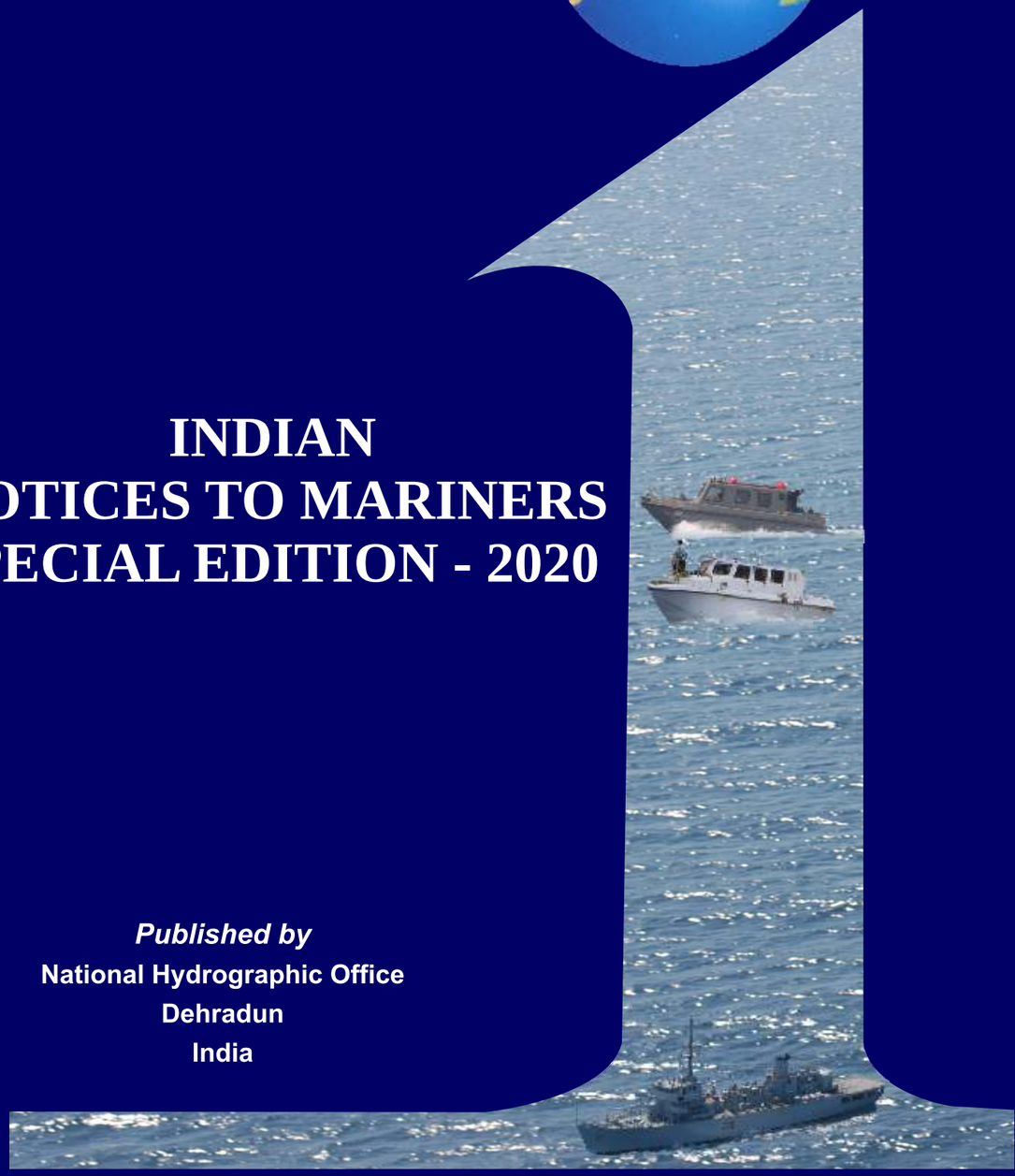
National Hydrographic Office
107-A, Rajpur Road, Dehradun - 248001, India.
Phones +91-135-2747365, Fax +91-135-2748373
Visit us at www.hydrobharat.gov.in
E-mail:inho@navy.gov.in, msis-inho@navy.gov.in

INDIAN NOTICES TO MARINERS SPECIAL EDITION - 2020

INDIAN
Charts and Publications

INDIAN NOTICES TO MARINERS SPECIAL EDITION - 2020

Published by
National Hydrographic Office
Dehradun
India



INDIAN NOTICES TO MARINERS

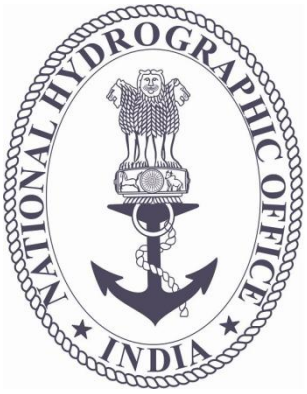
SPECIAL EDITION – 2020

RECORD OF CORRECTIONS

The inclusion of corrections in this volume should be recorded in the following table:-

Notices to Mariners

2020	2021	2022	2023



INDIAN

NOTICES TO MARINERS

SPECIAL EDITION

2020

NATIONAL HYDROGRAPHIC OFFICE
DEHRA DUN

INDIAN

NOTICES TO MARINERS

SPECIAL EDITION
2020

CONTAINING
SPECIAL NOTICES 1-28

NOTE

In addition to fortnightly editions of Notice to Mariners, following editions are also published by Indian National Hydrographic office

(a) Annual Edition – List of up-to-date corrections to Navigational Charts, Unexploded Charges and Text of Temporary and Preliminary Notices will be published annually as Annual Edition to Indian Notice to Mariners.

(b) Special Edition - Notices published in this Edition are of permanent nature. Any amendment/addition to these Notices shall be issued through Fortnightly Indian Notices to Mariners. Mariners are therefore advised to "RETAIN THIS EDITION" till its supersession/cancellation by this office.

(c) This edition supersedes the sixth edition (2016), which is cancelled.

PREFACE

This seventh edition of the Indian Notices to Mariners, Special Edition contains Special Notices to Mariners 1 to 28 which are of permanent nature. This edition contains the latest information received at the National Hydrographic Office, Dehradun till date. Copies of this publication can be obtained from authorised agents for the sale of Indian charts.

The National Hydrographic Office maintains updated navigational charts of the Indian subcontinent and adjacent areas and associated nautical publications. Mariners and concerned authorities are requested to inform this office of any changes affecting these permanent notices. Observations and suggestions can be sent to this office through the official website www.hydrobharat.gov.in or email at inho@navy.gov.in & msis-inho@navy.gov.in. Information received and assessed will be included in the Indian Notices to Mariners.

This edition supersedes the sixth edition (2016), which is cancelled.

(Vinay Badhwar)
Vice Admiral
Chief Hydrographer
to the Government of India

INDEX

Special Notice No. 1
GENERAL NOTICE

Mariners, ship owners, port authorities, E&P operators, ship managers, agents and insurance companies are advised to study this Special Notices to Mariners which contain important information pertaining to navigation.

Special Notice No. 2
AVAILABILITY OF NOTICES TO MARINERS

Indian Notices to Mariners are published fortnightly on 01st and 16th of every month and can be downloaded from INHD website **www.hydrobharat.gov.in**

Special Notice No. 3
RELIANCE ON CHARTS AND PREDICTED TIDES

1. Prudent mariners navigate with adequate under-keel clearance at all times, making due allowances for all the factors that are likely to reduce the depth beneath their keels. Mariners shall use a vessel's deepest draught when calculating the underkeel allowance. Underkeel allowance means the minimum clearance available between the deepest point on the vessel and the bottom, in still waters. Mariners are to calculate their vessel's deepest navigational draught and controlling depth of the intended transit, taking into consideration the following:-

(a) The vessel's mean draught;
(b) The vessel's trim and list characteristics;
(c) The intended transit speed and corresponding squat;
(d) The tide and current conditions;
(e) Sea state conditions;
(f) Past weather impact on water depth;
(g) The depth at the facility or anchorage;
(h) The depth of the transit area.

2. To ensure adequate under-keel clearance throughout the passage, under-keel allowance may be laid down by competent authority or determined onboard when planning the passage. The factors to be taken into account when determining this allowance are given in "The Mariner's Handbook". However, it is becoming increasingly apparent mariners attempt to navigate through certain areas with inadequate under-keel allowance.

3. Hydrographic Surveys have inherent technical limitations. Furthermore, in some dynamic areas the physical conditions and hence the depth of the sea-bed is constantly changing. Nautical charts can therefore seldom, be absolutely reliable in their representation of depth and when tidal predictions are applied to charted depths as if they were actual tidal levels the uncertainties are clearly compounded. Attention is therefore drawn in particular to the limitations of Hydrographic Surveys and tidal predictions in offshore areas.

4. The limitations of Hydrographic Surveys are discussed at length in "The Mariner's Handbook" and factors affecting predicted tide levels are described in the introduction to Indian Tide Tables.

5. The frequency and amplitude of negative storm surges, which should also be taken into account, are described in "The Mariner's Handbook".

6. Mariners, therefore, should allow for navigational uncertainties by preserving adequate clearances, both horizontally and vertically.

Special Notice No. 4

MINISTRY OF SHIPPING NOTIFICATION

(Source: Director General of Shipping (Govt. of India, Ministry of Shipping))

G.S.R. 311(E) – In exercise of the power conferred by section 457 of the Merchant Shipping Act, 1958, the Central Government hereby makes the following rules, namely :-

1. **Short title and commencement.**

(a) These rules shall be called the Merchant Shipping (Regulation of Entry of Ships into Ports, Anchorages and Offshore facilities) Rules, 2012.

(b) They shall come into force on the date of their publication on the Official Gazette:
(i) Provided that these rules shall apply, to the vessels which are chartered before the commencement of these rules, after the expiry of a period of sixty days from the date of their commencement.
(ii) Provided further that these rules shall not apply to warships such as naval ships, auxiliary naval ships and vessels owned or operated by a State and used for the time being for non-commercial purpose of for public service purpose.

2. **Definitions.**

(a) In these rules, unless the context otherwise requires:-
(i) "Act" means the Merchant Shipping Act, 1958 (44 of 1958);
(ii) "Maritime Claims" means the Claims as defined under article 2 and article 3 of the Convention on Limitation of Liability for Maritime Claims, 1976;
(iii) "Port Authority" means the Port Conservator or the Port Officer as defined in the Indian Ports Act, 1908;
(iv) "Port facility" means any area of land or water, or land and water within a port including without limitation any buildings, installations, terminals, floating terminals and transportation facilities, shipyards, ship repair yards or equipment in or on the relevant area used either wholly of partly in connection with the loading or unloading of goods to or from ships, the moving of passengers to or from ships, or for maintenance, repair and or anchorage of ships or for the provision of services to ships;
(v) "Protection and indemnity insurance" means insurance with or without deductibles, and comprising of the indemnity insurances provided by the members of the International Group of Protection and Indemnity Clubs or such other Insurance Company as authorised from time to time by the Government of India;
(vi) "Operator" means the owner of the ship or any other organization or any person authorized in this behalf for the operation of the ship;
(vii) "Shipping agent" means any person or commercial enterprise arranging and causing the transportation of cargo or passengers, providing information, preparing for and carrying out the sale or purchase or lease contracts for and on behalf of the ship owners, masters, operators or charterers of the vessels by the agreements they enter into, carrying out all the services and fulfilling the liabilities for such persons and parties duly acting for profit;

(b) Words and expressions used but not defined in these rules, and defined in the Act, shall have the same meanings respectively, assigned to them in the Act.

3. Any vessel of three hundred tons gross or more, other than Indian ship, entering into or sailing out of ports, terminals, anchorages or seeking port facilities or Indian onshore facilities in lndian territorial water shall be in possession of the insurance coverage against maritime claims and established policies and procedures for their supervision.

4. If such vessel, is

(a) An oil product or chemical tanker more than twenty years old: or
(b) A general cargo ship or bulk carrier or offshore support vessel or passenger vessel or any other type of cargo vessel more than twenty five years old; or
(c) A liquefied natural gas or liquefied petroleum gas tanker more than thirty years old;

It shall be classed with a classification society which is a member of the International Association of Classification Societies or with a recognised organisation duly authorised by Indian maritime administration.

5. The operator of the vessels other than Indian vessels shall have a valid protection and indemnity insurance policy against maritime claims to enter into the Indian coastal waters.

6. The insurance referred to in rule 3 and rule 4 above, shall cover maritime claims subject to the Convention on Limitation of Liability for Maritime Claims, 1976. The amount of the insurance for a ship per incident shall not be less than the maximum amount for the limitation of liability as laid down in the Protocol of 1996 amending the Convention on Limitation of Liability for Maritime Claims of 1976.

7. The operator of the vessel which intends to enter into the Indian territorial waters or Indian port facilities or Indian offshore facilities for any purpose shall submit either himself or through his shipping agent, forty-eight hours before entering a port or offshore facilities or before entering into the Indian territorial waters, whichever is earlier, the copies of the insurance policy and the Certificate of Class of the vessel to the concerned Port Authority.

8. Where the copies of the documents mentioned in the rule 7 are to be filed through the shipping agent, the operator shall submit a signed declaration duly authenticating that:-

(a) Appointment of the shipping agent is valid from the time vessel enters Indian coastal waters and shall remain valid till the vessel leaves Indian coastal waters; and
(b) The certificates submitted are true and correct to the best of his knowledge and belief.

9. The operator shall ensure that the insurance policy and the Certificate of Class remains valid during the vessels stay in the port areas or offshore terminal under the jurisdiction of India or areas in the coastal waters of India.

10. Where the existing protection and indemnity policies providing insurance coverage for vessels against maritime claims have been cancelled, suspended or become null and void for any reason whatsoever, the operator shall forthwith obtain a new protection and indemnity insurance policy for the vessel and submit a copy of such new or renewed insurance policy to the nearest Port Authority.

11. The insurance certificate and protection and indemnity insurance policy for maritime claims, in original or a certified copy and Certificate of Class in original, shall be kept on board and available for inspection.

12. The Port Authority shall verify the validity of the insurance policy and the Certificate of Class of the vessel and these documents shall be kept on board.

13. The Indian Coastguard and Indian Navy may also check and verify the protection and indemnity insurance and the name of Classification Society of the vessel, if considered necessary. If the vessel is not in possession of a valid protection and indemnity insurance and certificate of class, the matter shall be reported to the Directorate General of Shipping immediately, for appropriate action under the Act.

Special Notice No. 4A
CAUTION WHEN APPROACHING INDIAN PORTS/ ENTRY INTO RESTRICTED AREAS

(Source: Director General of Shipping (Govt. of India, Ministry of Shipping))

Part I - Closing of Ports; Stopping Movements in Ports

1. The Government of India, having taken into consideration the fact that it may be necessary to forbid entrances to certain ports under their control for reasons of security, notifies that on approaching the shores of India or any Indian port or locality, a sharp look out should be kept for the signals described in the following paragraphs, and for the vessels mentioned in Part II, paragraph 9 of this Notice and distinguishing other check signals made by them. In the event of such signals, being displayed, the port or locality should be approached with great caution, as it may be apprehended or obstructions may exist.

2. If entrance to a port is prohibited, three all round visible red flashing lights vertically disposed by night, or three red balls vertically disposed by day, will be exhibited in some conspicuous position in or near its approach. These signals will also be shown by the vessels indicated in Part II of this Notice.

3. If these signals are displayed, vessels must approach the port or locality with greatest caution and implicitly obey all orders and signals given to them by the Examination Vessel, Traffic Control Vessel or Signal Station.

4. If movement of shipping in a port or anchorage, under Naval control is prohibited, three lights red-green-red vertically disposed by 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.

5. At some ports or localities, search-lights are occasionally exhibited for exercise.

6. Instructions have been given to avoid directing movable search-lights during practice on to vessels under way. However mariners are warned that great care should be taken to keep a sharp lookout for the signal indicated in paragraph 2 above, when search-light are observed to be working.

7. Vessels are particularly warned not to enter "Dangerous Area" or approaches boom defences without permission, not to anchor or remain stopped in a "Dangerous Area" or "Prohibited anchorages" unless specially instructed to do so.

Part II - Examination Service

8. In certain circumstances, it is also necessary to take special measures to examine individual vessels desiring to enter ports and localities and to control entry in general. This is the task carried out by the Examination Service. Where traffic control vessels act as Examination Vessel, their authority will be the same.

9. In such cases, vessel carrying the distinguishing flags or lights mentioned in paragraph 12 & 13 below will be charged with the duty of examining the ships which desire to enter the port and allotting berths in which they shall anchor. If Government vessels, or vessel 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 obtain information as to the course on which they

should approach the port. Such communication will not be necessary if the pilot onboard has already received this information from the local authorities.

10. 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 port, by day and night, to keep a sharp lookout for any vessel carrying the flags or lights mentioned in paragraph 11 to 15 and to be ready to "bring to" at once when hailed by her or warned by the firing of a gun or sound rocket.

11. By day the distinguishing flag of the Examination Vessel or Traffic Control Vessel will be a special flag, white and red horizontal stripes surrounded by a blue border. The vessel would also display three red balls, vertically disposed, if entrance is prohibited.

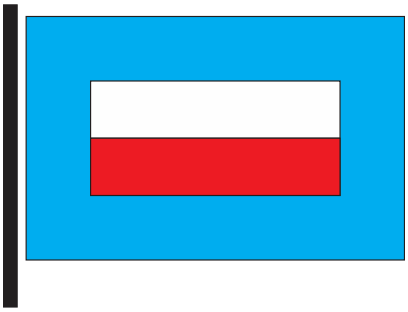
12. Usually the Examination Vessels or Traffic Control Vessels will fly the Blue Ensign, but in certain circumstances they may fly the White Ensign.

13. By night the vessel will carry:-

(a) Three red flashing lights, visible all round vertically disposed, if entrance is prohibited.

(b) Three green lights, visible all round vertically disposed, if entrance is permitted.

By Day



Special Flag

Three Red Balls

By Night

Three Green Lights

Three Flashing Red Lights

Day and Night Visual Signals Hoisted by Examination Vessel

14. The above lights will be carried in addition to the ordinary navigation light, and will show an unbroken light around the horizon. In some ports, pilot's launch may be used as the Examination Vessel. Masters are to keep sharp lookout for such a launch.

15. Merchant vessels approaching an Indian 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 or Traffic Control Vessel.

16. Masters are warned that, before attempting to enter any port when the Examination Service is in force, they must in their own interest strictly obey all instructions given to them by the Examination Vessel.

17. 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:-

(a) To lower any boat.
(b) To communicate with the shore or with other ships.
(c) To move the ship.
(d) To work cables.
(e) To allow any person or thing to leave the ship.
(f) To switch on or show any light when black out restrictions are in force.

18. The permission of the Immigration Officer must be obtained before any passenger or member of the crew who has embarked outside India is allowed to land.

19. In case of fog, Masters are urged to use utmost care, and the port should be approached with caution.

20. 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 by night; their use will render a vessel liable to be fired on.

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

22. Limits of Examination Anchorages at Okha, Porbandar, Mumbai, Goa, Kochi, Chennai, Visakhapatnam, Gangavaram, Paradip, Kolkata and Port Blair are as follows:-

(a) Okha: - Area enclosed by the following positions:-
(i) 22^0 30'.40 N, 69^0 02'.00 E (ii) 22^0 30'.40 N, 69^0 03'.65 E.
(iii) 22^0 31'.30 N, 69^0 03'.65E. (iv) 22^0 31'.30 N, 69^0 02'.00 E.

(b) Porbandar: - Area enclosed by the following positions:-
(i) 21^0 37'.50 N, 69^0 32'.80 E. (ii) 21^0 36'.55 N, 69^0 34'.05 E.
(iii) 21^0 37'.60 N, 69^0 34'.47E. (iv) 21^0 38'.58 N, 69^0 33'.30 E.

(c) Mumbai: - Area enclosed by the following positions:-
(i) 18^0 53'.05 N, 72^0 49'.83 E. (ii) 18^0 51'.55 N, 72^0 48'.92 E.
(iii) 18^0 51'.20 N, 72^0 49'.63 E. (iv) 18^0 52'.40 N, 72^0 50'.40 E.

(d) Goa: - Area enclosed by the following positions:-
(i) 15^0 23'.56 N, $73^0$43'.96 E (ii) 15^0 23'.56 N, 73^0 44'.96 E.
(iii) 15^0 22'.56 N, $73^0$44'.96 E. (iv) 15^0 22'.56 N, 73^0 43'.96 E.

(e) Kochi: - Area enclosed by the following positions:-
(i) 9^0 55'.10 N, 76^0 08'.60 E. (ii) 9^0 55'.10 N, 76^0 09'.60 E.
(iii) 9^0 54'.10 N, 76^0 09'.60 E. (iv) 9^0 54'.10 N, 76^0 08'.60 E.

(f) Chennai: - Area enclosed by the following positions:-

(i) 13°08'.91 N, 80° 19'.50 E. (ii) 13°08'.91 N, 80°21'.50 E.
(iii) 13°07'.16 N, 80° 21'.16 E. (iv) 13°07'.16 N, 80°19'.50 E.
(v) 13°07'.45 N, 80° 19'.25 E.

(g) Vishakhapatnam: - Area enclosed by the following positions:-

(i) 17^0 42'.30 N, 83^0 19'.70 E (ii) 17^0 42'.30 N, 83^0 21'.00 E.
(iii) 17^0 41'.52 N, 83^0 20'.10 E. (iv) 17^0 41'.52 N, 83^0 20'.65 E.

(h) Gangavaram:- Enclosed by an area of radius 3.4 cable centred on 17º36'.58N, 83º16'E.

(j) Paradip:- Enclosed by an area of radius 5 cable centred on 20^0 13 '.00 N, 86^0 41'.00 E

(k) Kolkata: - Area enclosed by the following positions:-

(i) 21^0 37'.45 N, 88^0 00'.70 E. (ii) 21^0 37'.21 N, 88^0 02'.25 E.
(iii) 21^0 40'.00 N, 88^0 00'.12 E. (iv) 21^0 40'.60 N, 88^0 01'.06 E.

(l) Port Blair: - Area enclosed by the following positions:-

(i) 11^0 40'.20 N.,92^0 46'.70 E. (ii) 11^0 40'.60 N, 92^0 47'.00 E.
(iii) 11^0 39'.80 N.,92^0 49'.80 E. (iv) 11^0 38'.10 N, 92^0 48'.80 E.

23. Nothing in this Notice is to be taken as over-ruling such general or local regulations as may be issued by the Public Traffic Regulations at each port, through routeing authorities by Notices to Mariners or other means to meet new dangers or situations which may arise to cover local conditions.

24. The Union Territory of Andaman and Nicobar Island has been declared as "RESTRICTED AREA" by the Government of India. Foreign vessel and foreign nationals are prohibited from visiting Andaman and Nicobar islands without prior permission from the Government of India.

Special Notice No. 4B
SATELLITE COMMUNICATION IN INDIAN WATERS

(Source: Director General of Shipping - Order No. 02 of 2012)

1. The use of Thuraya, Irridium and other such Satellite phone is banned in india under Sec 6 of Indian Wireless Act and Sec 20 of Indian telegraph Act. It is intimated to all Shipping companies / Shipping agents that use of Thuraya, iridium and other such Satellite is banned in Indian waters and seafarers should not use the same.

2. Satellite phones can be used only after a no objection certificate is issued by Department of Telecommunications (DOT) on a case to case basis.

3. The shipping agents should mandatorily intimate the details of person carrying Thuraya and the particulars of Thuraya, Irridium and other such sets in Pre Arrival Notification on Security (PANS).

4. The unauthorized holder of Thuraya, Irridium and other such Satellite phone can be prosecuted under Sec of Indian Wireless Act and sec 20 of Indian Telegraph Act.

Special Notice No. 5

WEATHER BULLETINS ISSUED TO SHIPS BY THE INDIA METEOROLOGICAL DEPARTMENT

(Source: www.imd.gov.in)

1. The India Meteorological Department Established in 1875, is the National Meteorological Service of the India and the principal government agency in all matters relating to meteorology, seismology and allied subjects. The main activities of the Indian Meteorological Department are as follows:

(a) To take meteorological observations and to provide current and forecast meteorological information for optimum operation of weather-sensitive activities like agriculture, irrigation, shipping, aviation, offshore oil explorations, etc.

(b) To warn against severe weather phenomena like tropical cyclones, norwesters, dust storms, heavy rains and snow, cold and heat waves, etc., which cause destruction of life and property.

(c) To provide meteorological statistics required for agriculture, water resource management, industries, oil exploration and other nation-building activities.

(d) To conduct and promote research in meteorology and allied disciplines.

(e) To detect and locate earthquakes and to evaluate seismicity in different parts of the country for development projects.

(f) To study and identify the potential consequences of an earthquake, both in relation to existing structures as well as in the planning and locating new facilities "in terms of cost effectiveness".

2. IMD has six Area Cyclone Warning Centers (ACWC)/Cyclone Warning Centers(CWC) located at Mumbai, Chennai, Kolkata, Bhubaneswar, Vishakhapatnam and Ahmadabad. Information regarding coastal weather bulletins can be obtained from the IMD and its ACWCs/CWCs websites which are given below:-

India Meteorological Department	http://www.imd.gov.in/
Regional Specialized Meteorological Centre-Tropical Cyclone	http://rsmcnewdelhi.imd.gov.in
Area Cyclone Warning Centre, Mumbai	http://www.imdmumbai.gov.in/
Area Cyclone Warning Centre, Chennai	http://www.imdchennai.gov.in/
Area Cyclone Warning Centre, Kolkata	http:// www.imdkolkata.gov.in/
Cyclone Warning Centre,, Bhubaneswar	http:// www.imdorissa.gov.in/
Cyclone Warning Centre,, Visakhapatnam	http:// www.cwcvsk.gov.in/
Cyclone Warning Centre,, Ahmadabad	http:// www.imdahm.gov.in/

Coverage

3. The sea areas and coastal strips, defined as the strip of sea up to 75 Km from the coastline, covered by the weather bulletins, are given in the accompanying diagram which also indicates the nomenclatures of sub-areas of the Arabian Sea (Sea Area I) and the Bay of Bengal (Sea Area II) used in the bulletins.

Categories

4. Weather Bulletins for Merchant Shipping are of the following categories:-

(a) **Merchant Shipping Bulletins**. These are for Sea Area I, broadcasted by the NAVTEX stations. Types and contents of these bulletins are described in paras 5 - 8. A detail of Merchant Shipping Bulletins is given in Appendix A.

(b) **Coastal Weather Bulletins.** These are intended to give detailed information on those elements of weather in which coastal ships are most interested. Types and contents of these bulletins are described in paras 5 and 9.

(c) GMDSS –Full GMDSS service for weather forecast commenced w.e.f 01 Oct 98 through INMARSAT. Two bulletins at 0900 UTC and 1800 UTC are broadcasted daily.

Types of Weather Bulletins

5. Weather Bulletins issued by NAVTEX Stations are of the following types:-

(a) "**Daily**" bulletins are routine bulletins issued twice a day during normal weather.

(b) "**Extra**" bulletin is issued, if considered necessary, when the weather is disturbed. However, an "Extra" bulletin is invariably issued when a depression is formed.

(c) "**Storm**" bulletins - if a cyclonic Storm has just developed, followed by three additional "Storm" bulletins, one "extra" and two "daily" bulletins make a total of six bulletins a day Storm three i.e., GASBAG bulletin (1500 UTC) should be issued on routine basis during cyclone situation. Normally two bulletins are issued (AURORA and BALLOON) daily. In case a cyclonic storm has formed, HEXAGON a special bulletin is issued additionally. Four more storm bulletins are issued (ELECTRON, FORMULA, GASBAG and DEWDROP), thus comprising six storm bulletins per day.

Code word for sea area bulletin	Code word for coastal bulletin	Chart on which based (UTC)
ELECTRON	STORM ONE	0000
AURORA	DAILY ONE	0300
FORMULA	STORM TWO	0900
BALOON	DAILY TWO	1200
GASBAG	STORM THREE	1500
DEWDROP	EXTRA	1800
HEXAGON	SPECIAL	-

(d) "**Special**" bulletin - if observations received, indicate unexpected development of weather, a "Special" bulletin is issued at any hour.

Note: - In case of Coastal Weather Bulletin, the "Extra", "Storm" and "Special" bulletins for any given strip of coast are issued, if the disturbed weather/cyclonic Storm is likely to have a significant influence on the weather of that particular coastal strip. Such bulletins are prefixed by the International Safety Signal TTT.

Contents of Weather Bulletins

6. Merchant Shipping Bulletins. "Daily" bulletins issued for Sea Area I consist of the following parts:-

Part I Storm warning in plain language prefixed by the International Safety Signal (TTT) as per details in Appendix B. This part is omitted during normal or seasonal weather.
Part II Synopsis of weather conditions in the forecast in plain language.
Part III Forecast in plain language.
Part IV Surface analysis in IAC (FLEET) Code.
Part V Surface reports from ships.
Part VI (i) Surface reports from selected Land Stations - in Code.
(ii) Upper wind reports - in Code.

7. "Daily" bulletins issued consist of parts, I, II and III only.

8. The additional bulletins, viz, "Extra", "Storm" and "Special" issued consist of Part-I only and are prefixed by the International Safety signal (TTT).

9. Coastal Weather Bulletins consist of the following:-

(a) Name of the coastal strip for which bulletin is issued.

(b) Important Weather System, if any, affecting the weather over the coastal strip and its movement in cases of Extra/Storm Bulletins.

(c) Period of validity of forecast.

(d) Forecast of Wind, Weather, Visibility and State of Sea for the Coastal strip.

(e) Information about storm warning signals, if any, hoisted at ports on the coastal strip concerned.

(f) Information on Storm Surges/Tidal waves is given whenever necessary.

Descriptive Terminology for Monsoons

10. In the weather forecast and meteorological bulletins for sea areas and coastal bulletins issued by the Forecasting Officers of the India Meteorological Department during the South-West and North-East Monsoon periods, the intensity of the monsoon is classified as weak, moderate, etc., in terms of the wind speed over the sea area. The following specifications apply to the description of the intensity of monsoon over sea.

Classification of Monsoon	**Corresponding wind speed**
Weak	Up to 12 kts
Moderate	13 to 22 kts

Strong	23 to 32 kts
Vigorous	33 kts and above.

Port Meteorological Offices

11. Port Meteorological Offices function at six Ports to render assistance and advice to merchant ships on all meteorological matters. Address and telephone numbers of these offices are given in Appendix B. The important functions of the Port Meteorological Offices are: -

(a) To instruct and maintain liaison with the Meteorological offices and Captains and officers on board ships of the Indian Voluntary Observing Fleet, shipping companies and other marine interests, maintain and inspect and replace (whenever necessary) the meteorological instruments installed on board these ships.

(b) On request from the master of any ship (irrespective of whether it is Indian or foreign ship) to check the meteorological instruments and to advise or assist in meteorological matters.

(c) To instruct on matters pertaining to observations, keeping of meteorological log, forms/books and prompt transmission of weather reports.

(d) To supply necessary forms, etc.

(e) To supply weather information and

(f) To promote and maintain co-operation with harbour authorities, shipping companies etc.

Appendix 'A'
(Refers to para 12)

Details of Merchant Shipping Bulletins

1. When a tropical cyclone has formed or when gales, depressions, cyclonic storms etc; are expected; Part I (Storm Warning in plain language)of Merchant Shipping Bulletins contains the following items in the order given below:-

(a) International Safety Signals (TTT).
(b) Statement of type of warning (Warning, Gale-Warning, Cyclone-Warning etc.)
(c) Date and Time of disturbance in UTC, in the International six figure date time group.
(d) Type of disturbance (Low, when it is expected to intensify into a Depression before broadcast of the next bulletin, Depression, monsoon-gale, cyclonic storm etc.) with a statement of central Pressure in hPa in the case of cyclonic storm intensity and above.
(e) Location of disturbance in degree and tenths, where possible, of latitude and longitude. (Information given, as far as possible, according to the degree of certainty with which the center is located).
(f) Forecast Direction and Speed of movement of disturbance (speed of storm center is given in knots; direction may be given to nearest of 16 points of compass or in degrees to nearest ten).
(g) Extent of affected areas.
(h) Speed and Direction of wind in various sections of the affected area.(Wind speeds are given, if possible for different distances from the center in the various sectors of the storm area. Wind speeds are given in knots; distance in nautical miles).
(i) Further indications (if any).

2. Item (b) of the Storm Warning message, viz., the statement of the type of warning may be anyone of the following; the specification for each is as given in the table:-

Type of Warning and disturbance	***Corresponding wind speed (Kts)***	***Beaufort Scale***
Warning:		
(i) Depression	17 – 27	5 - 6
*(ii) Deep Depression	28 - 33	7
**Gale Warning (Strong wind under steep pressure gradient, etc.)	34 - 47	8 – 9
Cyclone Warning (cyclonic storm)	34 - 47	8 – 9
Severe cyclone warning		
(i) Severe cyclonic storm	48 - 63	10 - 11
(ii) Very Severe Cyclonic Storm	64 – 119	12
(iii) Super Cyclonic Storm	120 and above	

* The term Deep Depression is not to be used in International Bulletins.
** Gale warning conditions (wind speed 34 kts. and above) occur in Indian sea areas usually in association with vigorous during south west monsoon season.

Appendix 'B'
(Refers to para 14 and 20)

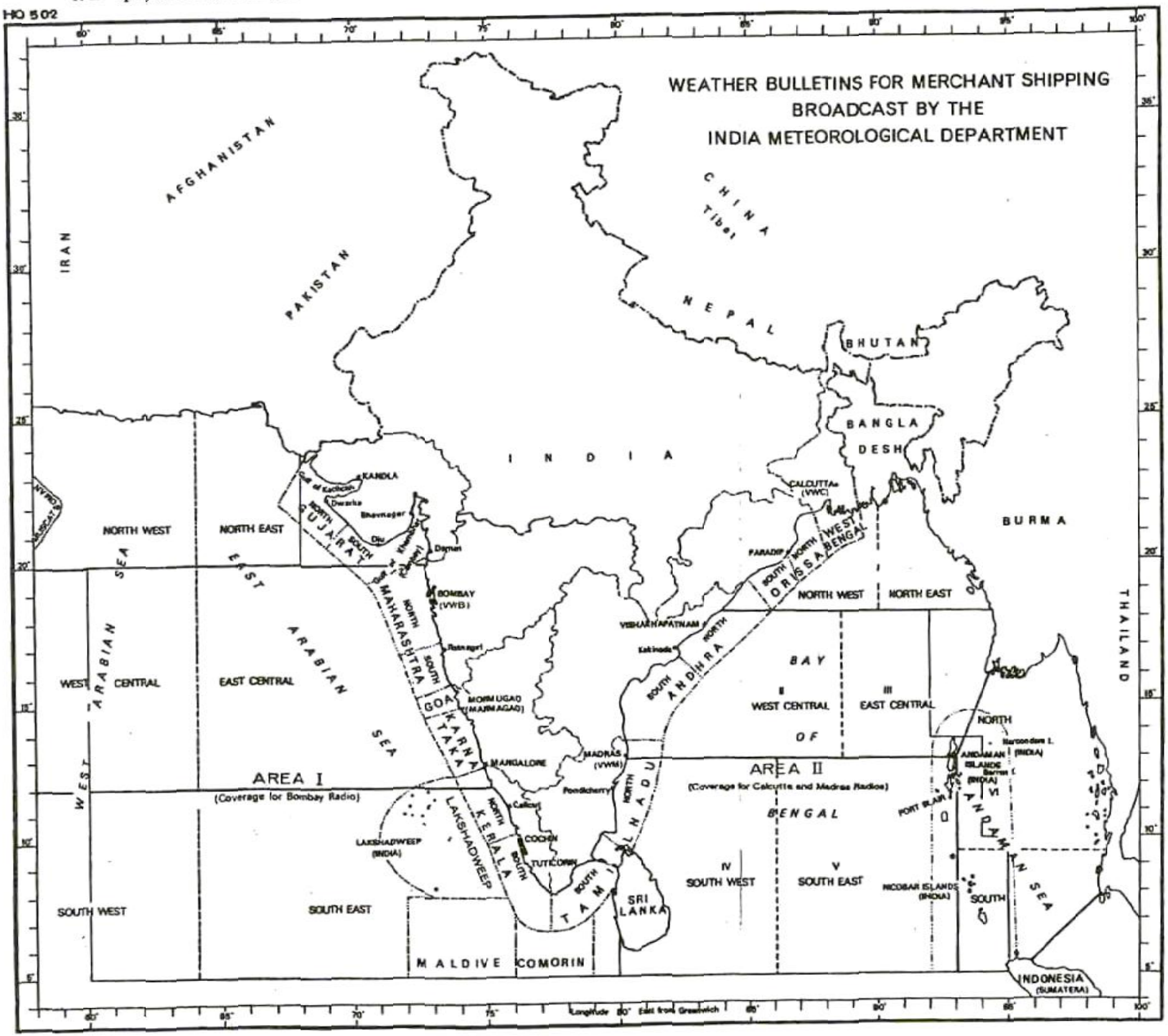
Indian - Port Meteorological Offices

Meteorological facilities are provided by the following Port Meteorological Offices (PMOs):-

Address	Contact	Working Hours
Director Port Meteorological Office Regional Meteorological Centre Near RC Church, Colaba Mumbai - 400005	Tel: 022 22174720/51654 Fax: 022 22154098/74724/721/60824 Email: isrmcmumbai@gmail.com	0930-1800 5 days week
Director Port Meteorological Liaison Office, (M.C. Panaji), Goa Observatory Altinho, Panjim Goa - 403001	Tel: 0832 2425547 0832 2520012 Fax: 0832 2420161 Email: rsrwgoa@gmail.com mc.goa@imd.gov.in	0930-1800
Director in-charge Port Meteorological Office Regional Meteorological Centre Inspectorate Section/PMO Unit New No.6, 9Old No. 50), College Road Chennai - 600006	Tel: 044 28246030 (Ext 6029) Fax: 044 28271951 Email: isrmcchennai@gmail.com isrmcchennai@imd.gov.in	0915-1745
Director I/C Port Meteorological Office Cyclone Warning Center Kirlumpudi Layout, Opposite Andhra University out gate Vishakhapatnam - 530017	Tel: 0891 2543031/32/34 Fax: 0891 2543033/36 Email: cwcvsk@gmail.com	1000-1700
Director I/C Regional Meteorological Centre 4 Duel Avenue, Alipore Kolkata - 700027	Tel: 033 24492559 Fax: 033 24793167 Email: drms.kolkata@gmail.com comm.alp@gmail.com	1000-1700
Director, Port Meteorological Office, Doppler Weather Radar Station, IMD, Vallumel Convent – Chirakkal Road, Rameswaram Village, (P.O) Pallurthy Kochi - 682006	Tel: 0484 2233649/875 Fax: 0484 2233649 Email: pmo.kochi@imd.gov.in dwrkochi@gmail.com rskochi@gmail.com dwrkochi@imd.gov.in	0900-1730

To accompany Notice to Mariners No. 5

HO 502



Special Notice No. 6
WARNING TO PORTS AND STORM SIGNAL STATIONS

(Source: www.imd.gov.in)

1. Storm warning Signals are part of Cyclone warning service of India Meteorological Department. The cyclone warning is one of the most important functions of the India Meteorological Department. It was the first service undertaken by the Department as early as in 1865.

2. The India Meteorological Department maintains a port warning service by which the port offices are warned by fast communication channels, about disturbed weather likely to affect their ports. On receipt of the warning from the ACWC/CWC, the port offices hoist appropriate visual signals prominently on signal masts so that they are clearly visible from a distance.

3. The storm warning signals are displayed prominently on masts in ports, are in the form of cones and cylinders for day-signals. During night red and white lamps are displayed in lighthouses for night- signals. In addition to hoisting signals, Port Officers have, in most cases, local arrangements for disseminating the information and warnings received by them, to country crafts and sailing vessels in the harbour. Mariners and other sea-faring people, including fishermen who may not be literate, are generally aware of the meaning of these signals.

4. At some ports, the meanings of the signals are displayed in English as well as in the local languages prominently on a notice board. While the India Meteorological Department is responsible for issuing the warnings, the port authorities arrange the display of signals. In addition to hoisting the signals, the port officers, in most cases, make arrangements for disseminating the warnings received by them, to country craft and sailing vessels in the harbour.

5. Ports in the maritime States are warned 5 to 6 times a day during periods of cyclonic storm by landline. The warnings contain information about the following:

(a) Location, intensity and expected direction of movement of the storm or depression,

(b) Part of the coast where it is expected to strike

(c) Type of signal, which the port should hoist.

Systems of Storm Warning Signals

6. A uniform system of storm warning signals was introduced at all the ports in India from 1st April 1898 and it is still popular with very little change. The system consists of:

(a) **General System.** This System has eleven signals. The ports where this system of signals is in use are called General ports.

(b) **Extended System.** An Extended System, in addition to the eleven signals of the General System, has six Section signals to indicate the location of the disturbance. These additional signals are hoisted along with Distant Signals. This system is a special case of the General System and is in use only at a few ports on the East coast of India (Bay of Bengal). These ports are called as extended ports. There is no port under the Extended System in West coast of India.

(c) **Brief System.** A Brief System consists of only five of the signals of the General Systems (viz. Signal Nos. III, IV, VII, X and XI). These are hoisted in association with prediction of bad weather at the port itself caused by disturbances out at sea. This system of signals is in use in ports used mainly by smaller vessels engaged in local traffic. These ports are called 'Brief ports'.

7. Details of storm warning signals are given in the publication "Code of Storm Warning Signals" issued by the Indian Meteorological Department.

8. List of Storm Signal Stations on the Indian Coast is given below.

INDIA - WEST COAST

General System. Alappuzha, Kochi, Beypore, Kozhikode, Mangalore, Panambur, Karwar, Mumbai, Mormugao, J.N.P.T.(Raigad), Diu, Daman, Mandvi (Kachchh), Navlakhi, Bedi, Rozi, Okha, Porbander, New Kandla Veraval, Bhavnagar, Magdalla, Alang, Jaffarabad, Mangrol, Sikka, Salaya, Dahej, Mundra, Pipavav, Arnala

Brief System. Dahanu, Tarapur, Nawapur (Boisar), Satpati, Kelva, Mahim, Dantiware (Palghar), Bassein (Vasai), Uttan (Bhayandar), Kalyan, Thane, Manori (Malad), Versova (Andheri), Bandra, Trombay, Mora (Uran), Karanja, Mandwa, Thal, Revas, Alibag, Revdanda, Murud (Janjira), Rajapuri, Shrivardhan, Bankot, Harnai, Dabhol, Jaigad, Varoda (Malgund), Ratnagiri (Bhagawati Bunder), Purnagad, Jaitapur, Devgad, Achara, Malvan, Nivti (pat), Vengurla, Redi, Kiranpani, Panaji, Honavar, Kasaragod, Bhatkal, Gangoli (Coondapoor), Malpe, Azhikal (Beliapattanam), Kannur, Thalasserry, Ponnani, Thiruvananthapuram and Minicoy.

Ports which receive information but hoist no signal at present. Rupen, Bharuch, Jakhau, Victor, Dwarka, Ulwa, Belapur (Thane), Belekeri (Avarsa),Tadri (Gokram), Kumta, Murdeshwarand

Note: - On receipt of warnings, the Port Officer at Gangoli (Coondapoor) transmits suitable warnings to smaller ports of Hangarkotta and Bainduru which fall within his jurisdiction.

INDIA - EAST COAST

General System. Toothukudi, Pamban, Kattupalli, Puducherry, Nizamapatnam, Machilipatnam, Vishakhapatnam, Krishnapatnam, Paradip, Gopalpur, Ennore, Haldia, Kolkata and Port Blair.

Brief System. Kolachal, Rameswaram, Vadarevu, Bhimunipatnam, Kalingapatnam, Puri and Chandbali.

Extended System. Nagapattinam, Cuddalore, Chennai, Kakinada Garmavaram and Sagar Island.

Pictorial Form of Visual Storm Warning Signals in Use

Signal/ Flag No.		NAME	Symbols		Description
			Day	Night	
1	DISTANT BAD WEATHER	DC1			Depression far at sea. Port NOT affected.
2		DW2			Cyclone far at sea. Warning for vessels leaving port.
3	LOCAL BAD WEATHER	LC3			Port Threatened by local bad weather like squally winds.
4		LW4			Cyclone at sea. Likely to affect the port later.
5	DANGER	D5			Cyclone likely to cross coast keeping port to its left.
6.		D6			Cyclone likely to cross coast keeping port to its right.
7.		D7			Cyclone likely to cross coast over/near to the port.
8.	GREAT DANGER	GD8			Severe cyclone to cross coast keeping port to its left.
9.		GD9			Severe cyclone to cross coast keeping port to its right.
10.		GD10			Severe cyclone to cross coast over or very near to the port.
11.		XI			Communication failed with cyclone warning office.

Special Notice No. 7

DISTRESS AND RESCUE AT SEA - SHIPS AND AIRCRAFT

(Source: Indian List of Radio Signals Vol 5)

GMDSS

1. The concept of a Global Maritime Distress Safety System (GMDSS) began as an idea at the International Maritime Organization (IMO) in 1973 and it entered into force in Feb 1999, after a 7-year introductory period. The requirement for ships to comply with the GMDSS is prescribed by SOLAS Chapter IV. This applies to all passenger vessels and all cargo vessels over 300 GRT, if they are on international voyages.

2. The GMDSS has been designed according to the Master Plan published in the IMO GMDSS Handbook, a large volume which describes the entire system and its relevant equipment standards. The Master Plan shows the details behind the world network of Rescue Co-ordination centres (RCCs), each responsible for a given Search and Rescue (SRR) (see ILRS Vol 5 2017 Chapter 10). Each RCC is able to initiate Maritime Safety Information (MSI), which is broadcast in telex format via satellite and/or terrestrial radio.

3. GMDSS communication between ships and the RCCs is carried out using satellite and/or terrestrial radio sub-system. The satellite sub-systems provide communications between ships and shore, and the terrestrial sub-systems provide for both ship-shore and ship-ship communications.

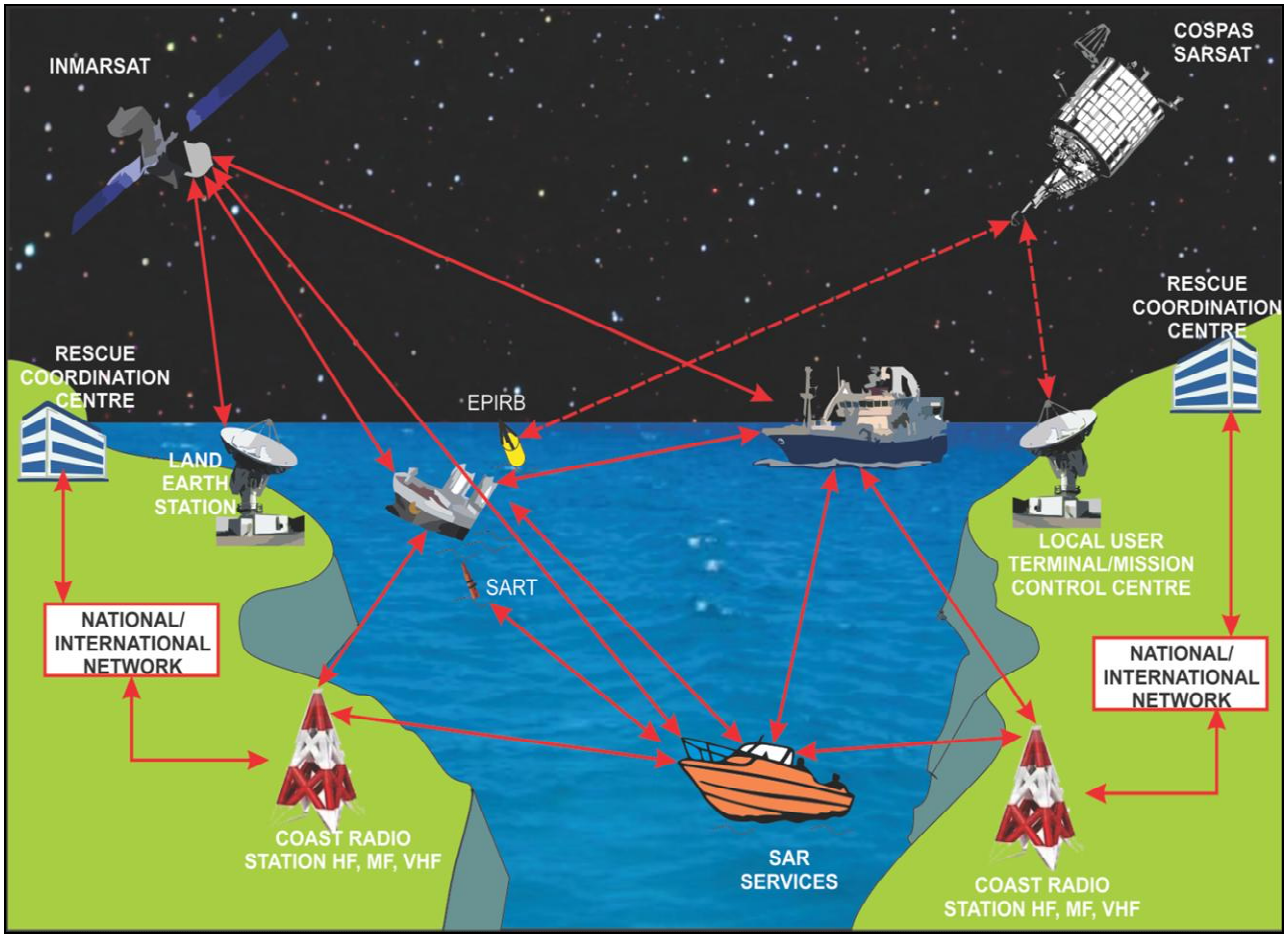
4. The satellite sub-systems include earth stations for INMARSAT and Cospas-Sarsat service-the former provides both GMDSS and commercial services, the latter provides a distress alerting system which responds to signals form portable transmitter known as an EPIRB.

5. Terrestrial radio uses an automatic calling device to make initial contact, after which communications are carried out by voice or telex according to normal radio procedures. The automatic calling system is known as Digital Selective Calling.

6. Many types of vessels, regardless of size, are not required to comply with GMDSS. This group includes fishing vessels, warships; pleasure yachts not engaged in trade, wooden ships of primitive build, ships not propelled by mechanical means (e.g. sailing vessels) and ships in the Great Lakes. There is no internationally agreed standard of service for these vessels, although some states encourage their non-GMDSS vessels to participate in the GMDSS on voluntary basis. Provision of Distress and Safety services of non-GMDSS vessels is determined by individual flag states, and many countries continue to provide Maritime Safety Services of a non–GMDSS nature. The GMDSS is, in effect, interleaved with pre-existing systems, which have not been prohibited in any way, but merely made optional. Non-GMDSS distress and safety procedures are carried out in the same way as they were before the introduction of the GMDSS, i. e. according the ITU Radio Regulations Appendix 13.

7 The communication procedures for both GMDSS and non-GMDSS vessels are contained in the ITU Radio Regulations. The procedures for initiating and responding to DSC calls are also described in ITU Recommendation M.493-11.

8. GMDSS watch keeping at sea must be maintained in accordance with SOLAS Regs 12 and 16. The latter requires that a primary GMDSS operator shall be nominated to carry primary responsibility for communications during distress incidents. The provisions of STCW 95 must also be observed.



Overview of GMDSS operations

9. This is achieved by carrying out regular statutory tests. STCW 95 also requires that the primary GMDSS operator must be nominated on the ship's emergency muster list and adds further duties such as ensuring that GMDSS communications are conducted according to IMO and ITU procedures and that any necessary instructions is given to other operators.

10. The GMDSS like all communications systems continues to evolve with advancing technology. For example the identifying number of ITU Recommendation M.493-11 indicates the eleventh version of that particular Recommendation. Additionally, the following three IMO Committees publish circulars from time to time, to modify procedures and technical standards.

(a) The Safety of Navigation (NAV) Sub-Committee.
(b) The Radiocommunication and SAR (COMSAR) Sub Committee.
(c) The Maritime Safety Committee (MSC).

11. Several circulars have been published with the intention of reducing the number of accidental distress alerts The ITU Manual (Resolution 349) also contains procedures for canceling accidentals distress alerts. Normally, no action will be taken against a ship for transmitting a false alert, provided that it is duly cancelled.

12. It can be seen from the above that the GMDSS facilities, regulations and procedures are contained in several publications, e.g. IMO SOLAS Chapter IV; IMO GMDSS Handbook;

IAMSAR Manual; STCW 95 Guidance on Radio Watchkeeping; ITU Radio Regulations and other ITU publications.

13. **Operational Details**. The type of equipment to be carried by each vessel, together with its maintenance arrangements and operating personnel is determined by a vessel's area of operation. Four Sea Areas have been defined according to the coverage of VHF, MF, HF Coast Radio Services and INMARSAT Services as follows.

DESCRIPTION OF GMDSS SEA AREAS

Area Description	Distance	Radio	Frequencies	EPIRBs	Survival Craft
A1-Within range of shore-based VHF stations	Depends on antenna height at shore –based VHF station, about 20-50 nm	VHF	156.525 MHz (Ch 70) for DSC or 156.8 MHz (Ch 16) RT	406 MHz Cospas-Sarsat or VHF EPIRB	9 GHz radar transponder (SART); VHF portable radio (Ch 16 and on other frequency)
A2 -Within range of shore-based MF stations	about 50-250 nm	MF VHF	as above, plus, 2187.5 kHz DSC, 2182 kHz RT, 2174.5 kHz NBDP, 518 kHz NAVTEX	406 MHz Cospas-Sarsat	as above
A3 -Within geo-stationary satellite range(i.e. Inmarsat)	76°N-76°S	HF or Satellite MF VHF	as above, plus 1.5-1.6 GHz alerting or as A1and A2 plus all HF frequencies	406 MHz Cospas-Sarsat	as above
A4 -Other areas (i.e. beyond Inmarsat range)	North of 76°N or South of 76°S	HF MF VHF		406 MHz Cospas-Sarsat	as above

BASIC EQUIPMENT (MINIMUM REQUIREMENTS INCLUDING DUPLICATION OF EQUIPMENT) FOR SOLAS SHIPS

Equipment	A1	A2	A3 Inmarsat Solution	A3 HF Solution	A4
VHF with DSC	X	X	X	X	X
DSC watch receiver channel 70	X	X	X	X	X
MF telephony with MF DSC		X	X		
DSC watch receiver 2187.5 kHz		X	X		
Inmarsat ship earth station with EGC receiver			X		
MF/HF telephony with DSC and NBDP				X	X
DSC watch receiver MF/HF				X	X

Duplicated VHF with DSC			X	X	X
Duplicated Inmarsat SES			X	X	
Duplicated MF/HF telephony with DSC and NBDP					X
NAVTEX receiver 518 kHz	X	X	X	X	X
EGC receiver	X[1]	X[1]		X	X
Float free satellite EPIRB	X	X	X	X	X[4]
Radar transponder (SART)	X[2]	X[2]	X[2]	X[2]	X[2]
Hand held GMDSS VHF transreceiver	X[3]	X[3]	X[3]	X[3]	X[3]
For passenger ships the following has applied since 01.07.97					
"Distress panel"(SOLAS Ch. IV/6.4 and 6.6)	X	X	X	X	X
Automatic updating of position to all relevant radio communication equipment (SOLAS Ch.IV/6.5). This also applies for cargo ships from Ist July 2002(Chapter IV, new regulation 18)	X	X	X	X	X
Two-way-on-scene radiocommunication o 121.5 or 123.1 MHz from the navigating bridge (SOLAS Ch.IV/7.5)	X	X	X	X	X

[1] Outside NAVTEX coverage area.
[2] Cargo ships between 300 and 500 grt.: 1 set. Cargo ships of 500 gt. and upwards and passenger ships: 2 sets.
[3] Cargo ships between 300 and 500 grt.: 2 sets. Cargo ships of 500 gt. and upwards and passenger ships: 3 sets.

COAST STATIONS IN INDIA

14. **The Digital Selective Calling (DSC) Sub-System.** DSC is a calling system that provides for distress, urgency and safety communications and also offers comprehensive facilities for routine communications, e.g. to initiate and to keep watch for automatic phone calls between ship and shore subscribers. The operator sets up calls using a DSC controller, and the controller is connected to a transreceiver. Sometimes both are contained in single unit.

VHF DSC COAST STATIONS- INDIA

STATION	**MMSI**	**POSITION**	**RANGE (IN MILES)**	**STATUS(*ASSOCIATED RCCS*)**
Mumbai	004192203	18°55'N72°50'E	25	Operational (*MRCC Mumbai*)
Chennai	004194401	13°06'N80°18'E	25	Operational (*MRCC Chennai*)
Port Blair	004194409	11°41'N92°46'E	30	Operational (*MRCC Port Blair*)
Porbandar	004192202	21°38'N69°37'E	25	Operational (*MRCC Mumbai*)
New Mangalore	004192204	12°55'N74°48'E	25	Operational (*MRCC Mumbai*)
Kochi	004192205	09°58'N76°16'E	20	Operational (*MRCC Mumbai*)
Visakhapatnam	004194402	17°41'N83°17'E	20	Operational (*MRCC Chennai*)
Paradip	004194403	20°16'N86°42'E	25	Operational (*MRCC Chennai*)
Haldia	004194404	22°02'N88°06'E	25	Operational (*MRCC Chennai*)
Diglipur	004194407	13°18'N93°04'E	25	Operational (*MRCC Port Blair*)

Campbell Bay	004194408	07°00'N93°55'E	30	Operational (*MRCC Port Blair*)
Goa	004192206	15°25'N73°48'E	25	Operational (*MRCC Mumbai*)
Mandapam	004194406	09°17'N79°05'E	20	Operational (*MRCC Chennai*)
Tuticorin	004194405	08°45'N78°12'E	20	Operational (*MRCC Chennai*)
Okha	004192207	22°28'N69°05'E	20	Operational (*MRCC Mumbai*)
Daman	004192201	20°25'N72°52'E	25	Operational (*MRCC Mumbai*)

HF DSC COAST STATIONS-INDIA

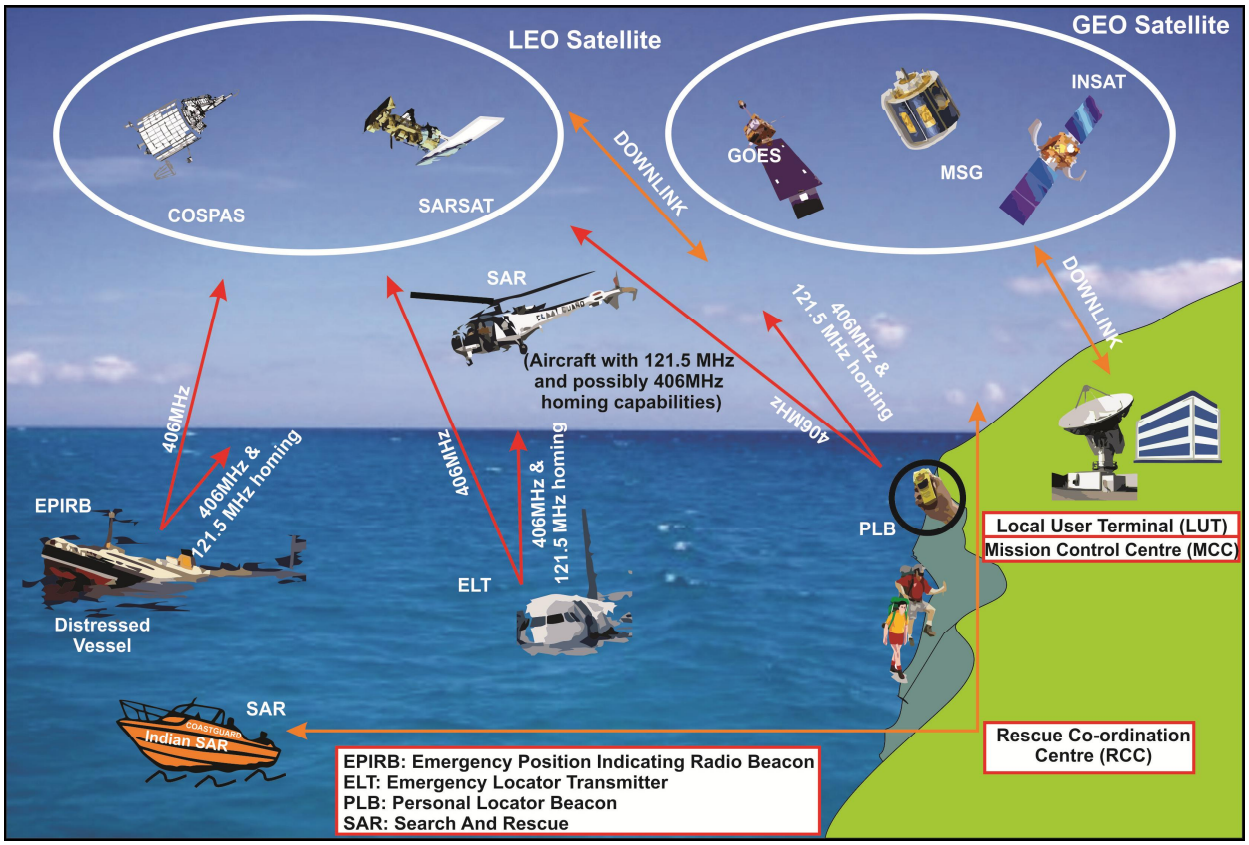
Station	**MMSI**	**Operational Frequency Bands**	**Status (*Associated RCCs*)**
Mumbai	004192203	4,6,8,12 & 16 MHz	Operational (*MRCC Mumbai*)
Chennai	004194401	4,6,8,12 & 16 MHz	Operational (*MRCC Chennai*)
Port Blair	004194409	4,6,8,12 & 16 MHz	Operational (*MRCC Port Blair*)
Porbandar	004192202	4,6,8,12 & 16 MHz	Operational (*MRCC Mumbai*)
Haldia	004194404	4,6,8,12 & 16 MHz	Operational (*MRCC Chennai*)
Mandapam	004194406	4,6,8,12 & 16 MHz	Operational (*MRCC Chennai*)
Daman	004192201	4,6,8,12 & 16 MHz	Operational (*MRCC Mumbai*)

INMARSAT STATION-INDIA

Country	**Associated LES**	**MRCC/Inmarsat Service**		**Contact detail/Region Satellite**	
India	Ghaziabad	MRCC Mumbai, Headquarters Coast Guard Region (West) Worli Seaface, PO, Mumbai, India Post Code – 400 030	 C F B B	Tel:+91 22 24316558/24388065/ 24383592/24383146 Fax: +91 22 24316558 E:mail : mrcc-west@indiancoastguard.nic.in	 IOR

SATELLITE AIDED SEARCH AND RESCUE SYSTEM

15. **Description.** With the increase in commerce and trade, sea and air travel have increased manifold. Innovations in the designs of ships and aircraft have reduced accidents but have been little successful in totally eliminating them. The **Cospas-Sarsat** system provides distress alert and location information to Search and Rescue (SAR) authorities, anywhere in the world, from marine, air and land users in distress. The Cospas-Sarsat international satellite system for search and rescue consists of a constellation of satellites in polar and geostationary orbits and a network of ground stations.



COSPAS-SARSAT System Overview

16. **Working of the System.** The ship/aircraft carries an emergency transmitter, capable of being activated either manually or automatically in case of a disaster. The uplink units can be Emergency Locator Transmitters (**ELTs**), maritime Emergency Position Indicator Radio Beacons (**EPIRBs**) or Personal Locator Beacons (**PLBs**). The signals from these units are detected by Cospas-Sarsat orbiting satellites and relayed to a ground station termed as Local User Terminal (**LUT**), which processes the signals to determine the beacon location. Alerts are then relayed together with the location data, via a Mission Control Centre (**MCC**) to an appropriate **RCC (Rescue Coordination Centre)** or a **SPOC (Search and Rescue Point of Contact).** The location of beacons is determined by **Doppler principle** using the relative motion between the satellite and the beacon. With the precise measurement of Doppler and the knowledge of satellite orbit, position of distress signal can be estimated. The international distress frequencies used are 121.5 MHz, 243 MHz and 406 MHz.

17. **The Cospas-Sarsat LEOSAR and GEOSAR System.** The Cospas-Sarsat System includes two types of satellites:

(a) Satellites in low-altitude Earth orbit (LEO) which form the LEOSAR System
(b) Satellites in geostationary Earth orbit (GEO) which form the GEOSAR System

18. The Inter Agency Steering Committee (IASC) consisting of representatives of Coast Guard, Directorate General of Shipping, Airport Authority of India, all three Defence services, Department of Telecommunication and Department of Electronics was set up in April 1986 with the **Department of Space as the nodal agency**. Two LUTs were set up, one at Bangalore (1989) and the other at Lucknow (1990). The **Indian Mission Control Centre** (**INMCC**), responsible for coordination with the rescue coordination centres, and other international MCCs is co-located with the Bangalore LUT. The system operations are fully automated. The INMCC is connected with the

Rescue Coordination Centres of the Airports Authority of India and transmits distress alerts received from the areas covered under these **RCCs.**

EMERGENCY POSITION INDICATION RADIO BEACONS (EPIRB)

19. **Description.** In the field of Search and Rescue (SAR), **distress radio beacons**, also collectively known as **distress beacons**, **emergency beacons**, or simply, **beacons**, are tracking transmitters which aid in the detection and location of boats, aircraft, and/or persons in distress. Marine distress beacons or emergency beacons are known as EPIRBs (Emergency Position Indicating Radio Beacons) which are a component of the Global Maritime Distress Safety System (GMDSS). Most commercial off-shore working vessels with passengers are required to carry a self-deploying EPIRB, while most in-shore and fresh-water craft are not. EPIRBs interface with Cospas-Sarsat, the international satellite system for Search and Rescue. When activated, such beacons send out a distress signal that, when detected by non-geostationary satellites, can be located by triangulation. In the case of 406 MHz beacons which transmit digital signals, the beacons can be uniquely identified almost instantly (via GEOSAR), and furthermore, a GPS position can be encoded into the signal which provides instantaneous identification of the registered user and its location.Often using the initial position provided via the satellite system, the distress signals from the beacons can be detected by SAR aircraft and ground search parties can home in on the distress signals from the beacons and come to the aid of the concerned boat, aircraft, or people Most EPIRBs are waterproof and fit in a cube about 30 cm on a side, and weigh 2 to 5 kg (4 to 11 lb). They can be purchased from marine suppliers. The units have a useful life of 10 years, operate across a range of conditions (−40°C/°F to +40°C/+104°F), and transmit for 24 to 48 hours.

