'·6N, 69°42'·1E) at Vādīnār Offshore Terminal SBM (9.121).
- 3 Racon (22°34'·3N, 69°47'·3E) at SPM-1, Reliance Jāmānagar Marine Terminal (9.136).  
Racon (22°36'·2N, 69°57'·1E) at Pirothan Island Lighthouse (9.117).
- 4 See *Admiralty List of Radio Signals Volume 2* for details.

## Directions

(continued from 8.237)

## Coastal route

## 9.22

- 1 **Caution.** On the coastal route there is only 8 cables between the drying reefs N of Burāl Reef and the deep water route (9.24). Through traffic is advised to keep N of the deep water route (see 9.25).
- 2 From a position W of Kachchigadh (22°20'N, 68°57'E) the route leads about 15 miles NNE thence about 35 miles E to a position of N of Kālubhār Reef (22°28'N, 69°37'E) in the vicinity of the E end of the deep water route.



passing (with positions from Burāl Reef Light (22°32'·7N, 69°16'·2E)):

- 3 WNW of a stranded wreck (21 miles SW), thence:  
WNW of an unnamed coastal reef with shoal patches  
extending about 1½ miles seaward (19¾ miles  
WSW), thence:
- 4 WNW of Āramda Reefs (16¼ miles WSW), thence:  
Clear of a 9·4 m shoal (18¼ miles WSW), thence:
- 5 WNW of Marian Shoal (14½ miles WSW) with  
Bobby Shoal lying 1 mile NE, thence:  
ESE of Lushington Shoal (27 miles WNW) (9·4),  
thence:
- 6 Clear of Gurur Shoal (14½ miles W), with a least  
depth of 3 m, and:  
ESE of Gurur Shoal Light-buoy (W cardinal)  
(12 miles WNW).

### 9.23

- 1 Then route then leads E, passing:  
N of Humani Point (11½ miles WSW), at the N end  
of the Okhamandal Peninsula, forms the S entrance  
point of the Gulf of Kachchh; a tower stands on  
the point. A beacon stands on the coast 4 cables  
SSW of Humani Point; another beacon stands at  
the head of a small bay 1½ cables SSE of the  
same point. No 1 Buoy (starboard hand) is moored  
1¾ miles NNW of the point at the extremity of  
shoal water in the W approaches to Okha (9·28).  
Thence:
- 2 N of a dangerous wreck (11 miles W) lying in the  
approaches to Okha (9·50), thence:  
N of Chandri Reef (8 miles W), which dries in places  
and is covered by the red sector (217°–247°) of  
Sāmiāni Island Centre Light (22°29'·3N, 69°05'·2E)  
(9·49), and S of Chandri Light-buoy (N cardinal)  
(9 miles WNW). Thence:
- 3 S of Paga Light-buoy (E cardinal) (3 miles NW),  
thence:  
N of Burāl Reef Light (9·27), marking the NW edge  
of Burāl Reef (Chānk Reef) (9·68) (extending  
9 miles E), a large coral reef which is steep-to on  
its N side; the reef dries and it supports several  
islands. For further details see 9·68. Thence:
- 4 N of Chānk Tāpu Light (9·27) (8 miles E), marking  
the NE edge of the reef, thence:  
S of Investigator Reef (16 miles ENE) which lies,  
near the middle of the gulf, just S of the deep  
water route. Thence:
- 5 To a position N of Kālubhār Reef (Kārumbhār Reef)  
(9·75) (20 miles ESE) and in the vicinity of the E  
end of the deep water route.

### Deep water route

#### 9.24

- 1 **Caution.** Reports are often received concerning route  
buoys that are missing or unlit, see also 9·8.
- 2 **General information.** The route varies in width between  
8 cables and 1¾ miles, it is marked in accordance with  
IALA Maritime Buoyage System (Region A). There are  
controlling depths of 25 m at the beginning of the route,  
NW of Kachchigadh Light, and 23 m NNE of Okha Point  
(22°28'·N, 69°05'·E); however, vessels should take into  
account possible changes which may have taken place due  
to meteorological or other effects since the last survey.
- 3 **Directions.** The route is entered in the vicinity of  
position 22°21'·N, 68°49'·E, about 7 miles WNW of  
Kachchigadh Light (8·234); it leads NNE between  
Lushington Shoal (22°38'·N, 68°47'·E) (9·4) and Gurur

Shoals (9·22), 13 miles ESE, and thence generally E into  
the gulf, passing S of Ranwara Shoals (22°42'·N, 69°19'·E)  
(9·25) and N of Investigator Reef (22°36'·N, 69°33'·E)  
(9·23).

- 4 **Underkeel clearance.** Deep draught vessels proceeding  
at their normal service speed, must allow a minimum  
underkeel clearance of 20% of their draught. At reduced  
speed, the clearance in calm weather may be reduced to  
15%; but if an appreciable sea or swell is running a 20%  
clearance must be allowed. Particular care should be taken  
where the chart indicates critical depths in the route and  
the vessels individual squat calculation applied. For the  
possible effect on depths of an earthquake see 9·3.

### Through route

#### 9.25

- 1 From a position W of Kachchigadh (22°20'·N, 68°57'·E)  
and the entrance to the deep water the route leads about  
21 miles NNE, thence about 40 miles E to a position of N  
of Kālubhār Reef and N of the E end of the deep water  
route. The through route keeps W and N of deep water  
route passing (with positions from Burāl Reef Light  
(22°32'·7N, 69°16'·2E)):
- 2 ESE of Lushington Shoal (27 miles WNW) (9·4),  
thence:  
WNW then N of Gurur Shoal (14½ miles W) (9·22),  
thence:
- 3 N of Kachchh Light-buoy (W cardinal) (6¼ miles  
NW), thence:  
N of an obstruction (3¾ miles N), and:
- 4 S of Ranwara Shoals (10½ miles NNW); these 2  
rocky shoals cover an extensive area with depths  
of 10 m or less and a least depth of 0·9 m, as  
shown on the chart; the sea always breaks over the  
SE shoal. Ranwara Light-buoy (port hand) is  
moored off the SW side of the SE shoal. Thence:
- 5 N of Investigator Reef (9·23) (16 miles ENE) thence:  
S of Sonar Light-buoy (port-hand) (9·94) (14½ miles  
ENE), thence:  
To a position N of Kālubhār Reef (9·75) (20 miles  
ESE) and N of the E end of the deep water route.

### Clearing marks and lines

#### 9.26

- 1 The alignment (171°) of the following marks leads W of  
Gurur Shoal (22°33'·N, 69°01'·E) and E of Lushington Shoal  
(22°38'·N, 68°47'·E):  
Kachchigadh Fort (22°19'·6N, 68°57'·0E) (8·241) and:  
Dwārkanath Temple (22°14'·2N, 68°58'·1E) (8·237).
- 2 For vessels passing S of Gurur Shoal, Sāmiāni Island  
Centre Lighthouse (22°29'·3N, 69°05'·2E) (9·49) bearing  
between 092° and 103° passes S of Gurur Shoal and N of  
Marian Shoal, in a depth of not less than 11·3 m; note that  
Bobby Shoal, and other isolated patches, lie from 3 to  
4½ miles W of the lighthouse between these bearings.

### Useful marks

#### 9.27

- 1 Mojaḡ Beacon (22°21'·4N, 68°57'·8E) a black  
masonry structure stands near a sandhill, about  
30 m high, with bushes on it.  
Mīthāpur Light (dark building, 50 m in height)  
(22°24'·4N, 69°00'·6E) stands close NE of a  
conspicuous chimney.  
Sāmiāni Island Centre Light (22°29'·3N, 69°05'·2E)  
(9·49).
- 2 Sāmiāni Island North Light (masonry tower, black  
and white bands, 10 m in height) (22°29'·5N,

69°05'·5E) stands at the NE end of a drying reef extending NE from the island.

- 3 Burāl Reef Light (white round tower, 12 m in height) (22°32'·7N, 69°16'·2E) stands near the NW extremity of Burāl Reef.

Chānk Tāpu Light (white framework tower, black bands) (22°32'·8N, 69°24'·6E) stands near the NE extremity of Burāl Reef.

- 4 Kālubbhār Tāpu Light (white round stone tower, 20 m in height) (22°26'·3N, 69°35'·2E) stands at the W end of Kālubbhār Tāpu (9.75) from where the reef extends about 1¼ miles offshore.

(Directions for the E part of the  
Gulf of Kachchh continue at 9.119)  
(Directions for Okha are given at 9.50)

## OKHA APPROACHES AND HARBOUR

### General information

Chart 673 plan of approaches to Okha and plan of Port of Okha

#### Position

##### 9.28

- 1 The port of Okha (22°28'N, 69°05'E) lies between the N end of Okhamandal Peninsula and Bet Shankhodhār (1 mile SE) (9.60). The town of Okha is situated close W of the port.

#### Function

##### 9.29

- 1 Principal imports are refined petroleum products, fertiliser, coke and coal. The main exports are bauxite, salt, soya bean meal, soda ash and rice.
- 2 In 1992, the port handled 454 273 tonnes of cargo.

#### Port limits

##### 9.30

- 1 From position 22°25'·5N, 68°59'·03E on the W coast of the peninsula the port limits are as follows:

|       |            |            |
|-------|------------|------------|
| N to  | 22°32'·0N, | 68°59'·3E. |
| E to  | 22°32'·0N, | 69°06'·5E. |
| S to  | 22°28'·5N, | 69°06'·5E. |
| SW to | 22°27'·7N  | 69°05'·4E. |
| SW to | 22°27'·1N  | 69°04'·5E. |

- 2 Thence to join the E coastline of the peninsula and follow it SW to position 22°26'·2N, 69°03'·15E.

#### Approach and entry

##### 9.31

- 1 The port is approached from NW passing N of Sāmiāni Shoal, and is entered between Sāmiāni Island North Light (22°29'·5N, 69°05'·5E) (9.27) and the shoal ground extending NNW from Bet Shankhodhār (9.60).

#### Traffic

##### 9.32

- 1 In 2003 the port was used by 60 vessels with a total dwt of 1 354 737.

#### Port authority

##### 9.33

- 1 Port Officer, Gujarat Maritime Board, Okha.

### Limiting conditions

#### Controlling depths

##### 9.34

- 1 In 1989 a limiting draught of 8 m was in force. See also 9.3.

#### Deepest and longest berth

##### 9.35

- 1 Sayaji Pier (9.55).

#### Tidal levels

##### 9.36

- 1 See information in *Admiralty Tide Tables Volume 3*. Mean spring range about 3·0 m; mean neap range about 1·6 m.

#### Density of water

##### 9.37

- 1 Density of water is 1·025 g/cm<sup>3</sup>.

#### Maximum size of vessel handled

##### 9.38

- 1 **Length:**  
Southwest monsoon; 164 m.  
Northeast monsoon; 160 m.
- 2 **Draught:** 6·7 to 8·0 m depending on height of tide.  
**Breadth:** 28·4 m due to narrow entrance (reported 1994).

#### Local weather

##### 9.39

- 1 Strong NE winds adversely effect the working of cargo by vessels lying at anchor off the port.  
During periods of strong winds, a confused sea often occurs at HW springs over the shallow ground lying NW of Padmatirth Point (22°27'·6N, 69°05'·6E) (9.53).

### Arrival information

#### Port operations

##### 9.40

- 1 Movement of vessels is restricted to daylight hours only.

#### Port radio

##### 9.41

- 1 There is a port radio station, for details see *Admiralty List of Radio Signals Volume 6(4)*.

#### Notice of ETA required

##### 9.42

- 1 Twenty-four hours notice is required, any subsequent alterations must be notified as soon as possible.

#### Outer anchorages

##### 9.43

- 1 **General.** A vessel may anchor in the outer roadstead, as shown on the chart, with Sāmiāni Island Centre Lighthouse (22°29'·3N, 69°05'·2E) (9.49) bearing 171° distant 1¼ miles in depths of about 12 m, sand and broken shell.  
**Examination.** For details of anchorage see 1.41.

#### Pilots and tugs

##### 9.44

- 1 **Pilotage** is compulsory for vessels over 350 gt; the pilot boarding place is situated about 1¼ miles NNW of Sāmiāni Island Centre Lighthouse. The pilot boards during daylight hours 1½ hours before HW, or at LW, during the NE monsoon; and 30 minutes before HW or 1½ hours before LW during the SW monsoon.  
For details see *Admiralty List of Radio Signals Volume 6(4)*.
- 2 **Tugs** are available, they join in the entrance channel.

**Requirement for local knowledge****9.45**

- 1 Local knowledge is required for the channel which leads E between Sāmiāni Shoal and Humani Point; and for the channel leading SSW between Sāmiāni Shoal and Sāmiāni Island. For details of these channels see 9.52.

**Harbour****General layout****9.46**

- 1 Okha harbour comprises a stretch of water encompassed by land, islands or drying shoals, it provides some alongside berths and an anchorage which is exposed NE.
- 2 There are general depths of 6 to 8 m in an area NE of the berths, but this area is surrounded by shoaler water with very shallow patches and foul ground in places. See also 9.3.

**Signals****9.47**

- 1 **Storm signals** are displayed from the port flagstaff standing close WNW of Okha Point; the general system is used. See 1.45.

**Tidal streams****9.48**

- 1 **Channel W of Okha.** Streams in the channel between Sāmiāni Shoal and Humani Point set ESE on the in-going stream and WNW on the out-going, a rate of  $3\frac{1}{2}$  kn is attained at neaps.
- 2 **North of Sāmiāni Island,** between it and Chandri Reef,  $2\frac{1}{2}$  miles NE, the streams set SE on the in-going and WNW on the out-going; the in-going stream attains a rate of 3 kn at springs and the out-going 2 kn at neaps.
- 3 **West of Sāmiāni Island,** the in-going stream sets NE and the out-going SW, at rates of  $1\frac{1}{4}$  kn at neaps; SE of the island the reverse is the case.
- 4 **South end of Sāmiāni Island,** around this point the in-going stream sets strongly S and E and thence S through the harbour curving towards E round the S end of Bet Shankhodhār with a rate of  $1\frac{1}{4}$  to  $1\frac{1}{2}$  kn at neaps and 2 kn at springs.
- 5 The out-going stream, coming from E round the S end of Bet Shankhodhār, reaches shoal water NW of Padmatirth Point ( $22^{\circ}27'.6N$ ,  $69^{\circ}05'.6E$ ) and here divides into two streams; one setting along the W side of the harbour and W of Sāmiāni Island and the other N and NE between Sāmiāni Island the N part of Bet Shankhodhār; thence it sets WNW to the N of Sāmiāni Island. This out-going stream has a rate of  $1\frac{1}{4}$  to 2 kn at neaps.
- 6 **Okha harbour.** Strong eddies form in the harbour at springs with the in-going and out-going streams, also a strong undertow occurs at the anchorage off Okha Point.
- 7 **Caution.** Except at slack water there is a strong race N and S of Sāmiāni Island and as tidal streams on each side of this island are fairly slack a vessel may take a sheer when entering or leaving the race; there is also a heavy tide-rip on all the shoals especially on the out-going stream.

**Landmarks****9.49**

- 1 Sāmiāni Island Centre Light (white round stone tower, 20 m in height) ( $22^{\circ}29'.3N$ ,  $69^{\circ}05'.2E$ ) stands near the centre of Sāmiāni Island; a tomb, with a spire, stands on a small mound close NNE of the light.

2

Humani Point (Okha) Light (white square masonry tower, red bands, 23 m in height) ( $22^{\circ}28'.5N$ ,  $69^{\circ}04'.2E$ ). Two radio masts standing close SW of the light are marked by fixed red lights.

**Directions****Approach channel****9.50**

- 1 From a position in deep water N of Humani Point ( $22^{\circ}29'N$ ,  $69^{\circ}04'E$ ) (9.23) a generally SE course should be shaped for the pilot boarding place or the outer anchorage, thence for a position off the harbour entrance (9.51), giving due attention to the following off-lying dangers (with positions from Sāmiāni Island Centre Light ( $22^{\circ}29'.3N$ ,  $69^{\circ}05'.2E$ )):
  - 2 A wreck ( $1\frac{3}{4}$  miles NNW), with a depth of 5 m over it.
  - A dangerous wreck ( $1\frac{1}{2}$  miles NNW) lies close SSE of a 9.1 m shoal patch and  $2\frac{1}{2}$  cables N of the pilot boarding position.
  - 3 Sāmiāni Shoal (extends 2 miles NW), which dries in parts, is marked near its NW end by No 1 buoy (starboard hand) and at its SE end by No 2 buoy (starboard hand), the position of which is approximate.
  - 4 Chandri Reef ( $2\frac{1}{2}$  miles NE) (9.23) has shoal patches extending  $1\frac{3}{4}$  miles W; No 1 Light-buoy (port hand) is moored near the W end of the shoal patches. In 1996 this buoy was reported replaced by a red drum. Less water was reported (1993), as shown on the chart, S of the shoals.
  - 5 Isolated shoal patches lie in the channel between Sāmiāni Shoal and the shoal patches extending W from Chandri Reef.
  - Chandri Rock ( $1\frac{1}{2}$  miles ENE).
  - 6 No 2 Light-buoy (port hand) ( $4\frac{3}{4}$  cables ENE), moored close NE of a patch which dries to 0.6 m, the N end of shoal ground, part of which dries, which extends  $1\frac{3}{4}$  miles N from Bet Shankhodhār (9.60).
  - 7 In 1986 it was reported that there was a least depth of 8.5 m in the approach channel.

**Harbour channel****9.51**

- 1 From a position 5 cables NE of Sāmiāni Island Centre Light (9.49) the channel leads SSW through the harbour entrance, passing (with positions from Sāmiāni Island Centre Light):
  - 2 WNW of No 2 Light-buoy (port hand) (9.50) ( $4\frac{3}{4}$  cables ENE), and:
    - ESE of Sāmiāni Island North Light (9.27), thence on the leading line:
  - 3 **Leading marks.**
    - Northeast corner of Sayaji Pier (9 cables SSW) and: Adatra Point Beacon (black, disc topmark) ( $1\frac{1}{4}$  miles farther SSW).
  - 4 The alignment ( $207\frac{1}{4}^{\circ}$ ) of these marks leads from a position inside the harbour entrance through the buoyed channel towards the berths, passing:
    - WNW of a stranded wreck (4 cables ESE), thence: ESE of shoal ground extending SE from Sāmiāni Island and marked by No 3 Buoy and No 4 Light-buoy (both starboard hand) ( $2\frac{1}{2}$  cables ESE and SE respectively), and:



- 6 WNW shoal ground (9.50) marked by No 3 Light-buoy (port hand) (3¾ cables SE), thence:

WNW of No 4 buoy (port hand) (5¼ cables SSE).

#### Cautions:

Because of the strong tidal race that may otherwise be encountered, both N and S of Sāmiāni Island, it is best to enter or leave harbour at about the time of slack water.

It is reported that buoys are frequently missing, see 9.8.

### Minor channels

#### 9.52

- 1 **Caution.** Strong tidal streams set across these channels, which are very narrow, making their use difficult.
- 2 Coastal vessels and small craft may use the channel which leads E between Sāmiāni Shoal and Humani Point and then S of Sāmiāni Island. Foul ground and shoal water extend offshore between Humani and Okha Points (9.53), also numerous detached patches exist in the channel and a dangerous wreck lies 1 cable W of the S extremity of Sāmiāni Island.
- 3 The channel leading SSW between Sāmiāni Shoal and Sāmiāni Island is seldom used.

### Useful marks

#### 9.53

- 1 Okha Point (22°28'4N, 69°05'0E) is low and sandy with the port flagstaff and a rest house standing close W.
- 2 Padmatirth Point (22°27'6N, 69°05'6E) a small bluff tableland that forms the NW extremity of Bet Shankhodhār Island; the point becomes an islet at HW springs. A small white-domed tomb stands on the point with a flagstaff ½ cable SSE; another white domed tomb stands 7½ cables E of the point.
- 3 Bet Shankhodhār Island Beacons (22°28'N, 69°07'E); a number of beacons stand in this vicinity, their positions are shown on the chart.

### Berths

#### Anchorage

##### 9.54

- 1 Vessels of draught not exceeding 5 m may anchor SE of Okha Point (9.53).

#### Jetties and wharf

##### 9.55

- 1 **Caution.** Depths at the berths should be confirmed with the local authority.
- 2 **Sayaji Pier**, a concrete pile structure close S of Okha Point (9.53) is 122 m long and 12.5 m wide; it is joined to the coast by a viaduct. Vessels up to 165 m in length can be berthed in a least depth of about 7.9 m on the SE side of the pier; on its NW side vessels up to 93 m in length can be berthed in a least depth of about 5.8 m. In 1986 it was reported that there was a depth of 8.5 m alongside this pier and that vessels of deeper draught anchored off the port to be lightened by barges.
- 3 A mooring buoy at the S end of Sayaji Pier is for the use of vessels berthing there.
- A wharf, 305 m long and extending SW from the root of Sayaji Pier, is for the use of lighters; a small concrete jetty at its S end is used by ferry boats plying between Okha and Bet Shankhodhār.

- 4 **Second Pier**, situated close SW of Sayaji Pier, is of concrete pile construction with a berthing face 145 m long and a width 13.7 m; vessels up to 93 m in length and 6.4 m draught can be accommodated. In 1986 it was reported that there was a depth of 8.5 m alongside this pier and that it had been used by a vessel 178 m in length with a 28 m beam. The SE side of the pier provides a deep water berth where vessels berth bows NE.

- 5 **Passenger Jetty** and a small slipway lie 3 cables SW of the root of Second Pier; 3 cables farther SW a wooden jetty, used by small craft, has a reported depth of 2.4 m alongside.

**Development.** Plans are in hand (1997) to construct an LPG berth at the port.

### Port services

#### Repairs

##### 9.56

- 1 Minor repairs only; small patent slip with cradle length 35 m, normally used for repairs to port craft.

#### Other facilities

##### 9.57

- 1 Medical dispensary; hospital 11 km distant; lighters for vessels at anchor.

#### Supplies

##### 9.58

- 1 Fuel oil, with 3 days notice; limited fresh water; provisions in small quantities.

#### Communications

##### 9.59

- 1 Airport at Mithāpur, 9 km SW; local rail at alongside berths; regular trade by sea to other Indian Ports.

## OKHA TO KĀLUBHĀR TĀPU—BAYS, ANCHORAGES AND HARBOURS

### Bet Shankhodhār and Positra Bay

*Chart 673 plan of Approaches to Okha*

#### Bet Shankhodhār

##### 9.60

- 1 **General information.** Bet Shankhodhār (22°28'N, 69°07'E) is a long and narrow island situated SE of the NE extremity of the Okhamandal Peninsula, from which it is separated by a channel 9 cables wide at its narrowest part; the SW part of the channel is mostly foul ground.

##### 9.61

- 1 **Topography.** The island is composed chiefly of sandhills with some clumps of coconut and a few other trees in its NE part; much of the remainder of the island is open jungle of prickly pear and thorny scrub, except in the SW, where it is of rocky tableland formation covered with dense forest.

- 2 Hanumān Point (22°28'N, 69°09'E) lies at the E end of the island with Hanumān Temple, which may be identified for position by the trees which hide it, standing 7 cables W. Hanumāndanda Reef lies on foul ground extending 1½ miles NNE of Hanumān Point.

- 3 Shankholia Point, the SW point of the island, is situated 4½ miles SW of Hanumān Point.

Padmatirth Point (22°27'6N, 69°05'6E) (9.53) forms the NW extremity of the island.

##### 9.62

- 1 **Okhamandal**, a town situated about 5 cables S of Padmatirth Point, is a main resort of pilgrims; it has many



temples and shrines in honour of Krishna, an incarnation of Vishnu, the “Preserver of Mankind” in the Hindu Trinity.

- 2 Dwarkadhish Temple, a large square building near the centre of the town, is very prominent.

- 3 Beyt Jetty, a small landing place is situated on the shore close SW of Dwarkadhish Temple; nearby more imposing buildings, to house pilgrims, stand in contrast with the stone and mud houses of the rest of the town.

### **Anchorage E of Bet Shankhodhār**

#### **9.63**

- 1 **General information.** During W gales well sheltered anchorage may be obtained, by small vessels, E of Bet Shankhodhār with Hanumān Point (22°28'N, 69°09'E) (9.61) bearing 334° distant 6 cables in a depth of about 10 m, sand and mud; it should be noted that E of this position the bottom is rocky.

#### **9.64**

- 1 **Tidal streams.** The in-going stream at the anchorage sets S and the out-going N; the streams attain a rate of 1¼ kn at neaps and 1½ kn at springs.

#### **9.65**

- 1 **Directions.** If making the anchorage E of Bet Shankhodhār, and intending to pass close W and S of Chandri Reef, pass W of No 1 Light-buoy (22°30'6N, 69°05'2E) (9.50) then steer SE until a sand ridge on the S end of Chandri Reef bears 080° when course should be altered E to pass well S of the sand ridge. Care must be taken to keep clear of Chandri Rock and a shoal patch, which dries, 4 cables NE of it. The tidal streams here set E and W at rates from 2½ to 3 kn.

- 2 When Positra Village (Chart 43), 2 miles SW of Positra Point (22°25'N, 69°12'E) and standing on ground about 20 m high bears 180°, the vessel will be E of Hanumāndanda Reef (9.61), thence steer for the village on this bearing until Sāmiāni Island Centre Lighthouse (22°29'3N, 69°05'2E) (9.49) bears 275° when course may be altered for the anchorage.

- 3 If passing E of Chandri Reef bring Positra Village to bear 180° and proceed as above.

### **Positra Bay**

#### **9.66**

- 1 **General information.** Positra Bay is entered between Positra Point (22°25'N, 69°12'E) and the SE point of Bet Shankhodhār, 3½ miles NE; the bay is very shallow and dries in places.

- 2 **Topography.** The S shore of the bay is low and much inundated at HW springs; the surrounding country is mostly sandy with cactus scrub and is sparsely cultivated.

- 3 **Depths.** Although depths within Positra Bay increase towards Shankholia Point (9.61) there are below-water rocks E of the point and local knowledge is necessary when navigating in the vicinity, see also 9.3.

- 4 **Landing** is difficult, except at HW springs, because of reefs, sand and mud banks.

### **Pindara Bay and approaches**

*Chart 43*

### **Description**

#### **9.67**

- 1 **Local knowledge** is required.

Pindara Bay is entered between Positra Point (22°25'N, 69°12'E) (9.66) and Shiyārdi Bet, a small island with mangroves extending S, 10 miles SE. The bay is shallow and its head dries out to a distance of about 1½ miles.

- 2 From the head of Pindara Bay, Okha Rann (8.230), a salt marsh which covers at HW springs and is almost impassable, extends S forming the E side of Okhamandal Peninsula and the W limit of the Saurashtra Coast which extends ENE to the head of the Gulf of Kachchh.

- 3 Merodi Bet (22°23'N, 69°13'E), known locally as Sahn, consists of two islets; the W islet is 18 m high with a flat summit, the E islet is smaller and cone-shaped.

- 4 Ajād Tāpu (22°23'N, 69°20'E) is a bluff island covered with jungle and has little cultivation; the ruins of an old Moslem Tower stand on the summit of a round hill at its S point. The island is surrounded by a rocky reef save on the SE side where a narrow strip of drying mud bank extends from a HW mark of white sand.

### **Directions**

#### **9.68**

- 1 **Dangers in the approach.** The approach from N leads between Paga Reef (22°28'N, 69°13'E) and Burāl Reef about 1 mile E, thence passes E of Boria Reef (22°25'N, 69°13'E) and clear of an unnamed reef, 2¼ miles SE.

- 2 Paga Reef lies in the approaches to Pindara Bay (9.67); it has a sand ridge on its SW side which is submerged only at HW springs. The reef is covered by the red sector (260°–290°) of Sāmiāni Island Centre Light (22°29'3N, 69°05'2E) (9.49).

- 3 Burāl Reef (Chānk Reef) (22°30'N, 69°20'E), a large coral reef which is steep-to on its N side, supports several islands including Nora Tāpu near the centre of its N part, this island is low and sandy, it is covered with mangroves and trees the highest of which are at its E end. Bhaidar Tāpu, similar to Nora Tāpu, lies 4 miles SSW; Chānk Tāpu is a small wooded island near the NE corner of the reef. Two small rocky islets, Khāra and Mitha Chusna, lie near the S tip of the reef.

- 4 A stranded wreck lies close S of the NW point of Burāl Reef with the forepart of another wreck 1 mile S; the former has been reported to give a good radar response, the mast of the latter is visible.

- 5 Boria Reef (22°25'N, 69°13'E), which dries, lies at the E edge of foul ground extending E from Positra Point; a small detached reef lies about 7 cables N of Boria Reef with a shoal patch 4 cables WSW of it. Local knowledge is necessary when navigating in this vicinity.

- 6 **Clearing marks:**

The alignment (about 143°) of the following marks leads close NE of Paga Reef:

- 7 The summit of Ajād Tāpu (22°23'N, 69°20'E) (9.67) and:  
Venu Hill (626 m high) (21°52'N, 69°45'E), standing in the Barda Hills 35 miles SE.

- 8 The alignment (about 205°) of the following marks leads close SE of Paga Reef:

The SE bluff of Okhamandal Peninsula (37 m high) (22°16'N, 69°09'E), 9½ miles SSW of Positra Point; seen between:

The two islets of Merodi Bet (22°23'N, 69°13'E) (9.67).

### **Other channels**

#### **9.69**

- 1 There is a deep-water channel between Paga Reef (9.68) and the detached reef close N of Boria Reef (9.68), but local knowledge is necessary for vessels using it.

- 2 There is a deep-water channel N and W of Ajād Tāpu (9.67) and its surrounding reef, but there are several dangers in the N channel and a large unnamed reef lies on the W side of the W channel near its N end.

## Anchorage in Pindara Bay

### 9.70

- 1 **Merodi Bet.** Anchorage for a small vessel can be obtained about 5 cables E of Merodi Bet and also on its W side in depths from 11 to 16.5 m, mud; it is well sheltered from all winds but local knowledge is required before approaching the anchorage.
- 2 **Ajād Tāpu.** Anchorage for small vessels with a shallow draught may be obtained off the SE side of Ajād Tāpu; local knowledge is required before approaching the anchorage.

## Anchorage and shelter off Burāl Reef

### 9.71

- 1 **West side.** Small vessels may anchor close W of the NW edge of Burāl Reef in depths of 7 m, mud; as shown on the chart. Care should be taken to avoid shoals extending NW and SW from the NW edge of the reef.
- 2 **East side.** There is good shelter on the E and SE sides of Burāl Reef from W winds; vessels anchoring off these sides must take care to avoid Bubasir Rock, (22°30'4N, 69°26'4E) which lies off the E side of the reef.
- 3 A vessels taking shelter for a single tide may anchor, at the edge of shoal soundings, with the trees on Chānk Tāpu bearing 271° distant about 2 miles, in depths of 15 m, mud; or farther SE, E of Bubasir Rock, with the trees bearing 293° distant about 3 miles, in depths of 12 m. At the latter anchorage the out-going stream sets NW and the in-going SE.
- 4 There are two anchorages, as shown on the chart, 2¼ and 3 miles SE of Chānk Tāpu in depths of about 6 and 8 m respectively, mud.
- 5 **Shelter.** Large local vessels seek shelter in the lee of Chānk Tāpu during the SW monsoon.
- 6 **Directions.** If proceeding to anchor on the E side of Burāl Reef, and passing N of it, keep a good lookout for the trees on Nora Tāpu and Chānk Tāpu and give these islands a berth of at least 3 miles.

## Pindara Bay to Salāya Harbour

### Chart 43

### Topography

#### 9.72

- 1 Mangroves extend about 7 miles E from Gāru Bet (see below), in this vicinity the coast is swampy with many small rocky hills rising from the swamp; thence farther E the land rises to its highest point, which is round, and named Simāni Hill (22°20'N, 69°30'E). North of Simāni Hill the land falls and terminates in the low peninsula of Dhani Bet (9.75), which extends to a position about 5 miles N of the hill.
- 2 Gāru Bet (22°19'5N, 69°21'0E) is prominently defined by a black buff on its E side.  
Pānero Tāpu (22°21'N, 69°27'E), covered with mangrove bushes, stands on the extensive flat of Gunjao Kudda.
- 3 Gāndhiya Kado Tāpu (22°23'5N, 69°29'0E) stands on a large unnamed drying flat.

## Off-lying reefs

### 9.73

- 1 **Vudda Kudda Reefs** (22°26'N, 69°24'E) consist of 3 detached drying reefs, orientated E/W, lying in the fairway SE of Burāl Reef (9.68).

## Channels

### 9.74

- 1 At HW a small vessel can pass through the shoal channel between a small detached reef (22°24'5N, 69°24'8E), situated close NW of Gunjao Kudda (9.72), and Vudda Kudda Reefs, 2 miles NW; a rock with a depth of 1.8 m over it lying in the centre of the channel should be given a wide berth.
- 2 The channel between the W end of Vudda Kudda Reefs and Burāl Reef 1¼ miles NW is deep, but there are shallow depths and a rock in its NE approach, and detached reefs at its SW end; the bottom is mostly mud.

## Salāya Harbour

### Chart 43

### General information

#### 9.75

- 1 **Position.** Salāya Harbour (22°25'N, 69°35'E) is situated between drying coral reefs extending NE from Dhani Bet and SW from Kālubbhār Tāpu (see below). Salāya, a small walled town with stone houses, stands at the head of Salāya Creek about 8 miles within the harbour entrance; the town is inaccessible at LW. The town of Khambhāliya, where there are several old temples, is situated 7 miles SSE of Salāya Town.
- 2 **Function.** The port is generally used by local trading vessels.
- 3 **Topography.** The SW side of the harbour is formed by Dhani Bet, a flat peninsula of sand and mud, fringed with mangroves. The peninsula is covered at HW springs except for some sand ridges at its N end; a sandbank close NW of the peninsula dries 3 to 5 m and the surrounding coral reef dries about 3 m.
- 4 Kālubbhār Tāpu (Kārumbhār Island) forms the NE side of the harbour, it resembles Dhani Bet in composition but there is a low narrow ridge of sand, covered with low scrub, along its N side. Kālubbhār Reef (Kārumbhār Reef) (22°28'N, 69°37'E) surrounds the island, it consists of hard dead coral and some very soft mud flats which are dangerous to walk on at LW; the reef covers at half tide.
- 5 **Approach and entry.** The port is approached from NW, across a bar of soft mud, and entered between the reefs of Dhani Bet and Kālubbhār Tāpu.
- 6 **Port authority.** The port is administered by the Salāya Port Authority, Director of Ports, C/O New Civil Hospital, Ahmedabad 360 016, India.

## Limiting conditions

### 9.76

- 1 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. Mean spring range about 4.3 m; mean neap range about 2.2 m.
- 2 **Density of water** is 1.025 g/cm<sup>3</sup>.

## Arrival information

### 9.77

- 1 **Outer anchorage.** A large vessel may anchor, as shown on the chart, about 1½ miles WSW of Kālubbhār Tāpu Lighthouse (22°26'3N, 69°35'2E) (9.27) in a depth of about 14 m, mud.
- 2 **Requirement for local knowledge.** Vessels should not anchor in the approaches or proceed S of Nora Rock (22°25'5N, 69°34'0E) (9.80); local pilots are reported to be available.

## Harbour

### 9.78

- 1 **Layout.** The port consists of an inner anchorage area and has a small landing place at its head.

**Storm signals** are displayed at Salāya, the brief system is used. See 1.47.

- 2 **Tidal streams** from 2 to 3 miles off the entrance to the harbour the in-going stream sets E and the out-going W, they attain a rate of 1 kn at neaps.

Details of tidal streams at the entrance and within the harbour are given on the chart.

- 3 **Landmarks:**

Kālubhār Tāpu Light (22°26'·3N, 69°35'·2E) (9.27).

Water tower (22°24'N, 69°43'E) (9.20).

## Directions

### 9.79

- 1 **Cautions:**

The entrance to Salāya Harbour is difficult to distinguish when the reefs are covered, for Dhani Bet and Kālubhār Tāpu present no natural distinctive features.

- 2 The wooden beacons (about 0.6 m high) marking the edges of the reefs on each side of the channel, and those marking the entrance and the head of Salāya Creek, cannot be relied upon.

- 3 The beacons used to approach the harbour (9.81) and described at 9.82 should not be confused, on the chart, with the wooden beacons marking the edge of the reef.

### 9.80

- 1 **Dangers:**

Nora Rock (22°25'·5N, 69°34'·0E), which has a narrow shoal extending WNW, restricts the width of the channel to less than 2 cables.

- 2 Sinclair Reefs (22°23'·6N, 69°35'·9E), consisting of dead coral which dries, lie upon mud banks between the entrance to the creek and the W entrance to Blunt Channel (9.127).

### 9.81

- 1 **Approach.** From a position NE of Chānk Tāpu Light (22°32'·8N, 69°24'·6E) (9.27) the approach leads SE for about 6½ miles on the line of bearing 128° of Kālubhār Tāpu Lighthouse until the until the ESE beacon (22°25'·8N, 69°32'·6E) of the N pair of leading beacons (9.82) standing on the W side of the entrance to the Harbour bears 152°; this line of bearing leads about 2¼ miles across the bar. Thence, the line of bearing 114° of Kālubhār Tāpu Lighthouse leads between Taylor Shoal (3¼ miles NW of the light) and Hands Shoals, 6 cables SSW.

- 2 When the NNW beacon (22°24'·5N, 69°33'·8E) of the S pair of leading beacons, standing on the SW side of Salāya Harbour, bears 158° keep it so; this leads to a position W of the outer anchorage and towards the deep channel W of Nora Rock (9.80).

## Entry leading beacons

### 9.82

- 1 The alignment (164°) of the leading beacons standing on the coral reef 2¼ miles SW of Kālubhār Tāpu Lighthouse leads, in shallow water E of Taylor Shoal, to the vicinity W of the outer anchorage and to a position SW of Nora Rock:

Front beacon (white stone) (22°24'·5N, 69°33'·8E).

Rear beacon (white stone) (3½ cables SSE).

- 2 The alignment (302° astern) of the leading beacons standing on the coral reef 2¾ miles W of Kālubhār Tāpu Lighthouse leads, from a position SW of Nora Rock across the harbour to the inner anchorage:

Front beacon (white stone) (22°25'·8N, 69°32'·6E).

Rear beacon (white stone) (5 cables WNW).

## Anchorage and berths

### 9.83

- 1 **Anchorage.** A large vessel may anchor in Salāya Harbour at the inner anchorage about 2 miles S of Kālubhār Tāpu Lighthouse in a depth of 15 m, mud.

Small vessels can anchor about 3½ miles SE of the same lighthouse in a depth of 7 m, mud.

### 9.84

- 1 **Piers and jetties.** Sykes Point (22°22'N, 69°37'E), situated at the head of the harbour, is the only place in the harbour at which landing is possible.

- 2 At Sykes Point a pier extends 4 cables N, it is suitable for boats and lighters to use for about 2 hours each side of HW, at other times the reef at the pierhead dries; a small jetty which boats can use at around the time of HW extends 2½ cables WNW from the W side of the point.

- 3 A jetty 1¼ miles S of Sykes Point can be used at any state of tide, except LW springs, but the channel to it from N is difficult when the reefs are covered.

## Communications

### 9.85

- 1 Salāya and Khambhāliya are both connected with the general railway system.

## WEST PART OF THE GULF OF KACHCHH—NORTHERN SIDE

### KHĀROD NADI TO NAVĪNĀL POINT

#### General information

Charts 43, 707

#### Route

##### 9.86

- 1 From a position SSW of the mouth of Khārod Nadi (22°50'N, 69°14'E) the route leads about 22 miles ESE then 12 miles E to a position SE of Navīnāl Point.

#### Topography

##### 9.87

- 1 Between Khārod Nadi and Māndvi Harbour, 7 miles E, the coast is fronted with white sandhills from 6 to 15 m high, which, on clear nights, are very prominent.

- 2 From Māndvi Harbour to Mudwah Point, 9 miles ESE, the coast is fringed by a sandbank extending in places about 9 cables offshore. An extensive backwater extends 5½ miles WNW from Mudwah Point (9.94), this backwater floods at HW during the SW monsoon and at other times during very high spring tides.

- 3 Thence to Navīnāl Point, 12 miles ESE of Mudwah Point, long narrow ridges of sand, up to 3 m high, front the coast and a drying bank extends about 1 mile seaward; an extensive swamp, much of it covered with mangroves and intersected by many small creeks, lies between the sand ridges and the mainland.

- 4 The coastline is backed, some 15 to 20 miles inland, by a range of hills which lie nearly parallel to the coast. There are three salient peaks in this range, Nanu Hill (23°12'N, 69°21'E), a circular hill; Krikubbah (not charted) a sharp peak, 253 m high, stands 6½ miles WSW of Nanu Hill; and



at the E end of the range Katrura (23°11'N, 69°48'E), another circular hill, which may at times be seen from the gulf.

### Depths 9.88

- 1 There is considerable variation in the depths throughout this route and numerous isolated shoal patches exist both near the coast and offshore. For the possible effect on depths of an earthquake see 9.3.

### Tidal streams 9.89

- 1 Tidal streams along this stretch of coast set E with the in-going and W with the out-going streams, they attain rates from 2 to 3 kn.
- 2 Tidal streams over Ranwara Shoals (22°42'N, 69°20'E) (9.25) attain a rate of 5 kn at springs and 3 kn at neaps.

### Overfalls 9.90

- 1 The strong tidal streams cause heavy tide-rips and overfalls over the uneven ground near Ranwara Shoals and in the vicinity of the isolated shoals lying, farther NW, S of Āsār Māta Temple (22°50'N, 69°13'E).

### Currents 9.91

- 1 See 9.7.

### Principal marks 9.92

- 1 **Landmarks:**  
Āsār Māta Temple (22°50'N, 69°13'E) a Hindu temple that stands, on the crest of some sandhills, near the W entrance point of Khārod Nadi; it marks the N entrance point of the Gulf of Kachchh.
- 2 Tamachi Pir Tomb (22°50'N, 69°17'E), a Moslem tomb that stands on a sandhill; at the E end of which, a small creek enters the gulf near the foot of a steep bluff.  
House (elevation 25 m) (22°50'N, 69°17'E), stands close W of Tamachi Pir Tomb (see below).  
Vijayvillas Palace stands close N of the above tomb.
- 3 Radio mast (elevation 74 m) (22°52'N, 69°24'E), from which an obstruction light is exhibited, stands 4½ miles NE of the entrance to Māndvi Harbour.  
Rāwal Pīr Tomb (22°49'N, 69°23'E); on which stands Rāwal Pīr Light (white concrete column on a white square tower, 7 m in height).
- 4 For details of landmarks on the S coast of the Gulf of Kachchh see 9.20.
- 5 **Major lights:**  
Chhachhi Light (22°57'·2N, 69°00'·1E) (9.225).  
Humani Point Light (22°28'·5N, 69°04'·2E) (9.49).  
Māndvi Light (trestle tower, red and white bands, 30 m in height) (Racon) (22°49'·7N, 69°20'·9E).
- 6 Mundra Marine Control Tower Light (22°43'·8N, 69°42'·4E), 24 m in height, situated on the jetty at Navināl Marine Terminal (9.106).  
Navināl Point Light (white round concrete tower, black bands, 24 m in height) (22°44'·4N, 69°42'·8E).
- 7 Pirothan Island NW Point Light (22°36'·2N, 69°57'·1E) (9.117).

### Other aids to navigation 9.93

- 1 Racon (22°28'·5N, 69°04'·2E) ½ cable SW of Humani Point Lighthouse, Okha (9.49).  
Racon (22°32'·7N, 69°16'·2E) at Burāl Reef Lighthouse (9.27).
- 2 Racon (22°49'·7N, 69°20'·9E) at Māndvi Light (9.92).  
Racon (22°30'·6N, 69°42'·1E) at Vādinār Offshore Terminal SBM (9.121).
- 3 Racon (22°34'·3N, 69°47'·3E) at SPM-1, Reliance Jāmnagar Marine Terminal (9.136).  
Racon (22°36'·2N, 69°57'·1E) at Pirothan Island Lighthouse (9.117).
- 4 See *Admiralty List of Radio Signals Volume 2* for details.

### Directions

(Directions for the passage WNW are given at 9.227)

### 9.94

- 1 **Caution.** Numerous isolated shoal patches exist within the 10 m depth contour off this stretch of coast.
- 2 From a position SSW of the mouth of Khārod Nadi (22°50'N, 69°14'E) the route leads about 22 miles ESE thence about 12 miles E to a position SE of Navināl Point, passing (with positions from Mudwah Point (22°47'N, 69°30'E)):
- 3 Clear of several isolated shoals (13½ to 17½ miles W) that lie NW of Ranwara Shoals (see below). Thence:  
Clear of Ranwara Shoals (9.25) (10 miles WSW), thence:
- 4 SSW of Mudwah Point, a sandy bluff, 12 m high; from which a ledge of rocks and shoal patches extend 1¼ miles SW. Thence:
- 5 SSW and S of Sonar Durree (6 miles SE) which consists of detached sand ridges that dry; the shoal is steep-to on its S side. Sonar Light-buoy (port hand) is moored 1½ miles S of this danger. Thence:
- 6 S of a dangerous wreck (13½ miles ESE) lying 1½ miles SE of Navināl Point, (22°44'N, 69°43'E); the point consists of a few low ridges of sand.
- 7 **Clearing marks.** The alignment (353°) of the following marks clears Ranwara Shoals to the E:  
Rāwal Pīr Tomb (22°49'N, 69°23'E) (9.92) and:  
Nanu Hill (25 miles farther N) (9.87).

### Useful marks 9.95

- 1 Kālubbār Tāpu Light (22°26'·3N, 69°35'·2E) (9.27).  
Sandhill (elevation 20 m) (22°47'N, 69°37'E) stands, at the E end of an island, 7 miles E of Mudwah Point.  
Mundra New Port Light (22°45'·8N, 69°42'·4E) (9.105).  
(Directions continue at 9.119)

### Māndvi Harbour

Chart 43

### General information 9.96

- 1 **Position.** Māndvi Harbour (22°49'N, 69°21'E) lies at the entrance to Rukmāwati River.  
**Function.** The harbour is a fair weather intermediate port, with an open roadstead anchorage, which is used principally by national vessels. The town of Māndvi is the most important commercial centre in the Gulf of Kachchh.



- 2 **Topography.** The town is surrounded by a wall flanked by bastions; a large flat-roofed building (not charted) in the town forms a prominent landmark. The coast on each side of the town is flat and sandy.

**Approach and entry.** The roadstead is approached, depending on draught, N or E of Ranwara Shoals; the inner harbour is entered, by local small craft only, E of a breakwater.

- 3 **Cargo** is worked at a rate of 800 tonnes per day and approximately 100 000 tonnes are handled annually. Principal imports include fertilizers and timber logs; exports are mainly bentonite lumps.

**Port authority.** Port Officer, Gujarat Maritime Board, Māndvi 370 465.

### Limiting conditions

#### 9.97

- 1 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. Mean spring range about 3.2 m; mean neap range about 1.8 m.

**Density of water** is 1.025 g/cm<sup>3</sup>.

**Local weather.** The roadstead is exposed and adversely effected by the SW monsoon.

### Arrival information

#### 9.98

- 1 **Port operations.** The port is closed from mid-May to mid-September.

- 2 **Port radio.** There is no port radio station, messages should be passed through a coast radio station. For details see *Admiralty List of Radio Signals Volume 1(1)*.

**Pilotage** is not available.

- 3 **Requirement for local knowledge.** The inner harbour can only be entered by lighters and small craft with the aid of local knowledge.

### Harbour

#### 9.99

- 1 **Layout.** The port consists of an open roadstead where vessels anchor and discharge cargo to lighters. The entrance to the inner harbour is protected from W winds by Albert Edward Breakwater which extends 564 m from the W entrance point of the river.

**Storm signals** are displayed, by day only, from a flagstaff at the customs house; the general system is used. See 1.45.

- 2 **Tidal streams** at the anchorage attain a rate of 3 kn at springs but of less than 2 kn at neaps. Farther offshore they increase in strength.

**Useful mark.** Albert Edward Breakwater Head Light (white square concrete column, red top, 7 m in height) (22°49'1N, 69°20'9E).

