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INMARSAT EGC SAFETYNET SYSTEM
DRAFT INTERNATIONAL SAFETYNET MANUAL

- 1 The Maritime Safety Committee at its fifty-eighth session (MSC 58/25, paragraph 9.15) approved the provisional text of the International SafetyNET Manual, annexed, for circulation to Member Governments as advance information.
- 2 Member Governments are invited, pending completion of a final text at the thirty-sixth session of the Sub-Committee on Radiocommunications, to take account of the information contained in the draft Manual when conducting system trials and tests.
- 3 The Maritime Safety Committee also established an International SafetyNET Broadcast Co-ordinating Panel for co-ordinating the development and use of the INMARSAT SAFETYNET service, to work by correspondence only, under the chairmanship of Commander A. Fuller, RN (IHO). The Panel's terms of reference are given in annex 1 to the draft International SafetyNET Manual and other arrangements on participation, function and method of work.
- 4 Members, intending to use the INMARSAT SafetyNET service for promulgation of MSI, are invited to take account of the draft International SafetyNET Manual and to provide the Panel with information on their plans to broadcast via SafetyNET.

ANNEX

DRAFT INTERNATIONAL SAFETYNET MANUAL

FOREWORD

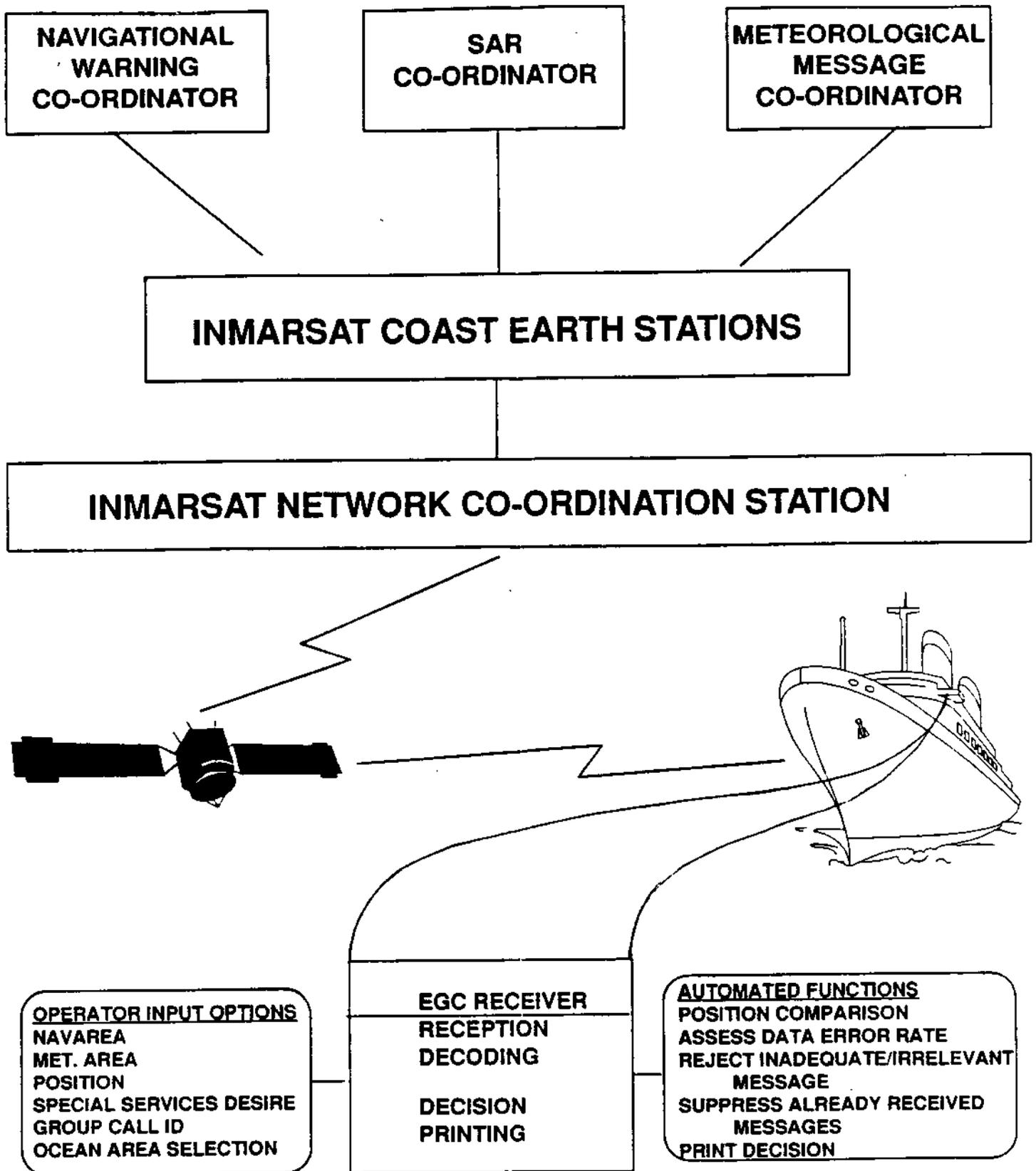
SafetyNETTM* is an international automatic direct-printing satellite-based service for the promulgation of navigational and meteorological warnings, meteorological forecasts and other urgent safety related messages - maritime safety information (MSI) - to ships. It has been developed as a safety service of INMARSAT's enhanced group call (EGC) system to provide a simple and automated means of receiving MSI on board ships at sea and in coastal waters, where appropriate. The information transmitted is relevant to all seagoing vessels and the message selection features ensure that mariners can receive safety information broadcasts which are tailored to their particular needs.

SafetyNET will fulfil an integral role in the global maritime distress and safety system (GMDSS) developed by the International Maritime Organization (IMO) and incorporated into the 1988 amendments to the International Convention for the Safety of Life at Sea (SOLAS) 1974 as a requirement for ships to which the Convention applies. The ability to receive SafetyNET service information will be generally necessary for all ships which sail beyond coverage of NAVTEX and is commended to all Administrations having responsibility for maritime affairs and mariners who require an effective MSI service in waters not served by NAVTEX.

* SafetyNET and FleetNET are registered trademarks of the International Maritime Satellite Organization (INMARSAT).

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THE SAFETYNET CONCEPT - FIGURE 1

1 INTRODUCTION

1.1 This manual describes the structure and operation of the SafetyNET service. It is intended primarily for national Administrations, but may also be useful to the mariner who require more operational information than is found in manufacturers' equipment manuals.

1.2 SafetyNET provides shipping with navigational and meteorological warnings, meteorological forecasts, shore-to-ship distress alerts, chart correction data and other urgent information in accordance with the requirements of the International Convention for the Safety of Life at Sea (SOLAS) 1974. It is suitable for use in all sizes and types of ships. Figure 1 illustrates the way the service is structured.

1.3 SafetyNET is a service of INMARSAT's enhanced group call (EGC) system and was specifically designed for promulgation of maritime safety information (MSI) as a part of the global maritime distress and safety system (GMDSS). The EGC system (technically a part of the Standard-C system) provides an automatic, global method of broadcasting MSI to all ships in both fixed and variable geographical areas or to predetermined groups of ships.

1.4 SafetyNET meets international requirements for broadcasting area, regional or local navigational warnings, meteorological warnings and forecasts, chart correction services and shore-to-ship distress alerts. It is designed with the capability to provide services within the coverage areas of geostationary maritime communications satellites (approximately between 75°N and 75°S). In addition to providing service to ships operating in sea area A3, it also provides the means of disseminating MSI to coastal waters not covered by NAVTEX on 518 kHz.

1.5 SafetyNET offers the ability to direct a call to a given geographical area. The area may be fixed, as in the case of a NAVAREA or weather forecast area, or it may be uniquely defined by the originator. This will be useful for messages, such as a local storm warning or a shore-to-ship distress alert, for which it is inappropriate to alert ships in an entire ocean region. The general EGC system capabilities are shown in figure 2.

1.6 SafetyNET messages can be originated by a registered information provider anywhere in the world and broadcast to the appropriate ocean area via an INMARSAT Standard-C coast earth station. Messages are broadcast according to their priority, i.e. distress, urgent, safety, and routine.

1.7 Aboard ship, SafetyNET messages are received through any one of a number of type-approved equipment.

2 DEFINITIONS

2.1 Coast earth station (CES): A land station in the INMARSAT satellite communications system which provides inter-connection between the satellite and shore systems such as telex and telephone.