20. **Beacon Modes.** The most important aspect of a beacon in classification is the mode of transmission. There are two valid transmission modes: digital and analog.

(a) **Digital Mode - 406 MHz Beacons.** 406 MHz beacons transmit bursts of digital distress information to orbiting satellites, and may also contain a small integrated analog (121.5 MHz) homing beacon. Advanced 406 MHz beacons are capable of transmitting a highly-accurate GPS location within their distress message; thus, the process of distress relief simply becomes "rescue" instead of "Search and Rescue." The distress message transmitted by a 406 beacon contains the information such as:

(i) Which country the beacon is from,

(ii) A unique 15-digit hexadecimal beacon identification code (a "15-hex ID"),

(iii) The encoded identification of the vessel or aircraft in distress, either as an MMSI value, or as, in the case of an ELT, either the aircraft's registration or its ICAO 24-bit address (from its Mode-S transponder

(iv) When equipped, a GPS position.

(v) Whether or not the beacon contains a 121.5 MHz "homer"

(vi) 406 beacons transmit for a quarter of a second immediately when turned on, and then transmit a digital burst once every 50 seconds thereafter. Both GEOSAR and LEOSAR satellites monitor these signals.

(vii) 406 beacons will be the only beacons compatible with the MEOSAR (DASS) system.

(viii) 406 MHz beacons must be registered.

(b) **Hex Codes**. The digital distress message generated by the beacon varies according to the above factors and is encoded in 30 hexadecimal characters. The unique 15-character digital identity (the 15-hex ID) is hard-coded in the firmware of the beacon. SAR authorities refer to the distress messages and the identity transmitted by 406 beacons, variously, as "hex codes."
For example hex codes look like the following: 90127B92922BC022FF103504422535

(i) A bit telling whether the message is short (15 hex digits) or long (30 hex digits) format.

(ii) A country code, which lets the worldwide COSPAS/SARSAT central authority identify the national authority responsible for the beacon.

(iii) Embedded 15-Hex ID or 15-hex transmitted distress message, for example, 2024F72524FFBFF the hex ID is printed or stamped on the outside of the beacon and is hard-coded into its firmware. The 15-hex ID can only be reprogrammed by certified distress radio beacon technicians. The national authority uses this number to look up phone numbers and other contact information for the beacon. This is crucial to handle the large number of false alarms generated by beacons.

(iv) A location protocol number and type of location protocol: EPIRB or MMSI, as well as all the data fields of that location protocol. If the beacon is equipped with GPS or GLONASS, a rough (rounded) latitude and longitude giving the beacon's current position. In some aircraft beacons, this data is taken from the aircraft's navigation system.

(v) When a beacon is sold to another country, the purchaser is responsible for having the beacon reprogrammed with a new country code and to register it with his/her nation's beacon registry, and the seller is responsible to de-register the deprecated beacon ID with his/her national beacon registry.

(vi) One can use the beacon decoder web page[1] at Cospas-Sarsat to decrypt/extract the 15-hex ID from the 30-hex distress message

(c) **Analog Mode - All Other Beacons**

(i) A simple analogue siren tone is transmitted continuously until the battery dies.
(ii) In the case of 121.5 MHz beacons, the frequency is monitored by most commercial airliners
(iii) The Cospas-Sarsat system can only detect this type of beacon when a LEOSAR satellite is in view of both the beacon and a LEOLUT (satellite dish). Satellite detection of 121.5 MHz beacons ceased on 1 February 2009.

21. **Frequencies** Distress beacons transmit distress signals on the following key frequencies; the frequency used distinguishes the capabilities of the beacon. A recognized beacon can operate on one of the three (currently) Cospas-Sarsat satellite-compatible frequencies. In the past, other frequencies were also used as a part of the search and rescue system.

(a) **Cospas-Sarsat (satellite) Compatible Beacon Frequencies**

(i) 406 MHz UHF- carrier wave at 406.025 MHz ± 0.005 MHz

(ii) 121.5 MHz VHF ± 6 kHz (frequency band protected to ±50 kHz). (Satellite detection ceased on 1 February 2009, but this frequency is still used for short-range location during a search and rescue operation)

(b) **Cospas-Sarsat Incompatible Beacon Frequencies**

(i) Marine VHF radio channels 15/16 - these channels are used only on the obsolete Class C EPIRBs.

(ii) The obsolete Inmarsat-E beacons transmitted to Inmarsat satellites on 1646 MHz UHF.

22. **EPIRB Sub-Classification.** EPIRBS are sub-classified as follows:

(a) **Recognized Categories:**

(i) Category I - 406/121.5 MHz. Float-free, automatically activated EPIRB Detectable by satellite anywhere in the world. Recognized by GMDSS.

(ii) Category II - 406/121.5 MHz. Similar to Category I, except is manually activated. Some models are also water activated.

(b) **Unrecognized Classes:**

(i) Class A - 121.5/243 MHz. Float-free, automatically-activating. These devices have been phased out by the FCC and *are no longer recognized*.

(ii) Class B - 121.5/243 MHz. Manually activated version of Class A. These devices have been phased out by the FCC and *are no longer recognized*.

(iii) Class S - 121.5/243 MHz. Similar to Class B, except it floats, or is an integral part of a survival craft (lifeboat). These devices have been phased out by the FCC and are no longer recognized.

(iv) Class C - Marine VHF ch15/16. Manually activated, these beacons operate on maritime channels only, and therefore are not detectable by satellite or normal aircraft. These devices have been phased out and are no longer recognized.

(v) Inmarsat-E - This service ended 1 December 2006; all former users have switched to Category I or II 406 MHz EPIRBS. These beacons were float-free, automatically activated EPIRBs operated on 1646 MHz. They were detectable by Inmarsat geostationary satellites, and were recognized by GMDSS.

23. **Activation Methods** There are two ways to activate a beacon; manually and/or automatically. Automatic EPIRBs are water activated, while automatic ELTs are G-force (impact) activated. Some EPIRBs also deploy; this means that they physically depart from their mounting bracket on the exterior of the vessel (usually by going into the water.) For a marine EPIRB to begin transmitting a signal (or "activate") it first needs to come out of its bracket (or "deploy"). Deployment can happen either manually—where someone has to physically take it out of its bracket—or automatically—where water pressure will cause a hydrostatic release unit to release the EPIRB from its bracket. If it does not come out of the bracket it will not activate. There is a magnet in the bracket which operates a reed safety switch in the EPIRB. This is to prevent accidental activation when the unit gets wet from rain or shipped seas. Once deployed, EPIRBs can be activated, depending on the circumstances, either manually or automatically (as soon as water comes into contact with the unit's "sea-switch".) All modern EPIRBs provide both methods of activation and deployment.

24. **Phase out of 121.5 & 243 MHz beacons** Since 1 February 2009, only 406 MHz beacons are detected by the international Cospas-Sarsat SAR satellite system. This affects all maritime beacons (EPIRBs), all aviation beacons (ELTs) and all personal beacons (PLBs). In other words, Cospas-Sarsat has ceased satellite detection and processing of 121.5/243 MHz beacons. These older beacons are now only detectable by ground-based receivers and aircraft. Despite the switch to 406 MHz, pilots and ground stations are encouraged to continue to monitor for transmissions on the emergency frequencies, as many 406 beacons are also equipped with 121.5 "homers." Furthermore, the 121.5 MHz frequency continues to be used as a voice distress frequency (especially in aviation).

25. **SAR Response to Various Beacons** Emergency beacons operating on 406 MHz transmit a unique 15, 22, or 30 character serial number called a Hex Code. When the beacon is purchased the Hex Code should be registered with the relevant national (or international) authority. Registration provides Search and Rescue agencies with crucial information such as:

(a) Phone numbers to call,

(b) Description of the vessel, aircraft, vehicle, or person (in the case of a PLB)

(c) Home port of a vessel or aircraft,

(d) Any additional information that may be useful to SAR agencies.

26. Registration information allows SAR agencies to start a rescue more quickly. For example, if a shipboard telephone number listed in the registration is unreachable, it could be assumed that a real distress event is occurring. Conversely, the information provides a quick and easy way for the SAR agencies to check and eliminate false alarms (potentially sparing the owner of the beacon thousands of dollars in negligent false alert fines.). An unregistered 406 beacon still carries some information, such as the manufacturer and serial number of the beacon. Despite the clear benefits of registration, an unregistered 406 beacon is very substantially better than a 121.5/243.0 beacon; this is because the Hex Code received from a 406 beacon confirms the authenticity of the signal as a real SAR alert. Beacons operating on 121.5 and/or 243.0 MHz simply transmit an anonymous siren tone, and thus carry no information to SAR agencies. Such beacons implicitly rely on the Doppler location detection system. SAR authorities have no way of knowing whether a 121.5/243.0 MHz signal is actually a SAR signal until they physically deploy to the location and home in on the source (and sound) of the transmission. Since SAR resources are scarce (and expensive), most countries do not deploy the most useful SAR homing assets (aircraft) until ambiguity has been resolved.

27. **Working of EPIRBs.** A beacon is activated by a crash, a sinking, or manually by survivors. The beacon's transmission is picked up by one or more satellites. The satellite transmits the beacon's signal to its ground control station. The satellite's ground station processes the signals and forwards the data, including approximate location, to a national authority. The national authority forwards the data to a rescuing authority. The rescuing authority uses its own receiving equipment to locate the beacon and makes the rescue or recovery. Once the satellite data is in, it takes less than a minute to forward the data to any signatory nation. There are several systems in use, with beacons of varying expense, different types of satellites and varying performance. Note that even the oldest systems provide an immense improvement in safety, compared to not having a beacon.

(a) **GPS-Based, Registered.** The most modern 406 MHz beacons with GPS locate a beacon with a precision of 100 meters, anywhere in the world, and send a serial number so

the government authority can look up phone numbers to notify next-of-kin in four minutes, with rescue commencing shortly afterward. The GPS system permits stationary, wide-view geosynchronous communications satellites to enhance the Doppler position received by low Earth orbit satellites. EPIRB beacons with built-in GPS are usually called GPIRBs, for GPS Position-Indicating Radio Beacon or Global Position-Indicating Radio Beacon.

(b) **High-Precision Registered.** An intermediate technology 406 MHz beacon has world-wide coverage, locates within 2 km (12.5 km² search area), notifies kin and rescuers in 2 hours maximum (46 min average), and has a serial number to look up phone numbers, etc. This can take up to two hours because it has to use moving weather satellites to locate the beacon. To help locate the beacon, the beacon's frequency is controlled to 2 parts per billion, and its power is a hefty five watts. Both of the above types of beacons usually include an auxiliary 25 milliwatt beacon at 121.5 MHz to guide rescue aircraft.

28. **Location by Doppler (Without GPS).** When the beacon has no GPS receiver, the system locates the beacon from its Doppler shift as received by the quickly-moving satellites. Using the same techniques as radar, basically, the frequency received varies depending on the speed of the beacon relative to the satellite. The amount of shift is proportional to the range and bearing to the satellite. The instant the beacon's Doppler shift changes from high to low indicate the time when the bearing from the beacon to the satellite's ground track is 90 degrees. The side of the satellite track is determined because the rate of change of the Doppler shift is faster when the Earth is turning towards the satellite track. One key to an effective Doppler position triangulation is excellent frequency stability. If the signal is not monotone (stable), then the results of the triangulation will vary. This is why 406 MHz beacons can be triangulated to within 5km and the b-side (unlikely mirror position) can be ruled out with 98.5% accuracy, whereas the old technology of analog beacons is only accurate to within a 20 km radius per mirror image, each of which is roughly equally likely to be the correct position. In order to handle multiple simultaneous beacons, modern 406 MHz beacons transmit in bursts, and remain silent for a few seconds. This also conserves transmitter power.

29. **Satellites Used.** Receivers are auxiliary systems mounted on several types of satellites. This substantially reduces the program's cost. The weather satellites that carry the SARSAT receivers are in "ball of yarn" orbits, inclined at 99 degrees. The longest period that all satellites can be out of line-of-sight of a beacon is about two hours. The first satellite constellation was launched in the early 1970s by the Soviet Union, Canada, France and the USA. Some geosynchronous satellites have beacon receivers. Since end of 2003 there are four such geostationary satellites (GEOSAR) that cover more than 80% of the surface of the earth. As with all geosynchronous satellites, they are located above the equator. The GEOSAR satellites do not cover the polar caps. Since they see the Earth as a whole, they see the beacon immediately, but have no motion, and thus no Doppler frequency shift to locate it. However, if the beacon transmits GPS data, the geosynchronous satellites give nearly instantaneous response. Cospas-Sarsat defines standards for beacons, auxiliary equipment to be mounted on conforming weather and communication satellites, ground stations, and communications methods. The satellites communicate the beacon data to their ground stations, which forward it to main control centers of each nation that can initiate a rescue effort.

30. **Registration of EPIRBs.** A website (http://inmcc.istrac.org) has been created by Indian Mission Control Centre (INMCC), Bangalore which has commenced web based beacon registration w.e.f 15 Aug 2006. The registration of EPIRBs is compulsory as per national and international requirements (ICAO/ IMO/DG Shipping/DG Civil Aviation). It is free of charge and the help is extended with no loss of time in case of distress. Non-registration and inadvertent activation of

beacons may be subjected to necessary disciplinary action. Beacon registration data includes primary and alternate emergency points of contact that SAR forces can call when a distress signal is received. Additional information is also included. For EPIRBs the vessel name, type, length, colour, capacity and homeport are listed as well as type of communication equipment and call sign. For ELTs, the aircraft number, make, model, colour, capacity and home airport/FBO are listed. Both registration forms also contain room for additional information that may help locate the vessel or aircraft sooner. The registration of beacon helps discriminate false alarms quickly saving SAR resources and efforts by the SAR forces. The registration information is stored securely at the INMCC and used only for search and rescue purposes. INMCC has standardised the EPIRBs registration format as per the international requirements, and made it available online for the users. On home page, you will find under login "New User". Go to this and join as new user by providing all the required details. After you finish this, INMCC will receive your profile to authorise you as registered user, and will provide you username and password by email. After receiving the username/password, please change password of your choice using an option provided in the software after log-in. After registering with INMCC, you can register/deregister your beacon or update the existing information directly using on line Beacon Registration Facility. Most of the existing users and beacons have been registered and made available online. You may access the information and update the data as appropriate. Information contained in the beacon registration database is critical to search and rescue operations and to your personal safety. It is our responsibility to ensure the details are kept up to date as it will help make life-saving job a lot easier when you most need it. The contact details of INMCC are as follows:-

(a) Indian Mission Control Centre (INMCC)
ISRO Telemetry Tracking and Command Network (ISTRAC)
Indian Space Research Organization (ISRO)
Govt. of India/Dept. of Space
Plot no. 12, Peenya Industrial Estate
Bangalore-560058

(b) <u>For operations related matters:-</u> Indian Mission Control Centre (INMCC), Bangalore

AFTN	VOBG YCYS
Telephone	+ 91 80 2809 4546
TeleFax	+ 91 80 2837 1857
e-mail	inmcc@istrac.org
INMCC Website	http://inmcc.istrac.org/

31. **<u>Coordinating agencies in India</u>.** Satellite Aided Search and Rescue System in India is operational since 1989 under Cospas-Sarsat programme, an international satellite system for Search and Rescue providing detection and location of distress signals on 3 distress frequencies i.e. 121.5 MHz, 243 MHz and 406 MHz. With ISRO as nodal agency, a steering committee was formed involving Airport Authorities of India, Indian Coast Guard, and Director General of Shipping, Indian Defence Services etc. to operate and maintain the system in India. First ground station, known as Local User Terminal (LUT) under Indian Mission Control Centre (INMCC) became operational at ISRO Telemetry Tracking and Command Network (ISTRAC) (a unit of ISRO in Bangalore) in Sept. 1989. The second LUT was commissioned at ISTRAC ground station at Lucknow in Sept. 1990. The Geostationary component of the system known as GEOSAR was developed by ISRO and integrated with INMCC in Dec. 1992. The GEOLUT is co-located with INMCC in Bangalore and uses Indian National Satellite (INSAT-3A) for reception and processing of 406 MHz alerts over a vast area from UK to Australia. The system has proved to be very

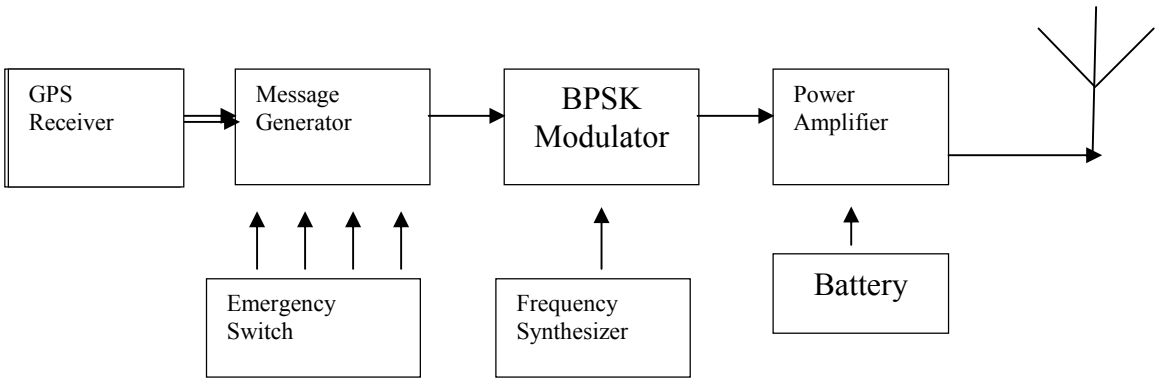
efficient in detecting and locating distress alerts received from ELTs (Emergency Locator Transmitters – carried by aircraft), EPIRBs (Emergency Position Indicating Radio Beacons – carried by marine vessels) and PLBs (Personal Locator Beacon – carried by individuals on expedition or journey to remote place) on three internationally identified distress frequencies (121.5, 243 and 406 MHz). The alert locations are passed on to 4 national Rescue Co-ordination Centres (RCCs) in India (Mumbai, Delhi, Kolkata and Chennai) and 7 neighbouring countries (Nepal, Bhutan, Bangladesh, Srilanka, Maldives, Seychelles and Tanzania) through AFTN (Aeronautical Fixed Telecommunication Network), used for civil aviation authorities of National & International airports.

INSAT based distress alert transmitter

32. **Introduction.** Indian Space Research Organization's Ahmedabad based Space Application Centre and Faridabad based VXL Technologies Ltd and the Indian Coast Guard has jointly developed a low cost GPS transmitter based Fisheries Alert system for use by fishermen at sea. The alert transmitter transmits via satellite to a land station the nature of emergency and the location information to launch search and rescue operations. Alerts sent by the inbuilt GPS transmitter indicating the boat's ID, position at sea, type of emergency, and time of alert activation will be received by INSAT 3A and forwarded to the Coast Guard's regional headquarters in Chennai where a Alert Reception Centre (Hub Center) has been set up. The station has been built by Bharat Electronics Limited, Bangalore. Alerts will also be picked up by the Maritime Rescue Coordination Centre in Chennai. The transmitter operates through a DRT transponder and can send out continuous alerts for 24 hours once every 5 minutes on an average while the staff at the rescue centres track the boat as it appears on a GIS map on their computer screens. Each transmitter costing below Rs 10,000 with an omni-directional antenna, has a lithium battery life of 24 to 48 hours after activation and will give its number and GPS position of the boat to the Coast Guard, which can then swing into action and carry out mid-sea rescues. As for the much harried fisherman, he need fear no more about being all at sea on his location while on the job.

33. **Overall System.** Cost consideration is one of the main drivers of the design of the transmitter for the intended application; it uses the UHF band for transmission through UHF X C, transponder on board INSAT satellite. The design of transmission system consists of Alert Transmitter (in the fishing boat), INSAT satellite and a Central Receive Ground station. The transmit power of the UHF transmitter is 5W (minimum) and information rate is 300bps. Entire data frame is RS coded to get adequate link margin of around 2.0 dB with transmission channel packet error probability of 0.01. RS coding is chosen to take care of burst errors due to interference from terrestrial emission within this band.

34. **Alert Transmitter.** The Block schematic of Alert transmitter is given below. The Alert transmitter consists of GPS receiver, Digital Message Generator, BPSK Modulator, UHF synthesizer, power amplifier and nearly omni directional antenna and it is battery operated. Specifications of Alert transmitter are given below. The GPS receiver is used to get the position of the transmitter. The GPS data (Transmitter location data) is given to message generator, which will add ID of the transmitter and read emergency bits from emergency switch. The message generator calculates redundant bits on ID emergency bits and GPS data as per RS coding algorithm and appends it along with the data. Message generator transmits this packet as per the protocol given above. The data frame received from message generator is BPSK modulated on UHF carrier and this signal is amplified to 7watt (max.) by power amplifier. The output of power amplifier goes to antenna, which radiates signal to satellite.



Block Schematics of Alert Transmitter

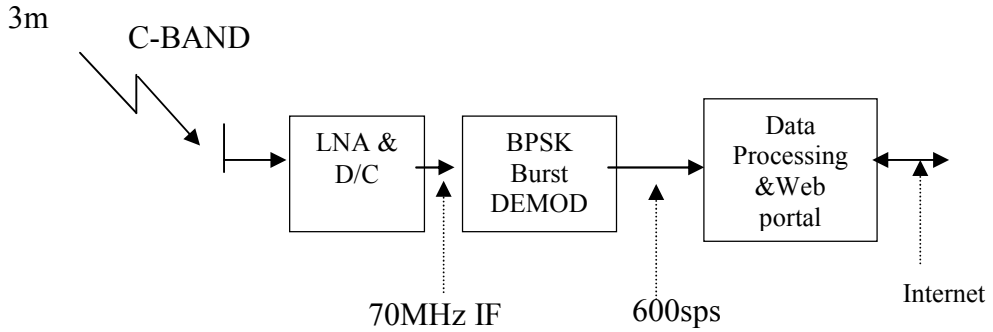
35. **Transmission Protocol.** Random transmission protocol is employed. The transmitter is usually in power off condition. As and when emergency condition arises, the user switches 'on' the transmitter and sets the emergency condition. As soon as GPS receiver acquires the GPS satellites, the position information is transmitted along with the emergency condition. In the first 5 minutes after the first GPS acquisition, the burst transmission is once during every 1-minute interval, and afterwards once every 5 minutes in random access mode. Every transmission contains new position along with the time of first GPS time acquisition. This continues till the battery power lasts or manual deactivation. The battery power lasts for minimum of 24 Hours of transmission.

36. **Specifications of Alert Transmitter.**

Output Frequency	: 402.65MHz to 402.85MHz
Step size	: 500Hz
Frequency stability over temp	: Better than 1 PPM
Frequency stability (long term)	: Better than 1PPM /year
Spurious	: >55dbc
Harmonic level	: >30dbc
Phase noise	
Freq. offset from center	: SSB phase noise
100Hz	: <-60dBc
1KHz & above	: <-70dBc
Output Power	: 5W min
Output Power Stability	: within 1.5dB over Frequency band and over temperature.
Input (GPS data)	
Data rate	: 4800 baud, asynchronous.
Level	: RS 232
Transmission format	: As given in Fig. 3
CR	:192 bits (All '1')
BTR	: 64 bits (alternate '1' & '0')
UW	: 64 bits (07EA CDDA 4E2F 28C2 (hex))
Message length	: 155 bits (90 bit message and 65 bit redundant)
Error correction	: RS coding
Transmission Rate	: 600 sps
Phase ambiguity resolution	: By differential encoding
Modulation	: BSPK
Phase in Accuracy	: ±2º (max.)
Amplitude Imbalance	: ±0.2dB (max.)
Antenna	: Omini

Supply Voltage	: 7.2V Primary Lithium Battery
Operating temperature	: -10deg.C to +50deg.C
Package	: Marine environment, water proof

37. **Receive Station.** The block schematics of receive station is given below. The receive system consists of receive antenna, RF down converter, IF down-converter & DSP based burst demodulator and data processing system. Specification and functional requirements of each sub-system is given below.



38. **Specification of Receive Station.**

Antenna & RF System:

Receive frequency (3.0m)	: 4505MHz (nominal)
G/T of Receive station	: 19dB/K
Output IF frequency band	: 70MHz (nominal)
Level	: -40dBm (nominal)

IF Down Converter and Burst Demodulator:

Input frequency band	: 70 MHz (nominal)
Input level	: -40dBm (nominal)
Modulation	: BPSK
Burst format	: as per Fig-3
Output Info. Rate	: 600 sps

39. **Description of Receive System.** The satellite signal in Ext. C-band is received by ground terminal consisting of 3m antenna. The 3-meter antenna is a solid dish antenna with G/T of 19dB/K. The antenna can be moved over 90° elevations and 360° azimuths. RF system consists of Low Noise Amplifier (LNA), and RF Down converter. A Low Noise amplifier is fitted with feed system amplifies the low-level signal received by antenna. Output of LNA goes to RF down converter, which converts RF signal into IF signal (70□18MHz). The frequency of IF is settable. 70 MHz IF signal goes to IF down converter and DSP based burst demodulator. The IF down converter converts 70 MHz input signal to a fixed IF of 9.0 KHz. The 9 KHz signal goes to DSP based burst demodulator, developed at SAC. The 9 KHz signal may have frequency offset due to transmitter frequency offset as well as due to satellite frequency offset. The DSP based BPSK burst demodulator has capability to track 9 kHz□5 kHz signal. The 9 kHz BPSK modulated signal is given to the burst demodulator. In the burst demodulator the 9 kHz signal first given to an Analog to Digital converter followed by DSP (AD21062 Processor). The DSP first looks for carrier frequency estimation. The process of estimation is continues till it receives the signal. On detection of the carrier the DSP processor starts demodulation of the signal and differentially decoded

synchronous data at 600 sps is obtained. An interface card converts the synchronous data to asynchronous data at 4800 baud, which goes to data processing system (PC). RS decoding is done in the PC with software developed at SAC. The data processing system consists of Pentium-IV PC platform that receives data on com. port and process the data and stores it. The PC displays the received data on-line and also acts as Web Portal for on-line accessing the position and emergency condition of the transmitter. The Web portal is developed at SAC.

SEARCH AND RESCUE RADAR TRANSPONDERS

40. **Description** Search and Rescue Transponders are electronic units which react to the emissions of X-band radars. Each time a SART detects a pulse from X-band radar it transmits a signal which is displayed on the screen of the radar which activated it. This can greatly help a would-be rescuer to locate a liferaft. They can be thought of as 'active' radar reflectors as they electronically enhance the echo received by radar. All compulsory GMDSS vessels up to 500 tons must carry at least one SART. Above 500 tons, they must carry two. Non-compulsory vessels are strongly advised to carry at least one to aid in any possible rescue.

41. **Operation of SART and Test Procedures.** A SART has a receiver which scans for UHF signals between 9.2 and 9.5 GHz - the frequencies on which X-band radar transmits its signal. As soon as the SART detects a signal it immediately transmits its own signal on the same frequency. This signal consists of a series of twelve pulses, and these are displayed on the screen of the radar as a series of twelve echoes with a gap of 0.6 miles between each of them**.** The first dot is at the position of the SART, with the remainder radiating in a straight line towards the edge of the screen. As the rescue vessel approaches the SART**,** the twelve dots each become short arcs**.** These arcs increase in size as the vessel gets closer, until the signal from the SART is permanently activated by the weakest side-lobes from the radar transmission. The signal from the SART becomes twelve concentric circles on the radar screen and this tells the would-be rescuers that they have more or less arrived. When a SART is switched on it will show a light to indicate that it is working. An approved SART should have sufficient power to operate in this stand-by mode for at least 96 hours. When it receives a signal from X-band radar, and transmits its own signal, it will either flash this indicating light or in some cases a second light or even a buzzer. This will serve to let the distressed persons know that approaching radar is activating the SART. If the survivors have handheld VHF with them then this would be a good time to use it to try calling the approaching ship. Since the radar UHF signals can only effectively travel in a straight line, the distance from which a SART can be activated by radar is dependent on its own height and the height of the interrogating radar scanner. Most SARTs have an extendible handle to help in positioning it as high as possible in the liferaft or lifeboat. The SART must be secured outside the canopy of the liferaft. Operating it from inside the liferaft will greatly reduce its effectiveness. The International Maritime Organisation stipulates that a SART mounted at a height of one metre must be detectable by a ship's radar with a scanner height of 15 metres at, distance of at least 5 miles. It has been found from tests that a ship's radar will usually detect a SART laying flat on the floor of a liferaft at around 1.8 miles. If the SART is upright on the floor the detection range increases to about 2.5 miles. It should be possible, under most conditions, to mount the SART at least two metres high. A normal detection range for a SART mounted two metres above sea level by an average ship's radar is about seven to ten miles. However, a search aircraft equipped with X-band radar should be able to detect it from at least 30 miles when flying at an altitude of around 3,000 feet. All SARTs should be checked on a weekly basis for any physical damage and for the expiration date of the battery. This is normally indicated on the manufacturer's plate affixed to the SART. It is permitted to check the operation of a SART by briefly turning it on and exposing it to the transmissions of the ship's radar. If this is done on board, then the radar screen will be flooded with the concentric circles, showing the proximity of the SART. Such tests should be conducted on a monthly basis and should be kept short so as not to

shorten the life of the battery too much and to reduce the risk of other vessels seeing it, resulting in a false distress alert. Ideally, such tests should be conducted when there are no other vessels within radar range so as not to cause interference or false alarms. Vessels which are using their radar to look for a SART should use a range of 6 or 12 miles on the radar for optimum results. If a shorter range is selected, the narrower bandwidth used in the receiver will reduce the brightness of the dots making them harder to see. There is no point in using a longer range; since the maximum distance a SART will be detectable from another vessel is 7 to 10 miles. There are some SARTs which have a so-called anti-collision mode. When operated in this mode they transmit five pulses instead of the normal twelve. Such a unit may well help the radar operator on an approaching ship to see you, but there is a danger that it might be mistaken for the distress signal and the ship may possibly try to rescue you, even if you were not in distress. Such use of a SART is not encouraged. Under distress conditions though, there is no doubt that a SART is a valuable aid for any vessel to carry. It will greatly facilitate any search and rescue operation.

42. The nature of action taken by these authorities when a casualty happens or is imminent depends on whether a ship or an aircraft is involved, position of the casualty and in circumstances in which it occurs. It will be seen that the circumstances attending a casualty vary considerably and the speed with which rescue measures can be taken depends on a rapid, yet careful appreciation of the situation by those concerned, particularly by the authorities that have to initiate search and rescue action. However, although much can often be done by the shore authorities, the co-ordination and direction of operations at the scene of the casualty will at times be a matter primarily for the Master of the distressed vessel or the Master of another ship going to her rescue, or the pilot of a search and rescue aircraft. The degree to which reliance must be placed on those at the scene will usually depend on the distance from the coast, at which the casualty occurs the farther from the coast, the greater the reliance on co-ordination on the spot.

43. In case of an aircraft casualty at sea, the first intimation that the aircraft is in trouble will normally be received by an Air Traffic Control Centre. The ATS will liaise with MRCC of Coast Guard for maritime search and rescue .The latter is responsible for the dispatch of aircraft and for arranging assistance from other authorities.

44. Guidance for masters on the assistance to be given during emergencies at sea is contained in Merchant Ship Search and Rescue manual (MERSAR), obtainable from the web site of International Maritime Organisation (IMO), 4 Albert Embankment, London SE1 7SR, U.K (http://www2.imo.org/b2c-imo/b2c/init.do) and IAMSAR manual ((International Aeronautical and maritime search and rescue manual). A National MSAR manual for Indian centre on similar lines with extract from IAMSAR/MERSAR/ICAO has also been promulgated.

IRIDIUM GMDSS

45. The IRIDIUM system is based on a network of 66 satellites. The satellite constellation is distributed on 6 near polar planes and each plane carries 11 operational satellites, as well as one spare satellite. Each satellite orbits at an altitude of 780 kilometers (420 nautical miles) above the surface of the Earth travelling around the planet once every 100 minutes. Unlike geostationary communications satellites which are located 36,000 kilometers above the Earth, the IRIDIUM satellites' low Earth orbit makes it possible to communicate directly with a hand-held telephone, in the meantime avoiding the typical delay of geostationary satellite transmissions. The satellite is linked to callers by a main mission antenna that offers 16 decibels of link margin, a signal that is strong enough to deliver high quality communications to a hand-held telephone.

The International Maritime Organization (IMO), through the International Mobile Satellite Organization (IMSO), has evaluated and verified the services provided by Iridium Communications

Inc. and has issued the company with a statement of recognition of Maritime Mobile Satellite Services provided by the company in the form of Maritime Safety Committee resolution MSC.451(99) dated 24 May 2018 effective from 01 Jan 20. The MSC recognized Iridium Satellite LLC (Safety Cast) as a mobile satellite communication service provider in GMDSS.

STATUTORY DUTIES OF MASTERS OF SHIPS

Obligation to Render Assistance to Ships or Aircraft in Distress

46. Taking into account the latest applicable International regulations under article 98 of United Nation Convention on Laws of sea 1982 (UNCLOS) and Article 10 of International Convention on Salvage, 1989 including article 11 of international convention on assistance and salvage at sea to which India is a party requires every master of an Indian ship is bound, so far as he can do so without serious danger.

47. **Merchant Shipping Act 1958, Sec. 355 and Regulation 10 - Chapter V - SOLAS – 1974.**

(a) The Master of an Indian ship on receiving at sea a (Chapter V - SOLAS – 1974) signal of distress or information from any source that a vessel or aircraft is in distress shall proceed with all speed to the assistance of the persons in distress informing them, if possible, that he is doing so unless he is unable or in the special circumstances of the case considers it unreasonable or unnecessary to do so or unless he is released from such obligation under the provisions of sub-section (c) or sub-section (d).

(b) The Master of a ship in distress, after consultation, so far as may be possible, with the masters of the ships which answer his call for assistance, has the right to requisition one or more of those ships as he considers best able to render assistance, and it shall be the duty of the master or masters of the ship or ships requisitioned to comply with the requisition by continuing to proceed with all speed to the assistance of persons in distress.

(c) The Master shall be released from the obligation imposed by sub-section (a) as soon as he is informed of the requisition of one or more ships other than his own and that the requisition is being complied with by the ship or ships requisitioned.

(d) The Master shall be released from the obligation imposed by sub-section (a) and if his ship has been requisitioned from the obligation imposed by subsection (b), if he is informed by the persons in distress or by the Master of any ship that has reached the persons in distress that assistance is no longer required.

(e) If the Master of an Indian ship on receiving at sea a signal of distress or information from any source that a vessel or aircraft is in distress, is unable or in the special circumstances of the case considers it unreasonable or unnecessary to go to the assistance of the persons in distress, he shall forthwith cause a statement to be entered in the official log-book or, if there no official log-book, cause other records to be kept with reasons for not going to the assistance of those persons.

(f) The Master of every Indian Ship for which an official log-book is required shall enter or cause to be entered in the official log-book every signal of distress or message that a vessel, aircraft or person is in distress at sea.

Penalties.

(a) If a Master fails to comply with sub-section(1) or (2) of Section 355 he shall be guilty of an offence and shall be punishable with imprisonment which may be extend to 6 months or fine which may amount to Rs.1,000 or both.

(b) If a Master fails to comply with sub-section (5) of Section 355, he shall be punishable with fine which may amount to Rs.1,000.

Duties of Masters in Case of Collision

48. These duties are prescribed in Section 348 and 349 of Merchant Shipping Act, 1958

Sec 348.

In every case of collision between two ships it shall be the duty of the Master or person incharge of each ship, if and so far as he can do so without danger to his own ship, crew and passengers, if any:

(a) To render to the other ship, her master, crew and passengers, if any, such assistance as may be practicable and may be necessary to save them from any danger caused by the collision and to stay by the other ship until he has ascertained that she has no need of further assistance.

(b) To give to the Master or person in-charge of the other ship the name of his own ship and the port to which she belongs and also the names of the ports from which she comes and to which she is bound.

Sec 349.

In every case of collision in which it is practicable to do so, the Master or every ship concerned shall, immediately after the occurrence, cause a statement thereof and of the circumstances under which the same occurred to be entered in the official log-book, if any, and the entry shall be signed by the Master and also by the Mate or one of the crew.

Penalties.

(a) If a Master or a person in-charge of a ship fails without reasonable cause, to comply with Section 348, he shall be punishable with imprisonment which may extend to 3 months or fine which may extend to Rs.3,000 or both If a Master fails to comply with Section 349, he shall be punishable with a fine which may extend to Rs.200.

Observance of Collision Regulations.

49. Section 286 of Merchant Shipping Act, 1958 provides as follows:-

(a) The owner or master of every ship and the owner or tindal of every sailing vessel to which collision regulations apply shall obey the regulations, and shall not carry or exhibit any lights or shapes or use any fog or distress signals, other than those required by the said regulations.

(b) If any damage to person or property arises from the non-observance by any such ship or sailing vessel of any of the collision regulations, the damage shall be deemed to have been occasioned by the willful default of the person-in-charge of the ship or the sailing vessel, as the case may be, at the time unless it is shown to the satisfaction of the court that the circumstances of the case made a departure from the regulations necessary.

Reports of Shipping Casualties.

50. Section 350, of Merchant Shipping Act, 1958, requires immediate notification in writing by the Master or owner to the Government of India when a ship has sustained or caused any accident involving loss of life or serious injury to any person or has received material damage, either to her hull or her machinery, affecting her sea worthiness or her efficiency. A similar notice has to be made under Section 351 by the owner or agent who has reason, owing to the non-appearance of the ship or to any other circumstances to apprehend that the ship which has been wholly lost.

Penalties: - If the Master, Owner or Agent fails, without reasonable cause to comply with Sec. 350 or 351 of the Merchant Shipping Act, he shall be punishable with a fine which may extend to Rs.500.

SHIPS IN DISTRESS

Statutory Distress Signals

51. Annex IV of International Regulations for Preventing Collisions at Sea 1972, lists the signals to be used or exhibited either together or separately to indicate distress and need of assistance.

(a) These signals which came in force with effect from 15 July, 1977 are as follows:-

(i) A gun or other explosive signal fired at intervals of about a minute;
(ii) A continuous sounding with any fog-signaling apparatus;
(iii) Rockets or shells, throwing red stars fired one at a time at short intervals;
(iv) A signal made by radiotelegraphy or by any other signaling method consisting of the SOS (. . . - - - . . .)in the Morse Code;
(v) A signal sent by radiotelephony consisting of the spoken word "MAYDAY";
(vi) The International Code Signal of distress indicated by N.C.;
(vii) A signal consisting of a square flag having above or below it a ball or anything resembling a ball;
(viii) Flames on the vessel (as from a burning tar barrel, oil barrel, etc.);
(ix) A rocket parachute flare or a hand flare showing red light;
(x) A smoke signal giving off orange-coloured smoke;
(xi) Slowly and repeatedly raising and lowering arms outstretched to each side;
(xii) A distress alert by means of digital selective calling(DSC) transmitted on VHF channel 70 or MF/HF on the frequencies 2187.5kHz,8414.5kHz, 4207.5 kHz, 6312 kHz, 12577kHz or 16804.5kHz
(xiii) A ship to shore distress alert transmitted by the ship's Inmarsat or other mobile satellite service provider ship earth station;
(xiv) Signals transmitted by emergency position – indicating radio beacons;
(xv) Approved signals transmitted by radio communications systems, including survival craft radar transponders

(xvi) The radiotelegraph alarm signal;
(xiii) The radiotelephone alarm signals;
(xiv) Signals transmitted by emergency position-indicating radio beacons;

(b) The use or exhibition of any of the foregoing signals except for the purpose of indicating distress and need of assistance and the use of other signals which may be confused with any of the above signals is prohibited.

(c) Attention is drawn to the relevant sections of the International Code of Signals, the International Aeronautical and Maritime Rescue Manual Volume III and the following signals:-

(i) A piece of orange-coloured canvas with either a black square and circle or other appropriate symbol (for identification from the air);
(ii) A dye marker.

52. Under Section 288 of Merchant Shipping Act 1958, and in pursuance of Regulation 24 Chapter III of SOLAS 1974, carriage of distress rocket signals onboard ships shall be as under:-

53. **Ships Distress Rocket Signals**

(a) Every ship of class I, II, III, IV, V, VI, VII and VIII and every ship of 15.2 metres (50 feet) and over in length of Classes IX, X and XI shall be equipped with no less than 12 parachute distress rocket signals.

(b) Every ship of less than 15.2 metres (50 feet) in length of Classes IX, X, XI, XII and every ship of Class XIII shall be equipped with not less than 12 pyrotechnic distress signals which shall be either parachute signals of a type or red hand flares capable to emit five red stars into the air to a height of not less than 45.7 metres (150 ft.)

(c) All pyrotechnic distress signals shall be packed in a water-tight container and shall be clearly and indelibly labeled to indicate their purpose.

Authority to use distress signals

54. The Merchant Shipping (Distress Messages and Navigational Warnings) Rule, 1962, provide as follows:-

(a) **Revocation of Distress Signals.** If, after sending out any distress signal by means of radio, the Master of the vessel which controlled the distress traffic subsequently finds that assistance is no longer required, he shall immediately send out a message notifying that assistance is no longer required and normal working may be resumed.

(b) **Prohibition of Misuse of Signals.**

(i) The urgency signal, the safety signal or the distress signal shall not be used by any vessel without the authority of the Master of the vessel.

(ii) The Master of a vessel shall not order the use of the distress signal unless he is satisfied:-

(a) that his vessel is threatened by grave and imminent danger, or that another vessel, or an aircraft is so threatened and cannot of itself send that signal; and

(b) that the vessel in danger whether his own vessel or another vessel or the aircraft in danger as the case may be, requires immediate assistance in addition to any assistance then available to her.

55. Ships have, on certain occasions, sent out a distress call and have failed to cancel it when no longer in danger, the radio officer or operator having gone off watch and the ship having proceeded on her voyage. Such action has resulted in serious loss of time to other ships and has in some instances caused needless anxiety to relatives and friends of those onboard, because failure to find or establish communication with the ship sending the signal has led to the belief that she has floundered.

Need for care in the use of certain distress signals

56. Experience has shown that two of the statutory distress signals, namely "a continuous sounding with any fog signaling apparatus" and "flames on the vessel" are not only liable to abuse, but when used as distress signals have often given rise to misunderstanding. A succession of signals on the whistle or siren is frequently made for other purposes than that of indicating distress e.g., for summoning pilot or attracting attention, and may be mistaken for a "continuous sounding". Similarly, working lights and "flare up" lights are authorised for use by fishing vessels and other small craft, and simplest way of making a "flare up" light is to dip a rag in paraffin and set it alight. Unfortunately small vessels in distress frequently make the signal "flames on the vessel" in the same manner. Thus it is often impossible to decide whether "flare up" lights are being shown or whether distress signals are being made, especially in areas where fishing is carried on. As a result uncertainty and delay have occurred and lives have been lost in consequence.

57. Distress signals should be as distinctive as possible, so that they may be recognised at once and assistance dispatched without delay. Thus, instead of making an indefinite succession of blasts on the fog signaling apparatus when in distress, mariners should make the "continuous sounding" by repeating the Morse signal SOS (. . . _ _ _ . . .) on the whistle or fog horn. If this is done there can be no mistake as to the meaning of the signal. Similarly, by night, if signaling for help by means of a lamp or flashing light the same signal SOS should always be used.

58. In the case of the "flames on the vessel" signal, unless the flames making the signal are sufficiently large to attract immediate attention, their chances of being recognised as a distress signal are very poor. The best distress signals are red parachute flares or rockets emitting red stars. Arrangements should be made to steady rockets to ensure their satisfactory flight when fired.

Maintenance of line-throwing rockets, distress rockets and smoke signals.

59. Line throwing rockets, distress rockets, red flares, etc., are liable to deteriorate if kept for a long period, and they should be condemned and replaced immediately after a period of three years from the date of manufacture. Special care should be taken regarding the disposal of these obsolete pyrotechnics. On no account should they be used for testing or practice purposes, or landed for any purpose. They should be kept in a safe place until the opportunity occurs for throwing them overboard so that they will sink in deep water well away from land. It is incumbent on ships' masters to ensure that the jettisoned rockets and flares etc. are adequately weighted; time expired pyrotechnics are being found washed up on beaches around the coast, exposing members of the

public (especially children) to serious consequences should they be tempted to handle them. Additionally, pyrotechnics should be removed from any protective plastic envelope packing before disposal. Life buoy smoke markers should also be replaced after three years. They should be examined carefully for corrosion or other defects and replaced earlier, if necessary.

Private distress messages.

60. It is undesirable for a vessel in distress to send a private message, bearing a specific address, asking for assistance because, if no general distress message is sent out, the public authorities concerned will be unable to render assistance to the vessel in question or to take steps to make the need generally known in order that other ships or persons may render assistance.

Vessels reported missing or overdue.

61. If the owner or agent of any Indian ship has reason, owing to the non-appearance of the ship or to any other circumstances, to apprehend that the ship has been wholly lost, he shall as soon as convenient, send to the Government of India notice in writing of the loss and of the probable cause there of. If the owner or agent fails without reasonable cause to comply with this, he shall be punishable with a fine which may extend to Rs. 500. The Marine Department, as far as practicable, will request the appropriate authorities to initiate Search and Rescue operations. The following particulars should be reported about the missing or overdue vessel:-

(a) Port of Registry and Official Number.
(b) Description.
(c) Whether fitted with RT or WT or both, and, if so, giving the call sign and frequency on which she operates.
(d) Last known position.
(e) Date last seen, or heard on the air.
(f) Probable fishing area.
(g) Full details of all safety equipment carried
(h) Number of persons onboard.
(j) Any other relevant information.

Owners and/or Agents should not delay making the necessary reports where they have any doubts concerning the safety of vessels.

Visual Signals Used Between Shore Stations in India and Ships in Distress.

62. In the event of a ship being in distress or stranded on the coasts of India, the following signals should be used by life-saving stations when communicating with her, and by the ship when communicating with life-saving stations as agreed in the International Convention on Safety of Life at Sea, 1974.

(a) Replies from life-saving station or maritime rescue units to distress signals made by a ship or person:-

	Signals	**Signification**
(i)	By day. Orange smoke signal or combined light land sound signal (thunder light) consisting of single three signal which are fire approximately one minute.	"You are seen - assistance will be given as soon as possible".
(ii)	By night. White star rocket consisting of three single signals which are fired at intervals of approximately one minute.	(Repetition of such signals shall have the same meaning.)

If necessary the day signals may be given at night or the night signals by day.

(b) Landing signals for the guidance of small boats with crew or persons in distress:-

	Signals	Signification
(i)	By day. - Vertical motion of a white flag or the arms or signaling the code letter"K"(_ . _) given by light or sound- signal apparatus.	"This is the best place to land".
(ii)	By night. - Vertical motion of a white light or flare, or signaling code letter"K" (_ . _) given by light or sound signal apparatus. A range (indication of light or flare at a lower level and in line direction) may be given by placing a steady white with the observer.	
(iii)	By day.-Horizontal motion of a white flag or arms extended horizontally or signaling the code letter "S"(. . .) given by light or sound-signal apparatus.	"Landing here highly dangerous"
(iv)	By night. - Horizontal motion of a white light or flare or signaling the code letter "S" (. . .) given by light or sound-signal apparatus	
(v)	By day. - Horizontal motion of a white flag, followed by the placing of the white flag in the ground and carrying of another white flag in the direction to be indicated and/ or a white star signal in the direction towards the better landing place or signaling the code letter "S"(...) followed by the code letter "R" (. - .) if a better landing place for the craft in distress is located more to the right in the direction of approach or signaling the code letter "L" (. - . .) if a better landing place for the craft in distress is located more to the left in the direction of approach.	"Landing here highly dangerous. A more favorable location for landing is in the direction indicated".
(vi)	By night. - Horizontal motion of a white light or flare, followed by the placing of the white light or flare on the ground and carrying of another white light or flare in the direction to be indicated and/ or a white star signal in the direction towards the better landing place or signaling the code letter "S" (. . .) followed by code letter "R" (. _ .) if a better landing place for the craft in distress is located more to the right in the direction of approach or signaling the code letter "L" (. _ . .) if a better landing place for the craft in distress is located more to the left in the direction of approach.	

(c) Signals to be employed in connection with the use of shore life-saving apparatus.

	Signals	Signification
(i)	By day. Vertical motion of a white flag or the arms	In general- "Affirmative". Specifically -"Rocket line is held".
	By night. Vertical motion of a white light or flare.	"Tail block is made fast",

		Hawser is made fast" is in the breeches buoy". "Haul away".
(ii)	By day. Horizontal motion of a white flag or arms extended horizontally By Night. Horizontal motion of a white light or flare.	In general- "Negative". Specifically-"Slack away"."Avast hauling".

(d) Signals to be used to warn ship which is standing into danger:-

Signals	Signification
The International code signal U or NF (. . _) flashed by lamp or made by foghorn, or whistle, etc.	The letter U "You are running into danger".

Should it prove necessary, the attention of the vessel is called to these signals by a white flare, a rocket showing white stars on bursting, or an explosive sound signal.

Co-operation between a ship's crew and others in the use of rocket life-saving apparatus.

63. Should lives be in danger and your vessel is in a position where rescue by the rocket life-saving apparatus is possible, a rocket with line attached will be fired from the shore or rescuing vessel, if available. Get hold of this line as soon as you can.

When you have got hold of it, signal to the shore as indicated in paragraph 62(c) (i).

64. Alternatively, should your vessel carry a line-throwing appliance and this is first used to fire a line ashore, this line will not be of sufficient strength to haul out the whip and those on the shore will, therefore, secure it to a stouter rocket line. When this is done, they will signal as indicated in paragraph 62(c) (i). On seeing their signal, haul in the line which was fired from the vessel until the stouter rocket line is on board.

65. Then, when the stouter rocket line is held, make the appropriate signal to the shore [paragraph 66(c)(i)] and proceed as follows:

(a) When you see the appropriate signal, ie. "haul away" made from the shore, haul upon the rocket line until you get a tail block with an endless fall rove through it (called the "Whip"), and with a jackstay attached to the bucket of the tail block.

(b) Make the tail block fast, close up to the mast or other convenient position, bearing in mind at the fall should be kept clear from chaffing by any part of the vessel and the space must be left above the block for the hawser. Unbend the rocket line from the whip. When the tail block is made fast and the rocket line unbent from the whip, signal to the shore again [as in paragraph 62(c)(i)].

(c) As soon as this signal is seen on the shore, a hawser will be bent to the whip, and will be hauled off to the ship by those on shore. Except when there are rocks, piles or other obstructions between the ship and the shore, a bowline will have been made with the end of the hawser round the hauling part of the whip.

(d) When the hawser is taken on board, the bowline should be cast off. Then, having seen that the end of the hawser is clear of the whip, the end should be brought up between

the two parts of the whip and made fast to the same part of the ship as the tail block but just above it and with the tally-board close up to the position to which the end of the hawser is secured (this will allow the breeches buoy to come right out and will facilitate entry to the buoy.).

(e) When the hawser has been made fast on board, unbend the whip from the hawser and see the bight of the whip has not been hitched to any part of the vessel and that it runs free in the block. Then signal to the shore [as in paragraph 62 (c) (i)].

(f) The men on shore will then set the hawser taut, and by means of whip will haul off to the ship the breeches buoy into which the person to be hauled ashore is to get. He should sit well down in the breeches buoy and when he is secure, signal again to the shore as indicated in paragraph 62 (c) (i) above, and the men on shore will haul the person in the breeches buoy to the shore. When he is landed the empty breeches buoy will be hauled back to the ship. This operation will be repeated until all persons are landed.

(g) During the course of the operations should it be necessary to signal, either from your ship to the shore, or from shore to ship, to "Slack away" or "Avast hauling" this should be done as indicated in paragraph 62 (c) (ii).

66. It may sometimes happen that the state of the weather and or the condition of the ship will not admit of a hawser being set up; in such cases a breeches buoy will be hauled off by the whip which will be used without hawser.

67. The system of signaling must be strictly followed. It should, however, be noted that the rescue operations as a whole will be greatly facilitated if signal communication (by semaphore or flashing lamp) is established between the ship and the shore (or lifeboat).

68. All women, children, passengers and helpless persons should be landed before the crew of the vessel. Masters and crew of stranded vessels should bear in mind that success in landing them by the rocket life saving apparatus depends in a great measure, upon their own coolness and attention to the instructions laid down.

Tankers - use of rocket line throwing apparatus.

69. It may be dangerous to attempt to establish communication by means of a rocket line throwing apparatus with an oil tanker, should that vessel be carrying petrol, spirit or other highly inflammable liquid. The assisting vessel should lie to WINDWARD of the tanker and before firing a rocket in her direction; ascertain whether it is safe to do so.

70. When a vessel in distress is carrying petrol, spirit or other highly inflammable liquid and is leaking, the following signals should be exhibited to show that it is dangerous to fire a line carrying rocket by reason of risk of ignition:-

By day: - Flag B of the International Code of signals hoisted at the masthead.

By night: - A red light hoisted at the masthead.

When visibility is bad the above signals should be supplemented by the use of the following International Code of signal made in sound:-

G U (_ _ . . . _) "It is not safe to fire a rocket."

SAR ORGANISATION IN INDIA

71. **Indian Coast Guard and SAR Responsibilities.**

(a) Indian Coast Guard has been entrusted with the duties of providing Search and Rescue assistance to mariners, and protection to fisherman including assistance to them at sea while in distress and safety of life and property at sea. Related to SAR, the Indian Coast Guard charter of duties include:-

(i) Providing protection to fishermen including assistance to them at sea when in distress.
(ii) Safety of life and property at sea.
(iii) Coordinate Search and Rescue operation at sea.

(b) **Definition of SAR.** Search and Rescue comprises the search for, and the provision of aid to, persons, ships or other craft which are, or are feared to be, in distress or imminent danger. The Indian Coast Guard is responsible for coordinating, Aeronautical and Maritime Search and Rescue in the Indian Search and Rescue Region. With a focus on the humanitarian nature of work, the Indian Coast Guard cooperates with other agencies to develop and sponsor vital standards and recommendations.

(c) **Resource Agencies**. In addition to the resources available with the Coast Guard, ships/aircraft/crafts/shore based facilities with the following agencies would be requisitioned for carrying out SAR operations:-

(i) Indian Navy
(ii) Indian Air Force
(iii) Directorate General of Shipping
(iv) Port Authorities
(v) Shipping Corporation of India
(vi) Director General Civil Aviation
(vii) Airports Authority of India
(viii) States/Central Fisheries Authorities
(ix) Marine Police of Coastal States and Union Territories
(x) Indian Meteorological Department
(xi) Indian Space Research Organisation
(xii) Department of Telecommunications
(xiii) Customs Authorities
(xiv) National Institute of Ocean Technology
(xv) Indian National Centre for Ocean Information Services
(xvi) Oil and Natural Gas Corporation
(xvii) Dredging Corporation of India
(xviii) Pawan Hans Limited
(xix) Private Shipping Companies

(d) **Point of Contact of SAR Board Members.** The Points of contacts of the SAR Board members and resources agencies for SAR requirements are placed at Appendix `D'.

72. **Search and Rescue Regions.**

(a) Search and Rescue Region is an area of defined dimensions, associated with an MRCC within which SAR services are provided. The Regional Air Navigation Plans

(RANPs) promulgated by ICAO, depicts aeronautical SRRs and Global SAR Plan promulgated by IMO delineates Maritime SRR. The countries have agreed to accept SAR responsibility for an area, which composed of one or more aeronautical SRRs. Any SAR facility within the SRR should respond to all distress situations whenever and wherever it is capable of doing so.

(b) The purpose of establishing an SRR, is to clearly define who has the primary responsibility for coordinating responses to distress situations in different area of the world, and to enable rapid distribution of distress alerts to the proper MRCC. It is also to ensure that the SAR services are provided at the earliest for that geographic area assumed by the country.

(c) The Maritime SRR is generally harmonized with Aeronautical SRR in most areas, which therefore minimize confusion over, which authority has to be alerted, when a distress situation arises at and over a specific geographic position.

73. **Indian SRR and SAR Organisation.**

(a) On accession to the International Convention on Maritime Search and Rescue 1979, Indian Government has assumed the responsibility of providing SAR cover in Indian SRR with Director General Indian Cost Guard designated as National Maritime SAR Coordinating Authority (NMSARCA). There are three geographic areas/regions established in Indian SRR, for coordinating responses to both maritime and aviation related distress incidents.

(b) The SRR (West) covers the SAR operations on the western seaboard. The SRR (East) covers Bay of Bengal including portions of Palk Bay and Gulf of Mannar. The SRR (A&N) covers the area adjacent to Andaman and Nicobar Islands.

(c) There are three Maritime Rescue Coordination Centres (MRCCs) defined in INSRR. The MRCC located at Mumbai covers the entire western seaboard of Indian SRR. The eastern seaboard is covered by MRCCs located at Chennai and Port Blair.

74. **Maritime Rescue Coordination Centre in Indian SRR.**

(a) The Maritime Rescue Coordination Centre (MRCC) is an operational facility, responsible for promoting efficient organisation of SAR services, and for coordinating the conduct of SAR operations within the SRR. The MRCC only coordinates and does not necessarily provide the SAR facilities in the applicable SRR. Aeronautical SAR responsibility is met by Airports Authority of India and Aeronautical SAR coordination is performed from aeronautical RCC. However, the responsibility for Aeronautical SAR over oceanic areas is the responsibility of Indian Coast Guard.

(b) There are three Maritime Rescue Coordination Centres (MRCCs) defined in ISRR. The MRCC located at Mumbai covers the entire western seaboard of Indian SRR. The Eastern seaboard is covered by MRCCs located at Chennai and Port Blair. The coordinates of the Indian SRRs associated with the respective MRCCs are as follows:-

(i) **MRCC Mumbai.** The Indian SRR (West) area covered by the MRCC Mumbai, is defined by the line joining the following coordinates and IMBL.

21 00 N	068 15 E	12 00 N	063 00 E
12 00 N	060 00 E	06 00 S	060 00 E
06 00 S	068 00 E	00 00 S	068 00 E
08 00 N	073 00 E	06 10 N	077 20 E
08 08 N	077 20 E		

(ii) **MRCC Chennai.** The Indian SRR (East) area covered by the MRCC Chennai, is defined by the line joining the following coordinates and IBL.

08 08 N	077 20 E	06 10 N	077 20 E
06 00 N	078 00 E	10 00 N	080 00 E
10 00 N	082 00 E	07 15 N	088 30 E
15 20 N	088 30 E		

Coastal border between India and Bangladesh

(iii) **MRCC Port Blair.** The Indian SRR (A&N) area covered by the MRCC Port Blair, is defined by the line joining the following coordinates and IBL.

Coastal border between India and Bangladesh

15 20 N	088 30 E	07 15 N	088 30 E
06 00 N	092 00 E	06 00 N	097 32 E

Northwards of position of serial (v) given above and covering the areas outside limits of the designated areas of other littoral countries.

(c) **National SAR Agency: Indian Coast Guard.**

Address: Coast Guard Headquarters, National Stadium Complex, Purana Quila Road, New Delhi – 110 001, India
Tel: +91 11 23384934, 23385849, 23384165, 23073995
Telefax: + 91 11 23383196
E-mail: nmsarb@indiancoastguard.nic.in, dte-ops@indiancoastguard.nic.in

	Telephone +91	Fax + 91	Others
Western Region			
MRCC Mumbai CGRHQ(West)	22 24301455 24316558 24388065 M-SAR Call: 1554	22 24316558	**AFTN** VABBYXYC **Inmarsat "C"** 441907210 **Inmarsat "Fleet 77"** 762882349 (Voice) 764902542 762882350 (Fax) 764902543 762882351 (Data) 600938515 INDSAR Toll free 762882351(Data) **e-mail:** mrcc-west@indiancoastguard.nic.in
MRSC Porbandar	286 2242451 2244056 M-SAR Call: 1554	2862210559	**Inmarsat "C"** 441908210 **e-mail:** dhq1@indiancoastguard.nic.in
MRSC Goa	832 2950274 832 2950275 M-SAR Call: 1554	8322950277	**Inmarsat "C"** 441900445 **e-mail:** dhq11@indiancoastguard.nic.in
MRSC New Mangalore	824 2405278 M-SAR Call: 1554	8242405267	**Inmarsat "C"** 441844822 **Fleet Broad Band-500** 773213830(Voice) 783238659(Fax) **e-mail:** dhq3@indiancoastguard.nic.in
MRSC Kochi	484 2218969 M-SAR Call: 1554	4842217164 4842218460	**Inmarsat "C"** 441900446 **e-mail:** dhq4@indiancoastguard.nic.in
MRSSC Vadinar	2833 256560 M-SAR Call: 1554	2833256560	**Inmarsat "C"** 441900448 **e-mail:** cgs-vdr@indiancoastguard.nic.in
MRSSC Okha	2892 262261 262259 M-SAR Call: 1554	2892263421	**Inmarsat "C"** 441923271 **e-mail:** cgs-okh@indiancoastguard.nic.in
MRSSC Beypore	495-2417995 M-SAR Call: 1554	4952417994	**Inmarsat "C"**441913010 **e-mail**: bpe@indiancoastguard.nic.in
MRSSC Vizhinjam	471-2481855 M-SAR Call: 1554	4712486484	**Inmarsat "C"** 441900449 **e-mail**: cgsvzm@indiancoastguard.nic.in
MRSC Kavaratti	4896 263491 M-SAR Call: 1554	4896 263497	**Inmarsat "C"** 441900453 **Fleet BB** 773213243 (Voice) 783231396 (Fax) 783239968 (Data) **e-mail**: cgdhq12@indiancoastguard.nic.in

Eastern Region

MRCC Chennai CGRHQ(East)	44 25395018 M-SAR Call: 1554	4423460405	**AFTN** VOMMYXCG **Inmarsat "C"** 441922669 **Fleet BB** 764902568 (Voice) 764902569 (Fax) 600938573 (Data) 600938569 (64 Kbits ISDN data) 600938570 (56 Kbits ISDN data) 600938572 (High quality voice) **e-mail:** mrcc-east@indiancoastguard.nic.in isareast@dataone.in icgmrcc_chennai@dataone.in
MRSC Haldia	3224 267755 3224 263407 M-SAR Call: 1554	3224264541	**Inmarsat "C"** 441907110 **e-mail:** dhq8@indiancoastguard.nic.in
MRSC Paradip	6722 223359 M-SAR Call: 1554	6722 222279 220174	**Inmarsat "C"** 441907710 **Fleet BB** 773213679 (Voice) 783232805 (Fax) 783238448 (Data) **e-mail:** dhq7@indiancoastguard.nic.in
MRSC Vishakhapatnam	891 2547266 M-SAR Call: 1554	891 2567789 2741130	**Inmarsat "C"** 441907210 **e-mail:** dhq6@indiancoastguard.nic.in
MRSC Tuticorin	461 2352046 M-SAR Call: 1554	461 2353503	**Inmarsat "C"** 441900447 **e-mail:** cgs-tut@indiancoastguard.nic.in
MRSSC Mandapam	4573 241634 4573 242020 M-SAR Call: 1554	4573 241142	**Inmarsat "C"** 441907810 **Fleet BB** 773213566 (Voice) 783234581 (Fax) 783233059 (Data) **e-mail:** cgs-mdp@indiancoastguard.nic.in

Andaman & Nicobar Region

MRCC Port Blair CGRHQ(A&N)	3192 245530 246081 M-SAR Call: 1554	3192 242948	**Inmarsat "C"** 441908010 **Fleet 77:** 764902560 (Voice) **e-mail:** mrcc-ptb@indiancoastguard.nic.in
MRSC Campbell Bay	3193 264666 264235 M-SAR Call: 1554	3193 264215	**Inmarsat "C"** 441907910 **e-mail:** dhq10@indiancoastguard.nic.in

MRSC Diglipur	3192 272345 M-SAR Call: 1554	3192 272345	**Inmarsat "C"** 441908110 **e-mail:** dhq9@indiancoastguard.nic.in

(d) **Adjacent SRRs.** The SRR of neighboring countries namely Pakistan, Maldives, Sri Lanka, Seychelles, Mauritius, Indonesia, Malaysia, Myanmar and Bangladesh share the boundary with Indian SRR. These SRR are established in cooperation with the neighbouring nations which are internationally recognized and described in the pertinent documents of IMO and Indian List of Radio Signals (ILRS) Vol 5, INP 31(5). The coordinating authorities of the respective SRRs along with contact details are as mentioned below:-

(i) **Pakistan SRR**. Ports and Shipping wing of Ministry of Communication is responsible for coordinating Search and Rescue operations. MRCC Pakistan (Maritime Security Agency) is located at Karachi.