### Anchorage and lighter berths

#### 9.100

- 1 **Anchorage.** Good anchorage can be obtained 2 miles S of Albert Edward Breakwater, as shown on the chart, in a depth of about 10 m, or farther offshore according to draught. Small vessels may anchor closer inshore, but should keep well clear of the coastal shelf and a rock, with a depth of 1.8 m over it, lying about 8 cables SW of the breakwater head.

- 2 **Lighter berths.** There is a pier and pitched slope at which lighters or sailing vessels, drawing up to 2.7 m, can secure alongside to work cargo; this can only be done at HW as the entire harbour dries out at half-tide.

### Port services

#### 9.101

- 1 **Facilities:** hospital; lighters and tugs.  
**Supplies:** fresh provisions; fresh water is not available.  
**Communications:** airport at Bhuj, 53 km NE, connects to Mumbai (Bombay).

### Mundra

*Chart 43 (see 1.14)*

### Mundra Port

#### 9.102

- 1 **Position.** Mundra Port (22°44'N, 69°42'E) lies about ½ mile W of Navināl Point (9.94) and includes the port storage areas and tank farm on Navināl Island, and Navināl Marine Terminal, a jetty which extends 7 cables SSW from the coast.

- 2 **Function.** It is an all-weather port providing facilities for bulk cargoes and tankers.

**Port Limits.** These encompass an area extending 4 miles E, 6 miles W and 4 miles S from Navināl Point, as shown on the chart.

- 3 **Approach and entry.** The port is approached from the SW, via the deep water route (9.13) if applicable, direct to the anchorage or pilot boarding position as noted on the chart.

- 4 **Traffic.** In 2003 the port was used by 250 vessels with a total dwt of 6 615 111.

**Port authority** is the Gujarat Adani Port Ltd., Mundra, Kachchh, Gujarat 370 421.

### Limiting Conditions

#### 9.103

- 1 **Deepest and longest berth** is No 1 berth S side of the jetty head (9.106).

**Maximum size of vessel.** It is reported that vessels up to 80 000 dwt can be handled.

- 2 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3* for Navināl Point. Mean spring range about 4.8 m; mean neap range about 2.5 m and tidal streams are reported to be 3 kts, 4-5 kts at spring tides with a flow direction of 070/250°.

### Arrival information

#### 9.104

- 1 **Port Radio.** There is a port radio station. For details see *Admiralty List of Radio Signals Volume 6(4)*.

**Notice of ETA** should be sent 7, 5, and 3 days and 48 and 24 hours before arrival.

- 2 **Anchorage.** It is reported that vessels awaiting a berth at Navināl Marine Terminal (9.106) anchor ¾ miles SSE of Navināl Point in about 30 m of water; the charted anchorage, ¾ miles WNW, has been discontinued due to an SBM being installed (2004) at 22°40'6N, 69°39'3E with a submarine pipeline (see 1.11) extending NNE to the shore.

- 3 **Pilotage** is compulsory and pilots board off the port.  
**Tugs** are available.

### Directions

#### 9.105

- 1 **Approaches:** The anchorage or pilot station (9.104) may be approached direct from the SW. For the anchorages E of Navināl Point see 9.108.

- 2 **Useful mark:** Mundra New Port Light (white concrete tower, 7 m in height) (22°45'8N, 69°42'4E).

**Berths****9.106**

- 1 **Navināl Marine Terminal** A T-headed jetty extends 7 cables SSE from the shore and the jetty head provides 2 inner and 2 outer berths. Berths Nos 1 and 2 at the W end are for tankers, No 1 berth for a maximum LOA of 250 m and draught of 15 m. Berths Nos 3 and 4 can handle bulk cargoes with vessels of a maximum LOA of 200 m and 15 m draught.
- 2 **Container terminal.** A container terminal jetty, aligned NW/SE, lies close to the charted position of Navināl Point (22°44'·5N, 62°42'·9E). The terminal is approached from SE through a channel with a maintained depth of 14·3 m and marked by light-buoys (lateral) on the alignment of leading lights.
- 3 Front light No 1 (elevation 19 m) (22°45'·1N, 69°42'·1E),  
Rear light No 2 (elevation 34 m) (22°45'·4N, 69°41'·6E),  
There is a turning basin off the jetty.

**Port Services****9.107**

- 1 **Fresh water** available from the quay and by barge. Fuel, stores and medical facilities are available.  
**Airport** at Bhuj and Kandla, 65 km away, provide flights to Mumbai.

**Mitha Port****9.108**

- 1 **General information.** Mitha Port, (22°46'N, 69°42'E) lies 1½ miles within the entrance to Bocha Creek, across which there is a bar with a least depth of about 0·3 m; local small craft, drawing up to 2·4 m can berth alongside. The port is closed from mid-May to September.
- 2 **Function.** Shallow draught barges load at small jetties on the E bank of the port from which over 50 000 tonnes

of salt are exported annually, bentonite lumps are also exported; imports include fertilizers and timber.

- 3 **Useful mark:** Mundra New Port Light (22°45'·8N, 69°42'·4E) (9.105).

- 4 **Anchorages.** The general anchorage for small vessels with shallow draught is E of Navināl Point in a depth of about 5 m; the anchorage affords shelter from W winds and is clear of the influence of tidal streams.

- 5 The roadstead anchorage, for deep draught vessels working cargo, is about 1¼ miles ESE of Navināl Point, as shown on the chart, and keeping clear of the alignment of the container terminal leading lights (9.106).

- 6 **Approaches.** The general anchorage should be approached with care to avoid a shoal bank, with a least depth over it of 0·3 m, lying about 2 miles ENE of Navināl Point. Local knowledge of the area is required for this anchorage.

- 7 The roadstead anchorage should be approached, from SSW or SSE, passing well clear of the shoals and isolated patches that extend from shore to positions W and E of the anchorage.

**Small craft***Chart 43***Mudwah Point****9.109**

- 1 **General anchorage.** Anchorage can be obtained by a small vessel, with shallow draught, behind Mudwah Point (22°47'N, 69°30'E) (9.94); the anchorage affords good shelter from the SW monsoon. There is a depth of about 4 m over the bar in the approach to the anchorage at HW springs. Local knowledge of the area is required for this anchorage.

**Other name****9.110**

- 1 Navināl Creek (22°44'·7N, 69°42'·8E).

**EAST PART OF THE GULF OF KACHCHH****KĀLUBHĀR TĀPU TO THE APPROACHES  
TO SOGAL CHANNEL AND HANSTHAL  
CREEK****General information**

*Charts 699, 3466, 43*

**Route****9.111**

- 1 From a position N of Kālubhār Reef (9.75) and in the vicinity of the E end of the deep water route (9.24) the route leads about 30 miles ENE to vicinity of the Outer Tuna Light-buoy (22°50'·8N, 70°06'·9E) and the approaches to Sogal Channel to Kandla, and to Hansthal Creek at the head of the gulf.

**Topography****9.112**

- 1 **North coast.** Between Navināl Point and Nakti Creek, 27 miles ENE, the coast is fronted by a mud flat which dries up to 3 miles offshore.  
**South coast.** This coast is heavily indented with bays and creeks and fronted by numerous large reefs.

**Depths****9.113**

- 1 Depths in the centre of the gulf along this route shoal gradually towards the head of the gulf, which itself, is generally shallow. Off the N shore there are several isolated shoal patches; the reefs on the S shore are steep-to except in the bays where the depths shoal more gradually. For the possible effect on depths of an earthquake see 9.3.

**Hazard****9.114**

- 1 It is reported that numerous small fishing vessels may be encountered off parts of the S coast of the Gulf of Kachchh.

**Prohibited anchorage****9.115**

- 1 Anchoring and fishing are prohibited within 1 mile of the submarine pipeline extending SW then S from 22°46'·5N, 69°51'·0E to the Reliance Jāmnaṅgar Marine Terminal (9.136) at Sikka, as shown on the chart, see also 1.11.

**Tidal streams****9.116**

- 1 The tidal streams generally follow the line of the coast, except in the bays, where an onshore component may be

experienced with the in-going stream; for further details see the tidal stream arrows on the chart.

- 2 Tidal streams in the W approach to Kandla Creek (23°02'N, 70°13'E) and Hansthal Creek, 6 miles SE, are in general very irregular and seem to be much influenced by a strong wind from any quarter. At Outer Tuna Light-buoy (22°50'·8N, 70°06'·9E) the streams have a rate of 2½ kn at springs and 1½ kn at neaps but these rates gradually increase towards Hansthal Creek where the rates are 7 kn at springs and 4 kn at neaps.

### Principal marks

#### 9.117

##### 1 Landmarks north shore:

Temple at Bhadreswar (elevation 23 m) (22°55'N, 69°54'E) is surmounted by a small white dome and has a fort standing close W.

Twin banyan trees (elevation 21 m) (22°55'N, 69°57'E).

For landmark at Kandla (23°02'N, 70°13'E) see 9.184.

##### 2 Landmarks south shore:

Radio mast (elevation 73 m) (22°29'N, 70°08'E) from which a red obstruction light is exhibited.

For landmarks at Sikka (22°29'N, 69°47'E) see 9.131.

For landmarks at Rozi Island (22°32'N, 70°03'E) see 9.146.

##### 3 Major lights:

Mundra Marine Control Tower Light (22°43'·8N, 69°42'·4E) (9.92).

Navināl Point Light (22°44'·4N, 69°42'·8E) (9.92).

Pirothan Island NW Point Light (white round concrete tower, black bands) (22°36'·2N, 69°57'·1E).

- 4 Tekra Light (metal column on black masonry tower, white bands, 14 m in height) (22°55'·6N, 70°07'·2E) stands on a sandy ridge at the S end of a mangrove swamp, 1½ miles SW of the W entrance point of Nakti Creek.

### Other aids to navigation

#### 9.118

- 1 Racon (22°30'·6N, 69°42'·0E) at Vādinār Offshore Terminal SBM (9.121).

Racon (22°34'·3N, 69°47'·3E) at SPM-1, Reliance Jāmnaṅgar Marine Terminal (9.136).

- 2 Racon (22°36'·2N, 69°57'·2E) at Pirothan NW Lighthouse (9.117).

Racon (22°57'·6N, 70°26'·7E) at Navlakhi Bet Lighthouse (9.216).

For details see *Admiralty List of Radio Signals Volume 2* for details.

### Directions

(continued from 9.27 and 9.95)

#### 9.119

- 1 From a position N of Kālubbhār Reef (22°28'N, 69°37'E) and in the vicinity of the E end of the deep water route (9.24) the route leads about 30 miles ENE to vicinity of the Outer Tuna Light-buoy (22°50'·8N, 70°06'·9E) passing (with positions from Pirothan Island Offshore NE Light (22°37'·2N, 69°58'·3E)):

- 2 NNW of Vādinār Offshore Terminal (9.121) (16 miles WSW), which lies 3 miles NNW of Narāra Bet, an islet with a clump of trees fronted by sand, which separates Pathfinder Inlet (9.126) and Sikka Creek (9.128); the islet is joined to the mainland S by a mangrove swamp and surrounded N by Narāra Reef. Thence:

3

NNW of the SPM working area of RPL, Reliance Jāmnaṅgar Marine Terminal, (9.136), (10 miles WSW), and:

SSE of Navināl Point (9.94) (16 miles WNW); the jetty of Mundra Port (9.102) lies 7 cables SW and a dangerous wreck 1¼ miles ESE, thence:

4

NNW of Munde Reef (Dera Reef) (8 miles SW), which forms the W end of an extensive reef that extends W from Munde ka Bet and N from Dide ka Bet, an islet with a range of sandhills and many mangroves. Thence:

SSE of an offshore bank and shoal patches (7 miles NW) with a least depth of 4·3 m, thence:

5

NNW of Pirothan Island (1½ miles SW), an island with trees on it which are retained as they make a good landmark; a coral reef surrounds the island and connects it with the islands and mainland SW and SE. Thence:

NNW of Bālāchadi Rocks (11 miles ENE); these rocks provide a good radar response. The outer anchorage and pilot boarding position for Navlakhi lie 5 miles NW. Thence:

6

To either the vicinity of Outer Tuna Light-buoy (9.185) (16 miles NNE), if bound for Sogal Channel, or to a position SSE of the buoy if proceeding to Hantshall Creek.

### Useful marks

#### 9.120

##### 1 North shore:

Temple at Goarsāma (elevation 19 m) (22°51'N, 69°46'E).

Luni Pir Dome (22°52'N, 69°49'E).

Dome (elevation 22 m) (22°53'N, 69°54'E).

Beacon G (black, rectangular topmark) (22°55'N, 70°01'E).

Beacon I (black, ball topmark) (22°55'N, 70°04'E).

2

For details of beacons in the vicinity of Kandla see 9.187.

3

##### South shore:

Kālubbhār Tāpu Light (22°26'·3N, 69°35'·2E) (9.27). Stranded wreck (22°31'N, 69°50'E) lies near the SW edge of Munde Reef.

4

Pirothan Island Offshore NE Light (white pyramidal concrete tower, red bands; 8 m in height) (22°37'·2N, 69°58'·3E).

Kalvan Light (22°35'·6N, 70°02'·7E) (9.148).

5

Mungra Reef Light-tower (white round concrete tower, red bands, 10 m in height) (22°45'·5N, 70°11'·1E) stands on a detached reef close S of the W end of Mungra Reef.

(Directions for Kandla continue at 9.185

and those for Hansthal Creek continue at 9.210)

### Vādinār Offshore Terminal

Chart 699

### General information

#### 9.121

- 1 **Position.** Vādinār Offshore Terminal (SBMs) (22°30'·6N, 69°42'·1E) is situated, 2¾ miles NNW of the N extremity of Narāra Bet and about 1½ miles off the reef, in a depth of 30 m. The terminal lies, 5½ miles SE of the E end of the deep water route (9.24), and within the limits of the port of Kandla (9.156).

2

**Function.** No 1 SBM is in the above position with No 2 SBM lying 1 mile WSW. The SBMs can accommodate a tankers of 300 000 dwt with a maximum draught of 22 m.



**Approach.** The anchorage and pilot station is 1½ miles S of the deep water route (9.24)

- 3 **Traffic.** In 2003 the terminal was used by 56 vessels with a total dwt of 11 730 602.

- 4 **Port authority.** The Chairman, Kandla Port Trust, A.O. Building, PO Box No. 50, Gandhidham (Kachchh), India; or locally, Kandla Port Trust, Vādinār Offshore Terminal, Vādinār, Jāmnagar, India.

### Arrival information

#### 9.122

- 1 **Port operations.** Tankers are only berthed during daylight hours, but may unberth at night.

**Port radio.** There is a port radio station, for details see *Admiralty List of Radio Signals Volume 6(4)*.

- 2 **Notice of ETA required.** ETA at the terminal should be sent 72, 24, and 12 hours in advance to the Harbour Master Kandla and to the local agents at Jāmnagar.

- 3 **Anchorage.** Vessels anchor 4½ miles NW of the terminal, near the pilot boarding place, in a depth of about 35 m.

- 4 Vessels awaiting a berth may also anchor N of Sikka Creek, in the vicinity of 22°31'4N, 69°46'0E, in depths of 17 to 20 m, as shown on the chart.

- 5 These anchorages are exposed to the SW monsoon and previous reports indicate that the anchorage off Sikka Creek may be crowded.

- 6 **Prohibited anchorage.** Anchoring and fishing are prohibited within about 3 miles of the terminal; the limits of the area are shown on the chart.

**Pilotage** is compulsory, the pilot boards from a tug in the anchorage in the vicinity of position 22°33'N, 69°38'E.

- 7 **Tug.** A tug, with fire-fighting and anti-pollution equipment, is available.

### Harbour information

#### 9.123

- 1 **Cargo arrangement.** Submarine pipelines are laid SE and SSE between the SBMs and to Narāra Bet (9.119); oil discharged from tankers is stored in a tank farm at Vādinār 4 miles S of the root of the pipeline. Vessels should not anchor or trawl in the vicinity of the pipelines (see 1.11 and Note on chart).

- 2 **Landmarks:**

Kālubhār Tāpu Light (22°26'3N, 69°35'2E) (9.27).

Water tower (22°24'N, 69°43'E) (9.20).

- 3 **Other aid to navigation:**

A racon (9.21) transmits, and a light is exhibited, from the E SBM.

For details see *Admiralty List of Radio Signals Volume 2*.

### Directions

#### 9.124

- 1 **Approach from W.** Deep-draught vessels bound for the terminal should use the deep water route (9.24).

- 2 **Berthing.** Vessels normally berth during slack water or on an out-going tidal stream, approaching the SBMs from W; due to insufficient sea room berthing is not attempted from E. However, it was reported in 1997 that vessels of 300 000 dwt can only berth during daylight hours, but they may unberth during darkness.

### Port services

#### 9.125

- 1 **Facilities:** no reception facilities are available for dirty ballast water.

**Supplies:** provisions; stores; water; all by barge.

### Pathfinder Inlet

*Charts 699, 43*

#### 9.126

- 1 **Position.** Pathfinder Inlet (22°28'N, 69°40'E) is entered between Kālubhār Reef and Narāra Reef to the E. The inlet connects with Salāya Harbour (9.75) through Blunt Channel as described at 9.127.

- 2 **Tidal streams** attain a rate of 3 kn inside the entrance to the inlet.

- 3 **Useful marks:**

Vādinār Offshore Terminal SBM (22°30'6N, 69°42'1E).

Āmbla, a hill standing 5 miles S of the entrance to the inlet, is prominent.

- 4 Lights (lateral) are exhibited, at the entrance to the inlet, from No 1 Beacon on the E side and from No 2 Beacon on the W side.

Water tower (22°24'N, 69°43'E) (9.20).

- 5 **Anchorage,** with shelter from the SW monsoon, can be obtained about 7½ cables N of the entrance to the inlet in a depth of 18 m, mud; taking care to anchor S of the area, shown on the chart, in which anchoring is prohibited and clear of Tilburn Shoal (22°29'N, 69°39'E). A small vessel can anchor about 1 mile within the entrance to the inlet; local knowledge is required before entering the inlet.

- 6 **Berth** A jetty, for the use of harbour craft, is situated on the E side of the head of the inlet; it is connected by causeway to Narāra Bet and thence to the village of Vādinār.

### Blunt Channel

#### 9.127

- 1 **General information.** Blunt Channel (22°24'N, 69°39'E), lying between Kālubhār Tāpu Island and the mainland S, connects the head of Salāya Harbour with Pathfinder Inlet (9.126) situated on the E side of the island.

- 2 The channel can be used by small craft of about 1.8 m draught at any state of the tide; however, it is narrow and tortuous and difficult to distinguish when the reefs and mud flats are covered. The N side of the channel is marked by three pole beacons (0.6 m high), but they cannot be relied upon. Local knowledge of the channel is essential before transit.

### Sikka

*Chart 699*

### General information

#### 9.128

- 1 **Position.** Sikka Creek (22°29'N, 69°47'E) is situated on the S coast of the Gulf of Kachchh, it lies between Narāra Bet and Goos reefs (see below).

The town of Sikka is situated at the head of the creek; it provides the site of one of the largest cement factories in Asia.

**Function.** The port of Sikka comprises the ammonia berth at the LCB jetty and the Lo-Lo/Ro-Ro jetty of RPL, both approached through Sikka Creek, and offshore SPMs and the Reliance Tanker Berths of Reliance Jāmnagar Marine Terminal (9.136).

- 2 **Topography.** Narāra Bet Reef is an extensive reef, that surrounds Narāra Bet (9.119); it lies on the SW side of Sikka Creek and covers at HW. A number of shoal patches extend up to about 5 cables NE of this reef.

- 3 Goos Reef, situated on the NE side of Sikka Creek, is an extensive detached reef which covers at HW; it has upon it a long prominent sandbank that dries well before



the reef itself. A shoal bank extends about 8 cables NW from the reef.

During the SW monsoon heavy breakers develop over both of the above reefs.

- 4 **Approach and entry.** Sikka Creek is approached from the E end of the deep water route (9.24) 8 miles NW, and entered between Narāra Bet and Goos reefs. The creek is navigable for about 3 miles at LW.

- 5 **Traffic.** In 2003, the berths and terminals in Sikka Creek and Reliance Jāmnagar Marine Terminal were used by 568 vessels with a total dwt of 56 958 693.

**Port Authority.** Sikka Port Authority, Gujarat State Government, Director of Ports, New Civil Hospital, Ahmedabad 360016.

### Limiting conditions

#### 9.129

- 1 **Deepest and longest berth.** The LCB jetty (9.133).  
**Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. Mean spring range about 4.8 m; mean neap range about 2.6 m.
- 2 **Density of water** is 1.025 g/cm<sup>3</sup>.  
**Maximum size of vessel handled** is LOA 180 m, draught 8.0 m (reported 1998).  
**Local weather.** The port is adversely effected by the SW monsoon.

### Arrival information

#### 9.130

- 1 **Notice of ETA required** is 48 hours; see *Admiralty List of Radio Signals Volume 6(4)*.
- 2 **Outer anchorage.** Tankers awaiting a berth anchor in the vicinity of 22°31'0N, 69°46'0E, in depths of 14 to 20 m, as shown on the chart. This anchorage is exposed to the SW monsoon and previous reports indicate that it may be crowded. See also 9.138.
- 3 **Pilotage** is compulsory, requirement messages should be sent to the Port Officers at Okha and Bedi Bandar 48 hours in advance. The pilot boards NW of the buoyed channel in position 22°30'1N, 69°46'0E. Boarding normally takes place 2 hours before HW and during daylight hours only. For further details see *Admiralty List of Radio Signals Volume 6(4)*.
- 4 **Tugs** can be made available.

### Harbour

#### 9.131

- 1 **Storm signals** are displayed at Sikka, the brief system is used. See 1.47.  
**Tidal streams.** Within Sikka creek, the tidal stream set is generally in a direction parallel to the axis of the channel, with a maximum rate of 2 kn.
- 2 **Landmarks:**  
Two chimneys (22°25'8N, 69°50'1E), 72 and 70 m in height stand in Sikka Town with 2 chimneys, 130 m in height, located 6¼ cables SW (chart 43).  
Tower (22°25'9N, 69°49'2E), height 25 m, stands close offshore at Sikka.

### Directions

#### 9.132

- 1 **Buoyed channel.** From the vicinity of the pilot boarding position (22°30'1N, 69°46'0E), the channel, marked by light-buoys and buoys (lateral), leads ¾ miles SE to LCB jetty, or about ¼ miles SE thence a farther 2 miles E to the Lo-Lo/Ro-Ro jetty.

### Leading marks:

- 2 Front mark, flagpole (22°27'8N, 69°48'2E),  
Rear mark, storm signal beacon (22°27'3N, 69°48'6E), the position of which is approximate.
- 3 The alignment (137°) of the leading marks leads through the outer part of the buoyed channel passing (with positions from the storm signal beacon):  
NE of Siri Reef (2½ miles NW) which dries, and a smaller isolated reef, which also dries, lies 2 cables farther NW, and:  
SW of Goos Reef (2¼ miles NNW) (9.128), thence:  
NE of a shoal with a depth of 2 m over it (2 miles NW), thence:
- 4 The LCB jetty is approached through the channel, with a least depth of 6.4 m, leading SSE and marked by buoys (lateral) or:  
The Lo-Lo/Ro-Ro jetty is approached through a channel, leading generally E between drying reefs, and marked by light-buoys (lateral).
- 5 **Caution.** The channel buoys moored in the outer part of the channel are reported liable to drag in strong winds, see also 9.8.

### Berths

#### 9.133

- 1 **Anchorage.** Sikka Creek provides sheltered anchorage in a depth of 11 m about 5 cables within the entrance between the SW side of Goos Reef and Siri Reef. Anchorage is prohibited in the creek S of Goos Reef in approaches to the Lo-Lo/Ro-Ro berth (below), as shown on the chart.
- 2 **LCB jetty,** also know as the GSCF jetty (22°27'4N, 69°47'9E) is used for the discharge of liquified ammonia and phosphoric acid. This berth is situated about 2 cables off the reef on the E side of the creek. The berth has an overall length of about 225 m handling vessels to 180 m LOA and draught 8 m. Two mooring dolphins flank each end of the central berthing face, which itself, is fronted by 3 yokohama floating fenders. The use of this berth was reported (1994) to be dangerous during the SW monsoon.
- 3 Berthing is carried out in daylight stemming the tide just prior to HW.  
**A disused jetty** stands in ruins about 5 cables SSE of the ammonia berth, its overhead ropeway to the shore ESE.
- 4 **Lo-Lo/Ro-Ro (RPL) berth** (22°28'5N, 69°50'1E) lies at the head of a jetty extending 1½ miles N from the coast at Sikka.

### Port services

#### 9.134

- 1 **Repairs:** minor repairs only.  
**Supplies:** fresh water and marine diesel oil, limited amounts only by barge or road tanker.  
**Communications:** local road and rail; airport at Jāmnagar 25 km.

### Local craft

#### 9.135

- 1 During heavy weather, and at HW, local craft pass through channels among the mangroves N of Sikka to reach Bedi Bandar (9.143), the port of Jāmnagar, about 15 miles E.

### Reliance Jāmnagar Marine Terminal

*Charts 699, 43*

### General Information

#### 9.136

- 1 **Position.** Reliance Jāmnagar Marine Terminal, which is part of the port of Sikka (9.128), comprises two SPMs in

the vicinity of 22°35'N, 69°48', located about 9 miles NNW of Sikka, and Reliance Jetty with four berths situated in the channel between Goos and Munde reefs (9.128 and 9.119), 3¼ miles N of Sikka.

- 2 **Function.** The terminal handles crude oil and petroleum products, including LPG, to and from the Jāmnagar refinery.

- 3 **Approach to SPMs.** The pilot boarding position (22°36'0N, 69°47'0E) (9.138) is approached directly from the E end of the deep water route (9.24). The SPMs, 1½ miles S and ESE, are approached directly, noting least depths of 28 m in the approach to SPM-1 (9.141).

- 4 **Approach and entry to jetty berths.** The terminal is approached directly from the E end of the deep water route (9.24) 8 miles WNW of the pilot stations (9.138). The approach from the Fairway Light-buoy (22°32'0N, 69°46'0E) (safe water) is generally ESE then SE through a channel marked by light-buoys (lateral), between Goos and Munde reefs.

- 5 **Traffic.** See details in Sikka (9.128).

**Port Authority.** See 9.128.

### Limiting Conditions

#### 9.137

- 1 **Controlling depths.** The least depth on the SPMs is 32 m, and at the berths is 13.4 m. The least depth in the channel to the berths is 13.9 m, and the minimum under keel clearance is 1.4 m, see also 9.3 and the note on depths on the chart.

**Tidal levels.** See Sikka at 9.129.

- 2 **Deepest and longest berths.** SPM-1 and Berth D.

**Maximum size of vessels handled** 350 000 dwt and 355 m LOA at the SPM-1, and 95 000 dwt and 246 m LOA at berth No 4.

### Arrival information

#### 9.138

- 1 **Port operations.** The SPMs are used for the discharge of crude oil, and the berths on the jetty handle POL, chemicals and LPG.

- 2 **Port Radio.** For details see *Admiralty List of Radio Signals Volume 6(4)*.

**Notice of ETA required.** 72, 48, 24 and 12 hours notice to be given in local time.

- 3 **Anchorage.** The VLCC anchorage is situated between 2 and 6 miles ENE of SPM-2 (9.136), as shown on the chart, in 28.5 to 36 m of water. Anchorage can also be obtained 3 miles W of SPM-1 in 36 m of water, and 3 miles SSW of

SPM-1 in the tanker anchorage in depths of 14 to 20 m, see 9.130.

- 4 **Prohibited area and anchorage.** The area surrounding the SPMs is designated an SPM working area; the port authority should be consulted about restrictions that apply in the area. In the area S and SE anchoring and fishing are prohibited; the limits of both areas are shown on the chart. Lighterage and transhipment are also undertaken in these areas.

- 5 **Submarine oil and gas pipelines** are laid between the SPMs and from the SPMs to the jetty. Anchoring and fishing are prohibited in the vicinity of these pipelines, and also within 1 mile of the pipeline leading N across the Gulf of Kachchh. See 1.11.

- 6 **Pilotage** is compulsory, and reportedly available only during daylight. Pilots for the SPMs board 1¼ miles N of SPM-1 (9.136). Pilots for the jetty berths board at Reliance Jetty pilot station, 2 miles SSW of SPM-1. For details see *Admiralty List of Radio Signals Volume 6(4)*.

**Tugs** are compulsory for berthing at Reliance Jetty.

### Harbour

#### 9.139

- 1 **General layout.** Reliance Jāmnagar Marine Terminal comprises 2 SPMs (9.136), and 4 berths on the NW side of Reliance Jetty, which lies at the N end of a trestle 2¾ miles long situated in the channel between Goos and Munde Reefs.

- 2 **Navigational aids**

Racon (22°34'3N, 69°47'3E) at SPM-1 (9.141).

Racon (22°30'6N, 69°42'0E) at Vādīnār Offshore Terminal SBM (9.121).

- 3 **Landmarks.** See 9.131.

### Directions

#### 9.140

- 1 **Buoyed channel** From the vicinity of the Fairway Light-buoy (9.136) the channel, marked by light-buoys (lateral), leads 2½ miles ESE as shown on the chart.

**Caution** – the outer buoys are liable to drag in rough weather.

- 2 **Leading lights:**

Front Light-beacon (22°29'5N, 69°50'9E).

Rear Light-beacon (22°29'3N, 69°51'1E).

- 3 From between Nos 5 and 6 Light-buoys (lateral) (22°31'2N 69°48'6E), the alignment (130°) of these lights leads 1½ miles SE through the channel, marked by light-buoys (lateral), to a turning circle of radius 240 m,



Reliance Jāmnagar Marine Terminal from NW (9.139)

(Original dated 2000)

Photograph – Captain M Reeves

3 cables NW of the jetty, with a least charted depth of 14.3 m; the banks outside the turning area are marked by light-buoys (cardinal).

### Berths

#### 9.141

- 1 SPM-1 is located in 24°34'3N, 69°47'3E, and SPM-2 1¾ miles farther NE, with depths of 32 and 30 m respectively for crude oil tankers up to 350 000 dwt. The SPMs are platforms marked by lights.
- 2 Four berths are on the NE side of Reliance Jetty, a jetty about 920 m in length, connected to a trestle leading S to Sikka. D Berth, the seaward one, is the deepest with a depth of 14.5 m and handling tankers up to 90 000 dwt. All the berths handle petroleum products and chemicals, and, additionally, LPG at A Berth. Each berth is 27 metres in length plus 4 breasting dolphins, all fendered, with additional mooring dolphins, marked by lights at A and D Berths.
- 3 Two mooring buoys lie 5 cables ESE of the jetty.

### Port Services

#### 9.142

- 1 **Supplies.** Fresh water, fuel, provisions and repairs are available.

### Bedi Bandar Port and Rozi Anchorage

*Charts 673 plan of Rozi Anchorage, 43*

#### General information

#### 9.143

- 1 **Position.** Bedi Bandar (22°31'N, 70°02'E) is situated some 3 miles inland on the W bank of Bedi Bandar Creek and about 4½ miles NW of the city of Jāmnagar.
- Function.** Bedi Bandar is the port for Jāmnagar, the headquarters of Jāmnagar District. Principal exports are salt, cattle feed, rice and soya beans; the main imports include dates, fertiliser, rock phosphate and grain.
- 2 **Topography.** Chhād (22°34'N, 69°59'E) and Jindra Bet, adjoining ENE, consist of sand and mud flats intersected by creeks and fringed with mangroves extending SE to Bedi Bandar Creek (see below); there is a prominent sandspit along the NE face of Jindra Bet. Rozi Island (22°32'N, 70°03'E), situated on the E side of Bedi Bandar Creek, is rocky and about 11 m high. East of Rozi Island the coast consists of sand and mud flats extending about 3 miles offshore, it is intersected by creeks and fringed with mangroves.
- 3 **Bedi Bandar Creek** enters the Gulf of Kachchh between the head of Rozi Jetty (22°33'9N, 70°02'4E) and a beacon (white masonry) standing 2¾ cables NNW. The creek dries S of the entrance but at HW tugs, boats and lighters can navigate the creek to a position beyond Bedi Bandar.

**Approach and entry.** The port is entered through Bedi Bandar Creek; but cargo is worked by lighters, as the tide permits, to and from Rozi Anchorage (9.145) 5 miles NNE.

- 4 **Traffic.** In 2003, the anchorage was used by 138 vessels with a total dwt of 3 238 396.

**Port authority.** Port Officer, Bedi Port, Jāmnagar 361 002, Gujarat State.

### Limiting conditions

#### 9.144

- 1 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. Rozi mean spring range about 5.5 m; mean neap range about 3.0 m.
- Density of water** at the anchorage is 1.025 g/cm<sup>3</sup>.

- 2 **Local weather.** The port is adversely effected by the monsoon, particularly in the afternoons, when strong winds and a heavy swell are likely to occur. West winds prevail from February to October.

### Port operations

#### 9.145

- 1 **Port operations.** The port is an all-weather lighterage port which is open all the year round; however, delays to lighterage operations must be expected during periods of inclement weather.
- Port radio.** There is a port radio station at Bedi Bandar. For details see *Admiralty List of Radio Signals Volume 6(4)*.
- 2 **Outer anchorage.** A large vessel, with cargo for Bedi Bandar, may anchor 1½ miles N of Kalvan Light-beacon (22°35'6N, 70°02'7E) (9.148) in depths of about 14 m as shown on the chart. For details of the small vessel anchorage see 9.149.
- 3 **Pilotage.** Pilots are available between Pirothan Island (22°36'0N, 69°57'5E) and the anchorages off Kalvan Light-beacon. For details see *Admiralty List of Radio Signals Volume 6(4)*.
- 4 **Requirement for local knowledge.** Much of the ground off Rozi is rocky or shallow with numerous unmarked dangerous wrecks and dangers lying in the offing; local knowledge is necessary before making an approach to the anchorages.

### Harbour

#### 9.146

- 1 **General layout.** From close W of Rozi Jetty, Bedi Bandar Creek leads 3 miles generally S to the lighter quays at Bedi Bandar.
- 2 **Storm signals** are displayed near Rozi Māta Temple (22°31'5N, 70°02'7E); the general system is used. See 1.45.
- 3 **Principal marks:**
  - Four radio towers (22°32'3N, 70°03'0E) stand near the centre of Rozi Island.
  - Water tower (22°31'8N, 70°03'1E), with another water tower located nearby and 2 flagstaffs standing about 3 cables SW.

### Directions

#### 9.147

- 1 If approaching Rozi Island from W do not alter course until Kalvan Light-beacon bears 185°, thereby avoiding Ranson Shoal (22°37'2N, 70°02'4E) and the dangers which extend offshore between Pirothan Island and Rozi Island (6 miles SE).
- 2 When approaching or leaving the anchorages, vessels should pass N of Ranson Shoal taking care to avoid the shoal water extending about 5 cables ESE of it; also passing well clear of the numerous charted wrecks and areas of foul ground that lie in this vicinity.

### Useful marks

#### 9.148

- 1 Kalvan Light (pole, 4 m in height) (22°35'6N, 70°02'7E) stands on a detached reef.
- Bedi Bandar Light (white metal framework tower, 12 m in height) (22°33'0N, 70°01'9E) stands among the mangroves 1 mile SSW of Rozi Island Jetty (9.149).
- 2 Stranded wreck (22°35'4N, 70°03'6E).
- Two Radio Masts (elevation 37 m) (22°29'7N, 70°02'6E).



Kota Tower (elevation 51 m) (round structure) (22°27'6N, 70°04'2E) stands on the W side of a fort at Jāmnagar.

Pratap Clock Tower (22°28'6N, 70°03'4E) stands close NNW of Jāmnagar.

- 3 A lattice mast and a flagstaff (both not charted) stand on Bada Bela (22°33'N, 70°00'E).

## Berths

### 9.149

- 1 **Anchorage.** Small craft may anchor 5 cables NE of Kalvan Light-beacon in depths of about 6 m, mud, as shown on the chart; the anchorage is well sheltered from W winds.
- 2 **Mooring buoy.** There is a white mooring buoy located 8 cables SE of Kalvan Light-beacon in a depth of about 3 m.
- 3 **Rozi Island Jetty.** N of Rozi Island a jetty, about 200 m wide, extends about 800 m NE from the head of a pier which projects 5 cables NNW from the coast.
- 4 **Bedi Bandar Creek lighter berths.** There are lighter quays near the mouth of the creek in the vicinity of Rozi Island. At Bedi Bandar a basin, which dries at half tide, provides 3050 m of lighter berths and a cargo wharf 335 m long.

## Port services

### 9.150

- 1 **Repairs:** there is a small dry dock length 70.1 m, width 13.4 m, depth on sill at MHWS 2.65 m which is used for port craft.
- Other facilities:** hospital at Jāmnagar; salvage tug; lighters and tugs.
- Supplies:** limited provisions; fresh water by barge.
- 2 **Communications:** rail; air to Mumbai.

## Coastal anchorages, creeks and towns

*Charts 3466, 43*

### Māshuri Creek

#### 9.151

- 1 Māshuri Creek (22°34'0N, 69°55'5E) lies on the E side of Dide ka Bet and enters the gulf 2½ miles N. Anchorage may be found by small craft in depths of about 8 m, mud, near the mouth of the creek. It would be unwise to enter the creek until about 2 hours after HW, at which time the edge of the reef dries; some rocky patches lie about 7½ cables within its entrance. Local knowledge is required before using this anchorage.

### Sachāna

#### 9.152

- 1 **General information.** Sachāna (22°34'N, 70°11'E) is a coastal town with a ship-breaking industry, vessels awaiting beaching are anchored in Bālāchadi Roads, 4½ miles NNW.

### Bālāchadi

#### 9.153

- 1 **General information.** Bālāchadi (22°36'N, 70°13'E) is a small village situated at the head of a creek from which a range of hills, attaining an elevation of 30 m, runs 1½ miles SE whence the hills end abruptly. A rock which dries 3 m lies off a cove in the creek.
- 2 **Anchorage.** A vessel may anchor in Bālāchadi Roads, about ¾ miles NW of Āku Pīr, in depths from 5.5 to 9.0 m, soft mud; the anchorage is protected from N by Bālāchadi Rocks (9.119).

- 3 The anchorage is approached with Āku Pīr bearing 120° and anchoring on that bearing according to draught.

#### Useful mark:

Āku Pīr (22°36'6N, 70°12'4E) stands on a small conical hill near the N entrance point of the creek, it is detached from the mainland and isolated at HW; a small range of rocky mounds front the coast in this vicinity, they are isolated at HW springs.

### Jodiya

#### 9.154

- 1 **Position.** The town at Jodiya is situated about 2 miles inland E of Dābar Creek (22°42'N, 70°16'E); Jodiya Bandar is situated 2 miles NW of the town.

**Jodiya Creek** is entered among mangroves on the W side of Jodiya Bandar.

- 2 **Directions.** Small craft can enter Jodiya Creek, but only after the time of half in-going stream if exceeding 1.8 m draught; local knowledge is required before entering the creek.

#### Useful marks:

Jodiya Bandar Light (framework tower, 30 m in height) (22°43'5N, 70°16'8E) stands at the N end of the quay wall.

- 4 Jodiya Fort (NW bastion 24 m high) (22°42'N, 70°18'E) stands in the town; Durbar House, stands close SE of the fort. These features, which may be seen from a distance of about 12 miles in clear weather, serve to identify the place unmistakably.

### Mungra Reef Anchorage

#### 9.155

- 1 **General information.** Anchorage may be obtained 1½ miles S of Mungra Reef Light-tower (22°45'5N, 70°11'1E) (9.120) in a depth of about 5.5 m, mud; as shown on the chart.

## KANDLA APPROACHES AND HARBOUR

### General information

*Chart 3466*

#### Position

##### 9.156

- 1 Kandla (23°02'N, 70°13'E) is situated on the W bank of Kandla Creek, on the N side of the Gulf of Kachchh near its head. Kandla Creek extends N from its entrance between Khengarji Bet (22°57'N, 70°10'E) (9.158) and Sathsaida Bet to the E.

#### Function

##### 9.157

- 1 Kandla is the most important port in the Gulf of Kachchh.

General cargo vessels, container ships and tankers use the port. The principal exports are salt, iron, steel, food grains and molasses; the main imports include LPG, fuel oils, edible oils, grain, fertiliser, sulphur, iron, steel, sugar, metal products and other general cargoes.

#### Topography

##### 9.158

- 1 Khengarji Bet and Sathsaida Bet forming, respectively, the W and E sides of the entrance to Kandla Creek are both typical rann ground of hard mud flats; they are described below. Both sides of Kandla Creek are protected by steep mangrove lined banks which are just covered at HW springs.



2 Khengarji Bet is a large island that separates Kandla and Nakti (9.199) creeks; it is partially below-water at HW springs and in places at HW neaps. Although there are a few small narrow ridges of sand near its S end the island appears from seaward to be covered with mangroves; it is intersected by numerous small creeks with mangrove bushes lining their banks. Khorī Creek forms the NE side of the island; off its S side the coastal reef, which dries, is itself fronted by an extensive shoal area.

3 Sathsaida Bet is fronted, along much of its S side, by low narrow ridges of coarse sand. Flamingo Flat, an extensive mud bank, extends up to about 1½ miles from the SW side of Sathsaida Bet.

### Piracy

#### 9.159

1 Prior to 2001 many incidents of piracy and armed robbery were reported by vessels in the Kandla area. For possible preventative measures see 1.56.

### Port limits

#### 9.160

1 The port limits extend about 50 miles SW of Kandla and include the Vādīnār Offshore Terminal (9.121); they are shown on Chart 43.

### Approach and entry

#### 9.161

1 Kandla is approached from SW via Sogal Channel, which has been dredged across Kandla Bar, and then entered through Kandla Creek.

### Traffic

#### 9.162

1 In 2003 the port was used by 1101 vessels with a total dwt of 21 368 479.

### Port authority

#### 9.163

1 Kandla Port Trust, Administrative Building, PO Box 50, Gandhidham-Kutch 370 201.

## Limiting conditions

### Controlling depths

#### 9.164

1 **Approach channel.** Depths in Sogal Channel and in the approaches to Kandla Creek are maintained by dredging, but the channel is subject to silting. Minimum charted depths (1995) were in the order of 5.3 m; however, Singhvi Shoal (9.185), encroaches into the channel and a depth of 4.3 m was reported (1994) over the bar.

2 **Caution.** Surveys conducted during 1998 and 1999 on either side of Sogal Channel, including Singhvi Shoal, Mid Shoal (9.179), Kala Dara Shoals (9.185), and Kapoor Shoal (9.210) showed less water than charted; also for the possible effects on depths by an earthquake see 9.3.

3 The latest information should be obtained from the Deputy Conservator at Kandla before entering the channel.

**Harbour.** Depths within Kandla Creek are very irregular and liable to change.

### Navigational aids

#### 9.165

1 **Caution.** The channels in this area are subject to frequent change and the buoyage and other aids to navigation are adjusted accordingly. For the latest information the mariner should consult the port authority, see 9.172. In addition, certain aids to navigation are

reported to be unreliable and maybe missing, unlit or out of position. Mariners are advised to navigate with caution.

### Deepest and longest berth

#### 9.166

1 Cargo Jetty (9.190).

### Tidal levels

#### 9.167

1 See information in *Admiralty Tide Tables Volume 3*. Mean spring range about 5.9 m; mean neap range about 3.9 m.

### Density of water

#### 9.168

1 Density of water is normally 1.025 g/cm<sup>3</sup> at Kandla berths, but it reduces to 1.000 g/cm<sup>3</sup> during the rainy season.

### Maximum size of vessel handled

#### 9.169

1 Vessels up to 225 m in length and drawing up to 9.2 m at HW neaps or up to 10.1 m at HW springs can use the port. The maximum permitted length for tankers is 213 m; draught depends upon the depth over the bar.

Maximum permissible draughts are issued quarterly by the Deputy Conservator.

2 It is reported that a vessel of LOA 223 m and draught 13.2 m has used the port.

### Local weather and sea state

#### 9.170

1 The approaches to the port are exposed to the SW monsoon and a heavy swell may be experienced.

In June 1998 the port was virtually isolated after a cyclone swept through the area, waves up to 10 m high were experienced and several vessels either capsized or dragged their anchors and at least one ran aground.

## Arrival information

### Port operations

#### 9.171

1 The port is open for day and night navigation but local conditions restrict the movement of some vessels, for details see 9.176.

### Port radio

#### 9.172

1 There is a port radio station, for details see *Admiralty List of Radio Signals Volume 6(4)*.

### Notice of ETA required

#### 9.173

1 Vessels should keep agents closely advised of ETA at the pilot station, which should preferably be about 2½ hours before daylight HW.

2 For details see *Admiralty List of Radio Signals Volume 6(4)*.

### Outer anchorage

#### 9.174

1 Vessels awaiting a pilot anchor SW of the Outer Tuna Light-buoy (22°50'8N, 70°06'9E) (9.185) in depths of 10 to 12 m, mud and sand; the holding ground is reported to be good but a large swell can be experienced during the SW monsoon.

The quarantine anchorage is situated about 1 mile S of Outer Tuna Light-buoy.

## Pilots and tugs

### 9.175

- 1 **Pilotage** is compulsory for merchant vessels; the pilot boarding place (22°50'·5N, 70°05'·8E) is situated 1 mile WSW of Outer Tuna buoy. Requests for pilots should be sent by the ship's agent 12 hours in advance.

- 2 Vessels should arrive at the outer anchorage to await a pilot 2½ hours, or more, before the time of daylight HW; it takes about 1½ hours to reach Kandla, hence, it is advisable to leave this anchorage just after half flood tide.

For details see *Admiralty List of Radio Signals Volume 6(4)*.

- 3 **Tugs** are available, they join vessels inside Kandla Creek near the berth; ship's wires are used.

## Regulations concerning entry

### 9.176

- 1 **General regulations.** The port is open for day and night navigation allowing vessels to berth or unberth at HW. Vessels berthed at mooring buoys may only berth or unberth in daylight.

- 2 Tankers or vessels with LOA exceeding 189 m, or of draught more than 8·2 m, or having a speed capability of less than 9 kn may not enter or leave the port during darkness. Movement of tankers is also governed by the requirement to transit Sogal Channel bar in daylight.

- 3 Loaded vessels may cross the bar only at HW; a forecast for draught limits to cross the bar is issued by the Port Trust.

## Registration

### 9.177

- 1 When the port is congested a registration scheme is operated whereby a vessel, having anchored in the outer anchorage, may register her arrival and will be informed of the date on which a berth will be available; the vessel may then proceed to other ports, returning by this date.

## Quarantine

### 9.178

- 1 Requests for pratique should be sent to the Port Health Officer, Kandla, addressed "Sandgrodh Kandla" using the standard message from *The International Code of Signals*. In addition the following information should be given in plain language:

- 2 Whether there has been any abnormal mortality of rats or mice.

Whether there are any monkeys onboard.

Whether the vessel has called at Djibouti or Aden and whether any persons were embarked there.

Names of all ports called at during the preceding 30 days, with dates of departure.

- 3 On anchoring in the outer anchorage, vessels should send a further message stating time of anchoring and requesting radio pratique.

Vessels subject to quarantine must remain at the Quarantine Anchorage (9.174) until pratique is granted; however, vessels with suspect cases of minor infectious disease may be berthed suitably in the harbour.

- 4 The pilot is authorized to grant pratique.

## Harbour

## General information and layout

### 9.179

- 1 Sogal Channel, named after Satyanarayana Sogal an hydraulic engineer who solved an acute siltation problem which facilitated the opening of this channel in 1984. The

channel leads NE towards Kandla Creek from the fairway buoy and lies between Khengarji Bet and Singhvi Shoal, on the N side and Kala Dara Shoal and Mid Shoal, on the S side; the channel is maintained by dredging.

- 2 Within the harbour, the alongside berths are located on the W side of Kandla Creek; there are a number of mooring buoys and anchorage areas within the creek.

## Spoil grounds

### 9.180

- 1 Two spoil grounds are established, each about 4 cables SE of the lead through Sogal Channel; they are marked by light-buoys (special) moored, respectively, 4 and 1½ miles SW of Beacon C (22°57'·6N, 70°16'·0E).