2.2 Enhanced group call (EGC): The system for broadcasting messages via the mobile satellite communications system operated by INMARSAT. EGC is a part of the Standard-C system and supports two services: SafetyNET and FleetNET. (SafetyNET receiving capability is part of the equipment which is required to

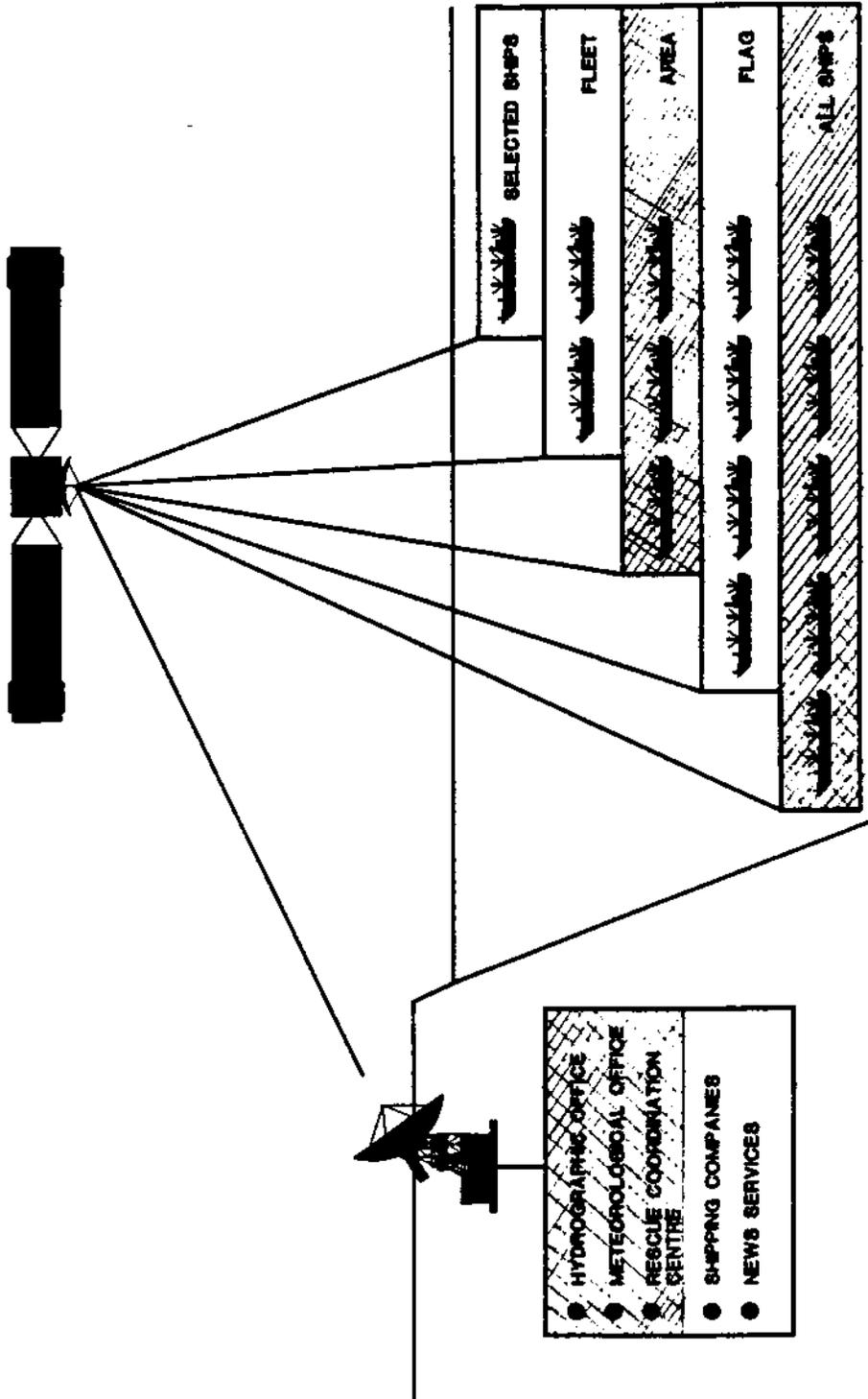


Figure 2 - Basic concept of the INMARSAT enhanced group call system
The shaded area indicates functions of the SafetyNET Service.

be carried in certain ships under the provisions of regulation 7.1.5 of chapter IV of the 1988 amendments to the International Convention for the Safety of Life at Sea (SOLAS), 1974).

2.3 FleetNET: A commercial service for the broadcast and automatic receipt of fleet management and general public information by means of direct-printing through INMARSAT's enhanced group call system.

2.4 International NAVTEX service: The system for the co-ordinated broadcast and automatic reception of MSI by means of narrow-band direct-printing telegraphy on 518 kHz, using the English language*. (NAVTEX receiving capability is part of the equipment which is required to be carried in certain ships under the provisions of regulation IV/7.1.4 of the 1988 amendments to the International Convention for the Safety of Life at Sea (SOLAS), 1974.)

2.5 International SafetyNET services: The co-ordinated broadcast and automated reception of MSI via the INMARSAT enhanced group call system using the English language to meet the requirements of the SOLAS Convention.

2.6 Maritime safety information (MSI): Navigational and meteorological warnings, meteorological forecasts and other urgent safety related messages.

2.7 National SafetyNET services: The broadcast and automated reception of MSI via the INMARSAT enhanced group call system, using languages as decided by the Administration concerned.

2.8 Network co-ordination station (NCS): A land station in the INMARSAT satellite communications system which controls channel assignments and other communications functions through a satellite for an entire ocean region.

2.9 Sea area A1: An area within the radiotelephone coverage of at least one VHF coast station in which continuous DSC** alerting is available, as may be defined by a Contracting Government.

2.10 Sea area A2: An area, excluding sea area A1, within the radiotelephone coverage of at least one MF coast station in which continuous DSC** alerting is available, as may be defined by a Contracting Government.

2.11 Sea area A3: An area, excluding sea areas A1 and A2, within the coverage of an INMARSAT geostationary satellite in which continuous alerting is available.

2.12 Sea area A4: An area outside sea areas A1, A2 and A3.

* Reference is made to the NAVTEX Manual approved by the Organization.

** "Digital selective calling (DSC)" means a technique using digital codes which enables a radio station to establish contact with, and transfer information to, another station or group of stations, and complying with the relevant recommendations of the International Radio Consultative Committee (CCIR).

2.13 SafetyNET: An international service for the broadcast and automatic reception of MSI by means of direct-printing through INMARSAT's enhanced group call system.

2.14 Ship earth station (SES): A mobile earth station in the maritime mobile-satellite service located aboard a ship.

2.15 Standard-A: A satellite communications system for transmission of voice, telex, facsimile or data using directional antennas in the INMARSAT satellite system.

2.16 Standard-C: A satellite communications system for telex or data messaging using small terminals and omni-directional antennas in the INMARSAT satellite system.

2.17 Registered provider: An authorized MSI provider which has an agreement with one or more CESS for providing SafetyNET broadcast information.

2.18 Rescue co-ordination centre (RCC): A unit responsible for promoting efficient organization of search and rescue services for co-ordinating the conduct of search and rescue operations within a search and rescue region.

3 GENERAL FEATURES OF THE ENHANCED GROUP CALL (EGC) SYSTEM

3.1 INMARSAT's EGC system is part of the Standard-C system and is complementary to the international NAVTEX service. The EGC system supports two services:

- .1 SafetyNET - for promulgation of MSI; and
- .2 FleetNET - for transmission of fleet management and general public information to fleets or groups of ships.

3.2 Virtually all navigable waters of the world are covered by the operational satellites in the INMARSAT system. Each satellite transmits EGC traffic on a designated channel. Any ship sailing within the coverage area of an INMARSAT satellite will be able to receive all SafetyNET messages broadcast over this channel. The EGC channel is optimized to enable the signal to be monitored by a small receive-only ship earth station which is dedicated to the reception of EGC messages. This capability can be built into other standard ship earth stations. It is a feature of satellite communications that reception is not generally affected by the position of the ship within the ocean region, atmospheric conditions or time of day.

3.3 Messages can be transmitted either to geographical areas (area calls) or to groups of ships (group calls):

- .1 Area calls can be to a fixed geographical area, such as one of the 16 NAVAREAS (figure 3) or to a temporary geographic area selected by the originator. Area calls will be received automatically by any ships whose receiver has been set to one or more fixed areas or recognizes a temporary area by the geographic position.
- .2 Group calls will be received automatically by any ship whose receiver acknowledges the unique group identity associated with a particular message.

3.4 Reliable delivery of messages is ensured by forward error correction techniques. Sea trials have demonstrated that the transmission link is generally error free and low error reception is achieved under normal circumstances.

4 OPERATION OF THE INTERNATIONAL SafetyNET SERVICE

4.1 Given the whole ocean coverage by a satellite channel, some form of discrimination and selectivity in printing the various messages is required. Area calls will be received by all ships within the ocean region coverage of the satellite. They will be printed only by those receivers which recognize the fixed area or the geographical position in the message. The message format includes a preamble which will enable the microprocessor in a ship's receiver to decide to print only those MSI messages which relate to present position, intended route, or to fixed areas programmed by the operator.

4.2 As each message will also have a unique identity, the printing of messages already received correctly can be automatically suppressed.

4.3 Reception of certain types of messages, such as shore-to-ship distress alerts and storm and navigational warnings, are mandatory and cannot be suppressed (refer to annex 2).

4.4 SafetyNET messages can be addressed to temporary geographic areas which may be circular (figure 4) or rectangular (figure 5) in shape. A circular area is described by a radius (in nautical miles) from a location specified in degrees of latitude and longitude. A rectangular area is described in degrees of latitude and longitude from the latitude and longitude of the south-west corner of the rectangle.

4.5 In the case of a ship in distress, the need exists to create a temporary geographic area to facilitate locating potential assisting ships. The most desirable approach might be to transmit a shore-to-ship distress alert to an area defined by the position of the casualty and a radius about the casualty. This can be done so that only those ships likely to be in the vicinity, potentially in position to help, are alerted. If no response is received from any ship at the first call, the area can, if necessary, be expanded in steps until an acknowledgement by one or more ships is received.

5 PROMULGATION OF MSI

5.1 MSI is promulgated by various information providers around the world. Messages for transmission through the SafetyNET service will, in many cases, be the result of co-ordination between authorities. Information providers will be authorized to broadcast via SafetyNET by the International Maritime Organization, in accordance with the procedures in annex 9. Authorized information providers will be:

- .1 hydrographic offices for navigational warnings and electronic chart correction data;
- .2 national weather services for meteorological warnings and forecasts;

- .3 rescue co-ordination centres for shore-to-ship distress alerts and other urgent information; and
- .4 the International Ice Patrol for North Atlantic ice hazards.