Telephone		+92 21 99214624 +92 21 99214964 – 67 + 92 21 99214865
Telefax	:	+ 92 21 99214625
Inmarsat "C"	:	446300048
Inmarsat "mini-C"	:	446300033
Email	:	mrccpmsa@cyber.net.pk hqmsa@cyber.net.pk

(ii) **Maldives SRR**. Maldives Coast Guard is the National SAR Agency, MRCC located at Male.

Telephone	:	+960 3338898 +960 3395981
Telefax	:	+960 3310054
Email	:	maldivescoastguard@defence.gov.mv mrcc@mndf.gov.mv

(iii) **Sri Lanka SRR**. SAR operations are coordinated with Sri Lankan Navy. MRCC is located at Colombo.

Telephone	:	+94 11 2445368
Telefax	:	+94 11 2441454
Email	:	mrcccolombo@gmail.com nhqdno@navy.lk nhqdno@yahoo.com

(a) **Limits of the area for which the centre is responsible.**

10°00'N, 80°00'E
10°00'N, 82°00'E
06°00'N, 92°00'E
02°00'S, 92°00'E
02°00'S, 78°00'E
06°00'N, 78°00'E

(iv) **Seychelles SRR**. Seychelles Coast Guard with assistance of Port and Marine Services Division coordinates the SAR operations. The MRCC is located at Mahe, Seychelles.

Telephone	:	+248 4290900
		+248 4224616
Telefax	:	+248 4323288
Email	:	mrcc.seycoast@email.sc
		seycoast@seychelles.net

(v) **Mauritius SRR**. SAR operations in the SRR are coordinated by National Coast Guard. MRCC is located at Port Louis.

Telephone	:	+230 2088317
		+230 2083935
		+230 2122747
Telefax	:	+230 2122757
Inmarsat "C"	:	464500096
		464500097
Email	:	opsncghq@orange.mu
		ncgops.mpf@govmu.org

(vi) **Indonesia SRR**. Baden SAR National is the SAR agency.

Telephone	:	+62 21 65867510
		+62 21 65867511
Telefax	:	+62 21 65857512
E mail	:	basarnas@basarnas.go.id

(vii) **Malaysian SRR**. The Malaysian Maritime Enforcement Agency is responsible for coordinating search and rescue operations.

Telephone	:	+60 3 89957000, 89413140
Telefax	:	+60 3 89473601, 389413129
E mail	:	mrccputrajaya@mmea.gov.my

(viii) **Myanmar SRR**. SAR operations are coordinated between the Myanmar Air force and Navy, and the Department of Civil Aviation and Marine Administration. MRCC Yangon is located at Yangon.

Telephone	:	+95 1 20417
Telefax	:	+95 1 266588
E mail	:	mrcc.yangoon@mptmail.com.mm
		mrcc.myanmar2012@gmail.com

(ix) **Bangladesh SRR**. The Department of Shipping is responsible for coordinating SAR Operations. MRCC Dhaka located at Dhaka.

Telephone	:	+880 1769702116
		+880 29836314
Telefax	:	+880 28871254
E mail	:	mrccdhk@navy.mil.bd

Aircraft Assisting Ship

75. Aircraft used on search and rescue duties may be able to assist a ship in distress by:-

(a) Locating her when her position is in doubt and informing the shore authorities so that ships in the vicinity going to her assistance may be given her precise position;

(b) Guiding surface craft to the casualty or, if the ship has been abandoned, to survivors in lifeboats, or rafts at sea;

(c) Keeping the casualty under observation;

(d) Dropping a marine marker and a smoke float by day or a flame float at night to mark the position;

(e) Dropping survival equipment.

Ships in distress may be supplied with special items of droppable equipment by SAR aircraft. This may comprise equipment containers connected in series by a buoyant rope. Alternatively the following may be dropped:-

(a) Individual life raft or pairs linked by a buoyant rope;

(b) Buoyant radio beacons and/or trans-receivers;

(c) Dye and smoke markers and flame floats;

(d) Parachute flares for illumination;

(e) Salvage pumps.

76. When a number of aircraft are engaged on a search for a casualty at sea, the procedure followed is to search an area which has been calculated to include the most probable position of the incident, allowing for any movement due to drift during the period of the search. The normal technique is for the aircraft to carry out 'creeping line ahead' searches for as long as the aircraft's endurance on task will permit. The spacing between the tracks flown by the aircraft depends on the visibility, the characteristics of the object being searched (e.g., dinghy, lifeboats, or raft etc.) and the type, if any, of electronic search aid used.

(a) Maritime aircraft may be employed to search at night for ships/aircrafts known to be in distress or overdue, or for survivors in lifeboats or life raft. Unless distressed personnel are able and know how to indicate their position to the aircraft the search may be valueless and could result in failure to locate survivors and transfer of the search to another area.

(b) The aircraft will fly through the search area at between three to five thousand feet or below cloud. The aircraft may switch on landing lights to indicate position.

(c) Points to note:-

(i) Each lifeboat or liferaft should carry at least three red flares.
(ii) If all else fail, use any means at your disposal to attract attention.

Helicopter Operations With Merchant Ships

77. Limited facilities for Rescue by Helicopters are available in the immediate vicinity of the ports of Mumbai (Bombay), Goa, Kochi (Cochin), Vishakhapatnam and Port Blair. Some general information is given below:-

Routine Use of Helicopter at Sea

78. Helicopter may operate from time to time with merchant ships at sea. These operations can be hazardous unless the following safety precautions are taken:-

(a) For helicopter winching, the ship must be steady on a course giving minimum ship roll & pitch motions. Relative wind should be maintained as follows:-

For Helicopter operating area

Aft - 30^o on Port Bow.

Midship - 30^o from Port Bow or a beam wind.

Forward - 30^o from Starboard Quarter.

If this is not possible the ship should remain stationary head to wind, or follow the instructions of the helicopter crew.

(b) An indication of relative wind direction should be given. to helicopter on R/T or Flags and pennants , illuminated at night could also indicate relative wind by the air flitter in wind. Smoke from a galley funnel may also give an indication of the wind but in all cases where any funnel is making exhaust, the wind must be at least two points off them port bow.

(c) Clear as large an area of deck (or covered hatchway) as possible and mark the area with a yellow dot 5 meters in diameter. Whip or wire aerials, davits, flag staffs or any other obstruction in and around the area should, if at all possible, be struck down.

(d) All loose articles must be securely tied down or removed from the transfer area. The downwash from the helicopter's rotor will easily lift unsecured covers, tarpaulins, hoses, rope and gash, etc., thereby presenting a severe flying hazard. Even small pieces of paper, if ingested by a helicopter engine, can cause the helicopter to crash.

(e) If a clear area cannot be provided, personnel can be lifted from a boat being towed astern of the ship by a long painter giving enough sea room to helicopter for hover.

(f) On no account must the winch wire or load be allowed to foul any part of the ship or rigging. In the event of a load or wire becoming snagged, the helicopter crew will cut the winch wire.

(g) The winch wire should be handled only by personnel wearing rubber gloves and solid rubber shoes. A helicopter can build up a charge of static electricity which if discharged through a person handling the winch wire, can kill or cause severe injury. The helicopter crew will normally discharge the static electricity before commencing the operation by dipping the winch wire in the sea or allowing the hook to touch the ship's deck. However, under some conditions sufficient static electricity can

build up during the operation to give unprotected personnel a sever shock.

(h) The helicopter will approach heading into the relative wind. For operating areas aft and midship the helicopter will approach from astern or abeam, and for operating area forward it will approach from the bow. The helicopter can lower on to or lift from the clear area (or boat towed astern). The maximum length of winch cable is normally about 80 meters but may be only 15 meters in some cases. The helicopter must keep clear of any obstructions such as masts since any contact by them with either the main or tail rotor will be disastrous for the helicopter.

(j) When being landed from a helicopter, personnel must obey the instructions given by the helicopter crew since there is a danger of inadvertently walking into the tail rotor which, due to its high speed of rotation, is difficult to see.

(k) EXTREME CAUTION must be exercised when firing line throwing rockets or any pyrotechnics when helicopter are in the vicinity.

Note: - If there are a number of survivors and there is a suitable clear area the pilot may wish to land on board. If so, he will discuss this option with the master before committing himself.

Use of Helicopters at Sea for Rescue and Medical Evacuation

79. When a distress message is received either visually or by radio from a ship in distress, steps taken by the rescue authorities ashore may include asking the nearest Rescue Co-ordination Centre to dispatch a helicopter to assist in the rescue.

80. It is essential that the ship's position should be given as accurately as possible if the original distress signal is made by radio. The bearing (magnetic or true) and distance from a fixed object, like a headland or lighthouse, should be given if possible. The type of ship and colour of hull should be included if time allows.

81. Helicopters are fitted with VHF FM and AM, UHF and HF RT; they do not normally carry MF. Communication between ship and helicopter should normally be achieved on Marine Band VHF/FM, but 2182 kHz is also available. It may be possible to do so via a lifeboat if one is in the vicinity. Alternatively a message may be passed via a Coast Radio Station on 2182 kHz, or on VHF 121.5 MHz or 243 MHz.

82. Once the helicopter has become airborne, the speed with which it locates the ship and the effectiveness of its work depends to a large extent on the co-operation of the ship herself.

83. From the air, especially if there is a lot of shipping in the area, it is very difficult for the pilot of a helicopter to pick out the particular ship he is looking for from the many in sight, unless that ship uses distinctive distress signal which can be clearly seen by him. One such signal is the orange-coloured smoke signal carried in the lifeboats. This is very distinct from the air. A well trained Aldis lamp can also be seen except in very bright sunlight when the lifeboat heliograph could be used. The display of these signals will save valuable time in the helicopter locating the casualty, and may mean all the difference between success and failure. It is not suggested, of course, that the Aldis lamp need necessarily be used to pass message in Morse.

84. If from the ship in trouble it is observed that the helicopter is going to pass by, or is on a course which will take it away, continued use should be made of visual distress signals, and at the

same time, if fitted with radio, the fact reported to the helicopter stating its present bearing and distance from the ship. Helo could be guided using clock codes to indicate position.

85. Wherever possible and if time allows, all the safety precautions mentioned in paragraph 92 should be taken. However, in a distress situation it may not be possible to meet all the requirements. Under such circumstances the operation may necessarily be slower than a routine operation but, because of their operational limitations, helicopters should not be unnecessarily delayed at the scene of rescue. Cases have arisen where the rescue has been seriously hampered by survivors trying to take personal belongings with them when being rescued by helicopter. In distress situations, transfers are limited to personnel only.

86. When co-operating with helicopters in SAR operations, ships should not attempt to provide a lee whilst helicopters are engaged in winching operations as this tends to create turbulence.

87. The helicopter pilot and crew are professionals in methods of rescue and well intentioned assistance from either the survivor himself or third parties in saving survivors invariably results in delays. The deck party should, therefore, remain stationary and allow the helicopter to move to them. The following rescue methods are employed:-

(a) The survivor, whether on deck or in the water, is rescued by means of strop. Whenever possible the crew is lowered from the helicopter together with the strop which is secured around the survivor's back and chest, and the survivor/casualty is winched up followed by the aircrew man.

(b) On certain occasions it may be necessary for the survivor to position the strop himself and proceed as follow:-

(i) Grasp the strop and put both arms and head through the loop.
(ii) Ensure the wide padded part is as high as possible across the back, with the two straps coming under the armpits and up infront of the face.
(iii) Pull the toggel down as far as possible.
(iv) When ready to be lifted, look up at the helicopter, put one arm out to full extent and give a "thumbs up" and continue to look up for visual indications from the helicopter crew.
(v) Spread arms horizontally, try and counter-act the swing should there be any.
(vi) When just below the helicopter, try and ward off to avoid being hit by the helicopter bottom.

(c) If a survivor on deck is injured to the extent that the use of a strop around his back and chest would aggravate the injury or cause suffering, a crew is lowered on to the deck with the stretcher. The survivor is placed in the stretcher, strapped in such a manner that it is impossible for him to slip or fallout, and both stretcher and crew are winched up into the helicopter. If possible the helicopter will be carrying a doctor who will be lowered to the deck and will assist the survivors as necessary. If the patient is already in a Neil - Robertson type stretcher this can either be lifted straight into the aircraft or placed in the rigid frame stretcher. It may also be possible to land the crew with a portable radio for direct communication with the helicopter.

88. When being landed from a helicopter, personnel must obey the instructions given by the helicopter crew since there is a danger of inadvertently walking into the tail rotor which, due to its high speed of rotation, is difficult to see.

AIRCRAFT CASUALTIES AT SEA

Distress Communication

89. Visual signals. An aircraft may indicate it is in distress by firing a succession of red pyrotechnic lights, by signalling SOS with signalling apparatus or by firing a parachute flare showing a red light. Navigation markers dropped by aircraft at sea, emitting smoke, or flames and smoke, should not be mistaken for distress signals. Low flying is not in itself an indication of distress.

90. An aircraft which has located another aircraft in distress may notify ships in the vicinity by passing a massage in plain language on distress frequencies. It may also give the following signals, together or separately, to attract a ships attention:-

(a) The repeated switching on and off of the aircraft's landing lights

(b) The irregular repeated switching on and off of the aircraft's navigational lights.

91. If it wishes to guide a ship to the casualty or survivors it will fly low around the ship or cross the projected course of the ship close ahead at a low altitude opening and closing the throttle or changing the propeller pitch. It will then fly off in the direction in which the ship is to be led. Pilots are instructed to rock their aircraft laterally when flying off in the direction of the casualty. The ship should acknowledge receipt of the signal and of messages on the same radio frequency. It should then either follow the aircraft or indicate by visual or radio means that it is unable to comply. The procedure for canceling these instructions is for the aircraft to cross the wake of the surface craft close astern at a low altitude, rocking the wings or opening and closing the throttle or changing the propeller pitch.

92. In order to take advantage of the greater visibility of pyrotechnics at night, searching aircraft will fly a creeping-line-ahead type of search, watching for a distress signal/pyrotechnic from the survivor(s).

93. Survivors from crashed aircraft in rubber liferafts may give the following visual distress signals:-

(a) Fire pyrotechnic signals emitting one or more red stars, or orange/red smoke.

(b) Flash a heliograph.

(c) Flash SOS or other distinctive signal by hand torch or other signaling lamp. Some life raft may show a steady or a flashing light.

(d) Blow whistles.

(e) Use of fluorescent dye marker giving an extensive bright green colour to the sea around the survivors.

(f) Fly a yellow kite from the life raft to support the aerial for the emergency radio transmitter.

94. **Radio Signals.** If an aircraft transmits a distress message by radio, the first transmission is made on the designated Air/Ground Route frequency in use at the time between the aircraft and the appropriate ground station, normally an Air Traffic Control Centre (A.T.C.C.). The aircraft might be asked by the A.T.C.C. to change to another frequency, possibly on another H.F. Route frequency or on the International aeronautical emergency frequency of 121.5 MHz or 243.0 MHz. If the aircraft is unable to contact the ground station on the route frequency, any other available frequency may be used in an effort to establish contact with any land, mobile or direction finder station.

95. There is close liaison among shore stations, including Air Traffic Control Centres, Rescue Co-ordination Centres, and the Indian Coast Guard. Merchant ships will ordinarily be informed of aircraft casualties at sea by broadcast messages made on the International distress frequencies of 6215 kHz, 2182kHz and VHF Ch 16 and on corresponding DSC frequency. Ships may, however, become aware of the casualty by:-

(a) Picking up an SOS message from an aircraft in distress which is able to transmit on 4125 kHz or by intercepting a distress signal from an aircraft using radiotelephony on 2182 Khz or VHF Ch 16.
(The form of such messages is given in Appendix A);

(b) Hearing and able to DF on the radio transmission on 121.5 MHz and 243.0 MHz from the hand-operated emergency transmitter carried by survival life rafts. (The form of such signal is given in Appendix A), or

(c) Picking up a message from a search and rescue aircraft.

96. If time permits the aircraft shall also transmit the distress call and message on the following frequencies:

(a) If over open sea on 3023 or 5680 kHz.

(b) If over land on the European Continent or within range of a communication station elsewhere, VHF/RT frequency of 121.5 MHz. This is also the frequency of SARBE & TALBE equipment. The distress message from the aircraft will contain as much of the following information as time permits:-

(i) Estimated position and time of the distress;
(ii) Heading in degrees (Magnetic and True);
(iii) Indicated air speed;
(iv) Flight level/altitude;
(v) Nature of distress and type of assistance required;
(vi) Type of aircraft;
(vii) Intention of pilot;
(viii) Endurance remaining;
(ix) Any other information (e.g. ditching, etc.)

Immediately before ditching of an aircraft as well as before total abandonment of an aircraft, the radio apparatus would be continuously on, if considered necessary and circumstances

permit. A ship on receipt of a distress message shall transmit a report in the form given in Appendix 'C'.

Action to be Taken When an Aircraft is Forced to "Ditch" (Alight On The Sea)

97. The captain of a distressed aircraft will be materially assisted in locating a ship if the latter:-

(a) Transmits homing bearing to the aircraft, or (if so requested) transmits signals enabling the aircraft to take its own bearing ;
(b) By day makes black smoke;
(c) By night directs a searchlight vertically.

98. Ditching an aircraft is difficult and usually dangerous. A ship which knows that an aircraft intends to ditch should, if practicable, try to provide a lee of calm water. This may be achieved by any means at the master's discretion, such as steering on a circular course through 360 degrees, with the addition, if possible, of an oil "slick".

99. The Captain of an aircraft normally sits on port side of the cockpit, and thus has better visibility on that side. An aircraft will therefore usually ditch on the starboard side of a ship and heading into wind, although, when seas are running high, it may be expected to attempt to land along the trough of the seas. In the absence of a pre-arranged plan, the ship should steam into wind and assume that the aircraft will ditch on her starboard side. Helicopter captains its on the starboard side of the aircraft and would, therefore normally ditch on the port side of the ship heading into wind.

100. If it is dark, the ship should illuminate the sea as much as possible by searchlight on the side upon which the aircraft is expected to ditch. Care should be taken not to dazzle the pilot who might otherwise lose control of his aircraft at a critical moment. It will help the pilot considerably if flame floats or preferably, in view of the danger of petrol coming into contact with them, battery operated floats are laid line astern to indicate the direction of the suggested alighting area. Six floats should be laid at 200 yards (182.9m) intervals.

101. The ship's Master should, if possible, tell the captain of an aircraft which is going to ditch the general weather conditions, including wind speed and direction, visibility, state of sea and swell, approximate cloud base and barometric pressure.

102. A land plane may break up immediately on striking the water, and life rafts may be damaged. The ship should therefore have a lifeboat ready for launching and, if possible, boarding nets should be lowered from the ship and heaving lines made ready in the ship and the lifeboat. Survivors of the aircraft may have orange lifejackets, water torch and whistles.

103. The method of picking up survivors from life raft must be left to the judgment of the captain of the ship carrying out the rescue operation.

104. The drift rate of a life raft would normally be expected to exceed that of a ship, so that with the ship to windward, the life raft might drift away from the ship unless some suitable means were available to catch the life raft and hold it alongside. This might involve the ship having to repeat the whole procedure of coming alongside again. However, if the ship were stopped long enough for her full drift rate to develop, this rate should exceed that of the life raft which would decrease as the lee afforded by the ship increased. On the other hand, ships of low freeboard would not afford much protection in any sea way, and the drift rate of the life raft

might not be arrested, and heavy seas washing over the lee side would make it difficult to take survivors on board. Another point to be considered is the lack of maneuverability once a ship is stopped.

105. With the ship to leeward, there should be no difficulty in keeping the life raft alongside, but with heavy seas running, there is the risk of life raft being dashed against the ship's side, and greater difficulty in taking survivors onboard.

106. It should be borne in mind that Military aircraft are often fitted with ejection seat mechanism, the position of which is indicated by a red solid triangle. The mechanism is activated by black and yellow striped handles. All handles or knobs, switches, etc., coloured red and with black and yellow stripes should not be touched, as the consequences of so during assistance may cause injury or even fatal injury to both the rescuer and the rescued.

Action taken to render assistance.

107. All information concerning aircraft in distress at sea or overdue in water surrounding India is passed to the Sector Search and Rescue Co-ordination Centre in whose area of responsibility the casualty has occurred or is likely to occur. Aircraft will then be sent, if necessary and practicable, to search for and fix as accurately as possible the position of the casualty. Although these aircraft will carry droppable survival equipment the survivors may normally be rescued by naval and merchant ships.

108. When an aircraft ditches into water, the first duty of any rescue craft is to save all persons aboard the aircraft, which may sink quickly. Ships making for an aircraft in distress should steam at full speed. The occupants may, however, be unconscious and either trapped within the aircraft or entangle in the wreckage. Passengers and crew are secured to their seats by webbing harness which passes over their shoulders, or by leather belts around their waists; these have quick release buckles, but it is simpler to cut them with a knife. If the ditched aircraft is on fire, the water surrounding it will probably be covered with burning petrol. Anyone thrown clear and floating in the fringes of the fire may be rescued by a grapnel with chain. The wreckage may be of great utility in determining the cause of an accident. Any attempt of salvage should be done with great care and keeping in view the hazards involved.

109. Every endeavour will be made to give merchant ships an accurate position of the casualty. When giving such a fix the ship should at once consult any other ship in the neighbourhood on the best procedure to be adopted, as is the practice in the case of casualties to ship; the ship going to rescue should answer the station sending the broadcast and give her identity, position and intended action.

110. If a merchant ship picks up an SOS message direct from the aircraft in distress, she should act as indicated in the preceding para and also relay the message to the nearest Coast Radio Station. Moreover, a merchant ship which has received an SOS message direct from the aircraft in distress and is going out to the rescue should take a bearing on the transmission and inform the Coast Radio Station or other vessel in the vicinity of the call-signal of the distressed aircraft the time at which the distress message was received, followed by the bearing and time at which the signal ceased.

Action to be taken when survivors are picked up.

111. A survivor from an aircraft casualty at sea who is picked up by a ship may be able to provide information which will assist in the rescue of other survivors. Master are therefore asked to put the following questions to rescued survivors of an aircraft casualty and to communicate the answers to a Coast Radio Station. They should also give the position of the rescuing vessel and the time when the survivors was picked up.

(a) Did you bale out or was the aircraft ditched? What was the time and date?
(b) If you have bailed out, at what altitude?
(c) How many others did you see leave the aircraft by parachute?
(d) How many ditched with aircraft?
(e) How many did you see leave the aircraft after ditching?
(f) How many survivors did you see in the water?
(g) What floatation gear had they?
(h) What was the total number of persons aboard the aircraft prior to the accident?
(i) What caused the emergency?

Masters are reminded that survivors may, especially in colder climates, be suffering from .lm 1.0" hypothermia and that qualified medical advice should be provided at the earliest opportunity.

112. **SEARCH AND RESCUE SIGNALS (Extract from I.C.A.O. Annex. 12 Chapter VI)**

(a) **Signals with surface craft.** When it is necessary for an aircraft to direct a surface craft to the place where an aircraft or surface craft is in distress the aircraft shall do so by transmitting precise instructions by any means at its disposal. If such precise instructions cannot be transmitted or when necessary for any other reason the instructions shall be given by using the procedure prescribed in sub -paragraph (b) below.

NOTE: - Current maritime signalling procedures include:

For Acknowledging Receipt of Signals

(i) The hoisting of a "Code pennant" (vertical red and white stripes) close up (meaning understood);
(ii) The flashing of a succession of "Ts" by signal lamp in Morse Code;
(iii) The changing of heading.

For Indicating Inability to Comply

(iv) The hoisting of the international Code flag "N" (a blue and white chequered square);
(v) The flashing of a succession of "Ns" in Morse code.

(b) The following procedures performed in sequence by an aircraft shall mean that the aircraft is directing a surface craft towards an aircraft or a surface craft in distress:-

(i) Circling the surface craft at least once;
(ii) Crossing the projected course of the surface craft ahead at a low altitude opening and closing the throttle or changing the pitch;

(iii) Heading in the direction in which the surface craft is to be directed.

Repetition of such procedure shall have the same meaning.

(c) The following procedure performed by an aircraft shall mean that assistance of the surface craft to which the signal is directed is no longer required:-

(i) Crossing the wake of the surface craft close astern at low altitude, opening and closing the throttle or changing the propeller pitch.

113. **ANTI PIRACY/ ARMED ROBBERY/ PETTY THEFT/ UNAUTHORIZED BOARDING - MEASURES BY PORTS AND SHIPS**

The Directorate has noted with serious concern that in the recent past, incidents of armed robbery and unauthorized boarding have been occurring on board ships, harbour craft, barges, tugs and other craft anchored within port limits of some Indian ports or while in transit in the water under Indian jurisdiction.

Analysis of the incidents in the recent past has revealed the following:

1. In most cases, Masters fail to immediately inform the port authority, nearest Maritime Rescue Coordination Centre/ Indian Coast Guard, local agents or the local law authority.

2. Majority of the cases are of robbery/ petty theft, but Masters report these cases as piracy directly to the International Maritime Bureau piracy reporting center, Kuala Lumpur.

3. Even in cases where such incidents have been reported to the coastal authorities, the reports were delayed giving ample time and opportunity to the miscreants to flee.

The following definition of piracy is contained in article 101 of the 1982 United Nations Convention on the Law of the Sea (UNCLOS):
"Piracy consists of any of the following acts:

(a) Any illegal acts of violence or detention, or any act of depredation (Plunder / Pillage or take goods forcibly), committed for private ends by the crew or the passengers of a private ship or a private aircraft, and directed:
(i) On the high seas, against another ship or aircraft, or against persons or property on board such ship or aircraft;
(ii) Against a ship, aircraft, persons or property in a place outside the jurisdiction of any State;

(b) Any act of voluntary participation in the operation of a ship or of an aircraft with knowledge of facts making it a pirate ship or aircraft;

(c) Any act inciting or of intentionally facilitating an act described in sub-paragraph (a) or (b)."

Armed robbery is robbery committed with the use of arms that could include weapons like sticks, knives, choppers and fire arms.
Petty theft may be classified as robbery where loose items of a ship i.e. paint, rope, wire, tools, brass and other metallic items which are stolen for monetary gain. While all types of thefts including petty theft are discouraged, it would be a distortion of facts if they are reported as piracy or armed robbery, bringing Indian ports to disrepute.

All ships including harbour craft and offshore supply vessels are hereby advised to:

1. Immediately report all incidents/ attempts of piracy and armed/-unarmed robbery to the nearest Marine Rescue Coordination (MRCC), local agents and Port Authority with a copy to DG Commcentre immediately when such incidents occur on the Indian coast with a description of the craft involved in the incident and any other relevant information. The report should be made immediately upon occurrence of an incident, which would assist the authorities to take timely action. The report may be made in the prescribed format attached as Annex-1 to this Circular. The contact details of the MRCC are attached as Annex-2 to this Circular.

The contact details of the DG Commcentre are as follows:
Tel Nos: 00 91 22 2261 0606; 2261 4646; 32959320 Fax: 00 91 22 2261 3636
E-mail: dgcommcentre@satyammail.net; dgcommcentre@vsnl.net

2. Give a correct description and refrain from using the word "PIRACY" in cases of petty theft/ robbery when reporting to International Maritime Bureau (IMB) piracy reporting Centre or other authorities.

Port Authorities are advised to:

1. Issue a VHF warning to all approaching ships and ships within their respective port limits to keep effective anti-piracy watch at all times. These warnings shall be issued at least once in every 4 hours and a record kept of the same.

2. Obtain a written statement from Masters of all outbound ships stating that there has been no case of piracy/ armed robbery or theft during the vessel's stay in port.

3. If there has been any such incident, obtain the Master's report with details of the incident, to whom it was reported and other relevant information shall be obtained and conveyed to the DG Commcentre without delay.

4. All ship agents may be directed to issue an advisory to all inbound ships to follow the procedures laid down in this circular. Upon receipt of a report from a ship, the agents are advised to immediately file a first information report with the nearest police station.

Appendix 'A'
(Refers to Para 94)

FORM OF DISTRESS CALLS AND MESSAGE FROM AIRCRAFT

1. The exact form of distress call or message from an aircraft in flight will depend on the time available to send it between the onset of the emergency and the landing of the aircraft in the sea. This may be matter of seconds.

2. When time permits, the form of distress call and distress message sent by civil aircraft will be as follows:-

(a) *Distress Call*

By radiotelephony.
the distress signal MAYDAY spoken three times.
-- the word THIS IS
-- the identification of the aircraft in distress spoken three times.
-- the radio frequency used in the transmission of the distress call.

(b) *Distress Message*

(i) The distress call (sent once);
(ii) The call sign or identification of the aircraft in distress, and as much as possible of the following information;
(iii) Nature of distress and kind of assistance required;
(iv) position, time of position and height, heading (magnetic and true) and indicated air speed (in knots).
(v) Any other information which might facilitate the rescue (including the intention of the person in command, e.g., ditching).

Note: - "Heading" gives the direction of the aircraft in the air, the speed and direction of the aircraft in the air, the speed and direction of the wind have to be allowed for to ascertain the actual direction over the sea.

"Indicated air speed" does not give the speed of the aircraft over the water as it does not allow, amongst other things, for the effect of the wind or the correction that has to be made for height.

3. If the circumstances make it necessary, the distress message may be sent without transmitting a prior distress call.

4. The distress message will be followed immediately: By transmission of unmodulated carrier wave for two periods of about ten seconds each, the call sign of the aircraft once and the word "OVER".

5. If the aircraft is to be ditched, the radio transmitter may be set for continuous transmission immediately prior to ditching, if circumstances permit.

Examples of Distress call and Message sent by radiotelegraphy:-

Distress Call "**SOS SOS SOS DE GABCD GABCD GABCD**"

Distress Message "**SOS GABCD ENGINE FAILURE QTH 1820 NORTH 6830 EAST QAH 8000 FT QTL 090 QTJ 250 QUG"**

The signals QTH, QTL, QTJ and QUG (denoting position, true heading, indicated airspeed and that the aircraft is to be ditched respectively) are taken from the General Section of the **Q** Code.

The signal QAH is taken from the Aeronautical Section of the Q Code and signifies the aircraft's altitude.

6. Civil aircraft using radiotelephony will use one of the following four types of call sign;

(a) A five character call sign, e.g. GABCD, 4XABC.

(b) A code word denoting the aircraft operating company followed by the flight number of the service on which the aircraft is operating , e.g., CLIPPER256 (CLIPPER is the code word denoting Pan Airways).

(c) A code word denoting the aircraft operating company followed by a five character call sign, e.g., BEALINE GABCED (BEALINE is the code word denoting British Airways [European Division].

(d) A combination of characters corresponding to the official registration mark of the aircraft, e.g., N3578.

The types of call signs in (b) and (c) are those most generally used.

After communication has been established when using the type of call sign in (c) an abridged call sign consisting of the airline code word and the last two characters of the five-letter call sign may be used, e.g., BEALINE CD.

7. The following pronunciation is used when transmitting numerals:

Numeral/ numeral element	*Pronunciation*	*Numeral/ numeral element*	*Pronunciation*
0	ZE-RO	7	SEv-en
1	WUN	8	AIT
2	TOO	9	NINE-er
3	TREE		
4	FOW-er		
5	FIFE	Decimal	DAY-SE-MAL
6	SIX	Thousand	Thousand

(The syllable shown in capital letters is stressed)

8. In radiotelephony all numbers are transmitted by pronouncing each digit separately, except that the whole thousands are transmitted by pronouncing each digit in the number of thousands followed by the word "THOUSAND":-

e.g., 969 is spoken as "Nine six nine"
1,986 is spoken as "One nine eight nine"
16,000 is spoken as "One six thousand"

9. The phonetic alphabet which is used with the English pronunciation is as follows:-

Letter	Word	Pronunciation in English	Letter	Word	Pronunciation in English
A	Alfa	**AL** FAH	N	November	NO **VEM** BER
B	Bravo	**BRAH** VOH	O	Oscar	**OSS** CAH
C	Charlie	**CHAR** LEE	P	Papa	PAH **PAH**
D	Delta	**DELL** TAH	Q	Quebec	KEH **BECK**
E	Echo	**ECK** OH	R	Romeo	**ROW** MEOH
F	Foxtrot	**FOK** STROT	S	Sierra	SEE **AIR** RAH
G	Golf	GOLF	T	Tango	**TANG** GO
H	Hotel	HOH**TELL**	U	Uniform	**YOU**NE FORM
I	India	**IN** DEE AH	V	Victor	**VIK** TAH
J	Juliet	**JEW** LEE **ETT**	W	Whiskey	**WISS** KEY
K	Kilo	**KEY** LOH	X	X-ray	**ECKS** RAY
L	Lima	**LEE** MAH	Y	Yankee	**YANG** KEY
M	Mike	MIKE	Z	Zulu	**ZOO** LOO

(The syllable to be emphasised are in bold letters)

10. The following is an example of a Distress Call and Distress Message transmitted by radiotelephony:-

Distress Call "MAYDAY MAYDAY MAYDAY THIS IS BEALINE GABCD BEALINE GABCD BEALINE GABCED"

Distress Message "MAYDAY BEALINE GABCD ENGINE FAILURE MY POSITION ONE EIGHT TWO ZERO NORTH SIX EIGHT THREE ZERO EAST AT EIGHT THOUSAND FEET TRUE HEADING ZERO NINE ZERO TWO FIVE ZERO KNOTS WILL HAVE TO DITCH"

FORM OF URGENCY MESSAGE FROM AIRCRAFT

Urgency message are originated when an aircraft is in danger and is in very urgent need of assistance which may possibly overcome the danger, e.g., aircraft lost, fuel shortage, partial failure and so on.

Urgency call is as follows:-

(i) (R/T VOICE)
"**PAN PAN PAN PAN PAN PAN** aircraft callsign (Once)"

Appendix 'B'
(Refers to Para 93)

DITCHING REPORT FOR AIRCRAFT IN DISTRESS

The procedure given below was adopted by the International Civil Aviation Organisation, on 1 December, 1957. It is to be followed by vessels making report of surface conditions to an aircraft that contemplates ditching at sea.

Ditching Reports: - Ditching report should be transmitted to aircraft in plain language or in Q Code and should comprise the following elements in the order indicated:-

(a) Unless previously established, the position of the ship in degrees and minutes of latitude and longitude, at the time the observation was taken;
(b) Sea-level pressure (specified as "approximate" when the report is not made by an ocean vessel or a selected ship);
(c) Surface wind direction in degree true;
(d) Surface wind speed in knots;
(e) Swell - intensity (see Note 1) and direction;
(f) State of sea (see Note 2.)
(g) Visibility;
(h) Amount and height above the sea of base of low cloud (both main layer and any scattered cloud below);
(j) Present weather;
(k) Remarks.

Note: - 1. When there is no swell, the term "none" is used; when swell is such that the length and height of the swell waves cannot be determined, the "confused" is used. The intensity of the swell, except when "none" or "confused" applies, is indicated by two terms, the first indicating the length of the swell and the second the height of the swell.

One of the following terms is used to indicate the length:

Short	0-100 Meters
Average	100-200 "
Long	Over 200 "

One of the following terms is used to indicate the height:

Low	0-2 Meters
Moderate	2-4 "
Heavy	Over 4 "

Note:- 2. The state of sea is specified by one of the following terms, selected according to the average wave height as obtained from the larger well-formed waves of the wave system being observed:

	Metres
Glassy	0
Rippled	0-0.1
Smooth	0.1-0.5

Slight	0.5-1.25
Moderate	1.25-2.5
Rough	2.5-4
Very Rough	4-6
High	6-9
Very high	9-14
Phenomenal	Over 14

Appendix 'C'
(Refers to Para 70)

POINT OF CONTACT OF NATIONAL SAR BOARD MEMBERS

	Address	Tele/Fax
DG Shipping	The Director General Directorate General of Shipping Jahaz Bhavan Walchand Hirachand Marg Mumbai: 400001	Tele : 022 22613651 : 022 22613652 Fax : 022 22613655 E-mail : dgship@dgshippping.com dgship-dgs@nic.in
Indian Navy	The Principal Director Naval Operations, Naval Headquarters Room No.186, South Block New Delhi:110011	Tele : 011 23014526, 23011252 Fax : 011 23793007 E-mail : indo2003@yahoo.com dno-navy@nic.in
Indian Air Force	The Director Operations (Navigation) Room No. 547 Directorate of Ops(T & H) Air Headquarters Vayu Bhavan, Rafi Marg New Delhi:110 001	Tele : 011 23063708 Fax : 011 23016354 E-mail : navd@nic.in
Chief Hydrographer	The Chief Hydrographer (for Joint Chief Hydrographer) National Hydrographic Office Post Box No. 75, 107-A Rajpur Road Dehradun: 248001, India	Tele : 0135 2747365 Fax : 0135 2748373 E-mail : inho-navy@gov.in
Airports Authority of India	The Executive Director(ATM) AAI Headquarters Rajive Gandhi Bhavan Safdarjung Airport New Delhi	Tele : 011 24631684 Fax : 011 22461078, 24610776 E-mail : gmais@aai.aero
Dept of Telecommunication	The Director (SU:l) Department of Telecommunication Room No.1106, Sanchar Bhavan 10, Asoka Road New Delhi:110 001	Tele : 011 23036019 Fax : 011 23710143 E-mail : dosuiv@gmail.com pawan.gupta.dot@gov.in
Department of Space	The Deputy Director ISRO Headquarters Antariksh Bhavan New BEL Road Bangalore : 560094	Tele : 080 28094581, 23415301, 22172314 Fax : 080 23412141 E-mail : director@istrac.org inmcc@istrac.org
Central Board of Customs & Excise	The Commissioner of Customs (Prev) Rummaging Section Clock Tower Building 2nd Floor Masjid (E), P&V Docks Mumbai-400 009	Tele : 022 22757628 Fax : 022 22612474, 23482424 E-mail : commrprev-cusmum@nic.in rsr.admn@gmail.com

Meteorological Department	The Deputy Director General Directorate General of Meteorology, Mausam Bhavan Lodhi Road, New Delhi-110003	Tele : 011 24611068 Fax : 011 23328549, 24699216 E-mail : dgmmet@gmail.com
Major Ports	The Deputy Secretary (Port Operations) Ministry of Shipping Room No. 527, Transport Bhavan 1, Sansad Marg New Delhi-110001	Tele : 011 23711323, 23714714 Fax : 011 23328549, 23739621 Email : arvind.chaudhary@nic.in
Shipping Industry	The Director Technical & Offshore Services Shipping Corporation of India Ltd Shipping House 245 Madame Gama Road Mumbai-400 021	Tele : 022 22853556, 22853559 Fax : 022 22854790 E-mail: dirtos.sect@sci.co.in
Andaman & Nicobar Islands (Union Territory)	Chief Port Administrator Port Management Board Port Blair, Andaman and Nicobar Islands	Tele : 03192 232773 Fax : 03192 233675 Email : cpapmb@and.nic.in cpapmb2015@gmail.com
Andhra Pradesh (Coastal State)	Director of Ports Port Administrative Building Beach Road, Post Box No. 11, Kakinada -533001	Fax : 0884 – 2367055 Tel : 0884-2375703/2363825 Email: portofficerkkd@gmail.com
Daman and Diu (Union Territory)	The Administrator Office of the Administrator's Office Fort Area, First Floor Secretariat, Moti Daman Daman	Tele : 0260 2230700, 2220140 Email: sp-dmn-dd@nic.in
Goa (Coastal State)	The Dy Superintendent of Police Office of Sub Divisional Police Officer Mapusa, Bardez Goa – 403567	Tele : 0832 2222995 Fax : 0832 2346925 Email : digpgoa.gpol@nic.in dyspcoastal@goapolice.gov.in
Gujarat (Coastal State)	The Vice Chairman and Chief Executive Officer Gujarat Maritime Board, Sector-10A Opp Air Force Station, Gandhinagar – 382010, Gujarat	Tel : 079-23238363 Fax : 079-23234703 Email: gmbho.nb@gmail.com vc-gmb@gujarat.gov.in
Karnataka (Coastal State)	The Director Ports and Inland Waterways Baithkol, Karwar Karnataka-581302	Tel : 08382-221494 Fax : 08382-228918 Email : directoratep@gmail.com
Kerala (Coastal State)	The Additional Secretary (for Secretary to Government) Fisheries and Ports (E) Department Thiruvananthapuram Kerala	Fax: 0471- 2504483/6415/ 2500438 Tel : 0471- 2507533/ 2500438 Email: c1_sec_dop@yahoo.in director.port@kerala.gov.in

Lakshadweep (Coastal State)	The Superintendent of Police Kavarati Lakshadweep and Minicoy Islands	Tele : 04896 262255, 262258 Fax : 04896 262184 Email : lk-admin@nic.in lak-sop@nic.in
Maharashtra (Coastal State)	Chief Executive Officer, Maharashtra Maritime Board, Home Department, (Ports & Transport) Indian Mercantile Chambers, 3rd Floor, 14 Ramjibhai Kamani Marg, Ballard State Mumbai – 400001	Tel: 022 -22658375 Fax: 022 -22614331 Email: mahammb.maharashtra.gov.in
Odisha (Coastal State)	The secretary Transport Department Government of Orissa 6th Floor, Rajaswa Bhawan Bhubaneswar – 751001	Tele : 0674 2536857 Fax : 0674 2536750 E-mail : ctsec.or@nic.in
Puducherry (Coastal State)	The Secretary Department of Ports Secretary to Government Government of Puducherry Puducherry-605 001	Tel : 0413-2333809/2233302 Fax : 0413-2233287 Email : dc.pon@nic.in
Tamil Nadu (Coastal State)	The Vice Chairman and Chief Executive Officer Tamilnadu Maritime Board 171, South Kesavaperumalpuram Raja Annamalaipuram, Chennai – 600 028	Fax : 044- 24951632 Tel : 044- 24641232/24934481 Email : tnmbho@gmail.com tnmb@tn.gov.in tnmb@md5.vsnl.net.in
West Bengal (Coastal State)	HQRS of Additional Director General & Inspector General of Police (Coastal Security), Araksha Bhavan, Salt Lake City, Sector-2, Kolkata, West Bengal-700 091	Tele : 033 2214 5455 Fax : 033 2214 4700 E-mail : dgpcswb@gmail.com
Fishing Community	The Chairperson National Fish Workers Forum (NFF) AT & Post –Satpati The F.S.S.S Ltd Talluka & Dist – Palghar Maharastra-401 405	Tel : 02525-224028/224029 Fax : 02525-224142 Email : rpatilnarendra@gmail.com
Sailing Vessel Operators	The President Federation of All Indian Sailing Vessel Industry Association C/O Hotel President Teen Batti, Near Town Hall Jam Nagar-361001 Gujarat	Tele : 0288 2557491 Tele : 0288 2558491 Email : indsailfed@gmail.com indiansailingvessels@gmail.com
DGCA	The Deputy Director General C/O Directorate of Civil	Tel : 011-24653509/ 24654910 Fax : 011-24652760

	Aviation Technical Centre, Opp Safdarjung Airport, New Delhi-110 003	Email : jamwal.dgca@nic.in
Department of Immigration	The Director Bureau of Immigration C/O Ministry of Home Affairs New Delhi-110003	Tele : 011-26105690 Fax : 011-23383888, 23385081 Email : boihq@nic.in jdboi-mha@nic.in
Ministry of Shipping	The Secretary Shipping, Ministry of Shipping Transport Bhavan No 1, Sansad Marg New Delhi 110001	Tele : 011-23722253 Email : secyship@nic.in
INCOIS	The Director, INCOIS Ocean Valley Pragathi Nagar (BO) Nizampet(SO) Hyderabad - 500090	Tel : 040-23895000 E-Mail : director@incois.gov.in
Ministry of Fisheries, Animal Husbandry, & Dairying	The Secretary Ministry of Fisheries, Animal Husbandry, & Dairying Krishi Bhawan New Delhi – 110 001	Tele : 011-23097014 E-Mail : jsfy@nic.in

Appendix 'D'
(Refers to Para 70)

CONTACT DETAILS OF RESOURCES AGENCIES

S. No	Agency		Telephone	Fax
1	**Indian Coast Guard**			
	(a) **NMSARCA, CGHQ, New Delhi**		011 23384934 011 23383999	011 23383196
	(b) **Western Region**			
	(i)	MRCC Mumbai	022 24316558	022 24316558 022 24333727
	(ii)	MRSC Vadinar	02833 256579	02833 256560
	(iii)	MRSC Okha	02892 262257 02892 263421	02892 263421
	(iv)	MRSC Porbandar	0286 2242451	0286 2210559
	(v)	MRSC Goa	0832 2950274 0832 2950275	0832 2950277
	(vi)	MRSC New Mangalore	0824 2405262	0824 2405267
	(vii)	MRSC Kochi	0484 2217164	0484 2218969
	(c) **Eastern Region**			
	(i)	MRCC Chennai	044 23460405	044 25395018 044 23460405
	(ii)	MRSC Haldia	03224 267755 03224 263407	03224 264541
	(iii)	MRSC Paradip	06722 223380	06722 222712
	(iv)	MRSC Vishakhapatnam	0891 2568879	0891 2568875
	(v)	MRSSC Mandapam	04573 241518 04573 241718	04573 241519
	(vi)	MRSC Tuticorin	0461-2352567	0461 242948
	(d) **Andaman and Nicobar Region**			
	(i) MRCC Port Blair		03192 245530 03192 246081	03192 235612 03192 242948
	(ii) MRSC Diglipur		03192 272345 03192 272423	03192 272345
	(iii) MRSC Campbell Bay		03193 264215 03193 264215	03193 264205
2	**Indian Navy**			
	(a) IHQ, MoD (Navy)		011 23011526 011 23011253	011 23793007
	(b) War Room		011 23017616	011 23011204
	(c) MOC Mumbai		022 22703743 022 22630550	022 22661702
	(d) MOC Kochi		0484 2662466 0484 2662793 0484 2662781	0484 2668717 0484 2668257 0484 2666140
	(e) MOC Chennai		044 25394240 044 25361999	044 25391286
	(f) MOC Vishakhapatnam		0891 2577147 0891 2577240	0891 2577147
	(g) MOC Port Blair		03192 232785	

3	**Indian Air Force**		
	(a) Air Headquarters	011 23376500	
	(b) IAF Mumbai	022 22054451	022 22059403
	(c) IAF Chennai	044 22375556	
4	**DG Shipping**	022 22613651 022 22613654 022 22616140	
5	**Chief Hydrographer of India**	0135 2747368	0135 2744873
6.	**Airport Authority of India**		
	(a) AAI Delhi		
	(b) AAI Mumbai		
	(c) AAI Chennai	044-22561539	044 - 22561535
	(d) AAI Kolkatta		
7.	**Indian Mission Control Center (Bangalore)**	080 28094546 080 28371857	080 28371857
8.	**Department of Telecommunication (DOT)**	011 23310217	011 23710143
9.	**Major Ports**		
	(a) Kandla Port Trust	02836 270514 02836 270461	02836-233585 02836-270624
	(b) Mumbai Port Trust	022 22612404	
	(c) Jawaharlal Nehru Port Trust	022 27244170	
	(d) Marmugao Port Trust	0832-2521155	
	(e) New Mangalore Port Trust	0824 2400430 0824 240734-7355	0824-2408390 0824-2408300
	(f) Cochin Port Trust	0484 2666610 0484 2666417	0484-2666417 0484-2668163
	(g) Tuticorin Port Trust	0461 2352290 0461-2352658	0461-2352301
	(h) Chennai Port Trust	044 25362201-2220 044 2536015-0160	044-25384012 044 25361228
	(j) Ennore Port Limited	044 25251666-1671 044-25251665	044-27950002
	(k) Visakhapatnam Port Trust	0891 2876001 0891-2565023	0891-2565042
	(l) Paradip Port Trust	06722 222046 06722 222127 06722-223498	06722-222025 06722-222256
	(m) Kolkatta Port Trust	033 22303451	033 22304901
10.	**Shipping Corporation of India**	022 22853556	022 22854790
11.	**Caostal States (Chief Secretaries)**		
	(a) Gujarat	079 23220372 079 23250301 079 23250303	079 23250305
	(b) Maharastra	022 22025042 022 22028762	022 22028594
	(c) Goa	0832 2419402	0832 2415201
	(d) Karnataka	080 22252442 080 22092476	08022258913
	(e) Kerala	0471 2333147 0471 2327376	0471 2327176

	(f)	Tamil Nadu	044 25671555	044 25672304
	(g)	Puducherry	0413 2334145 0413 2335512	0413 2337575
	(h)	Andhra Pradesh	040 23453620 040 23455340	040 23453700
	(j)	Orissa	0674 2534300 0674 2536700	0674 2536660
	(k)	West Bengal	033 22145858	033 22144328
	(l)	Andaman and Nicobar Islands	03192 233110 03192 234087	03192 232656
	(m)	Lakshadweep Islands	04896 262255	04896 262184
12.	**National Fish workers Forum**		0824 2457810	
13.	**Sailing Vessel Operators**		0288 25574912 022 40232489 (0) 9879578636	0288 2258491
14.	**IMD**		011 24611068 011 24699216	011 24643128
	(a)	Regional Met Centre Mumbai	022 22150431 022 22150517 022 22150405	022 22160824
	(b)	Regional Met Centre Chennai	044 28276752 044 28271581	044 28276752
	(c)	Regional Met Centre Pune	020 25530992	
	(d)	Regional Met Centre Kolkata	033 24793782 033 24793167 033 24790596	
15.	**MMD**			
	(a)	Mumbai	022 22039881	022 22013307
	(b)	Chennai	044 25251107 044 25251108	044 25232929
	(c)	Kolkata	033 22230236-0238 033 22230229	033 22230853
	(d)	Kochi	0484 2666104	0484 2667424
	(e)	Haldia	03224 252313 03224 252968	
	(f)	Goa	0832 2520617 0832 2520739	
	(g)	Tuticorin	0461 2352872 0461 2352852	
	(h)	Paradip	06722 222025 06722 222012	
	(j)	Jamnagar	0288 2752873	0288 2753693
	(k)	Visakhapatnam	0891 250148	0891 2568342
	(l)	Port Blair	03192 232530	03192 234830
16.	**Customs**			
	(a)	Commissioner of Customs - Mumbai	022 22620631	022 22612474
	(b)	Commissioner of Customs - Chennai	044 25221918-1936 044 25246800	
	(c)	Commissioner of Customs - Kolkatta	033 22304197 033 22304337 033 22304048#358	033 22105102

17.	**ONGC**			
	(a)	Head Office- Dehradun	0135 2759561-9567 0135275216-2165	
	(b)	Regional Office - Vadodara	0265 2641266 0265 2641366	0265 2641566 0265 2641316
	(c)	Regional Office - Mumbai	022 26562000 022 26563000	
	(d)	Regional Office-Chennai	044 28535110 044 26520150	
	(e)	Regional Office-Kolkata	033 22887544 033 22887476	033 22881936 03 22885632
18.	**Pawan Hans**		011 24602596 011 24647998	011 24602596
19.	**Dredging Corporation of India**		0891 2871230	0891 2871278

Special Notice No. 8

SHIP REPORTING SYSTEMS

(Source: Indian Coast Guard, Director General of Shipping (Govt. of India)

INDIAN SHIP POSITION AND INFORMATION REPORTING SYSTEM (INSPIRES)

1. In order to exercise effective open ocean vessel management for security of vessels navigating along the Indian coast, the Indian Navy in coordination with Directorate General of Shipping established the Indian Ship Position and Information Reporting System (INSPIRES) with effect from 01 November 1986. All Indian merchant vessels including coastal vessels and fishing vessels of more than 300 GRT shall participate in this reporting system. All vessels other than Indian ship of tonnage 100 GRT and above are encouraged to participate in this system. **In addition, all vessels above 100GRT, carrying dangerous and hazardous cargo transiting through the EEZ of India are also required to report their position as elaborated in Para 5.**

2. **Objectives.** Its main objective is 'Open Ocean Vessel Management'. The other objectives are as under:-

(a) Security of maritime traffic within the assigned INSPIRES area;
(b) For effective vessel traffic management services;
(c) For weather forecasting to enhance safety of navigation
(d) Monitoring and prevention of marine pollution.

3. **Area of Applicability (INSPIRES Area).** The area of applicability of INSPIRES coincides with the limits of NAVAREA VIII as specified in the IMO Manual on Maritime Safety Information as follows:-

(a) India /Pakistan frontier on coast
(b) 12^0 N, 63^0E
(c) 12^0 N, Somalia coast
(d) 10^0 30'S, Tanzania coast
(e) 10^0 30'S, 55^0E
(f) 30^0 S, 55^0 E
(g) 30^0 S, 95^0 E
(h) 6^0 N, 95° E
(j) 10^0N, Myanmar/Thailand Frontier

4. **Operating Authority.** The Director General Shipping shall co-ordinate the functioning of the system with Maritime Operation Centre, Mumbai (Bombay). The Indian Naval Communication Centres (COMCENs), Mumbai (VTF) and Vishakhapatnam (VTO) will participate as the shore stations for receiving INSPIRES messages.

5. **Carriage of Dangerous Cargo.**

(a) The Government of India has declared its intention to adopt measures within its Exclusive Economic Zone, in order to prevent, reduce and control contamination of the ecosystem.

(b) The Government of India requires all vessels above 100 GRT carrying dangerous and hazardous cargo traversing through Indian Exclusive Economic Zone to report the details of the cargo carried by the vessel 48 hrs prior to entering any Indian port or 24 hrs prior to entering, Indian Exclusive Economic Zone. Vessels traversing/entering Indian Exclusive Economic Zone from neighboring countries shall also require to report details of cargo 24 hrs prior to departure from the port.

(c) The report of dangerous and hazardous cargo shall be made in accordance with Indian Ship Reporting System - INSPIRES format with details as following:-

(i) Correct technical name or names of goods.
(ii) UN number or numbers.
(iii) IMO hazard class or classes.
(iv) Name of consignee/consignor and manufacturer of goods.
(v) Types of packages including identification makes or whether in portable tank or tank-vehicle or packaged in vehicle, freight container or other tanks port unit.
(vi) Quantity and likely condition of the goods.
(vii) Details of Arms and Ammunition being carried on board.

(d) Dangerous and Hazardous cargo shall include:
(i) Goods classified in the International Maritime Dangerous Goods (IMDG) code.
(ii) Substance classified in chapter 17 of the international code for the contraction and equipment of ships carrying dangerous chemicals in bulk (IBC code) and chapter 19 of the international code for the construction and equipment of ships carrying liquefied gases in bulk (IGC code).
(iii) Oil as identified in MARPOL Annex II.
(iv) Noxious liquid substance as defined in MARPOL.
(v) Harmful substance defined in MARPOL.
(vi) Radioactive materials specified in the code for the safe carriage of irradiated nuclear fuel, plutonium and high-level radioactive wastes in flasks on board ships (INF code).

(e) Mariners are advised to strictly adhere to this notice and give it wide publicity. Vessels plying within the Indian Exclusive Economic Zone are liable for investigation by Indian Naval and Coast Guard ships.

6. **Reporting Format.** Reporting format and procedures are given in Appendix 'A'. Sections of the reporting format which are not relevant to ship should be omitted from the report.

7. **Types of Reports.**

(a) Sailing Plan (SP). Immediately prior to departure or immediately after departure from port within the INSPIRES area or when entering the INSPIRES area. As the sailing plan message is lengthy with full particulars it would be advisable to send this directly by Telex, Fax or E-mail. In the event the sailing time is changed by more than two hours then only the time may be amended by the vessel when the pilot is disembarked. Ship fitted only with Radiotelephony should send their departure reports prior to sailing and send their position reports through other vessel in the vicinity. Vessels fitted with W.T are requested to assist vessels not fitted to relay the position reports.

(b) Position Report (PR). To be sent every day at times specified below:

Longitudes of vessel West of 80° E.		**Time (UTC)**
Latitude of vessel	0° - 10°N	0400-0455
	10° - 20°N	0500-0655
	North of 20°N	0700-0755
	0° - 30°S	0400-0455

Longitudes of vessel West of 80° E.		**Time (UTC)**
Latitude of vessel	0° - 10°N	0300-0355
	10° - 20°N	0500-0655
	North of 20°N	0600-0655
	0° - 30°S	0400-0455

(c) Deviation Report (DR). When vessels position varies significantly from the position that would have been predicted from previous reports, when changing the reported route or as decided by the Master.

(d) Final Report (FR). On arrival at the destination or when leaving the INSPIRES area.

(e) Any other report. Whenever required as decided by the Master to enhance the effectiveness of the objective of INSPIRES, and may, if necessary include brief report on cyclones, deep depression, defects, damages, deficiencies, limitations etc. of the participating vessel which assist the position reporting system, and also reports concerning marine pollution observed at sea during the reporting period.

8. **Receiving Stations.**

(a) All the reports specified in Para 7 are to be prefixed INSPIRES and transmitted to the stations detailed in Appendix 'B'.

(b) The report may be sent by any of the following methods :-

(i) Wireless telegraphy
(ii) Radiotelephony
(iii) Radio telex (v)Telefax - 91-22-22665435
(iv) Telephone (Terrestrial) - 91-22-22662695, 91-22-22751073
(vi) E-mail: ncsomb@vsnl.net

(c) Particulars of frequencies, watch keeping timing telex number telephone numbers etc. of COMCEN Mumbai (VTF) & COMCEN Visakhapatnam (VTO) through which the report can be made are given at Appendix 'C'.

(d) INSPIRES Reports will be accepted free of charge by VTF and VTO.

(e) The reports should be sent as follows :-

(i) Sailing Plan	Before or as near to the departure from a port within a system or when entering the area covered by the system.
(ii) Position Report	Every day at the time specified in paragraph 7(b).
(iii) Deviation Report	When ships position varies significantly from the position that would have been predicted from previous reports when changing the reported route or as decided by the Master.
(iv) Final Report	On arrival at the destination and when leaving the area, covered by the system.
(v) Any other Report	Any other report should be made in accordance with the system procedures as notified in Para 7.

(f) Overdue reports: Position reports must be received within six hours of the scheduled times

(g) Masters of all Indian registered ships above 300 GRT are directed to comply with the provisions of this notice as per scheduled procedure. Masters of foreign flag ship are encouraged to participate in the system to assist in achieving the above stated objectives in the interest of safety of ships and seafarers.

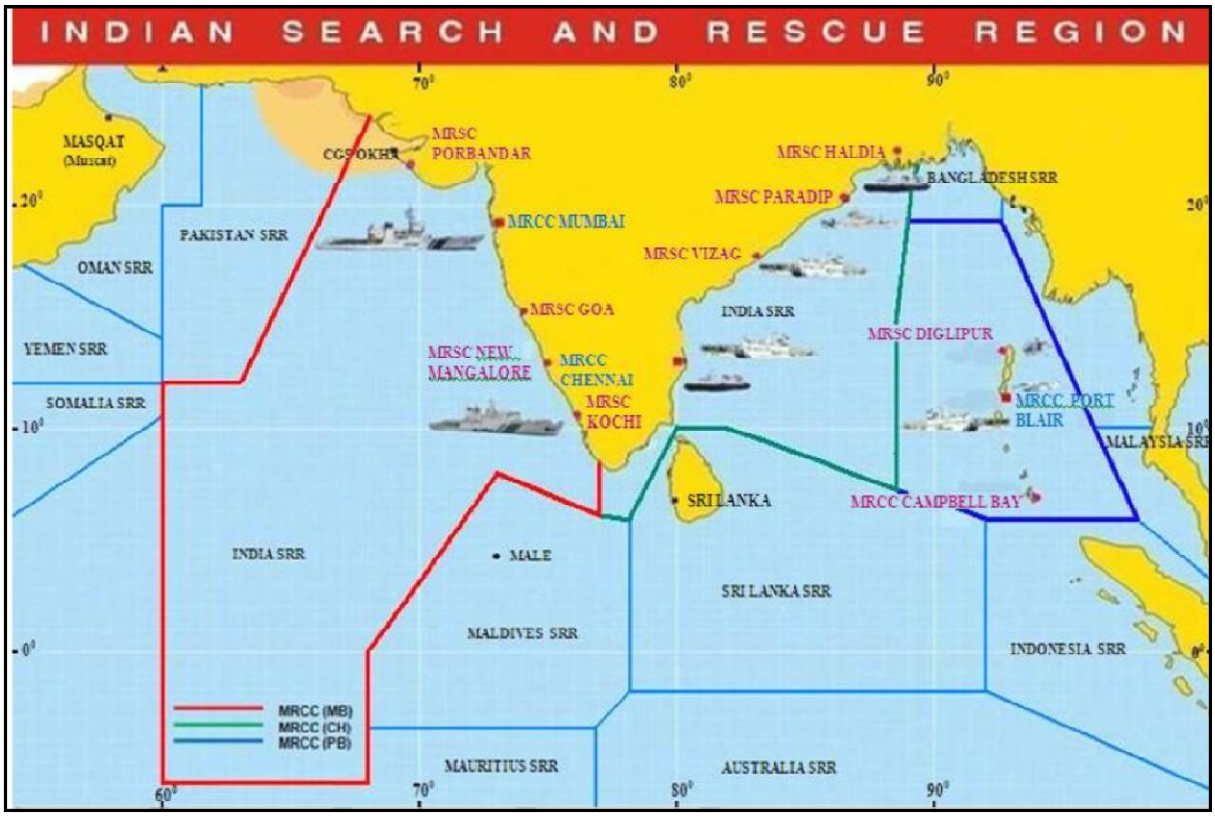
INDIAN SHIP REPORTING SYSTEM FOR SEARCH & RESCUE - INDSAR

9. **Introduction.** In compliance with the provisions of International convention on Maritime Search and Rescue, 1979 (SAR Convention 1979), and to provide / coordinate effective search and rescue operations in a possible event of unfortunate marine causality, the Indian Coast Guard has

brought in to operation the Ship Position Reporting System w.e.f. 01 Feb 2003 under the name "**Indian Ship Reporting System" (INDSAR**). The INDSAR is an advanced computerized system designed to contribute to safety of life at sea and is operated and maintained by the Indian Coast Guard through Maritime Rescue Co-coordination Centre in Mumbai.

10. **INDSAR Coverage Area.** The vessels entering the Indian Search and Rescue Region (ISRR) bounded by following coordinate are to provide information as enumerated in the succeeding paragraphs.

(a)	21^0 00′.00 N	65^0 15′.00 E
(b)	12^0 00′.00 N	63^0 00′.00 E
(c)	12^0 00′.00 N	60^0 00′.00 E
(d)	06^0 00′.00 S	60^0 00′.00 E
(e)	06^0 00′.00 S	68^0 00′.00 E
(f)	00^0 00′.00 S	68^0 00′.00 E
(g)	08^0 00′.00 N	73^0 00′.00 E
(h)	06^0 10′.00 N	78^0 00′.00 E
(j)	10^0 00′.00 N	80^0 00′.00 E
(k)	10^0 00′.00 N	82^0 00′.00 E
(l)	06^0 00′.00 N	92^0 00′.00 E
(m)	06^0 00′.00 N	97^0 32′.00 E



11. **Purpose.** INDSAR is an integral part of the Maritime Search and Rescue (M-SAR) system in India to provide up-to-date information on the movement of the vessel operating in ISRR. The objective of the INDSAR system is to:-

(a) Contribute to safety of life at sea and protection to marine environment.

(b) To reduce the interval between loss of contact with a vessel and the initiation of search and rescue operations in cases where no distress signal has been received.

(c) To permit rapid determination of vessels, which may be called upon to provide assistance.

(d) To permit delineation of a search area of limited size in case the position of a vessel in distress is unknown or uncertain;

(e) To facilitate the provision of urgent medical assistance or advice to vessels not carrying a doctor;

(f) To monitor and control the movement of all ships with special reference to ships engaged in the carriage of dangerous and hazardous cargo within SRR in the interest of ship and crew;

(g) Protection against Piracy and Armed Robbery.

12. **Applicability.** INDSAR is applicable to the following ships which navigate in the ISRR:-

(a) Mandatory reporting by all Indian registered ships of 100 GRT or more including sailing and fishing vessels engaged in international routes and domestic coastal route.

(b) The Indian Government encourages foreign ships of 300 GRT and above to participate voluntarily in INDSAR reporting system.

(c) All ships 100 GRT and above irrespective of flag carrying nuclear or other inherently dangerous or noxious substances or materials are encouraged to participate in INDSAR.

(d) All ships more than 20 years old irrespective of flag.

13. The ships participating in INDSAR do not incur any charge or additional responsibility than already exist under SOLAS 74 and SAR 79.

14. The Maritime Rescue Co-ordinating Centre, Mumbai (MRCC (MBI)) will co-ordinate the INDSAR with support from LES (Gaziabad)/BSNL and INMARSAT for receiving ships position report for SAR.

Address: Headquarters Coast Guard Region (W),
Worli Seaface, PO, Mumbai, India
Postcode: 400 030
Telefax: 91-22-2431 6558 / 2438 8065 / 24383592 / 24383146
INMARSAT 'C': 441907210 (**Toll free code 43**)
Email: mrcc-west@indiancoastguard.nic.in

15. Ships may participate in the INDSAR by the following ways:-

(a) Ships should send reports to MRCC (MBI) in accordance with INDSAR format when entering the INDSAR area.

(b) When ships first participate in the system, the Ship's Company, agents may handover the particular form to INDSAR centre i.e. MRCC (MBI).