## Depths and seabed

### 9.181

- 1 Depths within Kandla Creek, except near the banks, are generally deeper than those in the approach channel; the exception being Barry Shoal (23°01'·4N, 70°13'·5E) which lies near the centre of the channel close SSE of the oil jetties, see also 9.3.

- 2 The bottom within the creek is coarse sand, small stones and broken shell, save in depths of less than 5 m where mud is usually found.

## Signals

### 9.182

- 1 **Traffic signals.** A signal station is situated near the port radar tower (23°00'·5N, 70°13'·4E) (9.187). A black ball at the signal station indicates that a vessel is about to enter or leave the port. Other signals in use at the port are contained in the *Kandla Port Rules*, a copy of which can be obtained from the Kandla Port Trust Offices.

- 2 **Storm signals** are displayed; the general system is used. See 1.45.

## Tidal streams

### 9.183

- 1 **Approaches.** Tidal streams in the W approach to Kandla are in general very irregular and seem to be much influenced by a strong wind from any quarter. At Outer Tuna Light-buoy the streams have a rate of 2½ kn at springs and 1½ kn at neaps but these rates gradually increase farther E; on Kandla Bar the in-going stream sets NE at a rate of 2 to 3 kn at springs.

- 2 **Harbour.** Within Kandla Creek the maximum rate of the in-going stream at springs is 3 to 4 kn.

## Principal marks

### 9.184

- 1 **Landmark:**

Dharamsala tower (23°01'·8N, 70°13'·1E).

- 2 **Major light:**

Tekra Light (22°55'·6N, 70°07'·2E) (9.117).

## Directions

(continued from 9.120)

### 9.185

- 1 **Caution.** Some of the buoys and lights, in the approaches to Kandla, may not conform to the descriptions and positions given below or as shown on the chart.

- 2 **Sogal Channel** is marked by light-buoys (lateral) as shown on the chart. The light-buoys are moved frequently to meet changes in the channel, see 9.165.

- 3 **Sathsaida Leading Lights:**

Front light (22°57'·8N, 70°16'·0E) is exhibited from a position close NE of Beacon C.

Rear light (889 m NE of the front light).

4 From the vicinity of Outer Tuna Light-buoy (safe water) (22°50'·8N, 70°06'·9E) the track leads about 9 miles on the alignment (050½°) of these lights. This leads through the outer part of Sogal Channel to the vicinity of Nos 8a and 9a Light-buoys, passing the pilot boarding station at No 2 Light-buoy (port hand) NW of Kala Dara Shoal (22°53'·5N, 70°13'·0E), an extensive shoal which dries 2·4 m, and Mid Shoal, which dries 0·7 m, lying close N of the NE extremity of Kala Dara Shoal. In 2003, it was reported that Kala Dara Shoal has shifted appreciably towards NW and changes in depths have been observed in the area.

5 **Kandla Creek Approach Lights.** Two front lights, which share a common rear light, stand NNW of Sathsaida Leading Lights:

6 Front light (triangle on a white metal framework tower with black bands, 5 m in height) (788 m SW of rear light, described below).

Rear light (similar structure to above front light, 11 m in height) (22°58'·6N, 70°16'·0E).

Front light (elevation 8 m) (770 m SW of rear light), is exhibited from a position close NW of the first front light.

7 The alignment (035½° and 037½°) these lights, which are reported to indicate the SE and NW limits, respectively, of the channel, lead across the outer part of the inner bar between Singhvi Shoal (22°56'·3N, 70°13'·8E) and Kandla Bar, 8 cables ESE. However, it should be noted that the charted recommended track leads on the alignment (035½°), the reported SE limit of the channel. Thereafter the charted recommended track leads NNW and into relatively deeper water at the entrance to Kandla Creek.

## Kandla Creek

### 9.186

#### 1 Cautions:

Less water than charted has been reported in the harbour, see also 9.3.

Uncharted and unlit mooring buoys may be encountered in the harbour.

2 **General information.** Kandla Creek is marked by light-buoys (lateral); see also IALA Maritime Buoyage System (Region A) note on chart. The light-buoys are moved frequently to meet changes in the channel, see 9.165.

The recommended tracks for entering or leaving harbour are shown on the chart.

3 **Berthing** should be conducted into the tidal stream.

## Useful marks

### 9.187

#### 1 Approach beacons:

Beacon H (black, diamond topmark) (22°57'·0N, 70°09'·9E) stands about 6 cables N of the S point of Khengarji Bet.

Beacon A (black, cone topmark point up) (22°57'·7N, 70°12'·9E) stands towards the SE end of Khengarji Bet.

2 Beacon B (black, ball topmark) (22°58'·7N, 70°14'·6E) stands on the E bank of Kandla Creek, just within its entrance.

Beacon C (black, cone topmark point down) (22°57'·6N, 70°16'·0E) stands near the SW point of Sathsaida Bet.

3 There are other beacons in the approaches and several in the vicinity of the entrance to the creek, as shown on the chart.

4 **Harbour marks** (positioned from the radar mast described below):

5 Radar mast (23°00'·5N, 70°13'·4E) stands on the W bank of the creek at the E end of the Port and Customs Office.

Water tower (elevation 23 m) (5½ cables S).

Water tower (elevation 25 m) (5¾ cables WNW).

Water tower (elevation 15 m) (1·6 miles NNW).

Water tower (elevation 25 m) (1·4 miles N).

Chimney (elevation 45 m) (1·5 miles N).

6 There are numerous beacons standing on the E bank of the creek, and light-beacons on the W bank, as shown on the chart.

## Basins and berths

### Anchorage

#### 9.188

1 **General anchorage areas.** Anchorage in Kandla Creek may be found in the deeper water near the W shore between a position about 5 cables within the entrance and abreast the middle of Cargo Jetty (23°00'·0N, 70°13'·4E). Farther N, the anchorages are nearer the E shore, from abreast No 3 Oil Jetty (23°01'·5N, 70°13'·4E) to a charted anchorage, 7 cables N; the latter anchorage is situated in a depth of about 8 m, coarse sand with small stones and broken shell. There are other recommended anchorages in the creek, the positions of which are shown on the chart. None of the anchorages are numbered.

2 **General information.** Ships at anchor should give consideration to the use of a second anchor, laid at short stay, to steady the vessel when required; if used, the second anchor should be hove up 30 minutes before the change of tide and let go when the vessel has settled to the new stream.

### Moorings

#### 9.189

1 There are numerous numbered and unnumbered mooring buoys within the creek; the positions of known buoys are shown on the chart.

2 The mooring buoy located abreast the S end of Cargo Jetty is used by deep draught vessels waiting to berth.

### Alongside berths

#### 9.190

1 **Cargo Jetty.** This jetty is located about 2 miles within the creek on the W side, and has a total quayside of about 1700 m which provides six berths for general cargo vessels, each with a designed depth of 9·8 m alongside at MLWS; a seventh berth, with a depth of 10·0 m alongside, for container operations was reported available in 1993. A further berth, about 250 m long, was under construction in 1994 at the S end of the jetty.

2 The maximum permitted size for vessels using Cargo Jetty is length 225·5 m and draught 9·1 m.

3 **Tanker berths.** An oil jetty, situated on the W side of the creek about 1½ miles N of the N end of Cargo Jetty, has POL, vegetable oil and chemical facilities; there are two berths at this double jetty, No 1 (the N berth) and No 2 (lying close S) joined by dolphins and a walkway. Each berth is suitable for tankers up to 40 000 dwt, 213 m in length and draught of 10·3 m. Another oil jetty, No 3 Berth, which can accommodate a vessel of similar size, lies 2 cables S of No 2 Berth.

**Developments.** It was reported (1999) that there were a further 4 berths on the W bank within 6 cables N of Oil Jetty No 1, and (2001) that Oil Jetty No 1 had been re-numbered No 3, and Oil Jetty No 3 changed to No 1.



**Tidal basin****9.191**

- 1 A tidal basin, situated about 2 cables N of the N end of Cargo Jetty, is used for the loading or discharge of lighters and sailing vessels.

**Bandar Basin****9.192**

- 1 Bandar Basin, which dries, lies close N of the tidal basin and comprises three wharves; the N wharf is used by sailing vessels, the S wharf is for lighter operations and the W wharf is reserved for small craft with general cargo.

**Maintenance Jetty****9.193**

- 1 Maintenance Jetty is an L-shaped jetty situated close N of Bandar Basin; a floating dock is moored on its outer face.

**Port services****Repairs****9.194**

- 1 Minor repairs can be effected; divers can be arranged. There are two floating docks; the largest, length 111.0 m, width 27.2 m with a reported lifting capacity of 2700 tonnes, can accommodate vessels up to 100 m in length and draught 4.5 m.

**Other facilities****9.195**

- 1 De-ratting exemption certificates; hospitals, local and at Bhuj, 51 km NW; covered storage; fire fighting arrangements.

**Supplies****9.196**

- 1 Fresh water at berths and by barge; fuel and diesel oils; fresh provisions.

**Communications****9.197**

- 1 National road; local rail; airport, 13 km NW.

**Harbour regulations****9.198**

- 1 **Security regulations.** Kandla lies in a controlled area where special security regulations are in force; photography of shore installations is forbidden.

**Nakti Creek**

*Chart 3466*

**9.199**

- 1 **General information.** Nakti Creek (22°57'N, 70°08'E) is almost silted up and can only be used by small local craft proceeding to Tuna Bandar, which is situated on the W bank 3 miles within the entrance, where there is a fort.
- 2 **Topography.** The W entrance point of the creek is very low and covered with mangrove bushes which are nearly submerged at HW. Tekra Islet, lying in the creek abreast Tuna Bandar, is a mud islet covered with mangroves.
- 3 **Directions.** The channel leading to Tuna Bandar is marked by leading beacons, as shown on the chart; local knowledge of the channel is required before an approach is made.

**HANSTHAL CREEK****General information**

*Charts 672, 3466, 43 and 707*

**Description****9.200**

- 1 **Hansthal Creek** (22°56'N, 70°23'E) is the largest salt water creek, that penetrates into The Little Rann (9.201), at the head of the Gulf of Kachchh. The creek leads NE for about 4 miles from its entrance, which lies, between Sathsaida Bet to the N and the Saurashtra Coast to the S; the width of the creek has doubled by erosion this century and is now (1997) about 2 miles wide at its entrance.
- 2 Numerous small creeks empty into Hansthal Creek, as shown on the chart; the port of Navlakhi (22°58'N, 70°27'E) (9.213) is situated on Navlakhi Bet, which lies between two of these creeks, on the E bank.
- 3 Above Navlakhi Bet, Hansthal Creek is navigable by moderate-sized boats for 6 or 7 miles, but as the mangroves cease after 2 or 3 miles, there is only the ripple of water in the deeper channel to indicate the fairway.

**9.201**

- 1 **The Little Rann**, an extensive salt marsh ENE of the head of the Gulf of Kachchh is dry from November to February during the NE monsoon; but the SW monsoon drives the sea many miles to the E and the marsh becomes an impassable inland sea which is drained by Nakti (9.199), Kandla (9.156) and Hansthal Creeks.

**Topography****9.202**

- 1 From the vicinity of the E end of Mungra Reef (22°47'N, 70°15'E) a rann, resembling The Little Rann, lies on the S shore of the Gulf of Kachchh. Its ordinary HW mark extends NE to the mouth of Hansthal Creek; during the SW monsoon this rann covers to a depth of about 1.2 m but at other times it dries. NE of the rann the Saurashtra Coast is fringed, in ridges, with coarse sand and broken shell from 0.3 to 0.9 m high; its coastal bank dries in places.
- 2 The N coast of Hansthal Creek is fronted by an extension E of Flamingo Flat (9.158) which dries. Murga Bet, which lies off the E side of Hansthal Creek towards its NE end, consists of several islets covered with mangroves; on the W side, about 8 miles from the entrance, there is a large expanse of level ground which is flooded at HW.

**Depths****9.203**

- 1 Depths in Hansthal Creek vary considerably and the irregular-shaped depth contours provide little aid to navigation, see also 9.3.

**Pilotage****9.204**

- 1 Pilotage for Hansthal Creek is not compulsory, but if required, an experienced local guide can be embarked, see 9.215.

**Quarantine****9.205**

- 1 Kandla Port Health Officer customarily boards at the pilot boarding place and grants pratique.

**Local knowledge****9.206**

- 1 Shifting shoals in the approaches, within its entrance and at the head of Hansthal Creek makes local knowledge necessary before an entry is attempted.



## Anchorage

### 9.207

- 1 **Outer anchorage.** The anchorage, NE of Pirothan Island Offshore NE Light (9.120), is situated at 22°44'N, 70°05'E as shown on the chart.

Holding ground in Hansthal Creek is mostly bad with rock close under mud; thus, with the strong tidal streams a vessel will easily drag. For details of anchorages off Navlakhi see 9.217.

## Tidal streams

### 9.208

- 1 In the outer approaches to Hansthal Creek the tidal streams are in general very irregular and appear to be much influenced by a strong wind from any quarter; however, the rate gradually increases as the creek is approached.
- 2 At the entrance to the creek, because of the large area which covers and uncovers, the out-going stream attains a rate of from 6 to 7 kn and flows for about 8 hours; the in-going stream flows for only about 4 hours.
- 3 Within the creek, in places where the channel is from 1 to 1½ miles wide, the in-going and out-going streams attain a rate of 5 kn; during occasional freshets this rate may increase to 7 kn.

## Tidal levels

### 9.209

- 1 Tidal levels. See information in *Admiralty Tide Tables Volume 3*. Mean spring range about 5.4 m; mean neap range about 3.1 m.

## Directions

(continue from 9.120)

### 9.210

#### 1 **Cautions:**

The coastline in Hansthal Creek and in the approaches to Navlakhi (22°58'N, 70°27'E) is liable to change; mariners are advised to exercise caution when using radar ranges.

- 2 The navigational buoys moored in Hansthal Creek are moved as required to conform with the frequent depth changes that occur, see also 9.8. These buoys follow the obsolete Uniform System of Buoyage.

Vessels bound for Hansthal Creek should, if required, embark a pilot in the Navlakhi Port outer anchorage area (22°44'N, 70°05'E).

- 3 From a position SSE of Outer Tuna Light-buoy (9.185) the route leads about 10 miles ENE to a position S of Singare Shoal, passing, (with positions from Singare Shoal (22°54'·5N, 70°18'·0E)):
    - 4 NNW of Mungra Reef (15 miles NE), a reef with a heap of sand and shells about 7½ cables within the W extremity which, being the first part to dry, serves to identify the position of the reef, and: SSE of Kala Dara Shoal (9.185) (4½ miles W), thence;
    - 5 SSE of Kapoor Shoal (4 miles WSW), with a least depth of 4.7 m over it, thence;
- Clear of a shoal patch, lying in mid channel, with a depth of 4.9 m over it (3½ miles WSW); Navlakhi Buoy is moored 4½ cables ENE of the shoal patch, thence:

- 6 NNW of No 1 buoy (starboard hand) (2 miles WSW) moored off the N side of Baptista Shoals; these shoals, which dry and extend 2½ miles ENE/WSW, consist of ridges and pinnacles of coarse sand, small stones and broken shells, thence;

- 7 To a position S of Singare Shoal, noting the isolated shoal patches which lie close E of the latter shoal. Thence, the channel which is buoyed on both sides, should be followed into the creek and to the anchorages off Navlakhi see 9.217.

## Useful marks

### 9.211

- 1 Beacon D (black structure, diamond topmark) (22°56'·2N, 70°19'·8E).  
Beacon F (black structure, ball topmark) (22°56'·7N, 70°23'·2E).  
Stranded wreck (22°57'·2N, 70°24'·1E).
- 2 Moti Pātar Creek Light (Guduba Creek Light) (white triangle on red metal framework tower, elevation 12 m) (22°55'·4N, 70°25'·5E), stands on the mangrove island on the WSW side of the creek.

## Other names

### 9.212

- 1 Cutchi Kari (22°59'N, 70°24'E), a creek; not charted.  
Halai Kari (22°57'N, 70°28'E), a creek; not charted.

## Navlakhi

*Charts 672 and 43*

## General information

### 9.213

- 1 **Position.** Navlakhi Port (22°58'N, 70°27'E) is situated on the island of Navlakhi Bet, lying between the Sui (9.219) and Varsāmedi Creeks which flow into the E side of Hansthal Creek.
- 2 **Function.** A small port with an open roadstead anchorage. The main exports are salt and soya bean extractions; chief imports are fertilisers, sulphur and flour; 363 563 tonnes of cargo were handled in 1992.
- 3 **Approach and entry.** Lighters and small craft approach the port area through a buoyed channel.
- 4 **Traffic.** In 2003, the port was used by 22 vessels with a total dwt of 896 452.
- 5 **Port authority.** Port Officer, Gujarat Maritime Board, Navlakhi 363 680.

## Limiting conditions

### 9.214

- 1 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. Mean spring range about 6.4 m; mean neap range about 4.1 m.  
**Density of water** is reported to vary between 1.009 and 1.034 g/cm³.
- 2 **Maximum size of vessel** to have used the anchorage is 24 364 dwt and 203 m LOA.

## Arrival information

### 9.215

- 1 **Port operations.** Navlakhi is an all weather port where cargo is handled by lighters to and from ships at the anchorage; there is no night navigation.
- 2 **Port radio.** There is a port radio station, for details see *Admiralty List of Radio Signals Volume 6(4)*.
- 3 **Pilotage** is not compulsory but if required an experienced local pilot can be provided by the Port

Authority; in such cases, the pilot will normally board in the outer anchorage (22°44'N, 70°05'E).

- 4 Night pilotage is not available and generally movements take place around daylight HW; therefore, arrival at the pilot station should be 3 hours before HW.

- 2 **Requirement for local knowledge.** For details of local knowledge requirements see 9.206.

## Harbour

### 9.216

- 1 **Description.** The port area comprises a railway station and buildings connected with the operation of the port.

**Storm signals** are displayed at Navlakhi; the general system is used. See 1.45.

- 2 **Landmark:**

Navlakhi Bet Lighthouse (white framework tower, orange bands, 24 m in height) (22°57'·6N, 70°26'·7E) stands at the NW end of the island.

- 3 **Other navigational aid:**

Racon at Naviakhi Light.

See *Admiralty List of Radio Signals Volume 2* for details.

## Berths

### 9.217

- 1 **Anchorage.** In good weather, two vessels can anchor in the anchorage located 2¼ miles WSW of Navlakhi Bet Light, in depths of about 9 m, as shown on the chart; the holding ground here is fairly good and the sets of the tidal stream are comparatively steady. If a third vessel arrives off

the port, anchorage may be found in the vicinity of No 5 Buoy moored about 3½ miles SW of the light; for further details see 9.207.

- 2 Small vessels may anchor, according to draught, W of the port but cross currents from Sui and Varsāmedi Creeks cause severe yawing and bring great strain on their anchor cables.

- 3 **Wharves and jetties.** Lighter wharves and jetties are situated in Sui and Varsāmedi Creeks; there is a passenger landing jetty in Sui Creek.

## Port services

### 9.218

- 1 **Repairs:** minor repairs can be effected.

There is a small dry dock length 30 m, width 23 m, depth on sill at MHWS 3·21 m; also a slipway, length 91·45 m, cradle 25·00 m and gridiron, length 24·50 m. Normally all facilities utilised for local harbour craft.

- 2 **Other facilities:** limited medical; covered storage; lighters and tugs.

**Supplies:** limited provisions; limited fresh water by barge.

**Communications:** ferry daily to Kandla; airport 35 km NW.

## Small craft

### 9.219

- 1 Sui Creek, which lies S of Navlakhi Bet (22°58'N, 70°27'E), is navigable by vessels of about 2·7 m draught for approximately 4 miles; but farther E it becomes a ditch.

## COAST OF KACHCHH—KHĀROD NADI TO SIR MOUTH

### KHĀROD NADI TO SIR MOUTH

#### General information

*Charts 43, 39*

#### Route

##### 9.220

- 1 From a position SSW of the mouth of Khārod Nadi (22°50'N, 69°14'E) the route leads about 92 miles WNW to a position SSW of Sir Mouth.

#### Topography

##### 9.221

- 1 Between Khārod Nadi and the entrance to Godia Creek, 44 miles WNW, the coast of the Kachchh District is low and fronted by a narrow sandy ridge about 9 m high. Several small rivers enter the sea along this stretch of coast and, except for a large swamp 28 miles WNW of the entrance to Khārod Nadi, there are many villages standing on well cultivated land.
- 2 From the entrance of Godia Creek to the E bank of Kori Creek, 15 miles NW, the coast is low and much indented with creeks, the mouths of which are shallow and can only be used by boats; a shallow coastal bank extends up to about 9 miles offshore in places.

#### Depths

##### 9.222

- 1 With the exception of Lushington Shoal (22°38'N, 68°47'E) (9.4) and a shoal patch with a depth of 9·5 m over it, reported in 1985, to lie in position 23°00'·5N, 68°23'·0E, there are no known dangers off this stretch of coast outside the charted 10 m depth contour.
- 2 However, within the 5 m depth contour there are several shoal patches, some of which dry, and a number of isolated dangerous rocks; most of these dangers lie within 1½ miles of the shore. For the possible effect on depths of an earthquake see 9.3.
- 3 Between the E bank of Kori Creek (23°25'N, 68°24'E) and Sir Mouth, 23 miles WNW, there are a number of drying sandbanks lying off the creek and the Indus Delta (10.15).

#### Tidal streams

##### 9.223

- 1 Between Khārod Nadi and Godia Creek the tidal streams generally run parallel to the line of the coast, the in-going stream setting ESE and the out-going WNW; NW of Godia Creek the in-going stream sets E towards the coast at a rate of about 1 kn and the out-going stream sets seaward.
- 2 For details of tidal streams off the entrances to the principal mouths of River Indus see 10.20.

**Currents****9.224**

- 1 See 9.7.

**Principal marks****9.225**

- 1 **Landmarks:**

Āsār Māta Temple (22°50'N, 69°13'E) (9.92).

Dholo Pir Dome (22°55'N, 69°04'E).

Radio mast (23°15'N, 68°49'E), a red obstruction light is exhibited.

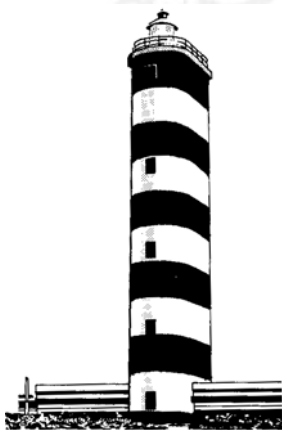
- 2 For principal marks at Godia Creek see 9.231.

For the principal mark on the E bank of Kori Creek see 9.232.

- 3 **Major lights:**

Māndvi Light (22°49'7N, 69°20'9E) (9.92).

Chhachhi Light (white masonry tower, black bands, 27 m in height) (22°57'2N, 69°00'1E) is fitted with a radar reflector, a disused lighthouse (6 m in height) stands 7½ cables W.



Chhachhi Light-tower (9.225)

(Original dated prior to 1981, Checked 2004)

- 4 Jakhāu Light (white round concrete tower, red bands, 41 m in height) (23°14'4N, 68°36'3E), stands within the entrance to Godia Creek on its S side.

**Other aids to navigation****9.226**

- 1 Racon (22°49'7N, 69°20'9E) at Māndvi Light (9.92).  
Racon (23°14'4N, 68°36'3E) at Jakhāu Light (9.225) at Mitha Port.

See *Admiralty List of Radio Signals Volume 2* for details.

**Directions****9.227**

- 1 From a position SSW of the mouth of Khārod Nadi (22°50'N, 69°14'E) the route leads about 92 miles WNW to a position SSW of Sir Mouth, passing (with positions from Jakhāu Light (23°14'4N, 68°36'3E)):
- 2 NNE of Lushington Shoal (37 miles SSE) (9.4), thence:  
SSW of Dutt Shoal (4 miles SSW), thence:  
Clear of a shoal patch (18½ miles SW) (9.222), thence:
- 3 SSW of a shoal area with a least charted depth over it of 1.8 m (17 miles WNW), which extends

seaward from the SE entrance point of Kori Creek.

Thence:

SSW of a dangerous wreck (33 miles WNW) the position of which is approximate, thence:

- 4 To a position SSW of Sir Mouth (10.30).

**Useful mark****9.228**

- 1 Maniyāra Hill (23°28'N, 68°37'E), on the summit of which stands a fort at an elevation of 67 m.  
(Directions continue at 10.26.

Directions for the entrance to Gulf of Kachchh are given at 9.22 and 9.25,  
and for the Deep Water route at 9.24)

**Anchorage**

Charts 39, 43

**9.229**

- 1 **General anchorage.** According to a report (1958) by INS *Investigator*, anchorages with good holding ground, generally in mud; can be obtained in depths of about 12 m from 4 to 5 miles offshore between Āsār Māta Temple (22°50'N, 69°13'E) and Godia Creek, 44 miles WNW.

**Godia Creek and Harbour**

Chart 39 (See 1.14)

**Godia Creek****9.230**

- 1 **General information.** Godia Creek (23°14'N, 68°35'E) is entered between low-lying sandy points. It can be identified by Luna Bet Beacon (9.231) standing on its NW side and, by two beacons standing on its SE side with Bari Beacon a further 2½ miles SE.
- 2 **Description.** This generally shallow creek has an entrance channel across the bar, about 2 cables wide, with deep-water on its centreline; there are drying banks lying on each side of the channel, the entrance and the creek. The bar, which extends about 1 mile seaward, has a least charted depth (1988) of 1.5 m; a pool, with a charted depth (1988) of 9.9 m, lies 1 mile within the entrance. From the pool, the creek shallows rapidly and extends about 2 miles E, at which point it curves N.
- 3 **Local knowledge.** Due to continual changing of the coastline and the sandbanks, local knowledge is necessary to enter the creek.

**Jakhāu Harbour****9.231**

- 1 **General information.** Jakhāu Harbour (23°13'N, 68°33'E), is an open roadstead situated on the outer side of the bar SW of the entrance to Godia Creek (9.230). The town Jakhāu is located inland, about 9 miles E of the harbour. The harbour is used by small vessels for loading salt during the fair weather season from October to January.

**Traffic.** In 2003, the port was used by 24 vessels with a total dwt of 72 808.

- 2 **Port authority.** Jakhāu Port Authority, C/O The Port Officer, Māndvi, Gujarat State, India.

**Storm signals** are displayed at Jakhāu Harbour, the brief system is used. See 1.47.

- 3 **Landmarks:**

Jakhāu Light (23°14'4N, 68°36'3E) (9.225).

Luna Bet Beacon (23°15'7N, 68°33'7E) stands on some sandhills, 9 m high, situated on the NW side of the entrance to Godia Creek.

- 4 **Directions.** Because of the nature of the coast, little is visible until a vessel approaches the charted 10 m depth

contour; at night, or in thick weather, a vessel should not proceed closer inshore until its navigational position has been verified.

- 5 **Anchorage.** Ships using Jakhāu Harbour, can find good anchorage about 5 miles SW of the entrance to Godia Creek in a depth of 9 m, mud and fine sand; as shown on the chart.
- 6 **Barge berth.** A jetty, 2½ miles ENE of the entrance to Godia Creek, is used to load barges for vessels at the anchorage.
- 7 **Mitha Port** lies at the head of Kherla Creek, a shallow creek, which extends about 7½ cables SE from a position 2 miles ENE of the entrance to Godia Creek (23°14'N, 68°35'E).

### Kori Creek

#### 9.232

- 1 **General information.** Kori Creek (23°30'N, 68°20'E), now one of the outlets of the Rann of Kachchh, was once one of the mouths of the Indus River. The entrance to the creek is fronted by a shallow bar but it can be navigated by local craft as far as Lakhpat, 28 miles within the entrance.
- 2 **Caution.** The channel and banks are liable to constant changes.  
**Local knowledge** of the area is necessary before closing and entering Kori Creek.

- 3 **Description.** Kori Creek is about 5 miles wide at the entrance; it is blocked by several sandbanks except on its E side where a deep-water channel leads, between off-lying sandbanks and the shore, into the creek.

- 4 **Depths.** The bar, of which the outer edge is more than 10 miles seaward of the entrance, is about 7 miles across with depths from 0·1 to 3·2 m. Within the bar a channel, reducing from about 2½ miles to 5 cables wide with depths from 5·3 to 18·0 m, leads through the creek for a distance of about 12 miles; thence the width of the channel is reduced, and subsequently divided, by sandbanks, see also 9.3.

- 5 **Tidal streams** are strong in the estuary of Kori Creek attaining a rate of 5 kn at springs and 3 kn at neaps. The in-going stream sets up the channel of the creek until about 1½ hours before HW when it sweeps over the sandbanks in the entrance; the in-going stream also sets into the bay N of Kori Creek. The out-going stream sets SW and S.

- 6 **Landmark:**

Koteshwar Temple (23°41'N, 68°32'E).

**Approach aspect.** When a vessel is in depths of more than 5 m off Kori Creek the low land, being about 10 miles distant, is generally not seen save in the clearest weather when low hills will be visible.

- 7 **Useful mark:**

Stranded wreck (23°30'·3N, 68°20'·3E).



This map illustrates the shipping lanes and distances between various ports in Iran and Pakistan along the coast of the Arabian Sea. The map includes a coordinate grid with longitude from 62° to 68° East and latitude from 23° to 26° North. Shipping lanes are represented by curved arrows with associated distance values in nautical miles. Key ports and locations marked include Damāghen-ye Pas Bandar, Gwatār Bay, Gwādar, Pasni, Ormāra, Sonmiani Bay, Karāchi, Port Muhammad Bin Qasim, and Sir Mouth. The map also shows the coastline of Iran to the west and Pakistan to the east, with the Arabian Sea to the south. A dashed line indicates the 62° longitude meridian. A pink rectangular box highlights the area around Karāchi and Port Muhammad Bin Qasim. A blue rectangular box highlights the area around Gwādar and Pasni. A blue rectangular box highlights the area around Ormāra. A blue rectangular box highlights the area around Sonmiani Bay. A blue rectangular box highlights the area around the Mouths of Indus. A blue rectangular box highlights the area around Sir Mouth. A blue rectangular box highlights the area around the Arabian Sea. A blue rectangular box highlights the area around the shipping lanes. A blue rectangular box highlights the area around the distances. A blue rectangular box highlights the area around the map. A blue rectangular box highlights the area around the title. A blue rectangular box highlights the area around the chapter number. A blue rectangular box highlights the area around the page number. A blue rectangular box highlights the area around the map. A blue rectangular box highlights the area around the title. A blue rectangular box highlights the area around the chapter number. A blue rectangular box highlights the area around the page number.

| From                    | To                      | Distance (nautical miles) |
|-------------------------|-------------------------|---------------------------|
| Damāghen-ye Pas Bandar  | Gwatār Bay              | 10.218                    |
| Gwatār Bay              | Gwādar                  | 10.198                    |
| Gwādar                  | Pasni                   | 10.194                    |
| Pasni                   | Ormāra                  | 10.178                    |
| Ormāra                  | Sonmiani Bay            | 10.151                    |
| Sonmiani Bay            | Karāchi                 | 10.156                    |
| Karāchi                 | Port Muhammad Bin Qasim | 10.36                     |
| Port Muhammad Bin Qasim | Sir Mouth               | 10.30                     |
| Sir Mouth               | Mouths of Indus         | 10.29                     |
| Mouths of Indus         | Karāchi                 | 10.40                     |
| Karāchi                 | Ormāra                  | 10.174                    |
| Ormāra                  | Damāghen-ye Pas Bandar  | 10.208                    |
| Damāghen-ye Pas Bandar  | Gwādar                  | 10.186                    |
| Gwādar                  | Ormāra                  | 10.145                    |
| Ormāra                  | Sonmiani Bay            | 10.157                    |
| Sonmiani Bay            | Karāchi                 | 10.73                     |
| Karāchi                 | Port Muhammad Bin Qasim | 10.73                     |
| Port Muhammad Bin Qasim | Sir Mouth               | 10.14                     |
| Sir Mouth               | Mouths of Indus         | 10.13                     |
| Mouths of Indus         | Karāchi                 | 10.40                     |
| Karāchi                 | Ormāra                  | 10.174                    |
| Ormāra                  | Damāghen-ye Pas Bandar  | 10.208                    |
| Damāghen-ye Pas Bandar  | Gwādar                  | 10.186                    |
| Gwādar                  | Ormāra                  | 10.145                    |
| Ormāra                  | Sonmiani Bay            | 10.157                    |
| Sonmiani Bay            | Karāchi                 | 10.73                     |
| Karāchi                 | Port Muhammad Bin Qasim | 10.73                     |
| Port Muhammad Bin Qasim | Sir Mouth               | 10.14                     |
| Sir Mouth               | Mouths of Indus         | 10.13                     |
| Mouths of Indus         | Karāchi                 | 10.40                     |
| Karāchi                 | Ormāra                  | 10.174                    |
| Ormāra                  | Damāghen-ye Pas Bandar  | 10.208                    |
| Damāghen-ye Pas Bandar  | Gwādar                  | 10.186                    |
| Gwādar                  | Ormāra                  | 10.145                    |
| Ormāra                  | Sonmiani Bay            | 10.157                    |
| Sonmiani Bay            | Karāchi                 | 10.73                     |
| Karāchi                 | Port Muhammad Bin Qasim | 10.73                     |
| Port Muhammad Bin Qasim | Sir Mouth               | 10.14                     |
| Sir Mouth               | Mouths of Indus         | 10.13                     |
| Mouths of Indus         | Karāchi                 | 10.40                     |
| Karāchi                 | Ormāra                  | 10.174                    |
| Ormāra                  | Damāghen-ye Pas Bandar  | 10.208                    |
| Damāghen-ye Pas Bandar  | Gwādar                  | 10.186                    |
| Gwādar                  | Ormāra                  | 10.145                    |
| Ormāra                  | Sonmiani Bay            | 10.157                    |
| Sonmiani Bay            | Karāchi                 | 10.73                     |
| Karāchi                 | Port Muhammad Bin Qasim | 10.73                     |
| Port Muhammad Bin Qasim | Sir Mouth               | 10.14                     |
| Sir Mouth               | Mouths of Indus         | 10.13                     |
| Mouths of Indus         | Karāchi                 | 10.40                     |
| Karāchi                 | Ormāra                  | 10.174                    |
| Ormāra                  | Damāghen-ye Pas Bandar  | 10.208                    |
| Damāghen-ye Pas Bandar  | Gwādar                  | 10.186                    |
| Gwādar                  | Ormāra                  | 10.145                    |
| Ormāra                  | Sonmiani Bay            | 10.157                    |
| Sonmiani Bay            | Karāchi                 | 10.73                     |
| Karāchi                 | Port Muhammad Bin Qasim | 10.73                     |
| Port Muhammad Bin Qasim | Sir Mouth               | 10.14                     |
| Sir Mouth               | Mouths of Indus         | 10.13                     |
| Mouths of Indus         | Karāchi                 | 10.40                     |
| Karāchi                 | Ormāra                  | 10.174                    |
| Ormāra                  | Damāghen-ye Pas Bandar  | 10.208                    |
| Damāghen-ye Pas Bandar  | Gwādar                  | 10.186                    |
| Gwādar                  | Ormāra                  | 10.145                    |
| Ormāra                  | Sonmiani Bay            | 10.157                    |
| Sonmiani Bay            | Karāchi                 | 10.73                     |
| Karāchi                 | Port Muhammad Bin Qasim | 10.73                     |
| Port Muhammad Bin Qasim | Sir Mouth               | 10.14                     |
| Sir Mouth               | Mouths of Indus         | 10.13                     |
| Mouths of Indus         | Karāchi                 | 10.40                     |
| Karāchi                 | Ormāra                  | 10.174                    |
| Ormāra                  | Damāghen-ye Pas Bandar  | 10.208                    |
| Damāghen-ye Pas Bandar  | Gwādar                  | 10.186                    |
| Gwādar                  | Ormāra                  | 10.145                    |
| Ormāra                  | Sonmiani Bay            | 10.157                    |
| Sonmiani Bay            | Karāchi                 | 10.73                     |
| Karāchi                 | Port Muhammad Bin Qasim | 10.73                     |
| Port Muhammad Bin Qasim | Sir Mouth               | 10.14                     |
| Sir Mouth               | Mouths of Indus         | 10.13                     |
| Mouths of Indus         | Karāchi                 | 10.40                     |
| Karāchi                 | Ormāra                  | 10.174                    |
| Ormāra                  | Damāghen-ye Pas Bandar  | 10.208                    |
| Damāghen-ye Pas Bandar  | Gwādar                  | 10.186                    |
| Gwādar                  | Ormāra                  | 10.145                    |
| Ormāra                  | Sonmiani Bay            | 10.157                    |
| Sonmiani Bay            | Karāchi                 | 10.73                     |
| Karāchi                 | Port Muhammad Bin Qasim | 10.73                     |
| Port Muhammad Bin Qasim | Sir Mouth               | 10.14                     |
| Sir Mouth               | Mouths of Indus         | 10.13                     |
| Mouths of Indus         | Karāchi                 | 10.40                     |
| Karāchi                 | Ormāra                  | 10.174                    |
| Ormāra                  | Damāghen-ye Pas Bandar  | 10.208                    |
| Damāghen-ye Pas Bandar  | Gwādar                  | 10.186                    |
| Gwādar                  | Ormāra                  | 10.145                    |
| Ormāra                  | Sonmiani Bay            | 10.15                     |

## CHAPTER 10

## SIR MOUTH TO GWATĀR BAY, INCLUDING KARĀCHI

## GENERAL INFORMATION

*Charts 39, 38, 707*

**Scope of chapter****10.1**

- 1 This chapter covers the coast of Pakistan from its approximate boundary with India at Sir Mouth (23°38'N, 68°02'E) to Damāgheh-ye Pas Bandar, the W entrance point of Gwatār Bay, which lies just W of the approximate boundary between Pakistan and Iran, 370 miles WNW. The ports of Karāchi (10.91), Port Muhammad Bin Qasim (10.36) and the minor harbours and anchorages on the coast are described.

**Topography****10.2**

- 1 The dominant feature of the E part of this coastline is the delta of the River Indus (10.15), which is flat everywhere, and partially flooded at high water for a considerable distance inland; it contrasts markedly with the central section of this coastline, W of Karāchi, named the coast of Las Bela, which is chiefly an uninhabited wilderness of hills and cliffs sloping to swamps or desert plains and also with the barren Makrān Coast, which is the dominant feature of the extreme W part of this area.

**Offshore features****10.3**

- 1 **Kori Great Bank** is an extension up to a distance of 60 miles offshore, in a SW direction, of the coastal bank between the mouth of Kori Creek (23°30'N, 68°20'E) (9.232) and Bachiār Creek, 40 miles NW. The seabed of the bank is fine sand and mud.
- 2 **The Swatch** (23°25'N, 67°18'E) is a remarkable submarine valley between 3 and 8 miles wide and extending SSW for about 50 miles. The bottom slopes from its landward end gradually to depths of more than 1000 m, whence the edge of the continental shelf slopes steeply down to the floor of the Arabian Sea. The bottom and sides of The Swatch are of grey mud with some sand and gravel on its NW edge.
- 3 The Swatch can be of great assistance to vessels approaching Karāchi from S; an echo sounder trace of a cross section showing the maximum depths obtained will provide a clear indication of the vessels position and is of particular use during the SW monsoon when visibility is poor and strong sets are experienced.

**Positions****10.4**

- 1 Positions read from chart 39 may differ from those obtained from the larger scale charts 58 and 59; positions between charts should therefore be transferred by bearing and distance, not by latitude and longitude.

**Navigational lights****10.5**

- 1 With the exception of the Indus Delta area and the coast of Las Bela, where there are large distances between some of the major lights, the coasts described in this chapter are generally well lit with several lights having ranges of 15 miles or more.

**Radiobeacon****10.6**

- 1 There is a marine radiobeacon at Karāchi, for details see *Admiralty List of Radio Signals Volume 2*.

**Buoyage****10.7**

- 1 The area covered by this falls within the IALA Maritime Buoyage System (Region A). Mariners are advised that some buoys and beacons may not conform to the IALA System; see note on charts.

**Tidal streams****10.8**

- 1 Details of tidal streams may be found in the relevant sections of the chapter.

**Currents****10.9**

- 1 There is a good deal of variability in the directions of currents in the vicinity of the Indus Delta but there is some tendency for sets to parallel the coast.
- 2 Currents farther off the Indus Delta have a seasonal variation related to the monsoons; from February to September the most usual set is SE, with greatest constancy during June to August; during October currents are variable in direction but from November to January the most common set is NW. The rate of the current is mostly less than 1 kn, but rates of about 2 kn occur at times mainly during June to August and in December.
- 3 Near Karāchi little current is experienced.  
The currents in the remainder of the area are mainly variable and weak, with a rate of usually less than ½ kn; the most common sets are E from February to October and W from November to January.

**Climate and weather****10.10**

- 1 For climate and weather see 1.178.

**Submarine and naval exercise areas****10.11**

- 1 A submarine exercise area covers the whole of the Las Bela (10.145) and Makrān Coasts (10.183), it extends up to 250 miles W and 100 miles SSE from Rās Muāri (24°50'N, 66°40'E); the area includes Ormāra Bay (10.178), Pasni

Bay (10.194) and Gwādar Bay (10.198). A good lookout should be maintained when passing through this area. See 1.8.

- 2 Naval exercises, including gunnery firings, take place S and up to 270 miles W of Rās Muāri.

### International boundaries

#### 10.12

- 1 In the E the boundary between India and Pakistan follows approximately the centre of Sir Creek (23°45'N,

68°11'E) (10.30). In the W, the approximate boundary between Pakistan and Iran extends N from a position about 2½ miles W of the entrance to Dasht Kaur River (25°10'N, 61°40'E) at the head of Gwatār Bay; for further details see 10.219.

### Navigational control

#### 10.13

- 1 For regulations which control navigation in the territorial waters of Pakistan see 1.39.

## SIR MOUTH TO PORT MUHAMMAD BIN QASIM

### SIR MOUTH TO PHITTI CREEK

#### General information

*Charts 58, 39*

#### Route

##### 10.14

- 1 From a position SW of Sir Mouth (23°38'N, 68°02'E) the route leads about 30 miles WNW thence about 55 miles NNW to a position SW of Phitti Creek.

### Topography—Indus Delta

#### 10.15

- 1 **Extent and general description.** The delta of the River Indus extends from Sir Mouth to Karāchi, about 12 miles NW of Phitti Creek; it covers a low area of some 3000 square miles and is almost perfectly level. The area is generally overgrown with tamarisk and mangrove, but there is good pasturage in the marshes and rice flourishes in places; elsewhere, in some parts there are immense deposits of salt.

#### 10.16

- 1 **Coast.** The coast formed by the delta of the Indus is generally flat with much flooding at high water. For many miles, save for a little jungle, there is nothing to be seen but swamp and the land is hardly discernible when more than 2 miles offshore; though, here and there, bushes may be seen at about 5 miles around low water.
- 2 The sea face of the delta is formed mostly by a narrow belt of low sandhills fronted by drying sandbanks which are intersected by mud-banked tidal creeks.

The coastline and creeks of the Indus Delta are constantly changing, and therefore they and the beacons, should not be relied on for navigation.

#### 10.17

- 1 For further details of individual creeks in the Indus Delta see 10.29.

### Depths

#### 10.18

- 1 The various mouths of the Indus Delta are constantly changing, and advancing seaward, thereby altering the coastal banks and depth contours.  
For details of off-lying features see 10.3.

### Hazard

#### 10.19

- 1 **Teredo worm.** This is very destructive to the hulls of small craft, see 1.147.

### Tidal streams

#### 10.20

- 1 Tidal streams are strong in the entrances to the principal mouths of River Indus attaining, at Sir Mouth a rate of 3 to 4 kn at springs and, at Ketī Bundar in Turshiān Creek (24°03'N, 67°23'E) a rate of 5 kn, on the out-going streams.

To the N of Turshiān Creek the in-going stream sets NNW, parallel with the coast, and the out-going stream SW and S.

- 2 Farther N, at the mouths of Dabbo Creek (24°19'N, 67°16'E) and Phitti Creek, 21 miles NNW, the out-going stream may attain a rate of 3 kn.

### Tide rips and discoloured water

#### 10.21

- 1 The out-going stream, issuing strongly from the delta mouths, causes heavy tide rips, especially at springs and carries much silt laden water far to seaward; at times the line of demarcation, sometimes more than 10 miles offshore, between this muddy water and the clean sea water is most marked.

### Currents

#### 10.22

- 1 See 10.9.

### Climate

#### 10.23

- 1 The climate of the delta is cool in winter, hot in summer, and unhealthy during the floods (July to September).

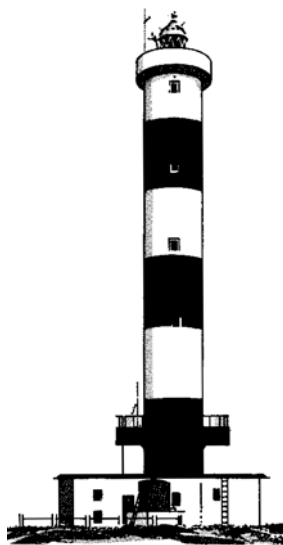
### Local weather

#### 10.24

- 1 In the heat of the day, especially during the dry season with the wind off the land, a heavy dust haze low over the coast makes coastal features unrecognisable, even at a short distance seaward.

**Principal marks****10.25****1 Landmarks:**

- 1 Tower (disused lighthouse) (grey framework tower, elevation 46 m) (23°44'·4N, 68°03'·9E), stands on a small islet on the SE side of Kājhar Creek.
- 2 Turshiān Old Lighthouse (24°04'·8N, 67°22'·4E), elevation 46 m, stands near the NW extremity of an island lying on the N bank of Turshiān Creek (10.33).
- Khuddi Island Lighthouse (white round concrete tower, black bands) (24°33'·6N, 67°13'·2E).
- 3 For other landmarks at Port Muhammad Bin Qasim see 10.58.



Khuddi Island Lighthouse (10.25)

(Original dated 1987, Checked 2004)

**4 Major lights:**

- Turshiān Creek Light, elevation 46 m.  
 Khuddi Island Light (24°33'·6N 67°13'·1E) as above.  
 Ahsan Channel Rear Leading Light (24°38'·2N, 67°06'·4E) (10.61).  
 Manora Point Light (24°47'·6N, 66°58'·7E) (10.118).

**Directions**

(continued from 9.12 and 9.228)

**Cautions****10.26**

- 1 It is dangerous for deep draught vessels to approach the Indus Delta for the coastline and creeks are constantly changing in position; therefore, the beacons in this area should not be relied upon as guides to navigation.
- 2 Breakers on the shelving coastal banks extend many miles offshore; they may often be seen before the coast is sighted, particularly during the SW monsoon when the visibility is poor, or when the sea breaks in depths more than 5 m.
- 3 Several vessels have grounded on the banks off the Indus Delta through failing to sound or to allow for the predominantly SE set (10.9); soundings obtained crossing The Swatch (10.3) are a useful guide.

**10.27**

- 1 From a position SW of Sir Mouth (23°38'N, 68°02'E) the route leads about 30 miles WNW thence about 55 miles NNW to a position SW of Phitti Creek, giving the Indus

Delta a wide berth and passing (with positions from Turshiān Creek Light (24°04'·6N, 67°24'·0E)):

- 2 SSW of a stranded wreck, the position of which is approximate (40 miles SE); another stranded wreck lies 8 miles N. Thence:
- 3 SSW of a stranded wreck (20 miles SE) lying off Kahr Creek, thence:  
 And clear of a dangerous wreck (45½ miles S), thence:  
 SSW of a stranded wreck (2½ miles SSW) lying off Turshiān Creek, thence:
- 4 SSW thence WSW of Turshiān Creek Light (10.25); the old lighthouse (10.25) lies 1½ miles WNW; thence:  
 WSW of a dangerous wreck (8¼ miles NW), the position of which is approximate, thence:  
 Clear of a dangerous wreck (28 miles NW), thence:
- 5 To a position SW of Ahsan Channel (24°34'N, 67°04'E).

**Useful marks****10.28**

- 1 Sun Well Oil Rig No 3 (24°20'·4N, 67°16'·7E) stands on the S side of the entrance to Dabbo Creek.  
 Sun Well Oil Rig No 2 (24°27'·2N, 67°17'·4E) stands about 2 miles within the entrance to Paitiani Creek near its NW bank.