5.2 Broadcasts of MSI in the international SafetyNET service will be in English; however, there is often a requirement for broadcasts also to be made in other languages.

5.3 Messages include instructions to the CES for processing the messages in the form of a special address header which consists of 5 "C" codes, as described below (see annex 6):

- C1 is priority code - 1 digit
(Distress, urgency, safety, routine)
- C2 is service code - 2 digits
(e.g. Meteorological forecast, etc.)
- C3 is address - 11 digits or less
(e.g. Meteorological warning to circular area)
- C4 is repetition rate - 2 digits
(e.g. Transmit once on receipt)
- C5 is presentation code - 2 digits
(e.g. International alphabet number 5 odd parity)

5.4 SafetyNET messages are stored at the coast earth station until transmitted the appropriate number of times, as specified by the C4 code.

5.5 The originator may also cancel a message before the desired number of repetitions have been made by sending an appropriate cancellation message to the CES. Examples of SafetyNET messages are in annex 4.

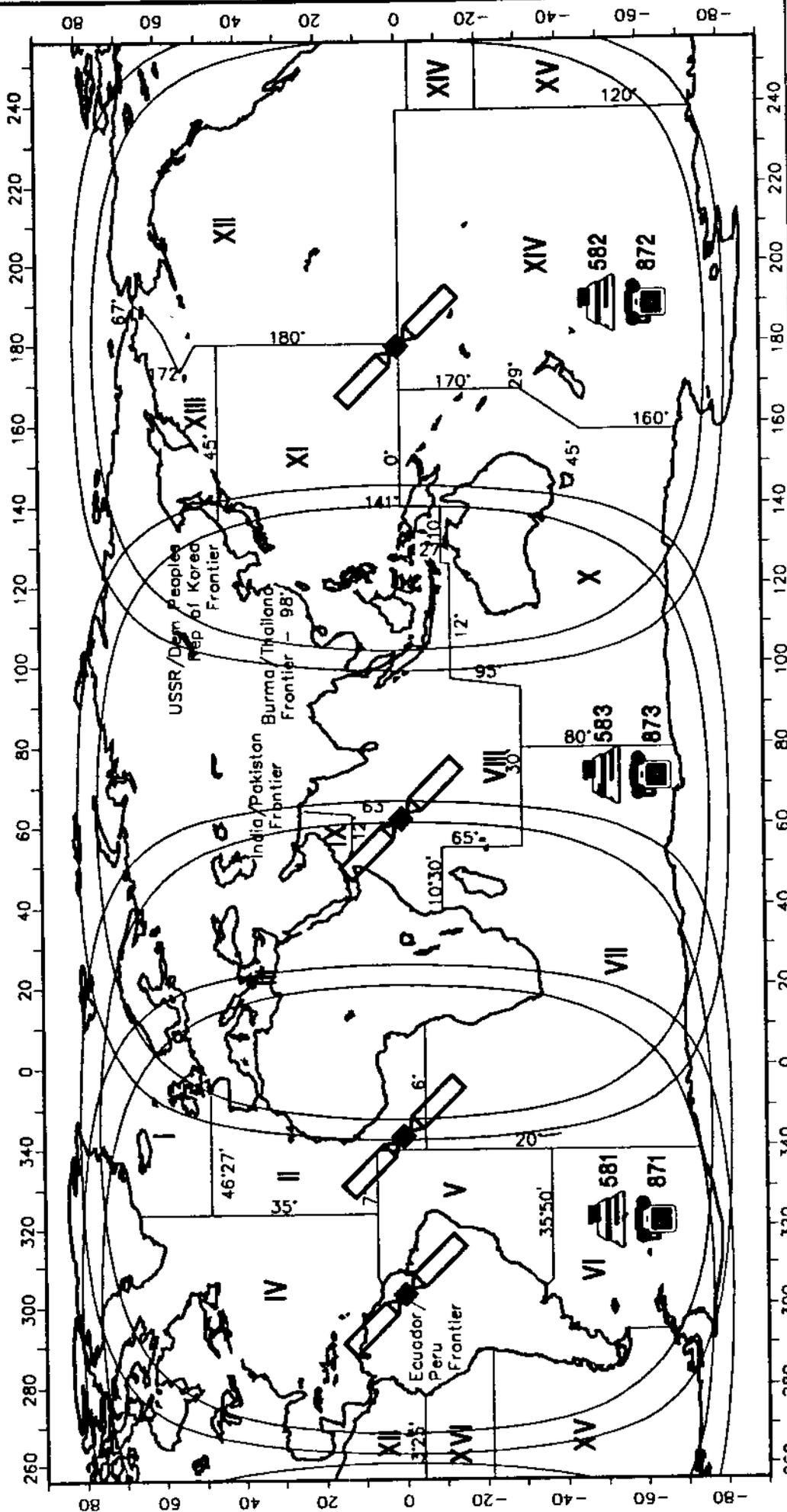
5.6 Messages destined for satellite coverage overlap areas and intended to be transmitted through two satellites to ensure they are received by all intended ships (which may be working through either satellite) are sent to two CESs, i.e. one CES in each ocean region.

5.7 In order to ensure the integrity of the MSI being received by mariners, it is necessary for MSI providers to monitor the broadcasts which they originate. Monitoring is especially important in a highly automated system which is dependent on careful adherence to procedure and format. This is to be accomplished by installation of an EGC receive facility ashore for use by each information provider:

- .1 to check that the message has been broadcast;
- .2 to confirm that the message is received correctly;
- .3 to ensure that cancellation messages are properly executed; and
- .4 to observe any unexplained delay in the message being broadcast.