(c) When ship's primitive particulars are altered, the ship's company, agents or the ship herself should report it to the MRCC in time.

16. **Sending Report.** Information sent by ships to INDSAR is protected and used only in a bonafide maritime emergency. A ship may send her report to MRCC (MBI) by the following ways:-

(a) Telephone : 91-22-2431 6558 / 2438 8065
(b) Fax : 91-22-24316558
(c) E-mail. : mrcc-west@indiancoastguard.nic.in
(d) **INMARSAT C**. **441907210 (INDSAR Toll free Code 43)**
INMARSAT Fleet 77: **764902542(Voice), 764902543 (fax)**
(e) Shipping company's report.

17. Ships may send E-mails or telex through the INMARSAT system. While using the INMARSAT system, make sure that the INMARSAT equipment maintains in the "LOGIN" mode all the times. If for any reasons, the PR or FR is failed to be sent, the ship should try to pass these message through another ship or other shore authorities related.

18. **Concept of INDSAR System.** On departure from an Indian Port or on entering the INDSAR area from overseas:

(a) Master are to send a Sailing Plan (SP) or the Entry report (EP) to MRCC (Mumbai) when entering Indian SRR.
(b) A computerized plot will be maintained of the ships position.
(c) Masters are to send the Position Report (PR) each day at a convenient time nominated by the ship. The maximum time between any two reports is not to exceed 24 hours.
(d) The date and time contained in the INDSAR reports are to be in UTC.
(e) A final report (FR) is to be sent on arrival at the destination or on departure from the INDSAR area.
(f) Special reports are to be sent as applicable.

19. **Types of Reports.** There are seven types of reports in INDSAR. The basic format of these reports follows the International maritime organization (IMO) standards. Each type is composed of several reporting items in alphabetic order. All the seven report types begin with INDSAR followed by a slash (/), the identifying letter of the report (SP,PR, DR,FR) and ends with a double slash(//). Each remaining line begins with a specific letter followed by slash (/) to identify line type. The remainder of each line contains one or more data fields separated by single slash(/). Each line ends with double slash(//). All reports end with a "Z" end of report line. These reports can be divided into two categories, that are **General Report** (four types included), and **Special Report** (three types included).

(a) **General Report**
(i) Sailing plan reports (SP).
(ii) Position reports (PR).
(iii) Deviation reports (DR).
(iv) Final reports (FR).

(b) **Special Report**
(i) Dangerous goods reports (DG).
(ii) Harmful substances reports (HS.)
(iii) Marine pollutants reports (MP).

Formats, Contents and Requirements of the Reports

20. **Sailing Plan (SP) INDSAR Reports.** The SP should contain enough necessary information to initiate a plot and predict vessel's actual position within 25 nautical miles at any

time assuming that the sailing plan is followed exactly. Before leaving from an Indian port or when entering the INDSAR area from overseas, a ship should send the SP to the INDSAR Center and adhere to the following stipulations:

(a) This report should be sent within 24 hours before the ship entering the Indian SRR boundary or 2 hours after entering the boundary.
(b) This report should be sent within 2 hours before, upon, or after her departure from any Indian port.

Note: If there is any doctor, physician's assistant or nurse on board the ship, item V should be added into the SP.

21. **Format of INDSAR SP of Ship's entering Indian areas from overseas and berthing at Indian ports.** The sailing plans require A, B, E, F, G, H, I, L and Z lines. The lines M, V and X lines are optional.

Example

INDSAR Sailing Plan	INDSAR/SP//
A Vessel's name and call sign	A/ ANPINGI/BPOA//
B Date and Time(UTC)	010700Z NOV//
E Course	E/160//
F Speed	F/150//
G Last port of call	G/SINGAPORE/0121N/10359E//
H Date/Time(UTC) and position of entry into INDSAR areas	H/02300Z/0600N/09430E//
I Next port of call and Estimated time of arrival	I/MUMBAI/1855N/07250E/150800Z//
L Intended route (composed of some track segments)	L1/300/0121N/10359E // L2/260/0500N/07800E// L3/345/1800N/07200E//
M Coast Radio Stations Monitored, or communication methods	M/INMARSAT C//
X Next port of call	X/ NEXT PORT /180800ZNOV//
Z Ending of the report	Z/EOR//

22. **Format of INDSAR SP between two domestic ports.** The lines A, B, E, F, G, H, I, L and Z for INDSAR SP should be reported. If necessary, the items and data fields E, K, N, O, S, T, U, W, X and / or Y may be added.

Example

INDSAR Sailing Plan	INDSAR/SP//
A Vessel's name and call sign	A/ANPINGI/BPOA//
F Speed	F/150//
G Last port of call	G/MUMBAI/1855N/07250E//
H Date/Time(UTC) and position of departing Indian coast ports	H/131900UTC/1855N/07250E//
I Next port of call and estimated time of arrival	I/VIZAG/210700UTC//
L Intended route(composed of some track segments)	L1/165/1730N/07200E// L2/090/0500N/07815E//

	L3/035/2000N/08630E//
M Communication methods	M/XSG//
Z Ending of the report	Z//

23. **Format of INDSAR SP for departing indian ports for foreign ports.** The lines A,B,E,F,G,H,I,L,Z for INDSAR SP should be reported . If necessary, the lines E, N, O, S, T, U, W, X and/or Y may be added.

Example

INDSAR Sailing Plan	INDSAR/SP//
A Vessel's name and callsign	A/ANPINGI/BPOA//
F Speed	F/150//
G Last port of call	G/MUMBAI/1855N/07255E//
H Date/Time(UTC) and position of departing Indian coast ports	H/020500UTC/1855N/07255E //
I Next port of call and estimated time of arrival	I/SINGAPORE/0121N/10359E /19600UTC//
K Date, time and point of exit from INDSAR area	K/160600UTC/0600N/09430E //
L Intended route(composed of some track segments)	L1/165/1730N/07200E// L2/080/0500N/07815E// L3/100/0600N/09430E// L1/145/0121N/10359E//
M Communication methods	M/XSG//INMARSAT C//
Z Ending of the report	Z//

24. **Format of INDSAR SP for transit of ships (only crossing the indsar area during the voyage from one foreign port to another foreign one).** The lines A,B,E,F,G,I,L,Z for INDSAR SP should be reported .If necessary, the lines E, N,O,S,T,U,W,X and/or Y may be added.

Example

INDSAR Sailing Plan	INDSAR/SP//
A Vessel's name and callsign	A/ANPINGI/BPOA//
F Speed	F/150//
G Last port of call	G/ KARACHI/2030N/06730E//
H Date/Time(UTC) and position of departing ports	H/020500UTC/2030N/06730E//
I Next port of call and estimated time of arrival	I/COLOMBO/0730N/07950E/ 1306000UTC//
K Date, time and point of exit from INDSAR area	K/080800UTC/0650N/07830E //
L Intended route(composed of some track segments)	L1/155/2030N/06730E // L2/080/0500N/07815E// L3/100/0600N/09430E// L1/145/0121N/10359E //
M Communication methods	M/XSG//
Z Ending of the report	Z//

25. **Position Reports (INDSAR PR).** The PR should be sent to INDSAR Center at the time prescribed or appointed. The first PR is required within 24 hours after the latest SP, thereafter at an interval of 24 hours or at the appointed daily reporting time. But the interval between two PRs must not exceed 24 hours until arrival at Indian coastal ports or departures from INDSAR boundary. Should a ship at any time be in a position more than 2 hours steaming from the position predicted in its last intended route, the new PR or DR should be sent. The information contained in the PR will be used by the Center to update the plot.

26. If a Deviation Report (DR) is sent 2 hours before PR, then the next PR may be sent 24 hours after the DR. The ETA at the next port of call, or INDSAR area boundary should be confirmed in the last PR. The revised ETA may also be amended in PR.

27. If the duration of whole voyage is less than 24 hours, the ship is not required to send a PR, and ship should only requested to send a SP when commencing her voyage and a FR when arriving at the destination.

28. The lines A,B,C,E,F,N,Z for INDSAR PR should be reported. The **I** line is strongly recommended. If necessary, the items and data fields S, X and/or Y may be added.

Example

INDSAR Position Report	INDSAR/PR//
A Vessel's name and callsign	A/ANPINGI/BPOA//
B Time(GMT or UTC)	B/090600Z//
C Position (Lat/Long)	C/1030N/07510E
E Course	E/165//
F Speed	F/150//
I Next port of call and estimated time of arrival	I/TUTICORIN/0930N/07515 E/092300Z//
N Date/ time of next PR	N/100600UTC//
Z Ending of the report	Z//

Notes

(a) Position Report should be sent at the time prescribed or appointed.

(b) The ETA at Indian coast port or departing from INDSAR area must be confirmed in the last PR.

29. **Deviation Report (INDSAR DR).** Thisreport should be sent as soon as any voyage information changes which could affect INDSAR's ability to accurately predict the vessel's position. Changes in course or speed due to weather change in destination, diverting to evacuate a sick or injured crew member, diverted to assist another vessel or any other vessel, or any deviation from the original Sailing Plan should be reported as soon as possible**.** The lines A,B,C,E,F,N,Z for INSAR PR should be reported. The line **I** and **L** are required if destination or route changes. The '**I'** line is always recommended**.** The **M** and **X lines** are optional.

Example

INDSAR Deviation Report	INDSAR/DR//
A Vessel's name and callsign	A/ANPINGI/BPOA//
B Time(GMT or UTC)	B/090100UTC//
C Position (Lat/Long)	C/1030N/07530E//
E Course	E/160//

I Next port of call and estimated time of arrival	I/TUTICORIN/090900UTC//
L Intended route(composed of some track segments)	L1/160/1030N/07530E// L1/040/0650N/07650E//
Z Ending of the report	Z//

30. **Final Report (INDSAR FR).** Final Report should be sent upon when the ship arrives at the port of destination OR when the vessel exits the INDSAR area. lines A, K, Z for INDSAR should be reported.

Example

INDSAR Final Arrival Report	INDSAR/FR//
A Vessel's name and callsign	A/ANPINGI/BPOA//
K Date/Time(UTC) and position of Exit from INDSAR coverage area or that of arrival at Indian coastal port and the port's name	K/011321UTC/09430E 20E// or K/011321UTC/KOCHI//
Z Ending of the report	Z//

31. **Dangerous Goods Report (INDSAR DG).** Dangerous Goods Report should be sent when an incident takes place involving the loss or likely loss overboard of packaged dangerous goods into the sea. The lines A,B,CM,Q,R,S,T,U,Z for INDSAR DG should be reported. If the condition of the ship is such that there is danger or further loss of packaged dangerous goods into the sea, item P of the standard reporting format should be reported.

Example

INDSAR Dangerous Goods Report (INDSAR/DG//	
A	Vessel's name and callsign
B	Time(GMT or UTC)
C	Ship's position (Lat/Long)
M	Communication methods
P	P1 Correct technical name or cargo's name P2 UN number or numbers P3 Dangerous Goods-Class P4 Names of manufacturers, consignee or consignor P5 Packing of cargo(including identification mark and methods of Transportation P6 Quantity and estimated condition of cargo
Q	Q1 Relevant conditions of ship Q2 Ability to transfer cargo, ballast water and fuel
R	R1 Correct technical name or cargo's name R2 UN number or numbers R3 Dangerous Goods-Class R4 Names of manufacturers, consignee or consignor R5 Packing of cargo(including identification mark and methods of Transportation R6 Quantity and estimated condition of cargo R7 Whether the lost goods floating or sunk R8 Whether the loss is continuing

	R9 Cause of loss
S	Weather condition
T	Ship owner and representatives
U	Ship's size and type
Z	Ending of the report

32. **Harmful Substances Report (INDSAR HS).** Harmful substances report should be sent when an incident takes place involving the discharge or probable discharge of oil (Annex I of MARPOL 73/78) or noxious liquid substances in bulk (Annex II of MARPOL 73/78).

33. The lines A, B,C, E, F, L, M, N, Q, R , S, T, U, X, Z for INDSAR HS should be reported, and P should be included if probable leakage.

Example

INDSAR Harmful Substance Report (INDSAR/HS//	
A	Vessel's name and callsign
B	Time(GMT or UTC)
C	Ship's position (Lat/Long)
E	Course
F	Speed
L	Intended route(composed of some voyage segments)
M	Communication methods
P	P1 Correct technical name of oil noxious liquid substance on ship P2 UN number or numbers P3 Pollution-Class(A,B,C or D) for noxious liquid substance P4 Names of manufacturers, consignee or consignor P5 Quantity
Q	Q1 Relevant conditions of ship Q2 Ability to transfer cargo, ballast water and fuel
R	R1 Correct technical name of oil noxious liquid substance discharged into sea R2 UN number or numbers R3 Pollution-Class(A,B,C or D) for noxious liquid substance R4 Names of manufacturers of noxious substance, or addresses of consignee or consignor R5 Estimated quantity of harmful substance R6 Whether the lost goods floating or sunk R7 Whether the loss is continuing R8 Cause of loss R9 Estimate the discharge , leakage and movement of the lost substance, if the liquid is harmful R10 Estimated spilt area
T	Names, addresses, telephone and telex numbers of the ship owner and representatives
X	X1 Actions for the moving noxious liquid substance or such substance discharged by ship X2 Assistance and salvage which have been requested and provided X3 Assisting or salvaging ships should report the detailed action planned take or being taken, if no details available at first, add it in the supplementary report.
Z	Ending of the report

34. **Marine Pollutants Report (INDSAR MP).** Marine pollutants report should be sent in the case of loss or likely loss overboard or harmful substance in packaged form, identified in the International Maritime Dangerous Good Code as marine pollutants. (Annex III of MARPOL 73/78).

35. The lines A, B, C, M, Q, R, S, T, U, X, Z for INDSAR HS should be reported, and P should be included if probable leakage.

Example

INDSAR Marine Pollutants Report (INDSAR/MP//	
A	Vessel's name and callsign
B	Time(GMT or UTC)
C	Ship's position (Lat/Long)
M	Communication methods
P	(Refer to the item and data field in the Dangerous Goods Report)
Q	Q1 Relevant conditions of ship Q2 Ability to transfer cargo, ballast water and fuel
R	R1 Correct technical name of cargo R2 UN number or numbers R3 Dangerous Goods –Class R4 Names of manufacturers, consignee or consignor R5 Packing of cargo(including identification mark and methods of transportation) R6 Quantity and estimated condition of cargo R7 Whether the loss goods floating or sunk R8 Whether the loss is continuing R9 Cause of loss
T	Names, addresses, telephone and telex numbers of the ship owner and representatives
X	X1 Actions for the moving noxious liquid substance or such substance discharged by ship X2 Assistance and salvage which have been requested and provided X3 Assisting or salvaging ships should report the detailed action planned take or being taken, if no details available at first, add it in the supplementary report.
Z	Ending of the report

36. **Reporting Format**. INDSAR Reporting format and Procedure will be same as given in Appendix 'A' for INSPIRES. Ships to pass INDSAR reports through code 43 of INMARSAT 'C', Number 441907210. The procedure for position reporting on code 43 of the INMARSAT 'C' is given in Appendix 'D'.

37. **Receiving Stations.**

(a) All the reports are to be prefixed INDSAR and forwarded to the MRCC (Mumbai) whose details are mentioned in Para 49.

(b) Mariners are advised to strictly adhere to INDSAR reporting system and if for any reason a Master is unable to pass his PR or FR he should attempt to pass a message through another ship, or harbour or other shore authority as appropriate. The MRCC Mumbai does

not forward reports to other reporting systems. Ships are requested to pass these reports direct.

MARITIME SEARCH AND RESCUE (M-SAR) – "ISLEREP"

38. The purpose of ISLEREP is to enhance navigational safety in and around the waters of A&N (Andaman & Nicobar) Islands and L & M (Lakshadweep and Minicoy) Islands thereby minimising the risk of a maritime accident and consequential pollution and major damage to the marine environment. These areas are internationally recognised as being of outstanding environmental importance. ISLEREP also provides the ability to respond more quickly in the event of any safety or pollution incident. Participation is encouraged for all categories of ships.

39. **Participation.** Ships of the following general categories are **required** to participate in the reporting system:-

(a) All ships of 50 metres or greater in overall length;
(b) All oil tankers*, liquefied gas carriers, chemical tankers or ships coming with the INF Code, regardless of length;
(c) Ships engaged in towing or pushing where the towing or pushing ship or the towed or pushed ship is a ship prescribed within the categories shown above or where the length of the tow, measured from the stern of the towing ship to the after end of the tow, exceeds 150 metres.

*For the purposes of this requirement "oil tanker" means ships defined at regulation 1(4) of Annex I to MARPOL 73/78 together with those ships other than oil tankers to which regulation 2 (2) of Annex I to MARPOL 73/78 applies, that is, ships "fitted with cargo spaces which are constructed and utilised to carry oil in bulk of an aggregate capacity of 200 cubic metres or more"
Warships, Naval Auxiliaries and Government ships are encouraged to participate in the ISLEREP on a voluntary basis.

40. **Operating Authority.** ISLEREP - Island (M-SAR) Reporting (System) is operated under joint arrangements between the Indian Coast Guard and the A & N / L & M Administration. The system is manned and operated on a 24 hour basis by Island Administration personnel operating from the Ship Reporting Centre, Radio Call Identity "ISLEREP CENTRE" with Port Blair radio at Port Blair and associated Islands or Kavaratti radio at Kavaratti or adjacent Islands.

41. **Concept of ISLEREP.** ISLEREP is based on a VHF voice reporting system employing a radio network along the A & N / L & M coasts and on Islands in the adjacent areas. Through this network certain categories of ships are required to report their entry into, and progress through the area. The purpose is to monitor compliance with the reporting requirement and provide enhanced ship traffic information at those locations. This will maintain a surface picture of participating ships and this will be established from position reports dead-reckoning.

42. **Entering the ISLEREP Area.** At the first designated reporting point after entering the area from seaward within 20 nautical miles of when sailing from a port within the area, ships are required to provide a position report (PR), with details such as identity, position, intended route, cargo and other supplementary information. The extent of the report will depend on whether the reporting ship has previously sent an INDSAR Sailing Plan (SP) message. If a ship is already an INDSAR reporter on first entry to ISLEREP, the ISLEREP system will require only a reduced PR from that ship.

43. **Enroute Position Reports.** As a monitor of progress through the reporting area, the enroute reporting have generally been placed at intervals of 80 - 100 nautical miles apart depending on locations and the siting of shore VHF radio stations. Position reports are generally limited to the identity of the ship, position, speed (or ETA) and any further information the Master considers might be of value to the system, such as concentrations of fishing vessels or abnormal weather conditions. In A & N Islands, a HF link called **"ATLANTA"** on frequency 8294 kHz (Day) and 6224 kHz (Night) is manned by Port authorities. HF watch keeping is also maintained off the Lakshadweep Islands between 0600 - 2200 hours (Indian Standard Time) on 4393.4, 6275, 7344 and 8275 kHz. Ships on tasks such as survey, research, aids to navigational support, tourist related activities or local trading operations, which may not be on continuous passage, are required to provide a PR to ISLEREP at intervals not exceeding 12 hours. Consistent with the aim of avoiding dual reporting, ships participating in INDSAR, when in the ISLEREP area, do not need to make separate INDSAR PRs. Instead the same can be messaged to INDSAR.

44. **Leaving the ISLEREP.** Ships sending their final report to the ISLEREP system when about to enter port or in vicinity of a "port of entry/departure" reporting point will be required to advise if this is a final INDSAR report (FR). Likewise ships sending their final report to the ISLEREP system when in the vicinity of an "area entry/departure" reporting must advise if they intend reporting to the INDSAR system for the remainder of their voyage in the Indian SRR area.

45. **Special Reports - Defects, damage, deficiencies or other limitations.** A ship must also advise ISLEREP when:

(a) It deviates significantly from the track reported in its last PR;
(b) It alters speed significantly, for reasons other than normal course and/or speed alterations;
(c) Damage or defects to the ship or its equipment which will affect its operation and/or seaworthiness;
(d) Damage to the ship or its equipment means that a discharge of dangerous goods, harmful substances or marine pollutants is about to/or likely to happen.

Examples of such incidents include but are not limited to the following: failure or breakdown of steering gear, propulsion plant, electrical generating system, essential shipboard navigational aids, collision, grounding, fire, explosion, structural failure, flooding, cargo shifting.

46. **Communications.** Ships participating in ISLEREP must communicate with ISLEREP CENTRE using VHF radio channels 8 and 16 (H24 watch keeping by Port Blair Radio and Kavaratti Radio) as the primary means of communication. The working VHF channel to be used will depend on the ship's position. If they wish, ships can provide details of their cargo to INDSAR/ISLEREP by non-radio means, such as facsimile, telephone or Inmarsat C, provided this is done in advance of their first report. The language to be used for reports in the ISLEREP system will be English, using the IMO's Standard Marine Communication Phrases (SMCP) were necessary. The Islands of A & N have a HF network call sign **"ATLANTA"** on frequency 8294 kHz (Day) and 6224 kHz (Night) whereas L & M Islands use VHF. Alternative communications may be utilised using one or more of the following (in order of preference):

(a) Inmarsat C through ARVI LES using Toll Free Code 43;
(b) Other Inmarsat (or non-Inmarsat) phone/fax/telex service;
(c) HF radiotelephone or telex services;

47. **Automated Position Reporting via Inmarsat C.** Vessels transiting the ISLEREP region are encouraged to participate in Automated Position Reporting (APR) via Inmarsat C code 43.

Inmarsat C APR costs will be borne by the Indian Coast Guard. This is only for use when communications on the VHF network have failed and a satellite link with MRCC Mumbai (Inmarsat C 441907210) is necessary.

48. **Types of ISLEREP Reports.** The main reports are as follows:-

(a) First ISLEREP PR if INDSAR SP already lodged
(b) First ISLEREP if INDSAR SP not lodged
(c) ISLEREP PR - Enroute
(d) Final ISLEREP PR
(e) ISLEREP PR reporting and changed circumstances

The basic format for ISLEREP reports follows the International Maritime Organization (IMO) standard. The first line in every report begins with ISLEREP followed by a slash (/), the report type and ends with a double slash (//). Each remaining line begins with a specified letter followed by a slash (/) to identify the line type. The remainder of each line contains one or more data fields separated by single slashes (/). Each line ends with a double slash (//). All reports should end with a "Z" end- of-report line. For VHF reporting, ships do not need to prefix each field with IMO format letter, but may do so if they wish.

49. **First ISLEREP PR if INDSAR SP already lodged.** If the ship has already submitted an INDSAR Sailing plan (SP) for the voyage, the ship will (at the first reporting point) normally only need to:

(a) Identify itself to the ISLEREP Centre
(b) Confirm that the ship is an INDSAR participant
(c) Report its position
(d) Confirm that there are no changes to the information provided, or alternatively
(e) Report any changes or additional information relevant to the voyage

Equivalent format field complying with IMO's general principles for ship reporting systems and ship reporting requirements. For VHF reporting, ships do not need to prefix each field with IMO format letter, but may do so if they wish.

50. **Form of messages.**

A / Ship Name/ Call sign//
B / Date/Time of ship's actual position (UTC) if within 20 n miles from the Island//
C / Latitude / Longitude of ship's actual position if within 20 n miles from the island//
E / Course in whole degrees True//
F / Speed in knots//
X / Remarks//

51. **First ISLEREP PR if INDSAR SP not lodged.** If the ship does not intend reporting to INDSAR then a FULL ISLEREP PR in the following format must be sent. Equivalent format field complying with IMO's general principles for ship reporting systems and ship reporting requirements. For VHF reporting, ships do not need to prefix each field with IMO format letter, but may do so if they wish.

52. **Form of messages.**

A / Ship Name/ Call sign/ IMO number//
B / Date/Time of ship's actual position (UTC) if within 20 n miles from the Island//
C / Latitude / Longitude of ship's actual position if within 20 n miles from the island//
E / Course in whole degrees True//
F / Speed in knots//
J / Coastal pilot on board? (Yes/No)//
L / Final Mandatory Entry/ anchoring in Island with name//
O / Draft fore and aft in metres and tenths of metres//
P / Cargo name Dangerous cargo (Yes/No)//
Q / Defects and other limitations (Yes/No-supply details)//
R / Brief details of type of pollution lost overboard (oil, chemicals, etc). See special reporting requirements (HS, DG or MP). Also report if any pollution sighted//
U / Ship type/Length in metres/Gross Tonnage//
X / Remarks//

53. **ISLEREP PR – Enroute.** Following the first report to ISLEREP CENTRE, further position reports are required:

(a) at each subsequent reporting of Islands and
(b) in any case at intervals not exceeding 12 hours

Equivalent format field complying with IMO's general principles for ship reporting systems and ship reporting requirements. For VHF reporting, ships do not need to prefix each field with IMO format letter, but may do so if they wish.

54. **Form of messages.**

A / Ship Name/ Call sign//
B / Date/Time of ship's actual position (UTC) - if within 20 n miles from the Island//
C / Latitude / Longitude of ship's actual position - if within 20 n miles from the Island//
E / Course in whole degrees True//
F / Speed in knots//
X / Remarks//

55. **Final ISLEREP PR.** Ships should notify ISLEREP CENTRE when:

(a) Departing the ISLEREP area or 20 n miles seaward from Island
(b) Arriving at a port within the Island (A & N / L & M)

If the ship is also an INDSAR reporting ship and is departing the ISLEREP area at the sea boundary it should notify ISLEREP CENTRE if it intends to continue reporting to INDSAR and if so, the Date/Time of the next INDSAR position report (PR). If the ship is arriving within a port at the ISLEREP area if should notify ISLEREP CENTRE that the report is also an INDSAR final report (FR).

Equivalent format field complying with IMO's general principles for ship reporting systems and ship reporting requirements. For VHF reporting, ships do not need to prefix each field with IMO format letter, but may do so if they wish.

56. **Form of messages.**

A / Ship Name/ Call sign//
B / Date/Time of ship's actual position (UTC) - if within 20 n miles from the Island//
C / Latitude / Longitude of ship's actual position - if within 20 n miles from the Island//

X / Remarks// [1: Yes INDSAR next report 130400//]
[2: Yes INDSAR final report//]
[3: Not INDSAR//]

57. **ISLEREP PR Reporting any changed circumstances.**
For the effective operation of the system, it is also a requirement to report to ISLEREP CENTRE if the ship:

(a) Deviates significantly from the track reported in its last ISLEREP PR; or

(b) Alters its speed significantly, for reasons other than normal course and/or speed alterations.

Safety related reports (including defects, damage, deficiencies and/or limitations) and also reports of pollution or cargo lost overboard must also be reported to ISLEREP CENTRE without delay. Message format fields Q or R should be used, or special reports DG, HS or MP should be used when required. (Refer to Pollution Reports by Radio, page 236 section 3 "Guidelines for detailed reporting requirements" for further details).

Equivalent format field complying with IMO's general principles for ship reporting systems and ship reporting requirements. For VHF reporting, ships do not need to prefix each field with IMO format letter, but may do so if they wish.

58. **Form of messages.**

A / Ship Name/ Call sign//
B / Date/Time of ship's actual position (UTC) - if within 20 n miles from the Island//
C / Latitude / Longitude of ship's actual position - if within 20 n miles from the Island//
E / Course in whole degrees True//
F / Speed in knots//
Q / Details if required//
R / Details if required//
X / Remarks//

LONG RANGE IDENTIFICATION AND TRACKING (LRIT)

59. **Introduction.** The Long Range Identification and Tracking (LRIT) System of ships was established by the International Maritime Organization (IMO) under MSC.202 (81) Resolution. This Resolution amends SOLAS 1974, chapter V- Regulation 19-1 of Safety of Navigation and binds all governments which have contracted to the IMO. The LRIT regulations as laid down by the IMO came into force with effect from 1st January 2008 internationally. The Government of India being party to the SOLAS 1974 as amended has given effect to the provisions as part of its international obligations on Dec 2008.

60. **Purpose of LRIT.** The main purpose of LRIT system is to promote safety of life at sea, detect and deter Security threat & protect Environmental with special reference marine environment. The LRIT data is shared with the other Flag States, Indian Navy & Indian Coast Guard (Maritime Rescue Co-Ordination Centres) since these entities perform the functions of Enforcement authority in the capacity of Coastal State. The system utility in respect of Safety, Security and marine environment protection is given below:

(a) For **Safety of Life** at sea, vessels in the vicinity of a SAR area are directed by the Maritime Rescue Co-Ordination Centres (MRCC). The LRIT Search & Rescue Surface Picture (SAR SURPIC) greatly enhances the co-ordination of the vessels being sent for

assistance in the SAR area. LRIT allows rescue co-coordinators to have access to a list / graphics of vessels of own flag & foreign in the area of a ship in danger. After obtaining a SAR Surface Picture a SAR poll can be given for instant position.

(b) For **Security** of the Nation including the coast line besides continuously tracking the national registered ships, the tracking & monitoring of all foreign vessels transiting a certain defined area or strategic areas around the country's coast can be activated. Tracking of country's own vessels also helps to improve maritime domain awareness (MDA) and a general understanding of vessel traffic in specific areas of interest& also in piracy prevention measures. The primary objective of security through vessel tracking is achieved, allowing interested parties (that carry the authority) to monitor any vessel's progress and observe any deviation from planned vessel routes – particularly important in light of the high incidences of piracy as well as increased security at ports, particularly in the US.

(c) For **Environmental Protection**, LRIT helps in tracking of a pollution related accident, ships carrying toxic & hazardous pollutants, quick response in directing rescue & pollution containment resources to the spot where a pollution accident has occurred. Another benefit is the ability to attribute responsibility for maritime environment and safety incidents, particularly in the case of environmental transgressions such as oil slicks, where regulatory bodies can use LRIT information to identify the likely vessels that were in the vicinity at the time.

61. **SOLAS Regulation- Scope**. The LRIT regulation will apply to the following ship types engaged on international & coastal voyages:

(a) All passenger ships including high speed craft,
(b) Cargo ships, including high speed craft of 300 gross tonnage and above, and
(c) Mobile offshore drilling units.

62. These ships must report their position to their Flag Administration at least 4 times a day. Most vessels set their existing satellite communications systems to automatically make these reports. Other contracting governments may request information about vessels in which they have a legitimate interest under the regulation. The LRIT information that the participating ships will be required to transmit include the ship's identity, location and date and time of the position. LRIT is a static data display system. The vessel's position displayed is the last reported position it has transmitted. Periodic position reporting frequency can be changed to a minimum of one position report in 24hrs to a maximum frequency of 15 minutes. All the information & periodic reporting change is triggered by the data centres. Instant position reports of vessels can be obtained by polling.

The components of LRIT system are:

(a) The already installed ship borne information & satellite communications equipment for transmitting LRIT information by the ship (mostly an Inmarsat - C or a stand-alone unit & for ships operating in Sea Area A4, Iridium etc is the LRIT-compliant option available).

(b) Shore based Communications Service Providers (CSPs) who sets up communication path to Application Service provider.

(c) The Application Service Providers (ASPs) passes expanded message to Data Center & provides ship configuration functionalities.

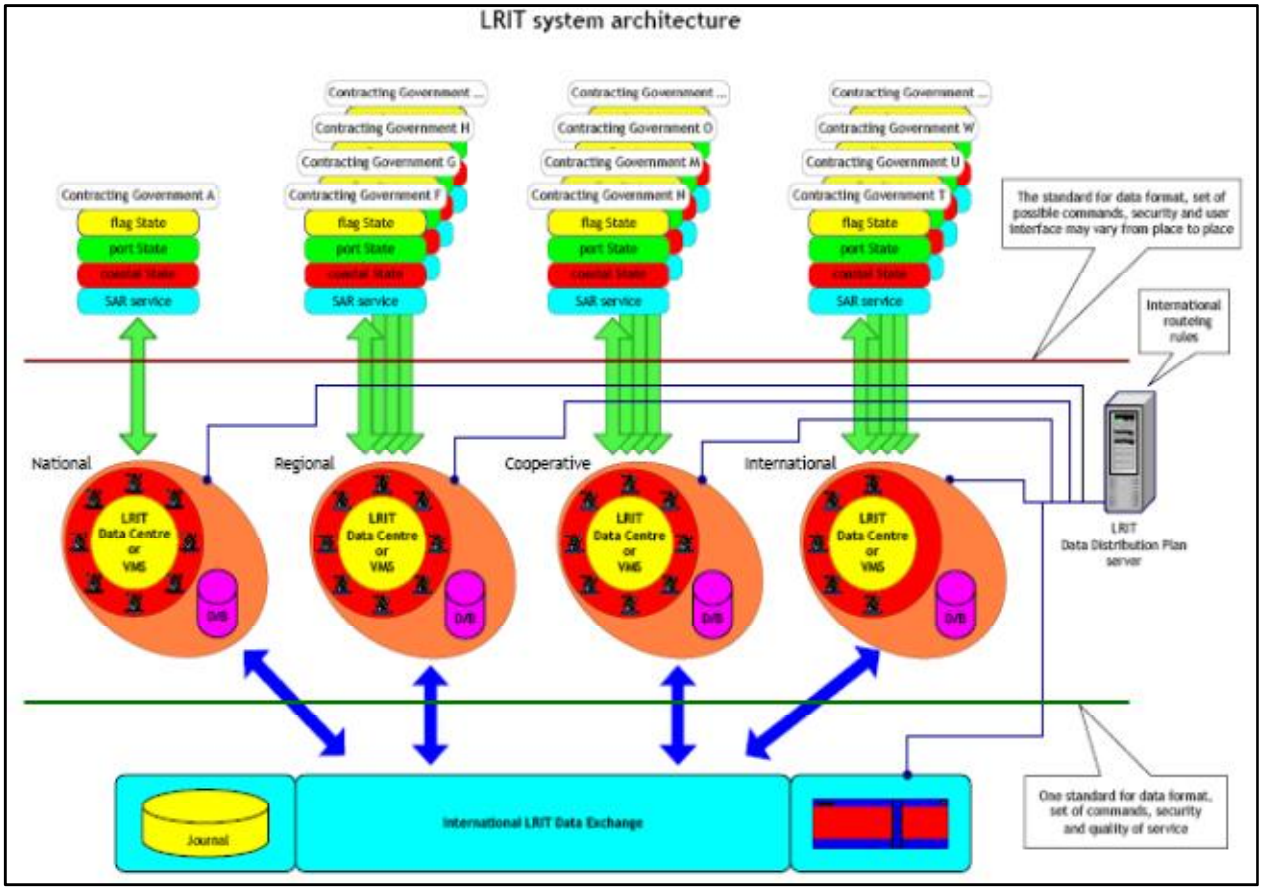
(d) The LRIT Data Centres stores the LRIT information & disseminates LRIT information to DC users according to Data Distribution Plan & processes all messages to and from International Data Exchange.

(e) The LRIT Data Distribution Plan (DDP) contains standing orders and polygons data of contracting Governments

(f) The International LRIT Data Exchange (IDE) processes all LRIT messages among LRIT DCs& routes the LRIT message to appropriate DC.

(g) The LRIT Data users receive the LRIT information as per their entitlement.

(h) Certain aspects of the performance of the LRIT system are reviewed or audited by the IMSO LRIT Coordinator acting on behalf of the IMO and its Contracting Governments.



63. **National Data Centre for LRIT.** The Indian National Data Centre for LRITwas set up & made operational at Directorate General of Shipping (DGS) Mumbai in July 2009. It is the repository of the LRIT information (i.e. ship positional data) and is connected to the wider International LRIT system via the International Data Exchange (IDE) using a specific LRIT communications protocol. There is a complete back up at main sight and a disaster recovery centre at New Delhi. The Data Centre (DC) at DGS is manned 24 x 7. The Indian Navy & Coast Guard are stakeholders besides the DGS. The National Data Centre (NDC) continuously monitors Indian ships on international trade all over the world. Foreign ships can be monitored upto 1000 nautical miles from the Indian coast when the LRIT Standing Orders are opened. The Indian shipping companies (owners & managers) are also provided restricted access to LRIT monitoring through the web so that they can continuously monitor only their own vessels & report any shortcomings to the Data Centre. Further the shipping companies can update the data required by the DGS of their vessel & company details for maintaining the information accuracy of the vessels registered in the LRIT database. The Indian NDC has upgraded their LRIT data centre and can provide services of LRIT to other SOLAS Contracting countries.

AUTOMATIC IDENTIFICATION SYSTEM (AIS)

64. Automatic Identification System (AIS) is a ship and shore based data broadcast system, operating in the VHF maritime band. Its characteristics and capability make it a powerful tool for enhancing situational awareness, thereby contributing to the safety of navigation and efficiency of shipping traffic management. Each AIS system consists of one VHF transmitter, two VHF TDMA receivers, one VHF DSC receiver, and standard marine electronic communications links to shipboard display and sensor systems. Position and timing information is normally derived from an integral or external global navigation satellite system (e.g. GPS) receiver, including a medium frequency differential GNSS receiver for precise position in coastal and inland waters. Other information broadcast by the AIS, if available, is electronically obtained from shipboard equipment through standard marine data connections. Heading information and course and speed over ground would normally be provided by all AIS-equipped ships. Other information, such as rate of turn, angle of heel, pitch and roll, and destination and ETA could also be provided. Although only one radio channel is necessary, each station transmits and receives over two radio channels to avoid interference problems, and to allow channels to be shifted without communications loss from other ships. Each station determines its own transmission schedule (slot), based upon data link traffic history and knowledge of future actions by other stations. A position report from one AIS station fits into one of 2250 time slots established every 60 seconds. AIS stations continuously synchronize themselves to each other, to avoid overlap of slot transmissions. The required ship reporting capacity according to the IMO performance standard amounts to a minimum of 2000 time slots per minute, though the system provides 4500 time slots per minute. The system coverage is similar to other VHF applications, essentially depending on the height of the antenna. Its range is slightly better than that of radar, due to the longer wavelength, so it's possible to "see" around bends and behind islands if the land masses are not too high. A typical value to be expected at sea is nominally 20 nautical miles. With the help of repeater stations, the coverage for both ship and VTS stations can be improved considerably. ITU-R Recommendation M.1371-1 describes the following types of AIS:

(a) Class A
(b) Class B

65. **Class A.** A Class A AIS unit broadcasts the following information every 2 to 10 seconds while underway, and every 3 minutes while at anchor at a power level of 12.5 watts. The information broadcast includes:

(a) MMSI number - unique referenceable identification.
(b) Navigation status (as defined by the COLREGS - not only are "at anchor" and "under way using engine" currently defined, but "not under command" is also currently defined).
(c) Rate of turn - right or left, 0 to 720 degrees per minute (input from rate-of-turn indicator).
(d) Speed over ground - 1/10 knot resolution from 0 to 102 knots.
(e) Position accuracy - differential GPS or other.
(f) Longitude - to 1/10000 minute and Latitude - to 1/10000 minute.
(g) Course over ground - relative to true north to 1/10th degree.
(h) True Heading - 0 to 359 degrees derived from gyro input.
(j) Time stamp - The universal time to nearest second that this information was generated.

66. In addition, the Class A AIS unit broadcasts the following information every 6 minutes:

(a) MMSI number - same unique identification used above, links the data above to described vessel.

(b) IMO number - unique referenceable identification (related to ship's construction).
(c) Radio call sign - international call sign assigned to vessel, often used on voice radio.
(d) Name - Name of ship, 20 characters are provided.
(e) Type of ship/cargo - there is a table of possibilities that are available.
(f) Dimensions of ship - to nearest meter.
(g) Location on ship where reference point for position reports is located.
(h) Type of position fixing device - various options from differential GPS to undefined.
(j) Draught of ship - 1/10 meters to 25.5 meters [note "air-draught" is not provided].
(k) Destination - 20 characters are provided.
(l) Estimated time of Arrival at destination - month, day, hour, and minute in UTC.

67. **Class B.** Vessel mounted AIS transceiver (transmit and receive) operates using, either carrier-sense time-division multiple-access (CSTDMA) or SOTDMA. There are two separate IMO specifications for Class B. CSTDMA transceivers listen to the slot map immediately prior to transmitting and seek a slot where the 'noise' in the slot is the same or similar to back ground noise, thereby indicating that the slot is not being used by another AIS device. Class Bs transmits at 2 W and are not required to have an integrated display: Class Bs can be connected to most display systems which the received messages will be displayed in lists or overlaid on charts. Default transmit rate is normally every 30 seconds, but this can be varied according to vessel speed or instructions from base stations. The Class B type standard requires integrated GPS and certain LED indicators. Class B equipment receives all types of AIS messages.

68. **AIS Carriage Requirements.** The following vessels must have a properly installed, operational, type approved AIS:

(a) Self-propelled vessels of 65 feet or more in length, other than passenger and fishing vessels, in commercial service and on an international voyage;
(b) Passenger vessels, of 150 gross tonnage or more;
(c) Tankers, regardless of tonnage;
(d) Vessels, other than passenger vessels or tankers, of 50,000 gross tonnage or more; and
(e) Vessels, other than passenger vessels or tankers, of 300 gross tonnage or more but less than 50,000 gross tonnage;
(f) Towing vessels of 26 feet or more in length and more than 600 horsepower, in commercial service.

69. **IMO's Provisions for AIS Shore Infrastructure.** IMO's SOLAS Convention, as revised, Regulation 19, A§2.4.5, states with regard to the purpose of the AIS:

"AIS shall

(a) Provide automatically to appropriate equipped shore stations, other ships and aircraft information, including ship's identity, type, position, course, speed, navigational status and other safety-related information;
(b) Receive automatically such information from similarly fitted ships;
(c) Monitor and track ships; and
(d) Exchange data with shore-based facilities."

70. In addition, the IMO Performance Standards for the AIS state:

(a) The AIS should improve the safety of navigation by assisting in the efficient navigation of ships, protection of the environment, and operation of Vessel Traffic Services (VTS), by satisfying the following functional requirements:
(i) In a ship-to-ship mode for collision avoidance;

(ii) As a means for littoral States to obtain information about a ship and its cargo; and

(iii) As a VTS tool, i.e. ship-to-shore (traffic management).

(b) The AIS should be capable of providing to ships and to competent authorities, information from the ship, automatically and with the required accuracy and frequency, to facilitate accurate tracking. Transmission of the data should be with the minimum involvement of ship's personnel and with a high level of availability.

(c) The installation, in addition to meeting the general requirements as set out in IMO resolution should meet the following requirements to applicable ITU Regulation Recommendations:-

(i) That such a system should be used primarily for surveillance and safety of navigation purposes in ship to ship use, ship reporting and vessel traffic services (VTS) applications. It could also be used for other maritime safety related communications, provided that the primary functions were not impaired;

(ii) That such a system would be capable of expansion to accommodate future expansion in the numbers of users and diversification of applications, including vessels which are not subject to IMO AIS carriage requirement, Aids-to-Navigation and Search and Rescue." (Recommendation ITU-R M.1371-1)

71. **Governing Organisations/ Regulations.** Following are the organisations and regulations on AIS:

(a) **IMO.** IMO has laid out the regulations for AIS through the following:
(i) IMO Regulation 19 - Carriage Requirements for SOLAS Vessels.
(ii) Performance Standard for a Universal Ship borne AIS MSC 74 (69).

(b) **ITU.** Technical Characteristics of AIS - Regulation M.1371;

(c) **IALA.**
(i) Provision of shore based AIS Recommendation A - 123
(ii) Shore Stations and networking aspects related to AIS Service A - 124
(iii) AIS for Aids to Marine Navigation A – 126

72. **AIS Information.**

Ship to Shore	**Shore to Ship**
Ship's Identification (MMSI)	Aid to Navigation
Speed, course, position	Search & Rescue
Destination	Port related information
Type of cargo (HAZMAT)	Channel management
	DGNSS corrections
	Maritime Safety Information (MSI)

73. **National AIS Network Concept.** The Automatic Identification System (AIS) provides for transmission of ship's Identity, type, position, course, speed, navigational status and other safety-related Information to the shore stations. Whenever vessel traffic Services (VTS) is set up, these inputs essentially contribute to overall affective control and management. With a view to putting the data transmitted by AIS to their best use, it is envisaged to set up a national AIS network with AIS Base stations located at suitable intervals along the entire coastline and provided with Radio data links. These links can be utilized to transmit the data to the nearest local authority, viz. ports, harbours, etc. who would be interested in monitoring the vessel traffic in their respective jurisdictions. Such a national network will also function as a safety related information service and extend assistance in search and rescue operations whenever necessary. Most AIS networks have a data repository (database) for logging AIS data for replaying any incident and for performing

statistical analysis of vessel traffic. A national AIS network will also be helpful in standardizing the equipment, as ISPS code is descriptive and not equipment specific.

(a) AIS Shore Station. An AIS shore station is a ship's AIS with additional functionalities. Some of these additional functionalities are:

(i) Channel Management.
(ii) Broadcast of DGNSS correction.
(iii) Broadcast of maritime safety information.
(iv) Initiate polling.

(b) Requirement of AIS Shore Station.

(i) All the SOLAS vessels above 300 tons have been fitted with ship's AIS (Dec 2004).

(ii) All the ports and port facilities have been complied with the ISPS (International Ship and Port Facility Security) code (July 2004).

(iii) As a requirement of ISPS, ports are required to monitor vessel movement within their port limits.

(iv) Monitor ship movement in the territorial waters & pass on safety related messages to ships, thus avoiding accidents.

(v) Carry out effective Search & Rescue.

(vi) Provide more accurate navigation by broadcast of DGNSS corrections.

74. The AIS shore station shall be installed at:-

(a) All major & minor ports for compliance towards ISPS;
(b) All lighthouses where DGPS broadcast stations have been installed;
(c) All intermediate spaces to provide a nationwide seamless coverage;

75. **Organizations involved in the project.**

(a) **Ports**: for compliance with ISPS for managing traffic and broadcast all safety related messages.

(b) **DGLL**: for establishment and maintenance of the network provide DGNSS corrections.

(c) **DG SHIPPING**: National Competent Authority.
(d) **Coast Guard**: for search & rescue information.
(e) Indian Navy.
(f) **IPA & Maritime Boards**: coordination between various ports.

76. **Proposed System Architecture**: The proposed National AIS Network Service shall consist of following:-

(a) National Data Centre (NDC) at Mumbai.

(b) One Coastal Control Centre (CCC) at Mumbai. NDC and CCC Mumbai shall be co-located.

(c) One Coastal Control Centre (CCC) at Vishakhapatnam.

(d) Six Regional Control Centres (RCC) at Jamnagar, Mumbai, Cochin, Chennai, Visakhapatnam & Kolkata.

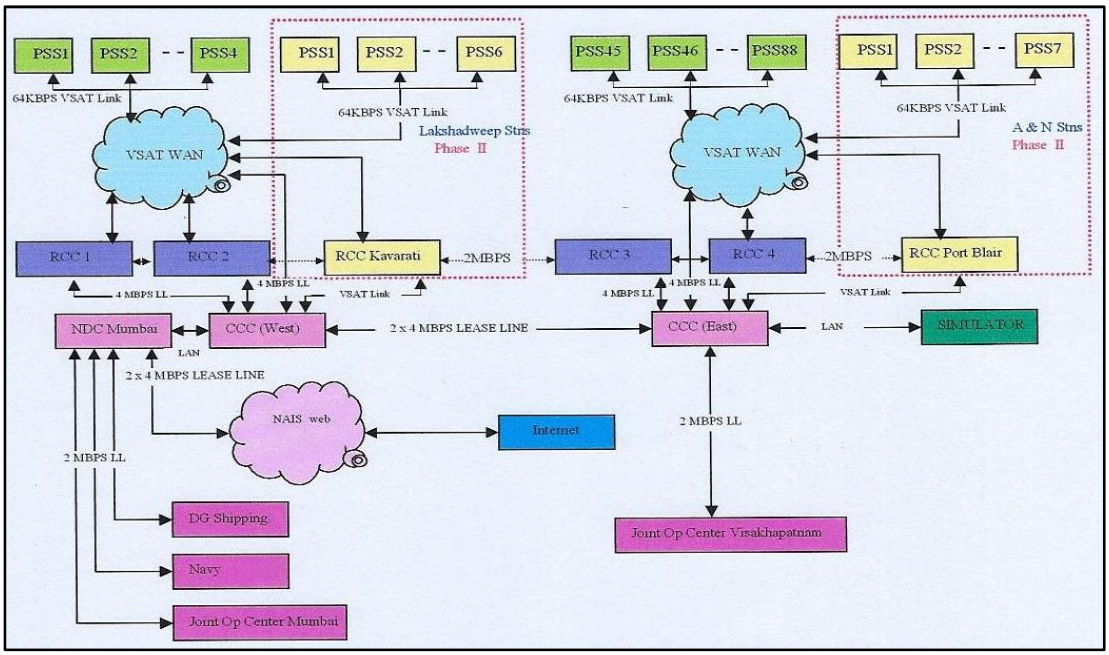
(e) About 74 Physical Shore Stations (PSS) at selected locations (Appendix 'E').
(f) AIS Base stations, to work in redundant configuration.
(g) AIS Network Server Solution Routing AIS Information to all RCCs & CCCs.
(h) Display systems for operators.
(j) AIS Network Manager.
(k) Data logging Facility.
(l) Data Communication Facilities – VSAT and Leased Lines.

(m) Connection facilities for various users of AIS Information.
(n) Secure AIS.
(p) Interfaces for Radar, LRIT, DSC and Lloyds Fairplay Data base.

77. The National AIS Network shall collect information at remote sites via the Physical Shore Stations (PSS) and shall distribute this information to various clients through Logical Shore Stations (LSS) at the RCCs & CCCs.

(a) PSS. IALA guidelines (Volume 1, Part II – Technical Issues) defines PSS as the most basic AIS-related entity, which can exist on its own in a real physical environment, as opposed to an AIS base station or AIS repeater station which need supporting infrastructures.
(b) LSS. IALA guidelines (Volume 1, Part II – Technical Issues) defines LSS as a software process, which transforms the AIS data flow associated with one or more PSS into a different AIS- related data flow.

78. The network architecture is shown in below:



Network Architecture for National AIS System

79. The PSS shall be connected via 64 Kbps links to the 4(four) Regional Control Centres via VSAT. RCCs on the East Coast shall be connected to CCC Vishakhapatnam and RCCs on West Coast shall be connected to CCC Mumbai via Mbps Leased Line circuits. The RCCs are interconnected via Mbps leased line. The RCCs are essentially maintenance positions where they would monitor the status of the PSS under their maintenance responsibility. This line shall be used to exchange the data between the Server Sites for complete data replication and redundancy. Both the CCCs will be interconnected by Mbps leased line. The AIS data shall be stored in a database at the two CCC's at Mumbai and Vishakhapatnam. CCC Mumbai will host the master database and will also function as National Data Centre. The redundant offsite storage shall be at Vishakhapatnam. These RCCs & CCCs shall be interconnected using WAN link. From the AIS Coastal Control Centre, users shall retrieve the stored data locally to provide a graphical playback of the data and perform associated statistical analysis. The graphical playback and statistical analysis functions will also be capable of using the AIS data storage located at any of the RCCs or the National Data Centre. The gateways for connection to the National Data Centre (NDC) shall

also be co-located at the CCC West. The capability to control and monitor the AIS Service shall be provided at each of the Regional Headquarters as well as at the two CCCs.

80. The National AIS Network shall include two AIS Coastal Control Centres (Mumbai and Vishakhapatnam). The Coastal Control Centres at Mumbai will also host National Data Centre (NDC). The primary clients (DG Shipping, Ports, Navy, and Coast Guard) shall connect to the NDC through leased lines to get data and other authorized users shall use the internet. Any one of the AIS Control Centre shall take the responsibility of maintaining the AIS Service Management (ASM) functionality and Data storage in case of failure the other Control Centre.

81. Each Regional Headquarters shall operate independently of the Control Centres as follows:-

(a) The LSS Process shall run on dual redundant hot standby servers located at the RCCs/CCCs. The servers shall provide one or several LSS Processes to RCCs and Coastal Control Centre locations, National Data Centre and other clients using the National AIS Network.

(b) The RCCs on the West Coast shall be located at Jamnagar, Mumbai & Cochin. The RCCs for the East Coast shall be located at Chennai, Visakhapatnam & Kolkata. The AIS Service Management (ASM) shall run on dual redundant hot standby server located at four RCCs and the two CCCs locations.

82. National AIS Network shall be configurable to share AIS data between RCCs using the network. These include received AIS data and transmit and receive binary messages from any RCC to any ship using Client Displays. The AIS Database system shall run on dual redundant hot standby server located at two CCCs. The main national AIS database shall be located at the National Data Centre in Mumbai.

83. The National Data Centre shall also host an AIS Web server that is capable of supplying 100 simultaneous AIS Web Viewers. The LSS process located at National Data Centre shall provide the Network Administrator with the ability to filter AIS information based on Client connections (Username/Password).

84. **AIS Service Management.** The AIS Service Management shall be the controlling entity for all of the AIS related Software and Hardware components comprising the National AIS Network. The ASM shall administer, configure and provide status monitoring of the entire National AIS Network. The ASM shall configure and define the network communication relationship between Physical Shore Stations and their associated Logical Shore Stations and between the Logical Shore Stations and the Clients. Data Sources

85. **Data Sources**. The National Data Centre database will receive data from following sources:-

(a) AIS (PSS and LSS)
(b) LRIT Data from LRIT Data Centre
(c) Lloyds Fairplay data from their databases
(d) Radar Data
(e) CCTV data

86. **Coastal Control Centres (CCC).** Two CCCs have been envisaged, for the East Coast at Visakhapatnam and West Coast at Mumbai. The RCCs on the East Coast shall connect to the CCC (East) and RCCs on the West Coast shall connect to CCC (West). In case of failure of any of the CCC, the PSSs shall connect to the working CCC. Therefore each CCC would work in Hot Stand By mode. The CCC at Mumbai shall also carry out functions of National Data Centre. The AIS Control Centres shall provide distribution of AIS data to Regional Control Centre.

87. **Regional Control Centres (RCC).** The AIS Network shall have six Regional Control Centres. The RCCs on the West Coast shall be located at Jamnagar, Mumbai and Cochin & Chennai, Visakhapatnam and Kolkata for the East Coast

88. **National Data Centre.** The National Data Centre shall be located at Mumbai. The NDC shall be connected through CCC (West) through a LAN. The CCC West shall provide distribution of AIS data to clients and between RCC and National Data Centre.

89. **AIS Coverage.** The locations of the AIS Base Stations are chosen in such a way that entire Coast shall be tracked by combination of about 88 AIS Base Stations. The system designed shall be in such a way that each AIS Sensor has built in redundancy. In case one AIS sensor becomes fully inoperable, the availability of data of remaining stations and other relevant data at affected stations shall be available at National AIS RCCs and CCCs and other user stations.

90. **Operational.** The National AIS is Operational w.e.f 01 Dec 2012.

Appendix 'A'
(Refers to Para 6)

STANDARD REPORTING FORMAT AND PROCEDURES

Telegraphy	***Telephone (Alternative)***	***Function***	***Information** required*
Name of the system	Name of the system		
INSPIRES	**INSPIRES**	System Identifier	Ship reporting System
	State in full	Types of Report	Types of report
1. SP		1. Sailing Plan	
2. PR		2. Position Report	
3. DR		3. Deviation Report	
4. FR		4. Final Report	
5. Give in Full		5. Any other Report	
A (Alpha)	Ship	Ships name and Call Sign or ships station Identity	
B (Bravo)	Time	Date and Time	A6 digit group giving day of month of event (first two digits) hours and minutes UTC (last four digits)
C (Charlie)	Position	Position	A4 digit group giving Lat. in Degree and Minute suffix with N/S and a four digit group giving Long. in Degree and Minutes suffix with E/W.
D (Delta)	Position	Position	True bearings (first 3digits) and distance (two digits) in nautical miles from a clearly identified landmark (State landmark)
E (Echo)	Course	True Course	A 3 digit group
F (Foxtrot)	Speed	Speed	A 3 digit group in knots and tenths of Knots.
G (Golf)	Departed	Port of Departure	Name of last port of call.
H (Hotel)	Entry	Date, Time & Point If entry into system	Entry time expressed as in(B) and exit position expressed as in (C) or (D).
I (India)	Destination and Ee-Tee-Aye	Destination and expected time of Arrival	Name of port and date time group expressed as in (B)
J (Juliet)	Pilot	Pilot	State whether a deep sea or local pilot is onboard.
K (Kilo)	Exit	Date, Time & Point	Exit time expressed as in (B) and of exit from the system exit position expressed as in (C) or (D).
L (Lima)	Route	Route information	Intended track (see Note 1)
M (Mike)	Radio	Radio	State in full name of Communication station/frequencies guarded
N (November)	Next Report	Time of Next Report	Date time group expressed in (B)
O (Oscar)	Draught	Maximum present static Draught in metres	4 digits giving in metres and cms
P (Papa)	Cargo	Cargo	Cargo and brief details of any dangerous cargo including harmful substances and gases that could endanger persons or the environments
Q (Quebec)	Defect/Damage Deficiencies, deficiencies	Defect/Damage Deficiencies, other limitations	Brief details of defects, damage, or other limitations

	Limitations		
R (Romeo)	Pollution	Description of pollution incident or observation	Brief details, including type of pollution (oil, chemicals, etc.) positionexpressed as in (C) or (D)
S (Sierra)	Weather	Weather conditions to report cyclonic condition only	Brief details.
*T (Tango)	Agent	Ships representative	Details of name and particulars of ships representative for provision of information
*U (Uniform)	Size and Type	Ship size and Type	Details length, breadth (in mtrs) gross tonnage and type etc. as required.
V (Victor)	Medical	Medical personnel	Doctor, Physician's assistant, personnel Nurse, No Medic.
W (Whisky)	Persons	Total No. of persons Onboard	State number
X (XRay)	Remarks	Miscellaneous	Any other information- give brief details.

Note :- 1. For route information latitude and longitude should be given for each turning point, expressed as in C above, together in type of intended track between these points, e.g. RL (Rhumb-Line), 'GC' (Great circle) or coast or in the case of coastal sailing, the estimated date of passing significant point expressed by a digit group as in (B) above.

2. The International Code of Signals should be used in the report wherever language problems exist. When the International Code is used, the appropriate indicator should be inserted after the alphabetical index in the text.

*3. Information under 'T and U' groups shall be provided by the ship owner or agent of the Indian Ships. All other ships may include this information in sailing plan (SP) on departure from any Indian Port or entry into the system.(**Only for INSPIRES**)

Message should normally contain the following Groups:-

(a) SAILING PLAN : Consists of items A,B,E,F,G,I,L,M,N,O,P,V,W. Items C, D and H should be added on entering the area. * (Please see Note No.3)

(b) POSITION REPORT:Consists of items A, B, C or, D,E,F,G, H, I, LM, N, O, P, V & W.

(c) DEVIATION REPORT (DR): Consists of items A,B,C or D; items E, F, L,. N and Q if appropriate.

(d) FINAL REPORT: Consists of items A, B, C or D items E, F, K & Lshould be added when leaving area.

Appendix 'B'
(Refers to Para 8)

RECEIVING STATIONS

Sl.No.	Station	Call Sign	Frequency band Covered.	Hours of Watch Keeping	Answering Freq.kHz	Ship Calling Freq. Band - Ship Working Frequency*
1.	COMCEN Mumbai	VTF2	4178-4187	1430-0230	4283	(CH5) 4181.6 to 4182 (CH6) 4182 to 4182.4
		VTF 3	6267-6280.5	1430-0230	6386.5	(CH5) 6272.4 to 6273 (CH6) 6273 to 6273.6
		VTF 4	8356 8374	continuous	8566	(CH5)8363.2 to 8364 (CH6)8364 to 8364.8
	Al	VTF 5	12534-12561	continuous	12849	(CH5)12544.8 to 12546 (CH6)12546 to 12547.2
		VTF 6	16712-16748	0230-1430	17132	(CH5)16726.4 to16728 (CH6)16728 to16729.6
2.	COMCEN Vishakhapatnam	VTO 2	4178-4187	1430-0230	4283	(CH5)4181.6 to4182 (CH6)4182 to4182.4
		VTO 3	6267-6280.5	continuous	6386.5	(CH5)6272.4 to 6273 (CH6)6273 to 6273.6
		VTO 4	8356-8374	continuous	8566	(CH5)8363.2 to 8364 (CH6)8364 to 8364.8

*Ships are to indicate their working frequency to COMCEN.

Appendix 'C'
(Refers to Para 8)

Frequencies, Call Signs, Class of Emission, Scheduled Time and Details of Transmission of broadcast by COMCEN Mumbai (BN) and COMCEN Vishakhapatnam (VN) are tabulated below:-

(a) Broadcast by COMCEN Mumbai (BN):

Name of Station	Call Sign	Frequencies kHz	Class of	Scheduled Time Emission (UTC)	Details of Transmission
COMCEN Mumbai (Main Station)	VTG 3	2072		0500 Main	VTG 4 Continuous
	VTG 4	4268			VTG 6
	VTG 5	6467	Al	1500	VTG 7
	VTG 6	8634			
	VTG 7	12808.5		0900 Repeat Period	VTG 3 Night VTG 5 (1430-0230 UTC)
	VTG 8	16938			
	VTG 9	22378		1215 Sunday Summary	VTG 8 Day VTG 9 (0230-1430 UTC)

(b) Broadcast by COMCEN Vishakhapatnam (VN):

Name of Station	Call Sign	Frequencies kHz	Class of	Scheduled Time Emission (UTC)	Details of Transmission
COMCEN Vishakhapatnam	VTP 3	2295		0500 Main	VTP 4 Continuous
	VTP 4	4238		1500	VTP 6 (Supplementary Station)
	VTP 5	6418	Al		
	VTP 6	8646		0900 Repeat Period	VTP 3 Night (1430-0230 UTC).
	VTP 7	12840			VTP 5
				1215 Sunday Summary	VTP 7 Day (0230-1430 UTC)

Appendix 'D'
(Refers to Para 37)

PROCEDURE FOR POSITION REPORTING FOR 'INDSAR'

Open Address Book (F3)

- Select New
- Write pos or 43
- Choose Special access (use space bar to choose)
- Write 43 against special access code
- Choose 7 bit
- The **OK**
- ESC

Now 43 has an entry in your address book

- Go to File (use ESC to do this or Alt F)
- Select New telex
- And then compose your message
- Latitude …….
- Longitude …….
- Course …….
- Speed ……..
- Time ……

Add whatever relevant information required as per INDSAR

- Then press Alt T to open Transmit window
- Write pos or 43 (whatever you have mentioned in the address book) Enter. (Also up down arrow can be used)
- Choose Earth Station (use space bar to choose from list) Enter
- Text in editor Enter
- Routine Enter
- Request confirmation Enter
- Immediate transmission Enter
- Then Send Enter

After some time go to logs choose trans and see whether your message has been transmitted successfully. If not, go to the MRN and contact LES.