(Directions continue for

Port Muhammad Bin Qasim at 10.59.

Directions for SE and W approaches to Karāchi are given at 10.84, and for the passage

W of Rās Muāri at 10.150)

**Indus Delta—Creeks**

Charts 59 plan of Approaches to Phitti Creek, 58, 39

**General information****10.29**

- 1 It is difficult to distinguish the various mouths of the Indus Delta, there are few beacons or other navigational aids and the coastline changes constantly. Only very brief descriptions of the mouths will be given as local knowledge will be necessary before entering any of the creeks.

**Sir Mouth****10.30**

- 1 **Sir Mouth** (23°38'N, 68°02'E) forms the joint entrance to Pir Sanāi and Sir Creeks. Sir Mouth is flanked by shallow spits with a bar across their inner points; within the bar, Sir Creek is navigable by small craft.

**Kājhar and Wari Creeks****10.31**

- 1 Kājhar Creek (23°47'N, 68°03'E) enters the sea NW of Sir Mouth; Kājhar Creek lighthouse (disused) (10.25) stands on a small islet set among the mangroves on the SE side of the creek. A beacon (elevation 17 m) stands on the E shore of the creek about 3 miles NNE of the disused lighthouse.
- 2 Wari Creek (23°54'N, 67°51'E) is the principal E mouth of the Indus. Its W entrance point continues to extend seaward and it is bordered by low sandy ridges which cover at high water springs; it is backed by an extensive mangrove swamp. The mouth of the creek is about 2 miles wide with shallow flats extending seaward; the in-going and out-going tidal streams set strongly over these flats.





and entered between the SE end of Bundal Island and the bank W of Khand Island (10.38); thence the dredged channel continues through Phitti Creek to the port area, 12 miles NE.

### Traffic

#### 10.41

- 1 In 2003 the port was used by 316 vessels with a total dwt of 11 704 554.

### Port authority

#### 10.42

- 1 Port Muhammad Bin Qasim Port Authority, Bin Qasim, Karāchi 75020, Pakistan.

### Development

#### 10.43

- 1 Plans for the development of the port include the deepening of the channel to accommodate vessels of up to 75 000 dwt and the provision of a container terminal.

## Limiting conditions

### Controlling depths

#### 10.44

- 1 Dredging of the channel is carried out as necessary but silting is liable to occur, particularly during the SW monsoon; see 10.59. The following depths are maintained as far as possible:
- 2
 

|                                           |        |
|-------------------------------------------|--------|
| Ahsan Channel                             | 13.5 m |
| Channel to Iron Ore and Coal Jetty        | 12 m   |
| Turning basin off Iron Ore and Coal Jetty | 12 m   |
| Channel to Marginal Wharf                 | 12 m   |
| Turning basin off Marginal Wharf          | 10 m   |

### Deepest and longest berth

#### 10.45

- 1 The Iron Ore and Coal Jetty (10.65).

### Tidal levels

#### 10.46

- 1 See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 2.4 and 1.3 m.

### Density of water

#### 10.47

- 1 Density of water is normally about 1.025 g/cm<sup>3</sup>.

### Maximum size of vessel handled

#### 10.48

- 1 It is reported that the largest vessel to have used the port was 91 849 dwt, 272.5 m LOA and 15.0 m draught. However, the maximum permitted draught, length and breadth for vessels berthing at the port are published monthly in Pakistan Temporary Notices to Mariners, or they should be confirmed with the local authority.

### Local weather and sea state

#### 10.49

- 1 Heavy swell will be encountered, during the SW monsoon, in the outer anchorage and across Ahsan Channel; also for most of this period, visibility is much reduced due to suspended dust in the atmosphere.  
Fog or mist may be experienced at dawn and dusk during the winter months.

## Arrival information

### Port radio

#### 10.50

- 1 For details see the *Admiralty List of Radio Signals Volume 6(4)*.

### Notice of ETA required

#### 10.51

- 1 Seventy two, 48 and 24 hours notice is required in advance to the Deputy Conservator; Port Qasim Control should be contacted about 6 hours before arrival.

### Outer anchorage

#### 10.52

- 1 Anchorage with good holding ground, sand and mud, can be obtained in an area, shown on the chart, situated about 1½ miles W of Fairway Light-buoy (24°33'N, 67°03'E). A spoil ground, also shown on the chart, lies about 3 miles SSE of Fairway Light-buoy.
- 2 During the SW monsoon, when a heavy swell persists, vessels are advised to anchor near the W end of the anchorage area and pay out extra cable.  
On anchoring, vessels should report their draught to the local authority.

### Waiting area

#### 10.53

- 1 There is a waiting area established near the entrance to the port, as shown on the chart, on the E side of the channel in position 24°40'7N, 67°08'8E.

### Pilots and tugs

#### 10.54

- 1 **Pilotage** is compulsory. Pilots board 1½ miles SW of the Ahsan Channel Fairway Light-buoy (10.56), from a launch with a grey hull and white superstructure. In adverse weather conditions, the pilot may board in the waiting area, between No B1 Light-buoy (starboard hand) and No B3 Light-beacon (10.63).  
For further details see the *Admiralty List of Radio Signals Volume 6(4)*.
- 2 **Tugs** are available; they join about 1½ miles seaward of the berth.

### Quarantine

#### 10.55

- 1 Pratique is normally granted after berthing.

## Harbour

### General layout

#### 10.56

- 1 **Approach channels.** The channel leading from seaward to the berthing areas is divided into 3 sections which are described below; the entire channel is well marked by light-beacons and light-buoys as shown on the chart.
- 2 **Ahsan Channel.** Fairway Light-buoy (safe water) (24°33'N, 67°03'E), moored 9 miles SSW of the SE end of Bundal Island, marks the entrance to the channel which leads NNE to Phitti Creek. The channel is dredged to the depth shown on the chart; however, the up-to-date information of the dredged channel, including its latest depths, should be obtained from the local authority; see also 10.59.
- 3 **Phitti Creek** is entered between SE end of Bundal Island (24°43'N, 67°08'E) and the bank W of Khand Island (10.38), 1 mile SE; the channel to the port area passes along this creek and thence through Kadiro Creek, past the Fauji Oil Terminal (10.64), to a turning basin off the Iron

Ore and Coal Jetty (10.65), a distance of about 13 miles from the inner end of Ahsan Channel. Four mooring buoys lie on the SE side of the channel, 1¼ miles ENE of the NE end of Bundal Island, in an prohibited anchorage area as shown on the chart.

- 4 **Gharo Creek** extends SE and NE, for about 2 miles, from the Iron Ore and Coal Jetty (10.65) to Marginal Wharf (10.67). Close SE of the root of Marginal Wharf there is a restricted area, containing 4 mooring buoys, within which anchoring is prohibited. Thence Gharo Creek leads, S of the port area, in a generally E direction.

### Tidal streams

#### 10.57

- 1 In the channel, upstream of the SE end of Bundal Island (24°43'N, 67°08'E), rates up to 5 kn may be experienced on the out-going stream at springs; at the mouth of Phitti Creek the rate may attain 3 kn. The set of the streams mostly follows the direction of the creeks, however it is reported that the streams may set across the channels; S of Bundal Island there is no information available and the set should be observed locally.

### Principal marks

#### 10.58

- 1 **Landmarks:**
  - Khuddi Island Lighthouse (24°33'·6N, 67°13'·2E) (10.25).
  - Ahsan Channel Rear Leading Light (24°39'·4N, 67°07'·3E) (10.61).
- 2 Building (elevation 10 m) (24°46'·0N, 67°11'·9E), with a tide gauge standing close SE.
- Radio mast (elevation 65 m) (24°46'·7N, 67°21'·1E), red obstruction lights are exhibited.
- For landmarks N of Bundal Island see 10.82.
- 3 **Major lights:**
  - Ahsan Channel Rear Leading Light (above).
  - Manora Point Light (24°47'·6N, 66°58'·7E) (10.118).

### Directions

(continued from 10.28)

### Cautions

#### 10.59

- 1 The dredged channel is liable to silt during the SW Monsoon (1.187) and the position of the channel may vary accordingly. The depths shown on the chart are maintained as required.
- The buoys are liable to drag and their charted positions should not be relied upon.
- 2 The latest information and details of the maximum permissible draught and dimensions for vessels using the channel should be obtained by consulting Notices to Mariners and Navigational Warnings issued by the Pakistan Navy.
- 3 Mariners are advised to navigate with due care.

### Deep draught vessels

#### 10.60

- 1 Deep draught vessels entering harbour are normally boarded by the pilot about 2½ hours before high water, this is to ensure that the vessel berths at high water; however, it has been reported that a vessel drawing 10·0 m has berthed at low water.

### Ahsan Channel

#### 10.61

##### 1 Leading Lights.

- 1 Front light Ahsan Channel (black metal pipe with platform, elevation 12 m) (24°38'·2N, 67°06'·4E).
- Rear light Ahsan Channel (black metal pipe, elevation 31 m) (24°39'·4N, 67°07'·3E), visible only between the bearings 029·9° and 034·9°; racon.
- 2 From the vicinity of Fairway Light-buoy (24°33'N, 67°03'E) (10.56) the alignment (032½°) of these lights leads, through the outer part of Ahsan Channel, to a position between No 7 Light-beacon (black metal pipe, green top with platform), 4 miles NE, and No 8 Light-buoy (port hand).
- 3 Thence the dredged channel should be followed through the inner part of Ahsan Channel to B1 and B2 Light-buoys (lateral) at the lower end of Phitti Creek.

### Phitti Creek

#### 10.62

##### 1 Leading Lights.

- 2 Front light Phitti Creek (black metal pipe with platform, elevation 8 m) (24°43'·6N, 67°09'·0E).
- Rear light Phitti Creek (similar construction, elevation 20 m) (24°44'·0N, 67°09'·1E).
- 3 From a position between B1 and B2 Light-buoys (lateral) (24°40'·5N, 67°08'·4E) the alignment (010¼) of these lights leads through Phitti Creek for 2¾ miles to a position between Nos 8 and 9 Light-buoys (lateral), thence the buoyed channel leads NNE for about 8 cables to a position between (P1 and B12 Light buoys (lateral), 3 cables ESE of the rear leading light. Thence on to the alignment of Kunni Leading Lights:
- 4 Kunni Front light (black metal pipe with platform, elevation 8 m) (24°45'·6N, 67°12'·2E).
- Rear Light (similar construction, elevation 20 m) (24°45'·9N, 67°12'·8E).
- 5 The alignment (056½°) of the lights leads 1¾ miles to a position between P5 and P6 Light-buoys (lateral), 1¼ miles WSW of Kunni front light, thence the dredged channel should be followed to Kadiro Creek and the W part of Gharo Creek to the berthing areas; for these channels the chart is sufficient guide.

### Useful marks

#### 10.63

- 1 Stranded wreck (24°37'·2N, 67°09'·3E).
- Ashan Channel Light-beacon No 3 (black metal pipe, green top with platform, elevation 10 m) (24°34'·8N, 67°04'·0E).
- Ashan Channel Light-beacon No 5 (black metal pipe, green top with platform, elevation 10 m) (24°35'·7N, 67°04'·7E).
- Ashan Channel Light-beacon No 8A (black metal pipe, red top with platform, elevation 10 m) (24°37'·3N, 67°05'·2E).
- 2 Bundal Island Light-beacon No 4 (black metal pipe with platform elevation 10 m) (24°41'·3N, 67°08'·1E).
- Bundal Island Light-beacon No 6 (white round tower, elevation 10 m) (24°43'·3N, 67°08'·7E).
- Tower (elevation 12 m) (24°43'·9N, 67°08'·9E) standing near the NE point of Bundal Island; Phitti Creek rear leading light (10.62) lies 1¾ cables ENE.
- 3 Qutub Point Light-beacon No 8 (white round tower) (24°46'·9N, 67°13'·7E).



Hasan Point Light-beacon No 7 (black metal pipe, green top with platform, elevation 10 m) (24°46'·8N, 67°14'·1E).

S.M. Point Light-beacon No 8a (black metal pipe, red top with platform, elevation 10 m) (24°47'·1N, 67°14'·2E).

Mazhar Point Light-beacon No 9 (white round tower) (24°46'·5N, 67°17'·4E).

4 Ganglaro Creek Light-beacon No 10 (white round tower) (24°47'·0N, 67°17'·7E).

Aziz Point Light-beacon No 11 (white round tower) (24°46'·2N, 67°18'·0E).

5 Marginal Wharf Light-beacon No 12 (white round tower) (24°46'·2N, 67°19'·4E); Marginal Wharf Light-beacon No 14, a similar beacon, stands 3 cables ESE.

## Berths

### Fauji Oil Terminal 10.64

1 Fauji Oil Terminal (24°47'·0N, 67°17'·2E) consists of a 46 m long central berthing platform, which is flanked on each side by a breasting dolphin and 2 mooring dolphins, thereby giving an overall berthing length of about 250 m. The central platform and the breasting dolphins adjoin an area with a maintained depth of 11·3 m, the mooring dolphins stand in shallower water.

2 The berth is designed to accommodate vessels between 25 000 and 75 000 dwt, but in 1995 the maximum size of vessels permitted to berth was limited to LOA 225 m, beam 32·2 m and draught 10 m, or 10·5 m with an indemnity from the vessel's owners, charterers or operators; berthing and unberthing parameters should be confirmed with the local authority.

### Iron Ore and Coal Jetty 10.65

1 Iron Ore and Coal Jetty, situated about 1 mile ESE of Fauji Oil Terminal, has a berthing face about 270 m long which adjoins an area with a maintained depth of 12·8 m.

2 The berth, which serves a steel mill, accommodates bulk carriers up to 50 000 dwt, 225 m in length and with draughts ranging from 10 to 12 m depending upon the season.

### Export Processing Zone Jetty 10.66

1 A T-headed jetty with a berthing face of about 300 m, located about 7 cables SE of Iron Ore and Coal Jetty, serves the export processing zone shown on the chart.

### Marginal Wharf 10.67

1 Marginal Wharf (24°46'N, 67°20'E), provides seven berths each 200 m long; the entire berthing face adjoins an area with a maintained depth of 10·0 m.

2 The maximum permitted vessel length is 183 m at all berths, but the maximum draught permitted at each berth should be confirmed with the local authority. Berth No 1 is used for the discharge of liquid products; the remaining section of the wharf can accommodate vessels of 25 000 dwt at Berths Nos 2–5, and of 35 000 dwt at Berth No 6 and 7; containers are handled at the 2 latter berths.

### Mooring buoys 10.68

1 Four mooring buoys lie on the SE side of the channel between Iron Ore and Coal Jetty (10.65) and the Export Processing Zone Jetty (10.66), and within a prohibited anchorage area as shown on the chart.

2 There are 4 mooring buoys in the middle of Gharo Creek close E of Marginal Wharf Berth No 1 (10.67); the light-buoys moored NW and S of the mooring area mark the NE limit of the 10·0 m dredged area. These mooring buoys are used principally by small gas tankers to discharge into lighters which transport the gas to a facility situated E of the root of Marginal Wharf.

## Port services

### Repairs 10.69

1 Limited repairs can be carried out.

### Other facilities 10.70

1 Local medical assistance; hospital at Karāchi; oily waste facilities.

### Supplies 10.71

1 Fresh water; provisions; fuel oil by barge or road tanker.

### Communications 10.72

1 Karāchi International Airport 30 km distant.

## KARĀCHI HARBOUR AND APPROACHES

### APPROACHES

#### General information

*Charts 58, 59*

#### Routes 10.73

1 **Approach from south-east.** The approach to Karāchi (24°50'N, 66°59'E) from SE is a continuation of the route leading from Sir Mouth to a position SW of Ahsan Channel (24°34'N, 67°04'E), see 10.26; thence 13 miles farther NW to a position SW of Manora Point (24°47'·3N, 66°58'·8E) (10.121).

2 **Approach from west.** The approach to Karāchi from W leads from a position SW of Rās Muāri (24°50'N, 66°40'E) to a position SW of Karāchi Harbour, 20 miles E.

#### Topography 10.74

1 **East side.** The sand dunes forming the coast from the mouth of Korangi Creek (24°45'N, 67°06'E) to the entrance of Karāchi Harbour, 7 miles NW, are more stable than those in the S part of the Indus Delta; they are from 2 to 5 m high and several miles wide. Towards the N part of this coast, a shallow bay with a sandy beach fronts Clifton,



a suburb of Karāchi which is distinguishable by several groups of large square buildings.

- 2 **West side.** Rās Muāri (10.84) situated 17½ miles W of the entrance to Karāchi Harbour (24°48'N, 66°59'E) is likely to be the landfall for vessels approaching Karāchi from W since the coastline turns sharply N at this point and the headland is prominent.

- 3 From Rās Muāri to Buleji Point (10.84), 8½ miles E, the coast is formed by a number of shallow bays each with a rocky coastline; it is backed by the Jhil Range of hills which have, a nearly level crest with some remarkable hummocks.

- 4 Hawkes Bay (10.90), with its low coastline, is situated E of Buleji Point; thence, a narrow sand spit, backed by mud flats and mangroves, extends 5½ miles SE to the entrance of Karāchi Harbour.

### Depths and bottom

#### 10.75

- 1 **Coastal depths.** Rās Muāri has depths in its immediate vicinity which are irregular and, within a radius of 7 miles, there are several depths less than those charted. The area should be approached with caution.

Elsewhere along the coast a bank, with depths of 10 m or less, extends up to 1¼ miles from the shore in places.

- 2 **Offshore depths.** Seaward of the 20 m depth contour, there are no charted off-lying dangers, save for a dangerous wreck, a shoal patch and an area of unexploded ordnance, all of which are described at 10.84.

- 3 **Bottom.** To the S of Rās Muāri and to the E of it, in depths more than 37 m, the bottom is everywhere soft.

### Submarine and naval exercise areas

#### 10.76

- 1 See 10.11.

### Prohibited anchorage

#### 10.77

- 1 Anchoring is prohibited within a rectangular area centred about 2½ miles SW of Buleji Point; the limits of the area are shown on the chart.

### Measured distance

#### 10.78

- 1 There is a measured distance (1855.3 m) situated close W of Buleji Point.

E marks; two beacons (black and white chequers) in line bearing 007°.

W marks; two beacons (black and white chequers) in line bearing 007°.

- 2 Running track 097°/277°.

### Spoil ground

#### 10.79

- 1 Spoil grounds lie about 5 miles W and 10 miles WSW of the entrance to Korangi Creek (24°45'N, 67°05'E) as shown on the chart.

### Rescue

#### 10.80

- 1 It is reported that three powered lifeboats are maintained at Karāchi, see 1.55.

For further information of rescue see *Admiralty List of Radio Signals Volume 5*.

### Currents

#### 10.81

- 1 Near Karāchi little current is experienced; for further details see 10.9.

### Principal marks

#### 10.82

##### Landmarks:

Chimney (24°47'·1N, 67°08'·3E).

Two chimneys (24°48'·1N, 67°07'·0E); another chimney, from which a flare is emitted, stands close S.

For landmarks at Port Muhammad Bin Qasim see 10.58.

For landmarks at Karāchi see 10.118.

##### Major lights:

Manora Point Light (24°47'·6N, 66°58'·7E) (10.118).

- 3 Rās Muāri Light (black concrete tower, white bands, 51 m in height) (24°49'·5N, 66°39'·9E) stands near the S point of Rās Muāri.

### Other aids to navigation

#### 10.83

- 1 See 10.6.

### Directions

#### 10.84

##### Cautions.

The dredged depths in the channel, and at the berths and moorings, are generally maintained, but are subject to siltation and are liable to change.

Buoys are unreliable and may be missing, unlit or out of position.

- 2 **General information.** If approaching Karāchi from S or W, Manora Point is usually the first land sighted.

The best approach is with Manora Lighthouse bearing about 040° until Fairway Light-buoy K (safe water) moored 3 miles SSW of Manora Point, is sighted and closed.

- 3 **South-east approach.** From a position SW of Ahsan Channel (24°34'N, 67°04'E) the route leads 12 miles NW to a position SW of Fairway Light-buoy K, passing:

- 4 SW of a wreck (24°42'·0N, 66°59'·1E) with a depth of 10 m over it; another wreck with a depth of 3.2 m over it lies 2 miles NE. Both wrecks lie in the red sector of Bara Andai Light (24°47'·8N, 66°59'·9E) (10.121). Thence:

To a position SW of Fairway Light-buoy K.

- 5 **West approach.** From a position SW of Rās Muāri (Cape Monze) (24°50'N, 66°40'E), a bluff sloping headland with Harahi its highest point about 5 cables inland; the route leads 20 miles E to a position SW of Fairway Light-buoy K, passing (with positions from the radio mast (24°50'·7N, 66°47'·3E) (10.85));

- 6 S of Beauchamp Reef (10.156) (11 miles W), thence: Clear of an area, the position of which is approximate, in which unexploded ordnance exists (10 miles SSW). Anchoring and underwater operations should not be carried out in the vicinity of this area. Thence:

- 7 S of Nancowry Shoal (9 miles WSW) consisting of a series of sand, gravel and coral ridges which lie on the inshore part of a spit that extends 3¾ miles SW from Rās Muāri, thence:

Clear of a dangerous wreck (10½ miles SW), the position of which is approximate, thence:

- 8 S of Buleji Point (2 miles E) which is low and sandy with a shoal spit extending 1½ miles S; some detached shoals lie about 1 mile farther S. Further detached shoals lie, closer inshore, up to 3¾ miles WSW of the point. Thence:

- 9 Clear of a dangerous wreck (6½ miles SSE) with a shoal patch, that has a depth of 17 m over it, lying

in an approximate position 1½ miles SSW of the wreck. Thence:

- 10 S of a wreck with a swept depth of 10·6 m over it (7¼ miles SE); another wreck with a swept depth of 9·3 m over it lies about 1½ miles N. Thence:
- 11 S of a wreck with a swept depth of 0·1 m over it (9 miles ESE) which is marked close W by a light-buoy (green, can); a foul area, with a depth of 14 m over it, lies 6 cables SW of the wreck. Thence:
- 12 To a position SW of Fairway Light-buoy K.

### Useful marks

#### 10.85

- 1 Sun Well Oil Rig No 1 (unlit) (24°42'·7N, 67°04'·2E). Aero light (24°53'·7N, 67°09'·2E). Mauripur Aero Light (elevation 14 m) (24°52'·8N, 66°56'·5E). Radio mast (red, white bands) (24°50'·7N, 66°47'·3E) from which obstruction lights are exhibited. Mian Mirza Bor (24°51'N, 66°43'E) the highest peak of the Jhil Range.
- 2 For useful marks at Karāchi see 10.121.

### Ghizri Creek and Korangi Creek

Chart 58

### General description

#### 10.86

- 1 Ghizri Creek and Korangi Creek, the N-most creeks draining the swamps of the Indus Delta, flow into the sea via a common mouth located between the sand dunes, described at 10.74, and the N end of Bundal Island, 1 mile SE. There are drying sandbanks adjoining the shore on each side of the entrance, off which, the sea breaks; a shallow bar, extending about 3 miles seaward, encompasses the entrance. There is a channel leading across the bar with a least depth about 1·4 m, but there are lesser depths close on each side.

### Local knowledge

#### 10.87

- 1 Local knowledge is required before an entry into Korangi Creek (10.86) is attempted.

### Landing place

#### 10.88

- 1 There is a T-shaped jetty extending from the base of a sandy bluff, 2½ miles within Korangi Creek (10.86) on its N bank, close S of the town of Korangi (24°47'N, 67°08'E).

### Korangi Fish Harbour

#### 10.89

- 1 A fishing harbour has been constructed about 4½ miles upstream of Korangi. The harbour has been developed to relieve congestion at Karāchi's fisheries harbour; it offers 1350 m of jetty extending into the deep water of the creek and facilities to handle 90 000 tonnes of fish annually.
- 2 The fishing harbour may be approached via Ahsan Channel (10.56) and Phitti Creek (10.56) following the directions for Port Muhammad Bin Qasim (10.59); thence through a buoyed channel, that leads about 1½ miles NW, from Qutub Point (10.63) to Korangi Creek and the vicinity of the fish harbour.

### Hawkes Bay

### General description

#### 10.90

- 1 **Position.** Hawkes Bay (24°51'N, 66°52'E), a shallow bight about 4 miles across, is situated E of Buleji Point. **Dangers.** There are a number of dangers located within the bay, including:
  - A reef and foul ground extending about 1 mile SE from Buleji Point at the W end of the bay.
  - 2 A detached dangerous rock lies 1¾ miles ENE of Buleji Point. A reef, with 2 detached rocks lying close S, extends about 5 cables SSW from the E end of the bay.
  - 3 **Submarine cable.** A cable is laid S, from the head of the bay, thence W and WSW passing about 4½ miles S of Rās Muāri, as shown on the chart.

### KARĀCHI HARBOUR

### General information

Charts 40, 58

### Position

#### 10.91

- 1 Karāchi (24°50'N, 66°59'E) is situated in the NE corner of the Arabian Sea about 17½ miles E of Rās Muāri.

### Function

#### 10.92

- 1 Karāchi is the largest city and the principal port of Pakistan, and was the capital of Pakistan from its independence in 1947 until 1970 when the capital was moved to Islamabad; its port is the gateway to the fertile regions of the interior, and it is the base for the Pakistan Navy.
- 2 The commercial section of the port handles a very wide variety of products, imports are principally crude oil, refined petroleum products, edible oils, machinery, fertilisers and grain; exports include raw cotton, rice, textiles and hand crafts. In 2004, the population is estimated to be about 9·2 million.

### Topography

#### 10.93

- 1 The town and port area stand on generally low terrain which is fronted by long stretches of sand dunes and large areas of mangroves.
- 2 On the W side of the port, between Manora Point Lighthouse (24°47'·6N, 66°58'·7E) and a point on the coast 2 miles NW, several large white buildings, most with flagstaffs, stand onshore. On the E side of the harbour entrance an extensive sand and mud bank, which dries, fronts the sea wall.

### Offshore features

#### 10.94

- 1 **Dangey Patches**, consisting of some rocky heads, lie 1½ miles SW of Manora Point Lighthouse.
- 2 **Oyster Islands**, 1 mile ENE of Manora Point Lighthouse, consist of Bara Andai and Baur Islands; Pyramid Rock, with several other smaller rocks nearby, lies close N of Baur Island and Chota Andai Island, another small island, lies 1¾ cables farther NNW.
- 3 Two dangerous wrecks lie in shallow water, respectively, 4 cables SSW (with a depth of 1·4 m over it) and 3 cables WSW (with a depth of 2·4 m over it) of Bara Andai Light.

**Port limits****10.95**

- 1 The seaward limits of the port are bounded by an arc of radius 12 miles from Manora Point (24°47'·3N, 66°58'·8E) as shown on the chart.

**Approach and entry****10.96**

- 1 The port is approached through a dredged channel marked by light-buoys, which is entered between a breakwater extending 2½ cables SSE from Manora Point (24°47'·3N, 66°58'·8E) and another breakwater extending ¾ cables SSE from Keamari Groyne, 8 cables N; it is planned to extend the latter breakwater.

**Traffic****10.97**

- 1 In 2003 the port was used by 1495 vessels with a total dwt of 11 704 554.

**Port authority****10.98**

- 1 Port Authority is exercised by the Karāchi Port Trust, Eduljee Dinshaw Road, Karāchi, Pakistan.

**Limiting conditions****Controlling depths****10.99**

- 1 **Channels and harbour areas.** Dredging of the channels is continuous to maintain the depths shown on the chart and those recorded in this volume; however, silting is liable to occur during the SW monsoon, see also 10.84.
- 2 The following depths are maintained as far as possible:
- |                                   |        |
|-----------------------------------|--------|
| Approach channel                  | 12·2 m |
| Lower Harbour (S part)            | 11·3 m |
| Lower Harbour (NW part)           | 8·2 m  |
| Upper Harbour                     | 9·1 m  |
| New Channel (W of Naval Dockyard) | 7·6 m  |
| Fish Harbour                      | 3·0 m  |

**Deepest and longest berth****10.100**

- 1 Oil Pier 1 (10.127), see also 10.103.

**Tidal levels****10.101**

- 1 See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 2·0 and 1·2 m.

**Density of water****10.102**

- 1 Density of water is about 1·025 g/cm<sup>3</sup>.

**Maximum size of vessel handled****10.103**

- 1 It is reported that tankers up to 305 m LOA and 11·9 m draught can be handled at Oil Pier 1 (10.127), and that dry cargo vessels up to 288 m LOA and 9·8 m draught can be accepted.

**Local weather and sea state****10.104**

- 1 During the SW monsoon, heavy swell will be encountered in the outer anchorage and the approach to the port; also at this time visibility is much reduced due to suspended dust in the atmosphere.
- 2 Fog or mist may be experienced at dawn and dusk during the winter months.

**Arrival information****Port operations****10.105**

- 1 **Arrival general.** The port is open for day and night navigation but local weather conditions (10.104) and port regulations (10.112) restrict the movement of some vessels. A port operations and information service is maintained through Manora Pilot Control; vessels should contact Manora Pilot Control.
- 2 Delays before entry into the harbour may be experienced; however, these delays can sometimes be minimised by arriving off the port before 0700.
- 3 **Port working.** Normal working hours in the port are from 0730 to 1630 and 1900 to 0330 with overtime extending to 24 hour working.
- 4 **Tankers.** Oil tankers will save time in discharging if advance information of their desired order of discharge is provided before arrival; also if aviation fuel, for which a laboratory test report has to be made, is discharged last.

**Port radio****10.106**

- 1 For details see *Admiralty List of Radio Signals Volume 6(4)*.

**Notice of ETA required****10.107**

- 1 Forty eight hours before arrival via the agents.

**Prohibited anchorages****10.108**

- 1 Anchoring is prohibited within the area, shown on the chart, which extends 5 miles SW from the close vicinity of Manora Breakwater Head (24°47'·1N, 66°58'·9E).
- 2 Anchoring and fishing are prohibited in an area extending 2 miles seaward between SSE and SW from the rifle range situated on the coast about 2 miles NW of Manora Breakwater Head; the limits of the area are shown on the chart.

**Outer anchorage****10.109**

- 1 **Caution.** During the SW monsoon vessels should not anchor off Karāchi; several ships have lost anchors and cables in the outer anchorage whilst attempting to do so.



- 2 **General anchorage.** From September to May vessels can anchor off Karāchi Harbour as convenient, outside of the prohibited anchorage area that extends SW from Manora Breakwater, according to draught and clear of the charted dangers. Vessels are advised not to anchor in depths less than 9 m; and, during April and May it is recommended they anchor farther offshore in depths not less than 12 m.

### Pilots and tugs

#### 10.110

- 1 **Pilotage** is compulsory for merchant vessels of more than 200 nrt; it is provided day and night subject to tides, length and draught. Pilots board about 3 miles SW of Manora Breakwater Head in the vicinity of Fairway Light-buoy K (24°44'·7N, 66°57'·2E).
- 2 If, because of adverse weather conditions, a pilot cannot be sent out the signal station (10.115) will inform vessels to that effect.
- 3 Waiting stations are allocated by Manora Pilot Control. A vessel awaiting a pilot should be hove to, with head to wind and sea; thence, on approach of the pilot cutter, vessels must bring the wind and sea on the port quarter and embark the pilot on the starboard side.
- The pilot change over time is 0700.
- For details see *Admiralty List of Radio Signals Volume 6(4)*.
- 4 **Tugs** are available, vessels using tugs must also use the services of a pilot.

### Requirement for local knowledge

#### 10.111

- 1 It is dangerous for vessels to proceed within 2 miles of the harbour entrance without local knowledge; under no circumstances should a merchant vessel or foreign warship attempt to enter harbour without a pilot.

### Regulations concerning entry

#### 10.112

- 1 **Caution.** Before entering harbour, the controlling depths for the port (10.99) should be confirmed with the local authority. However, under normal circumstances the following parameters apply.
- 2 **Cargo vessels and tankers.** It is reported that cargo vessels 288 m or less in length and drawing up to 9·75 m; also tankers 259 m or less in length and drawing up to 11·58 m when berthing at Oil Piers 1 and 2; are both normally permitted to enter harbour at any stage of the tide. These vessels may only sail between low water and 1 hour before high water.
- 3 **Vessels with the bridge aft** and over 160 m in length are only berthed during daylight hours.

### Quarantine

#### 10.113

- 1 A vessel in which there have been either more than 2 cases of dangerous infectious disease, or in which more than 2 deaths have occurred during the 12 days prior to arrival at Karāchi, must anchor in the Quarantine Anchorage, as shown on the chart, at the entrance to the harbour NE of Manora Point. Vessels in quarantine must not enter the harbour during the hours of darkness.

## Harbour

### General layout

#### 10.114

- 1 Karāchi Harbour is divided principally into two main parts, namely Lower and Upper Harbours. Most moorings and all oil piers are located in Lower Harbour, which is situated within the harbour entrance and extends about 1½ miles NNW; all other alongside berths are in Upper Harbour which extends generally NNE from Lower Harbour for about 2 miles.
- 2 The Naval Dockyard and berths are located on the S end of a peninsula lying between Upper Harbour and New Channel, about 3 cables W; Fish Harbour extends NNE from New Channel.

### Traffic and storm signals

#### 10.115

- 1 **Offshore traffic signals.** A signal station, for communicating with vessels outside of the harbour, is located in the conspicuous tower (24°47'·6N, 66°58'·6E) (10.118) that stands on Manora Peninsula.
- 2 **Harbour traffic signals.** A signal station for communicating with vessels inside the harbour stands near the root of Pilot Pier (24°47'·9N, 66°58'·5E); another signal station, with a clock tower situated close N, stands on East Wharf, 1½ miles N of Pilot Pier.
- 3 **Storm signals** are displayed from the offshore traffic signal station described above and from the N entrance point of Boat Basin, 1½ miles N of the offshore signal station; the general system is used. See 1.45.

### Climate

#### 10.116

- 1 For details see climatic table 1.221.

### Tidal stream

#### 10.117

- 1 **Outer anchorage.** The in-going tidal stream in this anchorage sets E; and the out-going stream, which is barely perceptible, sets W.
- 2 **Harbour.** Little information is available, but in general the tidal streams conform broadly to the direction of the buoyed channel, attaining reported rates of 1½ to 3 kn at springs and 1 kn at neaps. During spring tides, rates of about 1½ kn have been experienced 1 hour either side of high water. The out-going stream sets onto Merewether Wharf (24°49'·1N, 66°58'·4E) (10.131).

### Principal marks

#### 10.118

- 1 **Landmarks:**
- Manora Point Light (24°47'·6N, 66°58'·7E), see below.
- Signal Station (white lattice tower) (24°47'·6N, 66°58'·6E), a flagstaff stands close SSE.
- Flagstaff (24°48'·0N, 66°58'·4E) stands on a large building.
- 2 Chimney (24°50'·2N, 66°58'·5E).
- Water tank (24°50'·6N, 66°58'·7E).
- Tower (24°50'·8N, 66°59'·6E).
- Keamari Beacon (24°49'·2N, 67°00'·1E).



3 **Major light:**

Manora Point Lighthouse (red round tower, white bands, black base, white cupola, 38 m in height) (24°47'·6N, 66°58'·7E) stands 3½ cables NNW of Manora Point.



Manora Point Lighthouse from NE (10.118)

(Original dated 1997)

(Photograph – Crown Copyright)

### Directions for entering harbour

#### Approach

##### 10.119

#### 1 Cautions:

Bright lights within Karāchi Harbour, in the vicinity of East Wharf (24°49'·8N, 66°58'·7E), can be seen from well to seaward; care must be taken to avoid confusing them with navigational lights.

2 See 10.84 and the Note on Chart 40 regarding dredged depths and buoyage.

#### Entry

##### 10.120

1 **General information.** Vessels should enter Karāchi Harbour preferably on the first or last of the in-going tidal stream. If berthing during the SW monsoon it is advisable to let go an anchor in mid-stream to assist in hauling-off.

#### 2 Leading Lights:

Front light (framework tower) (24°47'·2N, 66°59'·6E).  
Rear light (similar structure) (840 m NE of front light).

3 From the vicinity of Fairway Light-buoy K (24°44'·7N, 66°57'·2E) (10.84) the alignment (040°) of these lights leads 3 miles NE through a dredged channel marked by light-buoys (lateral) to the harbour entrance, passing (with positions from the front light):

4 NW of a dangerous wreck (2¾ miles S) which has a swept depth of 1·7 m over it and is marked close SW by a light-buoy (starboard hand), and:



Karāchi Approaches Leading Lights from SW (10.120)

(Original dated 1997)

(Photograph – Crown Copyright)

SE of a dangerous wreck (2½ miles WSW) which has a swept depth of 5 m and is marked close W by a light-buoy (green, can), thence:

5 SE of a dangerous wreck (1½ miles SW) which has a swept depth of 5·6 m and is marked close WSW by a light-buoy (green, conical), thence:

SE of a dangerous wreck (1¼ miles WSW) which is marked close SE by a buoy (green, conical), thence:

6 Vessels should be guided by the light-buoys marking the dredged channel leading N then NNW through the Lower Harbour (10.125) and noting the following dangers within the harbour fairway:

Deep Water Point Rock (Bare Rock) (1 mile NW), which sometimes dries. P7 Light-buoy (port hand) lies 1 cable E.

7 A stranded wreck (2¼ miles NW), the position of which is approximate, lies close W of No 6 mooring berth.

#### Useful marks

##### 10.121

1 Manora Breakwater Head Light (elevation 15 m) (24°47'·1N, 66°58'·9E).

2 Manora Point (24°47'·3N, 66°58'·8E), a steep cliff at the S end of a narrow hill; the point is reported to be radar conspicuous at 17 miles.

Bara Andai Light (white square building, 4 m in height) (24°47'·8N, 66°59'·9E).

3 Stranded wreck (24°46'·8N, 67°00'·5E), with 2 more stranded wrecks lying, respectively, 2 cables and 1 mile NE.

Water tower (24°48'·8N, 67°02'·1E).

Aero light (24°53'·7N, 67°09'·2E).

### Directions for leaving harbour

#### General information

##### 10.122

1 It was reported (1995) that merchant vessels are not permitted to leave the port on the out-going stream.

2 When leaving harbour the pilot disembarks at the harbour entrance; from this position vessels should steer in the dredged channel, with the leading lights described at 10.120 in line (040°), astern, until seaward of Fairway



Breakwater Light

Manora Point Lighthouse

Manora Point from SE (10.121)

(Original dated 1997)

(Photograph – Crown Copyright)



Manora Point Breakwater Light from S (10.121)

(Original dated 1997)

(Photograph – Crown Copyright)

Light-buoy K (10.84). Thence, on no account should vessels bring Manora Lighthouse to bear less than 030° because of heavy rollers and swell on the edge of the flats to the E.

### Berthing areas, berths and basin

#### Depth information

##### 10.123

- 1 **Project depths** at all berths are shown in a table on the chart.

**Actual depths** available at the various berths are subject to change and are promulgated bi-annually, pre- and post-SW monsoon, by the Dock Master to vessels' agents.

#### Debris

##### 10.124

- 1 Debris in the waters of the harbour can cause frequent suction strainer blockage.

#### Lower Harbour

##### 10.125

- 1 **Description.** Lower Harbour extends from the harbour entrance, 1½ miles NNW, to the S end of East Wharf.

- 2 Sālehābād and Bunker Island are now incorporated in reclaimed land; Bhit and Bāba Islands lie on mudbanks on the W side of Lower Harbour. Bhit and Bāba Islands are low and sandy with many wooden fishermen's huts standing on them, and with fishing boats and local trading craft anchored off; Yari Creek leads W between these islands, and Bāba Pool lies abreast Bhit Island.

- 3 On the E side of Lower Harbour, N of Keamari Groyne which forms the SE part of the W bank, there is a large tank farm and a refinery adjacent to the tanker berths; some of the tanks are painted black to resemble houses.

##### 10.126

- 1 **Manora Jetties** is the collective name for several piers located on the NE side of Manora Peninsula which extends NW from Manora Point; these include Qāsim Pier, Pilot Pier, Crane Pier, Passenger Pier, Rahbar Pier and Workshop Pier. The positions of these piers are shown on the chart.

- 2 Boat work at the above piers is rather hazardous on the in-going stream and during the SW monsoon when a heavy swell may roll into the outer harbour.

##### 10.127

- 1 **Oil Berths and Basin.** Three tanker berths are situated off the E side of Lower Harbour, and are connected to the shore by piers; Boat Basin adjoins the oil berths N.

- 2 **Oil Pier 1 (O.P.1)**, the S-most berth, is 321 m long with a dredged area of 13.4 m orientated NNW/SSE alongside the central platform, the breasting and mooring dolphins flanking each side of the central platform stand in much shallower water. The maximum permitted draught at this berth is 11.9 m. There is a turning basin abreast the berth with a dredged depth of 10.4 m. A dangerous wreck lies close inside the W limit of the turning basin.

- 3 **Oil Pier 2 (O.P.2)**, situated N of O.P.1, adjoins the dredged channel; it is flanked on N and S sides by breasting and mooring dolphins.

- 4 **Oil Pier 3 (O.P.3)**, the N-most berth, adjoins the dredged channel; it is flanked on N and S sides by breasting and mooring dolphins.

##### 10.128

- 1 **Moorings.** Head and stern moorings, Nos 3-9, are situated on the W side of Lower Harbour fairway between Bunker Island and Bāba Pool.

**LASH Vessels' Moorings**, Nos 1-2, are situated abreast Bunker Island.



- 2 **Berthing arrangements.** Stern cable and mooring boats are provided by the Port Authority. Vessels should let go an anchor in mid-stream to enable them to haul off when leaving; but care is required for the holding ground is bad and the anchor may come home.

**10.129**

- 1 **Naval jetty.** A berth, with an adjoining slipway, lies on the S bank of Yari Creek (10.125) about 4½ cables W of Bhit Island.

**Upper Harbour****10.130**

- 1 **Description.** Upper Harbour is formed on the E side by East Wharf (orientated NNE/SSW about position 24°49'8N, 66°58'7E), and on its W side by West Wharf. Upper Harbour extends SSW to the coastal bank off Bhit and Bāba Islands (10.125), and NNE to Chinna Creek, Bunder and Jinnah Bridges; which carry the railway and road to the mainland. Keamari, a small town built on a sand ridge, lies E of the S part of East Wharf.

**10.131**

- 1 **East Wharf** is the collective name for all the wharves on the E side of Upper Harbour; these wharves are from S, their usage is as shown below:

| <i>Berth No</i> | <i>Usage</i>                                 |
|-----------------|----------------------------------------------|
| 1-4             | Merewether Passenger Wharf and Multi-purpose |
| 5-17            | Multi-purpose                                |

**10.132**

- 1 **Miscellaneous berths:**

Two ship repair berths are situated N of No 17 berth. Napier Mole Boat Wharf, curves NE from the above ship repair berths to Chinna Creek Bridges, it is used by local craft.

**10.133**

- 1 **West Wharf** has 7 nine berths along its berthing face, their usage is as shown below:

| <i>Berth No</i> | <i>Usage</i>              |
|-----------------|---------------------------|
| 22-23           | Lighterage                |
| 24              | Multi-purpose             |
| 25              | Heavy lifts               |
| 26-27           | Multi-purpose and tankers |
| 28-30           | Container Terminal        |

**10.134**

- 1 **Juna Bundar Wharf,** situated at the head of Upper Harbour on its N side provides 4 four berths, Nos 18-21, numbered from E, their usage is as shown below:

| <i>Berth No</i> | <i>Usage</i>  |
|-----------------|---------------|
| 18              | Heavy lifts   |
| 19-21           | Multi-purpose |

**New Channel****10.135**

- 1 **Description.** New Channel is entered from N end of the Lower Harbour and extends generally N for about 1 mile with the Naval Dockyard on the E side and mudflats and a shallow bank to the W. A training wall, extending 9¼ cables SSW from the Fish Harbour, is marked at its head by a light-beacon (white, 5 m in height).

- 2 **Naval Dockyard.** located at the SSW end of the peninsula that divides Upper Harbour and New Channel, has 4 berths, Nos 1-4, situated SSW of West Wharf (10.133) and 9 berths, Nos 5-13, at the SSW end of New Channel.

- 3 **Shipyard berths.** There are lay-by berths at the shipyard situated NNE of Naval Dockyard.

**Fish harbour.** There are numerous berths for fishing vessels, at the well-equipped modern fish harbour, adjoining the NNE end of New Channel.

**Port services****Repairs****10.136**

- 1 **Naval Dockyard.** There is a dry dock on its E side of the Naval Dockyard.

- 2 **Commercial Dockyard.** There are 2 dry docks opening into New Channel that are owned by Karachi Shipbuilding and Engineering Works, a company which undertakes extensive hull and engine repairs and also provides a small repair shop for minor work. There is also a small dry dock at Manora.

- 3 **Largest dry dock:**

Commercial Dry Dock No 1: length 185.75 m; width 27.00 m; vessels up to 26 000 dwt and draught 4.72 m; depth on sill at MHWS 8.53 m.

- 4 **Outer Anchorage.** Limited repairs can be effected at the anchorage except during the monsoon season.

**Other facilities****10.137**

- 1 De-ratting and exemption certificates issued. Hospitals, civil and military. Static 300 tonnes container crane. Floating cranes, largest 125 tonnes capacity. Wide variety of cargo handling arrangements. Vessels fitted with fire and salvage pumps.

**Supplies****10.138**

- 1 Diesel oil by lorry. Fresh provisions. Potable and boiler water at wharves or by barge; supply is limited by seasonal shortage, between May and August, to 200 tonnes or less. It should be noted that the quality of water supplied is often poor and it may be require treatment before usage.

**Communications****10.139**

- 1 International airport 10 km. Main line railway terminus.

**Harbour regulations****10.140**

- 1 The port of Karāchi is a restricted area within which no photography is permitted; all cameras are collected and sealed.

Radio and radar equipment is sealed.

Main engines may not be immobilised unless permission from the Port Authority has been obtained.

**Small craft****10.141**

- 1 **Manora** (24°47'8N, 66°58'6E). Numerous small craft moorings are situated in shallow water on the E side of the peninsula NW of Deep Water Point Rock (10.120), as shown on the chart.

**Bunker Island** (24°48'5N, 66°58'1E) (10.125); the N part of this island is occupied by the Karāchi Yacht Club.

**Bāba Pool** (24°49'1N, 66°58'0E) (10.125) affords good anchorage for small craft.

## RĀS MUĀRI TO ASTOLA ISLAND (COAST OF LAS BELA)

## GENERAL INFORMATION

Chart 38

**Topography****10.142**

- 1 The coast of Las Bela, which extends from the mouth of Hab River (24°53'3N, 66°41'6E) N and NW for about 50 miles and thence W for about 125 miles to Khōr Kalamat (25°20'N, 64°04'E), is chiefly an uninhabited wilderness of hills and cliffs sloping to swamps or desert plains.

**Depths****10.143**

- 1 Vessels navigating off the coast of Las Bela should keep outside of the 50 m depth contour, closing the land, if so obliged, with caution and sounding continuously. Charted depths are reported to be unreliable following volcanic disturbances in 1945.

**Supplies****10.144**

- 1 Very few supplies can be obtained from the villages on the coast of Las Bela.

## OFFSHORE ROUTE

## General information

Charts 58, 39, 38

**Route****10.145**

- 1 From a position SW of Rās Muāri (24°50'N, 66°40'E) the route leads generally W for about 155 miles to a position S of Astola Island.

**Topography****10.146**

- 1 The coast of Las Bela is described in general at 10.142. Along this route, the coast is backed in the E part by Pab Mountains and to the N by the Hāro Range of mountains (10.165); more detailed descriptions of local topography can be found in the relevant parts of the text later in the chapter.

**Currents****10.147**

- 1 See 10.9.

**Submarine and naval exercise areas****10.148**

- 1 See 10.11.

**Principal marks****10.149**

- 1 **Landmarks:**  
Chimney (24°54'3N, 66°41'5E) (10.155).  
Churna Island (24°54'N, 66°36'E) (10.155).
- 2 **Offshore mark:**  
Astola Island (25°07'N, 63°51'E) (10.182).
- 3 **Major lights:**  
Manora Point Light (24°47'6N, 66°58'7E) (10.118).  
Rās Muāri Light (24°49'5N, 66°39'9E) (10.82).  
Ormāra Light (25°11'1N, 64°41'1E) (10.173).  
Astola Island Light (25°07'4N, 63°50'5E) (10.173).