INMARSAT GLOBAL COVERAGE SHOWING 0° & 5° ELEVATION CONTOURS



OCEAN REGION CODE (TELEX) OCEAN REGION CODE (TELEPHONE)
 SATELLITE LOCATION: AORE 18.5°W, IOR 83°W, POR 180°E, AORW 55°W

Figure 3

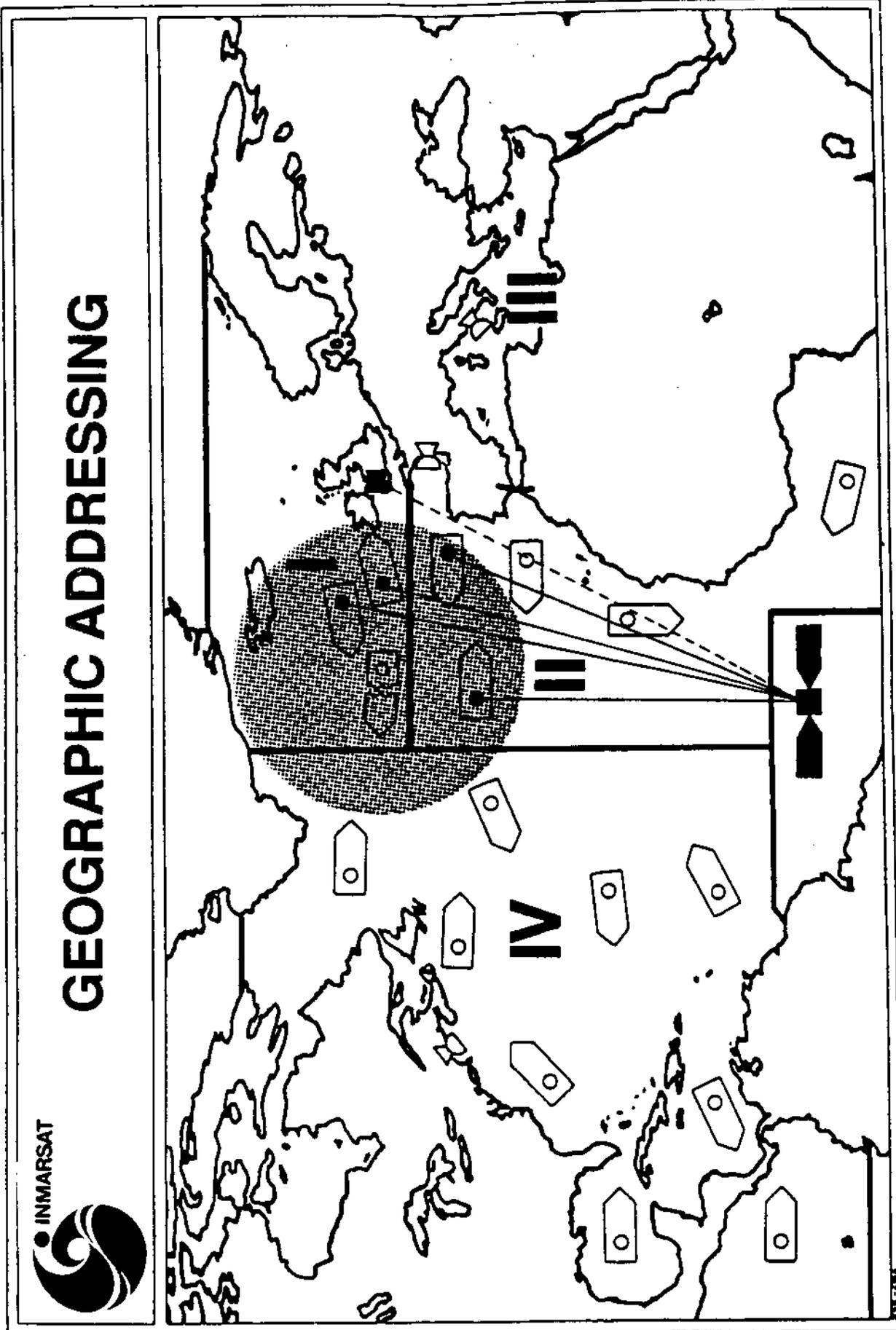


Figure 4 - Geographic Addressing

LOCAL AREA WARNING USING RECTANGULAR GEOGRAPHICAL ADDRESS

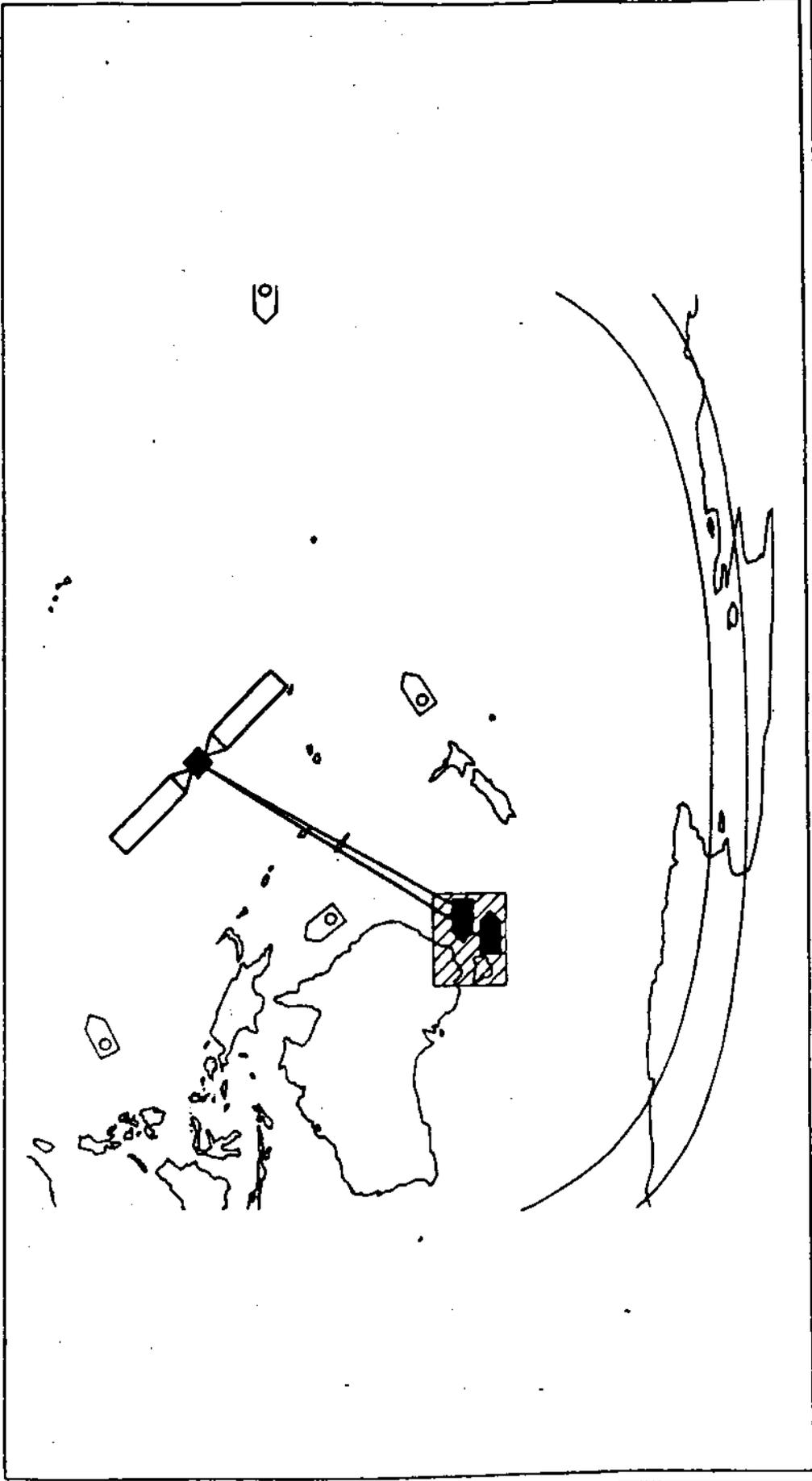


Figure 5

6 ACCESSING THE SafetyNET SERVICE

6.1 MSI messages are transmitted by telex, datalink or Standard-C to coast earth stations providing Standard-C services in accordance with national and international routing arrangements. Access to the SafetyNET service will be granted only to message originators authorized by IMO and registered with one or more Standard-C coast earth station (CES) operators.

6.2 Telex is the most common method for delivery of traffic to the CESs; however, some CESs will have the capability to receive data transmissions from intelligent micro computers using the X.25 (Packet Switching Protocol) and X.400 message handling standards.

6.3 Alternatively, a rescue co-ordination centre, hydrographic office or meteorological office, with the approval of the national licensing authority, may install a ship earth station (SES) on the premises to transmit SafetyNET messages to the serving Standard-C CES, which would then schedule the messages for transmission in the normal manner. The normal Standard-C communications charges will apply to this method of access, in addition to the EGC broadcast charges. Such an approach could prove particularly attractive to those originators located in countries without a CES, as potential delays and problems in the international terrestrial telecommunications networks could be avoided. It could also serve as an emergency back-up to normal terrestrial communications systems for urgent messages.

6.4 Computer software which can prepare messages for direct telex (and data) input to the EGC system is commercially available.

7 COAST EARTH STATION FUNCTION

7.1 Messages for transmission via the SafetyNET service are received and processed automatically. Because the system is automatic, it depends on accurate preparation of the traffic.

7.2 Messages are not reviewed for corruption or accuracy at the CES; therefore, the originator must take special care to adhere to the format specified in annex 6. It is for this reason that MSI providers must monitor the broadcasts that they originate.

7.3 Participating CES transmit SafetyNET messages over an interstation signalling link to the Ocean Region Network Co-ordination Station (NCS) for transmission over the broadcast channel (figure 1).

7.4 Messages will be queued at the CES according to priority and scheduled for retransmission according to instructions contained in the special address headers (C1 and C4); messages with the highest priority will be transmitted first. Shore-to-ship distress alerts will be broadcast first, followed by urgency, safety and then routine traffic. The originator of each message will specify in the message parameters the desired number of repetitions and the interval between transmissions.

8 BROADCAST CHANNEL CHARACTERISTICS

The modulation rate of the broadcast channel is 1,200 bits per second. Forward error correction is applied to this, creating an effective information transfer of 600 bits per second. (Rate 1/2 convolutional coding with interleaving is used to disperse error bursts which arise when deep fades are

present.) This ensures that there is a high probability of receiving a message correctly at the first transmission, irrespective of the atmospheric conditions or the ship's position within the satellite's coverage.

9 RECEIVING SafetyNET BROADCASTS

9.1 The basic requirements of the EGC receiver are that it shall continuously receive the broadcast channel (the Standard-C NCS common channel) and process the messages being transmitted through the satellite.

9.2 Although the receiver receives all SafetyNET messages on the broadcast channel, it incorporates a microprocessor which can be programmed to reject messages for printing automatically for example:

- .1 messages concerning subject matter of no relevance to the ship; and
- .2 messages directed to absolute geographic areas (rectangular or circular) which do not include the ship's position.

9.3 Messages which have been rejected will not be printed. The receiver also inhibits the multiple printing of correctly received messages. It is not possible to reject mandatory ALL SHIP messages such as shore-to-ship distress alerts. When a distress message is received an alarm will be given.

9.4 Although reception of SafetyNET traffic is automatic, the shipboard operator must set up the receiver properly at the start of the voyage:

- [.1 Selection of the appropriate broadcast channel (this may be an automatic function). In an area of overlap of coverage from two ocean region satellites, the operator must elect to receive SafetyNET traffic from only one satellite. In the case of NAV Warnings, this selection is made according to the table of which ocean region satellites are used for each NAVAREA, as follows:

table to be developed by IHO and WMO].

- .2 The identification code of fixed geographical areas, i.e. NAVAREAS and meteorological forecast areas, for which it is desired to receive MSI information, must be put into the receiver.
- .3 The ships position must also be keyed-in at periodic intervals or automatically provided through an interface with the ship's electronic position fixing system. It is recommended that the ship's position in the receiver be updated at least every 4 hours. If the ship's position has not been updated for more than 12 hours, all geographically addressed messages with priorities higher than routine within the entire ocean region will be printed out.

9.5 It is recommended that, in order to ensure that all necessary MSI is available before sailing, the EGC receiver remain in operation while the ship is in port.

9.6 If the ships EGC receive facility is a class 2 Standard-C SES, only MSI broadcasts through the satellite whose calling channel is being monitored by the SES will be received. Therefore, the class 2 Standard-C SES must monitor the calling channel of the appropriate satellite, as listed in section 9.4.1.

9.7 If the ship's EGC receive facility shares a directional antenna with an INMARSAT SES (e.g. Standard-A SES), only MSI broadcast through the satellite which is being tracked by the SES will be received. Therefore, the SES antenna must track the appropriate satellite, as listed in section 9.4.1.

10 CHARGES FOR SafetyNET SERVICES

10.1 There are no charges to the mariner for receipt of SafetyNET messages.

10.2 Message transmission charges are set by national telecommunication administrations and coast earth stations offering EGC services.

10.3 MSI to be broadcast through the SafetyNET service is transmitted to the CES via telex, datalink or a Standard-A/Standard-C transmission, for which the normal charges will apply.

11 PLANNING SafetyNET SERVICES

11.1 Hydrographic, meteorological and search and rescue authorities planning to provide MSI to ships at sea should co-ordinate their plans with other national authorities, and with IHO, IMO and WMO.

11.2 Prospective information providers should contact IMO at an early stage for advice and to obtain authorization to broadcast via SafetyNET.