Appendix 'E'
(Refers to Para 77)

LIST OF PHYSICAL SHORE STATIONS

SL. No.	LOL No.	Name of Lighthouse	Lat /Long. N/E	MMSI No	SERVICE DETAILS	TYPE	TRANSMITTED MESSAGE TYPES	REMARKS
1	0396	Dwarka Point Lt	22°14'.26N 68°57'.52E	4192211	Operational	Class A	A to N Messages	
2	0398	Navadra Lt	21°57'.02N 69°14'.10E	4192212	Operational	Class A	A to N Messages	
3	0400	Porbandar Lt	21°37'.33N 69°37'.19E	4192213	Operational	Class A	A to N Messages	
4	0404	Navibander Lt	21°27'.00N 69°47'.20E	4192214	Operational	Class A	A to N Messages	
5	0406	Mangrol Lt	21°06'.48N 70°06'.35E	4192215	Operational	Class A	A to N Messages	
6	0410	Veraval Lt	20°54'.68N 70°21'.20E	4192216	Operational	Class A	A to N Messages	
7	0414	Diu Head Lt	20°41'.48N 70°49'.65E	4192217	Operational	Class A	A to N Messages	
8	0432	Jafarabad Lt	20°51'.40N 71°22'.95E	4192218	Operational	Class A	A to N Messages	
9	0438	Jegri Island	21 02.42 N 71 48.27 E		Operational	Class A	A to N Messages	
10	0444	Gopnath Point Lt	21°12'.20N 72°06'.63E	4192219	Operational	Class A	A to N Messages	
11	0448	Piram Island Lt	21°35'.91N 72°21'.19E	4192220	Operational	Class A	A to N Messages	
12	0470	Luhara Point Lt	21°39'.52N 72°32'.95E	4192221	Operational	Class A	A to N Messages	
13	0476	Hazira Point Lt	21°05'.49N 72°38'.60E	4192222	Operational	Class A	A to N Messages	
14	0479	Kanai Creek Lt	20°48'.62N 72°49'.65E	4192223	Operational	Class A	A to N Messages	
15	0489	Umargam Lt	20°11'.75N 72°44'.91E	4192224	Operational	Class A	A to N Messages	
16	0491.5	Tarapur Point Lt	19°50'.80N 72°39'.42E	4192225	Operational	Class A	A to N Messages	
17	0499	Utan Point Lt	19°16'.70N 72°46'.85E	4192226	Operational	Class A	A to N Messages	
18	0558	Korlai Fort Lt	18°32'.30N 72°54'.36E	4192227	Operational	Class A	A to N Messages	
19	0562	Nanwell Point Lt	18°16'.83N 72°56'.16E	4192228	Operational	Class A	A to N Messages	
20	0566	Tolkeshwar Point Lt	17°33'.94N 73°08'.47E	4192229	Operational	Class A	A to N Messages	
21	0580	Ratnagiri Lt	16°59'.26N 73°16'.34E	4192230	Operational	Class A	A to N Messages	
22	0586	Wagapur Point Lt	16°36'.36N 73°19'.25E	4192231	Operational	Class A	A to N Messages	
23	0590	Devgarh Lt	16°23'.33N 73°22'.32E	4192232	Operational	Class A	A to N Messages	
24	0598	Vengurla Rocks Lt	15°53'.38N 73°27'.78E	4192233	Operational	Class A	A to N Messages	
25	0606	Aguada Lt	15°29'.51N 73°46'.36E	4192234	Operational	Class A	A to N Messages	

26	0634	Oyster Rocks Lt	14°49'.22N 74°03'.63E	4192235	Operational	Class A	A to N Messages	
27	0644	Honavar Lt	14°16'.58N 74°26'.61E	4192236	Operational	Class A	A to N Messages	
28	0648	Bhatkal Lt	13°57'.98N 74°32'.00E	4192237	Operational	Class A	A to N Messages	
29	0658	Kap Lt	13°13'.37N 74°44'.27E	4192238	Operational	Class A	A to N Messages	
30	0660	Suratkal Point Lt	13°00'.29N 74°47'.39E	4192239	Operational	Class A	A to N Messages	
31	0668.5	Kasargod Lt	12°30'.30N 74°58'.40E	4192240	Operational	Class A	A to N Messages	
32	0669.5	Kotte Kunnu Lt	12°00'.37N 75°12'.16E	4192241	Operational	Class A	A to N Messages	
33	0682	Kadalur Point	11 28.15 N 75 38.24 E		Operational	Class A	A to N Messages	
34	0689	Beypore Lt	11°09'.48N 75°48'.35E	4192242	Operational	Class A	A to N Messages	
35	0692	Ponnani Lt	10°46'.50N 75°55'.20E	4192243	Operational	Class A	A to N Messages	
36	0698	Kochi (Cochin) Lt	09°59'.90N 76°13'.30E	4192244	Operational	Class A	A to N Messages	
37	0706	Alappuzha Lt	09°29'.63N 76°19'.25E	4192245	Operational	Class A	A to N Messages	
38	0712	Tangasseri Point Lt	08°52'.80N 76°33'.90E	4192246	Operational	Class A	A to N Messages	
39	0718	Vizhinjam Lt	08°22'.97N 76°58'.78E	4192247	Operational	Class A	A to N Messages	
40	0726	Cape Comorin Lt	08°04'.82N 77°32'.84E	4192248	Operational	Class A	A to N Messages	
41	0730	Manappad Point Lt	08°22'.30N 78°04'.12E	4194415	Operational	Class A	A to N Messages	
42	0734	Pandiyan Island Lt	08°47'.14N 78°11'.83E	4194416	Operational	Class A	A to N Messages	
43	0738	Kilakkarai Lt	09°13'.50N 78°46'.92E	4194417	Operational	Class A	A to N Messages	
44	0900	Pamban Island Lt	09°17'.20N 79°13'.19E	4194418	Operational	Class A	A to N Messages	
45	0901.7	Ammapattinam Lt	10°00'.73N 79°13'.67E	4194419	Operational	Class A	A to N Messages	
46	0902	Kodikkarai Lt	10°16'.85N 79°49'.40E	4194420	Operational	Class A	A to N Messages	
47	0914	Nagappatinam Lt	10°45'.95N 79°51'.01E	4194421	Operational	Class A	A to N Messages	
48	0919	Porto Novo Lt	11°30'.22N 79°46'.24E	4194422	Operational	Class A	A to N Messages	
49	0926	Pondicherry Lt	11°54'.99N 79°49'.85E	4194423	Operational	Class A	A to N Messages	
50	0932	Mahabalipuram Lt	12°36'.95N 80°11'.50E	4194424	Operational	Class A	A to N Messages	
51	0936	Chennai Southern Lt	13°02'.39N 80°16'.77E	4194425	Operational	Class A	A to N Messages	
52	0950	Pulicat Lt	13°25'.27N 80°19'.61E	4194426	Operational	Class A	A to N Messages	
53	0951	Armagon Lt	13°53'.55N 80°12'.20E	4194427	Operational	Class A	A to N Messages	
54	0952	Krishnapatnam Lt	14°17'.14N 80°08'.27E	4194428	Operational	Class A	A to N Messages	
55	0952.9	Vodarevu Lt	15°47'.73N 80°24'.61E	4194429	Operational	Class A	A to N Messages	

56	0952.5	Ramayapatnam Lt	15°02'.98N 80°03'.00E	4194430	Operational	Class A	A to N Messages	
57	0953	Nagayalanka Lt	15°47'.20N 80°59'.25E	4194431	Operational	Class A	A to N Messages	
58	0955	Machilipatnam Lt	16°14'.91N 81°14'.02E	4194432	Operational	Class A	A to N Messages	
59	0957	Antravedi Lt	16°19'.02N 81°43'.55E	4194433	Operational	Class A	A to N Messages	
60	0958	Sacramento Lt	16°35'.20N 82°16'.80E	4194434	Operational	Class A	A to N Messages	
61	0964	Vakalapudi Lt	17°00'.83N 82°16'.58E	4194435	Operational	Class A	A to N Messages	
62	0966	Pentakota Lt	17°17'.90N 82°37'.10E	4194436	Operational	Class A	A to N Messages	
63	0970	Dolphin's Nose Lt	17°40'.53N 83°17'.68E	4194437	Operational	Class A	A to N Messages	
64	0980	Santhapalli Lt	18°03'.95N 83°38'.21E	4194438	Operational	Class A	A to N Messages	
65	0982	Kalingapatnam Lt	18°20'.43N 84°07'.31E	4194439	Operational	Class A	A to N Messages	
66	0986	Baruva Lt	18°52'.08N 84°35'.08E	4194440	Operational	Class A	A to N Messages	
67	0988	Gopalpur Lt	19°15'.35N 84°54'.40E	4194441	Operational	Class A	A to N Messages	
68		Pragi	19°28'.00N 85°10'.00E		Operational	Class A	A to N Messages	
69	1002	Puri Lt	19°47'.20N 85°48'.40E	4194442	Operational	Class A	A to N Messages	
70	1003	Chandrabhaga Lt	19°52'.00N 86°06'.50E	4194443	Operational	Class A	A to N Messages	
71	1004.4	Paradip Lt	20°15'.32N 86°39'.38E	4194444	Operational	Class A	A to N Messages	
72		Maipura	20°42'.50N 87°15'.00E	4194445	Operational	Class A	A to N Messages	
73		Balasore	21°29'.18N 86°55'.01E	4194447	Operational	Class A	A to N Messages	
74	1028	Sagar Island Lt	21°39'.51N 88°02'.82E	4194446	Operational	Class A	A to N Messages	

Special Notice No. 9
FIRING PRACTICE AND EXERCISE AREAS; DANGER AREAS

1. Firing and bombing practices and Defence exercises, take place in a number of areas off the coasts of India.

2. Although limits of practice areas are not, in all cases, shown on charts and descriptions of areas do not appear in the Sailing Directions, these are given in the Appendix to this notice which may be plotted on the appropriate charts. Such range beacons, lights and marking buoys as may be of assistance to the mariner or targets which might be a danger to navigation will however, be indicated on navigational charts and, when appropriate, in Sailing Directions. Lights will be mentioned in the List of Lights. Precautions to be observed by mariners are given in paragraph 6 to 9 of this notice.

3. The principal types of practices carried out are:-

(a) Bombing practice from aircraft:-Warning signals are usually shown.

(b) Air to air, and air to sea or ground firing.

(i) The former is carried out by aircraft at a large white or red sleeve, a winged target or flag towed by another aircraft moving on a steady course. The latter is carried out from aircraft at towed or stationary target on sea or land, the firing taking place to seaward in the case of those on land.
(ii) As a general rule, warning signals are shown when the targets are stationary, but not when towed targets are used.
(iii) All marine craft operating as range safety craft, target towers or control launches for remote controlled targets will display for identification purposes, while in or in the vicinity of the danger area, a large red flag at the masthead.

(c) Anti-aircraft (AA) firing.

(i) This may be from AA guns or machine guns at a target towed by aircraft as in (b) above, a remotely piloted aircraft, at balloons or kites, or pyrotechnic flares or illumination bombs, or on simulated virtual target. Practice may take place from ships and shore batteries.
(ii) Warning signals, as a rule are shown from shore batteries. Ships fly a red flag.

(d) Firing from shore batteries or ships at sea at fixed or floating targets. Warning signals are usually shown as in (c).

(e) Rocket and Guided Weapons firing.

(i) These may take the form of (b), (c) or (d) above. All such firing are conducted under (Air and Sea) Range procedure. Devices are generally incorporated whereby the missiles may be destroyed should their flights be erratic.
(ii) Warning signals are usually shown as in (c) above.

(f) Underwater Firings.

(i) These may be undertaken by ships, submarines or aircraft and may include firing of rockets, torpedoes, depth charges or other underwater weapons.

(ii) As a general rule, warning signals are shown when the firing is undertaken by ships. Ships fly a red flag and red flashing fixed light by night.

(iii) In case of the firings being undertaken by submarines/ aircraft, all marine craft operating in vicinity as range safety craft, target towing vessels, aircraft controlling ships or those in or in vicinity of danger area, will display, for identification purpose a red flag at Masthead by day and red fixed/ flashing light by night"

4. Warning signals, when given, usually consist of red flags by day and red fixed or red flashing lights at night. *The absence of any such signal cannot, however, be accepted as evidence that a practice area does not exist.* Warning signals are shown from shortly before practice commences until it ceases.

5. Ships and aircraft carrying out night exercises may illuminate with bright coloured flares. To avoid confusion with International distress signals red or orange flares will be used in emergency only.

6. **CAUTION:** A vessel may be aware of the existence of a firing area from NAVAREA VIII warning messages, Coastal Warning messages, Local Notices to Mariners and by observing the warning signals or the practice.

7. The range authorities are responsible for ensuring that there is no risk of damage from falling projectiles, shell-splinters, bullets, etc., to any vessel which may be in a practice area.

8. If, however, a vessel finds herself in an area where practice is in progress, she should maintain her course and speed but; if she is prevented from doing this by the exigencies of navigation, it would assist the Range Authority if she would endeavour to clear the area at the earliest. Furthermore, if projectiles or splinters are observed to be falling near the vessel, all persons on board should take cover.

9. Fishermen operating in the vicinity of firing practice and exercise areas may occasionally bring unexploded missiles or portions of them to the surface in their nets or trawls. These objects may be dangerous and should be treated with great circumspection and jettisoned immediately, no attempt being made to tamper with them or bring them back for inspection by Naval Authorities.

DANGER AREAS

10. ***Thumba Equatorial Rocket Launching Station.*** Experimental high altitude meteorological/ scientific rocket firing takes place periodically from a launching site at Thumba (8°31.98N, 76°52'.05E) on the west coast of India.

RH 200/RH 300 MKII

11. Danger areas are as follows:-

(a) Area I. A sector of radius 5 NM (5.75 miles) from launcher azimuth angles 190° and 300°.

(b) Area II. A sector of radius 45 NM (51.78 miles) and 75 NM (86.30 miles) from the launcher between azimuth angles 220° and 260°.

(c) Area III. A sector of radius 110 NM (126.57 miles) from the launcher between azimuth angles 220° and 260°.

12. Mariners are, therefore, advised to keep clear of the danger areas shown above when firing is due to take place.

13. NAVAREA VIII and NAVTEX Warnings will be issued sufficiently in advance in accordance with Special Notice No. 12. Visual warnings are fired at the launch site as follows:-

(a) White signal flares at T-45 min (2 No).
(b) Red signal flares at T-40 min (2 No).
(c) Green signal flares at T+5 min (2 No, all clear signal)

14. Vessels unavoidably in danger area should contact MRCC/nearest RCC on GMDSS.

15. ***Baleswar (Balasore) Rocket Launching Station.*** Balasore is located on the East Coast of India and has been in use since 1989. The rocket launching site at Balasore is situated in a place named Chandipur. The Interim Test Range in Chandipur, Balasore is responsible for carrying out tests for various missiles such as Agni, Prithvi, Trishul etc. Position (21°25'.50N, 87°00'.16E).

16. Danger areas will be intimated to all concerned authorities prior to any operation.

17. Mariners are advised to keep clear of the danger areas when firing is due to take place.

18. NAVAREA VIII and NAVTEX Warnings will be issued sufficiently in advance in accordance with Special Notice No. 12. No visual warning signals are displayed.

19. ***Satish Dhawan Space Centre, SHAR, Sriharikota.*** Experimental high altitude satellite/sounding rocket launching takes place periodically from Sriharikota station on the East Coast of India.

20. **Sounding Rocket Launching Station (13°41'N, 80°14'E).** Danger areas are as follows**:-**

(a) RH 200/RH 300

(i) Danger zone-1 is a circle of 10 nautical miles from the launcher.
(ii) Danger zone-2 is a sector of radius of 15 nautical miles between azimuth angles of 80° and 120° from the launcher.
(iii) Danger zone-3 is a sector within radius of 40 nautical miles and 70 nautical miles between azimuth angles of 80° and 120° from the launcher.

(b) RH 560 variant-1 (13°41'.44N, 80°14'.05E)

(i) Danger zone-1 is a circle of 5 nautical miles from the launcher.

(ii) Danger zone-2 is a sector of radius of 25 nautical miles between azimuth angles of 80° and 120° from the launcher.
(iii) Danger zone-3 is a sector within radius of 180 nautical miles and 300 nautical miles between azimuth angles of 80° and 120° from the launcher.

(c) RH 560 variant-2 (13°41'.44N, 80°14'.05E)

(i) Danger zone-1 is a circle of 10 nautical miles from the launcher.
(ii) Danger zone-2 is sector between radii of 50 nautical miles and 250 nautical miles from launch pad coordinates and between azimuth angles of 80° and 120° from true north.

21. **Satellite Launching missions.** Danger areas are as follows**:-**

(a) PSLV- VARIANT-1 (13°43.'.9N, 80°14'.2E/13°43'.2N, 80°13'.8E) (Sun Synchronous orbit)

(i) Danger zone-1 is a circle of 10 nautical miles from the launcher.
(ii) Danger zone-2 is an area enclosed by following coordinates.
12°00' N, 81°00' E
12°30' N, 81°30' E
11°45' N, 82°05' E
11°15' N, 81°35' E

(iii) Danger zone-3 is a rectangular area enclosed by the following positions:-
09°35' N, 82°45' E
09°35' N, 83°20' E
08°25' N, 83°20' E
08°25' N, 82°45' E

(iv) Danger zone-4 is a rectangular area enclosed by the following positions:-
00°00' S, 81°35' E
00°20' S, 82°55' E
04°05' S, 82°10' E
03°45' S, 80°50' E

(v) Danger zone-5 is a rectangular area enclosed by the following positions:-
25°15' S, 74°45' E
25°55' S, 77°30' E
35°00' S, 75°20' E
36°45' S, 72°00' E

(b) PSLV-VARIANT-2 (13°43'.9N, 80°14'.2E/13°43'.2N, 80°13'.8E) (Sun Synchronous orbit)

(i) Danger zone-1 is a circle of 10 nautical miles around the launcher.
(ii) Danger Zone - 2 is an area enclosed by the following coordinates.
13°10' N, 80°25' E
13°25' N, 80°40' E
12°45' N, 81°15' E
12°30' N, 81°00' E

(iii) Danger Zone - 3 is an area enclosed by the following coordinates.

11°45' N, 81°20' E
12°10' N, 81°50' E
10°45' N, 82°55' E
10°20' N, 82°25' E

(iv) Danger Zone - 4 is an area enclosed by the following coordinates.

10°15' N, 82°30' E
10°40' N, 83°00' E
09°50' N, 83°35' E
09°25' N, 83°05' E

(v) Danger Zone-5 is an area bounded by following coordinates.

08°25' N, 83°20' E
08°25' N, 83°55' E
07°15' N, 83°55' E
07°15' N, 83°20' E

(vi) Danger Zone-6 is an area bounded by following coordinates.

03°00' S, 81°10' E
03°20' S, 82°30' E
07°05' S, 81°35' E
06°45' S, 80°15' E

(vi) Danger Zone-7 is an area bounded by following coordinates.

29°45' S, 73°35' E
30°25' S, 76°10' E
39°55' S, 73°40' E
39°15' S, 71°05' E

(c) PSLV- VARIANT-3 (13°43'.9N, 80°14'.2E/13°43'.2N, 80°13'.8E) (Geo Transfer orbit)

(i) Danger zone-1 is a circle of 10 nautical miles around the launcher.

(ii) Danger Zone - 2 is a sector between 15 nautical miles and 60 nautical miles from launch pad coordinates and between azimuth angles 130° and 150° from True North.

(iii) Danger zone-3 is an area enclosed by the following coordinates.

11°45'N, 81°20'E
12°10'N, 81°50'E
10°15'N, 83°15'E
09°50'N, 82°45'E

(iv) Danger zone-4 is an area enclosed by the following coordinates.

09°00'N, 83°10'E
09°00'N, 83°55'E
07°15'N, 83°55'E
07°15'N, 83°20'E

(v) Danger zone-5 is an area enclosed by the following coordinates.

01°00'N, 81°25'E

00°40'N, 83°25'E
04°05'S, 82°30'E
03°45'S, 80°30'E

(d) PSLV- VARIANT-4 (13°43'.9N, 80°14'.2E/13°43'.2N, 80°13'.8E) (Geo Transfer orbit)

(i) Danger zone-1 is a circle of 10 nautical miles around the launcher.

(ii) Danger zone-2 is sector between 25 nautical miles and 90 nautical miles from launch pad and between azimuth angles of 130° and 150° from true north.

(iii) Danger zone-3 is an area enclosed by the following coordinates.
10°55'N, 82°00'E
11°25'N, 82°30'E
10°10'N, 83°25'E
09°40'N, 82°55'E

(iv) Danger zone-4 is an area enclosed by the following coordinates.
09°20'N, 83°00'E
09°20'N, 83°35'E
07°15'N, 83°55'E
07°15'N, 83°20'E

(v) Danger zone-5 is an area enclosed by the following coordinates.
04°00'S, 81°05'E
04°20'S, 83°05'E
09°05'S, 82°10'E
08°45'S, 80°10'E

(vi) Danger zone-6 is an area enclosed by the following coordinates.
36°30'S, 72°30'E
37°00'S, 75°00'E
47°00'S, 72°30'E
46°30'S, 70°00'E

(e) PSLV- VARIANT-5 (13°43'.9N, 80°14'.2E/13°43'.2N, 80°13'.8E) (Geo Transfer orbit)

(i) Danger Zone-1 is a circle of 10 nautical miles around the launcher

(ii) Danger Zone-2 is a rectangular area bounded by the following coordinates.
12°45'N, 82°00'E
12°45'N, 84°00'E
13°45'N, 82°00'E
13°45'N, 84°00'E

(iii) Danger Zone-3 is a rectangular area bounded by the following coordinates.
12°00'N, 86°45'E
12°00'N, 87°15'E
12°45'N, 86°45'E
12°45'N, 87°15'E

(iv) Danger Zone-4 is a rectangular area enclosed by the following coordinates.
10°00'N, 95°00'E
10°00'N, 95°30'E
11°00'N, 95°00'E
11°00'N, 95°30'E

(v) Danger Zone-5 is a rectangular area enclosed by the following coordinates.
19°00'S, 132°00'W
21°00'S, 132°00'W
16°00'S, 120°00'W
18°00'S, 120°00'W

(f) PSLV- VARIANT-6 (13°43'.9N, 80°14'.2E/13°43'.2N, 80°13'.8E) (Geo Transfer orbit)

(i) Danger Zone-1 is a circle of 10 nautical miles around the launcher.
(ii) Danger Zone-2 is sector between radii of 40 nautical miles and 75 nautical miles from launch pad and between azimuth angles of 80° and 125° from True North.
(iii) Danger Zone-3 is a rectangular area bounded by the following coordinates.
12°45'N, 82°45' E
13°15'N, 82°45' E
13°15'N, 84°00' E
12°45'N, 84°00' E

(iv) Danger Zone-4 is a rectangular area bounded by the following coordinates.
12°25'N, 84°10' E
13°00'N, 84°10' E
13°00'N, 85°40' E
12°25'N, 85°40'E

(v) Danger Zone-6 is a rectangular area enclosed by the following coordinates.
08°50'N, 94°30' E
10°50'N, 94°30' E
10°50'N, 95°30' E
08°50'N, 95°30' E

(vi) Danger Zone-7 is a rectangular area enclosed by the following coordinates.
16°30'S, 130°00' W
17°30'S, 130°00' W
08°00'S, 90°00' W
09°00'S, 90°00' W

(g) PSLV- VARIANT-7 (13°43'.9N, 80°14'.2E/13°43'.2N, 80°13'.8E) (Geo Transfer orbit)

(i) Danger Zone-1 is a circle of 10 nautical miles around the launcher
(ii) Danger Zone-2 is an area enclosed by the following coordinates.
12°00'N, 81°10'E
12°30'N, 81°40'E
11°45'N, 82°15'E
11°15'N, 81°45'E

(iii) Danger Zone-3 is an area enclosed by the following coordinates.
09°30’N, 82°45’E
10°00’N, 83°15’E
08°55’N, 83°45’E
08°25’N, 83°15’E

(iv) Danger Zone-4 is an area enclosed by the following coordinates.
00°45’S, 87°40’E
00°05’S, 89°00’E
02°05’S, 89°55’E
02°45’S, 88°35’E

(v) Danger Zone-5 is an area enclosed by the following coordinates.
50°00’S, 147°30’E
47°30’S, 147°30’E
46°00’S, 152°00’E
46°00’S, 160°00’E
50°00’S, 160°00’E
51°00’S, 155°00’E

(h) GSLV- VARIANT-1 (13°43'.2N, 80°13'.8E) (Geo Transfer orbit)

(i) Danger zone-1 is a circle of 10 nautical miles around the launcher.
(ii) Danger zone-2 is an area bounded by the following coordinates.
11°50'N, 85°15'E
12°35'N, 85°25'E
12°15'N, 86°25'E
11°30'N, 86°15'E

(iii) Danger zone-3 is an area bounded by the following coordinates.
10°40'N, 89°05'E
11°20'N, 89°15'E
10°45'N, 90°45'E
10°05'N, 90°35'E

(iv) Danger zone-4 is an area bounded by the following coordinates.
07°50'N, 95°15'E
09°30'N, 95°15'E
09°30'N, 96°05'E
07°50'N, 96°05'E

(i) GSLV- VARIANT-2 (13°43'.2N, 80°13'.8E) (Geo Transfer orbit)

(i) Danger zone-1 is a circle of 10 nautical miles around the launcher.
(ii) Danger zone-2 is an area bounded by the following coordinates.
12°05'N, 84°50'E
12°50'N, 85°00'E
12°20'N, 86°20'E
11°35'N, 86°10'E

(iii) Danger zone-3 is an area bounded by the following coordinates.
10°55'N, 88°35'E

11°40'N, 88°45'E
11°05'N, 90°30'E
10°25'N, 90°20'E

(iv) Danger zone-4 is an area bounded by the following coordinates.
08°10'N, 95°10'E
09°50'N, 95°10'E
09°50'N, 96°05'E
08°10'N, 96°05'E

(j) GSLV- MKIII VARIANT-1 (13°43'.2N, 80°13'.8E) (Geo Transfer orbit)

(i) Danger zone-1 is a circle of 10 nautical miles around the launcher.
(ii) Danger zone-2 is a rectangular area enclosed by the following coordinates.
12°30'N, 82°40'E
13°15'N, 82°50'E
12°45'N, 84°10'E
12°00'N, 84°00'E

(iii) Danger zone-3 is a rectangular area enclosed by the following coordinates.
11°35'N, 85°00'E
12°25'N, 85°10'E
11°45'N, 87°15'E
10°55'N, 87°05'E

(iv) Danger zone-4 is a rectangular area enclosed by the following coordinates.
08°10'N, 94°20'E
09°00'N, 94°40'E
08°25'N, 96°15'E
07°35'N, 95°55'E

(k) RLV-TD VARIANT-1 (13°43'.9N, 80°14'.2E)

(i) Danger zone-1 is a circle of 10 nautical miles around the launcher.
(ii) Danger zone-2 is a rectangular area enclosed by the following coordinates.
13°54'N, 81°00'E
13°54'N, 86°00'E
13°24'N, 86°00'E
13°24'N, 81°00'E

22. Mariners are advised to keep clear of the above danger areas when launching is due to take place. However, as per mission requirement these danger areas are likely to be changed marginally.

23. NAVAREA VIII and NAVTEX Warnings will be issued sufficiently in advance in accordance with Special Notice No. 12. No visual warning signals are displayed.

24. Vessels unavoidably in danger areas should contact MRCC Chennai.

Appendix 'A'
(Refers to Para 2)

NAVAL EXERCISE AREAS

1. **Off Dwarka.**

Area D

a) 22° 12'.00 N, 068° 36'.20 E
b) 21° 15'.30 N, 069° 04'.00 E
c) 21° 09'.00 N, 069° 40'.00 E
d) 21° 15'.00 N, 069° 41'.00 E
e) 22° 12'.00 N, 068° 42'.00 E

2. **Off Navi Bandar.**

Area P

a) 21°00' N, 068°00' E
b) 21°00' N, 069°12' E
c) 20°20' N, 069°40' E
d) 20°00' N, 069°40' E
e) 20°00' N, 068°40' E

3. **Off Diu.**

Area Q

a) 20°52'.68 N, 070°03'.08 E
b) 20°31'.76 N, 070°58'.69 E
c) 20°18'.91 N, 070°59'.42 E
d) 20°19'.09 N, 070°51'.71 E
d) 20°01'.11 N, 071°02'.54 E
d) 20°24'.93 N, 070°04'.10 E

Area T

a) 19°14' N, 069°45' E
b) 19°47' N, 068°35' E
c) 20°36' N, 069°02' E
d) 20°02' N, 070°09' E

4. **Off Mumbai**

Area F

a) 18°02'.00 N, 068°40'.00 E
b) 18°43'.00 N, 068°40'.00 E
c) 18°43'.00 N, 068°58'.00 E
d) 18°02'.50 N, 069°28'.00 E

Area G

a) 18°02' N, 068°40' E
b) 18°43' N, 068°40' E
c) 18°43' N, 067°43' E

Area T

a) 18°28'.00 N, 071°36'.00 E
b) 18°31'.00 N, 071°43'.50 E
c) 18°34'.50 N, 071°43'.50 E
d) 18°31'.50 N, 071°36'.00 E

Area K

a) 18°25'.00N, 071°36'.00 E
b) 18°34'.00N, 071°36'.00 E
c) 18°40'.50N, 071°50'.50 E
d) 18°31'.50N, 071°50'.50 E

Area AA1

a) 18°59' N, 072°51' E
b) 18°59' N, 072°56' E
c) 18°56' N, 072°56' E

d) 18°56' N, 073°02' E
e) 18°47' N, 073°02' E
f) 18°47' N, 072°55' E
g) 18°34' N, 072°55' E
h) 18°34' N, 072°42' E
j) 18°55' N, 072°42' E
k) 18°55' N, 072°49' E

5. **Off Ratnagiri.**

Area M
a) 16°00' N, 071°45' E
b) 16°00' N, 072°15' E
c) 15°40' N, 072°15' E
d) 15°40' N, 071°45' E

Area J
a) 17°00' N, 070°00' E
b) 17°00' N, 070°25' E
c) 16°28' N, 070°28' E
d) 16°28' N, 070°04' E

Area C
a) 17°50' N, 071°30' E
b) 17°50' N, 071°52' E
c) 17°32' N, 071°52' E
d) 17°32' N, 071°30' E

Area VAD 31
a) 17°50' N, 072°28' E
b) 17°50' N, 072°45' E
c) 17°13' N, 072°42' E
d) 17°35' N, 072°28' E

Area UU
a) 18° 00' N 070°12' E
b) 18° 00' N 070°50' E
c) 17° 47' N 071°04' E
d) 17° 40' N 070°50' E
e) 17° 40' N 070°12' E

6. **Off Devgarh.**

Area R
a) 16°30' N, 070°30' E
b) 16°30' N, 071°00' E
c) 16°00' N, 071°00' E
d) 16°00' N, 070°30' E

7. **Off Goa.**

Area D
a) 15°24'N, 072°34'E
b) 15°06'N, 072°40'E
c) 15°00'N, 072°28'E
d) 15°18'N, 072°22'E

Area H
a) 15°33'N, 072°11'E
b) 15°30'N, 072°28'E
c) 15°10'N, 072°20'E
d) 15°13'N, 072°02'E

Area RR
a) 15°58' N, 072°22' E
b) 15°58' N, 072°48' E
c) 15°30' N, 072°52' E
d) 15°30' N, 072°28' E

8. **Off Karwar.**

Area SS

a) 14°36'N, 073°15'E
b) 14°12'N, 073°24' E
c) 14°04'N, 073°00'E
d) 14°28'N, 072°52'E

9. **Off Quilon.**

Area Z5

a) 09°05'.00 N, 075°50'.00 E
b) 08°50'.00 N, 075°59'.00 E
c) 08°39'.00 N, 075°31'.50 E
d) 09°01'.00 N, 075°31'.00 E

10. **Off Kochi.**

Area A

a) 10°00' N, 075°23' E
b) 08°47' N, 076°05' E
c) 08°47' N, 075°22' E
d) 10°00' N, 074°37' E

Area Y

a) 10°00' N, 073°51' E
b) 10°00' N, 074°40' E
c) 09°00' N, 074°40' E
d) 09°00' N, 073°51' E

Area Q

a) 08°15' N, 075°18' E
b) 08°15' N, 074°32' E
c) 08°59' N, 074°06' E
d) 08°59' N, 074°54' E

11. **Off Chennai.**

Area C

a) 13°10' N, 081°15' E
b) 13°40' N, 081°15' E
c) 13°40' N, 081°45' E
d) 13°10' N, 081°45' E

12. **Off Kakinada.**

Area Z4

a) 17°03'.00 N, 083°01'.50 E
b) 16°58'.50 N, 083°03'.50 E
16°49'.00 N, 082°44'.00 E
d) 16°52'.50 N, 082°43'.50 E

Area Z7

a) 16°58'.83 N, 083°03'.83 E
b) 16°56'.00 N, 083°04'.83 E c)
c) 16°47'.83 N, 082°43'.83 E
d) 16°49'.00 N, 082°44'.00 E

13. **Off Vishakhapatnam.**

Area R

a) 17°45'.00 N, 083°38'.50 E
b) 17°41'.00 N, 083°44'.50 E

Area Y

a) 17°45'.00 N, 083°57'.00 E
b) 17°53'.00 N, 084°04'.30 E

c) 17°32'.50 N, 083°38'.00 E
d) 17°37'.00 N, 083°32'.50 E

c) 17°47'.00 N, 084°10'.20 E
d) 17°39'.00 N, 084°02'.50 E
e) 17°46'.00 N, 084°03'.50 E

Area S
a) 17°29'.50 N, 083°26'.00 E
b) 17°21'.00 N, 083°31'.50 E
c) 17°28'.50 N, 083°38'.00 E
d) 17°37'.00 N, 083°32'.00 E

Area L
a) 17°24'.00 N, 083°51'.00 E
b) 17°14'.00N, 083°51'.00 E
c) 17°20'.50N, 084°00'.00 E
d) 17°30'.50N, 084°00'.00 E

Area V
a) 17°14'.00N, 083°49'.10 E
b) 17°02'.00N, 083°48'.70 E
c) 17°08'.50N, 084°00'.00 E
d) 17°20'.50N, 084°00'.00 E

Area W
a) 17°04'.00N, 083°18'.00 E
b) 17°12'.50N, 083°27'.00 E
c) 17°06'.00N, 083°34'.00 E
d) 16°58'.00N, 083°24'.50 E

Area G1
a) 17°09'.50N, 083°24'.00 E
b) 17°11'.20N, 083°22'.50 E
c) 17°21'.00N, 083°32'.20 E
d) 17°19'.20N, 083°34'.50 E

Area G2
a) 17°01'.50N, 083°07'.50 E
b) 17°08'.50N, 083°21'.00 E
c) 17°11'.00N, 083°19'.50 E
d) 17°04'.00N, 083°06'.00 E

Area Z
a) 17°40'.00N, 084°00'.00 E
b) 17°40'.00N, 084°30'.00 E
c) 17°10'.50N, 084°30'.00 E
d) 17°10'.50 N, 084°00'.00 E

Area Z1
a) 17°38'.80N, 083°46'.50 E
b) 17°33'.00N, 083°41'.00 E
c) 17°34'.00N, 083°37'.00 E
d) 17°41'.80N,083°43'.00 E

Area Z2
a) 17°40'.20 N, 083°44'.80 E
b) 17°32'.60 N, 083°38'.00 E
c) 17°37'.20 N, 083°32'.20 E
d) 17°45'.00 N, 083°39'.00 E

Area Z3
a) 17°26'.60 N, 083°37'.50 E
b) 17°18'.70 N, 083°30'.60 E
c) 17°20'.30 N, 083°27'.80 E
d) 17°28'.90 N, 083°34'.70 E

Area R1
a) 17°01'.00 N, 082°35'.00 E
b) 16°46'.00 N, 082°41'.00 E
c) 17°20'.00 N, 083°32'.00 E
d) 17°29'.00 N, 083°25'.00 E

Area R2
a) 16°46'.00 N, 082°41'.00 E
b) 16°39'.00 N, 083°00'.00 E
c) 16°52'.00 N, 083°34'.00 E
d) 17°15'.00 N, 083°24'.00 E

14. **<u>Off Gopalpur.</u>**

Area Z6
a) 19°17'.83 N, 085°37'.00 E
b) 19°21'.00 N, 085°33'.83 E
19°10'.00 N, 085°25'.00 E
d) 19°07'.00 N, 085°29'.00 E

Area Z8
a) 19°17'.83 N, 085°37'.00 E
b) 19°15'.83 N, 085°39'.83 E
c) 19°05'.00 N, 085°31'.83 E
d) 19°07'.00 N, 085°29'.00 E

15. **Off Port Blair.**

Area S	Area T
a) 11°15' N, 094°00' E	a) 11°55' N, 091°30' E
b) 11°45' N, 094°00' E	b) 12°25' N, 091°30' E
c) 11°45' N, 094°30' E	c) 12°25' N, 092°00' E
d) 11°15' N, 094°30' E	d) 11°55' N, 092°00' E

16. **Off Car Nicobar Island**

Area X

a) 09° 24' N, 092° 19' E
b) 10° 23' N, 092° 19' E
c) 10° 23' N, 093° 20' E
d) 09° 24' N, 093° 20' E

FIRING AREAS

1. **Bedi (Off Balachadi).**

a) 22°49'.00 N, 070°06'.00 E
b) 22°45'.83 N, 070°13'.17 E
c) 22°38'.25 N, 070°09'.33 E
d) 22°41'.17 N, 070°01'.83 E

2. **Nora Island.**

Firing Area of 2 miles around Nora Island (22°31'.0 N, 69°20'.5 E).

3. **Off Mumbai**

Area A	Area B
a) 18°30' N, 070°50' E	a) 17°50' N, 072°00' E
b) 18°30' N, 071°10' E	b) 17°50' N, 072°20' E
c) 18°12' N, 071°10' E	c) 17°32' N, 072°20' E
d) 18°12' N, 070°50' E	d) 17°32' N, 072°00' E

Area R

a) 19°32' N, 067°22' E
b) 19°32' N, 069°06' E
c) 21°07' N, 069°06' E
d) 21°07' N, 067°22' E

4. **Mumbai.**

Firing from Middle Ground	Firing from Oyster Rock
a) 18°50'.00 N, 072°54'.50 E	a) 18°48'.00 N, 072°52'.00 E
b) 18°54'.30 N, 072°54'.00 E	b) 18°50'.00 N, 072°54'.30 E
c) 18°54'.50 N, 072°54'.00 E	c) 18°50'.00 N, 072°54'.50 E
d) 18°55'.10 N, 072°54'.50 E	d) 18°54'.65 N, 072°50'.58 E

e) 18°55'.17 N, 072°50'.97 E
f) 18°54'.65 N, 072°50'.58 E
g) 18°54'.39 N, 072°50'.35 E
h) 18°50'.00 N, 072°54'.30 E

e) 18°54'.39 N, 072°50'.35 E
f) 18°54'.08 N, 072°49'.80 E
g) 18°54'.05 N, 072°49'.48 E
h) 18°48' 00 N, 072°50'.00 E

Firing from
Colaba Point

a) 18°48'.00 N, 072°38'.00 E
b) 18°53'.35 N, 072°48'.45 E
c) 19°00'.00 N, 072°44'.05 E
d) 19°00'.00 N, 072°38'.00 E

Area 2

a) 18°51'.83 N, 072°38'.33 E
b) 19°01'.33 N, 072°49'.00 E
c) 19°05'.00 N, 072°47'.00 E
d) 19°04'.00 N, 072°35'.00 E

Area 1

a) 18°48'.00 N, 072°38'.00 E
b) 18°52'.00 N, 072°46'.00 E
c) 18°51'.00 N, 072°47'.00 E
d) 18°53'.58 N, 072°48'.75 E
e) 19°00'.00 N, 072°44'.08 E
f) 19°00'.00 N, 072°38'.00 E
f) and a) are to be joined by an arc with d) as centre.

5. **<u>Off Goa</u>.**

Area A

a) 15°12'.50 N, 073°20'.50 E
b) 14°54'.00 N, 073°28'.50 E
c) 15°16'.50 N, 073°29'.50 E
d) 14°58'.00 N, 073°38'.00 E

Area B

a) 15°08'.00 N, 073°10'.50 E
b) 14°50'.00 N, 073°19'.00 E
c) 15°12'.50 N, 073°20'.50 E
d) 14°54'.00 N, 073°28'.50 E

Air to Air
Range (VAD 17)

a) 15°09'N, 073°11'E
b) 15°15'N, 073°29'E
c) 14°37' N, 073°45' E
d)14°30'N, 073°29'E

6. **<u>Goa Firing Area</u>.**

a)15°13'N, 073°57'E
b)15°13'N, 073°52'E
c) 15°11' N, 073°52' E
d)15°11'N, 073°57'E

7. **<u>Netrani Island (Off Karwar)</u>.**

a) 13°56'.20N, 074°13'.60 E
b)14°07'.20N, 073°25'.07E
c) 14°07'.20 N, 074°13'.60 E
d)13°55'.20N, 074°25'.07E

8. **Off Kochi.**

Area D
a) 09°01' N, 075°39' E
b) 09°12' N, 075°08' E
c) 09°30' N, 075°17' E
d) 09°12' N, 075°44' E

Area E
a) 09°56' N, 075°16'E
b) 09°39' N, 075°28' E
c) 09°29' N, 075°11' E
d) 09°46' N, 075°00' E

Area H
a) 09°28' N, 074°09' E
b) 09°28' N, 074°39' E
c) 09°04' N, 074°39' E
d) 09°04' N, 074°09' E

Area J
a) 09°52' N, 074°15' E
b) 09°31' N, 074°15' E
c) 09°31' N, 073°56' E
d) 09°52' N, 073°56' E

Area B
a) 08°15' N, 074°38' E
b) 08°30' N, 074°38' E
c) 08°30' N, 075°00' E
d) 08°15' N, 075°00' E

Area U
a) 08°38' N, 074°24' E
b) 08°56' N, 074°14' E
c) 08°56' N, 074°34' E
d) 08°38' N, 074°45' E

9. **Kochi.**

Firing Sector
a) 09°57'.33 N, 076°14'.17 E
b) 10°03'.83 N, 076°03'.17 E
c) 09°44'.83 N, 076°15'.15 E

Firing Area
a) 09°57'.50 N, 075°59'.50 E
b) 09°57'.70 N, 076°14'.20 E
c) 09°44'.00 N, 076°17'.50 E
d) 09°42'.50 N, 076°09'.50 E

10. **Off Trivandrum.**

Area P
a) 08°16' N, 075°42' E
b) 08°16' N, 076°32' E
c) 08°41' N, 076°32' E
d) 08°41' N, 075°42' E

11. **Chennai Firing Area.** An arc from Chennai light 037°-184°-16NM

12. **Off Chennai.**

Area V
a) 16°10' N, 084°18' E
b) 16°10' N, 084°59' E
c) 15°30' N, 084°59' E
d) 15°30' N, 084°18' E

13. **Off Vishakhapatnam.**

Area A
a) 17°44'.00N, 084°05'.00 E
b) 17°44'.00 N, 083°48'.00 E

Area B
a) 16°30'N, 083°00'E
b) 15°30' N, 083°00' E

c) 17°48'.13 N, 083°42'.00 E
d) 17°58'.00 N, 083°52'.00 E
e) 17°58'.00 N, 084°19'.00 E

Area D

a) 16°56'.90N, 084°00'.20 E
b) 16°56'.90 N, 084°29'.63 E
c) 16°30'.41 N, 084°29'.63 E
d) 16°30'.41 N, 084°00'.20 E

Area M

a) 17°11'.00 N, 082°29'.00 E
b) 17°28'.90 N, 083°00'.80 E
c) 17°29'.80 N, 083°00'.80 E
d) 17°33'.80 N, 083°10'.40 E
e) 17°36'.90 N, 083°14'.17 E
f) 17°38'.00 N, 083°15'.00 E
g) 17°36'.00 N, 083°15'.00 E
h) 17°38'.00 N, 083°20'.00 E
j) 17°29'.00 N, 083°25'.00 E
k) 17°01'.00 N, 082°35'.00 E

c) 15°30' N, 084°00' E
d) 16°30' N, 084°00' E

Area E

a) 17°42'.05 N, 083°18'.40 E
b) 17°41'.50N, 083°18'.12 E
c) 17°30'.40N, 083°18'.12 E
d) 17°34'.07 N, 083°30'.30 E
e) 17°46'.07 N, 083°32'.07 E

14. **Off Gopalpur.**

a) 19°14'.60 N, 084°53'.70 E
b) 19°07'.39 N, 085°35'.94 E
c) 18°33'.61 N, 084°53'.74 E
An arc joining point (b) and (c) with a radius of 75 km from the centre point (a).

15. **Off Kalaikunda.**

a) 18°58'.89N, 087°00'.92E
b) 18°58'.89N, 090°06'.78E
c) 15°38'.99N, 090°06'.78E
d) 15°38'.99N, 087°00'.92E

16. **Off Balasore.**

a) 21°27'.50 N, 087°02'.00 E
b) 21°09'.00 N, 087°21'.85 E
c) 21°00'.30 N, 087°03'.00 E
d) 20°58'.50 N, 086°53'.50 E
e) 21°10'.90N, 087°04'.40 E

17. **Off Kolkata.**

a) 22°11'.50N, 088°11'.00 E
b) 22°11'.40N, 088°08'.00 E
c) 22°06'.00N, 088°09'.50 E
d) 22°01'.00 N, 088°03'.30 E
e) 22°07'.00 N, 088°10'.50 E
f) 22°05'.00N, 088°15'.00 E

18. **Off Port Cornawallis.**

a) 12°55'.00N, 094°05'.00 E
b) 12°55'.00 N, 094°45'.00 E
c) 12°30'.00N, 094°45'.00 E
d)12°30'.00N, 094°05'.00 E

19. **Off Port Blair.**

Area A
a) 11°39'N, 92°49'E
b) 11°39'N, 93°03'E
c) 11°24'N, 93°03'E
d) 11°24'N, 92°49'E

Area B
a) 11°55' N, 094°03' E
b) 11°55' N, 094°30' E
c) 12°25' N, 094°30' E
d) 12°35' N, 094°03' E

Area D
a) 11°24'N, 92°45'E
b) 11°24'N, 93°05'E
c) 11°00'N, 93°05'E
d) 11°00'N, 92°45'E

Area E
a) 11°39'.70 N, 092°46'.30 E
b) 11°40'.60 N, 092°47'.00 E
c) 11°37'.80 N, 092°57'.10 E
d) 11°30'.40 N, 092°48'.90 E

20. **Off Passage Island.**

a) 11°05'N, 092°35'E
b) 11°17'N, 092°47'E
c) 11°17' N, 092°35' E
d) 11°05'N, 092°47'E

21. **Off Rakhine Coast (Churk Rock)**

a) 17° 39'.50 N, 094° 25'.00 E
b) 17° 15'.50 N, 094° 25'.00 E
c) 17° 15'.50 N, 094° 07'.30 E
d) 17° 39'.50 N, 094° 07'.30 E

22. **Off Tanintharyi Coast (Freak Island)**

a) 12° 46'.00 N, 098° 05'.50 E
b) 12° 36'.00 N, 098° 05'.50 E
c) 12° 36'.00 N, 097° 41'.00 E
d) 12° 46'.00 N, 097° 41'.00 E

23. Following are safe flying heights:-

(a)	In Areas of Firing by Aircraft	
(i)	Air to Air Range	10,000 Meters
(ii)	Air to Sea/Ground Range	7,000 Meters
(b)	In Gunnery Practice Areas	
(i)	4" and above	13,000 Meters
(ii)	40/60 and 20 mm	8,000 Meters
(c)	In Missile Firing Areas	20,000 Meters

MISSILE FIRING AREAS

1. **Off Angria Bank.**

Area L

a) 17° 40' N, 071° 14' E
b) 17° 30' N, 071° 07' E
c) 17° 18' N, 071° 16' E
d) 15° 43' N, 071° 28' E
e) 15° 22' N, 072° 05' E
f) 16° 32' N, 072° 35' E
g) 16° 53' N, 072° 00' E
h) 17° 25' N, 071° 30' E

2. **Off Sesostris Bank.**

Area S

a) 16° 38'.00 N, 070° 03'.00 E
b) 16° 38'.00 N, 071° 10'.00 E
c) 16° 00'.00 N, 071° 10'.00 E
d) 13° 32'.50 N, 073° 22'.00 E
e) 12° 44'.00 N, 073° 22'.00 E
f) 12° 44'.00 N, 068° 52'.00 E
g) 14° 00'.00 N, 069° 10'.00 E
h) 15° 15'.00 N, 070° 12'.00 E

3. **Off Visakhapatnam.**

Area M

a) 18°58'.89N, 087°00'.92E
b) 18°58'.89N, 090°06'.78E
c) 15°38'.99N, 090°06'.78E
d) 15°38'.99N, 087°00'.92E

4. **Off Tillanchang.**

Area T

a) 08°08' N, 093°06'E
b) 08°08' N, 094°08' E
c) 11°12' N, 094°08' E
d) 11°12' N, 093°06' E

5. **Off Port Blair.**

Area C

a) 11°00' N, 092°50'E
b) 10°30' N, 092°50'E
c) 10°30' N, 093°40' E
d) 10°00' N, 093°40' E

Special Notice No.10
CAUTION WITH REGARD TO SHIPS APPROACHING SQUADRONS, CONVOYS, AIRCRAFT AND OTHER WAR SHIPS AT SEA, AIRCRAFT CARRIERS AT ANCHOR AND VESSELS.

Squadrons and Convoys

1. The attention of ship owners and mariners is called to the danger which is caused by a single vessel approaching a squadron of warships, or merchant vessels in convoy, so closely as to involve the risk of collision, when attempting to pass ahead of, or through such a squadron or convoy.

2. A single vessel approaching squadron or convoy may be contacted by the senior ship to keep well clear of the formation. Mariners are, therefore, warned that a single vessel should adopt early measures to keep out of the way of a squadron or convoy.

3. Although a single vessel is advised to keep out of the way of a squadron or convoy, this does not entitle vessels sailing in company to proceed without regard to the movements of the single vessel. Vessels sailing in a squadron or convey should accordingly keep a careful watch on the movements of any single vessel approaching the squadron or convoy and should be ready, in case the single vessel does not keep out of the way, to take such action as will best aid to avert collision.

Certain Other Warships - Position of Steaming Lights

4. Certain other warships, which, in accordance with Rule 1 (e) of International Regulations for preventing Collisions at Sea. 1972, cannot comply fully with the provisions of sections 2 and 3 of Annex 1 to the above rule, comply as closely as possible.

5. The following are some of the important deviations from the provisions of Section 2 and 3 of Annex 1 to the above rule, with respect to the positioning of lights in certain warships:-

(a) Where two masthead lights are carried, the horizontal and vertical separation between the two may be less than the prescribed value.

(b) The height above the hull of all the lights may be less than the prescribed value.

(c) Side lights may be positioned in front of the forward masthead light.

(d) The forward masthead light may be placed more than one quarter of the length of the vessel from the stem.

6. In addition certain vessels of 50 meters or more in length, of the following category may not be fitted with a second masthead light:-

(a) Frigates
(b) Patrol vessels
(c) SDBs
(d) Landing Ships
(e) Ocean Tugs
(f) Ocean Minesweepers

(g) Coastal Minesweepers
(h) Boom working vessels
(j) Submarines
(k) Survey Ships
(l) Missile Boats
(m) Missile Corvettes

Ships Towing Arrays

7. Modern capital warships are fitted with 'Towed Array Sonars' which are streamed during anti-submarine operations. These sonar arrays, when towed, extend upto 2 km behind the towing ship.

8. Mariners are, therefore, advised to exercise caution and give appropriate wide berth when approaching capital warships.

Special Notice No.11
INFORMATION CONCERNING SUBMARINES

Part I - Warning Signals

1. Mariners are warned that considerable hazard to life may result by the disregard of the following warning signals, which denote the presence of submarines: -

(a) Visual Signals

(i) Indian Vessels fly the International Code Group NE 2 to denote that submarines, which may be submerged, are in the vicinity. Vessels should steer so as to give a wide berth to any vessel flying this signal. If for any reason it is necessary to approach her, vessels should approach at low speed and a good lookout must be kept for submarines whose presence may be indicated only by their periscope or other masts showing above water.

(ii) A submarine submerged at a depth too great to show her periscope, may sometimes indicate her position by releasing a "SSE (Submerged Signal Ejector)" or “Smoke candle” which gives off a flare/smoke on first reaching the surface. Her position may sometimes be indicated by red-and-white or red-and-yellow buffs or floats, which are fitted low on the surface, close astern.

(iii) Shishumar Class of Submarines - Identification light: In order to enable accompanying vessels to identify the position of a dived Shishumar Class of submarine the identification light is provided in the aft section of the conning tower. This light emits a white light upward through plexi glass and has a luminous range of 7 miles when measured in the air during clear visibility.

(iv) All vessels transiting through areas promulgated as Naval Exercise Areas are to bear in mind that submerged/partly submerged submarines are likely to be encountered. As far as possible such vessels are not to switch off navigation lights and stop propulsion whilst within these areas.

(v) Movement of oil rigs outside offshore development areas is to be promulgated at least 48 hours prior to their movement for safety of submarine operations.

(vi) Promulgation of areas for seismic survey should as far as possible be clear of recommended routes to permit greater flexibility of dived submarine operations.

(vii) In order to enable vessels to identify the position of a dived Kalvari class of submarine, an identification light called **‘Marking Light’** is provided in the aft section of the conning tower. This light emits a white light upward and shows a vertical sector of 12 degrees on surface.

(b) Pyrotechnics and Smoke Candles. A Submerged Submarine in a Submarine Exercise area uses the following signals: -

Signal	Signification
Red grenades/flares fired in quick succession	Keep clear. I am carrying out emergency surfacing procedure. Do not stop propellers. Ships are to clear the area immediately and standby to render assistance.
Two coloured grenades/ flares 3 minutes apart. The colour of the grenades/flares may be *white* Yellow *or Green.*	Keep clear. My position is as indicated. I intend to carryout surfacing procedure. Do not stop propellers. Ships are to clear the immediate vicinity.

2. It must not be inferred from the above that Submarines exercise only when in company with escorting vessels.

3. The legend "**Submarine Exercise Area**" shown on certain charts should not be taken to mean that Submarines do not exercise outside such areas. Under certain circumstances a Local Coast Radio Station may broadcast warnings that Submarines are exercising in specified areas.

4. The accompanying diagrams show Sonobuoy DSTV - 2C, Aircraft Float, Smoke and Flame markers. Sonobuoy are dropped from aircraft to detect submarines and may be encountered anywhere at sea. Other countries have similar Sonobuoys but their colour and dimensions are not known.

Part II Navigational Lights

5. Submarines are likely to be met on surface by night on approaches to Mumbai, Vishakhapatnam, Kochi, Chennai, Goa, Karwar, Porbandar, Kakinada, Port Blair and Tuticorin. Meeting submarines on surface during approaches to other ports cannot be ruled out.

6. The masthead and sidelights of IN submarines are placed well forward and very low over the water in proportion to the length and tonnage of these vessels. The steaming lights, bow lights and overtaking lights are closely spaced and as a result they give no indication of the submarines length, her course or a change of course. The stern lights are placed very low and may at times be partially obscured by sea spray and wash. The stern lights are invariably lower than the sidelights.

7. In summary the overall arrangement of the submarine navigational lights is unusual and may give the impression of markedly smaller and shorter vessels than they truly represent. The submarines are fitted with Very Quick Flashing light of Yellow/Amber colour anti-collision light with visibility sector of 360^0. These lights should not be confused with a similar light exhibited by hovercraft with a rate of 120 flashes or more per minute. The specific characteristics pertaining to different classes of submarines are mentioned in succeeding paragraphs:-

(a) **Sindhughosh and Shishumar submarines.** They are fitted with a very quick yellow (amber) anti-collision light which flashes at 90 -105 flashes per minute and are fitted 1 to 2 m above the Masthead light.

(b) **Kalvari class submarines.** The Kalvari class are fitted with a Very Quick Yellow anti-collision light called **'Recognition light**'. The light is located 2-3 m above the Masthead light and produces flashes of 120-180 per minute. The approximate range of the 'Recognition Light' is more than 5nm over a sector of 360 degrees.

Part III - Sunken Submarine

8. A bottomed Submarine, which is unable to surface, will try to indicate her position by the following methods: -

(a) Releasing an indicator buoy as soon as the accident occurs.
(b) Firing of Green/Red/Yellow SSEs(Submerged Signal Ejector). It should be remembered that it might not be possible for the submarine to continuously to fire her SSE. Correspondingly, a partially flooded submarine may only have certain number of SSE and the searching ship should not therefore expect many to appear.
(c) Pumping out oil, fuel or lubricating oil.
(d) Releasing air bubbles.
(e) Blowing of gash/other floats am.
(f) Firing of MG 34/SFD
(g) Transmitting on UWT, main sonar, and distress sonar/distress after running echo sounder and hull tapping.

9. Since oil streaks or debris may be the only indication of the presence or whereabouts of the Sunken Submarine, it is vitally important that surface ships refrain from discharging anything which might appear to have come from a submarine while they are in the submarine probability area. Searching ships and aircraft can waste many valuable hours investigating these false contacts.

10. In any submarine accident, time is the most vital factor affecting the chances of rescue of survivors and as the sighting of an indicator buoy may be the first indication that an accident has in fact occurred, it is vital that no time should be lost in taking action.

11. At any time after a submarine accident, survivors may start attempting to escape. Conditions inside are likely to deteriorate rapidly and postponement of escape will only be made in order to allow the rescue ships to reach the scene. Any ship finding a moored Submarine Indicator Buoy should not therefore leave the position but should standby well clear ready to pick up survivors. The latter will ascend nearly vertically, and it is important that plenty of sea room is given to enable them to do so safely. On arrival on the surface, men may be exhausted or ill, and if circumstances are favourable, the presence of a boat already lowered is very desirable. Some men may require a recompression chamber and it will therefore, be the aim of the Naval authorities to get such a chamber to the scene as soon as possible.

To sum up, the aims of a Submarine Rescue Operation are:-

(a) To fix the exact position of the Submarine.
(b) To get a ship standing by to pick up survivors, if practicable with boats already lowered.
(c) To get medical assistance to survivors picked up.
(d) To get a diver's re-compression chamber to the scene in case this is required by those seriously ill after being exposed to great pressure.
(e) To inform the trapped men that help is at hand.

Submarine Indicator Buoy

12. I.N. Submarines are fitted with three different types of indicator buoys carried by Shishumar Sindhughosh and Kalvari class of submarines respectively. The physical dimensions, identifying marks and distress facilities of these buoys are described briefly in the succeeding paragraphs.

Emergency Indicator Buoy - Sindhughosh Class of Submarines

13. The diameter of the buoy is 115 cms. The buoy is painted in 4 quadrants. Alternate quadrants are painted yellow and orange. The buoy has a white flashing light flashing every 3 seconds. A powered telephone (from the batteries of the submarine) is fitted on top for two-way communication with the submarines. Two-way radiotelephony communication can be established with the submarine on 121.5 MHz when the buoy is recovered. A radio beacon transmitting at 51.2 MHz (continuous or transmitting for 20 seconds with a pause of 60 seconds) is fitted on the buoy. The buoy wire rope is 400 meter and the buoy communication cable is 500 meter in length.

Emergency Indictor Buoy - Shishumar Class of Submarines

14. The buoy is made of expanded plastic foam covered with GRP skin for physical protection. The buoy is semi spherical in shape, 76 cms in diameter and 90 cms high. The buoy floats end up with a freeboard of about 15 cms. It is covered with longitudinal strips of reflective tape alternative red and white. A 3-digit identification number is displayed on each side of ultra violet light flashing centre of the top surface. In darkness and good weather the unassisted visibility of the light is 5 miles. The buoy carries HF and UHF whip aerial (168 cms and 100 cms long respectively). The transmitters are automatically activated when the indicator buoy is released. The HF Transmission frequency of 8364 Khz contains the international distress call, SOS together with the submarine identification number. The UHF Sarbe tone is transmitted at a frequency of 243 MHZ. No two-way telephone communication with the submarine is possible. The indicator buoy is also equipped with an emergency 'Xenon' light flashing at 32 flashes per minute with a range of approx 5 nm in good visibility conditions.

Emergency Indicator Buoy – Kalvari Class of Submarines

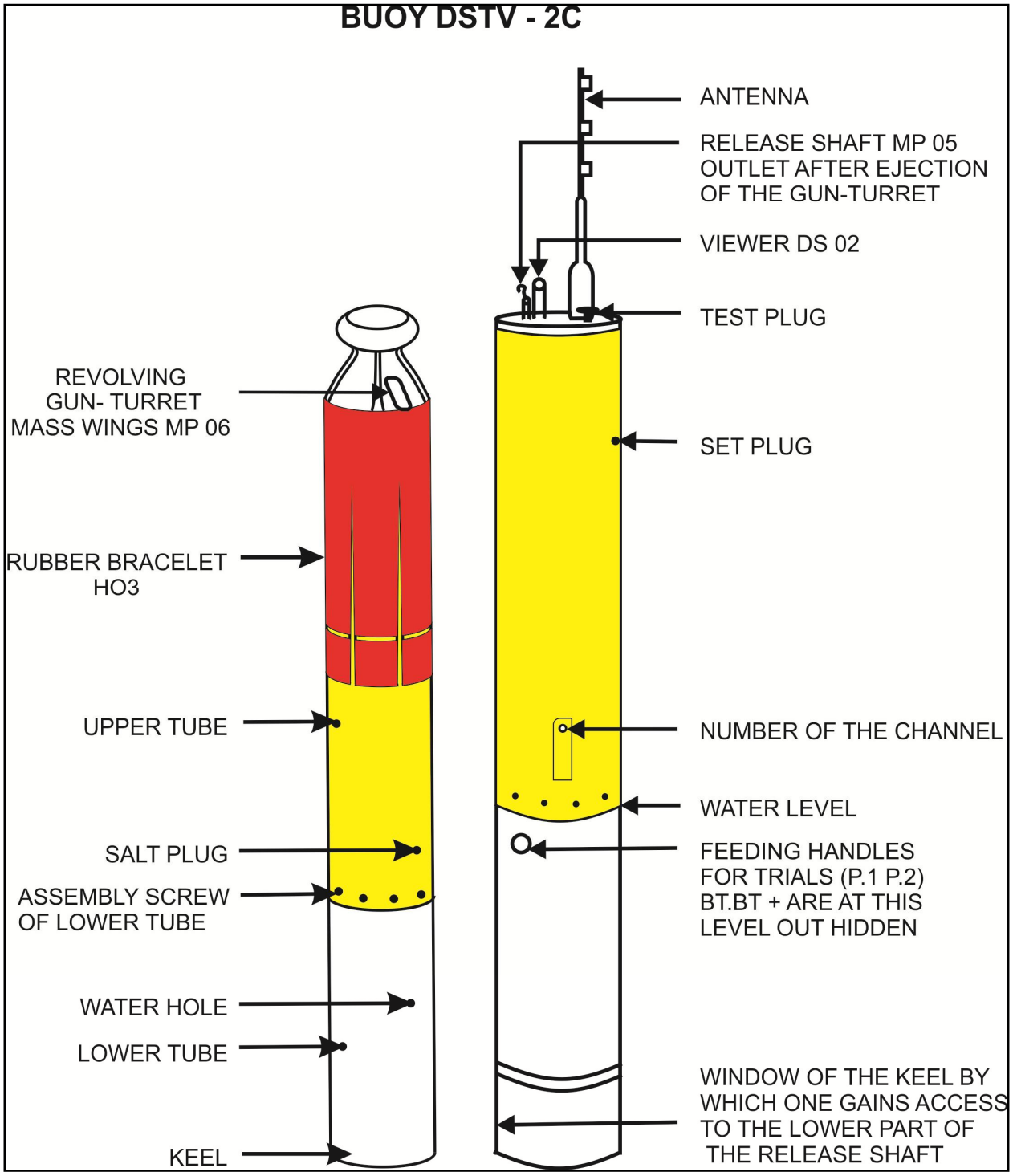
15. The 'Emergency Indicator Buoy' of the Kalvari class submarine is a circular metallic orange coloured buoy supported by a toridal float which gives positive buoyancy to the buoy. The buoy is semi-spherical in shape with dimensions 738mm (including float) in diameter and 806 mm (including the antenna height) in height and fitted in the aft part of the submarine. Post release the buoy floats free and is not attached to submarine. The information concerning the submarine is marked on the float on two plates i.e. one in hindi and other in English. It is equipped with a White light producing flashes of 50-70 per minute. It includes a Radio transmitter which transmits on marine distress UHF frequency of 243 MHz for detection, 121.5 MHz for Aircraft radar homing and a transmitter for transmission on identification frequency for satellite dedicated to rescue i.e on SARSAT/ COSPAS 406.028 MHz. An inbuilt battery ensures autonomous operation of the buoy up to 10 days after release.

16. The finder of any of these buoys should inform the nearest Naval/ Coastguard// Port/Police authorities and should not attempt to secure to or lift the buoy.

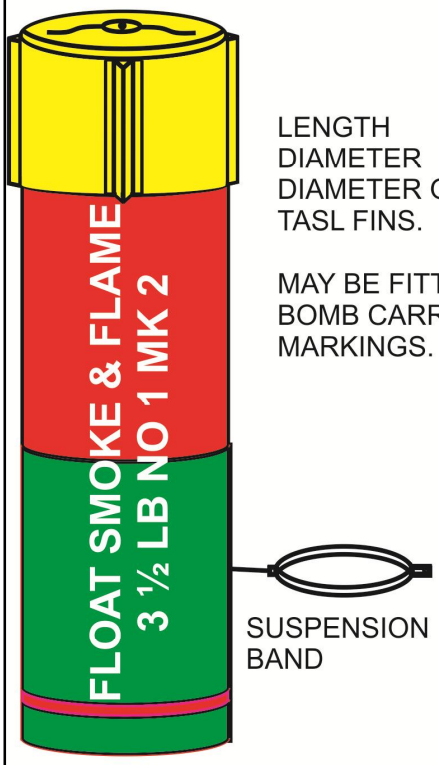
17. **Distress Flares** The submarines are fitted with flare launchers with capability of firing flares/ decoys available with the submarine to indicate her position in dived state in case of emergency are as tabulated below

Sr.	Flare Type	Signal Type
(a)	Star Signal	Red/ Green/ Yellow starred Flares
(b)	Day and Night signal	White smoke and flares
(c)	Coloured Smoke signal	Red/ Green/ Yellow Smoke

18. The various Submarine Indicator Buoy are as shown on following pages:-


BUOY DSTV - 2C
ANTENNA
RELEASE SHAFT MP 05
OUTLET AFTER EJECTION
OF THE GUN-TURRET
VIEWER DS 02
TEST PLUG
REVOLVING
GUN- TURRET
MASS WINGS MP 06
SET PLUG
RUBBER BRACELET
HO3
UPPER TUBE
NUMBER OF THE CHANNEL
WATER LEVEL
SALT PLUG
FEEDING HANDLES
FOR TRIALS (P.1 P.2)
BT.BT + ARE AT THIS
LEVEL OUT HIDDEN
ASSEMBLY SCREW
OF LOWER TUBE
WATER HOLE
LOWER TUBE
WINDOW OF THE KEEL BY
WHICH ONE GAINS ACCESS
TO THE LOWER PART OF
THE RELEASE SHAFT
KEEL

FLOAT, SMOKE AND FLAME, AIRCRAFT. 3 ½ NO. Mk. 2

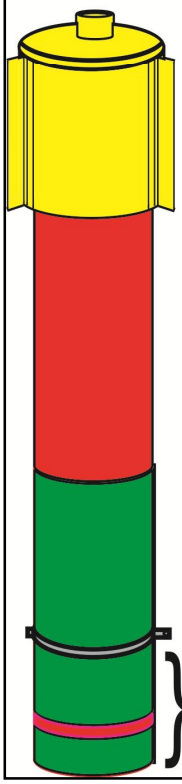


LENGTH	15 IN	WEIGHT FILLED	3 lb.
DIAMETER	3.25 IN	WEIGHT OF FILLING	14 OZ.
DIAMETER OVER TASL FINS.	3.9 IN	DURATION OF BURNING	6 MIN
		COLOUR OF SMOKE	WHITE

MAY BE FITTED WITH SUSPENSION BAND FOR RELEASE FROM BOMB CARRIER

MARKINGS.
1. NAME, NUMBER AND MARKER NUMBER
2. MONOGRAM OF FILLING STATION.
3. MONTH AND YEAR OF FILLING.
4. LOT NUMBER.