## Directions

**10.150**

- 1 From a position SW of Rās Muāri (24°50'N, 66°40'E) and clear of Nancowry Shoal (10.84), which extends 3¾ miles SW from Rās Muāri, the route leads generally W to a position S of Astola Island, passing:  
S of Beauchamp Reef (24°50'N, 66°35'E) (10.156), thence:  
S of the peninsula of Ormāra (25°11'N, 64°38'E) (10.178), on which stands a light, thence:  
2 S of Astola Island (25°07'N, 63°51'E) (10.182), on which stands a light (10.173); Webb Bank (10.174) lies 4½ miles S of the island.  
(Directions continue at 10.192)

## SONMIANI BAY

## General information

Charts 58, 39, 38

**Description****10.151**

- 1 **Position.** Sonmiani Bay is entered between Rās Muāri (24°50'N, 66°40'0E) and Rās Kachari, 58 miles NW.
- 2 **Local industries.** There is a ship-breaking industry in the bay located close N of Phuuri village (25°05'N, 66°43'E); vessels are beached and then broken up. The fishing village of Gadani is situated 3 miles NNE of Phuuri.
- Traffic.** In 2000, 28 vessels with a total dwt of 1 947 913 arrived for breaking up.

**Topography****10.152**

- 1 **General.** For 20 miles N of Rās Muāri the shore of the bay is indented between rocky points. Thence NW and W it becomes sandy and covered by low jungle, with scattered sandhills; a plain, about 20 miles wide in places, backs onto the foothills of the Pab Mountains in the E and to the Hāro Range of mountains NW. The plain is drained by the Titāin Nai River (10.160) which flows through a swamp to enter the sea at the head of Sonmiani Bay.
- 2 **Khalifa Point to Miani Hor.** From Khalifa Point (24°56'5N, 66°40'8E) to a point about 12 miles N, the coastline is generally hilly. Towards the N part of this stretch of coast there are three small bays, separated by rocky points; inland of the S-most bay there are backwaters, one of which has an entrance about 6½ miles N of Khalifa Point. From these backwaters and bays the ground rises abruptly to the S part of the Pab Mountains.
- 3 North of the above hilly coastline to the entrance of Miani Hor, a further 19 miles NW, the coast is bordered by sand hillocks covered with tufts of grass and small bushes.
- 4 **Miani Hor to Rās Kachari.** The N shore of Sonmiani Bay to the W of Miani Hor Entrance (25°24'N, 66°32'E) is low, with sandhills on which there are tufts of grass, as far as a spur of the Hāro Range of mountains, 26 miles W; it is thence low for 11 miles farther W to Chandragūp Hill (10.158).

**Depths****10.153**

- 1 From Khalifa Point to a point about 6½ miles N, the coast is fronted by a bank with depths of less than 5 m out to a distance of 1 to 2 miles; drying and below-water rocks lie on this bank and there are several detached shoal patches. Thence, to the entrance of Miani Hor, the depth



contours almost parallel the shore and depths reduce gradually as it is approached.

### Tidal streams

#### 10.154

- 1 In Sonmiani Bay the tidal streams are weak, the in-going stream sets E and the out-going W, each following the curve of the land.

### Principal marks

#### 10.155

##### 1 Landmarks:

Churna Island (24°54'N, 66°36'E), 5½ miles NW of Rās Muāri Light, is barren and uninhabited. From S, its steep light-coloured hills appear to rise to a peak; from W, it appears flat-topped with sloping sides.

- 2 Chimney (red and white bands on flues, 230 m in height) (24°54'·3N, 66°41'·7E), from which obstruction lights are exhibited, that stands at a power station about 1 mile N of the Hab River mouth.

Water tower (25°12'·0N, 66°45'·7E).

##### 3 Major light:

Rās Muāri Light (24°49'·5N, 66°39'·9E) (10.82).

### Directions

### Entry from south

#### 10.156

- 1 From a position SW of Rās Muāri (24°50'N, 66°40'E) and clear of Nancowry Shoal (10.84), which extends ¾ miles SW from Rās Muāri, the route leads initially NW then N into the bay passing (with positions from Rās Muāri Light):
- 2 SW and W of Beauchamp Reef (5½ miles NW), a narrow ridge of sand and gravel orientated NW/SE, thence:
- 3 W of Churna Island (5 miles NW) (10.155). A shoal ridge of gravel extends NE from Churna Island to the shore, and several detached shoal patches lie off its E and SE sides. Rās Muāri Light (10.82) is obscured over both Churna Island and the shoal patches lying between the island and the shore. The island is used as an air and sea bombardment target. During the SW monsoon it affords little shelter save to small craft anchoring in a lee close inshore. Thence:
- 4 W of Khalifa Point (7 miles N), which is low and sandy, and lies ¾ miles NNW from the mouth of Hab River; detached shoal patches lie up to about 1½ miles off this stretch of coast. Thence:
- 5 W of Kaio (12½ miles N), a rocky islet; foul ground extends E to the shore from the islet. A detached rock, which dries, lies about 8 cables NW of the islet. And:  
Clear of a mooring buoy (13½ miles NNW), thence to the head of the bay.

### Entry from west

#### 10.157

- 1 From a position S of Rās Kachari (25°23'N, 65°47'E), the SE extremity of some low cliffs above which rise a detached group of low hills, the track leads E to the head of the bay; the chart is sufficient guide.

### Useful mark

#### 10.158

- 1 Chandragūp (25°26'N, 65°52'E) which consists of several white conical hillocks standing at the E end of a detached group of low hills.

*(Directions for the coastal passage*

*W of Rās Kachari are given at 10.174)*

### Miani Hor

### Description

#### 10.159

- 1 Miani Hor Entrance (25°24'N, 66°32'E), about 2½ miles across, lies at the head of Sonmiani Bay; the hor extends some 24 miles generally WNW and is about 5 miles wide.
- 2 The village of Sonmiani, 5 miles ENE of the entrance to Miani Hor, is the seaport of Bela, 65 miles N, to which it is connected by road. The village is of drab appearance and hardly identifiable from seaward.
- 3 The harbour of Sonmiani is used only by local craft. Vessels wishing to communicate should anchor off the bar, in a depth not less than 9 m, with Churna Island (24°54'N, 66°36'E) (10.155) bearing about 173°.

### Topography

#### 10.160

- 1 On the E shore of the lagoon, between its entrance and Sonmiani village, there is a mud flat that mostly dries and over which the river Windar Nai discharges during floods. The N shore merges into extensive mangrove swamps. On the W side of the lagoon there is another extensive swamp which is partly covered at high water that extends, within the coastal sandhills, almost to the foot of the Hāro Range of mountains.
- 2 Titāin Nai is a river which discharges, during heavy rains, into the N part of the swamp, at the W end of Miani Hor; the river is dammed about 20 miles inland and its waters are normally absorbed by irrigation.

### Directions

#### 10.161

- 1 The entrance to the lagoon consists of a shoal flat, which dries in places, extending right across the entrance and forming a bar with a maximum depth of about 1·5 m; it is flanked on its E side by East Point which consists of sandy hillocks with a sparse cover of tamarisk, and on its W side by West Point consisting of low bare sandhills. During the SW monsoon seas break heavily across the whole entrance.
- 2 Within the entrance there are several channels, each with varying depths, but no specific channel leads to Sonmiani village; the deepest channel, lying close to the E shore of the lagoon, has reported depths of 9 m. Elsewhere, the lagoon is generally shallow with many drying sandbanks.

### Anchorage

#### 10.162

- 1 In addition to the anchorage off Mina Hor, anchorage can also be obtained in a depth of 9 m in Sonmiani Bay W of the mouth of Phor Nai (25°25'N, 66°02'E) which enters the sea through a small salt water creek, into which the river flows during the rains.

### Minor inlet and river

#### Chart 58

### Mubarak Village

#### 10.163

- 1 Mubarak Village (24°51'·1N, 66°39'·7E), is a fishing village which lies at the N end of a small bay with a sandy

beach located at the end of a valley, about 1½ miles N of Rās Muāri Light.

- 2 Detached hills, the seaward side of which are cliffy, rise between Mubarak Village and Hab River, 2¾ miles NE.

### Hab River

#### 10.164

- 1 Hab River (24°53'3N, 66°41'6E), flows into the sea 4 miles NNE of Rās Muāri Light. Except during freshets there is no fresh water within several miles of its mouth.
- 2 The hills on the S bank of Hab River end about 1 mile within its mouth; upstream of this point, there is a plain on each side of the river. The N side of the entrance to the river is low with a sandy spit extending nearly across the channel. Rathi, a small isolated rocky hill, stands on the N bank a short distance inland.
- 3 The channel of Hab River is tidal and nearly dries; it has depths of about 2.7 m at high water and usually breaks across the entrance. The channel outside the high water mark shifts but, with local knowledge, it is practicable for a ship's boat to navigate. The tidal influence does not extend beyond about 2 miles within the river mouth.

## RĀS KACHARI TO ASTOLA ISLAND

### General information

Chart 38

### Topography

#### 10.165

- 1 **General.** The coast of Las Bela is described in general at 10.142. This stretch of coast is backed in the E part by the Hāro Range of mountains which from seaward appear as a succession of rugged peaks, generally light in colour, with an irregular outline; there are lower whitish clay peaks fronting the range which are locally known as "shur". The central part is backed by the Tāloi Range of mountains.

#### 10.166

- 1 **Rās Kachari to Hingol River.** To the W of Rās Kachari (25°23'N, 65°47'E), for about 5 miles, the coast is cliffy and low; thence to the Hingol River mouth, 10 miles farther W, a ridge of hills about 76 m high slope down towards the coast.
- 2 Jabal Ghurāb, situated 2½ miles W of Rās Kachari, is small and oblong.  
A shoal bank extends about 2½ miles offshore near Jabal Ghurāb with depths of 11 m close to its outer edge.
- 3 Jazirāt Chahārdam, lying off the coast 3 miles W of Jabal Ghurāb, consists of some rocks up to 9 m high which is rather higher than the coast nearby; there is a good landing for boats on the inside of these rocks.
- 4 A small volcanic island was observed in 1945, about 3 miles SW of Jazirāt Chahārdam, but in 1947 it had submerged.

#### 10.167

- 1 **Hingol River to Rās Malān.** Between Hingol River (25°23'N, 65°31'E) (10.177) and Rās Malān, 16 miles W (10.174), the coast is bordered by low sandhills; it is backed by the Jabal Hinglaj (10.175) and Gurangatti (10.175) mountains. Rās Malān has cliffs of clay, capped with limestone, that rise abruptly from the sea along the coast to abreast its summit about 5 miles N; large masses of clay often fall from the sides of the cape.
- 2 Jabal Hab (25°24'N, 65°27'E), 351 m high, stands about 4 miles W of Hingol River.

#### 10.168

- 1 **Rās Malān to Ormāra Bays.** The coast for a distance of 19 miles W of Rās Malān is cliffy and thence to the isthmus of Ormāra, 15 miles WSW, it is sandy and fronted by low sandhills up to 14 m high, with a plain lying inland that extends about 10 miles N to the Tāloi Range of mountains.
- 2 Batt, the coastal highland extending W from Rās Malān, is intersected by the Hor Batt, a salt water lagoon with a sandy bar between it and the sea; a great water course runs into the lagoon from a gorge in the mountains. To the W of Hor Batt the mountains gradually become lower.
- 3 Chandra Kūp (25°22'N, 64°40'E) (10.175), has a group of about twelve small white mud volcanoes standing about 2 miles ESE; a single mud volcano, 20 m high, stands about 1 mile W of the hill.
- 4 Khōr Maniji, 18 miles W of Rās Malān, is shallow but, for a short period after the rains, it becomes the mouth of a small river; Khōr Gurād, 5 miles farther W, is similar. Both inlets are used by local boats.

#### 10.169

- 1 **Ormāra Bays to Khōr Kalmat.** Between Rās Sakanni (25°15'N, 64°28'E), the NW entrance point of West Bay (10.180), and Rās Basōl, 13 miles WNW; the coast is bordered by continuous cliffs, about 240 m high, of light colour and irregular outline but without any distinctive peaks. The cliffs form the sea face of the Kāmgar Hills, between which, and the Tāloi Range of mountains to the NE there is a wide plain.
- 2 The bay between Rās Basōl, at the W end of the cliffs described above, and Khōr Kalmat, 10 miles WNW, is shallow with a straight low sandy shore.
- 3 Basōl Kaur, a river flowing from the valley lying between the Tāloi Range of mountains and the Tālār Hills (10.181) to the W, enters the sea 1½ miles WNW of Rās Basōl; the land near the river is low and swampy.

### Depths

#### 10.170

- 1 See 10.143.

### Currents

#### 10.171

- 1 See 10.9.

### Submarine and naval exercise areas

#### 10.172

- 1 See 10.11.

### Principal marks

#### 10.173

- 1 **Landmarks:**  
Radio mast (25°12'5N, 64°37'8E) at Ormāra.  
Water tower (25°11'9N, 64°38'4E) at Ormāra.
- 2 **Offshore mark:**  
Astola Island (25°07'N, 63°51'E) (10.182), which is table-topped and mainly bordered by vertical cliffs consisting of soft clay, rubble and ironstone conglomerate.
- 3 **Major lights:**  
Ormāra Light (grey metal framework tower on white base, 8 m in height) (25°11'3N, 64°41'2E), stands on the summit of East Point (10.179).  
Astola Island Light (elevation 89 m) (25°07'4N, 63°50'5E), stands close W of the centre of the island.

## Directions

## 10.174

- 1 From a position S of Rās Kachari (25°23'N, 65°47'E) (10.157) the route leads generally WSW for about 108 miles to a position S of Astola Island (25°07'N, 63°51'E) passing:
- 2 SSE of Rās Malān (25°19'N, 65°14'E), a bluff with a steep face on its seaward side and a level summit, which, from seaward appears as a long light-coloured tableland ending in cliffs; there is a confused mass of lower hills with whitish clay peaks standing between it and Jabal Hinglaj, 17 miles NE. For further details of topography in the vicinity of Rās Malān see 10.167. Thence:
- 3 SSE of a dangerous wreck (25°08'·7N, 64°54'·2E), which lies 1½ miles S of the E extremity of Rodrigues Shoal (10.178); the shoal extends from 2 to 12 miles E of the peninsula of Ormāra (25°11'N, 64°38'E) (10.178), and is marked near its W end by an isolated danger light-buoy. Thence:
- 4 SSE of Rās Ormāra (25°09'N, 64°35'E) (10.178); a shoal with 4·4 m of water over it lies 5 cables S. Thence:
- 5 SSE and S of Webb Bank, a narrow ridge which is steep-to on its S side and with irregular depths extending 4½ miles N to Astola Island (10.182). The sea breaks on parts of Webb Bank during the SW monsoon. An 8·2 m shoal lies about 6 miles farther W. A wide berth should be given to this locality.

## Useful marks

## 10.175

- 1 Jabal Hinglaj (25°31'N, 65°26'E) a wedge-shaped mountain.  
Gurangatti (25°38'N, 65°21'E) is a remarkable square topped mountain, resembling a castle with bastions, its sides appearing almost vertical.
- 2 Chandra Kūp (25°22'N, 64°40'E) a white cone-shaped hill with a mud crater stands, on the plain fronting the Tāloi Range of mountains, about 4 miles inland; in certain lights this feature may appear dark. It should be noted that during strong winds the hill may be obscured by blown sand.

(Directions continue at 10.192)

## Anchorage

## 10.176

- 1 Anchorage may be obtained in the bay NE of Rās Malān (25°19'N, 65°14'E) (10.174), in a depth of 8 m, about 1 mile offshore.

## Hingol River

## 10.177

- 1 **Description.** Hingol River (25°23'N, 65°31'E) can be entered, at high water, by small craft drawing about 1·8 m. The river, the bed of which dries in many places, brings down quantities of driftwood during freshets. It winds around the E side of Jabal Hinglaj (10.175), and then to the coast through a gap in Jabal Hab (10.167). On the E bank of the river, the plain within the coastal sandhills is swampy after rain.
- 2 **Local knowledge** is required.

## Ormāra Bays

Chart 38, plan of Ormāra

## General information

## 10.178

- 1 **Position.** Ormāra peninsula (25°11'N, 64°38'E) extends about 6 miles seaward from an otherwise virtually straight coastline which lies S of the Tāloi Range of mountains, it is flanked on each side by a shallow bay. Ormāra village, consisting of a few stone houses, some mosques and a few mat huts, lies on the E side of the isthmus near its S end.
  - 2 **Function.** The area is the centre of the country's shark fishing industry; for further information, see development below.
  - 3 **Topography.** Rās Ormāra is the SW point of the peninsula which has cliffs on all sides and appears, from S, as wedge-shaped; it is only accessible from S where several valleys break the line of cliffs.
  - 4 A sandy isthmus connects the middle of the peninsula with the mainland N. Sand dunes, from 6 to 18 m high, which change shape in strong winds lie on the isthmus N of Ormāra village.
  - 5 **Development.** It was reported (1997) that the Pakistan Navy had opened a naval harbour, in East Bay (10.179), consisting of a dredged approach channel, two breakwaters, two piers, a wharf and the usual associated facilities. Further development may include a commercial port.
  - 6 **Dangers in the approach.** Rodrigues Shoal, consisting of 2 rocky ridges, with charted depths over them of 4·9 to 10 m, and a gutter between them, lies from about 2 to 12 miles E of the E end of the peninsula; a passage between the shoal and the peninsula has been swept to a depth of 8·2 m. The W end of the shoal is marked by light-buoy (isolated danger), and a dangerous wreck (10.174) lies 1½ miles S of the E end. South of the peninsula there are several isolated shoal patches, extending about 2 miles seaward, as shown on the chart.
  - 7 **Spoil ground** extends 1 miles S from the E ridge of Rodrigues Shoal as shown on the chart.
- Landmarks:**
- Ormāra Lighthouse (25°11'·1N, 64°41'·1E) (10.173).
  - Radio mast (25°12'·5N, 64°37'·8E).
  - Water tower (25°11'·9N, 64°38'·4E).
- 8 **Local weather.** There is usually at least one blow from the E during the SW monsoon, this is accompanied by rain, though not of long duration.
- Facilities:** minor medical; customs post; airfield 4 miles NW.

## East Bay

## 10.179

- 1 **General information.** East Bay (Dīmi Zarr) lies on the E side of the isthmus of Ormāra; it is the bay usually used by vessels anchoring, but it should be noted that it is open to E winds which may blow strongly.
- Tidal streams** in the bay are weak, they set NE and SW following the curve of the land.
- 2 **Mean tidal levels.** See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 1·8 m and 0·9 m respectively.
- Directions.** Chandra Kūp (25°22'N, 64°40'E) (10.175) bearing 345° leads, between East Point (25°11'·4N, 64°41'·9E) and Rodrigues Shoal (10.178), 2 miles E, in depths of about 8·5 m to a position close E of the charted anchorage described below.
- 3 **Anchorage** may be obtained with East Point bearing 179° distant about 2¾ miles, in a depth of 8 m, sand and mud; as shown on the chart.



Small vessels can anchor closer inshore, towards the village, in a depth of about 5 m.

- 4 **Landing** is best effected near the S end of the sand dunes, N of the village, in a position about 6 cables N of a small white dome; boats drawing about 1.5 m can approach here to within ½ cable of shore at half tide.

### West Bay

#### 10.180

- 1 **General information.** West Bay (Padi Zarr) lies on the W side of the isthmus of Ormāra; it provides the best anchorage during E winds but communication with the shore is less easy and, being open W and SW, the bay is seldom used.
- 2 **Anchorage** may be obtained in the bay, with the W end of Ormāra Peninsula bearing 180° distant about 2¼ miles, in depths of 4 m.

### Khōr Kalmat

Chart 38

#### 10.181

- 1 **General information.** Khōr Kalmat (25°20'N, 64°04'E) is the largest inlet on the coast of Las Bela; the entrance, about 1 mile wide, is fronted by a bar, with a depth of 0.1 m 2 miles SSE of the entrance, over which the sea breaks. There are two channels leading across the bar; it is reported that local craft of 2.7 m draught enter the inlet by the E channel, and that the W channel has depths of about 2 m.
- 2 Within the inlet there are depths of up to 25 m about 1 mile N of the entrance. Farther inland the khōr widens and branches into several creeks which, beyond the range of the tides, form the mouths of water courses.  
Tad village, situated on the W side of the khōr, contains a few houses; this small village is the only permanent habitation in the neighbourhood.
- 3 **Topography.** The land in the vicinity of Khōr Kalmat is very low with mangrove swamps. Tālār Hills extend ENE, from a position about 28 miles WNW of the entrance to the khōr, and approach the W end of the Tāloi Range of mountains.

## ASTOLA ISLAND TO GWATĀR BAY (MAKRĀN COAST)

### GENERAL INFORMATION

Chart 38

#### Topography

#### 10.183

- 1 The Makrān Coast extends in a generally W direction from Khōr Kalmat (25°20'N, 64°04'E) to the frontier of Iranian Makrān (25°11'N, 61°37'E), a distance of about 135 miles. The coast is indented by several large bays which are backed by mostly barren terrain and mountain ranges.

#### Depths

#### 10.184

- 1 Vessels navigating off the Makrān Coast should keep outside of the 50 m depth contour, closing the land, if so obliged, with caution and sounding continuously. Charted depths are reported to be unreliable following volcanic disturbances in 1945.

**Tidal streams** in the entrance to Khōr Kalmat are strong.

- 4 **Entry** into Khōr Kalmat is made difficult by the tidal stream and by rocks lying about 1 mile seaward of the bar, local knowledge is required before an approach is made.

### Astola Island

Chart 38

#### General information

#### 10.182

- 1 **Position.** Astola Island (25°07'N, 63°51'E) lies 17 miles SW of the entrance to Khōr Kalmat; the island, and the shoal water surrounding it, extends across much of the SE approaches to Pasnī Bay (10.194).
- 2 **Function.** The island is normally uninhabited, but it is used by fishermen during the NE monsoon; also it is visited by Hindus and Pasnī Meds, as a place of pilgrimage, who land at the NE point of the island whence the ascent is steep and tortuous.
- 3 **Topography.** The island, which is described as viewed from seaward at 10.173, is covered with small scrub.  
**Fauna.** At certain seasons the island abounds with small venomous snakes.
- 4 **Offshore features and dangers.** Sail Rock (Gurāb) lies 7 cables S of the island, it is steep-to, and appears like a boat under sail; a wreck, with a depth of 1.5 m over it, lies about 1¼ miles ESE of the rock and a wreck with a swept depth of 3 m over it lies close E of the island.  
In the middle of the N side of the island, a sand spit extends 3 about cables seaward.
- 5 **Major light:** Astola Island Light (25°07'·4N, 63°50'·5E) (10.173).  
**Directions.** Vessels should not pass between Sail Rock and the island; also, the entire coast should be given a wide berth to ensure passing well clear of the dangerous wrecks described above and other offlying dangers. Local knowledge is required before an approach to the island is made.
- 6 **Small craft.** There is a small boat harbour located towards the NW corner of the island.

#### Supplies

#### 10.185

- 1 Very few supplies can be obtained from the villages on the Makrān Coast.

## ASTOLA ISLAND TO GWĀDAR BAYS

### General information

Chart 38

#### Route

#### 10.186

- 1 From a position S of Astola Island (25°07'N, 63°51'E) the route leads about 85 miles W to a position S of Gwādar peninsula.

#### Topography

#### 10.187

- 1 The Makrān Coast is described in general at (10.183). Along this route the coast is backed, in the E by the Tālār Hills (10.181) and in the centre by the Chakūli Koh range of mountains, these are a continuation of the Tālār Hills, that lie parallel to the coast about 17 miles inland; in its W



part, the Koh-i Daram mountain range, which is separated from the Chakūli Koh range by the Save Kaur Valley (see below) lies parallel to the coast about 5 miles inland.

- 2 Between Jabal Zarain (25°12'·6N, 63°29'·6E) and a position about 8 miles W the coast is generally straight and backed by sand dunes. Thence to Rās Shamai Bandar (10.192), a further 15 miles W, the low coast forms a shallow bay which is apparently bordered by desert but, it is fertile in places a short distance inland. West of Rās Shamai Bandar, for about 18 miles, the coast is cliffy and rises a short distance inland, in the E part, to a long jagged ridge of precipitous white clay hills about 140 m high; except in a few places, along this stretch of coast, there is no beach at low water. The remainder of the coast, W to Jabal Sur, is sandy and rises to low hills with principally white clay peaks.

- 3 Save Kaur flows into a large salt water creek through one of the gaps in the hills N of its mouth (25°15'N, 62°51'E).

### Depths

#### 10.188

- 1 See 10.184.

### Currents

#### 10.189

- 1 See 10.9.

### Submarine and naval exercise areas

#### 10.190

- 1 See 10.11.

### Principal marks

#### 10.191

- 1 **Landmarks:**

Radio mast (25°16'·2N, 63°28'·5E), at Pasnī. Jabal Zarain (25°12'·6N, 63°29'·6E), a hill 126 m in height, brown in colour and shaped like a barn when seen from E or W but from S it appears as a long notched ridge with sloping ends; from a distance it looks detached from the low land upon which it stands.

- 2 **Major lights:**

Astola Island Light (25°07'·4N, 63°50'·5E) (10.173).

- 3 Gwādar Light (25°06'·0N, 62°20'·8E) stands near the centre of the peninsula, about 2 miles W of Rās Nūh (10.192).

- 4 Pasnī Light (25°12'·5N, 63°29'·3E) stands on the S side of Jabal Zarain.

### Directions

(continued from 10.150 and 10.175)

#### 10.192

- 1 From a position S of Astola Island (25°07'N, 63°51'E) the route leads W to a position S of Gwādar peninsula (25°06'N, 62°19'E) passing (with positions from Jabal Zarain (25°12'·6N, 63°29'·6E)):

- 2 S of Jabal Zarain (10.191) on which Pasnī Light, (10.191) stands, and clear of an unexploded ordnance (14 miles S), thence:

- 3 S of Rās Shamai Bandar (23 miles W) a bluff point, that stands on the first high land W of Jabal Zarain. A steep-to reef extends about 1½ miles offshore; vessels should not approach into depths of less than 11 m. Thence:

- 4 S of Rās Shāhid (27 miles W); a shoal patch with a depth of 19·1 m over it lies 13 miles SSW of the point. Thence:

- 5 S of a dangerous wreck (41½ miles W), the position of which is approximate, which lies 4 miles S of Rās Kappar (25°15'N, 62°46'E), the S end of a table-topped hill with bluff extremities; Kappar, a small village, lies close to the coast near the point. Thence:

- 6 S of a shoal patch with a depth of 12·1 m over it (50 miles W), thence:

S of a shoal patch with a depth of 18·1 m over it (54 miles W), thence:

- 7 S of Jabal Sur (56 miles W) a small wedge-shaped white clay hill, that rises steeply, with a vertical cliff at its E end; a low sandy isthmus connects it to the mainland and a small sandy bay lies close N. From E, Jabal Sur appears detached from the mainland. Thence:

- 8 S of Rās Nūh (25°06'N, 62°23'E), a prominent point at the E end of Gwādar peninsula. It has high white bluffs, and from E appears as a wedge-shaped island but from S and SW it is less remarkable, though it shows darker than the land backing it; a temple stands close to the bluff.

### Useful marks

#### 10.193

- 1 Clarke Peak (216 m high) (25°21'N, 63°33'E), the tallest peak that stands near the W end of a continuous ridge of peaks.

Bārñ (25°26'N, 62°35'E), which is the summit of the Koh-i Daram mountain range.

- 2 Mukh (25°27'N, 62°31'E), a prominent peak 891 m high, which stands about 4½ miles W of Bārñ in the Koh-i Daram mountain range.

(Directions continue at 10.215)

### Pasnī Bay and Pasnī

Chart 38, plan of Pasnī

### General information

#### 10.194

- 1 **Position.** Pasnī Bay is situated at the W end of a large indentation in the coast between the entrance to Khōr Kalmat (25°20'N, 64°04'E) and Jabal Zarain, 32 miles WSW. Pasnī town, lies on the W shore of the bay about 4 miles NNW of Jabal Zarain; it straggles inland for several miles and consists mainly of huts with a few permanent buildings.

- 2 **Function.** Pasnī is an important town and fishing harbour being the seaport of Kulānch, a district of Makrān; also it owes some importance to its proximity with Turbat, the headquarters of the administration for Makrān, about 50 miles NNW.

Principal exports are dried fish and dates with small quantities of wool, glue, cotton and mats; imports include general merchandise and oil.

- 3 **Traffic.** Vessels on passage from the Persian Gulf call occasionally, but trade is principally by dhow.

- 4 **Topography.** From the entrance to Khōr Kalmat to a position about 12 miles W the coast is low, with depths of less than 5 m extending up to 5 miles offshore. Farther W, towards Pasnī Bay, the coast gradually rises and is backed by continuous ridges of whitish-clay peaks (locally called "shur"), thence it merges into the barren shore of the bay; there is no vegetation in the area save for a few date palms growing S of Pasnī town. A mass of high white sandhills stand SW of the town with a number of "shur" to the N of them. In the bay between Jabal Zarain (10.191) and Rās

Jaddī, 1¼ miles NNE, a group of clay hills of fantastic shape and about 46 m high stand 1½ cables inland.

- 5 Shādi Kaur, a large shallow creek, entered 1½ miles N of Pasnī is encumbered at its mouth by drying banks and protected on its S side by a narrow sandy ridge.

### Limiting conditions

#### 10.195

- 1 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 2.0 m and 1.1 m respectively.
- 2 **Local weather and sea state.** During the SW monsoon a considerable swell runs into Pasnī Bay, with Rās Jaddī (10.194) giving little protection. A heavy swell breaking along the shore makes cargo working difficult and often impossible.

### Directions

#### 10.196

- 1 Vessels approaching Pasnī from SE should give Astola Island a wide berth; for details of dangers see 10.182.  
**Major light:** Pasnī Light (25°12'·5N, 63°29'·3E) (10.191).  
**Useful mark:** stranded wreck (25°17'·6N, 63°31'·8E).

### Harbour, anchorage and services

#### 10.197

- 1 **Harbour.** A fishing harbour with 3 piers protected by N and S breakwaters lies near the town (10.194).
- 2 **Anchorage** may be obtained in a depth of 6.4 m, sand, with Rās Jaddī bearing about 194° distant 2¼ miles; or farther offshore in depths of 7 m.  
**Medical:** government hospital.  
**Communications:** road to inland towns and Karāchi; air to Karāchi and Gwādar, during dry weather only.  
**Small craft.** Boats can enter Shādi Kaur (25°16'·5N, 63°28'·5E) (10.194) around the time of high water.

## Gwādar and Gwādar Bays

Chart 38, plan of Gwādar

### Gwādar

#### 10.198

- 1 **Position and description.** Gwādar town (25°08'N, 62°19'E) is composed largely of mat huts but it also contains a number of mud and stone buildings, including a prominent mosque, grouped around Wali's Fort (10.200).
- 2 **Function.** A small port with 3 jetties, reportedly for vessels to 1000 dwt, and fishing vessels.  
**Traffic** In 2003 the port was used by 3 vessels with a total dwt of 18 064.
- 3 **Topography.** Gwādar town lies on a low, narrow, sandy isthmus which connects a rocky peninsula with the mainland N; there are a few date palms and banyan trees near the populated area. To the E and W of this peninsula lie, respectively, Gwādar East and West Bays.
- 4 **Historical background.** Gwādar, and an area of more than 300 square miles surrounding it, formerly held by the Sultan of Muscat and Oman, were handed over to Pakistan in 1958.

#### 10.199

- 1 **Harbour development.** Plans have been formulated (1996) to dredge the approach channel, with a depth of about 10.5 m, for vessels of up to 50 000 dwt to berth at 3 offshore multi-purpose berths, each about 200 m long; the berths are expected to be connected to the shore by a causeway.

#### 10.200

- 1 **Tidal levels.** See information in *Admiralty Tide Tables Volume 3*. The average maximum and minimum tidal ranges are about 1.8 m and 0.8 m respectively.
- 2 **Principal mark:**  
Gwādar Light (25°06'·0N, 62°20'·8E) (10.191).
- 3 **Useful marks:**  
Wali's Fort (25°08'·3N, 62°19'·4E) a white square building, with a high tower and a tall flagstaff standing at its SE corner, is prominent from both Gwādar East Bay and West Bay.
- 4 The telegraph office, a large block of buildings, stands 5 cables S of Wali's Fort and N of the main town area.  
Water tower (25°06'·2N, 62°22'·4E).

#### 10.201

- 1 **Facilities:** hospital; customs post.  
**Communications:** local airport.  
**Small craft.** Local small craft land in either Gwādar East Bay or West Bay, boats being hauled up on the shelving beach.
- 2 **Fishing boats** frequent Bandar Hairān, a small bay situated on the S coast of the peninsula about 8 cables WSW of Rās Nūh (10.192); it has a sandy beach fronting low cliffs.

### Gwādar East Bay

#### 10.202

- 1 **Position.** Gwādar East Bay (Dīmi Zarr) lies on the E side of Gwādar Isthmus, it is entered between Jabal Sur (25°13'N, 62°29'E) (10.192) and Rās Nūh (10.192), 8¾ miles SW.
- 2 **Topography.** Except for the N side of the peninsula that extends W from Rās Nūh, which is cliffy, the shores of the bay are low and sandy.  
**Depths.** A flat, over which are depths from about 2 to 5 m, extends from 1 to 2 miles into the bay from the isthmus.
- 3 **Offlying feature.** A rocky spit extending about 1 mile S from Rās Nūh is usually marked by a ripple and, during the SW monsoon, by breakers.

#### 10.203

- 1 **Cautions:**  
In hazy weather, if not bound for Gwādar, vessels should keep in depths more than 37 m.  
At night, a good lookout should be kept for fishing boats and canoes with their nets out.
- 2 **Directions.** If approaching from E, vessels should keep in depths of 20 to 25 m; thence even if the weather is hazy it should then scarcely be possible to pass this rocky peninsula without sighting it.
- 3 If approaching from W it is inadvisable, especially during hazy weather, to enter depths of less than 22 m until Rās Nūh bears less than 350°.

The harbour is approached between buoys (lateral) moored 1½ miles NW of Rās Nūh, thence through an unmarked channel leading WSW to the harbour.

#### 10.204

- 1 **Port.** The main jetty extends about 410 m ENE from the shore with 2 further jetties close N and 5 cables S, forming Gwādar Mini Port
- 2 **Anchorage.** A vessel may anchor in Gwādar East Bay with Rās Nūh bearing about 160° distant 2¼ miles in a depth of 6 m, sand and shell; as shown on the chart. Local vessels anchor closer inshore, as draught permits, in order to obtain smoother water and to facilitate communication with the town.

- 3 **Small craft.** There is a boat harbour on the N side of the peninsula 4 cables W of Rās Nūh.

### Gwādar West Bay

#### 10.205

- 1 **Position.** Gwādar West Bay (Padi Zarr) lies on the W side of Gwādar Isthmus, it is entered between Rās Kamaiti (25°06'4N, 62°15'3E) (10.215) and Rās Pishūkān (10.215), 9 miles W.
- 2 **Topography.** The shores of Gwādar West Bay are generally flat except near Toshdān Kūh, situated off the NW part of the bay, where a range of low hills stand near the shore; a fort stands in the vicinity of the hills.
- 3 **Depths.** A flat, over which there are depths from about 2 to 5 m, extends from 1 to 2 miles into the bay from the isthmus and up to about 1 mile in most other parts; there is a detached shoal patch, with a depth of 4.9 m over it, about 4½ miles N of Rās Kamaiti, and a shoal with a depth of 9.1 m over it lies 3 miles ESE of Rās Pishūkān (10.215).
- 4 **Pishūkān,** a small village, lies on the W side of Gwādar West Bay 1½ miles NW of Rās Pishūkān.

**Akāra Kaur** is a small stream at the head of Gwādar West Bay with marshy land lying nearby.

#### 10.206

- 1 **Directions.** When approaching the E anchorage (see below) in Gwādar West Bay take care to avoid the spit extending S and SW of Rās Kamaiti and the charted shoals lying farther off the point.
- 2 **Anchorage** may be obtained on the E side Gwādar West Bay, in a depth of 7.3 m, with Rās Kamaiti bearing 198° distant about 1¼ miles; or on the W side of the bay, in the same depth, with Rās Pishūkān bearing 182° distant about 3 miles.

### Shelter

Chart 38

#### 10.207

- 1 Small vessels obtain some shelter from W winds in the W part of the bay E of Rās Shamai Bandar (25°14'N, 63°05'E) (10.192); for dangers off the point see 10.192.

## GWĀDAR BAYS TO GWATĀR BAY

### General information

Chart 38 with plan of Gwādar

#### Route

#### 10.208

- 1 From a position S of Gwādar peninsula (25°06'N, 62°19'E) the route leads about 50 miles W to a position S of Damāgheh-ye Pas Bandar.

### Topography

#### 10.209

- 1 The Makrān Coast is described in general at (10.183). The E part of this stretch of coast is backed by the Koh-i Daram mountain range which decreases in height to the W and ends abruptly in Gar-e Kūh (10.216); lower hills of clay front the range and a wide plain, which is partly cultivated and supports a few scattered villages, extends

from the foot of the range to the root of the isthmus of Gwādar (10.198).

- 2 The W part of this coastline is fronted by remarkable hills with rugged peaks, among which stand pillars of clay, that rise a short distance inland and extend W nearly to Dasht Kaur (25°10'N, 61°40'E); inland of these hills lies the great plain of the Dasht. Further detailed descriptions of local topography can be found in the text later in the chapter.
- 3 From Rās Pishūkān (25°06'N, 62°05'E) (10.215) to a position 12 miles W, the coast is virtually straight and low; thence to Rās Ganz (10.215), 4 miles SSW, it consists of a succession of rocky cliff points, separated by sandy beaches. Katāgar, a promontory, separates Rās Ganz from Gwatār Bay to the W; its S side, extending 7 miles W from Rās Ganz to Rās Jiwani, is an almost unbroken line of cliff with sandy beaches at its foot.
- 4 Ganz, 6 miles N of Rās Ganz, is a village of mat huts, amongst which, a small whitewashed mosque is the only permanent building.

### Depths

#### 10.210

- 1 The bottom off the promontories, peninsulas and points of land on this stretch of coast is very uneven, with numerous shoal patches, in depths of less than 20 m. For further details see 10.184.

### Tidal streams

#### 10.211

- 1 Tidal streams off the Gwādar peninsula (25°06'N, 62°19'E) set E and W, their rate is reported as hardly perceptible. However, in June 1927, HMS *Crocus* reported an E-going set of about 4 kn near the shore off Rās Nūh (the E point of the peninsula), at about 1 hour before high water; this was probably due to meteorological effects.

### Currents

#### 10.212

- 1 See 10.9.

### Submarine and naval exercise areas

#### 10.213

- 1 See 10.11.

### Principal marks

#### 10.214

- 1 **Landmark:**  
Kuh-e Pusht (25°06'5N, 61°23'0E), formerly called Castle Hill because of its fort-like appearance, is a square rocky hill whose summit can be seen over the lower hills fronting it when bearing less than 340°.
- 2 **Major lights:**  
Gwādar Light (25°06'0N, 62°20'8E) (10.191).  
Jiwani Light (25°01'8N, 61°48'6E), stands on the coast about 2½ miles W of Rās Ganz (10.215).

### Directions

(continued from 10.193)

#### 10.215

- 1 From a position S of Rās Nūh (25°06'N, 62°23'E) (10.192) the route leads W to a position S of Damāgheh-ye



Pas Bandar (25°04'N, 61°25'E), passing (with positions from Jíwani Aero Light (25°04'·2N, 61°48'·2E)):

- 2 S of Rās Kamaiti (25 miles E), a cliff 21 m high standing at the W point of Gwādar peninsula. Depths of less than 10 m extend up to 1¼ miles S of the peninsula between Rās Nūh and Rās Kamaiti, and there is an isolated patch with 2 m of water over it 7 cables offshore and midway between the points. Thence:
- 3 S of Rās Pishūkān (16 miles E), a ridge of narrow rocky cliffs 6 m high with a rocky spit, on which the sea breaks, extending 3½ cables ESE from it. A shoal with 9·1 m of water over it lies 3 miles ESE in the entrance approach to West Bay (10.205) Thence:
- 4 S of Rās Ganz (3½ miles SE), the bluff point of a promontory which is light in colour and 61 m high; the point forms a good landmark when seen from W. Thence:
- 5 S of Rās Garnān (¾ miles SSW), a point with a cliff 6 m high, which projects 5 cables S of the line of higher cliffs that back it; a spit, which appears to dry, extends from its W side. Thence:
- 6 S of Rās Jíwani (4½ miles SW), a point 30 m high; depths of 11 m or less extend 3 miles S of the point. Thence:  
S of a shoal with a depth of 9·4 m over it (18 miles WSW) in the W entrance to Gwatār Bay. Thence:
- 7 To a position S of a dangerous wreck (23 miles WSW) which lies 5 miles S of Damāgheh-ye Pas Bandar, the W entrance point of Gwatār Bay, which is a cliff about 14 m high that stands at the E end of a promontory with a line of rocks lying close offshore. Depths of less than 10 m extend up to 3½ miles S and 5 miles W of the point, from which a light (10.216) is exhibited.

### Useful marks

#### 10.216

- 1 Jabal-i Mehdī (25°13'N, 62°25'E), a precipitous white clay ridge with vertical cliffs on its S side, rises abruptly from the plain at the root of Gwādar Isthmus; the outline of the ridge is remarkable in the form of a sugar loaf. The Asses Ears stand 2 miles W of the summit; and, a little lower, there is another curious double peak. From E, this ridge appears detached from the mainland.
- 2 Batel Hill (25°07'N, 62°19'E), stands on the N side of Gwādar peninsula; the hill slopes down to the cliffs which face the peninsula on all sides.  
Kūh Sājidi (25°33'N, 62°17'E), is the summit of a mountain range, orientated E/W, about 20 miles inland.
- 3 Gar-e Kūh (25°23'N, 62°09'E), this mountain takes the form of two great vertical steps descending from its summit.  
Jíwani Aero Light (control tower, 9 m in height) (25°04'·2N, 61°48'·2E).
- 4 Drabhol Kūh (25°19'N, 61°39'E), a detached table-topped hill with sloping sides.  
Gavāter Fort (25°09'·5N, 61°30'·0E), a prominent white fort with two towers on its W side, stands in Gavāter village (10.223).
- 5 Damāgheh-ye Pas Bandar Light (framework tower, elevation 15 m) (25°03'·8N, 61°25'·4E) stands on Damāgheh-ye Pas Bandar Point.

*(Directions are continued in the Persian Gulf Pilot)*

### Bandar Ganz

#### 10.217

- 1 Bandar Ganz, entered between Rās Pishūkān (25°06'N, 62°05'E) (10.215) and Rās Ganz, 14 miles WSW, affords shelter to small vessels during W winds about 1 mile offshore in depths of 6 m.

### Gwatār Bay

#### Chart 38

#### General information

#### 10.218

- 1 **Description.** Gwatār Bay (25°05'N, 61°35'E), is entered between Rās Jíwani (25°01'N, 61°44'E) (10.215) and Damāgheh-ye Pas Bandar (10.215), 17 miles W.
- 2 **Topography.** The E shore of Gwatār Bay, for 3½ miles N of Rās Jíwani, is cliffy; farther N it is sandy with rocky hills rising a short distance inland. The hills near the shore are of even outline but behind them there are others of fantastic shapes of which the highest, in the form of a remarkable pillar, is very prominent.  
At the head of the bay, which is low, there are several creeks and mangrove swamps extending several miles inland.
- 3 The W shore of the bay is a succession of bluff points, separated by sandy beaches, behind these the land rises to table-topped hills.
- 4 **Depths and hydrography.** The gradual decrease of soundings towards the coast S of Gwatār Bay is a useful guide to vessels approaching at night or in thick weather.  
There are several detached shoals with depths less than 10 m in the approaches and some within the bay; also, a rocky shoal extends about 3½ miles N from Rās Jíwani. These known dangers are shown on the chart.
- 5 The water in the bay and its approaches becomes discoloured after heavy rain and there is much driftwood.  
In 1915 depths in the bay were reported to have shoaled.  
The bottom of the bay and its approaches consists of white clay, very tenacious and gritty.

#### International boundary

#### 10.219

- 1 The approximate boundary between Pakistan and Iran extends N from a boundary pillar (No 256) located on the seaward edge of sand dunes 2½ miles W of the entrance to Dasht Kaur (25°10'N, 61°40'E).

### Eastern side of Gwatār Bay

#### 10.220

- 1 **Description.** Jíwani, a village consisting of mat huts, stands 1¼ miles N of Rās Jíwani on low rocky cliffs. The main occupation is fishing; the fish is exported through Gwādar (10.198), 32 miles E.  
Jíwani Kaur enters Gwatār Bay 7 miles NNE of Rās Jíwani.
- 2 **Landing.** There is good landing, even during the SW monsoon, in a bay 1½ miles N of the W end of Rās Jíwani. A white rectangular stone fort stands, a little inland, at the head of this bay. The coastline in this vicinity, as charted, was reported in 1921 to be only approximately correct. Local knowledge of the offlying dangers (10.218) is required before a landing is attempted.
- 3 **Climate.** For details see climatic table 1.222.  
**Facilities:** dispensary; customs post.  
**Communications:** airfield 5 km ENE of Jíwani; road to Karāchi and Gwādar.

**Dasht Kaur****10.221**

- 1 **Description.** Dasht Kaur (25°10'N, 61°40'E), the largest river on the Makrān Coast, flows from the NNE and passes E of Drabhol Kūh (25°19'N, 61°39'E) (10.216) and thence into the head of Gwatār Bay. The entrance to the river was reported in 1916 to be 2 cables wide, lying between flat sandy banks, and to be encumbered by a bar over which the sea breaks during the SW monsoon; the bar and breakers extend about 1 mile S from the coast. The river is tidal for about 12 miles from its mouth but it is only about ½ cable wide in places, at such points depths may reach 6 m when the river is in flood; the general depth, about 10 miles upstream, is only about 0.6 m with a tidal rise from 0.6 to 0.9 m.

- 2 **Local knowledge.** It is recommended that entry into Dasht Kaur is not made without local, and up-to-date, knowledge; however, the following directions may be used as a guide to aid an approach and entry.

**10.222**

- 1 **Directions.** Passage over the bar, to the E of the breakers, could be made by keeping a grass-covered sandhill near the shore on the W side of the entrance in line with the third distant peak W of Drabhol Kūh Range of hills bearing 338° and keeping in a depth of 1.2 m.

Course should not be altered into the river until the sandy spit on the E bank is well clear of the E end of Drabhol Kūh. Thence, for the first 2 miles the E bank should be followed, but above this position the greater depths were found to be on the concave sides of the bends in the river.

**North-western side of Gwatār Bay****10.223**

- 1 **Description.** Rūdkhāneh-ye Bāhū Kalāt flows into Gwatār Bay, 8 miles NNE of Damāgheh-ye Pas Bandar (25°04'N, 61°25'E), as the combined mouth of two streams. It has a shallow bar but is deep inside and tidal for some distance although, after rain, the water is fresh for several miles from the entrance.

Gavāter, a village, stands on the S side of the mouth of Rūdkhāneh-ye Bāhū Kalāt.

- 2 **Dangers in the approach.** South Islet, 33 m high, and North Islet, which is lower, lie about 1 mile E of Damāgheh-ye Pas Bandar; these two small rocky islets stand close together on a reef with foul ground extending all round for about 4 cables.

- 3 **Shelter.** A small bay on the N side of Damāgheh-ye Pas Bandar affords shelter to small craft in depths from about 4 to 7 m, sand and mud.