11.3 International co-operation in developing broadcasts of safety information will ensure the most effective and efficient services to mariners. Information providers should contact the operators of the CESs they desire to use for promulgation of information to their areas of responsibility in order to determine specific details for addressing messages, accessing the CES, charges and payment for services and any other matters with respect to providing MSI to mariners.

11.4 Questions concerning promulgation of MSI through the EGC SafetyNET service can be addressed to IMO at the address shown below. Questions concerning the operation of the INMARSAT system should be addressed to INMARSAT, 40 Melton Street, London NW1 2EQ, United Kingdom.

12 INFORMATION FOR MARINERS AND PUBLICITY

12.1 The widest publicity should be given to the establishment of SafetyNET services. National Administrations should ensure that mariners are informed of the establishment of SafetyNET services by inclusion of full details in Notices to Mariners and Lists of Radio Signals. In addition, full details of the services should be forwarded to:

.1 International Maritime Organization
4 Albert Embankment
London SE1 7SR;

.2 those authorities known to produce Lists of Radio Signals.

ANNEX 1

INTERNATIONAL SAFETYNET BROADCAST CO-ORDINATING PANEL

Terms of reference and method of work

1 Terms of reference

To co-ordinate the development and use of the International SafetyNET Service, and in particular to:

- .1 develop operating methods for the effective use of the SafetyNET Service, including consideration of the need for scheduled broadcasts;
- .2 develop documentation in support of the SafetyNET service, in particular the International SafetyNET Manual;
- .3 co-ordinate tests and trials of SafetyNET services leading to the introduction of a fully operational international service by 1 February 1992;
- .4 advise coast earth station (CES) operators and potential Registered Information Providers on all aspects of the service, including system access and effective operation;
- .5 develop criteria and establish means for the approval and registration of potential information providers;
- .6 co-ordinate the Registration of Potential Information Providers; and
- .7 promote a proper understanding of the benefits and use of the International SafetyNET Service among the wider maritime community.

2 Contact address

The International SafetyNET Broadcast Co-ordinating Panel can be contacted at the following addresses:

Chairman, International SafetyNET Broadcast Co-ordinating Panel
International Maritime Organization
4 Albert Embankment
London SE1 7SR
United Kingdom

Telephone: 071-735 7611
Telex: 23588 IMOLDN G
Fax: 071-5873210;

or

Chairman, International SafetyNET Broadcast Co-ordinating Panel
Hydrographic Department
Ministry of Defence
Taunton, Somerset TA1 2DN
United Kingdom

Telephone: 0823-337900, Extension 533
Telex: 46274 NAVHYD G
Fax: 0823 284077

3 Method of work

Panel membership is open to all IMO Member Governments, ITU, WMO, IHO and INMARSAT and works only by correspondence.

ANNEX 2

IMO ASSEMBLY RESOLUTION A.664(16)

PERFORMANCE STANDARDS FOR ENHANCED
GROUP CALL EQUIPMENT

1 Introduction

1.1 The enhanced group call equipment to be used in the INMARSAT system should comply with the general requirements set out in Assembly resolution A.569(14) and the following minimum performance requirements.

1.2 The equipment should be capable of producing a printed copy of received information. Received EGC messages may be stored, with indication that the message has been received, for later printing, except for the vital messages referred to in paragraphs 3.2 and 3.5, which should be printed out upon receipt.

1.3 The enhanced group call installation may be either separate or combined with other installations.*

2 Technical requirements

The equipment should be type-approved by INMARSAT and should comply with the environmental conditions specified in the INMARSAT technical requirements for the enhanced group call receiver.

3 Operation

3.1 Means should be provided to enter the ship's position and area code manually so that area group calls can be received. Optionally, the ship's position, as determined by the navigational equipment, may be entered automatically and the area code automatically derived therefrom.

3.2 Provision should be made for a specific aural alarm and visual indication at the position from which the ship is normally navigated to indicate receipt of a distress or urgency call or a call having distress category. It should not be possible to disable this alarm and it should only be possible to reset it manually.

3.3 The equipment should indicate when it is not correctly tuned or synchronized to the enhanced group call carrier.

3.4 Any message should be printed regardless of the character error rate of its reception. The equipment should print a low line mark if a character is received mutilated.

* Elements of other installations, e.g. the antenna, low noise amplifier and down-converter of the ship earth station, may be shared for the reception of enhanced group call messages.

3.5 Acceptance or rejection of service codes* should be under the operator's control except that equipment should be unable to reject relevant navigational warnings, meteorological warnings, search and rescue information and certain special warnings, which are directed to a geographical area within which the ship is operating.

3.6 Means should be provided not to reprint the same message after it has been received without error.

3.7 The printing device should be capable of printing at least the Standard IA Number 5 character set. Other character sets are optionally used according to ISO 2022 or CCITT Recommendation T.61.

3.8 The printing device should be able to print at least 40 characters per line.

3.9 The signal processor and printing device should ensure that if a word cannot be accommodated in full on one line, it should be transferred to the next line. The printing device should automatically feed five lines after completing the printed messages.

4 Power supply

4.1 The enhanced group call equipment should normally be powered from the ship's main source of electrical energy. In addition, it should be possible to operate the enhanced group call equipment, and all other equipment necessary for its normal functioning, from an alternative source of energy.

4.2 Changing from one source of supply to another, or any interruption of up to 60 s duration of the supply of electrical energy, should not require the equipment to be manually re-initialized and should not result in loss of received messages stored in the memory.

5 Antenna siting

5.1 Where an omnidirectional antenna is used, it is desirable that the antenna be sited in such a position that no obstacle likely to degrade significantly the performance of the equipment appears in the fore and aft directions down to -5° and in the port and starboard directions down to -15° .

5.2 Where a stabilized directive antenna is used, it is desirable that the antenna be sited in such a position that no obstacle likely to degrade significantly the performance of the equipment appears in any azimuth down to -5° .

* The meaning of the service codes is the same as for the NAVTEX system (see CCIR Recommendation 540 and the NAVTEX Manual).

5.3 For omnidirectional antennas, objects, especially those within 1 m of the antenna which cause a shadow sector of greater than 2° , are likely to degrade significantly the performance of the equipment.

5.4 For directive antennas, objects, especially those within 10 m of the antenna which cause a shadow sector of greater than 6° , are likely to degrade significantly the performance of the equipment.

ANNEX 3

THE INMARSAT SYSTEM

1 There are three essential components of the INMARSAT system:

- the INMARSAT space segment - the satellites and their ground support facilities - planned by INMARSAT and funded by its Signatories (participating national communications authorities);
- the coast earth stations (CESs) which provide an interface between the space segment and the national and international fixed telecommunications networks and which are generally funded, and operated by Signatories; and
- the ship earth stations (SEs) - the satellite communications terminals which are purchased or leased by individual ship owners/operators.

2 Shore-to-ship communications are in the 6 GHz band (C-band) from the CES to the satellite and in the 1.5 GHz band (L-band) from satellite to ship. Ship-to-shore communications are in the 1.6 GHz band from the ship to the satellite and in the 4 GHz band (C-band) from satellite to CES.

3 The Space Segment

3.1 To provide its space segment for global coverage, INMARSAT employs satellite capacity leased under contract from three organizations:

- the European Space Agency (ESA) for the lease of two MARECS spacecraft;
- the International Telecommunications Satellite Organization (INTELSAT) for maritime communications sub-systems (MCS) on three INTELSAT V satellites, and
- the COMSAT Systems Division for the lease of three Marisat satellites in the three ocean regions for contingency back-up purposes.

3.2 This space segment provides a minimum of one operational and one spare satellite over each of the four main ocean regions with the exception of the polar regions above 75° latitude, which cannot be seen by geostationary satellites.

3.3 The INMARSAT Operations Control Centre (OCC), at the London Headquarters, functions around-the-clock co-ordinating activities of the satellite technical control centres, operated by the three space segment suppliers, and the coast earth stations. The OCC also commissions ship earth stations wishing to operate within the INMARSAT system.

3.4 INMARSAT, has purchased 4 new satellites, with an option for a further 5, from a consortium of companies headed by British Aerospace Dynamics Group. The first of these INMARSAT-2 satellites is expected to be delivered for launching in 1990. The succeeding satellites will then be delivered and launched at periodic intervals. These new satellites will have over three times the capacity of the existing satellites and will also cover 3 MHz of the aeronautical mobile-satellite "R" band, in addition to covering the whole of the maritime L-band allocation.

4 Coast earth station (CES)

The INMARSAT system is connected into the world-wide telecommunications networks via Signatory-owned CESs. Many of these coast earth stations provide Standard-C/EGC services. The wide spread of CESs around the world offers the prospect of reduced land-line and hence reduced message charges.

5 Ship earth station (SES)

5.1 Typical Standard-A SES above-deck equipment includes a steerable antenna mounted on a stabilized platform to enable the antenna to be kept pointed towards the satellite. It is enclosed within a protective radome. Below-deck equipment consists of a telephone, teleprinter and associated electronics. EGC receive capability can be added, as an option, by the manufacturer.

5.2 Standard-C/EGC ship earth stations are small, lightweight terminals, with small omni-directional antennas, for providing message-type services. EGC receive capability is included in the software of class 2 Standard-C SESs. The main electronics unit is approximately H x W x D, 75mm x 215mm x 280mm and weighs only a few kilograms. Interfaces via RS232 ports are provided for a personal computer or any other data terminal equipment device for message generation and display. The antenna is small and light enough to be installed high on the mast of any ship or boat; some manufacturers limit the cable length between antenna and below deck equipment to 35 m.