INDICATOR, A/S TRAINING, NO. 1 Mk. 1.



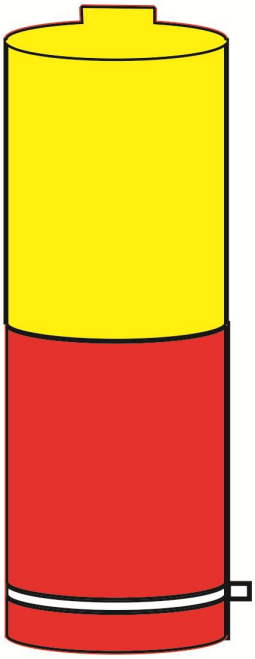
LENGTH	30 IN
DIAMETER	3.4 IN
DISTANCE ACROSS FINS.	5.5 IN
COLOUR OF SMOKE	WHITE
DURATION OF SMOKE AND FLAME	5 MIN

SUSPENSION BANK MAY BE FITTED

MARKINGS.
1. NAME AND TYPE OF STORE WITH Mk NO.
2. MONOGRAM OF FILLING STATION.
3. MONTH AND LAST TWO FIGURE OF YEAR OF FILLING.
4. LOT NUMBER.

SIGNAL CONTAINER – IN NORMAL FUNCTIONING THIS IS SEPARATED FROM THE INDICATOR BY THE SIGNAL EXPLODING UNDER WATER. THE UPPER BODY RISES TO THE SURFACE AND FUNCTIONS AS A SMOKE AND FLAME FLOAT

MARKER, MARINE, AIRCRAFT, 19 lb, No. 2 Mk. 1 & 2

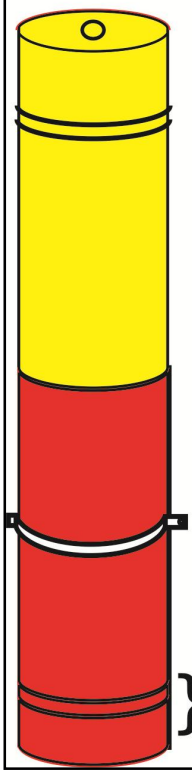


LENGTH	30 IN
DIAMETER	5.8 IN
DURATION OF BURNING	2 HOURS
COLOUR OF SMOKE	WHITE

SUSPENSION BAND MAY BE FITTED

MARKINGS.
1. NAME, NUMBER AND MARKER NUMBER
2. MONOGRAM OF FILLING STATION.
3. DATE OF FILLING (MONTH AND YEAR)
4. LOT NUMBER.

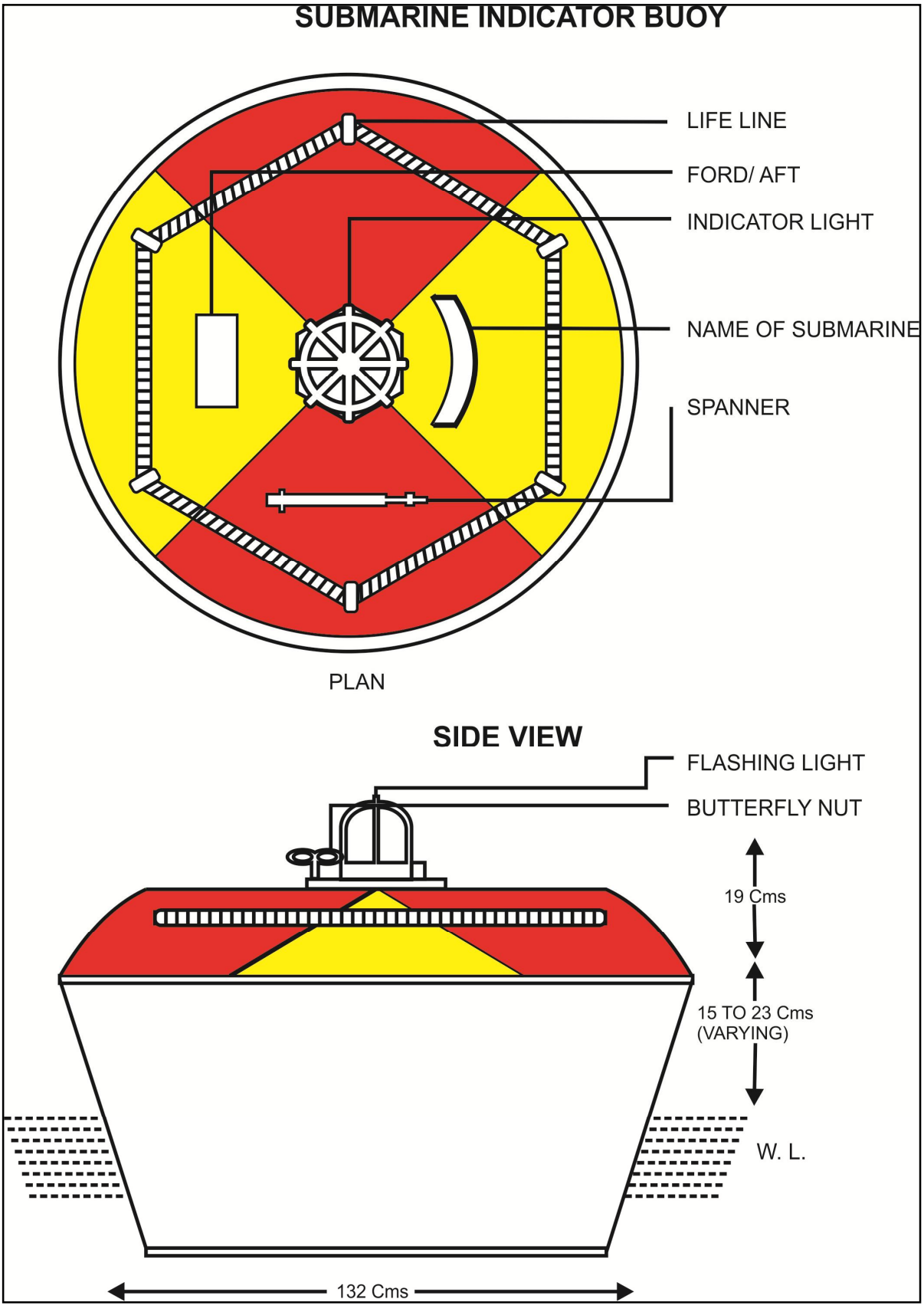
MARKER MARINE, No. 4, Mk. I.



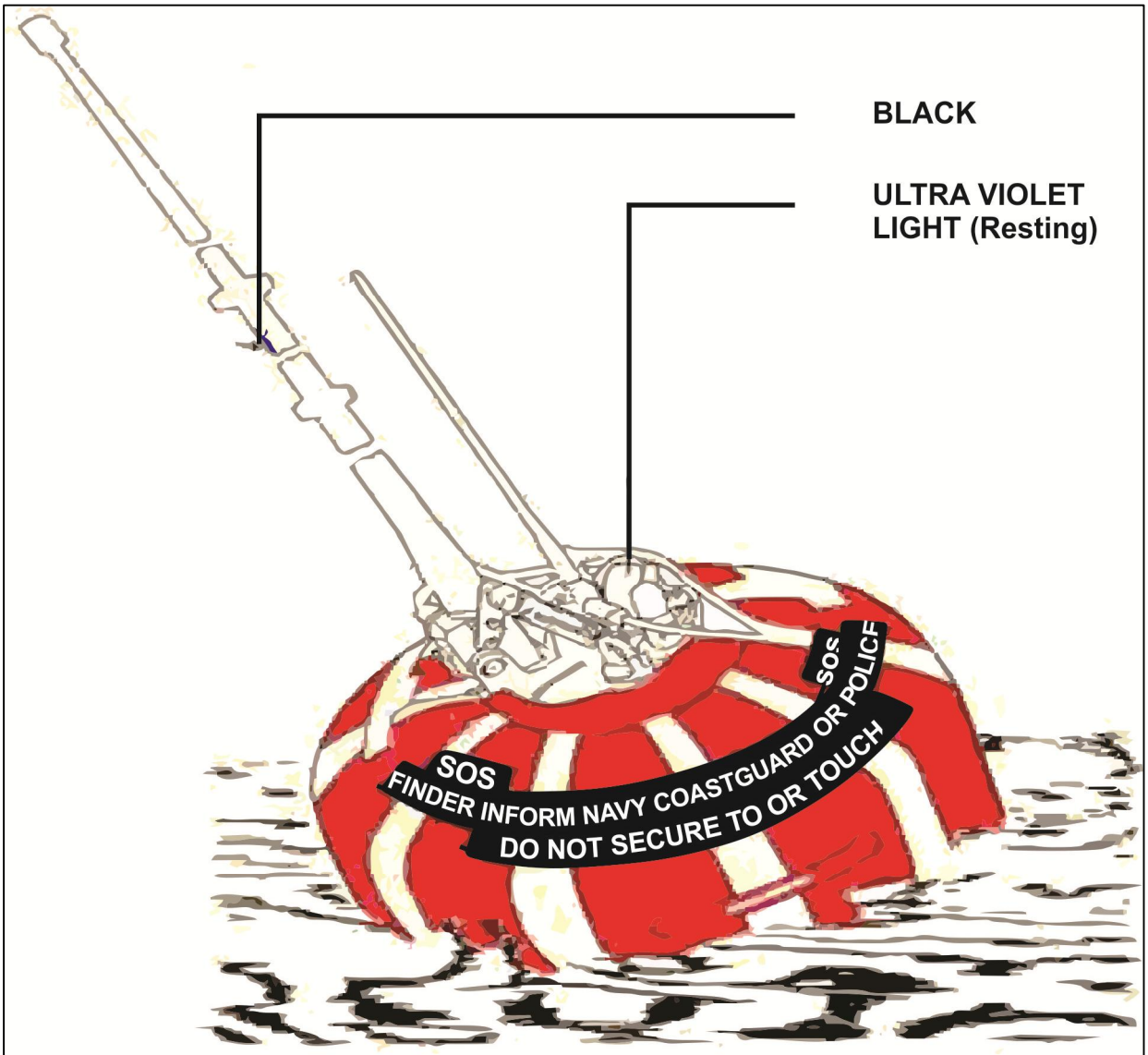
LENGTH	36 IN
DIAMETER	4.9 IN
DURATION OF BURNING	50 TO 60 MIN
COLOUR OF SMOKE	WHITE
COLOUR OF FLAME	YELLOW

MARKINGS.
1. NAME, NUMBER AND MARK NO.
2. MONOGRAM OF FILLING STATION.
3. MONOGRAM OF MANUFACTURER
4. DATE OF MANUFACTURE (MONTH AND YEAR)
5. DATE OF FILLING (MONTH AND YEAR)

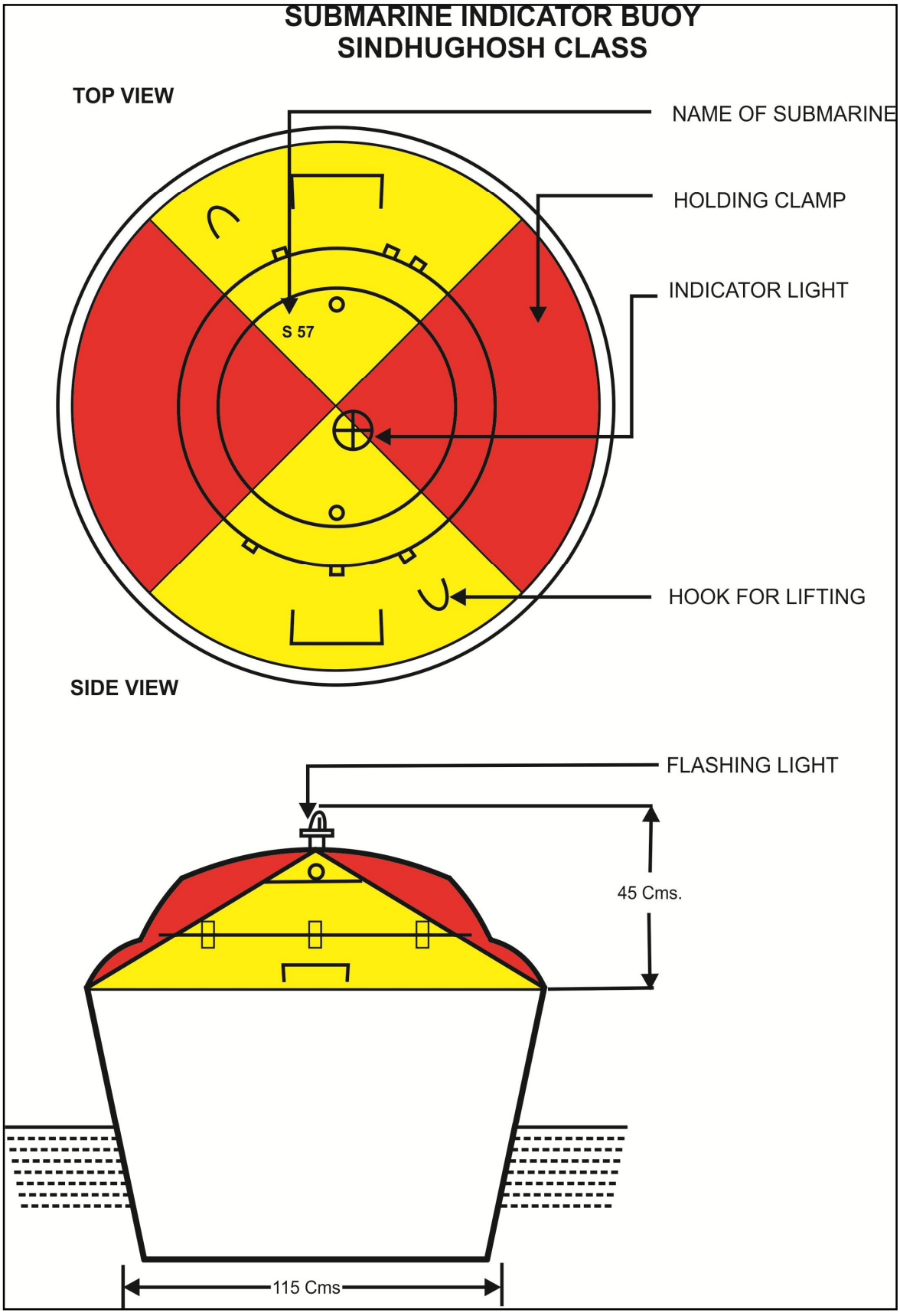
SUSPENSION BAND MAY BE FITTED A SMALL UNDERWATER DROGUE IS ATTACHED TO THE LOWER END AND IN SOME INSTANCES A PARACHUTE MAY BE FOUND ATTACHED TO THE TOP.


SUBMARINE INDICATOR BUOY
LIFE LINE
FORD/ AFT
INDICATOR LIGHT
NAME OF SUBMARINE
SPANNER
PLAN
SIDE VIEW
FLASHING LIGHT
BUTTERFLY NUT
19 Cms
15 TO 23 Cms
(VARYING)
W. L.
132 Cms

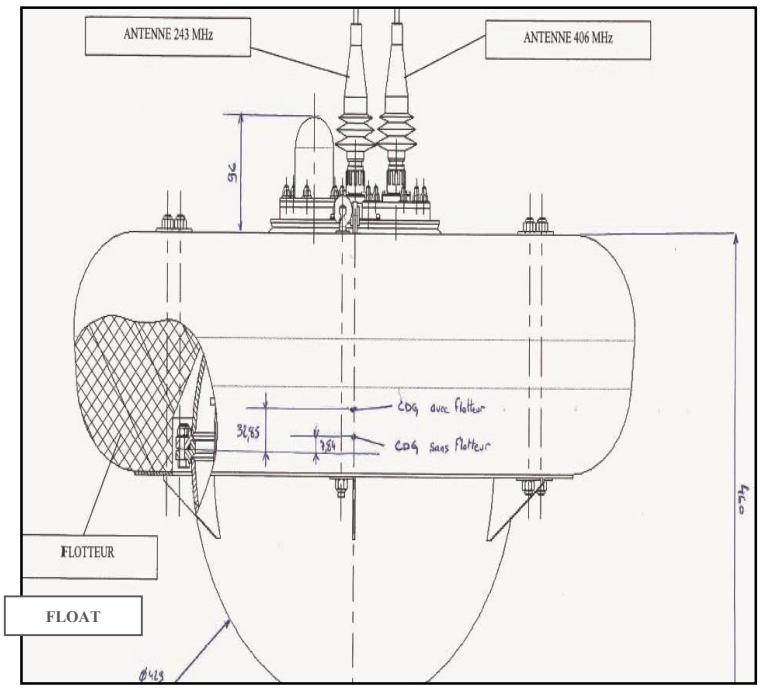
To accompany Notices to Mariner No. 11

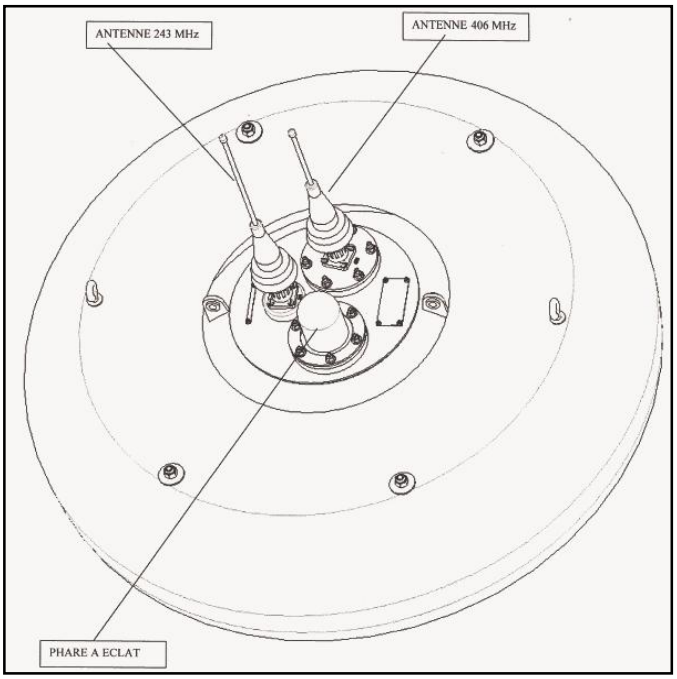


TYPE 639 - SUBMARINE INDICATOR BUOY


SUBMARINE INDICATOR BUOY
SINDHUGHOSH CLASS
TOP VIEW
NAME OF SUBMARINE
HOLDING CLAMP
INDICATOR LIGHT
S 57
HOOK FOR LIFTING
SIDE VIEW
FLASHING LIGHT
45 Cms.
115 Cms

SUBMARINE INDICATOR BUOY KALVARI CLASS





Special Notice No. 12
RADIO NAVIGATIONAL WARNINGS

(Source: Joint IMO MSI Manual S53, IMO NAVTEX Manual)

1. This Notice contains information concerning navigational warnings under the World Wide Navigational Warning Service (WWNWS). Navigational warnings are issued in response to SOLAS regulation V/4 and carry information which may have a direct bearing on the safety of life at sea. There are four types of navigational warnings: NAVAREA warnings, Sub-Area warnings, coastal warnings and local warnings.

2. **Methods of Broadcast.** Two principal methods are used for broadcasting maritime safety information in accordance with the provisions of the International Convention for the Safety of Life at Sea, 1974, as amended, in the areas covered by these methods, as follows:-

(a) NAVTEX**:** broadcasts to coastal waters; and

(b) SafetyNET**:** broadcasts which cover all the waters of the globe except for Sea Area A4 (Polar Regions)

3. **NAVAREA Warnings.** NAVAREA warnings are concerned with the information detailed below which ocean-going mariners require for their safe navigation. This includes, in particular, new navigational hazards and failures of important aids to navigation as well as information which may require changes to planned navigational routes. The following subjects are considered suitable for broadcast as NAVAREA warnings. This list is not exhaustive and should be regarded only as a guideline. Furthermore, it presupposes that sufficiently precise information about the item has not previously been disseminated in a Notice to Mariners:-

(a) Casualties to lights, fog signals, buoys and other aids to navigation affecting main shipping lanes;

(b) The presence of dangerous wrecks in or near main shipping lanes and, if relevant, their marking;

(c) Establishment of major new aids to navigation or significant changes to existing ones when such establishment or change, might be misleading to shipping;

(d) The presence of large unwieldy tows in congested waters;

(e) Drifting hazards (including derelict vessels, ice, mines, containers, other large items, etc.);

(f) Areas where search and rescue (SAR) and anti-pollution operations are being carried out (for avoidance of such areas);

(g) The presence of newly discovered rocks, shoals, reefs and wrecks likely to constitute a danger to shipping, and, if relevant, their marking;

(h) Unexpected alteration or suspension of established routes;

(j) Cable or pipe-laying activities, the towing of large submerged objects for research or exploration purposes, the employment of manned or unmanned submersibles, or other underwater operations constituting potential dangers in or near shipping lanes;

(k) The establishment of research or scientific instruments in or near shipping lanes;

(l) The establishment of offshore structures in or near shipping lanes;

(m) Significant malfunctioning of radio-navigation services and shore-based maritime safety information radio or satellite services;

(n) Information concerning special operations which might affect the safety of shipping, sometimes over wide areas, e.g., naval exercises, missile firings, space missions, nuclear tests, ordnance dumping zones, etc. It is important that where the degree of hazard is known, this information is included in the relevant warning. Whenever possible such warnings should be originated not less than five days in advance of the scheduled event and reference may be made to relevant national publications in the warning;

(p) Acts of piracy and armed robbery against ships;

(q) Tsunamis and other natural phenomena, such as abnormal changes to sea level;

(r) World Health Organization (WHO) health advisory information; and

(s) Security-related requirements.

4. **Structure of NAVAREA Warning.** NAVAREA warnings are consecutively numbered throughout the calendar year, commencing with 001/YY at 0000 UTC on 01 January. All NAVAREA warnings shall be broadcast only in English in the International NAVTEX and SafetyNET services in accordance with IMO resolution A.706 (17), as amended. The minimum information which a mariner requires to avoid danger is HAZARD & POSITION. Amplifying remarks may be included in order to provide sufficient extra details to clearly identify the significance of the hazard and to assist mariners in recognizing and assessing its effect upon their navigation. The time, date and duration of the event shall be included if known. The text of a navigational warning shall contain specific message elements, identified and ordered by the reference numbers shown forward:-

Part	Reference Number	Message Element
Preamble	1	Message series identifier
	2	General Area
	3	Locality
	4	Chart Number
Warning	5	Key subject
	6	Geographical position
	7	Amplifying remarks
Post Script	8	Cancellations details

NAVTEX

5. **Broadcast of Navigational Warnings by NAVTEX.** NAVTEX is an international automated direct-printing service for promulgation of navigational and meteorological warnings, meteorological forecasts and other urgent information to ships. It was developed to provide a low-cost, simple and automated means of receiving maritime safety information on board ships at sea in coastal waters. NAVTEX provides shipping with navigational and meteorological warnings and urgent information through automatic printouts from a dedicated receiver. NAVTEX is a component of the IMO/IHO Worldwide Navigational Warning Service (WWNWS) defined by IMO Assembly resolution A.706 (17). It has also been included as an element of the Global Maritime Distress and Safety System (GMDSS). Since 1 August 1993, NAVTEX receiving capability has become part of the mandatory equipment which is required to be carried in certain vessels under the provisions of the International Convention for the Safety of Life at Sea (SOLAS).

6. **Definitions.**

(a) International NAVTEX service means the co-ordinated broadcast and automatic reception on 518 kHz of maritime safety information by means of narrow-band direct-printing telegraphy using the English language.

(b) National NAVTEX service means the broadcast and automatic reception of maritime safety information by means of narrow-band direct-printing telegraphy using frequencies other than 518 kHz and languages as decided by the Administration concerned.

(c) NAVTEX means the system for the broadcast and automatic reception of maritime safety information by means of narrow band direct-printing telegraphy. This may include inland seas, lakes and waterways navigable by seagoing ships

7. **Principal Features of NAVTEX.** NAVTEX transmissions are sent via a single frequency from local stations situated worldwide. The power of each transmission is regulated so as to avoid the possibility of interference between transmitters. Users can set their NAVTEX receivers to receive specific message types and reject others. Messages such as navigational and meteorological warnings and search and rescue information are non-rejectable to ensure that ships equipped with NAVTEX always receive the most vital information. Users can choose to receive information from the single transmitter that serves the sea area around their position, or from a number of transmitters. NAVTEX coordinators exercise control of messages transmitted by each station according to the information contained in each message and the geographical coverage required. Thus a user may choose to accept messages either from the single transmitter which serves the sea area around his position, or from a number of transmitters as appropriate. Ideally, the user should select the station within whose coverage the vessel is currently operating and the station into whose coverage area the vessel will transit next.

8. **Language and National Broadcast Options.** International NAVTEX Service messages on 518 kHz shall be broadcast only in English. There is often a requirement for NAVTEX broadcasts to be made in national languages in addition to English. This shall only be achieved by the provision of a national NAVTEX service. National NAVTEX services use frequencies other than 518 kHz, and languages as decided by the Administrations concerned. These National NAVTEX services may be broadcast on 490 kHz or 4209·5 kHz, or on an alternative nationally assigned frequency.

9. **Message Content.** Examples of the content and layout of NAVTEX messages are shown in the Joint IMO/IHO/WMO Manual on Maritime Safety Information. This publication should be available to all personnel responsible for the drafting of messages to be broadcast by NAVTEX stations.

10. **Message Priorities in the International NAVTEX Service.** The message originator is responsible for assessing the urgency of the information and inserting the appropriate priority marking. One of the following three message priorities is used to dictate the timing of the first broadcast of a new warning in the NAVTEX service. In descending order of urgency:-

(a) VITAL for immediate broadcast, subject to avoiding interference to ongoing transmissions. Such messages shall also be passed to the appropriate NAVAREA Coordinator for possible transmission as a NAVAREA message via SafetyNET;

(b) IMPORTANT for broadcast at the next available period when the frequency is unused; and

(c) ROUTINE for broadcast at the next scheduled transmission.

11. Both VITAL and IMPORTANT messages shall be repeated, at least once at the next scheduled transmission time slot, if the situation is still extant. The message priority is a procedural instruction for the NAVTEX Coordinator or the transmitting station and shall not be included in the message. By selecting the appropriate priority of VITAL, IMPORTANT or ROUTINE at the transmission terminal, the message will be broadcast with the correct priority. In order to avoid unnecessary disruption to the service, the priority marking VITAL is to be used only in cases of extreme urgency, i.e. to relay an initial shore-to-ship distress-related message or acts of piracy warnings, tsunamis and other natural phenomena warnings. In addition, VITAL messages are to be kept as brief as possible. The information provider is responsible for ensuring that the NAVTEX Coordinator is fully and immediately aware when a message shall be broadcast with the priority of VITAL. VITAL messages will normally be broadcast using NAVTEX number $B_3B_4 = 00$.

12. **Overview of TECHNICAL CHARACTERS B1, B2, B3, B4.** NAVTEX messages include instructions to the NAVTEX receiver for processing maritime safety information in the form of the NAVTEX message identity, which consists of four technical "B" characters which make up an alphanumeric code. The technical "B" characters which make up the full NAVTEX message identity is as shown in the Table I below.

B_1 Transmitter Identification Character	**B_2 Subject Indicator Character**	**B_3, B_4 Message Numbering Character**
1 letter	**1 letter**	**2 digit**
A to X	A = Navigational warning	01 to 99 (Message numbering characters "00" are not to be used for routine message)
	B = Meteorological Warning	
	C = Ice report	
	D[12] = Search and Rescue nformation, acts of piracy warnings, tsunamis and other natural phenomenas	
	E = Meteorological forecast	
	F = Pilots and VTS service messages	

	G =	AIS Service Messages (non navigational aid)	
	H =	LORAN Message	
	I =	currently not used	
	J =	GNSS message	
	K =	Other electronic navigational aid system messages	
	L =	Other navigational Warnings-additional to B_2 Character A[13]	
	M = N= O= P= Q= R= S= T= U=	Currently not used	
	V= W= X= Y=	Special services Allocati--on by the IMO NAVTEX Co-ordinating panel	
	Z =	No message on hand	

Table I – Technical "B" characters which make up the full NAVTEX message identity

13. **Message Format.** NAVTEX messages must be composed in accordance to the guidelines contained in the Joint IMO/IHO/WMO Manual on Maritime Safety Information and IHO Publication S-53. The basic elements of the NAVTEX message is as shown in the table below:-

Element	Example
Phasing signal	
Start of message group	ZCZC
One space	
NAVTEX message identity	FA01
Carriage return + line feed	
Message content	(Date Time Group – Optional e.g. 040735 UTC OCT 10) ENGLISH CHANNEL. START POINT SOUTHWARD. CHART BA 442(INT 1701). UNEXPLODEDORDANANCE LOCATED 49-51.97N 003-39.54W AND 49-55.24N 003-40.79W
End of message instruction	NNNN
Carriage return + two line feed	
Phasing signal	

14. **B_1 – Transmitter Identification Character.** The transmitter identification character is a single letter which is allocated to each transmitter. It is used to identify the broadcasts which are to

be accepted by the receiver and those to be rejected, and also the time slot for the transmission. In order to avoid erroneous reception and interference of transmissions from two stations having the same transmitter identification character, it is necessary to ensure that such stations have a large geographical separation. Allocation of transmitter identification characters by alphabetical sequence to adjacent sites can also cause problems; hence, consecutive transmitter identification characters are not normally allocated to adjacent stations. Experience has shown that this removes the risk of a station which over-runs its time slot masking the phasing signal of an adjacent station which is about to begin its transmission. NAVTEX transmissions have a designed maximum range of about 400 nautical miles. The minimum distance between two transmitters with the same transmitter identification identifier must, therefore, be sufficient to ensure that a receiver cannot be within range of both at the same time.

15. **B_2 – Subject Indicator Character.** Information is grouped by subject in the NAVTEX broadcast and each subject group is allocated a B_2 subject indicator character. The subject indicator character is used by the receiver to identify the different classes of messages as listed in Table 1. Some subject indicator characters can be used to reject messages concerning certain subjects which may not be required by the ship (e.g., LORAN messages may be rejected by deselecting the B_2 subject indicator character H on the NAVTEX receiver on board a ship which is not fitted with a LORAN receiver). Reception of messages, transmitted using subject indicator characters A, B, D and L, which have been allocated for navigational warnings, meteorological warnings, search and rescue information, acts of piracy warnings, tsunamis and other natural phenomena, is mandatory and cannot be deselected on the NAVTEX receiver. This has been designed to ensure that ships using NAVTEX always receive the most essential information.

16. **B_3, B_4 – Message Numbering Characters (NAVTEX Number).** Each message within each subject group, is allocated a two digit sequential serial number, beginning at 01 and ending at 99. The B_3B_4 message numbering characters together, are often referred to as the "NAVTEX number". The NAVTEX number is solely allocated as a component of the NAVTEX message identity and should not be confused with (and bears no correlation to), the series identity and consecutive number of the NAVAREA or Coastal warning contained in the message. Messages broadcast using NAVTEX number B_3B_4 = 00 cannot be rejected and will automatically override any selection of B_1 transmitter identification characters as well as any B_2 subject indicator characters selected on the NAVTEX receiver. Use of NAVTEX number B_3B_4 = 00 must therefore be strictly controlled, since messages carrying it will always be printed or displayed every time they are received. Routine messages and service messages must never be allocated B_3B_4 = 00. The correct use of B_2 characters A, B, D and L, will ensure that messages containing safety information will always be printed or displayed on first receipt

17. **NAVTEX Coverage.** The status of NAVTEX Service within NAVAREA VIII is as shown below:-

Station (B_1)	Position	Tel/Fax/Email	Schedule	Range NM	Status
Veraval, India (**H**)	20°54′N 70°21′E	+91-22-22751049 +91-22-25069983	0010,510,0910, 1310,1710,2110	250	Operational
Vengrula, India (**J**)	15°51′N 73°37′E	+91-22-22751049 +91-22-25069983	0130,0530,0930 1330,1730,2130	250	Operational
Muttam Point, India (**L**)	08°07′N, 77°19′E	+91-22-22751049 +91-22-25069983	0150,0550,0950, 1350,1750,2150	250	Operational
Porto Novo, India (**O**)	11°30′N, 79°46′E	+91-22-22751049 +91-22-25069983	0220,0620,1020, 1420,1820,2220	250	Operational

Vakalpudi, India (**Q**)	17°00′N, 82°17′E	+91-22-22751049 +91-22-25069983	0240,0640,1040, 1440,1840,2240	250	Operational
Balasore, India (**S**)	21°29′N, 86°55′E	+91-22-22751049 +91-22-25069983	0300,0700,1100, 1500,1900,2300	250	Operational
Keating Point, India (**V**)	09°15′N, 92°46′E	+91-22-22751049 +91-22-25069983	0330,0730,1130, 1530,1930,2330	250	Operational
Mauritius (**C**)	20°10′S 57°28′E	+230-2085950 (T) +230-2110838 (F) 3bm.mrs@mauritiustelecom.com	0020,0420,0820, 1220,1620,2020	400	Operational
Mahe, Seychelles (**T**)	04°39′S 55°28′E	+248 4290900 (T) +248 4224616 +248 4323288 (F) mrcc.seycoast@email.sc	0310,0710,1110, 1510,1910,2310	400	Operational
Mahe, Seychelles (**M**)			0200,0600,1000, 1400,1800,2200		

18. **World Wide Radio Navigational Warning Service (WWNWS).** The maritime safety information service of the GMDSS is the internationally and nationally coordinated network of broadcasts containing information which is necessary for safe navigation, received in ships by equipment which automatically monitors the appropriate transmissions, displays information which is relevant to the ship and provides a print capability. The *World-Wide Navigational Warning Service (WWNWS)* means the internationally and nationally coordinated service for the promulgation of navigational warnings. The world has been divided into twenty one (21) definite geographical sea areas named as NAVAREAs by the International Maritime Organisation (IMO) for the purpose of promulgating radio navigational warnings under the World Wide Navigational Warning Service (WWNWS). The Chief Hydrographer to the Govt. of India has been nominated as the coordinator of NAVAREA VIII region which generally encompasses the Indian Ocean Region (IOR) including the Bay of Bengal and is authorized to provide search and rescue information for broadcast by the IMO. The delimitation of NAVAREAS for coordinating and promulgating radio navigational warnings under the World-Wide Navigational Warning Service is depicted in Annexure 'A' to this notice. The delimitation of such areas is not related to and shall not prejudice the delimitation of any boundaries between States.

19. **Broadcast of NAVAREA Warnings.** Details of NAVAREA broadcast for all NAVAREAs are given in ILRS Volume 5. NAVAREA VIII warnings are broadcast from Pune LES, daily 1000hrs and 2200 hrs UTC through INMARSAT. In case of any urgent information or emergency, they can be transmitted at any time. All in force NAVAREA VIII warnings are broadcast through SafetyNET via LES Pune for six weeks until cancelled. The NAVAREA warnings are forwarded to the following agencies for promulgation/broadcast:-

(a) COMNETCEN (Mumbai):- For transmission to IN Ships

(b) Director, Pune LES: - For transmission through GMDSS, in accordance with International Safety Net Manual.

All NAVAREA warnings in force are also uploaded on the official website of National Hydrographic Office www.hydrobharat.gov.in and are available at the following link. (http://www.hydrobharat.gov.in/downloads/navarea_warnings_in_force.pdf)

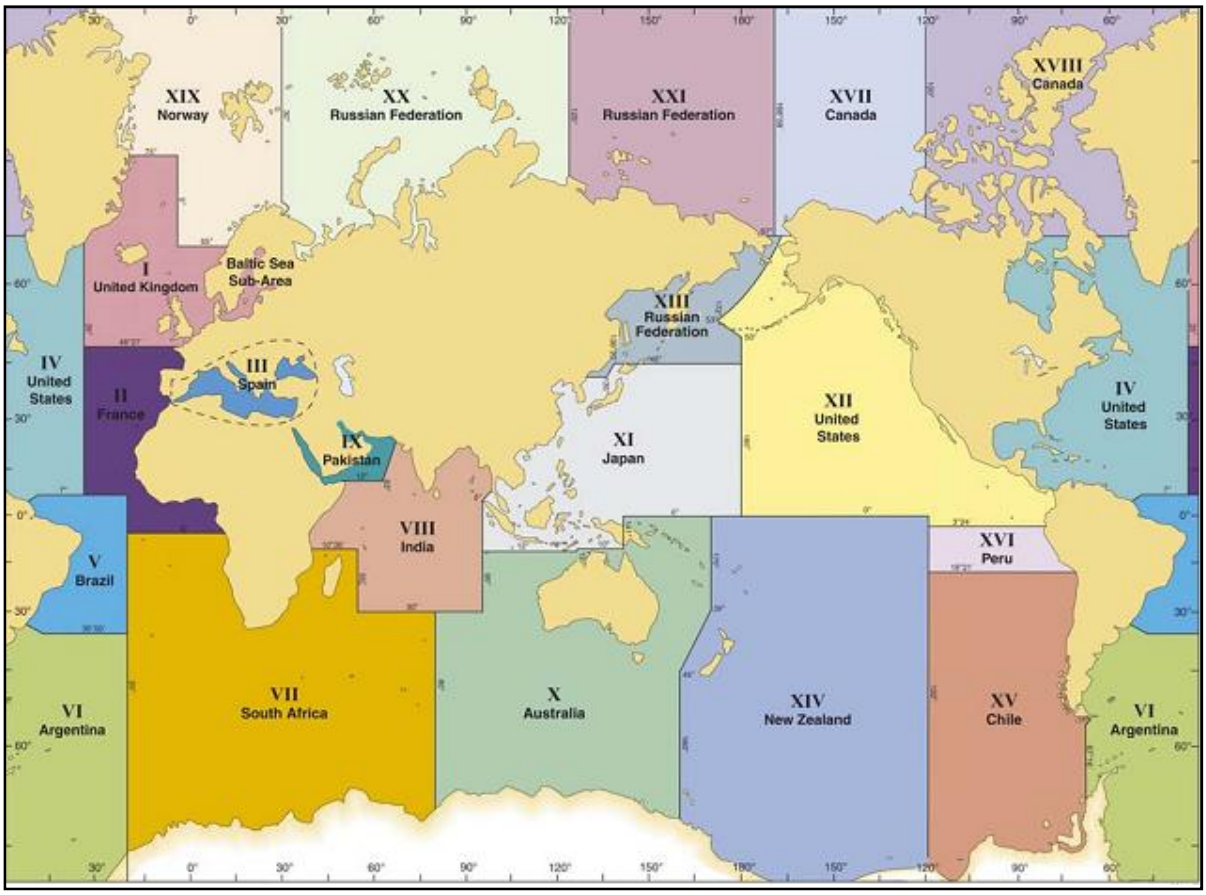
20. **NAVAREA VIII Coordinator Contact Details.** The Chief Hydrographer to the Government of India is the NAVAREA VIII Coordinator. The Chief Hydrographer shall be the central point of contact for all matters concerning to NAVAREA warnings including the monitoring of their broadcasts and to ensure that the messages originated have been correctly transmitted. He is to coordinate with the National Coordinators of the countries within the NAVAREA VIII for the collection of navigational information and promulgation of suitable warnings The contact details of NAVAREA VIII Coordinator is as follows:-

The Chief Hydrographer
Attn: Commander (H) - Maritime Safety Information Services
National Hydrographic Office
107-A, Rajpur Road
Post Box No. 75,
Dehradun, Uttarakhand
India
Pin 248 001
Tel: +91 135 2747368
Fax: +91 135 2748373
E-mail: msis-inho@navy.gov.in
inho@navy.gov.in
Web site: www.hydrobharat.gov.in

FOR URGENT NAVAREA PROMULGATION
Tel/Fax: +91-22-22751049
Email: ncdm-inho@navy.gov.in

(Appendix A)
(Refers to Para 20)

Delimitation of NAVAREAS under WWNWS



Special Notice No.13
SUBMARINE CABLES

(Source: www.cableawareness.info, www.iscpc.org)

1. **Damage to Submarine Cable.** Modern high capacity type submarine cables cross the oceans and major seas of the world. Cables of increasing capacity are being designed and will continue to be laid for many years to come. Towing of fishing gears, anchoring close or over the submarine cables and various other activities on the seabed could very easily damage a cable and cause major interruption to global communications with very serious consequences.

2. **Avoid Cables From Damage.** Considering the possibility of positioning inaccuracies and repaired cables section deviations, the fishing community are advised to keep towed gear a minimum distance of one nautical mile from either side of charted cables. For safe navigation and the avoidance of vital submarine cables, the most recent charts should always be available on the fishing vessel. The submarine cables are clearly identified on all charts used for navigation. The international symbol for an active submarine cable is a wavy line coloured magenta or black. In general the accuracy with which cables are laid varies inversely to the distance from land Navigation on cable ships is of a high standard but is limited to the techniques available when the cable was installed. Cables laid in the early 1970s, before satellite navigation became common could be up to one nautical mile (nm) out of charted position. With the use of satellites and other sophisticated navigational electronic aids, the positional accuracy of recently-laid cables is usually better than 0.5 nm. However despite this high accuracy during laying, the cable may be re-laid away from the original charted position due to cable repairs having been required subsequent to the original cable lay.

3. **Caution against Anchoring and Trawling in vicinity**

(a) Cautionary Note or the legend "Submarine Cable Area" appears on many charts, calling the attention of the mariners to the areas in which there are submarine cables.

(b) Every care should be taken to avoid anchoring and trawling in such areas even though there may be no specific prohibition against doing so, in view of the serious interference with communications which results from damage to submarine cables.

(c) Equal care should be taken wherever the symbols for submarine cables are shown on the chart.

4. **Danger Involved in Cutting to Clear Anchors or Fishing Gear.** In the event of any vessel fouling a submarine cable, every effort should be made to clear the anchor or gear by normal methods without causing damage. If these efforts fail, the anchor or gear should be slipped and abandoned without attempting to cut the cable. Very high voltage are fed into certain submarine cables and serious risk of loss of life exists due to electric shock, or at least of severe burns, if any attempt is made to cut the cable. Particular care should be exercised should a vessel's trawl/fishing gear foul and raise it from seabed, hence the vessel may capsize due to the excessive load. No claim in respect of injury or damage sustained through such interference with a submarine cable would be entertained by the owners of cable.

5. **Action Taken When fishing gear fouls on a cable.** When a cable gets accidentally entangled, great care needs to be taken when attempting to free the fouled gear. Comparatively little pressure is required to penetrate the insulation of a cable. When this happens, water will reach the centre conductor and render the cable unusable even though it may not be broken.

6. If gear cannot be freed without risk or damage to the cable, the gear should be abandoned. Cable owners will normally pay compensation for any gear sacrificed under these circumstances, provided such a loss can be proven and that all reasonable precautions were taken to prevent damaging the cable.

7. Claims for gear lost or damaged through entanglement with a submarine cable should be lodged in writing within 24 hours of arrival at the next port of call. Particulars of the incident should be given and full details recorded in the official vessel log. The report must include:

(a) The vessel's name, registered license number and captain's name and contact details.

(b) Name and address of vessel owner/s.

(c) Vessel's position and heading at the time of the incident (indicate land bearings and readings of electronic navigation system used).

(d) Water depth.

(e) Charts used at the time of the incident.

(f) A description of the gear deployed at the time of the incident

(g) A description of the cable if sighted.

(h) Copies of the relevant page from the vessel log in which the incident was recorded.

(j) Action taken to free gear and/or avoid damage to the cable.

8. **Action Taken When Suspected Foul of a Submarine Cable**

(a) If weights are excessive and suspect the vessel is fast to a cable, DO NOT endanger the vessel and crew by attempting to recover the gear.

(b) Carefully plot the ship's position as accurately as possible, checking for any cables that may be close to the position.

(c) Inform the Coast guard station of the situation or if the Coast guard is not reachable call the emergency number of the cable maintenance company concerned to state the incident concerning underwater or Submarine Telecommunications cable.

9. For more information on submarine cables, including related regulations and charting policy refer to the *Mariners Handbook*. Further information can be found on the website of the International Cable Protection Committee at www.iscpc.org.

Special Notice No. 14
INDIAN MERCHANT SHIPS – USE OF RADAR IN THE TIME OF EMERGENCY OR WAR

1. Pending the receipt of detailed instructions, Masters of Indian Merchant Ships on the outbreak of war or emergency should be guided by following principles:-

(a) When at Sea. Unrestricted use of radar under all occasions.

(b) When in Indian Harbour. To cease operating radar, except when ship is under way and if directed by the local Authorities.

Special Notice No. 15
INSTRUCTIONS REGARDING RENDERING REPORTS OF SHOALS OBTAINED BY ECHO SOUNDING

1. Each year numerous reports of shoal soundings are received by the Chief Hydrographer to the Govt. of India, but a large proportion of these have to be discarded as insufficient information is forwarded with them.

2. It may be noted that shoal sounding may be obtained due to false soundings which may be obtained from incorrectly adjusted echo sounder (E/S) sets due to one of the following causes:-

(a) The returning echo being received after the transmission interval has been completed once or perhaps twice.

(b) Dense shoals of fish and layers of plankton which sometime gives an echo completely masking that from the bottom. Such a layer is usually known as "deep scattering layer" and is often found to rise toward the surface, at dusk and after remaining during the night close to the surface, descends again at dawn. The deep scattering layer frequently encountered at or near the edge of the continental shelf is frequently mistaken for shoal water. An example of the deep scattering layer which appears to pass through the sea bed recorded on 2nd transmission is shown in the accompanying Figure No.1

(c) Layer of water of different temperature, density or salinity from that of the surrounding water can sometimes give false echoes.

(d) Strong tidal streams or eddies with solid particulars in suspension may give a feathery echo.

(e) It is possible in that powerful type of echo sounder's double echoes may be obtained even in the depths of several hundred meters. The second echo is invariably weaker than the first and can be faded by turning down the sensitivity of the receiver.

3. When unexpected shoal soundings are obtained in waters where charted depth gives no indication, even though discoloured water may be seen, the only certain method of confirmation of their existence is by taking a cast with the lead line.

4. When report of the shoal soundings are received at the National Hydrographic Office, they are carefully considered in the light of accompanying documents or other evidence before any action is taken to amend charts.

5. In order that the Chief Hydrographer to the Govt. of India can make full use of the report of sounding, the Echo Trace should always be forwarded together with Form IH 102 (Hydrographic Note). Navigating officers are requested to note the following points regarding essential details:-

(a) Draw a line across the trace when the shoal patch is encountered.

(b) Insert a number and time at the line. (The time is important since the height of the tide must subsequently be applied in order to obtain the correct depth).

(c) Insert the date of observation.

(d) Insert recorded depth of all peak soundings.

(e) Mark the phase or scale range in which the set is running noting particularly when a change is made.

(f) Insert the make and type of Echo Sounding Machine and the scale width.

6. It is important to note that the draught of the ship should be the same as the depth of the transmission line. In deeps water the depths need to be corrected for sound velocity.

7. In sets which have two operating speeds (e.g. meters and decimeters, or meters X10) the transmission lines must be separately adjusted to show the correct scale reading in each speed.

8. Attention is drawn to supplement to B.A. publication HD-282 ECHO SOUNDING. Errors, adjustments and reporting which can be obtained from British Admiralty Chart Agents.

Special Notice No. 16
INSTRUCTIONS FOR REPORTING DANGERS

1. Mariners at sea whilst on passage, or whilst entering / leaving ports / harbours and other waterways, are requested to look out for new or suspected dangers to navigation, changes in aids to navigation, or corrections to published charts and Sailing Directions. Whenever any such changes / dangers are observed, mariners are requested to notify the same to the Chief Hydrographer to the Government of India at the following address: -

National Hydrographic Office
107-A, Rajpur Road,
Dehradun - 248001
(UTTARAKHAND), INDIA
e-mail: - inho@navy.gov.in, msis-inho@navy.gov.in
Fax No.: +91-135- 2748373
WEB: www.hydrobharat.gov.in

Instructions for filling up IH 102

2. Kindly follow the instructions below in order to help the Hydrographic Office (the recipient) to quickly issue NAVAREA warning / Notice to Mariners for the benefit of all other mariners at sea.

Position Reporting

3. Accurate position or knowledge of position error is of great importance. Latitude and Longitude should only be used to specify position details when they have been fixed by GPS or Astronomical Observations. A full description of the method, equipment, time and datum (WGS 84/Everest/Other) used should be given. When position is defined by sextant angles or bearings (true or magnetic to be specified), more than two bearings should be used in order to provide a redundancy check. Distances observed by Radar should be corrected for index errors. Where position is derived after the event, from other observations and/or Dead Reckoning, the methodology of deriving the position should be included.

4. Paper Charts. A copy/tracing of largest scale chart is the best medium for forwarding details, the alterations and additions being shown thereon in red, but adequate details from the chart must be traced in black ink to enable the amendments to be fitted correctly.

5. ENCs. A Screen shot of largest scale usage band ENC with the alterations and additions being shown thereon in red. If it is to report an issue with the display of an ENC, a screen shot of the affected cell should be sent along with details of the ECDIS make and version in use at the time.

Depth Reporting

6. When soundings are obtained using echo sounders, the echo sounding trace should be duly annotated with date, times, position, depths, etc., and forwarded with the IH102. It is important to state whether the echo sounder is set to register depths below the surface or below the keel; in the latter case the vessel's draught should be given. Time and date should be given in order that corrections for the height of the tide may be made where necessary. The make, name and type of echo sounder should also be given.

7. For modern echo sounders that use electronic 'range gating', care should be taken that the correct range scale and appropriate gate width are in use. Older electro-mechanical echo sounders frequently record signals from echoes received back after one or more rotations of the stylus have been completed. Thus with a set whose maximum range is 500m, an echo recorded at 50m may be from depths of 50m, 550m or even 1050m. Soundings recorded beyond the set's nominal range can usually be recognised by the following:

(a) the trace being weaker than normal for the depth recorded;
(b) the trace passing through the transmission line;
(c) the feathery nature of the trace.

As a check that apparently shoal soundings are not due to echoes received beyond the set's nominal range, soundings should be continued until reasonable agreement with charted soundings is reached. However, soundings received after one or more rotations of the stylus can still be useful and should be submitted if they show significant differences from the chatted depths. Efforts should be made to identify and negate false echoes if any. The Mariners Handbook (NP100) and Notice 15 Special Edition of Notice to Mariners may be consulted.

8. Reports which cannot be confirmed or are lacking in certain details should not be withheld. Shortcomings should be stressed and any firm expectation of being able to check the information on a succeeding voyage should be notified.

9. Reports of **shoal soundings**, uncharted dangers and aids to navigation out of order should, at the mariner's discretion, also be made by radio to the nearest coast radio station. The draught of modern tankers in such that any uncharted depth under 30 meters or 15 fathoms may be of sufficient importance to justify a radio message.

10. Changes to Port information should be forwarded on Form IH.102A together with form IH.102. Form 102A contains the information required for Sailing Directions and should be used as an *aide memoir*. The Mariners Handbook, NP100, Chapter 8 gives general instructions. Where there is insufficient space on the forms an additional sheet should be used.

Please Note: - An acknowledgement will be sent by National Hydrographic Office for Hydrographic Notes, on receipt. When a Notice to Mariners is issued, the sender's ship or name is quoted as authority unless the information is also received from other authorities/ foreign Notices to Mariners. Further, communication from National Hydrographic Office to the sender of Hydrographic Notes will only be necessary to verify unusual features or abnormal values reported.

HYDROGRAPHIC NOTE				IH.102 (Revised 2012)
For Forwarding information for Indian Charts, ENCs and Publications and reporting of ENC related issues				
Date		Ref. Number		
Name of the Ship or Sender				
Address				
Tel/FAX/E-mail address				
Observation Date		Time (UTC/IST)		
Object of Changes Observed (Tick appropriate)	☐ Bathymetry	☐ Nav. Dangers	☐ Nav. aids	
	☐ Designated Areas	☐ Others		
Geographical Position (See Instructions Overleaf)	Latitude		Longitude	
Position Method	☐ DGPS	☐ GPS	☐ Radar	☐ Others
Datum Used	☐ WGS84	☐ Everest	☐ Others	
Charts Affected		Edition		
Latest Edition of Indian Notices to Mariners Held				
Tracing/Plot/Photograph if enclosed				
ENCs Affected				
Latest Update Disk Held				
Publication Affected		Edition		
Page No./Light No. etc				
Details:				
Limitations if any in Reporting the Changes Above				
Details of Documents/Photos attached:				
Signature of the Master/Reporter/Observer				

HYDROGRAPHIC NOTE FOR PORT INFORMATION (To accompany Form IH.102)	**IH.102A** **(Revised 2012)**

Date		Ref. No.		
Name of the Ship or Sender				
Address				
Tel/Fax/E-mail				
1. **NAME OF PORT**				
Location	Latitude		Longitude	
2. **GENERAL REMARKS**				
Principal activities and trade				
Number of ships and tonnage handled per year				
Maximum size of draught of vessel handled				
Copy of Port handbook (if available)				
3. **ANCHORAGES**				
Type / Purpose				
Minimum depth at anchorage				
Shelter afforded				
Holding ground				
Recommended pilotage to the anchorage				
4. **PILOTAGE**				
Authority for request				
Embarkation position				
Regulations				
Documents to be provided				
Recommended pilotage to approach of Harbour and Berths				
Information on VTMS				
5. **DIRECTIONS**				
Entry and Berthing Information				
Tides (Height)				
Tidal Stream Information				
Wind Speed and Direction				
Navigational Aids (Beacons / Buoys / Lights / Etc.)				
6. **POLLUTION CONTROL**				
Local regulation in force (If Any)				

7. TUGS	
Number available / Tug type	
Maximum HP / Bollard pull	
7. **TUGS (Continued)**	
Requesting authority	
Availability timing / Communication	
Hiring charges	
8. **BERTHING AND WHARVES**	
Type & Number of berths available	
Length	
Depth alongside	
Facilities available	
Procedure for requesting berth & hiring charges	
9. **CARGO HANDLING**	
Containers	
Lighters & Ro-Ro etc.	
10. **CRANES**	
Brief details of Max. lifting capacity, Height of boom at wharf level and Outreach	
Container handling facilities	
11. **BRIDGES**	
Vertical clearance	
12. **REPAIRS**	
Hull machinery and underwater	
Ship and Boat yards	
Docking or Slipway facilities (Size/ Dimensions of vessels handled)	
Hards and Ramps	
Divers / Diving assistance	
13. **SERVICES**	
Radio / FAX / Telephone / Internet etc.	
Medical	
Quarantine	
Consul	
Ship chandlery and Stevedores	
Compass adjustment	
Tank cleaning	

Hull painting Police / Ambulance / Firefighting (Fixed and Mobile facilities) Nav. Warning and Weather bulletin Garbage disposal / Waste oil disposal Helicopter landing facilities	
14. **RESCUE & DISTRESS**	
Salvage, Lifeboat, Life guards, etc	
15. **SUPPLIES**	
Fuel (Type, Quantities & Method of delivery)	
Fresh water (Method of delivery and Rate of supply)	
Provisions	
Chart agents	
16. **COMMUNICATIONS**	
Road, Rail and Air services available	
Nearest airport or airfield	
Port Radio and Information Service (Frequencies and Operating Hours)	
17. **PORT AUTHORITY**	
Designation, Address, Telephone, E-mail Address and Website	
18. **SECURITY**	
Security of ports / International Ship and Port Facility Security (ISPS) compliance	
Custom and Immigration Regulations in force	
19. **SMALL CRAFT FACILITIES**	
Information and facilities for small craft, yachts visiting the port	
Yacht clubs, berths etc	
20. **SHORT LEAVE**	
21. **CLUBS RECREATION**	
Information Kiosk (Location)	
Foreign Exchange firms / Banks (Within / Near Port Area)	
Places of interest near port	

22. **VIEWS**	
Photographs(Duly annotated) of the approaches, leading marks, the entrance to the harbour etc.	
23. **ADDITIONAL DETAILS**	
Any other information considered to be useful for the mariners	
SIGNATURE OF THE OBSERVER / REPORTER / MASTER	

Special Notice No. 16A
OCEAN OBSERVATION SYSTEMS
(Source: www.niot.res.in)

1. Under the Ocean Observation Network (OON) programme of ESSO MoES, the Ocean observation systems (OOS) group of NIOT is entrusted to undertake the activities on moored buoy programme. The OOS group, erstwhile National Data Buoy Programme, was established in 1996, with the objective to operate, maintain and develop moored buoy observational networks and related telecommunication facilities in the Indian seas. Later, OOS has inherited lead responsibility for a number of important and well-established observational programmes in the northern Indian Ocean. Due to the remoteness of the vast open oceans, there have been a challenge to continuously observe the ocean, which was later harmonized by in-situ and satellite based observations.

2. Moored Data Buoys are offshore floating platforms, fitted with meteorological and oceanographic sensors, moored at specific locations to observe in situ met ocean data at regular intervals. The observed data is then transmitted through satellite along with location reference, in synoptic hours, to the state-of-the-art shore station facility at NIOT, Chennai. Moored buoys have revolutionized the observing system capabilities and made a global system possible. Today, in-situ observations are very important as a complement to satellite-based observations. When assimilated into numerical models, in-situ observations calibrate the model and serve as a reference point. Presently, OOS has established sustained moored buoy network for oceanographic, marine meteorological and tsunami warning applications.

3. OOS operates three types of buoys systems viz. Met-Ocean, Deep Sea Instrumented buoy - OMNI (Ocean Moored buoy network for Northern Indian Ocean) and Tsunami. The OMNI buoys are equipped with high-tech sensors to measure ocean currents, conductivity, and temperature up to 500m depth along with solar radiation and precipitation. The Met-Ocean and OMNI buoys are configured to transmit observed Met-Ocean data once in three hours and the tsunami buoys are configured to report the water level data hourly and every five minutes during tsunami event mode. These buoys are deployed in coastal as well as in deep sea. All buoy systems are capable of transmitting data to shore in real time through satellite. The shore station at Chennai is manned 24 x 7 and the data obtained from the buoy network are disseminated in real time INCOIS for further analysis, dissemination and archival purpose.

4. In addition, OOS has established and maintaining CAL VAL Buoy system for satellite data validation in collaboration with SAC ISRO close to Lakshadweep islands. Also OOS has joined NCPOR (National Centre for Polar and Ocean Research-Goa) on projects such as Southern Ocean mooring system and Arctic mooring system. OOS in collaboration with NCPOR has deployed a buoy system in ARCTIC buoy system. Further, OOS in association with NOAA – PMEL USA, is maintaining the Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction (RAMA buoys) to study the Indian Ocean's role on the monsoons.

5. **Buoys Features:** The buoys are fitted with meteorological and oceanographic sensors to measure in-situ observations, global positioning system, beacon light, satellite transceiver, radar reflector and are powered by lead acid / lithium batteries. The data buoys are moored at a depth of 20 m to 4500 m depending upon its location of deployment. The choice on the right type of buoy used; normally depends upon its intended deployment and measurement requirements. Specific mooring design is used based on the type of buoy, location and water depth.

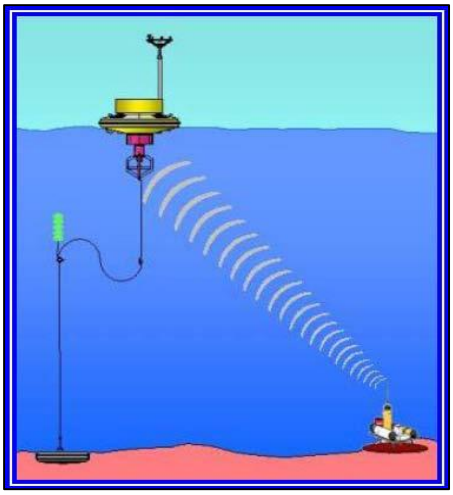
(a) **Met Ocean Buoys**: Met Ocean Buoys are capable of measuring in-situ Atmospheric Pressure, Air Temperature, Wind Speed, Wind Direction, Humidity Conductivity, Sea Surface Temperature, Current Speed, Current Direction and Wave Parameters.

(b) **OMNI Buoys**: The OMNI buoys are more similar to Met-Ocean buoys but are capable of measuring Ocean Current, Conductivity and Temperature up to 500m depth apart from standard suit of sensors used in the Met-Ocean buoys. In addition, these buoys are also equipped with Solar Radiation and Rain Gauge sensors.

(c) **Tsunami Buoys**: The tsunami buoys comprise of two units (i) The Surface Buoy and The Bottom Pressure Recorder (BPR).

(i) The surface buoy is more similar to a Met-Ocean and OMNI buoy, however not fitted with any Meteorological or Oceanographic sensors.

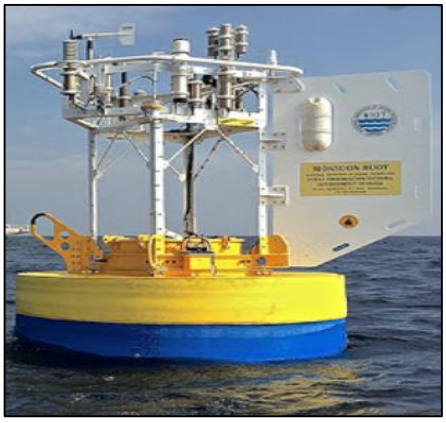
(ii) Bottom Pressure Recorder (BPR): The bottom pressure recorder is a sub-surface unit positioned close to the sea floor which includes a highly accurate pressure sensor which can detect earthquakes and sea level changes. The BPR is capable of detecting and measuring Tsunamis with amplitude as small as 1 cm in 6000 m water column. The BPR is designed to work both on normal conditions and during Tsunami. The BPR switches to an intense mode when a Tsunami event is detected. The observed water column values are transmitted through an acoustic modem to the surface buoy which in turn transmits to shore station at NIOT and to Tsunami Warning Centre at INCOIS, Hyderabad through mail. This data is then used with forecast models to predict the height of the wave and inundation when it arrives at a particular coastal location.

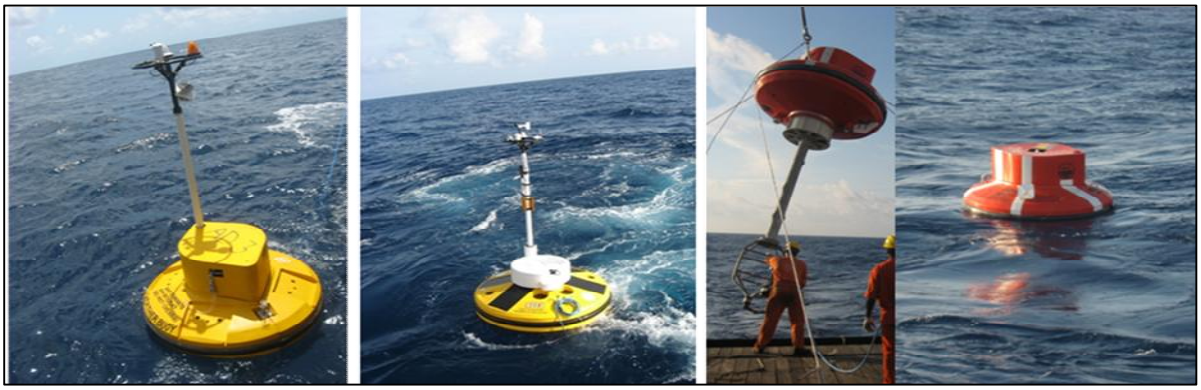


(d) **SAIC Buoy**: Apart from Indegenised NIOT Tsunami buoys, the Indian National Center for Ocean Information Services (INCOIS), Ministry of Earth Sciences in Hyderabad, India in associations with Science Applications International Corporation (SAIC), USA for the production and delivery of SAIC Tsunami Buoy (STB) systems. The STB systems are deployed at locations in the Bay of Bengal and off the northwest coast of India near the Makran subduction and forms part of a larger network of tsunami buoy systems that will provide the entire region with critical data to assess the magnitude of tsunamis generated in the Indian Ocean. The STB system also consists of two subsystems more similar to an Indigenised Tsunami buoy: a surface buoy, and a bottom pressure recorder. The data from these buoys is expected to complement the data from other observing systems that India has put in place for detection and monitoring of earthquakes and tsunamis.

(e) **WHOI Buoy**: The Indian National Center for Ocean Information Services (INCOIS), Ministry of Earth Sciences in Hyderabad, India in associations with Woods Hole Oceanographic Institution – USA, has deployed a buoy capable of measuring salinity,

temperature, currents, and nitrates and dissolved oxygen content at different levels in the sea up to a depth of 2 km to study how the atmosphere and the ocean interact and exchange energy. The buoy is located in the bay which receives the waters of the Ganga and the Brahmaputra. It also receives the highest rainfall in the Indian Ocean. This large amount of freshwater heats up and cool down at a much faster rate than the rest of the Bay. Weather forecasting is based on the rhythms of parameters such as the temperature of the sea, currents and the mixing of fresh and saline waters. This device, will give accurate data on these parameters and help forecasting agencies to validate their findings.