## INDEX

|                                     |        |                                     |        |                               |        |
|-------------------------------------|--------|-------------------------------------|--------|-------------------------------|--------|
| Aa Galaa                            | 2.46   | Ambu Islet                          | 8.21   | Bada Bela                     | 9.148  |
| Aarah                               | 2.282  | Ambwah Bay                          | 7.119  | Badagara                      | 5.142  |
| Achra Point                         | 7.57   | Amee Shoals                         | 6.176  | Badaidhidhdhoo                | 2.435  |
| Achra Point Light                   | 7.57   | Amindivi Islands                    | 2.522  | Badchidhar Point              | 6.136  |
| Achra River                         | 7.70   | Amini                               | 2.524  | Bāga Point                    | 6.216  |
| Achuvil; see Moti Gudda             | 6.127  | Amini Island Light                  | 2.524  | Bagad River                   | 8.125  |
| Adam's Bridge                       | 4.131  | Ammāpattinam                        | 3.239  | Baindūr                       | 6.109  |
| Adam's Peak                         | 1.85   | Amroli                              | 8.56   | Baindūr Head                  | 6.100  |
| Adatra Point                        | 9.51   | Anai Parai Hills                    | 5.19   | Baindūr River                 | 6.109  |
| Addoo Atoll                         | 2.19   | Anaimalai Hills                     | 5.112  | Baitkal; see Baitkol          | 6.132  |
| Addoo Atoll Lagoon                  | 2.46   | Ānaipār Island                      | 4.211  | Baitkol                       | 6.132  |
| Addoo Kandu; see Equatorial Channel | 2.51   | Ānalaitivu                          | 3.222  | Baitkol Bay                   | 6.132  |
| Adharan Faru Light                  | 2.448  | Anchorage Reef                      | 5.133  | Baitkol Cove                  | 6.151  |
| Adjakal Rock                        | 6.69   | Andambanmalai                       | 3.175  | Baitkol Gudda                 | 6.149  |
| Adunda Rock                         | 5.17   | Androth                             | 2.518  | Baitkol Point                 | 6.132  |
| Agacaim Point                       | 6.180  | Androth East Light                  | 2.519  | Baitkol Rock                  | 6.147  |
| Agāshi Bay                          | 8.36   | Androth West Light                  | 2.519  | Baker Rocks                   | 3.91   |
| Agastya Malai                       | 5.19   | Angala                              | 4.53   | Bālāchadi                     | 9.153  |
| Agatti                              | 2.515  | Angria Bank                         | 7.3    | Bālāchadi Roads               | 9.153  |
| Agatti Light                        | 2.516  | Anhenunfushi                        | 2.356  | Bālāchadi Rocks               | 9.119  |
| Aghnāshini River                    | 6.119  | Anjadip Island                      | 6.126  | Balapitiya Point              | 4.64   |
| Agolhitheemu                        | 2.380  | Anjanvel                            | 7.109  | Bambara House Pier            | 3.153  |
| Aguada Bay                          | 6.220  | Anjanvel Bay                        | 7.109  | Bambri Rocks                  | 3.21   |
| Rescue                              | 6.220  | Anjarakandi River                   | 5.170  | Bān Creek                     | 8.147  |
| Aguada Head                         | 6.218  | Anjengo                             | 5.43   | Banāra Gudda                  | 6.149  |
| Aguada Light                        | 6.216  | Anjengo Light                       | 5.34   | Banasuram                     | 5.171  |
| Ahivahfushi                         | 2.352  | Arabian Basin                       | 1.160  | Banbikauguda                  | 6.117  |
| Ahmedabad                           | 8.187  | Āramda                              | 9.20   | Bandar Hill                   | 7.156  |
| Ahnakal                             | 5.21   | Āramda Beacon                       | 9.20   | Bandar Hill Light             | 7.151  |
| Ahsan Channel                       | 10.56  | Āramda Reefs                        | 9.22   | Bandidhoo Maa Kandu           | 2.158  |
| Leading Lights                      | 10.61  | Arangala Point                      | 4.63   | Bandos Maa Gaa                | 2.267  |
| Ahungalla Point                     | 4.63   | Arge Cape                           | 6.132  | Bāndra Point                  | 8.23   |
| Aidhoo                              | 2.365  | Arge Island                         | 6.126  | Bānkot                        | 7.131  |
| Ajād Tāpu                           | 9.67   | Ari Atoll                           | 2.176  | Baptista Shoals               | 9.210  |
| Akāra Kaur                          | 10.205 | Ariadhoo                            | 2.180  | Bar Reef                      | 4.126  |
| Akasachetiya                        | 3.58   | Ariadhoo Kandu: 3°25'N, 72°50'E     | 2.171  | Bar Sand: Revadanda           | 7.160  |
| Akhāli Island                       | 7.34   | Ariadhoo Kandu; Ari Atoll           | 2.180  | Bara Andai                    | 10.94  |
| Akirifushi                          | 2.264  | Ariakaduva River                    | 6.10   | Bara Andai Light              | 10.121 |
| Āku Pīr                             | 9.153  | Arivara                             | 2.46   | Baraveli Kandu                | 2.413  |
| Akurala Point                       | 4.62   | Arnāla Island                       | 8.21   | Barbelyn Light                | 4.61   |
| Ala Gala                            | 4.53   | Arnāla Light                        | 8.22   | Barda Hills                   | 8.212  |
| Alang                               | 8.150  | Arripu Reef                         | 4.136  | Bare Rock;                    |        |
| Alang Light                         | 8.140  | Aruakalu Tower                      | 4.127  | see Deep Water Point Rock     | 10.120 |
| Ālantalai                           | 4.169  | Arugam Bay                          | 3.80   | Bari Beacon                   | 9.230  |
| Ālantalai Shoals                    | 4.167  | Arundel Shoal                       | 4.145  | Bārman Hill                   | 8.78   |
| Albert Edward                       |        | Āsār Māta Temple                    | 9.92   | Bārñ                          | 10.193 |
| Breakwater Head Light               | 9.99   | Asdhoo                              | 2.257  | Barnacle Rock                 | 7.263  |
| Albuquerque Rocks                   | 6.176  | Asdhoo Kandu                        | 2.258  | Baron's Cap                   | 3.92   |
| Alia Bet                            | 8.144  | Ashtamudi Backwaters                | 5.37   | Baros                         | 2.267  |
| Alibāg                              | 7.164  | Ashuera Hill                        | 7.188  | Barren Hill                   | 6.165  |
| Alibāg Creek                        | 7.164  | Asses Ears: Makrān                  | 10.216 | Barry Shoal                   | 9.181  |
| Alibāg Outer Reef                   | 7.150  | Asses Ears: Sri Lanka               | 3.78   | Baru Creek                    | 8.95   |
| Alifushi                            | 2.382  | Astola Island                       | 10.182 | Basavarajadurg Island         | 6.114  |
| Aligau                              | 2.395  | Astola Island Light                 | 10.173 | Basōl Kaur                    | 10.169 |
| Alimathaa                           | 2.221  | Atalhua Point                       | 3.20   | Basōl, Rās                    | 10.169 |
| Alleppey                            | 5.58   | Atlas Rock                          | 3.61   | Bassas de Pedro               | 2.539  |
| Alleppey Light                      | 5.49   | Āttangarai                          | 3.239  | Bassein Creek                 | 7.250  |
| Allhuras Kandu                      | 2.381  | Attupella                           | 4.62   | Bassein Oilfield              | 7.15   |
| Alligator Rock                      | 3.93   | Auranga River                       | 8.65   | Basses Ridge, Reef, Light,    |        |
| Alparqueiros Point                  | 6.177  | Ava Point                           | 3.167  | see under Great Basses Ridge, |        |
| Alphée Shoal                        | 3.89   | Aversa Hills; see Guddadevara Betta | 6.125  | Little Basses Ridge, etc.     |        |
| Alu Gala                            | 4.53   | Azhikkal                            | 5.168  | Bataina Gala                  | 4.56   |
| Alut Gala                           | 4.74   | Azhikkal Light                      | 5.152  | Batel Hill                    | 10.216 |
| Alut Ground                         | 4.38   | Azhikod Light                       | 5.112  | Bathalaa; Ari Atoll           | 2.188  |
| Amaduwa Point                       | 3.64   | Aziz Point                          | 10.63  | Bathalaa:                     |        |
| Amanakamunai                        | 3.221  |                                     |        | South Maalhosmadulu Atoll     | 2.363  |
| Amba River                          | 7.251  |                                     |        | Batt                          | 10.168 |
| Ambalangoda Rest House              | 4.65   |                                     |        | Batt Patch                    | 4.145  |
| Ambari Sunv                         | 6.147  | Baarah                              | 2.444  | Batticaloa                    | 3.94   |
| Āmbheta                             | 8.146  | Bāba Island                         | 10.125 | Batticaloa Lake               | 3.94   |
| Ambika River                        | 8.66   | Bāba Pool                           | 10.125 | Batticaloa Light              | 3.90   |
| Āmbla                               | 9.126  | Bachiar Creek                       | 10.32  | Batticaloa Roads              | 3.94   |
| Ambolgarh Bay                       | 7.89   | Back Bay: 8°36'N, 81°15'E           | 3.171  | Baur Island                   | 10.94  |
| Ambolgarh Point                     | 7.89   | Back Bay Light                      | 3.170  | Bazaar Rock                   | 3.171  |
| Ambolgarh Reef                      | 7.89   | Back Bay: Bombay                    | 7.190  | Beacon Rock: Batticaloa       | 3.89   |



- Beacon Rock: Trincomalee ..... 3.111  
 Beauchamp Reef ..... 10.156  
 Bedi Bandar ..... 9.143  
 Bedi Bandar Creek ..... 9.143  
 Bedi Bandar Light ..... 9.148  
 Bekal ..... 6.16  
 Bekal Fort ..... 6.15  
 Beleapani Reef;  
   see Cherbaniani Reef ..... 2.535  
 Belekeri ..... 6.128  
 Belekeri Bay ..... 6.128  
 Belekeri Creek ..... 6.128  
 Belekeri Hill ..... 6.127  
 Belekeri Point ..... 6.128  
 Belekeri Roads ..... 6.128  
 Belikatu Wawa ..... 4.38  
 Bennington Hill ..... 3.90  
 Bentota Ganga ..... 4.65  
 Beriyan Faru ..... 2.374  
 Beruwala Point ..... 4.62  
 Bet Shankhodhār ..... 9.60  
 Betul Point ..... 6.168  
 Beypore ..... 5.116  
 Beypore Light ..... 5.112  
 Beyrumadivaru ..... 2.186  
 Bhādar Creek ..... 8.186  
 Bhādar River ..... 8.228  
 Bhadreswar Temple ..... 9.117  
 Bhagat ..... 7.147  
 Bhagva Channel ..... 8.142  
 Bhagva Creek Light ..... 8.140  
 Bhagwati Bunder Harbour ..... 7.86  
 Bhaidar Tāpu ..... 9.68  
 Bhandārwādi Point ..... 7.102  
 Bharūch ..... 8.146  
 Bharūch Channel ..... 8.146  
 Bharūch Roads ..... 8.145  
 Bhatkal ..... 6.102  
 Bhatkal Fort ..... 6.97  
 Bhatkal Light ..... 6.97  
 Bhatkal River ..... 6.97  
 Bhatya Creek ..... 7.84  
 Bhāvnagar ..... 8.153  
 Bhāvnagar Creek ..... 8.173  
 Bhāvnagar Port ..... 8.153  
   Arrival information ..... 8.162  
   Berths ..... 8.169  
   Directions ..... 8.166  
   General information ..... 8.153  
   Harbour ..... 8.165  
   Limiting conditions ..... 8.161  
   Pilotage ..... 8.163  
   Port services ..... 8.171  
   Small craft ..... 8.172  
 Bhāvnagar Point ..... 8.173  
 Bhawani Temple ..... 8.111  
 Bhāyandar ..... 8.33  
 Bhensala Rock ..... 8.110  
 Bhensla Rock ..... 8.110  
 Bhesla Rock ..... 8.77  
 Bhīmpur ..... 8.52  
 Bhīrbhanjan Beacon Light ..... 8.202  
 Bhīrbhanjan Temple ..... 8.193  
 Bhit Island ..... 10.125  
 Bhubra Rock ..... 7.28  
 Biggs Point ..... 3.153  
 Biheddhootila ..... 2.468  
 Biledhdhoo ..... 2.169  
 Biledhdhoo Kandu ..... 2.169  
 Bileffāhi ..... 2.435  
 Bilikulu ..... 5.157  
 Bimbade Point ..... 6.159  
 Binaga Point ..... 6.132  
 Bingaram ..... 2.515  
 Binge Bay ..... 6.132  
 Bitra ..... 2.533  
 Bitra Light ..... 2.533  
 Bitra Par ..... 2.533  
 Biyaadhoo ..... 2.238  
 Black Point ..... 3.169  
 Black Rock ..... 6.148  
 Black Rocks: Beypore ..... 5.120  
 Black Rocks: Udiyāvara River ..... 6.63  
 Bloomfield Rock ..... 4.38  
 Blunt Channel ..... 9.127  
 Bobby Shoal ..... 9.22  
 Bocha Creek ..... 9.108  
 Bodu Faru ..... 2.369  
 Bodu Kalhi ..... 2.253  
 Bodubados ..... 2.267  
 Bodufarufinolhu Light ..... 2.371  
 Bodufinolhu Reef ..... 2.347  
 Bodugaa Muli Light ..... 2.150  
 Boduhithi ..... 2.264  
 Boduhuraa ..... 2.376  
 Bodulhaimendhoo ..... 2.428  
 Bodumohoraa ..... 2.218  
 Bodunaagoashi ..... 2.449  
 Boifushi ..... 2.352  
 Bojan Chor Channel ..... 2.500  
 Boli Mulah ..... 2.201  
 Bolifushi ..... 2.243  
 Bolissa Faru ..... 2.435  
 Bolt Point ..... 3.79  
 Bomasdhoo ..... 2.428  
 Bombay; see Mumbai ..... 7.191  
 Bombay High Oilfield  
   Development Area ..... 7.14  
 Bombay Island ..... 7.169  
 Boom Cove ..... 3.155  
 Boom Jetty ..... 3.155  
 Bore Rocks ..... 8.185  
 Boria Bay ..... 7.120  
 Boria Bay Light ..... 7.101  
 Boria Point ..... 7.100  
 Boria Reef ..... 9.68  
 Borret Rock ..... 3.100  
 Brancawara ..... 8.94  
 Brancawara Creek ..... 8.94  
 Breaker Bank ..... 8.43  
 Brown Rock Point ..... 3.100  
 Brown Shoal ..... 3.104  
 Brown's Hill ..... 3.19  
 Brum Mudle Rock ..... 7.81  
 Bubasir Rock ..... 9.71  
 Buffalo Rock; see Kambariam Island ..... 6.204  
 Buffaloes Hump; see Banasuram ..... 5.171  
 Builders Point ..... 5.96  
 Buleji Point ..... 10.84  
 Bull's Nose ..... 7.216  
 Bundal Island ..... 10.38  
 Bundala ..... 3.72  
 Bunker Island ..... 10.125  
 Buoyage systems ..... 1.16  
 Burāl Reef ..... 9.68  
 Burāl Reef Light ..... 9.27  
 Burehifasdhoo ..... 2.428  
 Burmana Point ..... 7.67  
 Burmana Reef ..... 7.67  
 Burnt Islands; see Vengurla Rocks ..... 7.27  
 Burondi Bay ..... 7.138  
 Burulu Falhu; see Gaafaru Falhu ..... 2.262  
 Burunee Kandu ..... 2.128  
 Buruni ..... 2.129  
 Butawa Point ..... 3.65  
 Butawa Rock ..... 3.65  
 Butcher Big Reef ..... 7.193  
 Butcher Island ..... 7.202  
 Butcher Light-beacon ..... 7.226  
 Button Rock ..... 6.126  
 Byramgore Reef ..... 2.534  
 Cābo Rajniwas ..... 6.178  
 Calicut ..... 5.135  
 Calicut Light ..... 5.134  
 Calicut Reefs ..... 5.133  
 Calimere, Point; see Point Calimere ..... 3.204  
 Camp Hill ..... 7.147  
 Campal ..... 6.222  
 Cana Paru Reef ..... 4.156  
 Canaguinim Bay ..... 6.167  
 Canaguinim Point ..... 6.167  
 Cāncara Point ..... 6.178  
 Cankarso Island ..... 6.178  
 Cannanore ..... 5.160  
 Cannanore Islands ..... 2.488  
 Cannanore Light ..... 5.149  
 Cape Comorin ..... 4.167  
 Cape Comorin Light ..... 4.165  
 Cape Monze; see Muāri, Rās ..... 10.84  
 Cape Rāma ..... 6.164  
 Cape; see proper name  
 Carlsberg Ridge ..... 1.160  
 Cat Cove ..... 3.154  
 Cavaleiro Light ..... 8.75  
 Cave Point ..... 8.122  
 Chachuda Temple ..... 8.107  
 Chadikal ..... 5.21  
 Chahārdam, Jazirāt ..... 10.166  
 Chakra River ..... 6.84  
 Chakūli Koh ..... 10.187  
 Chalai ..... 3.189  
 Chaldea Rock ..... 7.28  
 Challitivu ..... 3.91  
 Chānch Island ..... 8.112  
 Chānch Point ..... 8.111  
 Chandra Kūp ..... 10.175  
 Chandragiri River ..... 6.18  
 Chandragūp ..... 10.158  
 Chandreshwar Bhūtnāth Temple ..... 6.165  
 Chandri Reef ..... 9.22  
 Chandri Rock ..... 9.50  
 Chānk Reef; see Burāl Reef ..... 9.68  
 Chānk Tāpu ..... 9.68  
 Chānk Tāpu Light ..... 9.27  
 Channel Bank ..... 8.155  
 Chapel Hill ..... 3.103  
 Chapel Hill Light ..... 3.108  
 Chapel Island ..... 3.110  
 Chapel Point ..... 3.103  
 Chapel Rock ..... 3.110  
 Chāpora Fort ..... 6.219  
 Chāpora River ..... 6.225  
 Charts  
   Admiralty charts ..... 1.13  
   Foreign charts ..... 1.14  
 Chaul Bar ..... 7.160  
 Chaul Kadu Reefs ..... 7.150  
 Chaul Kadu Reefs Light ..... 7.151  
 Chaul Knob ..... 7.161  
 Chen Point ..... 3.82  
 Cherbaniani Reef ..... 2.535  
 Chereapani Reef;  
   see Byramgore Reef ..... 2.534  
 Cheriyaakara ..... 2.508  
 Cheriyaakara Light ..... 2.508  
 Cheriyaam ..... 2.509  
 Chetlat ..... 2.531  
 Chetlat Island Light ..... 2.531  
 Chetwai ..... 5.126  
 Chetwai Light ..... 5.112  
 Cheval Bank ..... 4.136  
 Chhachhi Light ..... 9.225  
 Chhād ..... 9.143  
 Chhāra ..... 8.189  
 Chiddle Rock ..... 3.65  
 Chikālin Point ..... 6.177  
 Chilaw Estuary ..... 4.129  
 Chilaw Lake ..... 4.128  
 Chilaw Point ..... 4.127  
 Chimney Hill ..... 3.78  
 China Bay ..... 3.155  
 Chinchani ..... 8.60  
 Chinchani-Tārāpur Creek ..... 8.60  
 Chiplūn ..... 7.116

|                                 |        |                                |        |                                |        |
|---------------------------------|--------|--------------------------------|--------|--------------------------------|--------|
| Chiwallyachi Bandar Bay         | 7.69   | Dabbo Creek                    | 10.34  | Dhigufaruvinagadu              | 2.356  |
| Chombakulu                      | 5.151  | Dābhol                         | 7.109  | Dhigurah                       | 2.187  |
| Chorwād Bandar                  | 8.225  | Dābhol Light                   | 7.113  | Dhigurashu Kandu               | 2.189  |
| Chota Andai                     | 10.94  | Dabolin                        | 6.210  | Dhiththudi                     | 2.200  |
| Chundikulam                     | 3.189  | Daedalus Rock                  | 3.67   | Dhiththudi Light               | 2.202  |
| Churna Island                   | 10.155 | Dahānu                         | 8.62   | Dhiyadhoo                      | 2.88   |
| Churpulti Sand                  | 7.109  | Dahānu Light                   | 8.52   | Dhiyamigili                    | 2.131  |
| Clappenburg Bay                 | 3.153  | Dahej                          | 8.147  | Dholera                        | 8.186  |
| Clappenburg Hill                | 3.104  | Dali Dongar                    | 7.78   | Dholo Pir Dome                 | 9.225  |
| Clappenburg Island              | 3.139  | Damāgheh-ye Pas Bandar         | 10.215 | Dhonaerikadoodhoo              | 2.419  |
| Clappenburg Point               | 3.139  | Damāgheh-ye Pas Bandar Light   | 10.216 | Dhoonidhoo                     | 2.286  |
| Clappenburg Point Beacon        | 3.139  | Damānganga River               | 8.63   | Dhorukandu Dhekunu Huraa       | 2.341  |
| Clappenburg Wharf               | 3.153  | Damānganga River Light         | 8.47   | Dhow Chan Rock                 | 3.175  |
| Clarke Peak                     | 10.193 | Damankul Bay                   | 7.106  | Dhuvaafaru                     | 2.380  |
| Climate and Weather             | 1.178  | Damankul Light                 | 7.104  | Dia Deva; see Butcher Island   | 7.202  |
| Climatic tables                 | 1.204  | Dānda Creek                    | 8.37   | Diamond Hill                   | 3.104  |
| Cochin                          | 5.65   | Dāndi                          | 8.140  | Diamond Point                  | 3.104  |
| Anchorage                       | 5.83   | Dangey Patches                 | 10.94  | Dide ka Bet                    | 9.119  |
| Arrival information             | 5.81   | Danson Peak; see Parvat Gudi   | 6.114  | Diffushi                       | 2.396  |
| Berths                          | 5.100  | Daravandhoo                    | 2.358  | Dighi                          | 7.152  |
| Naval jetty                     | 5.102  | Dart Rock                      | 6.116  | Dighi Hill                     | 7.155  |
| Oil terminal                    | 5.102  | Darya Bahādurgarh Island       | 6.69   | Dikwella                       | 3.32   |
| Product tankers                 | 5.102  | Darya Bahādurgarh Islands;     |        | Dikwella Bay                   | 3.32   |
| Directions                      | 5.94   | see Saint Mary Isles           | 6.65   | Dīmi Zarr; see Ormāra East Bay | 10.179 |
| General information             | 5.65   | Dasht Kaur                     | 10.221 | Diomedea Rock                  | 3.175  |
| Harbour                         | 5.87   | Daughish Peak                  | 6.127  | Direction Bank                 | 7.3    |
| Light                           | 5.92   | Davidson Rock                  | 3.82   | Distress and Rescue            | 1.50   |
| Limiting conditions             | 5.75   | Dayamada Point                 | 6.136  | Diu                            | 8.82   |
| Pilotage                        | 5.84   | Dead Man's Cove                | 3.104  | Diu Harbour                    | 8.82   |
| Port services                   | 5.103  | Deba Gala                      | 4.66   | Diu Head                       | 8.78   |
| Shipyard                        | 5.103  | Debaha Rock; Koggala           | 4.16   | Diu Head Light                 | 8.75   |
| Small craft                     | 5.108  | Debaha Rock; Telwatta Point    | 4.62   | Diu Island                     | 8.82   |
| Coconut Island                  | 6.63   | Deep Water Point Rock          | 10.120 | Diya Mudawa                    | 4.38   |
| Cod Bay                         | 3.156  | Delft Channel                  | 3.224  | Diyumba Alut Rock              | 3.24   |
| Cod Point                       | 3.156  | Delft Island                   | 3.224  | Diyumba Rocks                  | 3.26   |
| Cola Bay                        | 6.169  | Delft Island Light             | 3.224  | Dockyard Shoal                 | 3.141  |
| Colāba                          | 7.169  | Delvāda                        | 8.95   | Dodampara Rocks                | 4.62   |
| Colāba Point                    | 7.177  | Dematagala                     | 3.65   | Dodanduwa Point                | 4.53   |
| Colāba Reef                     | 7.224  | Demon Point; see Koattee       | 2.37   | Dolphin Rock                   | 7.224  |
| Colāba Shoals                   | 7.224  | Dera Reef; see Munde Reef      | 9.119  | Dolphin Rock Light             | 7.224  |
| Colombo                         | 4.79   | Devaghar Point                 | 7.131  | Dona Paula Bay                 | 6.178  |
| Anchorage outer                 | 4.98   | Devajagān Light                | 8.181  | Dondra Head                    | 3.20   |
| Arrival information             | 4.96   | Devate Gudda                   | 6.117  | Dondra Head Light              | 3.16   |
| Berths                          | 4.111  | Devagadgudda Island            | 6.134  | Dongri Point                   | 8.22   |
| Directions                      | 4.107  | Devgarh                        | 7.58   | Dongri Point Light             | 8.22   |
| General information             | 4.79   | Devgarh Harbour Light          | 7.55   | Doores                         | 2.153  |
| Harbour                         | 4.102  | Devgarh Hill                   | 7.56   | Dorava Point                   | 3.63   |
| Light                           | 4.105  | Devil's Point; E side Palk Bay | 3.239  | Dorava Rock                    | 3.63   |
| Limiting conditions             | 4.90   | Devil's Point; Pāmban Island   | 3.228  | Doru Kandu                     | 2.341  |
| Pilotage                        | 4.99   | Devrāpura Creek                | 8.115  | Dosi Rock                      | 8.120  |
| Port services                   | 4.114  | Dhaandhoo                      | 2.87   | Drabhol Kūh                    | 10.216 |
| Rescue                          | 4.118  | Dhabidhoo                      | 2.109  | Drunken Sailor Rock; see Galua | 4.74   |
| Colombo Lake                    | 4.90   | Dhādhār River                  | 8.183  | Dudh River                     | 8.39   |
| Comorin Cape, Light             | 4.165  | Dhagethi                       | 2.187  | Dufferin Point                 | 5.99   |
| Condolim Hill; see Kandoli Hill | 6.216  | Dhakandhoo                     | 2.352  | Dungar                         | 8.112  |
| Conical Hill: 14°43'N, 74°20'E  | 6.125  | Dhani Bet                      | 9.75   | Dunlop Hill                    | 3.82   |
| Conical Hill: Murud — Janjira   | 7.155  | Dhanushkodi                    | 3.239  | Dutch Bay; Gulf of Mannār      | 4.129  |
| Constance Rock                  | 5.21   | Dharaboodhoo                   | 2.165  | Dutch Bay; Trincomalee         | 3.113  |
| Coondapoor                      | 6.84   | Dharaboodhoo Kandu             | 2.169  | Dutch Point                    | 3.113  |
| Coondapoor Light                | 6.83   | Dharamtar                      | 7.251  | Dutt Shoal                     | 9.227  |
| Coote Reef                      | 5.133  | Dharamtar Creek                | 7.251  | Duwemodera Hill                | 4.63   |
| Cora Divh                       | 2.541  | Dharmadam                      | 5.149  | Dwārka                         | 8.239  |
| Coral Point                     | 3.93   | Dharmadam Puzha;               |        | Dwārka Point                   | 8.236  |
| Cortalin Point                  | 6.180  | see Dharmadam River            | 5.170  | Dwārka Point Light             | 8.234  |
| Countries                       |        | Dharmadam River                | 5.170  | Dwarkadhish Temple             | 9.62   |
| India                           | 1.90   | Dharmapattanam Island          | 5.151  | Dwārkanath Temple              | 8.237  |
| Lakshadweep                     | 1.72   | Dheburideetheree Kandu         | 2.160  |                                |        |
| Maldives                        | 1.61   | Dheburidheythereyyaadhoo       | 2.375  | Eagle Point                    | 3.141  |
| Pakistan                        | 1.130  | Dhidhdhoo; Ari Atoll           | 2.179  | East Cape                      | 4.168  |
| Sri Lanka                       | 1.77   | Dhidhdhoo; Faadhippolhu Atoll  | 2.403  | East Channel                   | 3.207  |
| Couraça Light                   | 8.83   | Dhidhdhoo;                     |        | East Channel Swatch            | 7.187  |
| Crocodile Rock                  | 5.17   | North Thiladhunmathee Atoll    | 2.451  | East Channel: Shiāl Bet        | 8.116  |
| Cross Island                    | 7.242  | Dhidhdhoo; finolhu             | 2.186  | East Islet                     | 6.134  |
| Cross Island Reef               | 7.237  | Dhiffushi                      | 2.252  | East Rock                      | 7.39   |
| Cross Island Reef Beacon        | 7.242  | Dhiffushi Kandu                | 2.258  | Eastern Bank                   | 8.43   |
| Currents and Tidal Streams      | 1.163  | Dhiggaru                       | 2.208  | Eboodhoo                       | 2.239  |
| Cutchi Kari                     | 9.212  | Dhiggiri Kandu                 | 2.224  | Eboodhoofinolu                 | 2.239  |
|                                 |        | Dhigu Faru                     | 2.466  | Eboodhoofushi                  | 2.156  |
| Dābar Creek                     | 9.154  | Dhigufaruhuraa                 | 2.461  | Edipparufushi                  | 2.389  |

- Egeria Patch ..... 3.79  
 Eight Degree Channel ..... 2.472  
 Eight Feet Patch ..... 7.187  
 Eight Foot Patch ..... 3.208  
 Ekasdhoo ..... 2.428  
 Ekveni Gala ..... 4.74  
 Elattūr Cape ..... 5.133  
 Elattūr River ..... 5.143  
 Elephant Island: Kārwar;  
   see Mogeragudda Island ..... 6.126  
 Elephant Island: Trincomalee ..... 3.110  
 Elephant Pass ..... 3.103  
 Elephant Point: Trincomalee ..... 3.140  
 Elephant Point: Vendloos Bay ..... 3.91  
 Elephant Ridge ..... 3.103  
 Elephant Rock: Patanagala Point ..... 3.66  
 Elephant Rock: Trincomalee ..... 3.140  
 Elephant Rock: Vendloos Bay ..... 3.91  
 Elephanta Island ..... 7.226  
 Elephanta Patch ..... 7.226  
 Elephanta Patch Light ..... 7.226  
*Elephantas* ..... 1.190  
 Elikalpeni Bank ..... 2.521  
 Elizabeth Island ..... 3.112  
 Elizabeth Point ..... 3.171  
 Eluvativu ..... 3.222  
 Enboodhoo Kandu ..... 2.239  
 Enciam Islet ..... 5.16  
 Enciam Rocks ..... 5.17  
 Engineer Ridge ..... 3.158  
 English Cemetery ..... 7.135  
 Entrance Bank ..... 8.155  
 Entrance Rock ..... 6.69  
 Equatorial Channel ..... 2.51  
 Ereminia Gala Point ..... 4.16  
 Eriyadhoo: Male' Atoll ..... 2.264  
 Eriyadhoo:  
   South Miladhunmadulu Atoll ..... 2.428  
 Erminia Gala Point ..... 4.18  
 Ernākulam ..... 5.66  
 Ernākulam Channel ..... 5.98  
 Eskar Temple ..... 8.20  
 Etawa Reef ..... 3.21  
 Ethiopia Shoal ..... 3.187  
 Eththigili ..... 2.382  
 Examination anchorages ..... 1.41  
 Eydhafushi ..... 2.361  
  
 Faadhippolhu Atoll ..... 2.392  
 Faadhoo ..... 2.397  
 Fahara Magu Channel ..... 2.500  
 Fairlie Rocks ..... 3.175  
 False Knob ..... 7.185  
 Fares ..... 2.352  
 Farudhoru ..... 2.389  
 Farukolhu ..... 2.428  
 Farukolhu Kandu ..... 2.468  
 Farukolhufunadhoo ..... 2.428  
 Farukolhufushi ..... 2.252  
 Feevah ..... 2.426  
 Fehendhoo ..... 2.340  
 Fehenfushi ..... 2.340  
 Fehigili ..... 2.397  
 Felidhe Atoll ..... 2.215  
 Felidhoo ..... 2.221  
 Felivaru ..... 2.407  
 Fenboahuraa ..... 2.389  
 Fenbofinolhu ..... 2.206  
 Fenfushi Faru ..... 2.369  
 Feridhoo ..... 2.182  
 Feydhoo: Addoo Atoll ..... 2.35  
 Feydhoo: Male' ..... 2.280  
 Fieeali Light ..... 2.168  
 Fifty Fathoms Flat, The ..... 7.3  
 Fihaalhohi ..... 2.244  
 Filaafuni ..... 2.463  
 Filitheyo Kandu ..... 2.169  
 Filladhoo ..... 2.442  
 Finolhu Falhu ..... 2.241  
  
 Firiteyo ..... 2.169  
 Fisherman's Rock; see Ambari Sunv ..... 6.147  
 Fisherman's Rocks ..... 3.114  
 Fiyooree Kandu ..... 2.70  
 Fiyoari Light ..... 2.69  
 Flagstaff Point ..... 3.103  
 Flamingo Flat ..... 9.158  
 Foakaidhoo ..... 2.428  
 Foammulah ..... 2.56  
 Fodhdhoo ..... 2.435  
 Fonaddoo ..... 2.120  
 Fonaddoo Kandu ..... 2.120  
 Fonadhoo ..... 2.103  
 Footukandu Light ..... 2.77  
 Forrester Rock ..... 3.143  
 Fort Cochin ..... 5.66  
 Fort Dwārka ..... 8.237  
 Fort Frederick ..... 3.103  
 Fort Hammenhiel ..... 3.231  
 Fort Hammenhiel Light ..... 3.223  
 Fort Point ..... 7.58  
 Fort Saint Angelo ..... 5.162  
 Fort, The: Colombo ..... 4.88  
 Fort, The: Ratnāgiri ..... 7.78  
 Fort Victoria ..... 7.135  
 Forte do Diu ..... 8.75  
 Forte do Mar ..... 8.83  
 Forte do Mar Light ..... 8.83  
 Forte do Nagwa ..... 8.78  
 Foththeyo-bodufushi ..... 2.218  
 Fotteyo Light ..... 2.219  
 Fotteyo Muli ..... 2.220  
 Foul Point; see Kevuliya ..... 3.93  
 French Pass ..... 3.153  
 French Point ..... 3.153  
 Friar's Hood ..... 3.88  
 Fuggiri ..... 2.370  
 Fulangi ..... 2.78  
 Fulhadhoo ..... 2.340  
 Fulidhoo ..... 2.220  
 Fulidhoo Kandu ..... 2.230  
 Fulidhoo Light ..... 2.223  
 Funadhoo: Male' Atoll ..... 2.288  
 Funadhoo:  
   South Maalhosmadulu Atoll ..... 2.352  
 Furanafushi ..... 2.252  
 Fushi ..... 2.188  
 Fushi Kandu: Hadhdhunmathee Atoll ..... 2.105  
 Fushi Kandu: North Nilandhe Atoll ..... 2.165  
 Fushifaru ..... 2.400  
 Fushifaru Kandu ..... 2.128  
 Fussaru Falhu ..... 2.227  
 Fussaru Light ..... 2.228  
  
 Gaadhiffushi ..... 2.134  
 Gaadhoo ..... 2.103  
 Gaadhoo Kandu ..... 2.98  
 Gaadhoo Koa ..... 2.304  
 Gaaerifaru ..... 2.410  
 Gaafaru ..... 2.262  
 Gaafaru Falhu ..... 2.262  
 Gaafaru Kandu ..... 2.261  
 Gaafunee Kandu ..... 2.165  
 Gaafushi ..... 2.452  
 Gaafushi Kandu ..... 2.452  
 Gaagadufaruhuraa ..... 2.353  
 Gaagandu ..... 2.186  
 Gaagandu Faru Light ..... 2.432  
 Gaahuraa ..... 2.208  
 Gaakoshinbi ..... 2.435  
 Gaamathikulhudhoo ..... 2.470  
 Gadani ..... 10.151  
 Gadhada ..... 8.100  
 Gadhdhoo ..... 2.65  
 Gaha Faru ..... 2.181  
 Gal Pare ..... 4.38  
 Galboda Kanda ..... 4.63  
 Galbokka Point ..... 4.74  
 Galee Point ..... 7.85  
  
 Galgoda ..... 4.63  
 Galgodiya ..... 3.20  
 Gallaidhoo ..... 2.435  
 Gallandhoo ..... 2.463  
 Gallandhoo Kandu ..... 2.456  
 Galle ..... 4.20  
   Anchorage inner ..... 4.39  
   Anchorage monsoon outer ..... 4.30  
   Arrival information ..... 4.29  
   Berths ..... 4.40  
   Directions ..... 4.38  
   General information ..... 4.20  
   Harbour ..... 4.35  
   Light ..... 4.37  
   Limiting conditions ..... 4.28  
   Pilotage ..... 4.31  
   Port services ..... 4.42  
   Rescue ..... 4.46  
   Small craft ..... 4.47  
 Galle Tower ..... 4.14  
 Galu Falhu ..... 2.285  
 Galu Gala ..... 4.53  
 Galua ..... 4.74  
 Galwala ..... 4.107  
 Gamaria Rock ..... 5.40  
 Gan Island: Sri Lanka ..... 3.27  
 Gan Kandu: Addoo Atoll ..... 2.28  
 Gan Kandu: Huvadhoo Atoll ..... 2.66  
 Gan: Addoo Atoll ..... 2.27  
 Gan: Hadhdhunmathee Atoll ..... 2.103  
 Gan: Huvadhoo Atoll ..... 2.67  
 Ganabi Memorial ..... 4.165  
 Gandhamāna Temple ..... 3.228  
 Gandhār ..... 8.128  
 Gāndhiya Kado Tāpu ..... 9.72  
 Gandura ..... 3.31  
 Gandura Bay ..... 3.31  
 Gandura Point ..... 3.21  
 Gangāvali River ..... 6.129  
 Gangehi Light ..... 2.183  
 Ganglaro Creek ..... 10.63  
 Gangoli ..... 6.84  
 Gangoli Shoals ..... 6.88  
 Ganz ..... 10.209  
 Ganz, Bandar ..... 10.217  
 Ganz, Rās ..... 10.215  
 Gaonkhadi ..... 7.90  
 Gar-e Kūh ..... 10.216  
 Garnān, Rās ..... 10.215  
 Gāru Bet ..... 9.72  
 Gaspar Dias ..... 6.220  
 Gavāter ..... 10.223  
 Gemanafushi ..... 2.88  
 Genawana ..... 4.62  
 Gesskalhuhura ..... 2.45  
 Gharapuri; see Elephanta Island ..... 7.226  
 Gharo Creek ..... 10.56  
 Ghizri Creek ..... 10.86  
 Ghod Bandar ..... 8.35  
 Ghogha ..... 8.172  
 Ghogha Bhandar Light ..... 8.168  
 Ghurāb, Jabal ..... 10.166  
 Gibbet Island ..... 4.37  
 Gillham Rock ..... 5.133  
 Gimona Peak ..... 7.130  
 Gin Ganga River ..... 4.56  
 Gir Forest ..... 8.75  
 Gir Range ..... 8.75  
 Giraavaru ..... 2.264  
 Giraavaru Irumathee Kandu ..... 2.265  
 Giraavaru Uthuru Kandu ..... 2.265  
 Girekede ..... 2.44  
 Girifushi ..... 2.252  
 Girij Hill ..... 8.22  
 Girye Bay ..... 7.71  
 Goa Island ..... 6.192  
 Goarsāma Temple ..... 9.120  
 Goda Gala: E approach to Galle ..... 4.16  
 Goda Gala: SSW of Dodanduwa ..... 4.53



- Godagala Point ..... 4.65  
 Godawaye Point ..... 3.39  
 Godia Creek ..... 9.230  
 Gogola North Temple ..... 8.83  
 Gogul Point ..... 7.129  
 Goidhoo Atoll ..... 2.339  
 Goidhoo: Goidhoo Atoll ..... 2.340  
 Goidhoo:  
   North Miladhunmadulu Atoll ..... 2.435  
 Gokarn ..... 6.129  
 Golap Hill ..... 7.78  
 Golāri Creek ..... 6.132  
 Golikodlu Peak ..... 6.127  
 Gomti Nadi ..... 8.239  
 Gona Gala ..... 4.75  
 Gongola ..... 3.16  
 Goos Reef ..... 9.128  
 Gopālgarh Fort ..... 7.109  
 Gopnāth Point ..... 8.110  
 Gopnāth Point Light ..... 8.107  
 Gopnāth Shoals ..... 8.139  
 Gora Chan Creek ..... 10.32  
 Gorai Rock ..... 8.22  
 Gorakhnath ..... 8.197  
 Govvaafushi ..... 2.471  
 Grāndi Island ..... 6.164  
 Grāndi Island Light ..... 6.165  
 Grant Channel ..... 8.99  
 Gravel Hill ..... 3.145  
 Great Basses Light ..... 3.58  
 Great Basses Reef ..... 3.60  
 Great Basses Ridge ..... 3.60  
 Great Dam, The ..... 4.147  
 Great Sober Island ..... 3.154  
 Green Island: Bombay ..... 7.226  
 Green Island: Tellicherry ..... 5.151  
 Green Islet ..... 8.21  
 Grommet Rock ..... 3.140  
 Guddadevara Betta ..... 6.125  
 Guddehali Betta ..... 6.125  
 Gudsar Sunv ..... 6.126  
 Guduba Creek Light;  
   see Moti Pātar Creek Light ..... 9.211  
 Guhāgar ..... 7.122  
 Gulf of Kachchh ..... 9.1  
 Gulf of Khambhāt ..... 8.127  
 Gulf of Khambhāt, Head of ..... 8.174  
 Gulhi ..... 2.238  
 Gulhi Falhu ..... 2.263  
 Gull Islet ..... 7.226  
 Gull Islet Light ..... 7.226  
 Gull Rock: Tadri ..... 6.119  
 Gull Rocks: Kottagoda ..... 3.31  
 Gulur Point ..... 8.50  
 Gulwala Bank ..... 8.51  
 Gunjao Kudda ..... 9.72  
 Gunner's Quoin ..... 3.88  
 Gurāb; see Sail Rock: Makrān ..... 10.182  
 Gurād, Khōr ..... 10.168  
 Guraidhoo Kandu ..... 2.133  
 Guraidhoo Light ..... 2.119  
 Guraidhoo: Kolhumadulu Atoll ..... 2.118  
 Guraidhoo: South Male' Atoll ..... 2.237  
 Gurangatti ..... 10.175  
 Gulpūr Channel ..... 6.31  
 Gulpūr River ..... 6.27  
 Gurugudu Point ..... 3.59  
 Gurur Shoal ..... 9.22  
 Gwādar ..... 10.198  
   East Bay ..... 10.202  
   West Bay ..... 10.205  
 Gwādar Light ..... 10.191  
 Gwatār Bay ..... 10.218  
  
 Hab, Jabal ..... 10.167  
 Hab River ..... 10.164  
 Hadhdhunmathee Atoll ..... 2.94  
 Hādīmadi Island ..... 6.116  
  
 Hairān, Bandar ..... 10.201  
 Hajambro Creek ..... 10.34  
 Hakuraahuraa ..... 2.200  
 Hālādi River ..... 6.84  
 Halai Kari ..... 9.212  
 Hambantota ..... 3.44  
 Hambantota Point ..... 3.39  
 Handran Gala ..... 4.62  
 Hands Shoals ..... 9.81  
 Hangarkatta ..... 6.92  
 Hangnaameedhoo ..... 2.190  
 Hangnaameedhoo Dhekunu Kandu ..... 2.190  
 Hanhushi ..... 2.100  
 Hani Kandu ..... 2.366  
 Hanifaruhuraa ..... 2.365  
 Hanikandu Faru ..... 2.353  
 Hanimaadhoo ..... 2.441  
 Hankede ..... 2.35  
 Hankede Hajara ..... 2.35  
 Hansthal Creek ..... 9.200  
 Hanumān Point ..... 9.61  
 Hanumān Temple ..... 9.61  
 Hanumāndanda Reef ..... 9.61  
 Harahi ..... 10.84  
 Haravalli ..... 6.117  
 Harden Point ..... 3.155  
 Hareshwar Hill ..... 7.128  
 Harnai ..... 7.139  
 Harnai Light ..... 7.130  
 Hāro Range ..... 10.165  
 Hatam Urita Kalle ..... 3.104  
 Hataru Alholhu Medu ..... 2.196  
 Hathifushi ..... 2.467  
 Hathikolhu ..... 2.245  
 Havelock Rock ..... 7.27  
 Havelock Rock Anchorage ..... 7.48  
 Hawkes Bay ..... 10.90  
 Hawkins Reef ..... 6.116  
 Hāzira ..... 8.57  
 Hāzira Light ..... 8.47  
 Hāzira Offshore Terminal ..... 8.55  
 Hebadhoo: Male' Atoll ..... 2.264  
 Hebadhoo:  
   South Miladhunmadulu Atoll ..... 2.428  
 Hebattu Gudda ..... 6.132  
 Helegeli ..... 2.257  
 Helegeli Irumathee Kanduolhi ..... 2.258  
 Heming Rocks ..... 3.93  
 Heretere ..... 2.45  
 Hervey Patches ..... 8.21  
 Hibalhidhoo ..... 2.361  
 High Land of Saint John ..... 8.52  
 High Rock ..... 8.21  
 Hikkaduwa Gala ..... 4.53  
 Hikkaduwa Point ..... 4.53  
 Himendhoo ..... 2.182  
 Himithe Kandu ..... 2.165  
 Himithi ..... 2.163  
 Himmafushi ..... 2.252  
 Himmiya Kandu ..... 2.265  
 Hindelnattu ..... 3.16  
 Hingaahuraa ..... 2.219  
 Hingladevi ..... 7.147  
 Hinglaj, Jabal ..... 10.175  
 Hingol River ..... 10.177  
 Hiniduma Kanda ..... 4.14  
 Hinnavaru ..... 2.411  
 Hirae ..... 4.66  
 Hirilandhoo ..... 2.123  
 Hirilandhoo Kandu ..... 2.123  
 Hiriyafushi ..... 2.159  
 Hirubadhoo ..... 2.428  
 Hitaadhoo ..... 2.360  
 Hithaadhoo: Huvadhoo Atoll ..... 2.76  
 Hithadhoo Kandu ..... 2.98  
 Hithadhoo: Addoo Atoll ..... 2.36  
 Hithadhoo:  
   Hadhdhunmathee Atoll ..... 2.96  
 Hoadedhdhoo ..... 2.71  
  
 Hog Island: 14°00'N, 74°29'E;  
   see Shirālī Island ..... 6.116  
 Hog Island: 18°58'N, 72°58'E;  
   see Nhāva Island ..... 7.258  
 Holhudhoo ..... 2.435  
 Holi Hill ..... 7.78  
 Honāvar ..... 6.118  
 Honāvar Light ..... 6.117  
 Hood's Tower ..... 3.112  
 Hor Batt ..... 10.168  
 Horseshoe Bank ..... 4.152  
 Horseshoe Spit ..... 4.191  
 Hosdrug Fort ..... 6.15  
 Howarth Point ..... 8.173  
 Huddi Point ..... 6.97  
 Hudel Gudda ..... 6.117  
 Hulhangu Kandu ..... 2.262  
 Hulhudheli ..... 2.151  
 Hulhudhoo ..... 2.41  
 Hulhulē Falhu ..... 2.272  
 Hulhumeedhoo ..... 2.41  
 Hulhuvchi Kandu ..... 2.158  
 Hulikkal Gudda ..... 6.127  
 Hulule ..... 2.272  
 Humani Point ..... 9.22  
 Humani Point (Okha) Light ..... 9.49  
 Hummocks of Thal, The ..... 7.143  
 Huraa ..... 2.252  
 Hurasfaruhuraa ..... 2.435  
 Huravalhi ..... 2.412  
 Huru-elhi ..... 2.179  
 Huvadhoo Atoll ..... 2.63  
 Huvadhoo Kandu;  
   see One and a Half Degree Channel ..... 2.89  
 Huvahandhoo ..... 2.466  
 Huvahandhoo Kandu ..... 2.468  
 Huvarafushi ..... 2.467  
  
 Ibha Rock ..... 3.39  
 Iguraidhoo ..... 2.380  
 Ihavandhippolhu Atoll ..... 2.457  
 Ihavandhoo ..... 2.467  
 Ihuru ..... 2.267  
 Illukatiya Point ..... 3.67  
 Imbue Ranne Gala ..... 4.38  
 Immanuel Church ..... 4.72  
 India  
   General information ..... 1.90  
   Ports, list of ..... 1.151  
 Indragadh Hill ..... 8.52  
 Indravati Patch ..... 6.116  
 Indus Delta — Creeks ..... 10.29  
 Innafinolhu ..... 2.467  
 Innafushi: Goidhoo Atoll ..... 2.340  
 Innafushi: Maamakunudhoo Atoll ..... 2.385  
 Innamaadhoo ..... 2.380  
 Investigator Bank ..... 2.507  
 Investigator Reef ..... 9.23  
 Iranativu North ..... 3.227  
 Iranativu South ..... 3.227  
 Iruwai Kandu ..... 2.262  
 Isdhoo Kalaidhoo ..... 2.103  
 Isdhoo Light ..... 2.104  
 Islet Point ..... 8.110  
  