5.3 Stand-alone EGC receivers provide the capability to receive SafetyNET and FleetNET messages only; there is no transmit capability for sending outgoing messages. The EGC antenna is identical to a Standard-C antenna.

5.4 The technical requirements of all classes of equipment are found in annex 7.

ANNEX 4

OPERATIONAL GUIDANCE

- (1) Navigational warning services
(To be developed by IHO)
- (2) National weather services
(To be developed by WMO)
- (3) Search and rescue services
(To be developed by LSR Sub-Committee)
- (4) Chart correction services
(To be developed)

Note: This annex will include message formats and examples.

ANNEX 5

PROCEDURE FOR AMENDING THE SafetyNET MANUAL

1 Proposed amendments to the SafetyNET Manual should be submitted to the IMO Maritime Safety Committee for evaluation.

2 The agreement of the International Hydrographic Organization, INMARSAT and the World Meteorological Organization, and the active participation of other bodies, should be sought according to the nature of the proposed amendments.

3 When the proposals for amendment have been examined in substance, the Maritime Safety Committee will entrust the Sub-Committee on Radiocommunications with the ensuing editorial tasks.

ANNEX 6

MESSAGE ADDRESSING

1 Addressing for the SafetyNET message

1.1 Introduction

This section describes the method by which International SafetyNET service messages are transmitted to coast earth stations by information providers for subsequent transmission over the satellite system. The format in which they are transmitted is also described.

1.2 Routing of Messages

An information provider wishing to have an EGC message transmitted via the Standard-C system will use an appropriate terrestrial or satellite service, telex or packet network to gain access to the required coast earth station. CCITT Rec. F.127 describes the operational procedures.

1.3 Addressing of EGC packets

After having gained access to the coast earth station, the information provider must give EGC packet address information so that the ships in the right areas receive the EGC messages. The EGC packet address information is sent by the information provider by means of a special message header at the beginning of messages that are required to be transmitted. These message headers will consist of 5 special codes called C codes. The 5 codes may be prefixed by additional characters to indicate that the message is an EGC transmission.

The following generalized message header format using C codes shall be adopted by all information providers:

C codes transmitted to the coast earth station are: C₁: C₂: C₃:
C₄: C₅:

Where

C ₁	is the priority code	- 1 digit
C ₂	is the service code	- 2 digits
C ₃	is the address	- up to 11 digits
C ₄	is the repetition rate	- 2 digits
C ₅	is the presentation code	- 2 digits

A digit in this context means an alpha-numeric character.

The meanings of the C codes is explained in the next sections, but for illustration purposes an example is given below:

An incoming EGC telex:

2:42:012:11:05 (the C code message header)
0245 UTC
Gale Warning depression expected over SE England 1200 GMT.
South-westerly gale force 8 imminent in sea area Dover

This example code is for urgent priority ($C_1 = 2$) EGC call containing a WMO type Meteorological Warning ($C_2 = 42$) to Region 12 ($C_3 = 012$) which will be repeated 6 minutes ($C_4 = 11$) after the initial transmission. The text is transmitted in International Alphabet 5. ($C_5 = 05$).

Each of the C codes shall be delimited by the character combination number 3(:) CCITT Alphabet No. 2.

1.3.1 Priority codes (C_1)

Format as received at coast earth station - 1 digit.

The C_1 code is used to indicate to the coast earth station the level of priority needed for the message's transmission. The priority number is given in ascending order as follows:

- 0 Routine
- 1 Safety
- 2 Urgent
- 3 Distress

1.3.2 Service codes (C_2)

Format as received at coast earth station - 2 digits.

A C_2 code is adopted that will explicitly indicate to the EGC receiver the length of the address it will need to decode during message processing. The presently allocated service codes are described below together with the length of the EGC packet address in bytes and the number of digits in the C_3 code; 64 service codes are available.

- (a) 00 All Ships Call
C₃ code 00
- (b) 04 Meteorological Warnings to Rectangular Areas
C₃ Code - 11 digits
- (c) 11 Inmarsat System Message
C₃ Code - 2 digits
- (d) 13 NAVTEX Re Broadcasts
C₃ Code - 4 digits
- (e) 14 Shore Ship Distress Alert to circular addresses
C₃ Code - 10 digits
- (f) 22 WMO Meteorological Forecasts
C₃ Code - 3 digits
- (g) 24 Meteorological Warning to Circular Areas
C₃ Code - 10 digits
- (h) 31 Navarea Warnings
C₃ Code - 2 digits

ANNEX 6

MESSAGE ADDRESSING

1 Addressing for the SafetyNET message

1.1 Introduction

This section describes the method by which International SafetyNET service messages are transmitted to coast earth stations by information providers for subsequent transmission over the satellite system. The format in which they are transmitted is also described.

1.2 Routing of Messages

An information provider wishing to have an EGC message transmitted via the Standard-C system will use an appropriate terrestrial or satellite service, telex or packet network to gain access to the required coast earth station. CCITT Rec. F.127 describes the operational procedures.

1.3 Addressing of EGC packets

After having gained access to the coast earth station, the information provider must give EGC packet address information so that the ships in the right areas receive the EGC messages. The EGC packet address information is sent by the information provider by means of a special message header at the beginning of messages that are required to be transmitted. These message headers will consist of 5 special codes called C codes. The 5 codes may be prefixed by additional characters to indicate that the message is an EGC transmission.

The following generalized message header format using C codes shall be adopted by all information providers:

C codes transmitted to the coast earth station are: C₁: C₂: C₃:
C₄: C₅:

Where

C ₁	is the priority code	- 1 digit
C ₂	is the service code	- 2 digits
C ₃	is the address	- up to 11 digits
C ₄	is the repetition rate	- 2 digits
C ₅	is the presentation code	- 2 digits

A digit in this context means an alpha-numeric character.

The meanings of the C codes is explained in the next sections, but for illustration purposes an example is given below:

An incoming EGC telex:

2:42:012:11:05 (the C code message header)
0245 UTC
Gale Warning depression expected over SE England 1200 GMT.
South-westerly gale force 8 imminent in sea area Dover

- (i) 34 WMO Meteorological Forecasts (rectangular)
C₃ Code - 11 digits
- (j) 42 WMO Meteorological Warnings
C₃ Code - 3 digits
- (k) 72 Chart Correction Services
C₃ Code - 7 digits

1.3.3 Addresses (C₃)

The methods that information providers will use to transmit the EGC packet addresses are given below for each service type described in section 1.3.2.

1.3.3.1 Service Code 00

Name of Service - All Ships Call:

Description - used to address messages to all ships in the region.

1.3.3.2 Service Code 04

Name of Service - Meteorological Warning to Rectangular Areas:

C₃ Code - 11 digits.

Description - rectangular addresses will consist of 11 numbers received at the CES. These are as follows:

D₁ D₂ N or S (3 characters) - Latitude of south-west corner of the rectangle in degrees and whether east (E) or west (W) of the prime meridian.

If the longitude is less than 100° then the notation 085, for example, should be used.

D₆ D₇ (2 characters) Extent in degrees of rectangle in latitude (northings).

D₈ S₉ (2 characters) Extent in degrees of rectangle in longitude (eastings).

e.g. 12S124E1010

A rectangle whose southwest corner is 12 S and 124 E. The extent of the rectangle is 10° north and 10° east.

1.3.3.3 Service Code 11

Name of Service - Inmarsat System Message:

C₃ Code - 2 digits

Description - This service is used to address EGC receivers under the following categories:

00	all users
01	AOR east
02	AOR west
03	POR
04	IOR
05	Standard A users only
06	Standard B users only
07	Standard C users only

1.3.3.4 Service Code 13

Name of Service - NAVTEX Re Broadcasts:

C₃ Code - 4 digits

Description - The Navarea X₁ and X₂ codes and the Navtex B₁ and B₂ codes are transmitted to the CES as 4 characters. The order of transmission is X₁, X₂, B₁ and B₂.

The following is a list of the B₁ and B₂ codes:

B₁ is a character identifying the NAVTEX transmitter coverage area.

B₂ is a unique character for each type of message as follows:

A:	Navigational warnings
B:	Meteorological warnings
C:	Ice reports
D:	Search and rescue information
E:	Meteorological forecasts
F:	Pilot service messages
G:	DECCA messages
H:	LORAN messages
I:	OMEGA messages
J:	SATNAV messages
K:	Other electronic navaid messages
L:	Additional navigational warnings
Z:	QRU (no message on hand)

1.3.3.5 Service Code 14

Name of Service - Shore Ship Distress Alert:

C₃ Code - 10 digits

Description - Circular address will consist of 10 numbers as follows:

D₁ D₂ N or S (3 characters) - Latitude of centre in degrees and whether north (N) or south (S). The notation 08 should be used for latitudes less than 10°.

D₃ D₄ D₅ E or W (4 characters) - Longitude of centre in degrees and whether east (E) or west (W) of the prime meridian. The notation 085 should be used for longitudes less than 100°.

M₁ M₂ M₃ (3 characters) - Radius of circle in nautical miles. Up to 999 NMs.

e.g. 56N034W010
Centre of circle is 56 N 034 W
Radius of circle 10 nautical miles.

1.3.3.6 Service Code 22

Name of Service - WMO Meteorological Forecasts:

C₃ Code - 3 digits
Description - Up to 999 WMO areas can be addressed.

1.3.3.7 Service Code 24

Name of Service - Meteorological Warnings to Circular areas:

C₃ Code - 10 digits
Description - see 1.3.3.6 for description of circular addressing.

1.3.3.8 Service Code 31

Name of Service - Navarea Warnings:

C₃ Code - 2 digits
Description - up to 99 Navareas can be addressed.