Met Ocean Buoy Omni Buoy Tsunami Buoy

Met/Coastal Buoy

OMNI Buoy

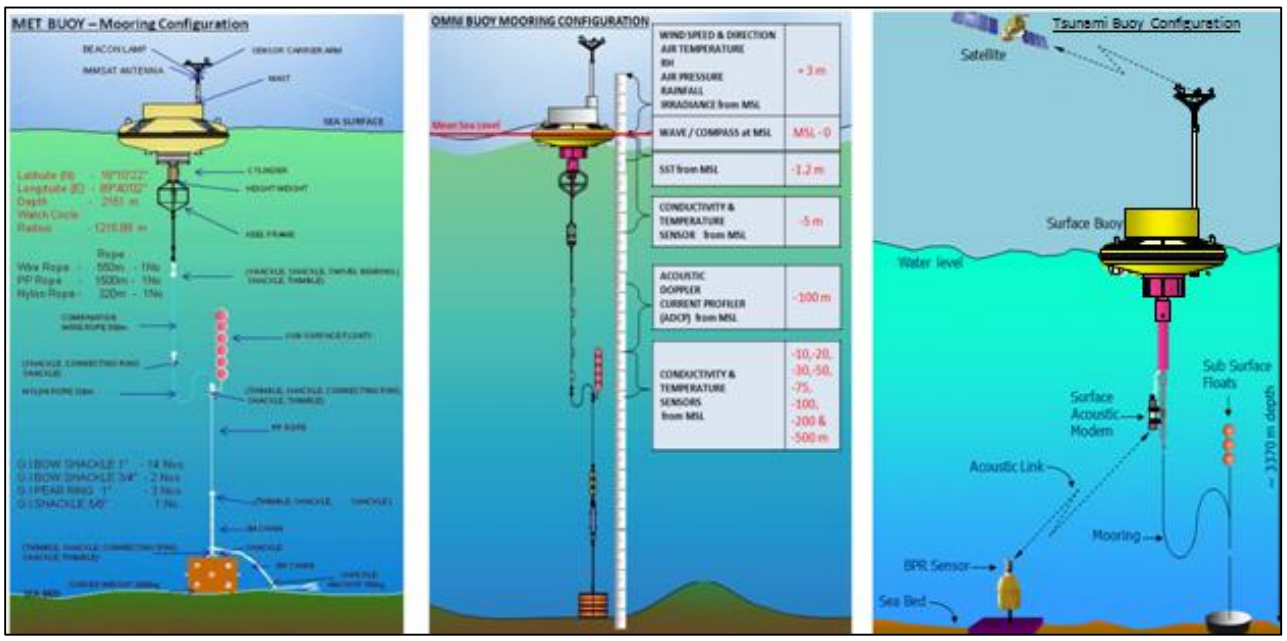
Indian Tsunami Buoy

Indian Tsunami Buoy

STB Tsunami Buoy

WHOI Buoy

6. Typical Mooring configurations:



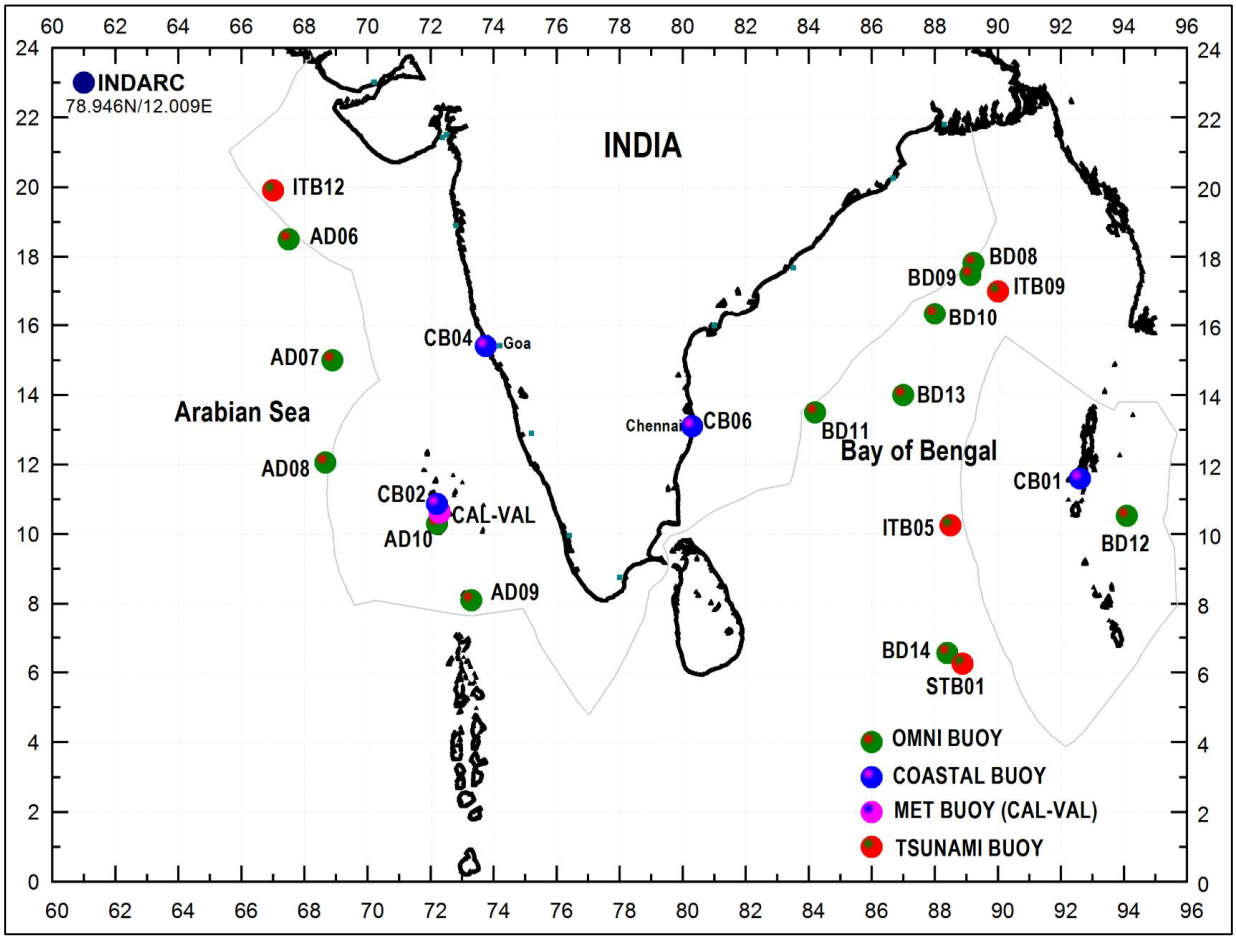
7. **Application of Buoy Data.** The time series observations from data buoys have become an indispensable tool for the operational users like India Meteorological Department (IMD), as they extensively rely on the real-time in-situ data provided by the buoys for their operational activities especially during bad weather periods. The systematic long-term information around the Indian Seas under OOS programme has greatly improved the understanding of the monsoon system especially during experiments like Bay of Bengal Monsoon Experiment (BOBMEX) and Arabian Sea Monsoon Experiment (ARMEX) conducted under the Indian Climate Research Programme (ICRP).

Another important application of the real-time buoy observations is by providing the ground truth for the calibration of observations made by the satellite sensors. Long-term records of meteorological and oceanographic conditions are extensively used by a variety of other applications like port development, fisheries, coastal zone management, oil exploration, etc. Understanding the role of ocean dynamics and/or ocean-atmosphere coupling in the ENSO/ELNINO will be another goal. Long time observations from these buoy array will facilitate the scientists to define the seasonal and intra-seasonal variability's.

The data from Tsunami buoy is very critical and helps the National Disaster Management Authority to promulgate timely warning and alerts to Indian Nationals.

8. **Maintenance of Met Ocean, OMNI and Tsunami Buoys**. This increases the reliability of the observational system and the data, buoy maintenance are undertaken at regular intervals to up keep the buoy network. Sensor calibrations are carried out before and after the buoy deployments to ensure the quality data return. The maintenance of buoys is carried out using NIOT-MoES vessels Sagar Nidhi, Sagar Kanya and Sagar Manjusaha. In addition, minor maintenance and survey works are carried out by Sagar Tara and Sagar Anveshika.

9. **Buoy Locations**:



ARABIAN SEA BUOYS			
Sl.No	**Buoy Field ID / Type**	**Latitude (N)**	**Longitude (E)**
1	NIOT AD06/OB	18° 29' 42"	67° 27' 00"
2	NIOT AD07/OB	14° 56' 08"	68° 59' 04"
3	NIOT AD08/OB	12°04' 05"	68° 37' 58"
4	NIOT AD09/OB	08° 08' 26"	73° 15' 32"
5	NIOT AD10/OB	10° 19' 03"	72° 35' 32"
6	NIOT CALVAL/MB	10° 36' 58"	72° 18' 01"
7	NIOT CB02/CB	10° 52' 26"	72° 12' 32"
8	NIOT CB04/CB	15° 24' 18"	73° 45' 07"
BAY OF BENGAL BUOYS			
Sl.No	**Buoy Field ID / Type**	**Latitude (N)**	**Longitude (E)**
1	NIOT BD08/OB	17° 49' 07"	89° 13' 59"
2	NIOT BD09/OB	17° 28' 56"	89° 07' 45"
3	NIOT BD10/OB	16° 21' 37"	87° 59' 25"
4	NIOT BD11/OB	13° 31' 31"	84° 10' 00"
5	NIOT BD12/OB	10° 31' 15"	94° 05' 09"
6	NIOT BD13/OB	13° 59' 15"	86° 58' 55"
7	NIOT BD14/OB	06° 33' 56"	88° 21' 18"
8	NIOT CB01/CB	11° 35' 20"	92° 35' 46"
9	NIOT CB06/CB	13° 06' 03"	80° 18' 54"
10	WHOI buoy	17° 48' 14"	89° 30' 17"
TSUNAMI BUOYS (Arabian Sea & Bay of Bengal)			
Sl.No	**Buoy Field ID / Type**	**Latitude (N)**	**Longitude (E)**
1.	NIOT TB09/TB	17° 04' 18"	90° 00' 14"
2.	NIOT TB12/TB	19° 53' 43"	66° 59' 52"
3.	NIOT TB12A/TB	18° 38' 10"	67° 11' 34"
4.	NIOT TB05/TB	10°10' 00"	88° 29' 53"
5.	ITB-01(SAGAR BHOOMI)	08°15' 57"	73° 16' 51"
6.	STB01/TB	06° 15' 00"	88° 52' 48"
7.	STB02/TB	20° 48' 00"	65° 20' 24"
8.	STB03/TB	03° 48' 36"	91° 42' 00"
9.	STB05/TB	13° 30' 00"	89° 00' 00"

Note: The present positions of the buoys may be obtained from the latest edition of Indian Notices to Mariners.

Buoy Characteristics				
1	Colour	Yellow coloured buoy of 3.0 m diameter and 3.5 m mast carrying sensors.		
2	Augmentations	Fitted with RADAR REFLECTOR		
		Fitted with BEACON Light	Colour :	Yellow
			Visibility :	4 Nautical Miles
			Flashes :	4 Flashes every 15 seconds

3	Mode of Communication	Insat, Inmarsat & GPRS	
4	Forewarning	Safe distance for shipping	1000m off the buoy.

10. **List of Data End Users.**

Sl. No	End User	Data Supply	Use
(a)	India Meteorological Department (IMD)	24x7	For their day-to-day operational weather forecasting and cyclone warning
(b)	National Center for Medium Range Weather Forecasting (NCMWRF)	24x7	This organisation receives buoy data from IMD for validation of their forecasting model
(c)	Indian National Centre for Ocean Information Services (INCOIS)	24x7	To support Potential Fishing Zone notification and validation of ocean state forecasting model
(d)	World Meteorological Organisation (WMO)	24x7 (8 times a day)	Data is given in GTS format to IMD to disseminate to WMO for their activates such as understanding global climate and forecast.
(e)	National Hydrographic Office (NHO)	Monthly	For issuing Navigational Warnings
(f)	Ports (Ennore, Tuticorin, Mangalore & Goa)	Monthly	For vessel traffic management and port development activities.
(g)	Indian Space Research Organisation (ISRO), Space Application Centre (SAC) & Vikram Sarabhai Space Centre (VSSC)	On Request	For satellite Data Validation and allied research uses
(h)	IISC Bangalore, Department of Science & Technology	On Request	Climate research
(i)	Indian Climate Research Programme (ICRP),		
(j)	IIT's (Madras, Bhuvaneswar, Kharagpur, Bombay)		
(k)	Naval Physical Oceanographic Laboratory (NPOL)	On Request	For various research activities
(l)	Indian Coast Guard	On Request	To ensure safety of life at sea as well as for operational requirements.
(m)	Indian Navy		

(n)	Oil and Natural Gas Corporation Limited	Specific project requirements	Environmental monitoring for Oil exploration activities.
(o)	Universities (Andhra, Kerala Agricultural University, Cochin & Mangalore)	On Request	For research and academic purposes.
(p)	Central Marine Fisheries Research Institute (CMFRI)	On Request	For various research activities.
(q)	Collaborative Projects	On Request	For various research activities

11. **Use of Buoys to Fishermen**. Buoys are fisherman's friend at sea capable of identifying cyclones, storm surges and Tsunamis which causes loss of life, devastation and misery. The data observed by these buoys help to provide weather forecast and warnings in advance. In addition to the weather forecast, fish potential zones can also be identified with the help of data buoys, enabling the fishermen to locate the fishing zone. The ability to predict future climatic events and to estimate the degree to which they will disturb the ocean and its resources can potentially help fishermen to plan their operations in advance.

12. **Advice to Fishermen.**

(a) Always keep watch for the buoys at sea.

(b) They are visible on your radar system.

(c) Signaling beacon light buoys helps you to identify them during night.

(d) Always keep off your fishing operations from buoys to avoid entanglement of your net.

(e) Don't tie your boats, damage or destroy any part of the buoy, since they provide valuable information for your life at sea.

(f) If your net gets entangled with the buoy mooring, do not damage or cut the buoy mooring to retrieve them.

(g) Since the buoy is under a great deal of tension, if lifted or pulled, will cause severe damage to you and your boat.

(h) If anyone found tampering the buoy will be punished severely.

(j) Whenever you see a buoy drifting or anyone attempting to damage the buoy, immediately informs that to your nearest Police Station or call on us in address given below:

13. **Group Head.**

Ocean Observation Systems,
National Institute of Ocean Technology
Velachery – Tambaram Road, Pallikaranai, Chennai
India, Pin – 600 100.
Phone: 044 - 66783535 / 66783536 / 66783537 / +91-9445040408 / +91-9444399829
Fax : 044 – 66783400, Email: ssamc@niot.res.in

Special Notice No. 16B

FISH AGGREGATING DEVICES (FADs)

(Source: Hydrographic Unit, Mauritius)

1. **Introduction**. Fish Aggregating Devices (FADs) are moored at several locations around Mauritius Island. These are not marked on the navigational charts. The Coordinates of FAD are as follows:-

S/N	NAME	DEPTH (m)	COAST	LAT	LON
1	ALBION I	1280	2.3	20 ° 09'.446	57 ° 23'.330
2	ALBION II	410	1.1	20 ° 11'.869	57 ° 22'.891
3	BAIE DU CAP	855	2.7	20 ° 33'.073	57 ° 23'.283
4	BLUE BAY	968	2.4	20 ° 29'.110	57 ° 43'.540
5	FLAT ISLAND	750	9.6	19 ° 49'.434	57 ° 34'.373
6	FLIC EN FLAC I	1241	2.5	20 ° 15'.995	57 ° 19'.337
7	FLIC EN FLAC II	215	0.9	20 ° 17'.791	57 ° 20'.645
8	GRAND CARREAU	260	8.2	20 ° 21'.436	57 ° 55'.531
9	LA PRENEUSE	2480	5.2	20 ° 17'.711	57 ° 16'.080
10	MARITIM	400	1.4	20 ° 04'.345	57 ° 29'.160
11	MEDINE	2580	5.3	20 ° 12'.663	57 ° 17'.410
12	MON CHOISY	590	1.7	20 ° 01'.424	57 ° 30'.340
13	POINTE AUX CAVES	2400	4.4	20 ° 10'.741	57 ° 19'.510
14	POINTE AUX SABLES	100	0.9	20 ° 09'.753	57 ° 25'.179
15	PORT LOUIS I	3560	11.8	20 ° 02'.816	57 ° 15'.956
16	PORT LOUIS II	3409	9.5	20 ° 06'.205	57 ° 15'.882
17	POUDRE D'OR II	245	4.2	20 ° 02'.444	57 ° 45'.933
18	PTE AUX CANONNIERS	450	3.3	19 ° 56'.307	57 ° 33'.647
19	RIVIERE NOIRE I	968	4.5	20 ° 23'.596	57 ° 16'.771
20	RIVIERE NOIRE II	480	2.2	20 ° 21'.069	57 ° 19'.780
2 1	RIVIERE NOIRE III	3100	9	20 ° 17'.901	57 ° 12'.119
22	ROCHES NOIRES	732	5.4	20 ° 02'.576	57 ° 48'.654
23	SOUILLAC	1075	2.2	20 ° 33'.793	57 ° 31'.146
24	TAMARIN	390	1.5	20 ° 20'.630	57 ° 20'.119
25	TOMBEAU BAY	1050	2.6	20 ° 04'.413	57 ° 27'.890
26	TROU AUX BICHES I	2023	4.3	20 ° 00'.161	57 ° 27'.775
27	TROU AUX BICHES II	2675	6.6	20 ° 01'.334	57 ° 24'.387
28	POSTE DE FLACQ	800	3.25	20 ° 07'.690	57 ° 48'.670
29	TROU D'EAU DOUCE	992	2.8	20 ° 13'.710	57 ° 55'.374

Note: As at date there are 8 FADs to be re-deployed. The FADs will be re-set subject to prevailing of good weather conditions and running conditions (awaiting clearances) of the boat Investigator II. The FADs at greater depths (> 1000m) would require the use of echo sounder. The echo sounder in boat Sphyrna II is not functional. The FADs at all other locations will be monitored in terms of repairs and maintenance.

2. **Method of Mooring.** The FADs are anchored with concrete mooring blocks weighing 1 to 2 tons. The mooring rope is a polypropylene of 18 mm diameter. The mooring depth of FADs varies from 200 m to 3900 m. Since mooring rope is in excess of 50-100 m, the FADs move around the moored positions, at the surface within a radius of 200-500 meters for certain FADs.

3. **Top marks and Identification.** FADs are marked with orange coloured (colour code: hex #ff4f00) floats and Radar reflector (mounted on Spar of 2.5-3 m above water level) for ease of detection.

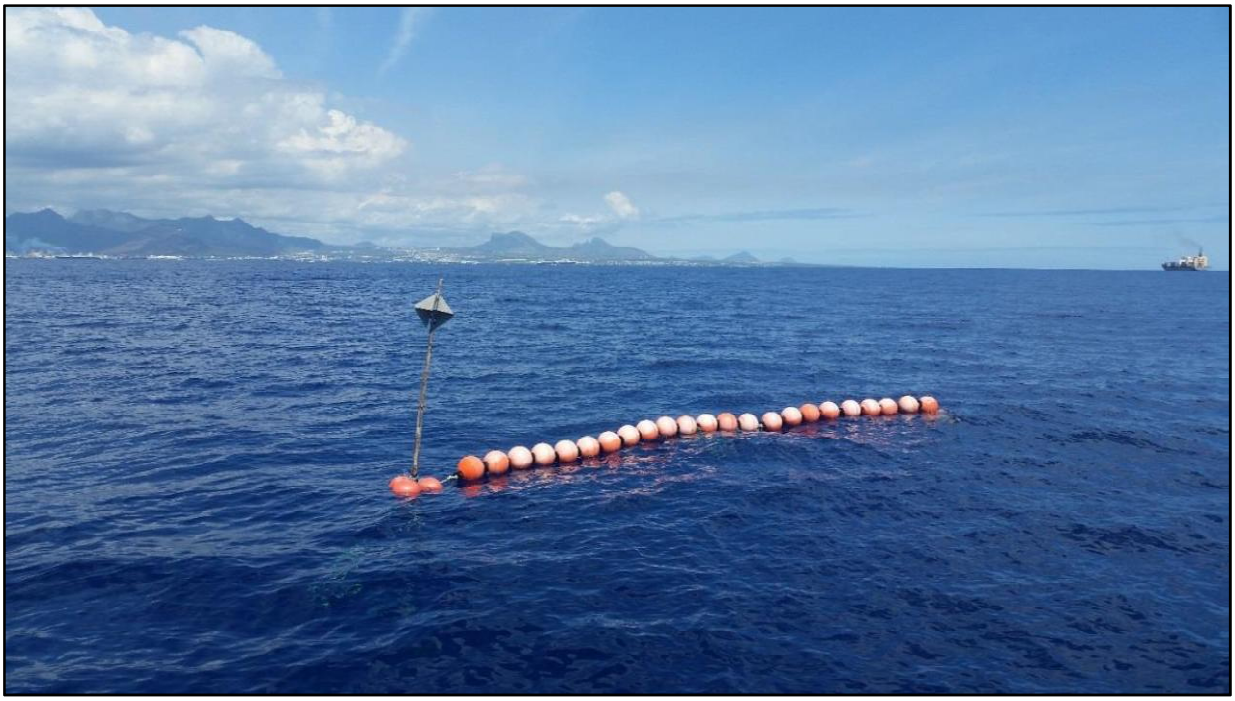


Fig 1: Marker of Fish Aggregating Device

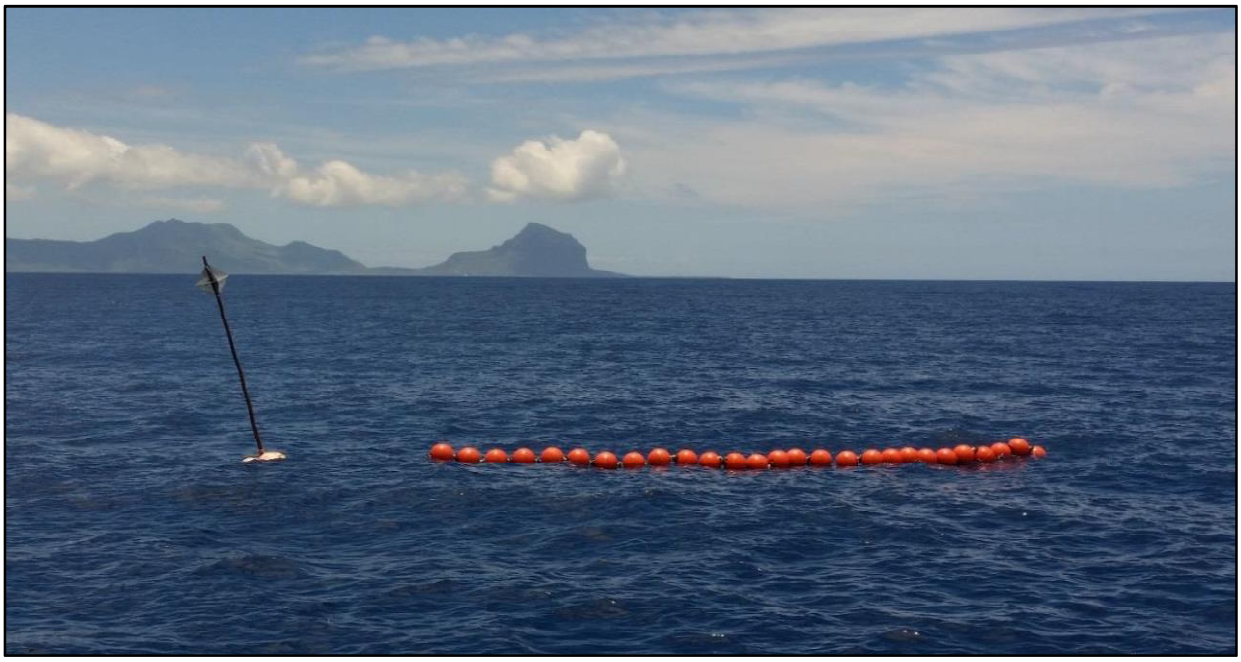


Fig 2: Marker of Fish Aggregating Device

Special Notice No.17
SIGNIFICANCE OF GOOD SEAMANSHIP AND SAFE NAVIGATIONAL WATCHKEEPING PRACTICES DURING SW MONSOON

(Source: Director General of Shipping (Govt. of India))

Adverse weather conditions during the seasonal southwest monsoon period in Indian waters hamper the safety of navigation. In the light of these circumstances, the mariner is urged to adhere to the following guidelines while navigating in the approaches of Indian ports or along the coast of India especially during severe monsoon between Jun to Sep. However such precautions or practices are recommended during all time of the year.

(a) Masters are urged to use latest updated, largest scale Indian published navigational charts.

(b) Master shall ensure that vessel draws adequate draft and trim to achieve 100 percent propeller submergence.

(c) Masters should ensure that anchors are kept in readiness for letting go in an emergency situation.

(d) Masters are to ensure that main propulsion and steering system of his vessel are always kept in high state of readiness for immediate maneuver.

(e) It is responsibility of the master to obtain latest weather bulletin of the concerned area of navigation prior entering Indian waters as well as while awaiting at anchorage or at roadstead.

(f) Contingency plan is one of the components of comprehensive voyage plan and available at all times in any emergency situation.

(g) The storm signal hoisted by Indian Port Signal station (PSS) is to be adhered to while navigating in the approaches of the ports.

(h) The vessel during navigation shall display lights and shapes and use appropriate sound signal during navigation as prescribed by International Regulations for preventing collisions at sea 1972 or any special regulations promulgated made by the port.

(j) The Master shall ensure that all Navigational watch keeping officers apply the provision of International Regulations for preventing collisions 1972 or special regulations promulgated by the port to avoid risk of collision or close quarter situations.

(k) The latest navigational warnings in force issued by the ports or coast radio stations or National Hydrographic Office, Dehradun as the case may be shall be closely monitored and taken into account ensuring safe navigation.

(l) The fundamentals of observing of good seamanship, navigational watch keeping, limitations encountered by the vessel and special circumstances if any, must be taken into consideration to enhance safe navigation.

Special Notice No. 18

INTERNATIONAL HYDROGRAPHIC ORGANISATION

(Source: www.iho.int)

1. The International Hydrographic Organization is an intergovernmental consultative and technical organization that was established in 1921 to support safety of navigation and protection of marine environment.

2. **Historical Background.** International cooperation in the field of hydrography began with a Conference held in Washington in 1899, followed by two others in Saint Petersburg, in 1908 and 1912. At the suggestion of the Hydrographers of Great Britain and France the first International Hydrographic Conference was convened in London from 24 June to 16 July 1919, attended by Hydrographers and other representatives of 24 nations, during which it was decided that a permanent body should be created. The resulting International Hydrographic Bureau began its activity in 1921 with nineteen Member States. At the invitation of H.S.H. Prince Albert I of Monaco, a noted marine scientist, the Bureau was provided with headquarters in the Principality of Monaco. The Organization has remained in Monaco ever since, thanks to the continuing and very generous support of the Prince's successors.

3. **Convention on The International Hydrographic Organisation.** An Intergovernmental Convention on the Organisation was drafted during the IXth I.H. Conference in 1967 and, after ratification by the required majority of Member Governments, came into force on 22 September 1970. From that date, the term International Hydrographic Bureau (IHB) refers only to the headquarters of the Organisation, with the organisation itself being referred to as the International Hydrographic Organisation (IHO).The Organisation currently has a membership of ninety maritime States, with several others in the process of becoming Members.

4. **Administration.** The administration of the IHO is carried out by a committee of three elected Directors, who must be of different nationalities, all of whom are required to be “men of considerable sea experience and with great knowledge of practical hydrography”. One of the three is elected President of the Directing Committee. A small permanent staff of technical experts and clerical assistants aids the Directing Committee in its work. The Directing Committee, together with a small international staff of technical experts in hydrography and nautical cartography, makes up the International Hydrographic Bureau in Monaco. The IHB is the secretariat of the IHO, coordinating and promoting the IHO's programmes and providing
advice and assistance to Member States and others.

5. The objectives of the Organisation are to bring about:-

(a) The greatest possible uniformity in nautical charts and documents.

(b) The adoption of reliable and efficient methods of carrying out and exploiting hydrographic surveys.

(c) The development of the sciences in the field of hydrography and the techniques employed in descriptive oceanography.

6. **IHO Areas of Activity.** The principal activities undertaken by IHO are as appended below:-

(a) **Standardization.** IHO has consistently worked towards achieving maximum standardization of nautical products, services and survey practices. IHO publication M-4 is an example of an IHO standard that has resulted in the adoption of consistent colours, symbols, nomenclature and general presentation for charts produced by IHO Member Organization.

(b) **The International (INT) Chart.** The idea of a common, worldwide chart series (INT Charts) produced to a single set of agreed specifications was adopted in 1971. Under this arrangement, member nations wishing to print their own versions of another member INT charts, may do so by obtaining (by mutual agreement), copies of the necessary reproducible material and printing their own copies.

(c) **Capacity Building and Technical Cooperation.** The Organization assesses and assists in sustainable development and improvement of the States, to meet the objectives of the IHO and the Hydrography, Cartography and Maritime Safety obligations and recommendations described in UNCLOS, SOLAS V and other international instruments. In 2002 the International Hydrographic Organization created a new Committee called the Capacity Building Sub-Committee (CBSC). A Capacity Building Fund has been created to provide support for the main categories of capacity building activity i.e. technical assistance, training and education, financial assistance for participation in IHO events and start-up funding for hydrographic elements of projects, as identified in the IHO Capacity Building Strategy.

(d) **Education and Training.** IHO Member States offer more than thirty technical training programs in hydrography that conform to guidelines established by the IHO. In some instances these programs are offered free of charge while others provide scholarships to those attendees that demonstrate the need. In cooperation with the Fédération Internationale des Géomètres (FIG), and the International Cartographic Association (ICA), a comprehensive set of Standards of Competence for hydrographic surveyors and nautical cartographers have been drawn up, together with appropriate syllabi for the guidance of universities and teaching establishments throughout the world. An International Board supervises the application of these standards with a view to achieving internationally recognized qualifications in the hydrographic profession. The Board reviews the training syllabi of worldwide educational institutions, and awards international certificates of recognition to those courses which have achieved the required minimum standards of competence. Three important publications relating to education and training include:

(i) IHO Publication S-5: "Standards of Competence for Hydrographic Surveyors";
(ii) IHO Publication S-8: "Standards of Competence for Nautical Cartographers";
(iii) IHO Publication C-47: "Courses in Hydrography and Nautical Cartography

(e) **External Stakeholder Liaison.** The International Hydrographic Organization works with a wide spectrum of International Organizations, Industry Stakeholders and other important associated communities.

(f) **Bathymetry and Ocean Mapping.** The IHO contributes towards development of scientific knowledge of the ocean environment by coordinating the systematic collection and recording of ocean bathymetry on a World Series of Bathymetric Plotting Sheets. This global coverage of deep ocean data is available to hydrographers, oceanographers, geoscientists and educational institutions. Much of the data contained on these plotting sheets have been digitised and are available from the IHO Data Centre for Digital Bathymetry (DCDB) which is located at the U.S. National Geophysical Data Center, Boulder, Colorado, USA. The bathymetric data are also used for the preparation of the General Bathymetric Chart of the Oceans (GEBCO), which comprises 18 separate map sheets, covering all oceanic areas. The GEBCO Series is produced jointly by the IHO and the Intergovernmental Oceanographic Commission (IOC) of UNESCO. The GEBCO Digital Atlas (GDA) is available on CD-ROM.

7. The IHO also participates in several IOC sponsored regional International Bathymetric Chart projects, namely:-

(a) The International Bathymetric Chart of the Arctic Ocean (IBCAO);

(b) The International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico (IBCCA);

(c) The International Bathymetric Chart of the Central Eastern Atlantic Ocean (IBCEA);

(d) The International Bathymetric Chart of the Mediterranean and Black Seas (IBCM);

(e) The International Bathymetric Chart of the South Eastern Pacific (IBCSEP);

(f) The International Bathymetric Chart of the Southern Ocean (IBCSO);

(g) The International Bathymetric Chart of the Western Indian Ocean (IBCWIO);

(h) The International Bathymetric Chart of the Western Pacific Ocean (IBCWP);

8. **IHO Publications.** IHO produces numerous publications which are available from the IHO Web-site, or can be provided on CD-ROM. Printed copies of some periodical publications are also available. Most IHO publications are produced in English and French, however some of the more significant publications are also issued in Spanish.

9. **International Hydrographic Conferences.** The International Hydrographic Conference (IHC) is formed by the representatives of Member States and meets every five years to provide general guidance on the functioning and work of the organization, as well as taking decisions of technical and administrative nature. The official representative of each Member Government within the IHO is normally the national Hydrographer, or Director of Hydrography, who, together with their technical staff, meet at 5-yearly intervals in Monaco for an International Hydrographic Conference. The Conference reviews the progress achieved by the Organization through its committees, sub committees and working groups, and adopts the programmes to be pursued during

the ensuing 5-year period. A Directing Committee of three senior hydrographers is elected to administer the work of the Organization during that time.

BUREAU HYDROGRAPHIC INTERNATIONAL
4 QUAI ANTONIE I er
B.P. 445
MC 98011 MONACO CEDEX
TELEPHONE: +377 93 10 81 00
TELEFAX: +377 93 10 81 40
TELEX: 479164 MC-INHORG
e-mail (INTERNET): info@ihb.mc
http://www.iho.shom.fr/
INTERNATIONAL HYDROGRAPHIC BUREAU

Appendix A
(Refers to Para 9)

IHO MEMBER STATES

Algeria	Finland	Myanmar	Suriname
Argentina	France	Netherlands	Sweden
Australia	Georiga	New Zealand	Syrian Arab Republic
Bahrain	Germany	Nigeria	Thailand
Bangladesh	Greece	Norway	Tonga
Belgium	Guatemala	Oman	Trinidad and Tobago
Brazil	Iceland	Pakistan	Tunisia
Brunei Darussalam	India	Papua New Guinea	Turkey
Cameron	Indonesia	Peru	Ukraine
Canada	I.R.Iran	Philippines	United Arab Emirates
Chile	Ireland	Poland	United Kingdom of Great Britain and Northern Ireland
China	Italy	Portugal	United States of America
Colombia	Jamaica	Qatar	Uruguay
*Congo, Democratic Republic of	Japan	Republic of Korea	Venezuela
Croatia	Kuwait	Romania	Vietnam
Cuba	Latvia	Russian Federation	
Cyprus	Malaysia	Saudi Arabia	
Denmark	Mauritius	*Serbia	
*Dominican Republic	Mexico	Singapore	
Ecuador	Monaco	Slovenia	
Egypt	Montenegro	South Africa	
Estonia	Morocco	Spain	

Fiji	Mozambique	Sri Lanka	

Note: '*'indicates Rights of membership suspended

Pending member status- Bulgaria, Congo, Haiti, Malta, Mauritania, Sierra Leone, Solomon Island, Vanuatu

Special Notice No. 19
INFORMATION ABOUT RADAR BEACONS

(Source: Director General of Lighthouses and Lightships)

1. Radar beacons have been installed along the Indian Coast, these Racons are located on the conspicuous objects like light houses, light floats etc, and operate on 'I' band (9300 to 9500 Mhz).They provide information on bearing and range by means of special coded signals displayed on the ships radar. Range is measured from the centre of the PPI to the inner most point of the special coded signal transmitted by the racon after applying a standard negative correction of 75 metres (246 feet), in order to cater for delay in reception and transmission.

2. The details of Racons' installed along the Indian coast are as follows:-

Sr. No	Station name	Sector	Service: Continuous	Code	Position
1	Mitha Port Lt		Yes	M	23°14'.38N 68°36'.41E
2	Mandvi Lt		Yes	G	22°49'.70N 69°20'.85E
3	Mundra Port Navinal VTS Tower		Yes	C	22°46'.08N 69°40'.36E
4	Navlakhi Lt		Yes	B	22°57'.66N 70°26'.62E
5	Pirotan Island Lt		Yes	K	22°36'.26N 69°57'.14E
6	Sikka Creek, SPM		Yes	B	22°33'.53N 69°45'.75E
7	Vadinar Offshore Terminal SBM - 1	360°	Yes	U	22°30'.56N 69°42'.07E
8	Bural Reef Lt	360°	Yes	D	22°32'.69N 69°16'.20E
9	Humani Point Lt Okha Port	355°30'- 311°30'	Yes	O	22°28'.61N 69°04'.19E
10	Kachchigadh Lt	360°	Yes	K	22°19'.85N 68°56'.97E
11	Dwarka Point Lt	273°30'- 225	Yes	G	22°14'.26N 68°57'.52E
12	Porbandar Lt	140°- 300°30'	Yes	D	21°37'.33N 69°37'.19E
14	Veraval Lt	360°	Yes	K	20°54'.68N 70°21'.20E
15	Diu Head Lt		Yes	D	20°41'.48N 70°49'.65E
16	Savai Bet Island Lt		Yes	M	20°54'.24N 71°31'.56E
17	Gopnath Point Lt		Yes	G	21°12'.20N 72°06'.63E
18	Alang Lt		Yes	C	21°24'.18N 72°11'.11E
19	Piram Island Lt		Yes	B	21°35'.91N 72°21'.19E
20	Luhara Point Lt		Yes	D	21°39'.52N 72°32'.95E
21	Sutherland Ch SPM		Yes	U	21°08'.94N 72°34'.43E
22	Hazira Point Lt		Yes	K	21°05'.49N 72°38'.60E
23	Tapti Oil Field Platform STD		Yes	C	20°32'.74N 71°58'.67E
24	Umargam Lt		Yes	M	20°11'.75N 72°44'.91E
25	Mukta-Panna and Bassein Oilfield, Platform		Yes	C	19°07'.44N 72°06'.50E
26	Prongs Reef Lt		Yes	G	18°52'.75N 72°47'.98E
27	Bombay High Oilfield Platform		Yes	B	19°37'.84N 71°17'.77E
28	Bombay High Oilfield Platform		Yes	D	19°17'.56N 71°16'.91E
29	Neelam Heera and Ratna		Yes	G	18°48'.41N 72°20'.04E

	Oilfield, Platform				
30	Korlai Fort Lt	360°	Yes	O	18°32'.30N 72°54'.36E
31	Ratnagiri Lt	360°	Yes	G	16°59'.26N 73°16'.34E
32	Vengurla Rocks Lt	360°	Yes	D	15°53'.38N 73°27'.78E
33	Aguada Lt		Yes	O	15°29'.51N 73°46'.36E
34	Oyster Rocks Lt (Devgadgudda Is)	360°	Yes	D	14°49'.22N 74°03'.63E
35	Suratkal Pt Lt		Yes	C	13°00'.29N 74°47'.39E
36	Kotte Kunnu Lt		Yes	K	12°00'.37N 75°12'.16E
37	Beypore Lt		Yes	G	11°09'.48N 75°48'.35E
38	Androth Island, East End Lt	360°	Yes	D	10°48'.93N 73°42'.10E
39	Kiltan Island South Lt		Yes	O	11°28'.13N 73°00'.46E
40	Kadmat Island Lt		Yes	G	11°15'.40N 72°47'.37E
41	Kavaratti Lt		Yes	K	10°33'.68N 72°38'.77E
42	Agatti Island Lt		Yes	B	10°52'.51N 72°12'.30E
43	Suheli Par, Cheriyakara Islet Lt	285°-250°	Yes	O	10°02'.40N 72°17'.20E
44	Azhikod Lt		Yes	D	10°12'.20N 76°09'.46E
45	Kochi (Cochin) Lt	360°	Yes	K	09°59'.90N 76°13'.30E
46	Minicoy Island Lt	192°-150°	Yes	G	08°16'.16N 73°01'.57E
47	Vizhinjam Lt		Yes	O	08°22'.97N 76°58'.78E
48	Muttam Point Lt		Yes	M	08°07'.37N 77°19'.05E
49	Cape Comorin Lt		Yes	C	08°04'.82N 77°32'.84E
50	Manappad Point Lt		Yes	G	08°22'.30N 78°04'.12E
51	Pandiyan Island Lt		Yes	O	08°47'.14N 78°11'.83E
52	Nagappatinam Lt		Yes	G	10°45'.95N 79°51'.01E
53	Tirukkadaiyur Power Station	360°	Yes	O	11°04'.41N 79°51'.16E
54	Porto Novo Lt		Yes	B	11°30'.22N 79°46'.24E
55	Chemplast Cuddalore Vinyls_Mt Lt		Yes	C	11°38'.37N 79°46'.35E
56	Pondicherry Lt		Yes	D	11°54'.99N 79°49'.85E
57	Chennai (Madras) Southern Lt		Yes	K	13°02'.39N 80°16'.77E
58	Ennore, North Breakwater Head Lt	360°	Yes	K	13°15'.27N 80°21'.16E
59	Pulicat Lt		Yes	B	13°25'.20N 80°19'.78E
60	Krishnapatnam Lt		Yes	C	14°17'.14N 80°08'.27E
61	Ramayapatnam Lt		Yes	K	15°02'.98N 80°03'.00E
62	Narasapur Point Lt		Yes	B	16°19'.04N 81°43'.50E
63	Vakalapudi Lt		Yes	G	17°00'.83N 82°16'.58E
64	Dolphin's Nose Lt		Yes	O	17°40'.53N 83°17'.68E
65	Gopalpur Lt		Yes	S	19°15'.35N 84°54'.40E
66	Paradip Lt		Yes	K	20°15'.32N 86°39'.38E
67	Dhamra Lt Buoy		Yes	D	20°55'.37N 87°07'.06E
68	Dariapur Lt		Yes	G	21°47'.42N 87°51'.80E
69	Hugli River Eastern Channel Lt Vessel		Yes	O	21°02'.94N 88°11'.39E
70	East Island Lt		Yes	D	13°37'.79N 93°02'.94E

71	North Point Lt, Port Blair		Yes	K	11°42'.28N 92°45'.29E
72	Keating Point Lt	052°-319°	Yes	O	09°15'.36N 92°46'.50E
73	Chowra Island Lt		Yes	B	08°27'.67N 93°03'.31E
74	Indira Point Lt	244°-103°	Yes	G	06°45'.35N 93°49'.63E

Special Notice No. 20
DEVELOPMENT OF OFFSHORE OIL AND GAS FIELDS

Seismic Surveys

1. Seismic surveys for offshore oil and mineral resource explorations are conducted in and around Indian waters. Details of these surveys are generally broadcast to mariners as a Radio Navigational Warning or by Notices to Mariners. It is seldom practicable to publish details of the areas of operation except in general terms and vessels carrying out seismic surveys may, therefore, be encountered without prior notice. Seismic survey vessels operate either alone or in company and may tow a sensing device in the form of buoyant cable streamed one to two nautical miles astern. The sensing device may be on the surface or at depths down to approximately 12 metres (40 feet) and an orange buoy usually attached to the end of cable, displays quick flashing light and carries a radar reflector.

2. In the process of the survey, repeated shock waves are created by using at any level from the bottom to the surface, explosive charges, compressed air, mechanical liberators or by electrical means. Occasionally, explosive charges of up to 2000 lbs are used. The seismic surveys vessels will usually be making way through the water but sometimes stop for extended periods.

3. Seismic survey vessels which are unable to manoeuvre are required to carry the lights and signals, described in Rule 27 of International Regulations for Preventing Collisions at Sea, 1972 and should be given a wide berth (2 to 2½ miles).

4. If charges are being fired by radio or electrically triggered detonators, survey vessels may suspend radio and radar transmission to avoid accidental firings. Vessels being called by light are, therefore, to answer by the same means and not by radio.

5. Charges may be contained in a variety of cylinders, tubes or bags which may be marked as "Dangerous". No attempt to recover such items should be made and if any is inadvertently taken aboard in trawlers, etc., should be jettisoned immediately.

Oil Rigs and Production platforms.

6. There are two types of drilling rigs in use at present in Indian Offshore fields:-

(a) **Jack-up Rigs.** These are propelled/towed in positions where their steel legs are lowered to the seabed; the drilling platform is then jacked-up clear of the water. They are generally used in depths upto 100 metres.

(b) **Dynamic Positioning Drill ships.** These are built with a tall drilling rig amidship and usually with a helicopter deck near the stern. A typical drill ship has a displacement of 14,000 tons, a length of 135m and a maximum speed of 14 Knots. For drilling in depths of less than 200 metres, 8-point anchoring system is used. When drilling in deep water, their position is maintained by dynamic positioning equipment which enables these drill ships to keep on stations above the borehole. A feature of the drill ships with automated station-keeping facilities is their ability to manoeuvre accurately, with the aid of thrusters fitted with controlled pitch propellers. These are used in depths above 200 metres.

Wellheads

7. In the course of exploratory work, numerous wells are drilled to find the extent of the field. Wells which will not be required again are sealed with cement plug below the seabed and andoned.

8. Other wells, known are suspended wells, which may be required at a later date have their wellheads capped and left with a pipe and other equipment projecting from the seabed. Such wellheads are sometimes marked by buoys to assist recovery and to warn the mariners that they are a hazard to navigation or fishing.

Production Platforms/Water Injection/Process Platforms

9. These are massive structure carrying drilling and production equipment, oil and gas separation and treating plants, pumpline stations, electricity generators, cranes and helicopter landing deck. They are marked by lights, fog signals, and on some platforms flares burn at times. Production Platforms are charted. Platforms stand singly or in groups, linked to each other by pipelines and bridges. Process platforms are manned round the clock and have residential accommodation. A trunk pipeline connects them to the shore/storage tanker/tanker loading buoy or a floating terminal.

Subsea Structure / Wellheads

10. These structures are basically Wellheads, pipeline, etc. and manifolds installed at the seabed in deepwater area/shallow water area and need to be protected from any possible damages due to anchoring and sinking of vessels.

Loading and Unloading System

11. A variety of moorings, generally referred to a Single Point Mooring (SPM) have been developed to enable large vessels to moor by their bows to either load or unload their cargoes. There are at present Single Buoy Moorings (SBM) moored in Bombay oilfield and at Vadinar offshore oil terminal to facilitate oil tankers to be moored for transportation of crude.

Safety Zones

12. Under International law, a coastal state may construct and maintain on the continental shelf installations and other devices necessary for the exploration of its natural resources, establish Safety Zones around such installations and devices and take within these zones measures necessary for their protection.

13. Safety zones may extend to a distance of 500 metres around installations and other devices, measured from each point of their outer edges. Ships of all nationalities are required to respect these safety zones.

14. Several coastal states have made provisions in their National Law to cover the establishment of safety zones and have made infringement of the declared zones a criminal offence. Since the type of offshore installation subject to safety zone differ from State to State, mariners are advised always to assume the existence of a safety zone unless they have information to the contrary. Installation and devices include fixed production platforms, mobile exploration rigs, tanker loading moorings and seabed installations including submerged wellheads. The Government of India has established 500-metre safety zones around each installation in the oil field development areas. Mariners should not enter these safety zones

15. Some coastal states have declared Prohibition on entry into, or on fishing and anchoring within, areas extending beyond 500 metres from the installations. Publication of the details of such wider areas is solely for the safety and convenience of shipping and implies no recognition of the international validity of such restrictions. See also "The Mariners Handbook" chapter 1 section 1.

Warning to Mariners

16. Fixed platforms, wellheads, SBMs and pipelines are normally charted. The mobile rigs move from site to site at irregular intervals and details of their movements and positions are promulgated to shipping by means of NAVAREA VIII warnings.

17. It is essential that all vessels keep well clear of these structures; underwater and surface hazards to navigation exist in their vicinity and in any case consequences of damage of collision could be disastrous.

18. Within certain oilfields which are being developed or are already producing oil and gas the limits of which are charted, there are likely to be construction and maintenance vessels including submarine crafts, divers and obstruction, possibly marked by buoys. Supply vessels and in some cases, tankers, frequently manoeuvre within these fields, Mariners are strongly advised to keep outside such areas.

19. Unlit and uncharted platforms and Buoys may be encountered in Mumbai High, Neelam, Heera, Bassein oilfields, mariners are advised to exercise caution.

20. Vessels encountering uncharted oil platforms/ structures are to report the matter immediately at following addresses: -

(a) Chief Hydrographer to the Government of India
P. O. Box No. 75,107-A Rajpur Road
Dehradun - India - 248 001
Tel: - 91-135-2747365, 2747360, **Fax:** - 91-135-2748373
Email: inho@navy.gov.in / msis-inho@navy.gov.in

(b) Flag Officer: - Offshore Defence Advisory Group;
15th Floor, F-Wing, Maker Towers, Cuffe Parade
Mumbai: - 400 005
Tel: - 91-22 22181424, Fax: - 91-22 22151906

Light and Fog Signals.

21. Offshore structure operating in Indian waters will carry the following internationally agreed marking:-

(a) White lights on the horizontal extremities of the structure flashing in uniform Morse 'U' every 15 sec, range 10 miles.
(b) A fixed red light on the highest point of the structure.
(c) Illuminated identification.
(d) A signal sounding Morse 'U' every 30secs, when the visibility is less than 2 nautical miles.

Special Notice No. 21
TRAFFIC SEPARATION SCHEMES - SHIPS ROUTEING

(Source: Director General of Shipping, www.imo.org)

1. Ships' routeing systems contribute to safety of life at sea, safety and efficiency of navigation and/or protection of the marine environment. Ships' routeing systems are recommended for use by, and may be made mandatory for, all ships, certain categories of ships or ships carrying certain cargoes, when adopted and implemented in accordance with the guidelines and criteria developed by the IMO.

2. Traffic separation schemes and other ship routeing systems have now been established in most of the major congested; shipping areas of the world and the number of collisions and groundings have often been dramatically reduced.

3. In 1961, the Institutes of Navigation of the Federal Republic of Germany, France and the United Kingdom carried out a study of measures for separating traffic in areas where statistics indicated increased risk of collision. The first Traffic Separation Scheme was implemented in the Dover Strait in 1967. Since then a larger number of similar routeing schemes have been established throughout the world. The details are shown on the charts and referred to in Sailing Directions. For further information about ships' routeing, see ’The Mariner's Handbook ".

4. The International Maritime Organisation (IMO) is the only body responsible for establishing and recommending measures on an international level concerning ships routeing. Where in schemes lie wholly within territorial water, decisions concerning routeing rest with the national government but such schemes may also be submitted for IMO's approval and adoption. The details of schemes adopted by IMO are set out in the IMO Publication "Ships' Routeing" and in subsequent amendments and IMO circulars. Member states of IMO usually take legislative action to ensure that their nationally registered ships adhere to the measures and routes adopted by the Organisation. In some schemes, special provisions are included governing their use by all ships or by specified classes of ships. On the charts, relevant information is given or there are recommendations to chart users to consult Sailing Directions for details.

5. The schemes approved by IMO and the routes established by coastal states or other competent national authorities concerned with the safety of navigation will be inserted on navigational charts. On the charts, the IMO-adopted schemes are not differentiated from other routeing schemes; however, all charts showing traffic separation schemes will carry a reference to this Notice. While vessels using the traffic lanes in schemes adopted by IMO must, in particular, comply with Rule 10 of International Regulations for Preventing Collisions at Sea, 1972, they are not thereby given any right of way over crossing vessels. The other steering and sailing Rules still apply in all respects, particularly if the risk of collision is involved.

6. Where two or more Governments have a common interest in a particular area, they should formulate joint proposals for the delineation and use of a routeing system therein on the basis of an agreement between them. Upon receipt of such proposal and before proceeding with consideration of it for adoption, the Organization shall ensure details of the proposal are disseminated to the Governments which have a common interest in the area, including countries in the vicinity of the proposed ships' routeing system. Contracting Governments shall adhere to the measures adopted by IMO concerning ships' routeing. They shall promulgate all information necessary for the safe and effective use of adopted ships' routeing systems. A Government or Governments concerned may monitor traffic in those systems. Contracting Governments shall do everything in their power to secure the appropriate use of ships' routeing systems adopted by the Organization. Mandatory ships'

routeing systems shall be reviewed by the Contracting Government or Governments concerned in accordance with the guidelines and criteria developed by the Organization.

7. A ship shall use a mandatory ships' routeing system adopted by the Organization as required for its category or cargo carried and in accordance with the relevant provisions in force unless there are compelling reasons not to use a particular ships' routeing system. Any such reason shall be recorded in the ships' log.

8. Governments intending to establish a new routeing system, or amend an existing one, must submit proposed routeing measures to IMO's Sub-Committee on Safety of Navigation (NAV), which will then evaluate the proposal and make a recommendation regarding its adoption. The recommendation is then passed to the MSC for adoption.

9. As well as traffic separation schemes, other routeing measures adopted by IMO to improve safety at sea include two-way routes, recommended tracks, deep water routes (for the benefit primarily of ships whose ability to manoeuvre is constrained by their draught), precautionary areas (where ships must navigate with particular caution), and areas to be avoided (for reasons of exceptional danger or especially sensitive ecological and environmental factors).

10. Elements Used in Traffic Routeing Systems Include:

(a) Traffic separation scheme: a routeing measure aimed at the separation of opposing streams of traffic by appropriate means and by the establishment of traffic lanes.

(b) Traffic lane: an area within defined limits in which one-way traffic is established. Natural obstacles, including those forming separation zones, may constitute a boundary.

(c) Separation zone or line: a zone or line separating traffic lanes in which ships are proceeding in opposite or nearly opposite directions; or separating a traffic lane from the adjacent sea area; or separating traffic lanes designated for particular classes of ship proceeding in the same direction.

(d) Roundabout: a separation point or circular separation zone and a circular traffic lane within defined limits.

(e) Inshore traffic zone: a designated area between the landward boundary of a traffic separation scheme and the adjacent coast.

(f) Recommended route: a route of undefined width, for the convenience of ships in transit, which is often marked by centerline buoys.

(g) Deep-water route: a route within defined limits which has been accurately surveyed for clearance of sea bottom and submerged articles.

(h) Precautionary area: an area within defined limits where ships must navigate with particular caution and within which the direction of flow of traffic may be recommended.

(j) Area to be avoided: an area within defined limits in which either navigation is particularly hazardous or it is exceptionally important to avoid casualties and which should be avoided by all ships, or by certain classes of ships.

11. The annexed list contains details of the Traffic Separation Schemes at present included in the chart series or in the process of being inserted for the North Indian Ocean area from South Africa Coast to Singapore, including the Red Sea and the Persian Gulf. Several facts about each scheme are given:

(a) The geographical positions quoted are approximate and, with the place names, are given merely to indicate the general location of the scheme and to facilitate its identification on the charts. If any extensive area is involved, the geographical co-ordinates of the extreme ends of the separation zones or lines are given.

(b) The schemes which have been adopted by IMO are marked* in the margin. For other schemes, the originating authority is given. Any change to the schemes during the year will be announced through Notices to Mariners.

(c) In each case, only the principal charts, on which the details of the scheme are shown, are quoted. Separate latticed versions are not listed.

(d) In some cases, the volumes of Admiralty Sailing Directions which contains details of the scheme are quoted under the heading "Remarks".

List of Traffic Separation Schemes Shown on Indian/Admiralty Charts.

*1. Gulf of Suez
Charts: B.A. 2133, 333, 2373, 2374, 2375,159
(The Mariners Roueting Guide - Chart 5501 is recommended as an additional reference).

2. Approaches to Yanbu
Charts: B.A. 326, 327, 328, 158
The Royal Commission for Jubail and Yanbu, Kingdom of Saudi Arabia.

*3. Strait of Tiran (In the Entrance to the Gulf of Aqaba)
Charts: B.A. 801, 2375, 12, 159

*4. Bab-el-Mandeb
Charts: B.A. 452, 1925, 3661, 143, 6, 157

*5. Southern Red Sea - West and South of Hanish al Kubra
Charts: B.A 453, 1925, 143, 6, 157

*6. Southern Red Sea - East of Jabal Zuqar Island
Charts: B.A 453, 1925, 143, 6, 157

*7. Off Ra's al Hadd
Charts: B.A. 38, 2851, 707, 2858

*8. Off Ra’s al Kûh
BA Charts: 3171, 3520, 2888, 2851, 2837, 2858

*9. Strait of Hormuz
Charts: B.A. 3172, 3173, 2888, 2837, 2851, 2858

*10. Tonb-Forur
Charts: 8004, 289, B.A.2441, 3174, 2887, 2888, 2837, 2858

*11. Off Mînâ'al Ahmadî
Charts: B.A. 1223, 3773, 2882, 2884, 2847, 2858

*12. Between Zaqqum and Umm Shaif Oilfieldsand
Charts: B.A. 2443, 2444, 3178, 3179, 2886, 2887, 2889, 2837, 2858

*13. In the Approaches to Ra's Tanura and Ra's Ju'aymah
Charts: B.A. 3776, 3812, 3777, 3788, 3790, 2882, 2883, 2886, 2837, 2847, 2858
Amended width of Arrival Channel not yet IMO adopted.

*14. Between Zuluf and Marjan Oilfields
Charts: B.A. 3774, 2882, 2884, 2847, 2858

*16. Off Mumbai
Charts: 21, 22(INT 752), 292(INT 7021), 293(INT 7022), 253(INT 7328), 254(INT 7331), 255(INT 7334), 256(INT 7340), 210, 211, 212, 2016(INT 7336)
Director General, Shipping. Mandatory for all Indian and Foreign flag ships India *{(Details available in Indian Notices to Mariners 075(07/18)}*.

*17. Off Dondra Head (Sri Lanka).
Charts: 226, 264, 32, and 23.

18. Port of Singapore — Traffic Systems – Sinki Fairway
Charts: B.A. 4031, 4032, 4034, 4040, 3833
Maritime and Port Authority of Singapore
Remarks: See Admiralty Sailing Directions, N.P.44.

19. Port of Singapore — Traffic Systems – Southern Fairway
Charts: B.A. 3833, 4035, 4036, 4037, 4040, 4041
Maritime and Port Authority of Singapore
Remarks: See Admiralty Sailing Directions, N.P.44.

*20. At One Fathom Bank (Permatang Sedepa).
Charts: B.A. 2139, 3940, 3945, 3946, 1353, 1358
Remarks: See Admiralty Sailing Directions, N.P.44.

*21. Port Klang (Pelabuhan Klang) to Port Dickson
Charts: B.A. 1140, 2139, 3940, 3946, 1358
Remarks: See Admiralty Sailing Directions, N.P.44.

*22. Port Dickson to Tanjung Keling
Charts: B.A. 3946, 3947, 1358
Remarks: See Admiralty Sailing Directions, N.P.44.

*23. Melaka to Iyu Kecil
Charts: B.A. 3833, 2403, 3946, 3947, 1358
Remarks: See Admiralty Sailing Directions, N.P.44.

*24. Singapore's Strait, (Main Strait)
Charts: B.A. 4030, 4031, 4036, 4038, 4039, 4040, 4041, 3833, 5502, 2403, 3947, 1358
Remarks: See Admiralty Sailing Directions, N.P.44.

*25. Singapore Strait {off St John's Island(Pulau Sakijang Bendera)}
Charts: B.A. 4040, 4041, 3833, 5502, 2403, 1358
Remarks: See Admiralty Sailing Directions, N.P.44.

*26. Singapore Strait (off Changi and Pulau Batam)
Charts: B.A 4037, 4041, 4042, 3831, 3833, 5502, 2403
Remarks: See Admiralty Sailing Directions, N.P.44.

*27. Horsburgh Lighthouse Area
Charts: B.A. 4042, 3831, 2403, 2422, 2869, 5502, 1312
Remarks: See Admiralty Sailing Directions, N.P.44.

* *Details available in www.imo.org*

Special Notice No.22
IALA MARITIME BUOYAGE SYSTEM

(Source: www.iala-aism.org)

1. The severest test of buoyage system occurs when the mariner is confronted unexpectedly at night or in low visibility by the lights marking an uncharted danger, such as a recent wreck; immediately, he must decide which way to go.

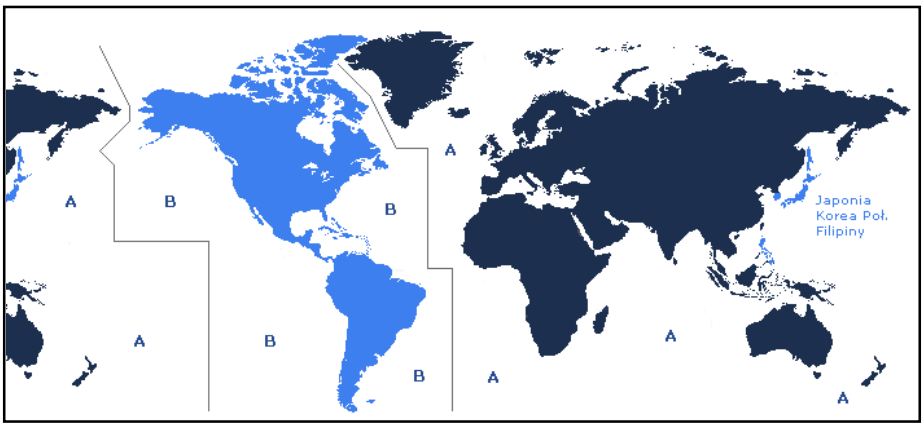
2. The fact that the existing systems of buoyage are not always sufficiently understood was illustrated by a disaster in the Dover Strait in 1971. Although marked under the existing system, the wreckage of the Texco Caribbean was struck by the Brandenburg, which sank. A few weeks later the wreckage, despite being marked by a wreck-marking vessel and many buoys, was struck by the Niki, which also sank. On sighting a navigational mark, every mariner's reaction should be instinctive, positive and correct. In 1976, there were more than 30 different systems in use world-wide. Many of these systems have rules which conflict with one another. This has resulted in a situation which is particularly confusing at night when a mariner may be unexpectedly confronted by the light, the meaning of which is not clear. Such confusions can be unexpectedly dangerous when the light is marking a new and as yet uncharted danger. This may leave the mariner in doubt as to his proper course of action leading to make a wrong and perhaps disastrous decision. Over the years, many attempts have been made to solve these difficulties of opinion regarding various systems of buoyage but without success. The International Technical Committee of the International Association of Lighthouse Authorities (IALA) examined the problems of Uniform Maritime Buoyage System and promulgated two sets of Rules namely Region 'A' the Combined Cardinal and Lateral System (Red to Port) and Region 'B' Lateral System only (Red to Starboard). At the IALA conference convened at Tokyo in 1980, it was agreed to harmonise Systems 'A' and 'B' into a single IALA Maritime Buoyage System. Subsequently an agreement on the IALA Maritime Buoyage System came into force in April, 1982 when 28 Maritime countries of Region 'A', including India, have signed the agreement.

3. The Rules for Region 'A' have been agreed to by the International Maritime Organisation (IMO). They are particularly suitable for use in Europe, Africa, India, Australia and some Asian waters.

4. Within both regions, use may be made of the full range of cardinal and other marks established for Region 'A'. Some minor features, appropriate in both regions, will be added to the existing system, the most significant being the provision of a modified lateral mark for indicating the preferred route where a channel divides. These changes and additions are unlikely to give rise significant alteration in the areas where IALA Buoyage system has already been implemented.

5 In the IALA System the regional (of the systems A and B) principle of painting of the lateral signs was maintained. The countries that accepted the red colour for the left hand lateral signs have been included in the region A. The countries that use the green colour for the left hand lateral signs were included in the region B. In both the regions, the fairway direction is the one leading from the sea (when a different manner is used than an adequate notice is provided). Following the division into the IALA System regions, marine maps contain respective notice, i.e. the "IALA System Region A" or the "IALA System Region B". The IALA System has five types of signs that are used in various associations. The signs have specific identification elements that make them easily recognizable to the sailors. The lateral signs in the Regions A and B are different, but the other four signs are common for these both regions. The lateral buoys and marks are placed according to the direction accepted for marking of the right and left side of the fairway. In the

Region A, during the day and night, the green colour is used to mark the right side of the fairway, and the red colour - to mark the left side.



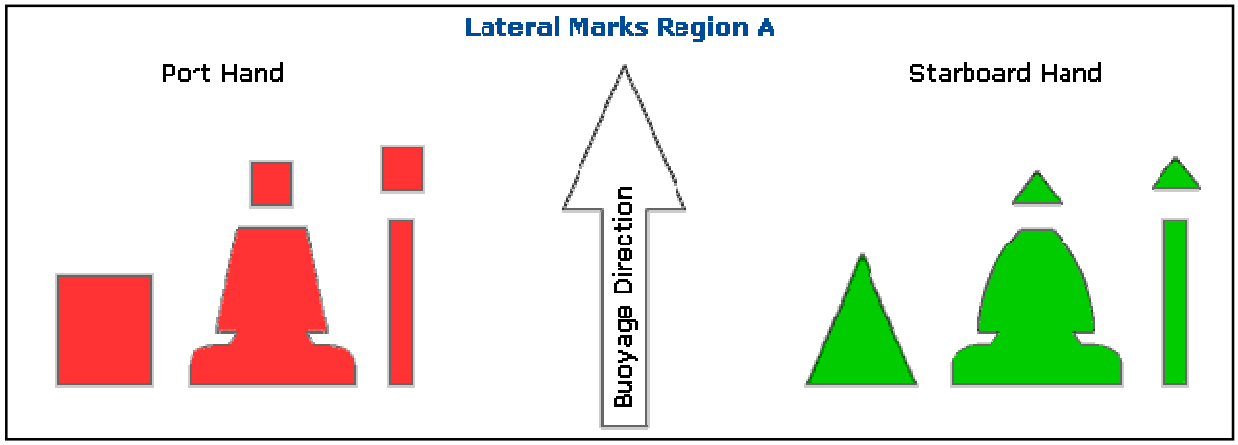
6. **Description of Lateral Marks used in Region A**

Port Hand Marks

Colour : Red
Shape (Buoys) : Cylindrical (can) pillar or spar
Topmark (if any) : Single red cylinder (can)
Light (when fitted)
Colour : Red
Rhythm : Any, other than that described in para 8 below

Starboard Hand Marks

Colour : Green
Shape (Buoys) : Conical, pillar or spar
Topmark (if any) : Single green cone, point upward
Light (when fitted)
Colour :Green
Rhythm :Any, other than that described in para 8 below



In the Region B the colours are reversed, ie the red colour is used for the right side, and the green colour - for the left side.