 Jabal = mountain, islet, island;  
   see proper name  
 Jabal-i Mehdī ..... 10.216  
 Jaddī, Rās ..... 10.194  
 Jāfarābād ..... 8.87  
 Jāfarābād Creek ..... 8.87  
 Jāfarābād Harbour ..... 8.87  
 Jāfarābād Light ..... 8.75  
 Jaffna ..... 3.232  
 Jaffna Lagoon ..... 3.232  
 Jaffna Obelisk Light ..... 3.221  
 Jaffna Peninsula ..... 3.197  
 Jaigarh ..... 7.102

|                                          |        |                         |        |                               |        |
|------------------------------------------|--------|-------------------------|--------|-------------------------------|--------|
| Jaigarh Bay                              | 7.102  | Kaddaikadu              | 3.188  | Kandla                        | 9.156  |
| Jaigarh Fort                             | 7.105  | Kaddhoo                 | 2.107  | Anchorage                     | 9.174  |
| Jaigarh Head                             | 7.102  | Kadeawella Point        | 3.93   | Inner                         | 9.188  |
| Jaigarh Head Light                       | 7.99   | Kadhdhoo; see Kaddhoo   | 2.107  | Outer                         | 9.174  |
| Jaitāpur                                 | 7.88   | Kadiapattanam           | 5.30   | Quarantine                    | 9.174  |
| Jakhāu                                   | 9.231  | Kadimma                 | 2.156  | Arrival information           | 9.171  |
| Jakhāu Harbour                           | 9.231  | Kadiro Creek            | 10.56  | Berths                        | 9.190  |
| Jakhāu Light                             | 9.225  | Kadmat                  | 2.526  | Directions                    | 9.185  |
| Jalālpur                                 | 8.67   | Kadmat Island Light     | 2.526  | General information           | 9.156  |
| Jāmnagar                                 | 9.143  | Kadoodhoo               | 2.123  | Harbour                       | 9.179  |
| Jamsetji Causeway                        | 8.23   | Kadoomaafushi           | 2.240  | Limiting conditions           | 9.164  |
| Janjira Fort: Harnai                     | 7.129  | Kaduhulhudhoo           | 2.84   | Pilotage                      | 9.175  |
| Janjira Fort: Rājpurī                    | 7.147  | Kadul Rock              | 3.42   | Port services                 | 9.194  |
| Jawahar Dweep; see Butcher Island        | 7.202  | Kadumoonufushi          | 2.163  | Kandla Bar                    | 9.185  |
| Jawahar Lal Nehru Port                   | 7.258  | Kaduoiygiri             | 2.252  | Kandla Creek                  | 9.156  |
| Anchorage                                | 7.264  | Kaduviligili            | 2.82   | Kandoli Hill                  | 6.216  |
| Arrival information                      | 7.260  | Kaduviligili Light      | 2.82   | Kandoodhoo Kandu              | 2.123  |
| Berths                                   | 7.264  | Kagal                   | 6.119  | Kandu Huraa                   | 2.39   |
| Directions                               | 7.262  | Kagi                    | 2.257  | Kandu Huraa Light             | 2.40   |
| General information                      | 7.258  | Kagi Kanduolhi          | 2.258  | Kāngi Islet                   | 6.148  |
| Harbour                                  | 7.261  | Kahandawa Rocks         | 3.38   | Kāngiguda Islet               | 6.148  |
| Limiting conditions                      | 7.259  | Kahr Creek              | 10.32  | Kanheri                       | 8.22   |
| Pilotage                                 | 7.260  | Kaikawalagala Point     | 4.66   | Kanhoji Angre Island          | 7.150  |
| Port services                            | 7.265  | Kaio                    | 10.156 | Kanhoji Angre Island Light    | 7.147  |
| Small craft landings                     | 7.266  | Kājhar Creek            | 10.31  | Kanifinolhu                   | 2.252  |
| Jazirāt = island, islet; see proper name |        | Kājhar Creek Tower      | 10.31  | Kanifushi Light               | 2.404  |
| Jegri Bay                                | 8.122  | Kakerativu              | 3.221  | Kanifushi: Faadhippolhu Atoll | 2.401  |
| Jegri Bluff                              | 8.122  | Kal Aru                 | 4.137  | Kanifushi:                    |        |
| Jegri Island                             | 8.110  | Kala Dara Shoal         | 9.185  | South Maalhosmadulu Atoll     | 2.361  |
| Jegri Island Light                       | 8.107  | Kālabādevi Bay          | 7.117  | Kanimeedhoo                   | 2.120  |
| Jewellers' Islands                       | 2.153  | Kālabādevi Creek        | 7.117  | Kanimeedhoo Kandu             | 2.120  |
| Jhānjhmer                                | 8.126  | Kālaidhoo               | 2.428  | Kankesanturai                 | 3.212  |
| Jhānjhmer Fort                           | 8.107  | Kalametiya Point        | 3.38   | Kankeshwar                    | 7.188  |
| Jhānjhmer Light                          | 8.111  | Kalametiya Rock         | 3.38   | Kānkon Bay                    | 6.172  |
| Jhil Range                               | 10.74  | Kalapu Gala             | 4.126  | Kansa Fort                    | 7.150  |
| Jindra Bet                               | 9.143  | Kālāvali Creek          | 7.51   | Kansa Rock; see Gull Islet    | 7.226  |
| Jīwani                                   | 10.220 | Kalcotta Rocks          | 3.19   | Kānte Peak                    | 7.130  |
| Jīwani Aero Light                        | 10.216 | Kāldurg                 | 8.22   | Kanthe Thuki Reef             | 3.229  |
| Jīwani Kaur                              | 10.220 | Kālhaidhoo              | 2.109  | Kāp Battery                   | 6.60   |
| Jīwani Light                             | 10.214 | Kalherehaa              | 2.66   | Kāp Light                     | 6.60   |
| Jīwani, Rās                              | 10.215 | Kalhufahala-fushi       | 2.131  | Kāp Rock                      | 6.63   |
| Jodiya                                   | 9.154  | Kālinadi Creek          | 6.154  | Kapoor Shoal                  | 9.210  |
| Jodiya Bandar Light                      | 9.154  | Kāljondhi               | 7.99   | Kappar                        | 10.192 |
| Jodiya Creek                             | 9.154  | Kalkudah Bay            | 3.100  | Kappar, Rās                   | 10.192 |
| Jog River                                | 7.129  | Kallaru Reef            | 4.152  | Karāchi                       | 10.91  |
| Jogmāri Hill                             | 8.52   | Kallāyi                 | 5.167  | Anchorage                     | 10.109 |
| Johnston Castle Rock                     | 7.44   | Kallāyi River           | 5.135  | Outer                         | 10.109 |
| Johnston Point                           | 8.173  | Kalmat, Khōr            | 10.181 | Prohibited                    | 10.108 |
| Johnston Point Light                     | 8.173  | Kalmunai                | 3.89   | Quarantine                    | 10.113 |
|                                          |        | Kalmunai Point          | 3.225  | Approach from SE              | 10.73  |
|                                          |        | Kalmunai Reef           | 3.98   | Approach from W               | 10.73  |
|                                          |        | Kalpeni                 | 2.509  | Arrival information           | 10.105 |
|                                          |        | Kalpeni Island Light    | 2.510  | Berths                        | 10.123 |
|                                          |        | Kalpitiya               | 1.43   | Lower Harbour                 | 10.125 |
|                                          |        | Kalpitti                | 2.515  | New Channel                   | 10.135 |
|                                          |        | Kalti Gudda             | 6.114  | Upper Harbour                 | 10.130 |
| Kaadeddhoo                               | 2.73   | Kalu Ganga              | 4.76   | Directions — arrival          | 10.119 |
| Kaadeddhoo Kandu                         | 2.70   | Kālubbār Reef           | 9.75   | Directions — departure        | 10.122 |
| Kaashidhoo                               | 2.338  | Kālubbār Tāpu           | 9.75   | General information           | 10.91  |
| Kaashidhoo Bodu Kandu                    | 2.331  | Kālubbār Tāpu Light     | 9.27   | Harbour                       | 10.114 |
| Kaashidhoo Kuda Kandu                    | 2.331  | Kalutara                | 4.76   | Limiting conditions           | 10.99  |
| Kaashidhoo Light                         | 2.338  | Kaluwatta Gala          | 4.74   | Naval Dockyard                | 10.135 |
| Kaashidoo Kandu;                         |        | Kalvan Light            | 9.148  | Pilotage                      | 10.110 |
| see Kardiva Channel                      | 2.331  | Kamadhoo                | 2.363  | Port services                 | 10.136 |
| Kachari, Rās                             | 10.157 | Kamadhoo Kandu          | 2.364  | Small craft                   | 10.141 |
| Kāchbi Reef                              | 8.79   | Kamaiti, Rās            | 10.215 | Karaitivu                     | 3.213  |
| Kachchaitivu                             | 3.228  | Kamandurg               | 8.22   | Karaitivu Island              | 4.129  |
| Kachcheri                                | 4.37   | Kambariam Island        | 6.204  | Karamas Rock                  | 3.24   |
| Kachchigadh                              | 8.241  | Kāmgār Hills            | 10.169 | Karanja Beacon                | 7.224  |
| Kachchigadh Light                        | 8.234  | Kānāi Creek             | 8.66   | Karanja Hill                  | 7.188  |
| Kada Point                               | 3.23   | Kanandhou Kaleyge Galha | 2.44   | Karanja Island                | 7.224  |
| Kada Rock                                | 3.24   | Kanara, North           | 1.113  | Karanja Reefs                 | 7.193  |
| Kadalūr Point                            | 5.133  | Kanara, South           | 1.112  | Kārānjhālen Bay               | 6.220  |
| Kadalūr Point Light                      | 5.131  | Kandakkadavu            | 5.49   | Kārbone                       | 7.116  |
| Kadalūr Reef                             | 5.133  | Kandani Halla           | 6.122  | Kardeshwar Point              | 7.105  |
| Kadar Pir                                | 8.212  | Kanditeem               | 2.433  | Kardiva Channel               | 2.331  |
| Kadda Rocks                              | 4.38   |                         |        |                               |        |

|                                |        |                                       |        |                                       |        |
|--------------------------------|--------|---------------------------------------|--------|---------------------------------------|--------|
| Kari Malai Utu Malai           | 3.104  | Khandema Magu Channel                 | 2.500  | Konkan Coast                          | 1.114  |
| Kariapar                       | 4.200  | Khānderi Flats                        | 7.150  | Kooddoo                               | 2.85   |
| Karichāl                       | 5.11   | Khāra Chusna                          | 9.68   | Kopata                                | 4.53   |
| Kāril Kachal Channel           | 7.28   | Khāra Triangulation Station           | 8.96   | Korangi                               | 10.88  |
| Kāril Rock                     | 7.28   | Kharāda River                         | 7.58   | Korangi Creek                         | 10.86  |
| Kariya Shulli Island           | 4.209  | Kharavli                              | 7.226  | Korha Rock                            | 3.69   |
| Karkaigudda Island             | 6.134  | Khārod Nadi                           | 9.86   | Kori Creek                            | 9.232  |
| Kārlī River                    | 7.49   | Khengarji Bet                         | 9.158  | Kori Great Bank                       | 10.3   |
| Karnataka; see Mysore          | 1.111  | Kherla Creek                          | 9.231  | Korlai Fort Light                     | 7.151  |
| Kārumbhār Island;              |        | Khobar Beacon                         | 10.32  | Korlia                                | 7.161  |
| see Kālubbhār Tāpu             | 9.75   | Khobar Creek                          | 10.32  | Korlia Fort                           | 7.161  |
| Kārumbhār Reef;                |        | Khokhra Hills                         | 8.136  | Koswari Island                        | 4.209  |
| see Kālubbhār Reef             | 9.75   | Khondha Creek                         | 8.62   | Kota                                  | 6.82   |
| Kārwar                         | 6.130  | Khōr = creek,                         |        | Kota Kunnu                            | 5.115  |
| Arrival information            | 6.141  | arm of the sea; see proper name       |        | Kota Rock                             | 5.17   |
| Berths                         | 6.150  | Khori Creek                           | 9.158  | Kota Tower                            | 9.148  |
| Alongside berths               | 6.151  | Khuddi Creek                          | 10.35  | Kotada Bluff                          | 8.110  |
| Anchorage                      | 6.150  | Khuddi Island Light                   | 10.25  | Kotavanni                             | 4.17   |
| Landing                        | 6.152  | Kihafun Kandu                         | 2.158  | Koteshwar Temple                      | 9.232  |
| Directions                     | 6.146  | Kihavahuruvalhi                       | 2.352  | Kotranes                              | 8.79   |
| General information            | 6.130  | Kilakkarai                            | 4.210  | Kottagoda                             | 3.31   |
| Harbour                        | 6.142  | Kilakkarai Channel                    | 4.210  | Kottagoda Point                       | 3.31   |
| Limiting conditions            | 6.140  | Kilakkarai Light                      | 4.205  | Kottaippattanam                       | 3.239  |
| Pilotage                       | 6.141  | Kiltān                                | 2.529  | Kottakkariār River                    | 3.239  |
| Port services                  | 6.153  | Kiltān Island North Light             | 2.529  | Kotte Kunnu                           | 5.149  |
| Small craft                    | 6.154  | Kiltān Island South Light             | 2.529  | Kotte Kunnu (Mount Dilli) Light       | 5.149  |
| Kārwar Bay                     | 6.133  | Kim River                             | 8.143  | Kovalam Point                         | 5.16   |
| Kārwar Head                    | 6.149  | Kinolhas                              | 2.380  | Kovi Tivu                             | 4.154  |
| Kārwar Rock; see Gudsar Sunv   | 6.126  | Kirama Oya                            | 3.41   | Kovilan Light                         | 3.204  |
| Kāsaragod                      | 6.17   | Kirimechiodai Malai                   | 3.92   | Kovilan Point                         | 3.204  |
| Kāsaragod Light                | 6.13   | Kirinde                               | 3.69   | Kovilhottam Light                     | 5.49   |
| Kāsaragode                     | 6.116  | Kirinde Point                         | 3.69   | Kozhikode; see Calicut                | 5.135  |
| Kāsarokod                      | 6.118  | Kirinde Rock                          | 3.69   | Krikubbah                             | 9.87   |
| Kashavaru Falhu                | 2.220  | Kithi Kandu                           | 2.265  | Kuda Kalhi                            | 2.253  |
| Kashi Faru                     | 2.352  | Klahati Paar                          | 3.167  | Kuda Kandu; Addoo Atoll               | 2.38   |
| Kashidhoogiri                  | 2.352  | Ko Vari Bay                           | 2.502  | Kuda Kandu; Huvadho Atoll             | 2.66   |
| Katāgar                        | 10.209 | Koatney                               | 2.37   | Kuda Kanduoilhi                       | 2.351  |
| Katahella Rock                 | 3.33   | Kochi                                 | 5.74   | Kuda Point                            | 8.140  |
| Katane Reef                    | 7.104  | Kodachādri                            | 6.97   | Kuda Vshee Kandu                      | 2.165  |
| Kataragama                     | 3.58   | Kodakkad Kunnu                        | 5.134  | Kuda Wataru                           | 2.267  |
| Kathi Vallimuni Reef           | 3.238  | Kodāvali River                        | 7.88   | Kudabados                             | 2.267  |
| Kāthiawār Coast                | 8.2    | Kodda; see Flagstaff Point            | 3.103  | Kudadhoo                              | 2.365  |
| Katkovalam                     | 3.189  | Koddiyar Aru                          | 3.104  | Kudafalhu                             | 2.165  |
| Katpur Island                  | 8.110  | Koddiyar Bay                          | 3.104  | Kudafinolu                            | 2.238  |
| Katrura                        | 9.87   | Koddiyar Sand                         | 3.115  | Kudahuvadhoo                          | 2.149  |
| Katta Gala                     | 4.38   | Kodey                                 | 2.86   | Kudahuvadhoo Kandu                    | 2.135  |
| Katta, Outer                   | 4.38   | Kodhipparu                            | 2.263  | Kudahuvadhoo Kanduoilhi               | 2.158  |
| Kattakkal                      | 5.144  | Kodi Point                            | 2.501  | Kudalafari                            | 2.82   |
| Kaur = stream; see proper name |        | Kodinār                               | 8.189  | Kudalafari Light                      | 2.82   |
| Kavaratti                      | 2.511  | Kodiyakkarai Light                    | 3.204  | Kudalhaimendhoo                       | 2.428  |
| Kavaratti Island Light         | 2.512  | Koduwakattumalai                      | 3.168  | Kudarappu                             | 3.188  |
| Kavvāyi Backwater              | 6.10   | Koggala Lake                          | 4.18   | Kudarikilu                            | 2.352  |
| Kāyalpattinam                  | 4.169  | Koh = mountain, hill; see proper name |        | Kudarikilu Kandu                      | 2.364  |
| Keays                          | 3.231  | Koh-i Daram                           | 10.187 | Kudle Hill                            | 6.119  |
| Keamari                        | 10.130 | Kokkilai Lagoon                       | 3.174  | Kudremalai Point                      | 4.127  |
| Keamari Beacon                 | 10.118 | Kokupeaoahykalla                      | 3.168  | Kudremalai Tower                      | 4.127  |
| Keamari Groyne                 | 10.125 | Kola Islet                            | 4.63   | Kudremukh                             | 6.57   |
| Kedhikulhudhoo                 | 2.426  | Kola Point                            | 3.23   | Kudumbegala                           | 3.81   |
| Kelaa                          | 2.441  | Kolaa                                 | 2.80   | Kūh = mountain, hill; see proper name |        |
| Kelani Gala                    | 4.74   | Kolaba Fort                           | 7.151  | Kukra Island                          | 6.128  |
| Kelani Ganga River             | 4.127  | Kolaba Fort Light                     | 7.151  | Kukra Light                           | 6.128  |
| Kelve                          | 8.37   | Kolāba                                | 1.117  | Kukulhudhoo Faru                      | 2.369  |
| Kelve Māhīm Light              | 8.22   | Kolachel                              | 5.20   | Kulānch                               | 10.194 |
| Kendhoo                        | 2.352  | Kolachel Light                        | 5.22   | Kulasekarappattinam                   | 4.169  |
| Kenpungoda Church              | 4.125  | Kolamaafushi                          | 2.76   | Kulhudhoo Kandu                       | 2.426  |
| Kerala                         | 1.108  | Kolhumadulu Atoll                     | 2.116  | Kulhudhuffushi                        | 2.441  |
| Kerekund                       | 6.116  | Kolhuvaariyaafushi                    | 2.201  | Kumbaru Bay                           | 7.141  |
| Keroela Rock                   | 3.142  | Koli Gudda                            | 6.117  | Kumbaru Point                         | 7.129  |
| Kerselea Bank                  | 8.144  | Kolimuruka Reef                       | 4.211  | Kumbla                                | 6.55   |
| Keti Bundar                    | 10.33  | Kollam                                | 5.144  | Kumbla Fort                           | 6.26   |
| Kevuliya                       | 3.93   | Kollengode Bluff                      | 5.112  | Kumbukkan Oya                         | 3.67   |
| Keyodhoo                       | 2.221  | Kolonna Point                         | 3.38   | Kumburahela                           | 3.78   |
| Khai Creek                     | 10.34  | Komandoo                              | 2.435  | Kumta                                 | 6.120  |
| Khalifa Point                  | 10.156 | Komari                                | 3.82   | Kumta Point                           | 6.120  |
| Khambhāliya                    | 9.75   | Komari Ridge                          | 3.79   | Kumta Point Light                     | 6.117  |
| Khambhāt                       | 8.184  | Konaje Kallu                          | 6.60   | Kumundhoo                             | 2.444  |
| Khambhāt Channel               | 8.177  | Koney Light;                          |        | Kunahandhoo                           | 2.96   |
| Khand Island                   | 10.38  | see Port Kārwar Light                 | 6.145  | Kunahandhoo Light                     | 2.97   |
| Khandalla Rock                 | 3.96   | Kongala                               | 3.78   | Kunchan Kallū                         | 3.92   |



|                      |       |
|----------------------|-------|
| Kundah Hills         | 5.146 |
| Kundalika River      | 7.158 |
| Kundugāl Channel     | 4.152 |
| Kundugāl Gut         | 4.152 |
| Kundugāl Point       | 4.152 |
| Kunfunadhoo          | 2.358 |
| Kunjar Gudde         | 6.64  |
| Kunni                | 10.62 |
| Kupata               | 4.62  |
| Kur Kanduoilhi       | 2.408 |
| Kura Islet           | 7.56  |
| Kura Patches         | 7.56  |
| Kurali               | 2.206 |
| Kuramathi            | 2.192 |
| Kurandhuvaru         | 2.134 |
| Kurchikulu Rock      | 5.151 |
| Kuredhdhoo           | 2.407 |
| Kurendhoo            | 2.402 |
| Kurli Sand           | 7.104 |
| Kurmagadgudda Island | 6.133 |
| Kurne Point          | 7.117 |
| Kuroilhi             | 2.463 |
| Kursadi Beacons      | 4.152 |
| Kursadi Tivu         | 4.152 |
| Kurundu Kanda        | 4.54  |
| Kurusukal            | 5.21  |
| Kushipur Point       | 7.79  |
| Kusuldiva Gudda      | 6.126 |
| Kwada Bay            | 6.132 |
| Kwada Point          | 6.132 |

|                                     |        |
|-------------------------------------|--------|
| Laccadive Islands; see Lakshadweep  | 2.477  |
| Lākdīa Hill                         | 8.52   |
| Lakhat                              | 9.232  |
| Lakshadweep                         | 2.477  |
| Lakshadweep Sea                     | 1.160  |
| Lamblekri Hill                      | 7.78   |
| Land's End                          | 3.220  |
| Landaa Giraavaru                    | 2.364  |
| Lankanfinolhu                       | 2.252  |
| Lankanfushi                         | 2.252  |
| Lansiya Rock                        | 3.63   |
| Las Bela                            | 10.142 |
| Lewin Rock                          | 3.67   |
| Lhaimagu                            | 2.428  |
| Lhohi                               | 2.403  |
| Lhohifushi                          | 2.252  |
| Lhossalafushi                       | 2.403  |
| Life-saving stations                | 1.55   |
| Lifeboats; see Life-saving stations |        |
| Limits of book                      | 1.1    |
| Lipuram Obelisk                     | 4.168  |
| Little Basses Light                 | 3.58   |
| Little Basses Reef                  | 3.61   |
| Little Basses Ridge                 | 3.61   |
| Little Powder Island                | 3.157  |
| Lively Rocks                        | 3.167  |
| Locusts                             | 1.32   |
| Loliem Point                        | 6.164  |
| Loliem Rocks                        | 6.148  |
| Lonuziyaariykolhu                   | 2.293  |
| Lor Hill                            | 8.78   |
| Luhāra Point                        | 8.140  |
| Luhāra Point Light                  | 8.140  |
| Luna Bet Beacon                     | 9.231  |
| Luni Pir Dome                       | 9.120  |
| Lushington Shoal                    | 9.4    |

|                                    |       |
|------------------------------------|-------|
| Ma Rock                            | 3.42  |
| Maa Faru:                          |       |
| North Maalhosmadulu Atoll          | 2.369 |
| Maa Faru:                          |       |
| South Maalhosmadulu Atoll          | 2.347 |
| Maa Haa Light                      | 2.260 |
| Maa Haa Reef                       | 2.260 |
| Maa Kandu: Addoo Atoll             | 2.39  |
| Maa Kandu: Kolhumadulu Atoll       | 2.128 |
| Maa Kanduoilhi: Faadhippolhu Atoll | 2.403 |

|                               |       |
|-------------------------------|-------|
| Maa Kanduoilhi:               |       |
| North Thiladhunmathee Atoll   | 2.443 |
| Maa Kanduoilhi:               |       |
| South Maalhosmadulu Atoll     | 2.359 |
| Maa Ma Lee Kandu;             |       |
| see Eight Degree Channel      | 2.472 |
| Maa Maduvvari                 | 2.361 |
| Maa Thila                     | 2.279 |
| Maabaidhoo                    | 2.105 |
| Maabaidhoo Kandu              | 2.105 |
| Maabinhuraa                   | 2.396 |
| Maaddoo                       | 2.361 |
| Maadheli                      | 2.152 |
| Maadhoo                       | 2.238 |
| Maadooni Faru                 | 2.369 |
| Maaduni Faru                  | 2.445 |
| Maaboodhoo                    | 2.158 |
| Maafaru                       | 2.419 |
| Maafehelaa                    | 2.88  |
| Maafilaafushi                 | 2.405 |
| Maafushi: Goidhoo Atoll       | 2.340 |
| Maafushi: Huvadhoo Atoll      | 2.78  |
| Maafushi: South Male' Atoll   | 2.238 |
| Maagulhi Falhu                | 2.226 |
| Maagulhi Kandu                | 2.226 |
| Maakadoodhoo                  | 2.428 |
| Maakurathu                    | 2.380 |
| Maalefaru Kandu               | 2.158 |
| Maalhos                       | 2.182 |
| Maalhoss                      | 2.361 |
| Maamakunudhoo Atoll           | 2.383 |
| Maamigilee Kandu              | 2.180 |
| Maamigili                     | 2.180 |
| Maamunagau                    | 2.375 |
| Maamunagaufinolhu             | 2.373 |
| Maamutaa                      | 2.84  |
| Maandhoo                      | 2.108 |
| Maarandhoo                    | 2.451 |
| Maarikilu                     | 2.354 |
| Maashigiri                    | 2.373 |
| Maagoodhoo                    | 2.428 |
| Maavaashi Kandu               | 2.165 |
| Maavah                        | 2.96  |
| Maavah Kandu                  | 2.98  |
| Maavaidhoo                    | 2.440 |
| Maavaidhoo Kanduoilhi         | 2.427 |
| Maavaru Light                 | 2.164 |
| Maavarufalhu                  | 2.163 |
| Maavaruhuraa                  | 2.169 |
| Maavelavaru Reef              | 2.435 |
| Māchhiwāda Light              | 8.47  |
| Machhli Bandar Reef           | 6.132 |
| Machkandi River               | 7.90  |
| Machlimar Point               | 7.29  |
| Mada Gala                     | 4.53  |
| Madalbarē Gudda               | 6.100 |
| Madda Gala                    | 4.74  |
| Madgarh Hill                  | 7.130 |
| Mādhavpur                     | 8.215 |
| Madhiriguraidhoo              | 2.398 |
| Madhirivaadhoo                | 2.364 |
| Mādhwād Bainsla               | 8.77  |
| Mādhwād Bay                   | 8.79  |
| Anchorage                     | 8.81  |
| Directions                    | 8.80  |
| General information           | 8.79  |
| Landing                       | 8.81  |
| Mādhwād Creek                 | 8.79  |
| Mādhwād Temple                | 8.75  |
| Madifushi                     | 2.134 |
| Madivaru Kandu                | 2.158 |
| Madivaru: Faadhippolhu Atoll  | 2.412 |
| Madivaru: Male' Atoll         | 2.264 |
| Madu Ganga                    | 4.64  |
| Madulu                        | 2.459 |
| Madumora Reef                 | 3.20  |
| Maduvvari: Faadhippolhu Atoll | 2.403 |
| Maduvvari: Mulaku Atoll       | 2.208 |
| Magatha Faalan                | 2.318 |

|                           |        |
|---------------------------|--------|
| Magavari                  | 2.47   |
| Magdalla                  | 8.53   |
| Maggona Point             | 4.75   |
| Magoodhoo                 | 2.167  |
| Maha Oya                  | 4.120  |
| Mahaanahuraa              | 2.238  |
| Mahad                     | 7.137  |
| Mahalakshmi               | 8.52   |
| Maharashtra               | 1.115  |
| Mahaweli Ganga            | 3.104  |
| Mahawelli Bay             | 3.49   |
| Mahawelli Point           | 3.38   |
| Mahawelli Rock            | 3.38   |
| Mahe                      | 5.167  |
| Mahe Light                | 5.152  |
| Mahe River                | 5.167  |
| Mahendra Giri             | 5.16   |
| Mahi Sāgar River          | 8.184  |
| Mahibadhoo                | 2.187  |
| Māhim                     | 8.38   |
| Māhim Bay                 | 8.23   |
| Māhim Creek               | 8.38   |
| Māhim River               | 8.23   |
| Mahuva                    | 8.120  |
| Mahuva Bandar             | 8.120  |
| Mahuva Bay                | 8.120  |
| Maiboodhoo Kanduoilhi     | 2.158  |
| Mainbapara                | 4.62   |
| Makra Bank                | 8.177  |
| Makrān Coast              | 10.183 |
| Makunudhoo Light          | 2.387  |
| Makunudhoo:               |        |
| Maamakunudhoo Atoll       | 2.385  |
| Makunudhoo: Male' Atoll   | 2.264  |
| Mal Bank                  | 8.177  |
| Malabar Coast             | 1.106  |
| Malabar Point             | 7.190  |
| Malacca Banks             | 8.43   |
| Mālād Creek               | 8.25   |
| Malagoda Kanda            | 4.17   |
| Malai Porru Putta Paar    | 3.167  |
| Malān, Rās                | 10.174 |
| Malay Cove                | 3.154  |
| Malcolm Atoll             | 2.383  |
| Malcolm Channel           | 8.156  |
| Maldives                  |        |
| General information       | 1.61   |
| Ports, list of            | 1.151  |
| Maldives Ridge            | 1.160  |
| Male Gudda                | 6.97   |
| Malet Shelf               | 7.234  |
| Male'                     | 2.289  |
| Anchorage                 | 2.316  |
| Arrival information       | 2.301  |
| Berths                    | 2.318  |
| Directions                | 2.311  |
| General information       | 2.289  |
| Harbour                   | 2.304  |
| Limiting conditions       | 2.296  |
| Pilotage                  | 2.303  |
| Port services             | 2.319  |
| Rescue                    | 2.324  |
| Male' Atoll               | 2.248  |
| Mālgund                   | 7.98   |
| Malhohu Dhekunu Kandu     | 2.184  |
| Malim; see Penha di Frāns | 6.221  |
| Mālipuram                 | 5.126  |
| Mallok Reef               | 8.151  |
| Malpe                     | 6.65   |
| Mālvān                    | 7.42   |
| Mālvān Bay                | 7.43   |
| Mālvān Rock               | 7.27   |
| Mama Point                | 6.220  |
| Mampuri                   | 4.126  |
| Manadhoo                  | 2.420  |
| Manakkodam Light          | 5.49   |
| Manalli Reef              | 4.154  |

|                                   |        |                               |        |                             |        |
|-----------------------------------|--------|-------------------------------|--------|-----------------------------|--------|
| Manalli Shoal                     | 4.145  | Meedhoo Kandu                 | 2.158  | Motapāt Creek               | 8.115  |
| Manalli Tivu                      | 4.154  | Meedhoo Light                 | 2.157  | Moti Damān                  | 8.63   |
| Manappād Outer Shoal              | 4.167  | Meedhoo: Hulhumheedhoo        | 2.41   | Moti Gudda                  | 6.127  |
| Manappād Point                    | 4.167  | Meedhoo:                      |        | Moti Pātar Creek Light      | 9.211  |
| Manappād Point, Light             | 4.165  | North Maalhosmadulu Atoll     | 2.379  | Mou-Rambu Point             | 2.501  |
| Manatkadu                         | 3.188  | Meedhoo: South Nilandhe Atoll | 2.156  | Mount Challenger            | 3.158  |
| Manda Gala                        | 4.54   | Meedhuffushi                  | 2.152  | Mount Dilli                 | 5.151  |
| Mandagala                         | 3.67   | Meerufenfushi                 | 2.252  | Mount Lavinia               | 4.72   |
| Mandaitivu                        | 3.225  | Megal River                   | 8.225  | Muāri, Rās                  | 10.84  |
| Māndālgudda Island                | 6.134  | Mehti Khada                   | 8.21   | Muāri, Rās Light            | 10.82  |
| Mandapam                          | 4.156  | Mendhoo                       | 2.96   | Mubarak Village             | 10.163 |
| Mandāvi River                     | 6.221  | Menik Ganga                   | 3.53   | Mud Cove                    | 3.156  |
| Mandel Rock                       | 7.27   | Merodi Bet                    | 9.67   | Mudhulla Point              | 6.129  |
| Mandhoo                           | 2.182  | Methla Point                  | 8.110  | Mudipina Padavu             | 6.26   |
| Mandhoo Dhekunu Kandu             | 2.184  | Mian Mirza Bor                | 10.85  | Mudle Shoal;                |        |
| Mandhoo Uthuru Kandu              | 2.184  | Miani Hor                     | 10.159 | see Taylor Shoal: Mirya Bay | 7.86   |
| Māndvi Harbour                    | 9.96   | Mid Shoal                     | 9.185  | Mudwah Point                | 9.94   |
| Māndvi Light                      | 9.92   | Mid-Indian Ridge              | 1.160  | Muhammad Bin Qasim, Port;   |        |
| Mangalore                         | 6.27   | Middle Bank: Tuticorin        | 4.200  | see Port Muhammad Bin Qasim | 10.36  |
| Mangalore Light                   | 6.26   | Middle Banks                  | 3.208  | Mukh Peak                   | 10.193 |
| Māngrol                           | 8.226  | Middle Channel                | 3.208  | Mukkunni Mala               | 5.19   |
| Māngrol Bandar                    | 8.226  | Middle Ground Islet           | 7.224  | Mukta — Panna and Bassein   |        |
| Māngrol Light                     | 8.212  | Middle Point                  | 3.156  | Oilfield Development Area   | 7.15   |
| Mangrove Cove                     | 3.156  | Middle Rock, Mahawelly Bay    | 3.49   | Mul Dwarka                  | 8.196  |
| Mangrove Island                   | 3.157  | Middle Rock, Saint Mary Isles | 6.69   | Mulah Kandu                 | 2.203  |
| Maniji, Khōr                      | 10.168 | Migoodhoo                     | 2.428  | Mulaku Atoll                | 2.198  |
| Maniyāra Hill                     | 9.228  | Miladhoo                      | 2.423  | Mulee Kandu                 | 2.203  |
| Manjampadi Hill                   | 6.15   | Milandhoo                     | 2.428  | Mulhadhoo                   | 2.462  |
| Manjeshvar                        | 6.55   | Minden Rock                   | 3.140  | Mulhadhoo Kandu             | 2.463  |
| Manjeshwara                       | 6.25   | Mindhola River                | 8.52   | Muli                        | 2.201  |
| Mannār                            | 3.233  | Minicoy                       | 2.490  | Mulidhoo                    | 2.455  |
| Mannār Island                     | 4.131  | Minicoy Island Light          | 2.495  | Mulikolhu                   | 2.45   |
| Mannār Island Light               | 3.221  | Mirissa                       | 3.23   | Mūlki Rocks                 | 6.63   |
| Manora Breakwater Head Light      | 10.121 | Mirissa Point                 | 3.23   | Mūlki                       | 6.76   |
| Manora Point                      | 10.121 | Miriyaandhoo                  | 2.365  | Mūlki River                 | 6.76   |
| Manora Point Light                | 10.118 | Mirya Bay                     | 7.85   | Mullaitivu                  | 3.169  |
| Manori                            | 8.26   | Mirya Head                    | 7.78   | Mullaitivu Light            | 3.165  |
| Manori Creek                      | 8.26   | Mirya Peak                    | 7.75   | Mullaitivu Shoals           | 3.169  |
| Manori Point                      | 8.26   | Mitha Chusna                  | 9.68   | Mumbai                      | 7.191  |
| Mansfield Patch                   | 4.145  | Mitha Port, Kerla Creek       | 9.231  | Anchorage                   | 7.227  |
| Manzel Creek; see Golāri Creek    | 6.132  | Mitha Port, Mundra            | 9.108  | Dhows                       | 7.234  |
| Māpuca River                      | 6.224  | Mithāpur                      | 9.59   | Emergency                   | 7.233  |
| Maradhoo                          | 2.35   | Mithāpur Light                | 9.27   | Explosives                  | 7.231  |
| Maradhoofeydhoo                   | 2.35   | Mithivirdi                    | 8.128  | Merchant vessels            | 7.228  |
| Maragalakanda                     | 3.81   | Miyāni                        | 8.238  | Naval vessels               | 7.229  |
| Marble Bay                        | 3.104  | Miyaru Kandu                  | 2.169  | Outer                       | 7.189  |
| Marble Point                      | 3.104  | Miyet Point                   | 7.85   | Prohibited: Approaches      | 7.180  |
| Marescaux Rocks                   | 3.79   | Módara Muduwa Rock            | 4.74   | Prohibited: Harbour         | 7.235  |
| Margarita Shoal                   | 4.145  | Moderegān Aru                 | 4.139  | Quarantine                  | 7.230  |
| Marian Shoal                      | 9.22   | Moderegān Point               | 4.136  | Tankers                     | 7.232  |
| Marivel Patches                   | 6.176  | Mogeragudda Island            | 6.126  | Approaches                  | 7.168  |
| Maroli Hill                       | 8.52   | Mojap Beacon                  | 9.27   | Arrival information         | 7.208  |
| Maroli Light                      | 8.52   | Moliem Point                  | 6.167  | Basins and berths           | 7.237  |
| Maroshi                           | 2.435  | Monro Rocks                   | 3.79   | Ballard Pier                | 7.239  |
| Martha Patches                    | 6.164  | Moolkalle Point               | 3.20   | Hughes Dry Dock             | 7.252  |
| Marutva Malai                     | 5.16   | Moplah Bay                    | 5.160  | Minor basins and berths     | 7.244  |
| Māshuri Creek                     | 9.151  | Mora                          | 7.259  | Naval Dockyard              | 7.238  |
| Matara                            | 3.28   | Mora Sands                    | 7.104  | Oil jetties                 | 7.245  |
| Matara Bay                        | 3.28   | Moratuwa                      | 4.74   | Crude oil berths            | 7.246  |
| Mathagal                          | 3.214  | Moresby Channel               | 2.366  | Products berths             | 7.247  |
| Matheerah                         | 2.467  | Mormugao                      | 6.173  | Wet docks                   | 7.240  |
| Mathiveri                         | 2.185  | Anchorages                    | 6.194  | Indira Dock                 | 7.241  |
| Mattāncheri                       | 5.66   | Inner                         | 6.206  | Prince's Dock               | 7.243  |
| Mattāncheri Channel               | 5.97   | Outer                         | 6.194  | Victoria Dock               | 7.242  |
| Matte Mada                        | 4.38   | Arrival information           | 6.192  | Directions: Approaches      | 7.187  |
| Mauripur                          | 10.85  | Berths                        | 6.206  | Directions: Harbour         | 7.224  |
| Māvalli                           | 6.116  | Alongside berths              | 6.208  | General information         | 7.191  |
| Mayagala                          | 3.68   | Landing                       | 6.209  | Harbour                     | 7.215  |
| Mazgaon                           | 7.167  | Mooring buoys                 | 6.207  | Landing places              | 7.257  |
| Mazhar Point                      | 10.63  | Directions                    | 6.203  | Limiting conditions         | 7.202  |
| Meda Creek                        | 8.238  | General information           | 6.173  | Pilotage                    | 7.212  |
| Medhafushi: Faadhippolhu Atoll    | 2.403  | Harbour                       | 6.198  | Port services               | 7.252  |
| Medhafushi: Ihavandhippolhu Atoll | 2.463  | Limiting conditions           | 6.185  | Small craft                 | 7.256  |
| Medhufinolhu                      | 2.264  | Pilotage                      | 6.196  | Tidal streams               | 7.182  |
| Medhukuburudhoo                   | 2.435  | Port services                 | 6.210  | Approaches                  | 7.182  |
| Medical Advice, Radio             | 1.31   | Mormugao Bay                  | 6.176  | Berthing area               | 7.220  |
| Medu Gaa                          | 2.46   | Mormugao Head                 | 6.175  | Harbour                     | 7.219  |
| Mee Meti Yawa                     | 4.38   | Mormugao Point                | 6.181  |                             |        |
| Meedhaahuraa                      | 2.403  | Mormugao Rocks                | 6.176  |                             |        |

|                                 |       |                                 |       |                                 |        |
|---------------------------------|-------|---------------------------------|-------|---------------------------------|--------|
| Mumbri Bay                      | 7.56  | Navigation dangers and hazards  |       | North Cove                      | 3.156  |
| Mumbri Point                    | 7.56  | Mines                           | 1.4   | North East Port Beacon          | 3.230  |
| Munaikkādu Point                | 3.239 | Navigation amongst coral        | 1.3   | North Island                    | 6.69   |
| Munayai Paru                    | 3.109 | Principal Routes                | 1.2   | North Islet: Gwatār Bay         | 10.223 |
| Munde ka Bet                    | 9.119 | Navināl Creek                   | 9.110 | North Islet: Suheli Par         | 2.508  |
| Munde Reef                      | 9.119 | Navināl Marine Terminal         | 9.106 | North Maalhosmadulu Atoll       | 2.367  |
| Mundel Point                    | 4.149 | Navināl Point                   | 9.94  | North Miladhunmadulu Atoll      | 2.415  |
| Mundoo                          | 2.109 | Navlakhi                        | 9.213 | North Nilandhe Atoll            | 2.161  |
| Mundra                          | 9.102 | Navlakhi Bet                    | 9.213 | North Pap Beacon                | 7.185  |
| Mundra New Port Light           | 9.105 | Navlakhi Bet Light              | 9.216 | North Point                     | 5.149  |
| Mungra Reef                     | 9.210 | Navsāri                         | 8.67  | North Thiladhunmathee Atoll     | 2.436  |
| Mungra Reef Anchorage           | 9.155 | Navy House                      | 3.139 | North Toni Beacon               | 3.230  |
| Mungra Reef Light-tower         | 9.120 | Nawābandar                      | 8.95  | Northesk Rocks                  | 3.110  |
| Munyal Par; see Bassas de Pedro | 2.539 | Nawābandar Light                | 8.78  | Norway Island                   | 3.110  |
| Mūrāt River                     | 5.142 | Nayinativu                      | 3.224 | Norway Point                    | 3.110  |
| Murdeshvar Island               | 6.116 | Nazaret Point                   | 6.178 | Nūh, Rās                        | 10.192 |
| Murex Bluff                     | 8.77  | Neduntivu Shoal                 | 3.224 | Nukudiankulu                    | 5.151  |
| Murex Reef                      | 8.77  | Neelam Heera and Ratna          |       | Nuroni Cove                     | 3.21   |
| Murga Bet                       | 9.202 | Oilfields Development Area      | 7.16  |                                 |        |
| Murray Ridge                    | 1.160 | Negombo Lagoon                  | 4.128 | Odshel Point                    | 6.178  |
| Murud                           | 7.152 | Negombo Point                   | 4.126 | Okha                            | 9.28   |
| Murud Hill                      | 7.147 | Negombo Waiting Area            | 4.122 | Anchorage inner                 | 9.54   |
| Murud — Janjira Fort Light      | 7.155 | Nehindi Rock                    | 3.39  | Anchorage outer                 | 9.43   |
| Murud — Janjira Harbour         | 7.152 | Neori Point                     | 7.100 | Arrival information             | 9.40   |
| Musākāzi Point                  | 7.88  | Neru Magu Channel               | 2.500 | Berths                          | 9.55   |
| Musākāzi Point Light            | 7.78  | Netrani Island                  | 6.116 | Directions                      | 9.50   |
| Musal Tivu                      | 4.211 | Netrāvati Channel               | 6.31  | General information             | 9.28   |
| Mushroom Rock                   | 8.112 | Netrāvati River                 | 6.30  | Harbour                         | 9.46   |
| Muttam Point                    | 5.17  | New Hazur Palace                | 8.212 | Limiting conditions             | 9.34   |
| Muttam Point Light              | 5.16  | New Islet                       | 4.154 | Pilotage                        | 9.44   |
| Muttupettai                     | 4.212 | New Mangalore                   | 6.34  | Port services                   | 9.56   |
| Mutugala Point                  | 3.64  | Anchorage                       | 6.45  | Tidal streams                   | 9.48   |
| Mutwal Point                    | 4.85  | Arrival information             | 6.45  | Okha Madhi                      | 8.236  |
| Mysore                          | 1.111 | Berths                          | 6.53  | Okha Point                      | 9.53   |
|                                 |       | Directions                      | 6.51  | Okha Rann                       | 8.230  |
|                                 |       | General information             | 6.34  | Okhamandal                      | 9.62   |
|                                 |       | Harbour                         | 6.46  | Okhamandal Peninsula            | 8.230  |
|                                 |       | Limiting conditions             | 6.44  | Olavattūr Kunnu                 | 5.112  |
|                                 |       | Pilotage                        | 6.45  | Old Port Light                  | 8.173  |
|                                 |       | Port services                   | 6.54  | Olhugiri                        | 2.357  |
| Nadallaa                        | 2.68  | Neykurendhoo                    | 2.444 | Olhugiri Kandu                  | 2.128  |
| Nādāpuram Mudi                  | 5.171 | Neyo                            | 2.424 | Olhuhali                        | 2.264  |
| Nade Munai Paar                 | 3.140 | Nhāva Creek                     | 7.264 | Olhuhali Uthuru Kandu           | 2.265  |
| Naditivu                        | 3.104 | Nhāva Island                    | 7.258 | Olhukolhu                       | 2.403  |
| Nagwa Point                     | 8.77  | Nhāva-Sheva, Port of;           |       | Olhuveli                        | 2.238  |
| Naifaru                         | 2.412 | see Jawahar Lal Nehru Port      | 7.258 | Olhuvelifushi                   | 2.396  |
| Naivaadhoo                      | 2.449 | Nicholson Cove                  | 3.158 | Oluvil Light                    | 3.88   |
| Nakachchaafushi                 | 2.264 | Niger Rock                      | 3.104 | Omadhoo                         | 2.187  |
| Nakti Creek                     | 9.199 | Nigger's Head                   | 7.224 | Ona Gala                        | 4.107  |
| Nalandhoo                       | 2.428 | Nikol Bandar                    | 8.123 | One and Half Degree Channel     | 2.89   |
| Nalla Tanni Island              | 4.207 | Nilagalahela                    | 3.78  | Orlando Cove                    | 3.154  |
| Namunakuli                      | 3.100 | Nilandhoo Kandu                 | 2.165 | Ormāra                          | 10.178 |
| Nancowry Rock                   | 6.99  | Nilandhoo: Huvadhoo Atoll       | 2.86  | Ormāra Light                    | 10.173 |
| Nancowry Shoal                  | 10.84 | Nilandhoo: North Nilandhe Atoll | 2.163 | Ormāra peninsula                | 10.178 |
| Nāndivela                       | 8.75  | Nilapannikamalai                | 3.175 | Ormāra, Rās                     | 10.178 |
| Nāni Damān                      | 8.63  | Nilaveli Hill                   | 3.170 | East Bay                        | 10.179 |
| Nanu Hill                       | 9.87  | Nileswarem River                | 6.10  | East Point                      | 10.179 |
| Nānwell Point                   | 7.147 | Nilewelli Bay                   | 3.47  | West Bay                        | 10.180 |
| Nānwell Point Light             | 7.147 | Nilewelli Point                 | 3.21  | Orr's Hill                      | 3.158  |
| Narāra Bet                      | 9.119 | Nilkete Rock                    | 4.74  | Orripar                         | 4.200  |
| Narāra Bet Reef                 | 9.128 | Nilot Point                     | 5.156 | Ostenburg Point                 | 3.141  |
| Narāra Reef                     | 9.119 | Nilwala Ganga                   | 3.28  | Ostenburg Ridge                 | 3.103  |
| Narmada Bank                    | 8.43  | Nindakara                       | 5.53  | Outer Bhagva Sand               | 8.142  |
| Narmada River                   | 8.144 | Nindan Godella                  | 4.54  | Outer Islet                     | 8.21   |
| Natural conditions              |       | Nine Degree Channel             | 2.507 | Outer Patches                   | 6.176  |
| Climate and weather             | 1.178 | Nisāna Gudda                    | 6.117 | Outer Rocks                     | 6.63   |
| Currents                        | 1.163 | Nishkalank Mahadev Temple       | 8.140 | Outer Tuna Light-buoy           | 9.185  |
| General information             | 1.160 | Niuti Fort                      | 7.28  | Oyster Islands                  | 10.94  |
| Sea and swell                   | 1.172 | Nolhivaramu                     | 2.444 | Oyster Rock, Mumbai             | 7.224  |
| Tidal stream                    | 1.170 | Nolhivaranfaru                  | 2.444 | Oyster Rocks, Kārwar            | 6.134  |
| Tides                           | 1.171 | Noomara Kandu                   | 2.426 | Oyster Rocks Light              | 6.125  |
| Volcanic activity               | 1.162 | Noomaraa                        | 2.426 |                                 |        |
| Naukhari Point                  | 7.251 | Nora Rock                       | 9.80  | Pab Mountains                   | 10.146 |
| Nāvadra Light                   | 8.234 | Nora Tāpu                       | 9.68  | Padi Zarr; see Ormāra West Bay  | 10.180 |
| Naval Yard                      | 3.157 | Norfolk House                   | 3.139 | Padiyamkara Tekku               | 5.52   |
| Nāvāpur                         | 8.40  | North Ari Atoll                 | 2.176 | Padmagarh Fort                  | 7.45   |
| Nāvāpur Light                   | 8.22  | North Beacon                    | 3.230 | Padmatirth Point                | 9.53   |
| Navibandar                      | 8.228 | North Channel                   | 3.209 | Padua Bank; see Bassas de Pedro | 2.539  |
| Navibandar Light                | 8.228 | North Channel Beacon Light      | 7.226 |                                 |        |
| Navigational aids               | 1.15  |                                 |       |                                 |        |
| Navigational Warnings, Radio    | 1.26  |                                 |       |                                 |        |