1.3.3.9 Service Code 34

Name of Service - WMO Meteorological Forecasts (rectangular):

C₃ Code - 11 digits
Description - see 1.3.3.3. for description of rectangular address.

1.3.3.10 Service Code 42

Name of Service - WMO Meteorological Warnings:

C₃ Code - 3 digits
Description - Up to 999 WMO Meteorological areas can be addressed.

1.3.4 Repetition Codes (C₄)

Format as received at coast earth station - 2 digits. The C₄ repetition codes are divided into 2 categories:

Category (a) for messages that are required to be repeated a finite number of times; and

Category (b) for messages that are required to be repeated at specified intervals until cancelled by the information provider.

1.3.4.1 Category (a) repetition codes

- 01 transmit once on receipt
- 11 transmit on receipt followed by repeat 6 minutes later
- 61 transmit 1 hour after initial broadcast (twice)
- 62 transmit 2 hours after initial broadcast (twice)
- 63 transmit 3 hours after initial broadcast (twice)
- 64 transmit 4 hours after initial broadcast (twice)
- 66 transmit 12 hours after initial broadcast (twice)
- 67 transmit 24 hours after initial broadcast (twice)
- 70 transmit 12 hours after initial broadcast then 12 hours after the second broadcast (three times)
- 71 transmit 24 hours after initial broadcast then 24 hours after the second broadcast (three times)

Note: Other codes may be offered by CES operators.

1.3.4.2 Category (b) repetition codes

The following repetition codes are not mandatory but indicate the wishes of the MSI providers.

A category (b) repetition code allows a message to be repeated indefinitely or until cancelled by the message provider. The repetition period can be set at between 1 and 120 hours. In addition, each transmission can be echoed after a fixed period of 6 minutes.

The repetition codes are of the form $\langle \text{Multiplier} \times \text{Delay} \rangle$ where $\langle \text{Multiplier} \rangle$ specifies the number of delay periods between each broadcast and $\langle \text{Delay} \rangle$ is a fixed number of hours.

The Multiplier digit may be any digit from 1 to 5 as follows:

Multiplier

- 1 specified delay period between broadcasts
- 2 2 specified delay periods between broadcasts
- 3 3 specified delay periods between broadcasts
- 4 4 specified delay periods between broadcasts
- 5 5 specified delay periods between broadcasts

The Delay digit coding is as follows:

Delay

- 2 1 hour delay; no echo
- 3 1 hour delay; with echo
- 4 6 hours delay; no echo
- 5 6 hours delay; with echo
- 6 12 hours delay; no echo
- 7 12 hours delay; with echo
- 8 24 hours delay; no echo
- 9 24 hours delay; with echo

The various combinations are shown in the table below:

Multiplier						
Delay	1	2	3	4	5	Echo
2	1	2	3	4	5	no
3	1	2	3	4	5	yes
4	6	12	18	24	30	no
5	6	12	18	24	30	yes
6	12	24	36	48	60	no
7	12	24	36	48	60	yes
8	24	48	72	96	120	no
9	24	48	72	96	120	yes

Examples

- 1 Code 19 means "repeat broadcast every 24 hours with an echo 6 minutes after each broadcast"
- 2 Code 38 means "repeat broadcast every 72 hours with no echo"

1.3.4.3 Cancel facility

The MSI providers have indicated that a cancellation facility for messages transmitted to a CES with category (b) repetition codes is necessary.

An example of a cancel instruction is as follows:

"Cancel messages <Message Reference Number> at <Time>"
where <Message Reference number> is the number given to the message provider by the CES on receipt of the initial message and <Time> is of the form:

DDHHMM Z space MMM space YY

e.g. 2 1 1 4 3 0 Z F E B 88

If the Cancel instruction accompanies a broadcast message it will appear between the NNNN and ++++ characters as follows:

ZCZC
C₁:C₂:C₃:C₄:C₅
"Text"
CANCEL (Message Reference Number) at (Date/Time Group)
++++

Notes

- 1 Only the "text" is for transmission
- 2 When included with a message for broadcasting, the CES message cancellation instructions will appear between the NNNN and the +++ characters. There will only be one instruction to each line, but the facility to provide for more than one line of instructions is desirable.
- 3 If the cancellation instruction terminates after the Message Reference Number, i.e. the (Time/Date) is not included, then the instruction should be executed immediately.
- 4 It should also be possible for a Cancel instruction to be sent to the CES's Store and Forward unit.

1.3.5 Presentation codes (C₅)

The current allocation of presentation codes is as follows:

- 00 IA number 5 (IR.V version) odd parity
- 01 Katakana odd parity
- 02 Devnagiri odd parity
- 03 Arabic odd parity
- 04 Cyrillic odd parity
- 05 Greek odd parity
- 06 ITA 2
- 07 Data

ANNEX 7

RECEIVER SPECIFICATIONS

These technical requirements were prepared by INMARSAT for equipment manufacturers and have been extracted from the System Definition Manual (SDM) for the Standard-C Communications System (Release 1.3).

Enhanced group call (EGC) receiver facilities will be used by ships to which chapter IV of the 1988 SOLAS amendments apply as well as by ships not required to comply with the SOLAS Convention. It should be noted that EGC receiver facilities provided on ships to which the SOLAS Convention applies should comply with the performance standards for EGC equipment contained in annex 2.

MODULE 4 - SUPPLEMENT 1
TECHNICAL REQUIREMENTS FOR AN
ENHANCED GROUP CALL RECEIVER

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¹ The requirements of this section may be amended to comply with future recommendations of the IMO.

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1 INTRODUCTION

1.1 GENERAL

Enhanced Group Calls are a message broadcast service within the Standard-C Communications System. It allows terrestrial information providers to pass messages or data to mobile Enhanced Group Call (EGC) receivers, Class 2 or Class 3 SES's, or Standard-A and Standard-B SESs equipped with EGC receivers.

EGC messages are sent to Coast Earth Stations by shore based Information Providers using terrestrial facilities such as Telex. The messages are processed at the CES's, and forwarded to an NCS which transmits them on a NCS common channel.

There are two basic services offered by EGC; the SAFETYNET™ service and the FLEETNET™ service. SAFETYNET™ is a service provided primarily for the dissemination of maritime safety information, such as shore to ship distress alerts, weather forecasts and coastal warnings. FLEETNET™ is a commercial communication service allowing terrestrial information providers to send messages to pre-defined groups of subscribers.

Both the SAFETYNET™ and FLEETNET™ services make use of a flexible addressing techniques to allow the reception of messages from a variety of service providers depending on the particular requirements of the user. The SAFETYNET™ service utilizes a geographic area addressing technique to direct messages to ships within a defined boundary. The FLEETNET™ service employs closed user group and unique receiver addressing to provide secure transmission of messages from the terrestrial information provider to the desired service recipient(s).

1.2 PURPOSE AND SCOPE

An EGC receiver is defined as a single channel receiver with a dedicated message processor. SES Classes 2 and 3 provide an EGC capability in addition to shore-to-ship and ship-to-shore messaging capabilities as indicated in Figure S1.1 and defined in Module 4, Section 2.1. Other EGC receiver options are anticipated and are shown in Figure S1.2.

This document presents the technical requirements and recommendations for an Enhanced Group Call (EGC) receiver. These requirements must be satisfied before the equipment can be utilized in the INMARSAT system.

Procedures for type approval by INMARSAT of a manufacturer's design are provided in a complementary document entitled "Type Approval Procedures for INMARSAT Standard-C Ship Earth Stations".

This document defines the mandatory requirements for reception and processing of EGC messages transmitted on an NCS common channel. The purpose of these requirements is to ensure that all EGC receivers provide adequate performance. Requests for changes to or a waiver of the requirements described below, will be considered provided they can be justified as being consistent with the purpose of the document. Such requests should be forwarded to INMARSAT together with all substantiating details necessary to justify the request.