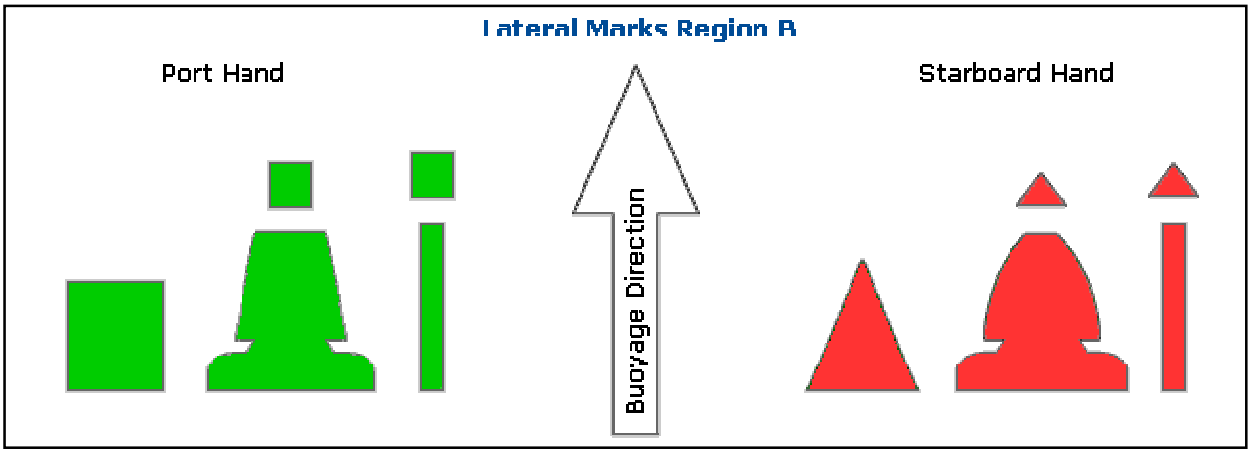
Description of Lateral Marks Used in Region B.

Port Hand Marks

Colour : Green
Shape (Buoys) : Cylindrical (can) pillar or spar
Topmark (if any) : Single green cylinder (can)
Light (when fitted)
Colour : Green
Rhythm : Any, other than that described in para 9 below

Starboard Hand Marks

Colour : Red
Shape (Buoys) : Conical, pillar or spar
Topmark (if any) : Single red cone, point upward
Light (when fitted)
Colour : Red
Rhythm : Any, other than that described in para 9 below



When the path is divided on a fairway, then the direction of the main path is shown with a modified lateral buoy in order to indicate the direction of this main path.

8. **Modified Lateral Buoys and Marks for the Region A**

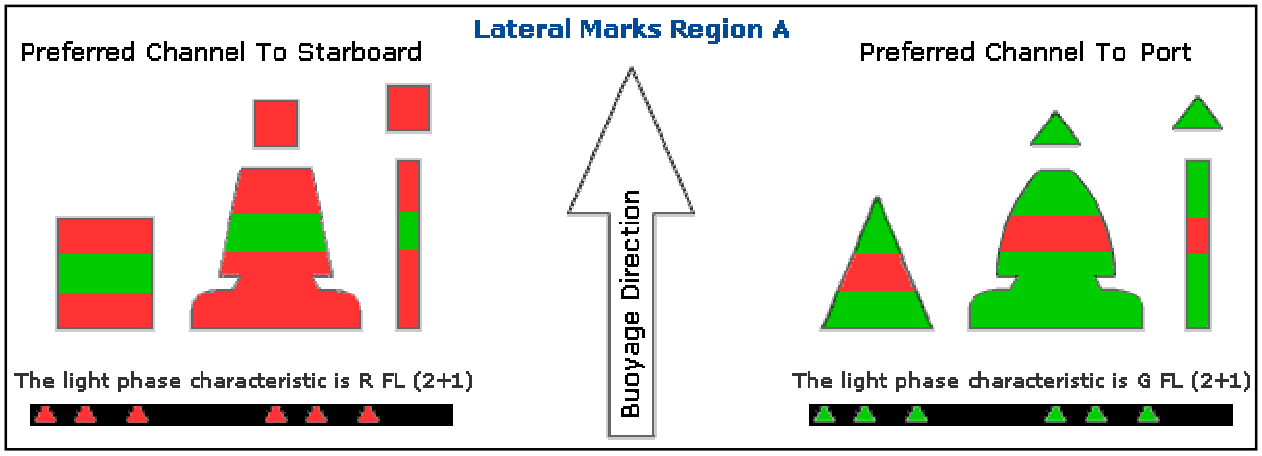
At the point where the channel divides, when proceeding in the "Conventional Direction of Buoyage", a preferred channel may be indicated by a modified Port or Starboard lateral mark as follows:

Preferred Channel to Starboard:

Colour	:	Red with one broad green horizontal band
Shape (Buoys)	:	Cylindrical (can), pillar or spar
Topmark (if any)	:	Single red cylinder (can)
Light (when fitted)		
Colour	:	Red
Rhythm	:	Composite group flashing (2+1)

Preferred Channel to Port:

Colour	:	Green with one broad red horizontal band
Shape (Buoys)	:	Conical, pillar or spar
Topmark (if any)	:	Single green cone, point upward
Light (when fitted)		
Colour	:	Green
Rhythm	:	Composite group flashing (2+1)



9. **Modified Lateral Buoys and Marks for the Region B**

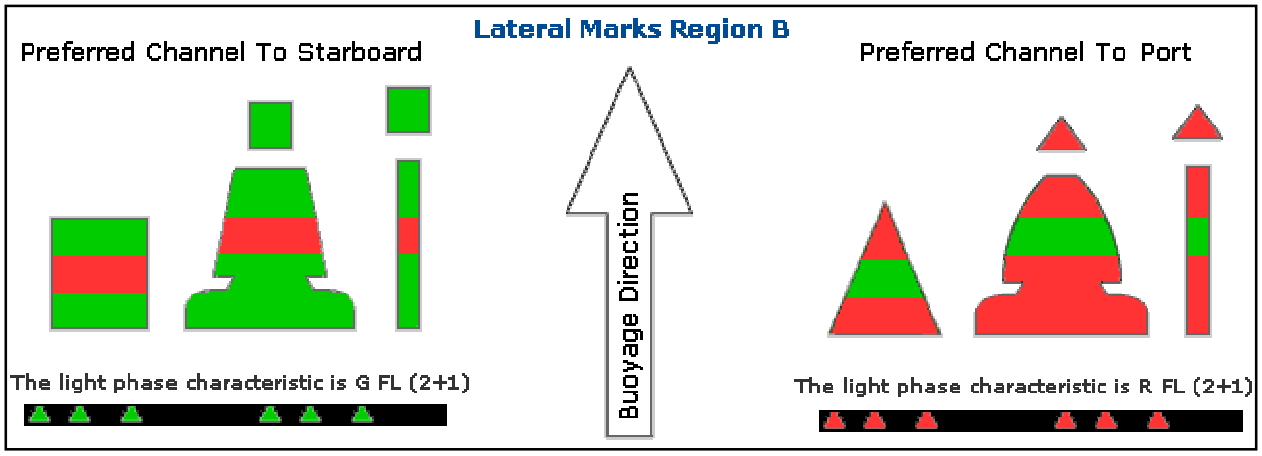
At the point where the channel divides, when proceeding in the "Conventional Direction of Buoyage", a preferred channel may be indicated by a modified Port or Starboard lateral mark as follows:

Preferred Channel to Starboard:

Colour	:	Green with one broad red horizontal band
Shape (Buoys)	:	Cylindrical (can), pillar or spar
Topmark (if any)	:	Single green cylinder (can)
Light (when fitted)		
Colour	:	Green
Rhythm	:	Composite group flashing (2+1)

Preferred Channel to Port:

Colour	:	Red with one broad green horinwonatal band
Shape (Buoys)	:	Conical, pillar or spar
Topmark (if any)	:	Single red cone, point upward
Light (when fitted)		
Colour	:	Red
Rhythm	:	Composite group flashing (2+1)



10. **General Rules for Lateral Marks**

(a) **Shape.** Where lateral marks do not rely upon cylindrical (can) or conical buoy shapes for identification they should, where practicable, carry the appropriate topmark.

(b) **Numbering and Lettering.** If marks at the sides of a channel are numbered or lettered, the numbering or lettering shall follow the "conventional direction of buoyage".

11. **Cardinal Buoys.** Cardinal Buoys indicate that the deepest water occurs at the side of the mark's name. They are placed to the north, south, east or west from the hazard. The cardinal buoys have mainly the shape of columns or poles. They are painted in horizontal, yellow and black stripes, and their topmarks (two cones) are painted black. The arrangement of cones at the top is an indication of the black stripe (or stripes) position on the buoy.

cones with tops up: the black stripe is above the yellow one,
cones with tops down: the black stripe is under the yellow one,
cones with bases towards one another: the black stripes above and below the yellow one,
cones with tops towards one another: the black stripe with the yellow stripes above and below.

North Cardinal Mark

Topmark	:	2 black cones, one above the other, points upward
Colour	:	Black above yellow
Shape	:	Pillar or spar
Light (when fitted)		
Colour	:	White
Rhythm	:	VQ or Q

East Cardinal Mark

Topmark	:	2 black cones, one above the other, base to base
Colour	:	Black with a single broad horizontal yellow band
Shape	:	Pillar or spar

Light (when fitted)

Colour : White
Rhythm : VQ(3) every 5s or or Q(3) every 10s

South Cardinal Mark

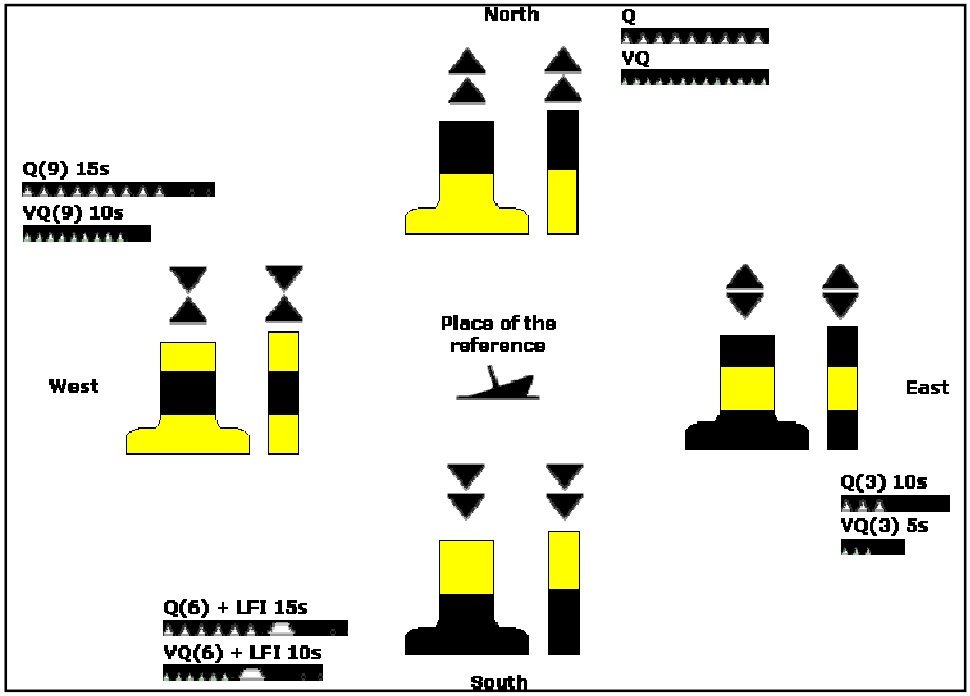
Topmark : 2 black cones, one above the other, points downward
Colour : Yellow above Black
Shape : Pillar or spar
Light (when fitted)

Colour : White
Rhythm : VQ(6)+long flash every 10s or Q(6)+long flash every 15s

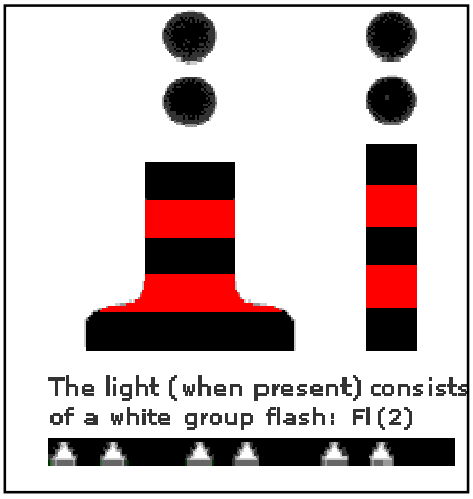
West Cardinal Mark

Topmark : 2 black cones, one above the other, point to point
Colour : Yellow with a single broad horizontal black band
Shape : Pillar or spar
Light (when fitted)

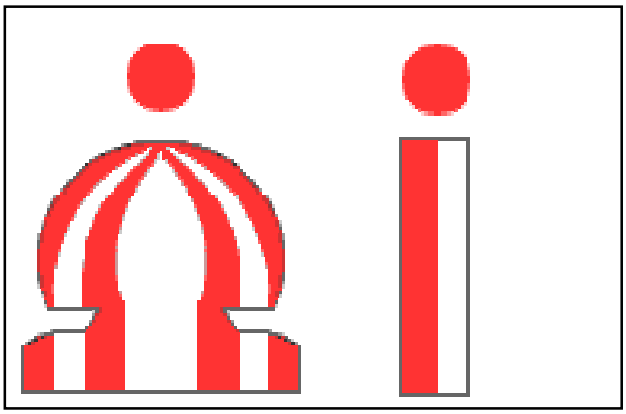
Colour : White
Rhythm : VQ(9) every 10s or or Q(9) every 15s



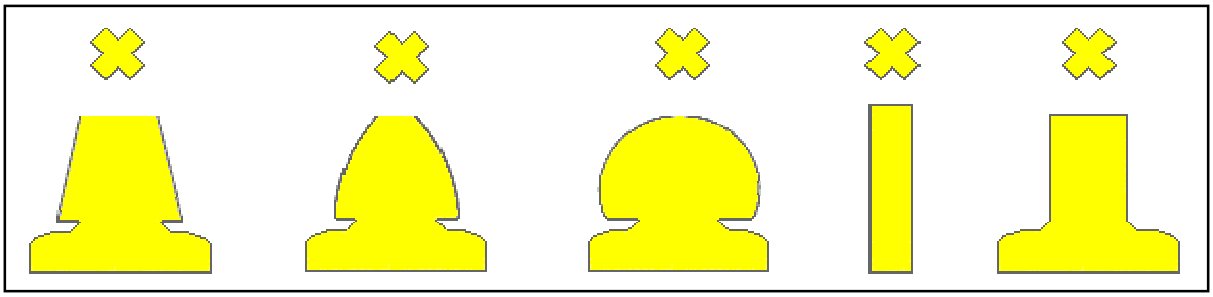
12. **Marks Indicating Isolated Dangers.** Marks indication isolated dangers are placed directly over minor obstacles around which the water is navigable. The have shapes of columns, poles or other; however, they are difficult to confuse with the cardinal buoys. They are black with horizontal red stripes. The topmarks consists of two black spheres one above the other. The light is white - a group flash light Fl(2) with two flashes in a group.



13. **Marks Indicating Safe Water.** They indicate that water is navigable around the mark and they do not show any hazards. They can be used to mark, eg a fairway axis or as approach signs. The safe water marks appearance is completely different from the one of the buoys that indicates the hazard. Their may have a shape of a sphere, a column or a pole, with a red sphere as a topmark. These are the only marks painted in vertical stripes (red and white). When the light is installed, then its colour is white and its rhythm may be isophase, occulting, long flash or the Morse Code letter "A".



14. **Special Buoys and Marks.** Special Buoys and Marks do not represent navigational aids. They indicate a special area or an object mentioned on maps or in other nautical documents and publications. These special marks are painted yellow and have a topmark in the shape of a yellow lying cross (X). The light (if installed) is also yellow. As in poor visibility it is possible to mistake the yellow colour for the white, the yellow lights of the special marks cannot have the rhythm adopted for marks with the white light. The shape of the special marks cannot be confused with the shape of navigational marks, i.e. if special marks have been used to mark, eg the left side of the fairway, then they must have a cylindrical and not conical shape. The special marks may have letters or numbers painted on them.



15. **New Danger.** Attention is being drawn to the fact that a "new danger" that has not yet been announced in nautical documents may be indicated with a duplicating mark being identical (in all details) with the principal mark. The duplicating mark should stay until the news about the new danger has been adequately announced. The "new danger" mark should be equipped with a Racon sending out the letter "D" in the Morse Code.

Emergency Wreck Marking Buoy

16. **Introduction.** At present new dangers are generally marked by cardinal or lateral buoys, although it is recognised that a number of authorities also deploy isolated danger marks. Recent grounding and collisions have indicated a need for a revision of how new dangers are marked, especially in an emergency.

17. The **IALA Guideline No.1046 - Response Plan for the Marking of New Wrecks** provides guidance to Authorities for an immediate, effective and well co-ordinated response in such a situation. The guidelines recommend procedures to be observed, as well as considerations to be taken into account with respect to all necessary measures when confronted with a new danger or an obstruction as a result of an incident within their area of responsibility.

18. Furthermore, there has been discussion with regards to the limitations of the present IALA Maritime Buoyage System when providing initial marking of new dangers. At present, new dangers are generally marked by cardinal or lateral buoys, although it is recognised that a number of Authorities also deploy isolated danger marks. Recent groundings and collisions have indicated a need for a revision of how new dangers are to be marked, especially in an emergency. As such, Guideline No.1046 provides guidance and recommendations for emergency wreck marking.

19. **Scope and Objectives.** This Recommendation provides details of a new buoy configuration, in addition to that already found in the IALA Maritime Buoyage System, which Authorities may consider deploying when responding to a new danger or obstruction.

20. **Considerations.** A new wreck can be very dangerous for shipping, not only when its exact position is unknown and is still unmarked, but even when the position is known and the wreck is properly marked. In the past, new wrecks have caused problems to other shipping resulting in damage, pollution and even loss of life. As detailed in the Guideline No.1046, Authorities should consider a range of responses including the deployment of guard ships, the use of AIS, temporary VTS and deployment of buoys amongst other risk mitigation measures. Whatever additional risk mitigation measures are initiated, a new danger must be physically marked. Weather conditions, sea state and unknown facts about the danger can all hamper timely marking. However, it is of great importance that the location of the danger is marked as soon as practicable and that this marking can be readily recognised by ships as a new hazard. The volume of traffic, background lighting and proliferation of Aids to Navigation (A to N) in the area may make the deployment of cardinal or lateral marks difficult for mariners to quickly identify a new danger in the initial stages of an incident. In these instances, authorities are invited to consider the deployment of an emergency wreck marking buoy that is specifically designed to mark new dangers.

21. **Emergency Wreck Marking Buoy.** The emergency wreck-marking buoy is designed to provide high visual and radio aid to navigation recognition. It should be placed as close to the wreck as possible, or in a pattern around the wreck, and within any other marks that may be subsequently deployed. The emergency wreck marking buoy should be maintained in position until:

(a) The wreck is well known and has been promulgated in nautical publications;

(b) The wreck has been fully surveyed and exact details such as position and least depth above the wreck are known; and

(c) A permanent form of marking of the wreck has been carried out.

22. **Characteristics.** The buoy has the following characteristics:

(a) A pillar or spar buoy, with size dependant on location.

(b) Coloured in equal number and dimensions of blue and yellow vertical stripes (minimum of 4 stripes and maximum of 8 stripes).

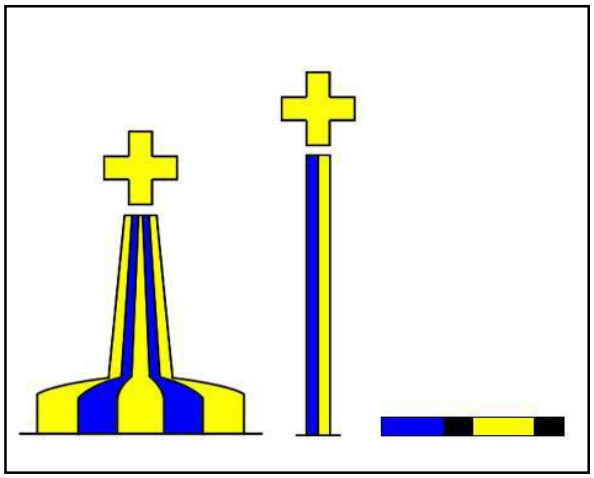
(c) Fitted with an alternating blue* and yellow flashing light with a nominal range of 4 nautical miles (authorities may wish to alter the range depending on local conditions) where the blue and yellow 1 second flashes are alternated with an interval of 0.5 seconds.

B1.0s + 0.5s + Y1.0s + 0.5s = 3.0s

(d) If multiple buoys are deployed then the lights should be synchronized.

(e) Consideration should be given to the use of a racon Morse Code "D" and/or AIS transponder.

(f) The top mark, if fitted, is to be a standing/upright yellow cross.



* The light characteristic was chosen to eliminate confusion with blue lights to identify law enforcement, security and emergency services.

23. A brief summary of the Maritime Buoyage System (Region 'A'), including the symbols and abbreviation used for charting the buoys under the system, is given in NP 735 (IALA Buoyage System) and Chart 5020 (INT 1).

Special Notice No.23
FORMER MINE DANGER AREAS: SWEPT ROUTES AND INSTRUCTIONS REGARDING EXPLOSIVES PICKED UP AT SEA

1. Minefields were laid in many parts of world during World War II, Korean war and in a number of less extensive conflicts since then. Many of these minefields have been swept; others have had routes swept through them. These routes are mostly marked by buoys and have been used safely by shipping for many years.

2. Due to the lapse of time, navigation through these minefields whether they have been swept or not is now considered no more dangerous from mines than from any other of the usual hazards to navigation; but in unswept areas danger still exists with regard to anchoring, fishing or any form of Submarine or seabed activity. Furthermore uncharted wrecks and shoals may lie in these areas, some of which are not covered by modern surveys. Former mine danger areas are mentioned in appropriate volumes of Sailing Directions.

3. Even in swept waters and routes there is a remote risk that mines may still remain. Mariners are therefore advised only to anchor in port approaches and established anchorages. In an emergency it is better to anchor in a swept route rather than in unswept waters.

4. Drifting mines may occasionally be sighted majority will probably be "lost" exercise mines. All drifting mines should be reported immediately to the Naval/Coast guard authorities on normal ship/shore communication channel; an "All Ships" broadcast should be made on VHF channel 16 to communicate the information to ships in the vicinity. The time of sighting and position of the mine is important in the reporting information. A drifting mine is best left for the naval experts to deal with.

5. Mines, torpedoes, depth charges, bombs and other explosive missiles are sometime picked up in trawls, often in waters comparatively distant from where they were laid or dropped. Explosive weapons are dangerous even if they have been in the water for many years, and the following guidance is given in dealing with them:

(a) A suspected explosive weapon should not be landed on deck if it has been observed while trawl is still outboard. The trawl should be lowered and where possible towed clear of regular fishing ground before cutting away the net as necessary. The position of depth of the water where the mine was cut away should be passed to the Naval Coastguard authorities.

(b) In the event of the weapon not being detected until the content of trawl have been discharged on deck, the skipper of the fishing vessel must decide whether to rid his ship of the weapon by passing it over the side or to make for the nearest port informing the Harbour Authority and Naval Authorities by radio without delay. His decision will depend upon the circumstances, but he should be guided by the following points:

(i) Great care should be taken to avoid bumping the weapon.
(ii) If retained onboard it should be stowed on deck, away from the heat and vibration, firmly chocked and lashed to prevent movement.
(iii) It should be kept covered and dumped down. (This is important because any explosive which may have become exposed to the atmosphere is liable to become very sensitive to shock if allowed to dry out.)
(iv) The weapon should be kept on board for as short a time as possible.

(v) If within two or three hours steaming of the coastline the safest measure will generally be to run towards the nearest port and lie a safe distance off shore to await the arrival of a Naval Explosive Ordnance Disposal Unit. Under no circumstances should the vessel bring the mine or weapon into harbour.

(c) Under no circumstances should attempts be made to clean the weapon for identification purposes, open it or tamper with it in any way.

(d) A ship with an explosive weapon on board, or in her gear, should warn other ships in the vicinity giving her position and, if applicable, intended position of jettisoning.

Special Notice No.24
NOTICES TO MARINERS – Explanation of Terms

1. An explanation of the various commands used within Section II of fortnightly Indian Notices to Mariners is summarised below. The main text of the correction starts with one of the following five commands, usually in the order shown:

(a) **INSERT** is to be used for the insertion of all new data or, together with the **DELETE** command (see (e) below), when a feature has moved position sufficiently that the **MOVE** command (see (d) below) is not appropriate. For example: Delete feature and Insert in a different position. Note: The text to be written on a chart by insertion will appear in *Italics* in the printed notice.

(b) **AMEND** is to be used when a feature remains in its existing charted position but has a change of characteristics, for example:

Amend light to, *Fl.3s25m10M 16° 02'.20N, 73° 27'.30E*

When only the range of a light changes then it is sufficient to state

Amend range of the light to, *10M 16° 02'.20N, 73° 27'.30E*

(c) **SUBSTITUTE** is to be used when one feature replaces an existing feature and the position remains as charted. The new feature is always to be shown first, for example:

Substitute (where is the new feature) for (where is the old feature)

(d) **MOVE** is to be used for feature whose characteristics/descriptions remain unchanged, but they are to be moved small distances (the rule of thumb will be within a radius of 2.5cm from the previous charted position), for example:

Move starboard-hand conical buoy from: 15° 24'.50N, 73° 45'.00E
To: 15° 24'.60N, 73° 45'.20E

(e) **DELETE** is to be used when feature are to be removed from the chart or, together with the **INSERT** command (see (a) above), when features are to be removed a significant distance such that the **MOVE** command is inappropriate.

Special Notice No. 25
NATIONAL CLAIMS TO MARITIME JURISDICTION

(Source: www.un.org)

1. The following list shows the breadth of sea (measured from the appropriate baselines in nautical miles) claimed respectively as territorial sea (TS), contiguous zone (CZ), exclusive economic zone (EEZ) and fishery zone (FZ), where no EEZ is claimed, as being under the state's jurisdiction. The information is compiled from various, sometimes unofficial, sources; the absence of a limit from this list indicates that the information is not held.

2. The claims are published for information only.

Country	TS	CZ	EEZ	FZ
Albania[1]	12*			
Algeria[1]	12*	24	200[3]	52[20]
Angola[1]	12	24	200	
Antigua and Barbuda[2]	12*	24	200	
Argentina[1]	12	24	200	
Australia[1]	12[10,22]	24	200	
Bahamas[2]	12		200	
Bahrain	12	24		
Bangladesh[1]	12*	18	200	
Barbados[2]	12*		200	
Belgium	12	24	200[19]	
Beliz[1]	12[15]		200	
Benin	200			200
Bosnia and Herzegovin[30]				
Brazil[1]	12	24	200	
Brunei Darussalam	12		200	
Bulgaria[1]	12	24	200	
Burma[1]	12*	24	200	
Cambodia[1]	12*	24	200	
Cameroon[1]	12	24		
Canada[1]	12	24	200	
Cape Verde[2]	12*	24	200	
Chile[1]	12	24	200	
China, Peoples' Republic[1]	12*	24	200	
China, Republic of (Taiwan)[1]	12*	24	200	
Colombia[1]	12		200	
Comoros[2]	12*		200	
Congo, Democratic Republic	12*	24[19]	200[19,28]	
Congo, Republic		24	200	
Cook Islands	12		200[19]	
Costa Rica[1]	12		200	
Côte d'Ivoire	12	24	200	
Croatia[1]	12*			200[25,27]
Cuba[1]	12	24	200	
Cyprus[1]	12	24	200	
Denmark[1]	12*[26]	24	200	
Greenland[1]	3		200	

Faeroe Islands[1]	12			200
Djibouti[1]	12[28]	24[28]	200[28]	
Dominica	12	24	200	
Dominican Republic[2]	12	24	200[19]	
Ecuador[1]	12		200	
Egypt[1]	12*	24	200	
El Salvador[*]	12	24	200	
Equatorial Guinea	12		200	
Eritrea[1*]	12[11]			
Estonia[1]	12*[19]		200[19]	
Fiji[2]12		200		
Finland[1]	12*[12,19]	14	200[19]	
France[1]	12	24	200[13]	12[13]
French Antarctica	12			
Gabon[1]	12	24	200	
Gambia	12	18		200
Georgia	12	24	200[28]	
Germany[1]	12[8,26]		200[19]	
Ghana	12	24	200	
Greece	6[29]			
Grenada[2]	12*	24	200	
Guatemala	12		200	
Guinea	12[19]	24[19]	200[19]	
Guinea Bissau[1]	12		200	
Guyana	12*	24	200	
Haiti[1]	12	24	200	
Honduras[1]	12	24	200	
Iceland[1]	12		200	
India[1]	12*	24	200	
Indonesia[2]	12		200	
Iran[1*]	12*	24	200[28]	
Iraq	12			
Ireland[1]	12	24	200[19]	200
Israel[*]	12[16]		200[28]	
Italy[1]	12		200[31]	
Jamaica[2]	12	24	200	
Japan[1]	12[21]	24	200	
Jordan	3			
Kenya[1]	12		200[3]	
Kiribati[2]	12	24	200	
Korea, Democratic People's Republic[*]	12*	50[23]	200	
Korea, Republic of (South)[1]	12*[5]	24	200	
Kuwait	12	24[28]	200[28]	
Latvia	12		200[19]	
Lebanon	12		200[19]	
Liberia	12	24	200	
Libya[1,4]	12*		200	74[19]
Lithuania	12[3]	24[3]	200[3,28]	
Madagascar[1]	12	24	200	

Malaysia[1]	12		200	
Maldives[2]	12*	24	200	
Malta[1]	12*	24		25
Marshall Islands[2]	12[3]	24[3]	200[3]	
Mauritania[1]	12	24	200	
Mauritius[1]	12*	24	200	
Mexico[1]	12[28]	24[28]	200[28]	
Micronesia (Federated States of)	12		200	
Monaco[3]	12			12
Montenegro[1]	12*			12
Morocco[1]	12	24	200	
Mozambique[1]	12	24	200	
Namibia	12	24	200	
Nauru	12[19]	24[19]	200[19]	
Netherlands	12	24	200[19]	
Aruba, Curacao, Sint Maarten	12	24	200[28]	
Bonaire, Sint Eustatius and Saba	12	24	200[28]	
New Zealand	12	24	200	
Ross Dependency	12			
Tokelau	12		200	
Nicaragua[1]	12	24	200	
Nigeria	12		200	
Niue	12[19]	24[19]	200[19]	
Norway[1]	12	24	200	
Bouvetøya	12		200	
Jan Mayen[1]	12		200	
Svalbard[1]	12		200	
Oman[1]	12*	24	200	
Pakistan[1]	12*	24	200	
Palau	12	24	200	
Panama	12	24	200	
Papua New Guinea[2]	12[14]			200
Peru[1*]	200			200
Philippines[2]	12		200	
Poland	12		200[28]	
Portugal[1]	12	24	200	
Qatar	12	24		
Romania[1]	12*	24	200	
Russian[1]	12	24	200	
St. Kitts and Nevis	12	24	200	
St. Lucia	12	24	200	
St. Vincent and the Grenadines[2]	12*	24	200	
Samoa	12[19]	24[19]	200	
Sao Tome and Principe[2]	12		200[19]	
Saudi Arabia[1]	12	24	200[7]	
Senegal[1]	12	24	200	
Seychelles[2]	12*	24	200	
Sierra Leone	12*	24	200	
Singapore	12[7]		200[7]	

Slovenia	12*			
Solomon Islands[2]	12		200	
Somalia	12*		200[19]	
South Africa[1]	12	24	200	
Spain[1]	12	24	200[13,28]	
Sri Lanka[1]	12*	24	200	
Sudan[1]	12*	18		
Suriname	12		200	
Sweden[1]	12[26]		200[19]	
Syrian[1*]	12*	24	200	
Tanzania[1]	12		200	
Thailand[1]	12	24	200	
Timor-Leste	12	24	200	
Togo	30		200	
Tonga	12		200[3]	
Trinidad and Tobago[2]	12	24	200	
Tunisia[1]	12	24	200[7]	
Turkey[1*]	12[6]		200[17]	
Tuvalu[2]	12	24	200	
UAE[1*]	12*	24	200	
UK[1]	12		200	
Anguilla	12			200
Ascension	12		200	
Bailiwick of Guernsey	12			12
Bailiwick of Jersey	12			3[24]
Bermuda	12		200	
British Antarctic Territory	3			3
British Indian Ocean Territory	3			200[32]
British Virgin Islands	12			200
Cayman Islands	12			200
Cyprus (Sovereign Base Areas)	3			3
Falkland Islands[1]	12			200[9]
Gibraltar	3			3
Isle of Man	12			12
Montserrat	3			200
Pitcairn	3		200	
St. Helena	12		200	
South Georgia[1]	12		200[33]	
South Sandwich Islands	12		200[33]	
Tristan da Cunha	12		200	
Turks and Caicos Islands[1]	12			200
Ukraine[1]	12		200	
Uruguay[1]	12	24	200	
USA[*]	12	24	200	
Vanuatu[2]	12	24	200	
Venezuela[1*]	12	15	200	
Vietnam[1]	12*	24	200	
Yemen[1]	12*	24	200	

Notes: Limits of dependent territories have not been listed unless they differ from those of the metropolitan state.
1. Employs straight baseline systems along all or a part of the coast.
2. Claims archipelagic status.
3. Claims waters within limits defined by geographic co--ordinates.
4. Claims all water south of 32°30′N in the Gulf of Sirte as internal waters.
5. Claims 3M in Korea Strait.
6. Claims 6M in Aegean Sea.
7. To boundaries provided for in international law.
8. Special claim extends limit to include the deep water anchorage west of Helgoland.
9. 150M in west with a rhumb line between 52°30′.00S, 63°19′.25W and 54° 08′.68S, 60°00′.00W.
10. Certain islands in the Torres Strait retain 3M territorial sea limit.
11. Jurisdiction claimed to the limit of the pearl and sedentary fishery grounds.
12. Bogskar has a 3M territorial sea limit.
13. In the Mediterranean, France claims a 12M fishery limit and a 200M Ecological Protection Zone to defined co-ordinates. Spain claims a fishery limit to median lines in the Mediterranean. Spain claims an EEZ in the Mediterranean to defined co--ordinates. 14. Reduced to 3M in the Torres Strait area.
15. Reduced to 3M in the Gulf of Honduras.
16. Reduced to 3M off Gaza.
17. Only claims an EEZ in the Black Sea.
18. TS limit reduced in parts of the Gulf of Finland to preserve a high seas corridor.
19. To defined co-ordinates.
20. Reduced to 32M west of the longitude of Ras Ténés.
21. TS limits reduced in the following international straits to retain a high seas corridor: La Perouse (Soya), Tsugaru, Osumi, Eastern and Western Channels, and Tsushima.
22. Special claim extends limit to include a roadstead off the port of Karumba in the Gulf of Carpentaria.
23. Military zone in the Sea of Japan and to EEZ limit in the Yellow Sea.
24. Exclusive Fisheries Zone Special regime in the Bay of Granville beyond 3M.
25. The outer limit is claimed to that limit permitted by general international law.
26. TS limits reduced in the following areas to retain a high seas corridor: Kattegat, northern approaches to The Sound, southern approaches to The Sound, Samso Belt, Kadet Renden, Fehmarn Belt, Kieler Bucht, and Bornholmsgat.
27. Ecological and Fisheries Protection Zone.
28. To median lines or boundaries.
29. 10M territorial airspace applies to civil aviation.
30. Territorial Sea enclave defined by median lines with Croatia.
31. Claims an ecological protection zone to agreed boundaries or median lines.
32. In addition claims 200M Environment Protection and Preservation Zone.
33. The 200M zone is claimed as a Maritime Zone rather than specifically as an EEZ.

* Indicates a state which has NOT ratified or acceded to the UN Convention on the Law of the Sea (UNCLOS), which came into force on 16 November 1994.

* Indicates a state which requires prior permission or notification for entry of foreign warships into the territorial sea.

Special Notice No. 26
SATELLITE NAVIGATION SYSTEMS

(Source: www.gps.gov)

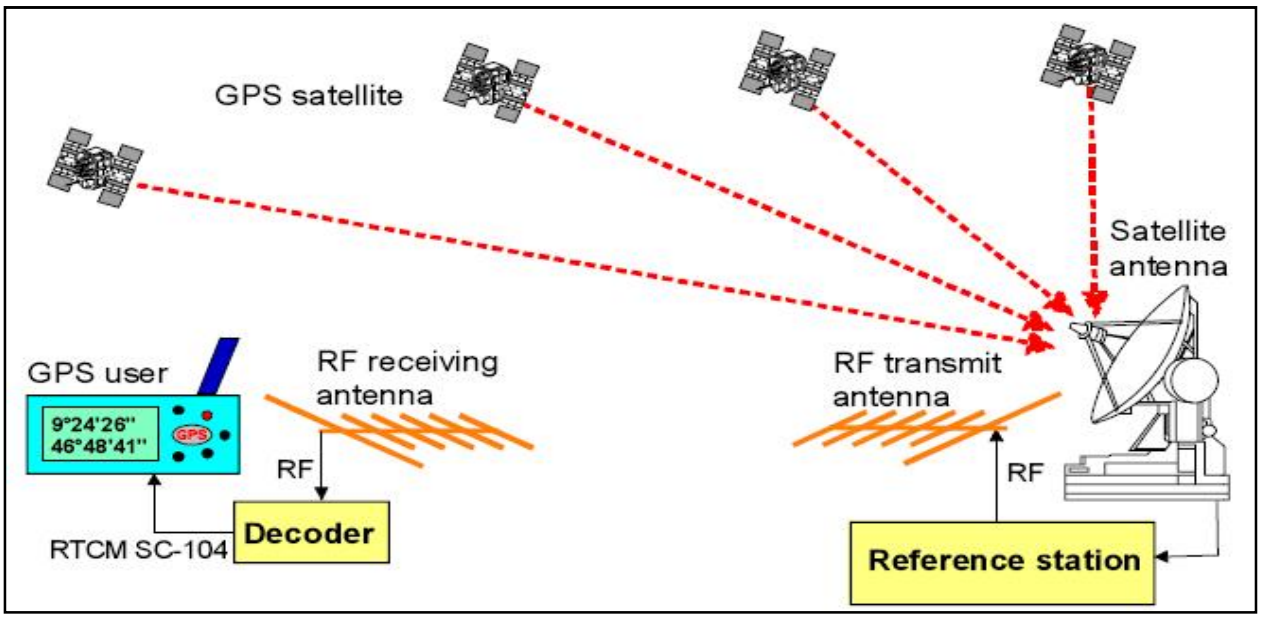
1. **The NAVSTAR Global Positioning System.** The **Global Positioning System**, commonly referred to as **GPS**, is a fully-functional satellite based navigation system. This is also officially named as **Nav**igation **S**ignal **T**iming and **R**anging **GPS (NAVSTAR GPS)**. A constellation of more than two dozen GPS satellites broadcasts precise timing signals to the GPS receivers, allowing them to determine their location (longitude, latitude, and altitude) accurately in any weather, day or night, anywhere on the Earth's surface. GPS has today become a vital global utility, indispensable for modern navigation on land, sea, and air around the world, as well as an important tool for map-making and land surveying. GPS provides extremely precise tools for time reference, required towards survey, telecommunications and various scientific researches, including the study of earthquakes.

2. The GPS space segment consists of a constellation of satellites transmitting radio signals to users. The US Air Force manages the constellation to ensure the availability of at least 24 GPS satellites, 95% of the time. For the past several years, it has been monitoring 31 operational GPS satellites. The constellation includes three spare satellites in orbit, in case of any failure. Each satellite circles around the Earth twice a day at an altitude of 20,200 kilometers (12,600 miles). The orbits are so aligned that at least four satellites are always within line of sight from almost any place on Earth. There are four active satellites in six orbital planes. Each orbit is inclined 55 degrees from the equatorial plane, and the right ascension of the ascending nodes is separated by sixty degrees. The flight path of the satellites are measured by the monitoring stations situated around the world. There is also a master control station which processes their combined observations and sends updates to the satellites through the control stations situated at various places on the earth surface. The updates synchronize the atomic clocks on board each satellite to within one microsecond and also adjust the ephemeris of the satellite's internal orbital model to match the observations of the satellites from the ground.

Differential Global Positioning System

3. The signals and data from the GPS satellites may exhibit some inherent errors, such as errors due to wave propagation, inaccuracies on satellite orbit predictions and clock drifts. All such errors affect the positioning accuracy in traditional GPS receivers. These errors, intentional or inherent in the GPS system when used, have a common characteristic: **high degree of correlation in space**. A **high degree of space correlation** means that the errors observed by all GPS receivers locked on a given satellite will be virtually the same over an area of several thousand miles.

4. **Principle.** The basic principle of the Differential GPS (DGPS) technique consists of observing each satellite separately and measuring the error brought about by the satellite, using a receiver installed at a station with known coordinates. The DGPS technique relies on the error measured for each satellite as shown in the diagram. The technique consists of directly comparing the geographical positions computed by two receivers (one of which being stationary). One could never be sure that both receivers used track the same satellites to compute the respective positions, which might lead to large errors. The deviations called **corrections,** observed on each satellite, incorporated in digital message, must be broadcast to Differential GPS users through a specific highly reliable radio frequency link called Radio Technical commission for Mariners Special Committee (RTCM SC108).



(Principle of Differential GPS)

GLONASS

5. **GLONASS**, acronym for *Globalnaya Navigazionnaya Sputnikovaya Sistema* or Global Navigation Satellite System, is the Russian Federation equivalent of the United States GPS system.

6. The system requires 18 satellites for continuous navigation services covering the entire territory of Russian Federation and 24 satellites to provide services worldwide. A standard GLONASS orbital constellation of 24 located in a medium altitude near circular orbits with normal altitudes of 19,100 km, inclination of 64.8° and a period of 11 hours 15 minutes 44 seconds. The value of the period made it possible to create a stable orbital system, which unlike GPS orbits, does not require correcting impulses to maintain it practically during the entire period of active existence. The nominal inclination ensure 100% availability of navigation on the territory of the Russian Federation, even if several spacecraft leave the orbital group.

EGNOS

7. The European Geostationary Navigation Overlay Service (EGNOS) is the first pan-European satellite navigation system. It augments the US GPS satellite navigation system and makes it suitable for safety critical applications such as flying aircraft or navigating ships through narrow channels. Consisting of three geostationary satellites and a network of ground stations, EGNOS achieves its aim by transmitting a signal containing information on the reliability and accuracy of the positioning signals sent out by GPS. It allows users in Europe and beyond to determine their position to within 1.5 metres.

8. EGNOS is a joint project of ESA (European Space Agency), the European Commission and Eurocontrol, the European Organisation for the Safety of Air Navigation. It is Europe's first activity in the field of Global Navigation Satellite Systems (GNSS) and is a precursor to Galileo.

9. The EGNOS Open Service has been available since 1 October 2009. EGNOS positioning data are freely available in Europe through satellite signals to anyone equipped with an EGNOS-enabled GPS receiver. The EGNOS **Safety of Live** service has been officially declared available for aviation on 02 March 2011. The main objective of the SoL service is to support civil aviation

operations down to LPV (Local Performance with Vertical Guidence) minima. EGNOS Data Access Service (EDAS) is the single point of access for the data collected and generated by the EGNOS ground infrastructure distributed over Europe and North Africa.

GALILEO

10. **Galileo** is a satellite navigation system currently being built by the European Union (EU) and European Space Agency (ESA). Galileo is a global navigation satellite system, providing a highly accurate, guaranteed global positioning service under civilian control. It will be inter-operable with GPS and GLONASS, the two other global satellite navigation systems. A user will be able to take a position with the same receiver from any of the satellites in any combination.

11. ESA's first two navigation satellites, GIOVE-A and –B, were launched in 2005 and 2008 respectively, reserving radio frequencies set aside for Galileo by the International Telecommunications Union and testing key Galileo technologies. Thereafter up to four operational satellites were launched in the timeframe of 2005-2006 to validate the basic Galileo space and related ground segment. The first two operational satellites were launched in Oct 2011 and the second pair was launched in Oct 2012. Once this In-Orbit Validation (IOV) phase has been completed, the remaining satellites are being placed in orbit at regular intervals to reach full operational capabilities.

12. The first pair of Galileo's FOC phase, GSAT0201 and GSAT0202 was launched in August 2014. Despite having been injected into incorrect orbit, these were moved to an improved orbit at the end of 2014 and the beginning of 2015. Subsequent FOC satellites were launched from 2015 to 2018. The Galileo FOC satellites provide the same capabilities as the previous IOV satellites, but with improved performance, such as higher transmit power.

Global System (BeiDou-2 or Compass navigation system)

13. The second generation of the system, officially called the BeiDou Navigation Satellite System (BDS) and also known as COMPASS or BeiDou-2, became operational in China in December 2011 with a partial constellation of 10 satellites in orbit. Since December 2012, it has been offering services to customers in the Asia-Pacific region.

14. BeiDou-2 (formerly known as COMPASS) is not an extension to the older BeiDou-1, but rather supersedes it outright. The new system is a constellation of 35 satellites, which include 5 geostationary orbit satellites for backward compatibility with BeiDou-1, and 30 non-geostationary satellites (27 in medium Earth orbit and 3 in inclined geosynchronous orbit), that offer complete coverage of the globe. There will be two levels of service provided; free service to civilians and licensed service to Chinese government and military users:-

(a) The free service will have a 10 meter location-tracking accuracy, will synchronize clocks with an accuracy of 10 ns, and measure speeds within 0.2 m/s.

(b) The licensed service will be more accurate than the free service, can be used for communication, and will supply information about the system status to the users.

Quasi-Zenith Satellite System

(Quasi-Zenith satellite orbit)

15. QZSS is a Japanese satellite positioning system composed mainly of satellites in quasi-zenith orbits (QZO). However, the term "Quasi-Zenith Satellite (QZS)" can refer to both satellites in QZO and geostationary orbits (GEO). For that reason, the name "QZO satellite" is used when it is necessary to specifically refer to satellites in QZO. Satellite positioning systems use satellite signals to calculate position information. One famous example is the American Global Positioning System (GPS); the QZSS is sometimes called the "Japanese GPS".

16. Satellite positioning is possible with four or more satellites, but a larger number of satellites are ideal for obtaining stable
positioning information. However, the number of visible GPS satellites was smaller in urban and mountainous areas where satellite signals are obstructed by buildings, trees, and other objects, making the stable acquisition of positioning information impossible in some cases.

17. QZSS (Michibiki) has been operated as a four-satellite constellation from November 2018, and three satellites are visible at all times from locations in the Asia-Oceania region. QZSS can be used in an integrated way with GPS, ensuring a sufficient number of satellites for stable, high-precision positioning. QZS are compatible with GPS and receivers can be procured at a low cost, so it is expected that position information businesses utilizing geographical and spatial information will be developed.

Indian Regional Navigational Satellite System (IRNSS)

18. IRNSS is an autonomous regional satellite navigation system being developed by ISRO (Indian Space Research Organization). The government of India approved the project in May 2006, with the intention of the system to be completed and implemented in the timeframe 2016. The objective of the project is to implement an independent and indigenous regional space borne navigation system for national applications. The IRNSS design requirements call for a position accuracy of < 20 m throughout India and within the region of coverage extending about 1500 km beyond. The system is expected to provide accurate real-time position, velocity and time observables for users on a variety of platforms with a 24 hour x 7 day service availability under all weather conditions. The IRNSS is being developed parallel to the GAGAN (GPS Aided GEO Augmented Satellite Navigation) program, the ISRO SBAS (Satellite Based Augmentation System) version of an overlay system for GNSS signal corrections.

19. The proposed IRNSS system will consist of a constellation of seven satellites and a supporting ground segment. Three of the satellites in the constellation will be placed in a geostationary orbit and the remaining four in a geosynchronous inclined orbit of 29º relative to the equatorial plane. Such an arrangement would mean all seven satellites would have continuous radio visibility with Indian control stations. ISRO has filed for 24 MHz bandwidth of spectrum in the L5-band (1164 – 1189 MHz) for IRNSS and for the second signal in S-band (2483.5 – 2500 MHz).

20. The IRNSS constellation architecture consists of the following elements:

(a) Space Segment: The space segment consists of seven satellites, 3 satellites in GEO (Geostationary Orbit at 32.5°, 83° and 131.5° East) and 4 satellites in GSO (Geosynchronous Orbit placed at inclination of 29° with longitude crossing at 55° and 111.75° East). Two spare satellites are also planned. The satellites are specially configured for the navigation. Same configuration for GEO and GSO which is desirable for the production of the satellites. The satellite payloads would consist of atomic clocks and electronic equipment to generate the navigation signals. The navigation signals themselves would be transmitted in the S-band frequency (2-4 GHz) and broadcast through a phased array antenna to maintain required coverage and signal strength. The satellites would weigh approximately 1,330 kg and their solar panels generate 1,400 watts. IRNSS system provides dual frequency (S & L5 band) usage. At present one down link in S-band and three down links in L5 band are planned. The System is intended to provide an absolute position accuracy of better than 20 meters throughout India and within a region extending approximately 1,500 to 2,000 km around it.

(b) Ground Segment: The ground segment IRNSS constellation would consist of a Master Control Center (MCC), ground stations to track and estimate the satellites' orbits and ensure the integrity of the network (IRIM), and additional ground stations to monitor the health of the satellites with the capability of issuing radio commands to the satellites (TT&C stations). The MCC would estimate and predict the position of all IRNSS satellites, calculate integrity, makes necessary ionospheric and clock corrections and run the navigation software. In pursuit of a highly independent system, an Indian standard time infrastructure would also be established.

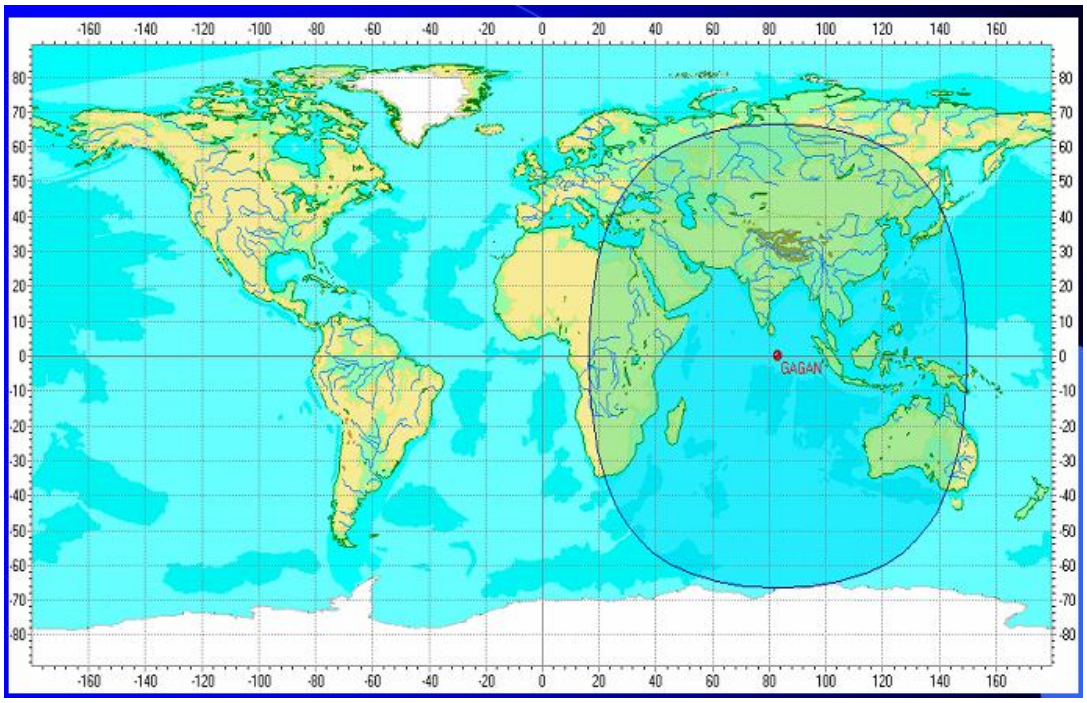
(c) User Segment: The IRNSS user segment is made of the IRNSS receivers. They will be dual frequency receivers (L5 and S band frequency) or single frequency (L5 or S band frequency) with capability to receive ionospheric correction. They will be able to receive and process navigation data from other GNSS constellations and the seven IRNSS satellites will be continuously tracked by the user receiver.

21. **Development.** As part of the project, the Indian Space Research Organisation (ISRO) opened a new satellite navigation centre within the campus of ISRO Deep Space Network (DSN) at Byalalu, in Karnataka on 28 May 2013. A network of 21 ranging stations located across the country will provide data for the orbital determination of the satellites and monitoring of the navigation signal. A goal of complete Indian control has been stated, with the space segment, ground segment and user receivers all being built in India. Its location in low latitudes facilitates coverage with low-inclination satellites. Three satellites will be in geostationary orbit over the Indian Ocean. Missile targeting could be an important military application for the constellation. The NavIC signal was released for evaluation in September 2014. From 1 April 2019, use of AIS-140 compliant NavIC-based vehicle tracking systems was made compulsory for all commercial vehicles in India. In January 2020, Qualcomm launched three new chipsets, Snapdragon 720G, 662 and 460 with support for Navigation with Indian Constellation (NavIC). NavIC is planned to be available for civilian use in mobile devices, after Qualcomm and Indian Space Research Organisation signed an agreement.

GAGAN

22. The GPS Aided Aided Geo Augmented Navigation (GAGAN) system is developed by Indian Space Research Organization (ISRO), together with Airports Authority of India (AAI), to deploy and certify an operational satellite-based augmentation system (SBAS). The system's service area covers the Indian Flight Information Region (FIR), with the capability of expanding to neighbor FIRs.

23. GAGAN provides a civil aeronautical navigation signal consistent with International Civil Aviation Organization (ICAO) Standards and Recommended Practices (SARPs) as established by the Global Navigation Satellite System (GNSS) panel. The GAGAN system provides non-precision approach (NPA) service accurate to within the radius of $1/10^{th}$ of a nautical mile over the Indian FIR. The system is interoperable with other International SBAS system such as U.S. Wide Area Augmented System (WAAS), the European Geostationary Navigation Overlay Service (EGNOS) and the Japanese MTSAT Satellite Augmentation System (MSAS) and provides seamless air navigation across regional boundries.



(Gagan Coverage From 82 Deg East)

24. The GAGAN system consist of the following elements for the effective implementation of SBAS over India:-

(a) Indian Reference Station (INRES) at 15 locations across India.

(b) Indian Master Control Centre (INMCC) - two at Bangalore.

(c) Indian Land Uplink Station (INLUS) – three stations, two at Bangalore and one at Delhi.

(d) Geostationary Satellites (GSAT8/GSAT10) in orbit and one on-orbit spare in GSAT-15 launched on November 10, 2015.

(e) A data communication subsystem – two optical fiber communication (OFC) circuits and two very small aperture terminal (VSAT) circuits.

Special Notice No. 27
INDIAN DGPS BEACONS NETWORK

(Source: Director General of Lighthouses and Lightships)

1. The Indian DGPS beacon network maintained by DGLL transmits DGPS corrections along the IN coast. These Beacons Transmitting DGPS Corrections includes identification numbers for the Reference Stations from which the corrections are derived as well as Transmitting Stations which broadcast the information. The Reference Station numbers are included in the header of RTCM 104 Type 1 or Type 9 message. The Transmitting Station numbers are included in RTCM 104 Type 7 messages. Integrity Monitoring details provided within the header of RTCM 104 Type 1 or Type 9 message this indicates that the reference station is healthy, unhealthy or unmonitored. The Indian DGPS beacon network may be switched off without notice for maintenance.

2. Details of DGPS Beacons on Indian coast and corrections transmitted by them is as follows:

SL No	Station Name	Identification Number		Position	Nominal Range		Integrity Monitoring	Msg type	Bit Rate (bps)
		Ref Stn	Tx Stn		Km	At (uV/m)			
1	Gopnath Pt	404 405	102	N 21° 12' 11.87941 E 72° 06' 31.19905	185	100	Yes	3,5,7,9,16	100
2	Hazira	498 490	104	N 21° 05' 31.433 E 72° 38' 34.607	185	100	Yes	3,5,7,9,16	100
3	Okha	401 402	100	N 22° 28' 35.28200 E 69° 04' 11.11494	185	100	Yes	3,5,7,9,16	100
4	Porbander	402 403	101	N 21° 37' 21.21943 E 69° 37' 12.00377	185	100	Yes	3,5,7,9,16	100
5	Uttan Point	406 407	103	N 19° 16' 42.18192 E 72° 46' 50.85529	185	100	Yes	3,5,7,9,16	100
6	Ratnagiri	420 421	110	N 16° 59' 16.37376 E 73° 16' 20.59930	185	100	Yes	3, 5,7,9,16	100
7	Aguada	410 411	105	N 15° 29' 32.17852 E 73° 46' 20.84846	185	100	Yes	3, 5,7,9,16	100
8	Suratkal Point	412 413	106	N 13° 00' 17.02686 E 74° 47' 23.38618	185	100	Yes	3,5,7,9,16	100
9	Azhikode (Periyar River)	414 415	107	N 10° 12' 13.03787 E 76° 09' 27.30537	185	100	Yes	3,5,7,9,16	100
10	Minicoy Island	418 419	109	N 08° 16' 09.95776 E 73° 01' 33.26505	185	100	Yes	3,5,7,9,16	100
11	Pandiyan Thivu	424 425	112	N 08° 47' 08.91256 E 78° 11' 48.55972	185	100	Yes	3,5,7,9,16	100
12	Nagapatnam	426 427	113	N 10° 45' 58.13329 E 79° 51' 00.37244	185	100	Yes	3,5,7,9,16	100
13	Puducherry (Pondicherry)	422 423	111	N 11° 54' 59.02836 E 79° 49' 51.72534	185	100	Yes	3,5,7,9,16	100
14	Pulicut	430 431	115	N 13° 25' 15.943 E 80° 19' 36.393	185	100	Yes	3,5,7,9,16	100

15	Krishnapatnam	432(RS 1) 433(RS2)	116	N 14° 15' 17.533210 E 80° 07' 33.235470 N 14° 15' 17.464800 E 80° 07' 33.358240	185	100	Yes	5,7,9, 16	100
16	Antervedi	436 437	118	N 16° 19' 01.11865 E 81° 43' 32.84462	185	100	Yes	3,5,7, 9,16	100
17	Dolphin Nose	428 429	114	N 17° 40' 41.98458 E 83° 17' 29.14874	185	100	Yes	3,5,7, 9,16	100
18	Paradip	440 441	120	N 20° 15' 21.04035 E 86° 39' 19.88278	185	100	Yes	3,7,9, 16	100
19	Sagar Island	434 435	117	N 21° 39' 30.55691 E 88° 02' 49.10468	185	100	Yes	3,7,9, 16	100
20	East Island	442 443	121	N 13° 37' 52.039 E 93° 02' 49.902	185	100	Yes	3,7,9, 16	100
21	Keating Point	438 439	119	N 09° 15' 21.14906 E 92° 46' 31.38245	185	100	Yes	3,7,9, 16	100
22	Rameswaram	446 447	123	N 09° 17' 01.892 E 79° 18' 31.828	185	100	Yes	3,5,7, 9,16	100
23	Campbell Bay	444 445	122	N 07° 00' 30 E 93° 56' 12	300	162	Yes	2,3,5, 7,9,16	100

Special Notice No. 28

LIST OF DEPOTS AND CHART AGENTS FOR THE SALE OF INDIAN CHARTS AND OTHER HYDROGRAPHIC PUBLICATIONS

DEPOTS

National Hydrographic Office 107 - A, Rajpur Road, Post BoxNo.75, Dehradun - 248 001 Phone: 0091-135 – 2747365 Fax: 0091-135 – 2748373 Email: inho@navy.gov.in sales-inho@navy.gov.in Web: hydrobharat.gov.in	**Naval Chart Depot** Castle Park, Shahid Bhagat Singh Road Mumbai – 400 023 Phone: + 91 – 022 – 22751049 Fax:+91 – 022 – 22751049 Email: ncdm-inho@navy.gov.in	**Naval Chart Depot** C/O Fleet Mail Office Visakhapatnam – 530 014 Phone:0891–2812842/ 2812119 Fax: 0891 - 2812842 Email: ncdv-inho-navy@nic.in

DETAILS OF AGENTS FOR THE SALE OF ENC

United Kingdom Hydrographic Office Admiralty Way, Taunton, Somerset TA1 2DN, UK Tel: +44 (0) 1823 337900 Fax: +44 (0) 1823 330561, 1823 284077 Web site: www.hydro.gov.uk	**Navico Norway AS** Elganeveien 1, 4370, Egersund, Norway Ph: +47 51 464700, +91 2262233326 Mob: +91 9820238542 Fax: +47 51 464701, +91 2267939504 Email: enc@c-map.com, info@c-map.co.no Website: www.c-map.com
M/s Primar **Norwegian Hydrographic Service,** **Postbox 60,** **4001 Stavanger** **Norway** Telephone - +47 - 51 85 87 00 Fax - + 47 - 51 85 87 08 E-mail: data@ecc.no Website: - www.primar.org	**M/s IIC Technologies Limited** B-2-350/5/B-22, Road No. 3 Banjara Hills Hyderabad - 500 034 Telangana Tel:+91 4039144444 Fax: +91 4039144455 Email: somnath.marthi@iictechnologies.com Web: www.iictechnologies.com

DETAILS OF INDIAN CHART AGENTS

OSA Books and Periodicals R-246, Greater Kailash –I, New Delhi - 110 048 Tel/Fax: +91-11-26418643, 46557337, Mob: 9971093992 Email: rpani246@gmail.com	**M/s VDO Marine Insrtuments** Shanghar Building, PO Bag No – 645, 45/271, Corner of Bristow & Naval Road, Willingdon Island, Kochi – 682 003 Tel: +91 484 2667157 Fax: +91 484 2667121 Email: atmain@md4.vsnl.net.in
M/s Global Charts & Nav. Aids Pvt. Limited 1A, Goa Mansion, Ground Floor, 58, Dr. SunderlalBahl Path (Goa Street), Fort, Mumbai - 400 001 Tel: 91-22-22626318, 22626380 Fax: 91-22-22621488 Email: sales@globalcharts.in Web: www.globalcharts.com.sg	**SMS Marine Private Ltd** 505, Raheja Arcade, Sector 11, CBD Belapur, Navi Mumbai – 400 614 Tel: +91-22-62233326, Fax: 022-67939504 Mobile: +91 9820 238 542 Email: info@c-map.co.in , raj.chakravorty@smsmap.com Web: www.smsmaps.co.in
M/s C & C Marine Combine 25 Bank Street, 1st Floor, Fort Mumbai - 400 023 Tel: 91-22- 22660017/0018/0525/1937 Ext: 32 Tel: 91-22-22672143 Fax: 91-22-22670896 Email: vijay@ccmarine.in, sales@ccmarine.in	**M/s Global Marine Infratech Pvt. Ltd.** SikshaSandan, Ground Floor, Plot No. ND7, VIP Area, IRC Village, Bhubaneswar – 751015 Tel: +91-674-2550599, Fax: +91-674-2551899 Cell:- +91-9337477799, 7077702499 Email: tusarkantha@gmiindia.in Web: www.gmiindia.in
M/s JM Maritime Services 24/24C Kavarana Building, Ground Floor, WadiBunder, P.D. Mellow Road, Mumbai – 400 009 Tel: +91 22 23736956, Fax: 022 - 23725083 Cell: +91 9820788357 Email : jmms@mtnl.net.in , charts@mtnl.net.in	**L. R. Marine Services** 301, 3rd Floor, Birya House, 265, PerinNariman Street, Fort, Mumbai - 400 001. Tel: +91-22-2269 1535, Fax: +91-22-66359148 Cell No: +91 8108926880/ +91 98214 60258 Email: lrcharts@gmail.com, lrmarine@live.com
M/s Lift o Marine Allen's Mansion, C6, Nungi Station Road, Bata Nagar, Kolkata – 700 140 Tel: +91 9836972027 Fax: 033 24924283 Email: sankar@liftomarine.org,liftomarine77@gmail.com Web: www.liftomarine.org	**IIC Technologies Limited** 8-2-350/5/B-22, Road No. 3, Banjara Hills, Hyderabad – 500 034, Telangana Tel: +91 40 39144444 Fax: +91 40 39144455 Email: somnath.marthi@iictechnologies.com Web: www.iictechnologies.com
M/s Zenith Surveys (I) Pvt. Ltd. Lakhani'sPlam View, First Floor, Office No. 889, Sector 48, Nerul, Navi Mumbai – 400 706 Tel/ Fax: +91-22- 27708011 Email: zenithsurveys703@gmail.com nyvmane@yahoo.com Web: www.zenithsurvey.com	