|                                     |        |                                         |        |                                   |        |
|-------------------------------------|--------|-----------------------------------------|--------|-----------------------------------|--------|
| Paga Reef .....                     | 9.68   | Pavas Point .....                       | 7.91   | Port Dābhol .....                 | 7.109  |
| Pagoda Hill; see Devate Gudda ..... | 6.117  | Pedro Channel .....                     | 3.187  | Port Kārwar Light .....           | 6.145  |
| Pahala Point .....                  | 3.67   | Pedro Channel Middle Beacon .....       | 3.188  | Port Muhammad Bin Qasim .....     | 10.36  |
| Paitiani Creek .....                | 10.34  | Pedro Channel South Obelisk .....       | 3.184  | Arrival information .....         | 10.50  |
| Pakistan                            |        | Pedruana Gala .....                     | 4.54   | Berths .....                      | 10.64  |
| General information .....           | 1.130  | Pelagas Kanda .....                     | 4.66   | Export processing zone .....      | 10.66  |
| Ports, list of .....                | 1.151  | Penha di Frāns .....                    | 6.221  | Fauji Oil Terminal .....          | 10.64  |
| Pala Gala .....                     | 4.74   | Pepperpot Jetty .....                   | 3.157  | Iron Ore and Coal Jetty .....     | 10.65  |
| Palapana Gala .....                 | 3.19   | Perali Mala .....                       | 5.171  | Marginal Wharf .....              | 10.67  |
| Palativu .....                      | 3.225  | Perch Rock .....                        | 7.44   | Mooring buoys .....               | 10.68  |
| Palatupana Point .....              | 3.64   | Peremul Par .....                       | 2.528  | Directions .....                  | 10.59  |
| Pālghāt Gap .....                   | 5.2    | Perigee Light-float .....               | 8.168  | General information .....         | 10.36  |
| Palitana Mountain .....             | 8.107  | Perigee Rock .....                      | 8.167  | Harbour .....                     | 10.56  |
| Palk Bay .....                      | 3.215  | Periyār Lake .....                      | 5.124  | Limiting conditions .....         | 10.44  |
| Palk Strait .....                   | 3.195  | Periyār River .....                     | 5.124  | Pilotage .....                    | 10.54  |
| Pallaipara Rock .....               | 4.74   | Perumātura Light .....                  | 5.36   | Port services .....               | 10.69  |
| Pallikall Shoal .....               | 5.40   | Pesalai .....                           | 3.234  | Port of Nhāva-Sheva;              |        |
| Palmyra Point .....                 | 3.206  | Phitti Creek .....                      | 10.56  | see Jawahar Lal Nehru Port .....  | 7.258  |
| Pālshet .....                       | 7.121  | Leading lights .....                    | 10.62  | Port Redi .....                   | 7.30   |
| Pālshet Bay .....                   | 7.121  | Phor Nai .....                          | 10.162 | Port services — summary           |        |
| Pālshet Light .....                 | 7.101  | Phuari .....                            | 10.151 | Docking facilities .....          | 1.155  |
| Pāmban .....                        | 3.236  | Pidurutalagala .....                    | 1.85   | Other facilities .....            | 1.156  |
| Pāmban Island .....                 | 3.228  | Pigeon Island; see Netrani Island ..... | 6.116  | Ports and principal anchorages    |        |
| Pāmban Island Light .....           | 3.221  | Prkene Island .....                     | 6.164  | List of .....                     | 1.151  |
| Pāmban Pass .....                   | 4.147  | Pillar Rock .....                       | 8.122  | Portugal Bay .....                | 4.129  |
| Anchorage .....                     | 4.156  | Pillinawa Point .....                   | 3.66   | Poshpir .....                     | 8.21   |
| Arrival information .....           | 4.149  | Pilotage .....                          | 1.19   | Positra Bay .....                 | 9.66   |
| Directions .....                    | 4.151  | Pīndara Bay .....                       | 9.67   | Positra Point .....               | 9.66   |
| General information .....           | 4.147  | Pinnacle Rock: 8°46'N, 81°06'E .....    | 3.170  | Powder Bay .....                  | 3.157  |
| Limiting conditions .....           | 4.148  | Pinnacle Rock: Gopnāth Point .....      | 8.110  | Powder Boat Passage .....         | 3.157  |
| Pilotage .....                      | 4.149  | Pinnacle Rock: Trincomalee .....        | 3.158  | Powder Island .....               | 3.157  |
| Pāmban Viaduct .....                | 4.147  | Pīpāvān Bandar .....                    | 8.112  | Powder Rocks .....                | 3.142  |
| Pāmbār River .....                  | 3.239  | Pīpāvān Port .....                      | 8.112  | Powell Islands .....              | 2.382  |
| Pambuttivu .....                    | 3.154  | Pipelines .....                         | 1.33   | Pra Malai .....                   | 3.113  |
| Panadura .....                      | 4.76   | Pir Pau .....                           | 7.247  | Prabhās Pātan .....               | 8.193  |
| Panadura Ganga .....                | 4.76   | Pir Pau Deep .....                      | 7.248  | Pratap Clock Tower .....          | 9.148  |
| Panaji .....                        | 6.223  | Pir Sanāi Creek .....                   | 10.30  | Prinz Heinrich Patch .....        | 3.19   |
| Panawa .....                        | 3.79   | Piracy .....                            | 1.56   | Prompt Rock .....                 | 4.74   |
| Panbruj Point .....                 | 7.135  | Piram Island .....                      | 8.139  | Prompt Shoal .....                | 3.24   |
| Pandi Aricha Munai Paar .....       | 3.140  | Piram Island Light .....                | 8.136  | Prongs Reef .....                 | 7.187  |
| Pandigat Point .....                | 6.164  | Pirothan Island .....                   | 9.119  | Prongs Reef Light .....           | 7.185  |
| Panditovo Point .....               | 3.91   | Pirothan Island NW Point Light .....    | 9.117  | Puhumodal Rock .....              | 3.24   |
| Pāndiyan Tivu Light .....           | 4.186  | Pirothan Island                         |        | Pukkunnu .....                    | 5.131  |
| Pānero Tāpu .....                   | 9.72   | Offshore NE Light .....                 | 9.120  | Puliyantivu .....                 | 3.222  |
| Pānikota Islet .....                | 8.77   | Pīshūkān .....                          | 10.205 | Pulleri .....                     | 5.21   |
| Panju Island .....                  | 8.35   | Pīshūkān, Rās .....                     | 10.215 | Pulli Reef .....                  | 4.154  |
| Pānvel Creek .....                  | 7.264  | Pitawatan Point .....                   | 3.59   | Pulli Shoal .....                 | 4.154  |
| Pār River .....                     | 8.64   | Pittaniya Rocks .....                   | 4.74   | Pulmoddai .....                   | 3.174  |
| Parali Islets .....                 | 2.515  | Pitti .....                             | 2.514  | Pulmoddai Pier Light .....        | 3.170  |
| Pārdi .....                         | 8.64   | Plantain Point .....                    | 3.157  | Pulmoddai Roads .....             | 3.174  |
| Parei Duwa .....                    | 3.24   | Po Gala .....                           | 4.74   | Puma Channel .....                | 4.154  |
| Pares Shoal .....                   | 3.24   | Point Calimere .....                    | 3.204  | Puma East Channel .....           | 4.154  |
| Parhur Peak .....                   | 7.143  | Point Calimere Light .....              | 3.204  | Pumurichan Tivu .....             | 4.154  |
| Parititivu .....                    | 3.222  | Point de Galle .....                    | 4.24   | Punkudutivu .....                 | 3.221  |
| Parker Rock .....                   | 6.148  | Point de Galle Light .....              | 4.37   | Punkudutivu Light .....           | 3.221  |
| Pārnera Hill .....                  | 8.52   | Point Pedro .....                       | 3.184  | Punnaikayal .....                 | 4.169  |
| Parvat Gudi .....                   | 6.114  | Point Pedro Light .....                 | 3.184  | Punnaikkula Point .....           | 3.91   |
| Parweka Point .....                 | 7.56   | Point Pedro Shoal .....                 | 3.187  | Punuli Point .....                | 5.149  |
| Pasavadi gumpa Mala .....           | 6.23   | Point Pedro Town .....                  | 3.211  | Pura Malai .....                  | 3.167  |
| Pascoe Rock .....                   | 6.178  | Polatu Ganga .....                      | 3.23   | Purangad Bay .....                | 7.90   |
| Pasipattanam .....                  | 3.239  | Polkote Gala .....                      | 4.38   | Purangad Bay Light .....          | 7.78   |
| Pasnī .....                         | 10.194 | Pollution .....                         | 1.34   | Pūrna River .....                 | 8.67   |
| Pasnī Bay .....                     | 10.194 | Ponnāni .....                           | 5.125  | Pusht, Kuh-e .....                | 10.214 |
| Pasnī Light .....                   | 10.191 | Ponnāni Light .....                     | 5.112  | Puttalam Lagoon .....             | 4.128  |
| Passenger Pier .....                | 3.157  | Ponnāni River .....                     | 5.125  | Pyramid Rock .....                | 10.94  |
| Passi Rock .....                    | 4.62   | Porakād .....                           | 5.51   |                                   |        |
| Patalamalai; see Round Island ..... | 3.111  | Poras Rock .....                        | 7.34   |                                   |        |
| Patanagala Point .....              | 3.66   | Porbandar .....                         | 8.217  | Qalandri Creek .....              | 10.32  |
| Pathfinder Inlet .....              | 9.126  | Anchorage .....                         | 8.222  | Qasim, Muhammad Bin;              |        |
| Pātia Hill .....                    | 8.52   | Arrival information .....               | 8.219  | see Port Muhammad Bin Qasim ..... | 10.36  |
| Patiagala Point .....               | 4.66   | Berths .....                            | 8.223  | Quarantine .....                  | 1.38   |
| Patirajja Point .....               | 3.59   | Directions .....                        | 8.221  | Quilāndi .....                    | 5.143  |
| Patna Rock .....                    | 5.21   | General information .....               | 8.217  | Quilon .....                      | 5.37   |
| Pattanam arudur .....               | 4.208  | Harbour .....                           | 8.220  | Qutub Point .....                 | 10.63  |
| Patten Rock .....                   | 3.82   | Limiting conditions .....               | 8.218  |                                   |        |
| Patva Bay .....                     | 8.121  | Pilotage .....                          | 8.219  | Raafushi .....                    | 2.429  |
| Paulo Creek .....                   | 7.163  | Port services .....                     | 8.224  | Raafushi Light .....              | 2.432  |
| Paurādhār Islet .....               | 8.110  | Porbandar Light .....                   | 8.212  | Radio facilities .....            | 1.20   |
| Pavas Bay .....                     | 7.91   | Port Bānkot .....                       | 7.131  | Raij Māgus .....                  | 6.220  |

|                                   |        |                                         |        |                                 |        |
|-----------------------------------|--------|-----------------------------------------|--------|---------------------------------|--------|
| Raij Māgus Light                  | 6.220  | Rihiveli                                | 2.243  | Sawmill Point                   | 2.318  |
| Railway Cove                      | 3.155  | River Indus                             | 10.2   | Sawyers Patches                 | 6.204  |
| Railway Pier                      | 3.155  | Rocket and satellite launching stations | 1.9    | Schwarte Fort                   | 4.35   |
| Raiymandhoo                       | 2.200  | Rocky Islet: Calicut                    | 5.133  | Sea level and Tides             | 1.171  |
| Raiymandhoo Light                 | 2.202  | Rocky Knob                              | 3.58   | Sea and Swell                   | 1.172  |
| Rājman Fort                       | 6.119  | Rocky Point                             | 3.103  | Sea water characteristics       | 1.176  |
| Rājāpur                           | 7.88   | Rocky Shoal                             | 8.77   | Sealark Rock: Galle             | 4.38   |
| Rājāpur Bay                       | 7.88   | Rodrigues Shoal                         | 10.178 | Sealark Rock: Weligama Bay      | 3.24   |
| Rājāpur Creek                     | 7.88   | Roebena Point                           | 2.499  | Seamount, MGU                   | 1.161  |
| Rājkot, Fort                      | 7.45   | Round Hill: Devgarh                     | 7.55   | Search and Rescue               | 1.50   |
| Rājkot Rock                       | 7.44   | Round Hill: Murud — Janjira             | 7.155  | Searle Patch                    | 6.178  |
| Rājpurābandar                     | 8.98   | Round Island                            | 3.111  | Secundra Rock                   | 4.38   |
| Rājpurī                           | 7.147  | Round Island Light                      | 3.108  | Selhihifushi                    | 2.395  |
| Rājpurī Creek                     | 7.152  | Round Point                             | 3.143  | Seltive Reef                    | 4.200  |
| Rakeedhoo                         | 2.225  | Round Point Shoals                      | 3.144  | Sena River                      | 8.128  |
| Rakeedhoo Kandu                   | 2.217  | Rozi Anchorage                          | 9.145  | Sesalkhāda Creek                | 8.82   |
| Rāma Bay                          | 6.166  | Rozi Island                             | 9.143  | Sesostri Bank                   | 2.540  |
| Rāma False Bluff                  | 6.164  | Rozi Island Jetty                       | 9.149  | Sevandapar Rock                 | 4.200  |
| Rāmancheri Tura                   | 5.51   | Rozi Māta Temple                        | 9.146  | Shādi Kaur                      | 10.194 |
| Rāmangundi                        | 6.117  | Rūdikhāneh-ye Bāhū Kalāt                | 10.223 | Shah Jehan Shoal                | 7.129  |
| Ramen Point                       | 4.153  | Ruffushi                                | 2.447  | Shāhid, Rās                     | 10.192 |
| Rāmeswaram                        | 3.221  | Ruffushi Kanduolhi                      | 2.447  | Shalli Island                   | 4.207  |
| Randombe                          | 4.64   | Ruhuna                                  | 1.88   | Shamai Bandar, Rās              | 10.192 |
| Rangali Light                     | 2.183  | Rukmāwati River                         | 9.96   | Shankholia Point                | 9.61   |
| Rankuran Point                    | 7.131  | Rumassala Kanda                         | 4.14   | Sharāvati River                 | 6.118  |
| Rann of Kachchh                   | 9.232  | Rupen Bandar                            | 8.240  | Sharp Hill                      | 3.90   |
| Rannaalhi                         | 2.246  | Ruwana Rock                             | 3.26   | Shāstri River                   | 7.108  |
| Ranson Shoal                      | 9.147  |                                         |        | Shaullavanaigenpatam Column     | 3.221  |
| Ranvi Point                       | 7.113  |                                         |        | Shell Bay                       | 3.114  |
| Ranwara Shoals                    | 9.25   |                                         |        | Shendur                         | 8.22   |
| Rās = Cape; see proper name       |        | Sābarmati River                         | 8.185  | Shet Bandar                     | 7.257  |
| Rasdhoo Atoll                     | 2.191  | Sachāna                                 | 9.152  | Shetrunji River                 | 8.149  |
| Rasfari                           | 2.264  | Sacrifice Rock                          | 5.131  | Sheva Island                    | 7.261  |
| Rasfushifaru                      | 2.458  | Sadashivgarh Hill                       | 6.149  | Shiāl Bet                       | 8.112  |
| Rasgethemu                        | 2.380  | Saddle Hill                             | 7.61   | Shikotar Māta                   | 8.185  |
| Rasmaadhoo                        | 2.380  | Sāgargarh Fort                          | 7.147  | Shīl Bandar                     | 8.227  |
| Rassamunai Point                  | 3.19   | Sāgargarh Range                         | 7.143  | Shimisgudda Island              | 6.133  |
| Rat Point                         | 2.276  | Sahn                                    | 9.67   | Shingle Tivu                    | 4.152  |
| Ratgama Lake                      | 4.55   | Sail Rock: Makrān                       | 10.182 | Ship Rock: 8°19'N, 81°24'E      | 3.93   |
| Rathi                             | 10.164 | Sail Rock: Mormugao                     | 6.164  | Ship Rock: Great Basses Ridge   | 3.60   |
| Ratmalana                         | 4.75   | Sailor's Bastion                        | 4.48   | Shirāli Island                  | 6.116  |
| Ratnāgiri                         | 7.79   | Saint George's Bank                     | 6.164  | Shirgaon                        | 8.39   |
| Ratnāgiri Bay                     | 7.79   | Saint George's Islands                  | 6.164  | Shirgaon Creek                  | 7.117  |
| Ratnāgiri, District of            | 1.116  | Saint George's Reef                     | 6.164  | Shiriya River                   | 6.55   |
| Ratnāgiri Light                   | 7.75   | Saint Jāsintu Island                    | 6.177  | Shitta Point                    | 6.154  |
| Ratnapur                          | 8.144  | Saint Mary Isles                        | 6.65   | Shīyārdi Bet                    | 9.67   |
| Rattan Point                      | 3.39   | Saint Mary Isles Light                  | 6.60   | Shoal Bank                      | 8.196  |
| Rāwal Pīr Light                   | 9.92   | Saiyad Rājpurābandar Light              | 8.78   | Shorukulu                       | 5.151  |
| Rāwal Pīr Tomb                    | 9.92   | Sājidi, Kūh                             | 10.216 | Shoulder Point                  | 3.168  |
| Red Bluff                         | 3.171  | Sakanni, Rās                            | 10.169 | Sikka                           | 9.128  |
| Reddhdfutta                       | 2.65   | Sāl River                               | 6.171  | Sikka Creek                     | 9.128  |
| Redi Fort                         | 7.29   | Salāya                                  | 9.75   | Sil Point                       | 7.109  |
| Redi Point                        | 7.32   | Salāya Creek                            | 9.75   | Silavatturai Reef               | 4.136  |
| Redi Rock                         | 7.27   | Salāya Harbour                          | 9.75   | Simāni Hill                     | 9.72   |
| Regulations                       |        | Saleh Magu Channel                      | 2.500  | Simar                           | 8.96   |
| Control of navigation             | 1.39   | Sālehābād                               | 10.125 | Simar Fort                      | 8.77   |
| Dangerous cargoes                 | 1.37   | Salsette Island                         | 8.23   | Simar Fort Light                | 8.77   |
| Distress and rescue               | 1.50   | Sāmarvel Hill                           | 8.52   | Simar Light                     | 8.78   |
| Examination service               | 1.40   | Sambore Bay                             | 3.115  | Sims Rock                       | 8.110  |
| Pilotage                          | 1.19   | Sāmiāni Island                          | 9.49   | Sinclair Reefs                  | 9.80   |
| Pollution international           | 1.34   | Sāmiāni Island Centre Light             | 9.49   | Sindhudrug Janjira              | 7.45   |
| Pollution national                | 1.36   | Sāmiāni Island North Light              | 9.27   | Sindhudrug Janjira Light        | 7.45   |
| Quarantine                        | 1.38   | Sāmiāni Shoal                           | 9.50   | Singare Shoal                   | 9.210  |
| Storm signals                     | 1.44   | Sand Bank Channel                       | 4.152  | Singhvi Shoal                   | 9.185  |
| Submarine cables and pipelines    | 1.33   | Sandy Point                             | 7.155  | Single White Rock               | 6.99   |
| Submarine exercise areas          | 1.8    | Sangama Kanda Point                     | 3.79   | Singwāda River                  | 8.206  |
| Traffic separation scheme         | 1.35   | Sangama Kanda Point Light               | 3.79   | Sinquerim River                 | 6.220  |
| Reis Sand                         | 6.222  | Sangameshwar                            | 7.108  | Sir Creek                       | 10.30  |
| Rekawa Point                      | 3.38   | Santa Cruz Aero Light                   | 8.20   | Sir Mouth                       | 10.30  |
| Reliance Jāmnagar Marine Terminal | 9.136  | Sathsaida Bet                           | 9.158  | Siri Reef                       | 9.132  |
| Reliance Magdalla                 | 8.58   | Sathsaida Leading Lights                | 9.185  | Sister Shoal                    | 3.143  |
| Reliance Shoal                    | 5.133  | Satpati                                 | 8.39   | Sita River                      | 6.92   |
| Reliance SPM                      | 8.55   | Satpati Light                           | 8.20   | Slave Island                    | 4.72   |
| Residency Hill                    | 4.37   | Saurashtra Coast                        | 9.67   | Sleet Rock                      | 3.20   |
| Revadanda                         | 7.158  | Savāi Bet                               | 8.110  | Small Pox Island; see Viringili | 2.499  |
| Revadanda Port                    | 7.158  | Savāi Bet Light                         | 8.107  | Small Quoin                     | 3.92   |
| Revāpurī Light                    | 8.168  | Savāi Bet Reef                          | 8.110  | Small Sober Island              | 3.141  |
| Revas Bandar Light                | 7.251  | Save Kaur                               | 10.187 | Smooth Islet                    | 3.115  |
| Ribudhoo                          | 2.153  | Sāvitrī River                           | 7.137  | Snail Rock                      | 6.116  |

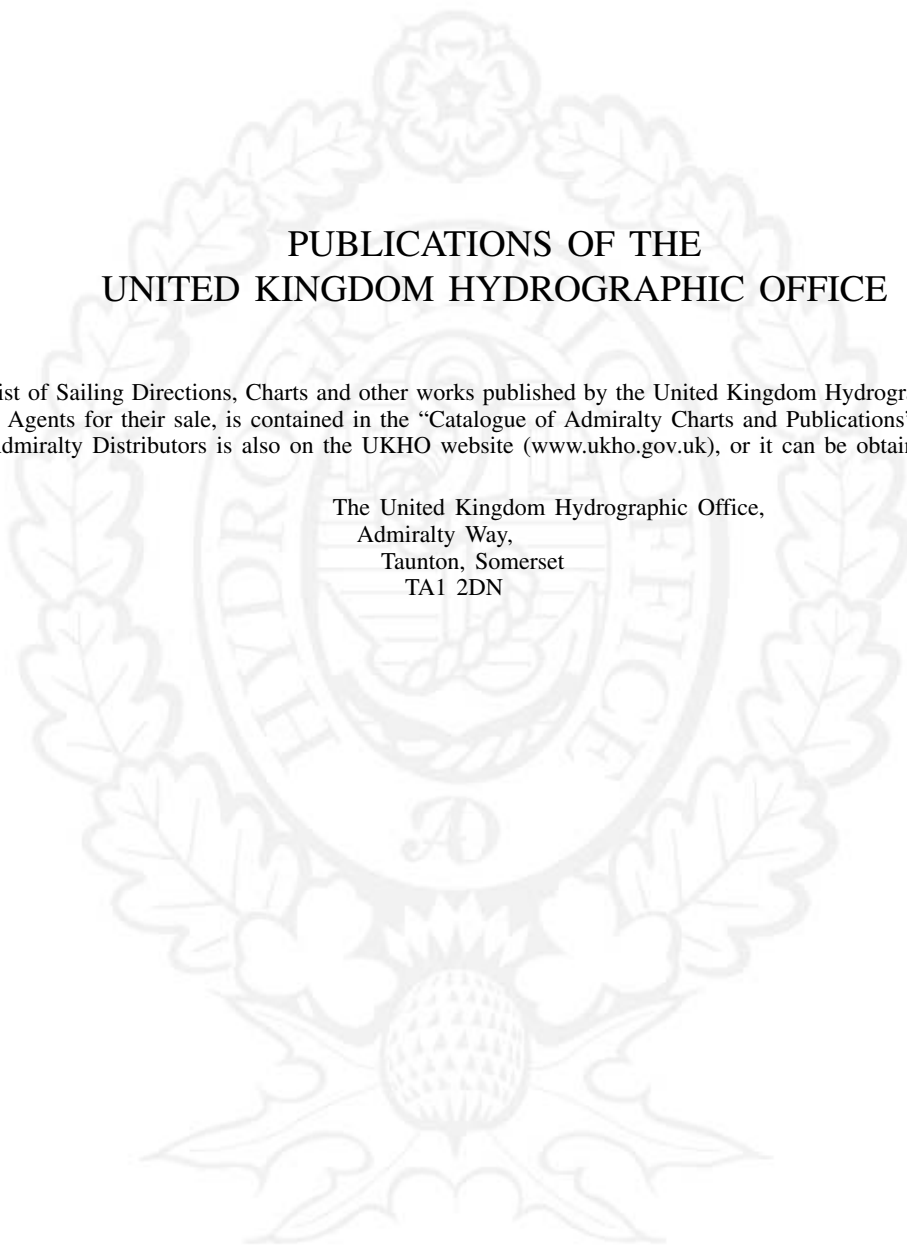
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|-------------------------------------|--------|---------------------------------|--------|--------------------------------|--------|
| Snug Cove                           | 3.154  | Talāja Hill                     | 8.136  | Thuvuru                        | 2.207  |
| Sogal Channel                       | 9.179  | Tālār Hills                     | 10.181 | Thuvurudhekunu Kandu           | 2.207  |
| Somali Basin                        | 1.160  | Talarambee Point                | 3.19   | Tiger Hill; see Wagh-giri      | 7.29   |
| Somat River                         | 8.206  | Talavda River                   | 7.29   | Tikkoti                        | 5.133  |
| Somnāth Temple                      | 8.193  | Talayi                          | 5.159  | Tilburn Shoal                  | 9.126  |
| Sonar Durree                        | 9.94   | Talayi Rock                     | 5.151  | Tinnakara                      | 2.515  |
| Sonmiani                            | 10.159 | Talipparamba River              | 5.168  | Tinnakara Light                | 2.516  |
| Sonmiani Bay                        | 10.151 | Tāloi Range                     | 10.168 | Tippu Sultan Gudda Light       | 6.83   |
| Sookana Point                       | 7.117  | Talpona River                   | 6.164  | Tiruchchendūr Point            | 4.168  |
| Sookana Shoals                      | 7.100  | Tamachi Pir Tomb                | 9.92   | Tirumana                       | 5.134  |
| South Ari Aroll                     | 2.176  | Tambalagam Bay                  | 3.104  | Tirūr                          | 5.125  |
| South Banks                         | 3.206  | Tambalagam Shoal                | 3.104  | Titāin Nai                     | 10.160 |
| South East Port Beacon              | 4.153  | Tambalagam Spit                 | 3.104  | Tokul Point                    | 7.71   |
| South Island                        | 6.69   | Tamilnadu                       | 1.107  | Tolkeshwar Point               | 7.113  |
| South Islet: Gwatār Bay             | 10.223 | Tangalla                        | 3.41   | Tolkeshwar Point Light         | 7.99   |
| South Islet; Suheli Par             | 2.508  | Tangalla Bay                    | 3.41   | Tondi                          | 3.237  |
| South Maalhosmadulu Atoll           | 2.345  | Tangalla Point                  | 3.38   | Tonkul Peak                    | 7.101  |
| South Male' Atoll                   | 2.235  | Tangalla Rock                   | 3.38   | Toshdān Kūh                    | 10.205 |
| South Miladhunmadulu Atoll          | 2.415  | Tangasseri Point Light          | 5.34   | Tottapalli                     | 5.64   |
| South Nilandhe Atoll                | 2.147  | Tankāri                         | 8.182  | Tower Hill                     | 3.92   |
| South Rock                          | 7.39   | Tankāri Point                   | 8.183  | Towers of Silence              | 8.140  |
| South Thiladhunmathee Atoll         | 2.436  | Tankāri Road                    | 8.182  | Town Bay                       | 3.157  |
| South Toni Beacon                   | 4.153  | Tanna Rocks                     | 3.20   | Traffic and operations         |        |
| South West Point Rock               | 7.39   | Tānūr Nagaram                   | 5.126  | Exercise areas                 | 1.7    |
| Southampton Hill                    | 3.145  | Tāpan Island                    | 8.110  | Fishing                        | 1.6    |
| Southern Ghāts                      | 4.158  | Tāpi River                      | 8.56   | Marine exploitation            | 1.10   |
| Spit Sand                           | 8.115  | Tapti Oilfield Development Area | 8.44   | Piracy and Terrorism           | 1.56   |
| Spit, The                           | 8.115  | Tapti Rock                      | 7.27   | Rocket and Satellite Launching |        |
| Split Rock                          | 3.81   | Tārāpur                         | 8.60   | Stations                       | 1.9    |
| Square Rock                         | 7.27   | Tārāpur Harbour                 | 8.60   | Traffic                        | 1.5    |
| Square Rock: Patva Bay              | 8.121  | Tārāpur Point                   | 8.21   | Traffic Separation Scheme      | 1.35   |
| Sri Lanka                           |        | Tārāpur Point Light             | 8.20   | Transit Hill                   | 3.65   |
| General information                 | 1.77   | Tartar Rock; see Pala Gala      | 4.74   | Tree Islet; see Bitra          | 2.533  |
| Ports, list of                      | 1.151  | Tavsaī Point                    | 7.104  | Tree Rock                      | 3.93   |
| Security zone                       | 1.80   | Taylor Shoal: Mirya Bay         | 7.86   | Tria Gala                      | 4.74   |
| Srīvardhan                          | 7.140  | Taylor Shoal: Salāya Harbour    | 9.81   | Triodi Reef                    | 5.133  |
| Srīvardhan Bay                      | 7.140  | Tejo                            | 6.222  | Trincomalee                    | 3.116  |
| Srīvardhan Bay Light                | 7.130  | Tekra Islet                     | 9.199  | Anchorage inner                | 3.146  |
| Srīvardhan Point                    | 7.140  | Tekra Light                     | 9.117  | Anchorage outer                | 3.113  |
| Stork Shoal                         | 3.187  | Tellicherry                     | 5.153  | Arrival information            | 3.128  |
| Storm warning signals               | 1.44   | Tellicherry Light               | 5.152  | Bay                            | 3.101  |
| Suaroge Light                       | 2.97   | Telwatta Point                  | 4.63   | Berths                         | 3.147  |
| Submarine Cables                    | 1.33   | Tena Creek                      | 8.141  | Directions for bay             | 3.109  |
| Sudukal                             | 5.21   | Terekhol Fort                   | 7.29   | Directions for harbour         | 3.140  |
| Suheli Par                          | 2.508  | Terekhol River                  | 7.49   | General information            | 3.116  |
| Sui Creek                           | 9.219  | Teveratio Point                 | 2.501  | Harbour                        | 3.135  |
| Sultānpur                           | 8.149  | Thaburudhoo: Male' Atoll        | 2.252  | Limiting conditions            | 3.124  |
| Sultānpur Shoals                    | 8.139  | Thaburudhoo:                    |        | Pilotage                       | 3.131  |
| Sunchi Reefs                        | 6.176  | South Miladhunmadulu Atoll      | 2.435  | Port services                  | 3.148  |
| Sunjan; see High Land of Saint John | 8.52   | Thakandhoo                      | 2.451  | Small craft                    | 3.153  |
| Sunk Rock                           | 7.224  | Thal                            | 7.143  | Trincomalee Tea Traders        |        |
| Sunk Rock Light                     | 7.224  | Thal Knob                       | 7.185  | Association Jetty              | 3.155  |
| Sunri Creek                         | 10.32  | Thal Knob Beacon                | 7.185  | Trivandrum                     | 5.25   |
| Sur, Jabal                          | 10.192 | Thal Reefs                      | 7.187  | Trivandrum Aero Light          | 5.16   |
| Sūrat                               | 8.59   | Thal Shoal                      | 7.187  | Trize Kila                     | 7.105  |
| Sūrat Roads                         | 8.54   | Thāna                           | 1.118  | Trombay Channel                | 7.248  |
| Suratkal Point Light                | 6.60   | Thāne                           | 7.250  | Trombay Island                 | 7.247  |
| Sureya Tree Bay                     | 3.48   | Thāne Creek                     | 7.250  | Trombay Peak                   | 7.188  |
| Surveyor Rock                       | 3.96   | The Basin                       | 4.152  | Trombay Peak Light             | 7.188  |
| Surveyor's Sand                     | 10.38  | The Little Rann                 | 9.201  | Tucker Light-beacon            | 7.225  |
| Sutherland Channel                  | 8.51   | The Paps                        | 7.188  | Tukda                          | 8.216  |
| Sutrāpāra                           | 8.207  | The Swatch                      | 10.3   | Tulsi Gudda                    | 6.125  |
| Sutrāpāra Light                     | 8.197  | Thimarafushi                    | 2.120  | Tulsunde Cove                  | 7.88   |
| Suvāli Bank                         | 8.51   | Thinadhoo: Felidhe Atoll        | 2.221  | Tuna Bandar                    | 9.199  |
| Suvāli Hills                        | 8.42   | Thinadhoo: Huvadhoo Atoll       | 2.68   | Tunda Point                    | 2.499  |
| Suvāli Point                        | 8.51   | Thoddoo                         | 2.195  | Turbat                         | 10.194 |
| Swatch, The; see The Swatch         | 10.3   | Tholhimarahuraa                 | 2.243  | Turshiān Creek                 | 10.33  |
| Sweat Bay                           | 3.104  | Thompson Hill                   | 3.90   | Turshiān Creek Light           | 10.25  |
| Swell Rock                          | 3.39   | Thondaimanaru                   | 3.207  | Tuticorin                      | 4.191  |
| Sykes Point                         | 9.84   | Thonithurai                     | 4.153  | Tuticorin Zone A (New Port)    | 4.170  |
|                                     |        | Thonithurai Temple              | 4.153  | Anchorage                      | 4.181  |
| Tad                                 | 10.181 | Thulhaadhoo                     | 2.348  | Arrival information            | 4.179  |
| Tadri                               | 6.119  | Thulhaagiri                     | 2.267  | Berths                         | 4.189  |
| Tadri Light                         | 6.117  | Thulusdhoo                      | 2.252  | Directions                     | 4.187  |
| Tadri River; see Aghnāshini River   | 6.119  | Thulusdhoo Kandu                | 2.253  | General information            | 4.170  |
| Talai                               | 4.169  | Thumba                          | 1.9    | Harbour                        | 4.183  |
| Talaïmannar                         | 3.235  | Thuraakunu                      | 2.462  | Limiting conditions            | 4.178  |
| Talaïri Island                      | 4.211  | Thuraakunu Light                | 2.464  | Pilotage                       | 4.182  |
| Talāja                              | 8.149  | Thurti Pane                     | 6.18   | Port services                  | 4.190  |



|                                          |       |                                          |       |                                     |        |
|------------------------------------------|-------|------------------------------------------|-------|-------------------------------------|--------|
| Tuticorin Zone B (Minor Port) . . . . .  | 4.191 | Valinokkam Point . . . . .               | 4.210 | Viligili: Addoo Atoll . . . . .     | 2.43   |
| Arrival information . . . . .            | 4.193 | Valiyakara . . . . .                     | 2.508 | Viligili: Huvadhoo Atoll . . . . .  | 2.84   |
| Berths . . . . .                         | 4.197 | Valiyakara Light . . . . .               | 2.508 | Viligili: Male' Atoll . . . . .     | 2.276  |
| Directions . . . . .                     | 4.195 | Valkunji . . . . .                       | 6.57  | Viligili: . . . . .                 |        |
| General information . . . . .            | 4.191 | Vallanad . . . . .                       | 4.165 | South Maalhosmadulu Atoll . . . . . | 2.349  |
| Harbour . . . . .                        | 4.194 | Valsād . . . . .                         | 8.65  | Viligilimathidhahuraa . . . . .     | 2.252  |
| Limiting conditions . . . . .            | 4.192 | Valsād Bay . . . . .                     | 8.65  | Viligilivaru . . . . .              | 2.238  |
| Port services . . . . .                  | 4.198 | Valsād Bay Light . . . . .               | 8.52  | Viligilivarufinolhu . . . . .       | 2.168  |
| Small craft . . . . .                    | 4.199 | Valvettithurai . . . . .                 | 3.213 | Vilinjam . . . . .                  | 5.29   |
| Tüttukkudi; see Tuticorin . . . . .      | 4.191 | Vān Island . . . . .                     | 4.209 | Vilinjam Light . . . . .            | 5.16   |
| Two White Rocks . . . . .                | 6.99  | Vanakbava Light . . . . .                | 8.77  | Vilufushi . . . . .                 | 2.131  |
| Uan Gala . . . . .                       | 4.74  | Vanbadi . . . . .                        | 2.122 | Vilufushi Light . . . . .           | 2.132  |
| Uarashi Beacon . . . . .                 | 8.22  | Vandhoomaa Faru . . . . .                | 2.357 | Virapāndiyanpattinam . . . . .      | 4.169  |
| Uarashi Reef . . . . .                   | 8.22  | Vankalai Reef . . . . .                  | 4.136 | Virgel Ganga . . . . .              | 3.100  |
| Ucheli Creek . . . . .                   | 8.40  | Vārārūp Temple . . . . .                 | 8.107 | Virgel Rocks . . . . .              | 3.93   |
| Uda Point . . . . .                      | 3.66  | Varihuraa . . . . .                      | 2.403 | Viringili . . . . .                 | 2.499  |
| Udiyāvara River . . . . .                | 6.70  | Varoli River . . . . .                   | 8.47  | Vodamulaa . . . . .                 | 2.88   |
| Udwāda . . . . .                         | 8.50  | Varsāmedi Creek . . . . .                | 9.213 | Volcanic activity . . . . .         | 1.162  |
| Ugoofaaru . . . . .                      | 2.380 | Vartu Nadi . . . . .                     | 8.238 | Vudda Kudda Reefs . . . . .         | 9.73   |
| Uheliya Reef . . . . .                   | 4.74  | Varwāla . . . . .                        | 8.237 | Vypin . . . . .                     | 5.66   |
| Ukulhas . . . . .                        | 2.187 | Vasai . . . . .                          | 8.28  | Waaf Pier . . . . .                 | 3.155  |
| Ulandhe Point . . . . .                  | 3.39  | Vasai Creek . . . . .                    | 8.28  | Waal Islet . . . . .                | 4.62   |
| Ulhās River . . . . .                    | 8.35  | Vasai Fort . . . . .                     | 8.32  | Wada Vetye . . . . .                | 7.72   |
| Uligamu . . . . .                        | 2.462 | Vasai Light . . . . .                    | 8.32  | Wadge Bank . . . . .                | 5.12   |
| Uligamu Kandu . . . . .                  | 2.463 | Vāso Bay . . . . .                       | 6.177 | Wadinagala Peak . . . . .           | 3.88   |
| Ullackalie Lagoon . . . . .              | 3.93  | Vashafaru . . . . .                      | 2.453 | Wagapur Point . . . . .             | 7.88   |
| Umargām Light . . . . .                  | 8.47  | Vashafaru Light . . . . .                | 2.453 | Wagapur Point Light . . . . .       | 7.75   |
| Umarsādi Creek . . . . .                 | 8.64  | Vashavarrehaa . . . . .                  | 2.66  | Wagh-giri . . . . .                 | 7.29   |
| Umbrella Rock . . . . .                  | 3.82  | Vāshishti River . . . . .                | 7.116 | Wahu Rock . . . . .                 | 3.27   |
| Unaeria Rocks . . . . .                  | 3.49  | Vattaru Falhu . . . . .                  | 2.214 | Walawe Ganga . . . . .              | 3.51   |
| Unawātuna Point . . . . .                | 4.16  | Vattaru Kandu . . . . .                  | 2.209 | Wali's Fort . . . . .               | 10.200 |
| Underi Islet . . . . .                   | 7.166 | Vattarurah . . . . .                     | 2.214 | Waller Pat Reclamation . . . . .    | 5.108  |
| Undoodhoo . . . . .                      | 2.352 | Vavul Mala . . . . .                     | 5.131 | Wari Creek . . . . .                | 10.31  |
| Unniamor; see Lushington Shoal . . . . . | 9.4   | Vavvaru . . . . .                        | 2.412 | Warori Bluff . . . . .              | 7.100  |
| Uppu Aru . . . . .                       | 3.115 | Velanai . . . . .                        | 3.231 | Warori Bluff Bay . . . . .          | 7.118  |
| Uppu Tanni Island . . . . .              | 4.207 | Velassaru . . . . .                      | 2.241 | Warori Bluff Light . . . . .        | 7.101  |
| Uran Light-beacon . . . . .              | 7.225 | Velassaru Falhu . . . . .                | 2.243 | Wāsi Borsi Light . . . . .          | 8.47   |
| Uran Patch Light-beacon . . . . .        | 7.225 | Velassaru Kanduolhi . . . . .            | 2.242 | Watering Point . . . . .            | 4.37   |
| Urani Point . . . . .                    | 3.63  | Velavaru Kandu . . . . .                 | 2.158 | Watta Rock . . . . .                | 3.38   |
| Urimunai . . . . .                       | 3.221 | Veldur Bay . . . . .                     | 7.109 | Waulugalakanda . . . . .            | 3.16   |
| Urot Mala . . . . .                      | 5.112 | Veldūr Hill . . . . .                    | 7.113 | Webb Bank . . . . .                 | 10.174 |
| Ussapur Rock . . . . .                   | 8.21  | Velidhoo . . . . .                       | 2.434 | Weligama . . . . .                  | 3.23   |
| Utan . . . . .                           | 8.27  | Veligadu . . . . .                       | 2.192 | Weligama Bay . . . . .              | 3.23   |
| Utan Light . . . . .                     | 8.20  | Velim . . . . .                          | 6.162 | Weligama Bay Light . . . . .        | 3.25   |
| Utrecht Bastion . . . . .                | 4.37  | Vella Pertumuni Reef . . . . .           | 3.238 | Weligama Point . . . . .            | 3.23   |
| Vaadho Kandu . . . . .                   | 2.247 | Vellār River . . . . .                   | 3.197 | Welihukka . . . . .                 | 4.38   |
| Vaadho Kanduolhi . . . . .               | 2.242 | Vembār . . . . .                         | 4.209 | Welikada . . . . .                  | 4.96   |
| Vaadho Kuda Kandu . . . . .              | 2.66  | Vendloos Bay . . . . .                   | 3.100 | Welmaduwa Island . . . . .          | 4.62   |
| Vaadho: Huvadhoo Atoll . . . . .         | 2.65  | Vendloos Point . . . . .                 | 3.91  | Wemyss Point . . . . .              | 3.158  |
| Vaadho: . . . . .                        |       | Vendurutti . . . . .                     | 5.87  | Wera Point . . . . .                | 3.23   |
| North Maalhosmadulu Atoll . . . . .      | 2.378 | Vengurla . . . . .                       | 7.37  | Weragela Kanda . . . . .            | 4.75   |
| Vaadho: South Male' Atoll . . . . .      | 2.241 | Vengurla Point Light . . . . .           | 7.26  | West Channel . . . . .              | 3.206  |
| Vaagali . . . . .                        | 2.243 | Vengurla Roads . . . . .                 | 7.40  | West Channel: Shiāl Bet . . . . .   | 8.116  |
| Vaanee Kandu . . . . .                   | 2.158 | Vengurla Rock . . . . .                  | 7.28  | West Hill . . . . .                 | 5.134  |
| Vabbinfaru . . . . .                     | 2.267 | Vengurla Rock Anchorage . . . . .        | 7.48  | Western Bank . . . . .              | 8.43   |
| Vādem Bay . . . . .                      | 6.177 | Vengurla Rocks . . . . .                 | 7.27  | Western Bastion Light . . . . .     | 3.204  |
| Vādhavan . . . . .                       | 8.61  | Vengurla Rocks Light . . . . .           | 7.26  | Westminster Abbey . . . . .         | 3.78   |
| Vādhavan Point . . . . .                 | 8.50  | Venkatāpur River . . . . .               | 6.120 | Whale Reef . . . . .                | 7.150  |
| Vādinār . . . . .                        | 9.123 | Venu Hill . . . . .                      | 9.68  | White Rock . . . . .                | 3.93   |
| Vādinār Offshore Terminal . . . . .      | 9.121 | Veragalle Point . . . . .                | 3.33  | White Sand Hill . . . . .           | 3.81   |
| Vadinolhu . . . . .                      | 2.101 | Verāval . . . . .                        | 8.198 | White Top Rock . . . . .            | 3.104  |
| Vadinolhu Kandu . . . . .                | 2.102 | Verāval Light . . . . .                  | 8.193 | Whittle Bandar . . . . .            | 8.186  |
| Vadinolhu Light . . . . .                | 2.101 | Vereg Islet . . . . .                    | 6.177 | Willingdon Island . . . . .         | 5.74   |
| Vaffushi Light . . . . .                 | 2.371 | Vesāva . . . . .                         | 8.24  | Wilpattu . . . . .                  | 1.88   |
| Vaffushiurua . . . . .                   | 2.371 | Vesāva Light . . . . .                   | 8.24  | Windar Nai . . . . .                | 10.160 |
| Vagaaru . . . . .                        | 2.462 | Veymandhoo . . . . .                     | 2.120 | Worli Point . . . . .               | 8.22   |
| Vagaaru Kandu . . . . .                  | 2.463 | Veymandoo Kandu . . . . .                | 2.110 | Yademale Gudda . . . . .            | 6.100  |
| Vāghotan . . . . .                       | 7.67  | Veyvah . . . . .                         | 2.203 | Yakgahagala Point . . . . .         | 4.66   |
| Vāghotan River . . . . .                 | 7.64  | Vihamanaafushi . . . . .                 | 2.283 | Yakinigeduwa . . . . .              | 4.17   |
| Vaigai River . . . . .                   | 3.239 | Vihur Point . . . . .                    | 7.152 | Yakkala . . . . .                   | 3.82   |
| Vaikaradhoo . . . . .                    | 2.446 | Vijayadurg . . . . .                     | 7.64  | Yala Rock . . . . .                 | 4.16   |
| Vaikaramuraidhoo . . . . .               | 2.446 | Vijayadurg Fort . . . . .                | 7.67  | Yan Oya . . . . .                   | 3.175  |
| Vaippār . . . . .                        | 4.209 | Vijayadurg Light . . . . .               | 7.67  | Yard Cove . . . . .                 | 3.158  |
| Vaippār River . . . . .                  | 4.209 | Vijayavillas Palace . . . . .            | 9.92  | Yari Creek . . . . .                | 10.125 |
| Valaichchenai River . . . . .            | 3.100 | Vilangu Shulli Island . . . . .          | 4.209 | Yedamavina River . . . . .          | 6.101  |
| Valapattanam River . . . . .             | 5.168 | Viligili Kandu: Addoo Atoll . . . . .    | 2.44  | York Creek . . . . .                | 3.157  |
|                                          |       | Viligili Kandu: Huvadhoo Atoll . . . . . | 2.82  |                                     |        |
|                                          |       | Viligili Light . . . . .                 | 2.349 |                                     |        |

York Island ..... 3.157  
York Shoal ..... 3.142  
  
Zarain, Jabal ..... 10.191  
Ziyaarahfushi Kandu ..... 2.265  
Ziyaaraiyfushi ..... 2.264  
Zuvāri River ..... 6.177





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