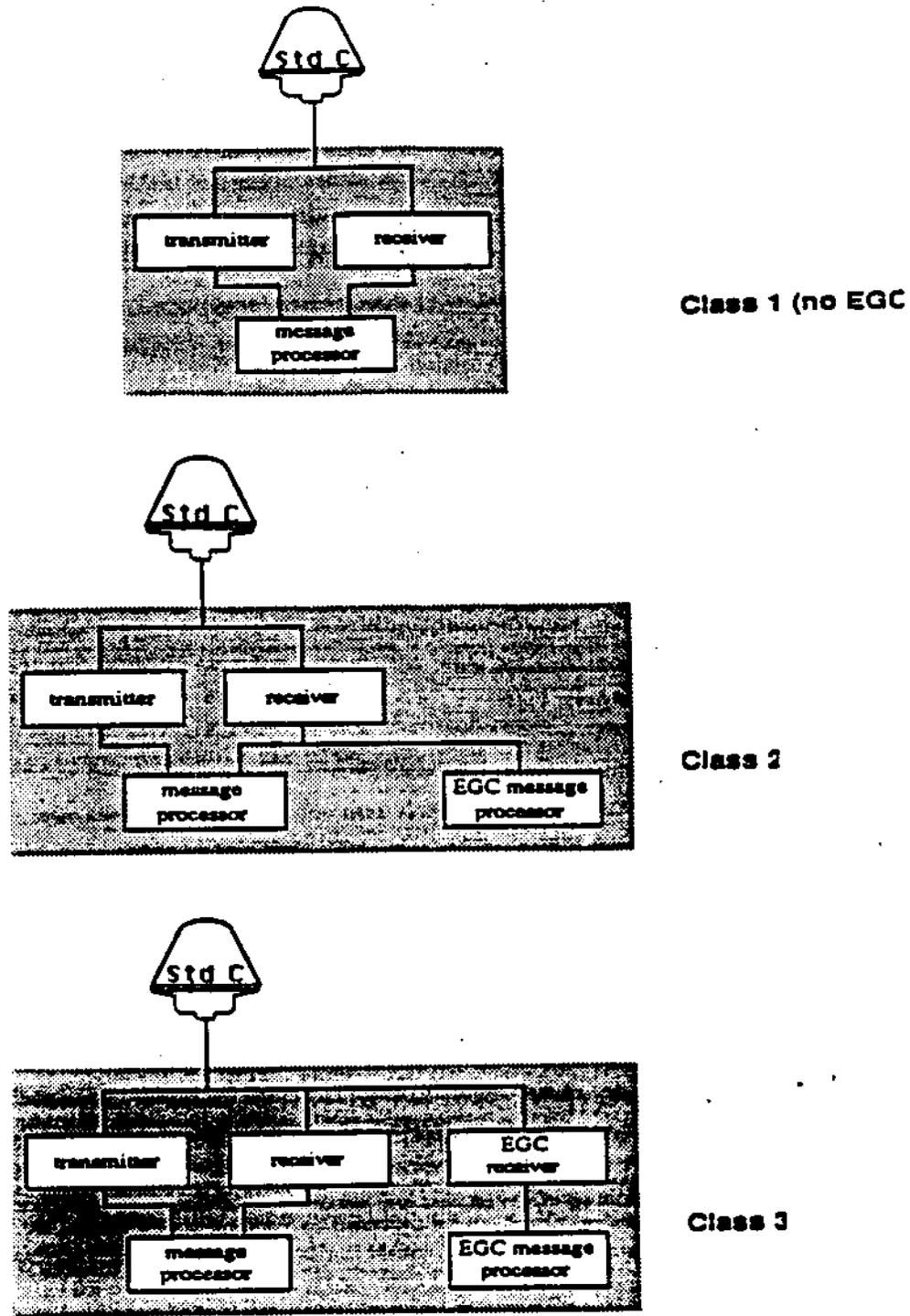
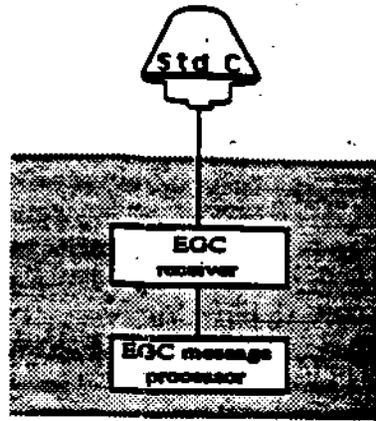
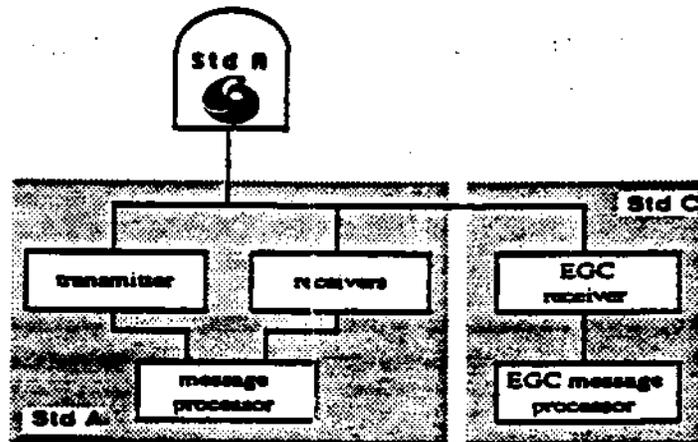


FIGURE S1.1 CLASSES OF SHIP EARTH STATIONS



Option 1
(standalone EGC receiver)



Option 2
(add-on to Standard A equipment)

FIGURE S1.2 EGC RECEIVER OPTIONS

1.3 RELATED DOCUMENTS

Designers of EGC receivers should familiarize themselves with the other Modules of the Standard C SDM.

A glossary of terms and a list of abbreviations used throughout the SDM is found at the end of Module 1. Reference should be made to this for clarification of terms and notation.

2 GENERAL REQUIREMENTS

2.1 MANDATORY CAPABILITIES

The mandatory capabilities of an EGC receiver are defined below.

- (a) Continuous reception of an NCS common channel and processing the information according to the EGC message protocol;
- (b) Automatic recognition of messages directed to fixed and absolute geographic areas and service codes as selected by the receiver operator;

Additional optional capabilities required for reception of FLEETNET™ service broadcasts are as follows:

- (c) Automatic recognition of uniquely addressed messages directed to a particular EGC receiver;
- (d) Automatic recognition of messages directed to a group of which the receiver operator subscribes to;
- (e) Automatic response to group ID updates directed to that EGC receiver, adding or deleting group IDs as commanded.

3 RF SUBSYSTEM REQUIREMENTS

3.1 GENERAL

The antenna and receiver requirements of Module 4 are applicable to a stand alone EGC receiver or an EGC receiver integrated with a Class 2 or Class 3 SES. The applicable Sections are as follows:

Section	Title
3.2	Antenna Requirements, Gain and Polarization
3.3.1	Gain-to-Noise Temperature Ratio
3.3.2	Received Signal Levels
3.3.3	Immunity to Out of Band Signals

3.2 EGC RECEIVER TUNING

The receiver shall be capable of being tuned to any channel in the band 1530.0 to 1545.0 MHz in increments of 5 kHz, starting at 1530.000 MHz and extending up to 1545.000 MHz.

3.3 NCS COMMON CHANNEL SELECTION

EGC receivers shall be equipped with facilities for storing up to 20 NCS channel numbers. Four of these will be permanently assigned global beam frequencies as follows:

NCS	NCS Common Channel	
	Channel No.	Frequency
AOR	[11080]	[1537.7 MHz]
POR	[12580]	[1541.45 MHz]
IOR	[10840]	[1537.1 MHz]
Spare	[TBD]	[TBD]

These four Channel numbers shall be stored in ROM and shall not be alterable.

The spare common channel will be transmitted in the event of interference on the nominated frequency.

The remaining list of up to 16 valid NCS common channel frequencies will be published by INMARSAT and will be assigned as expansion common channels. These shall be held in non-volatile, but alterable storage and be capable of operator alteration in the event that INMARSAT decides to update the frequency plan by adding, deleting or changing allocations.

4 RECEIVER PERFORMANCE

4.1 SHORE TO SHIP SIGNAL CHARACTERISTICS

The L-Band signal characteristics of the NCS common channel carrier at the surface of the earth are listed in Module 4, Section 4.1.

4.2 SHORE TO SHIP CHANNEL MODULATION CHARACTERISTICS

The modulation characteristics of the NCS common channel are listed in Module 4, Section 4.2.

The interleaving, encoding and scrambling techniques used are described in Module 3, Section 3.

4.3 RECEIVER SELECTIVITY

The attenuation versus frequency response of the receiver from the antenna port to the demodulator input shall comply with the limits shown in Figure 4-7 (Module 4).

4.4 DEMODULATOR PERFORMANCE

The output performance requirements specified in Section 4.5 below shall be met under the L-band signal parameters assumed to exist in the vicinity of the antenna and with the signal impairments, as given in Module 4, Section 4.4.

4.5 OUTPUT PERFORMANCE

The output performance shall be measured in terms of the packet error probability (PEP) under continuous reception conditions, where.

$$\text{PEP} = (\text{Total packets transmitted} - \text{total packets received correctly}) / \text{total packets transmitted.}$$

The limits for the maximum acceptable PEP for a range of unfaded power flux densities (PFD) at the antenna are as follows:

PFD (dBW/m ²)	PEP (128 byte packet)	PEP (48 byte packet)
-144.5	0.08	0.027
-144.0	0.040	.014
-143.5	0.02	0.007
-143.0	0.012	0.004
-142.5	0.004	0.002

NOTE: The power flux densities are assumed to be pure RHCP (0 dB axial ratio) at the antenna and correspond to the demodulator input C/No's given in Module 2, Section 3.2, Table 5 and assuming a receiver system G/T of -23 dB/K and 5° elevation.

5 MESSAGE PROCESSING REQUIREMENTS¹

5.1 GENERAL

This section describes the requirements and recommendations for the message processing subsystem of the EGC receiver.

¹ The requirements of this section may be amended to comply with future recommendations of the IMO.

Message processing will be based on the header field described in Module 3, Table 2 and Module 5, Section 9.

For messages with a double header, the two packets must be regarded as a single message and shall be treated in exactly the same manner as the individual packets of single header messages.

Messages shall not be printed until completely received, even in the case of multi-packet messages.

Acceptance or rejection of service code types shall be under operator control with the following exceptions:

- (a) Receivers shall always receive navigational warnings, meteorological warnings, SAR information and shore to ship distress alerts which are directed to a geographical area within which the receiver is situated.
- (b) Unique and group identities shall not be operator programmable;

5.2 EGC RECEIVER ADDRESSING

The five basic methods of addressing EGC receivers are:

- (i) All ships call;
- (ii) INMARSAT System Message Addressing;
- (iii) Group addressing;
- (iv) Unique addressing; and
- (v) Geographic Area addressing.

The type of address used in the header of an EGC packet is uniquely determined by the service code field.

5.2.1 EGC Receiver Unique Identities

The FLEETNET™ service provides a means of transmitting messages to both individual and selected groups of EGC receivers. These receivers will be allocated unique 24 bit identities by INMARSAT.

Unique identities are required for the reception of EGC System Messages (Service code 23) and for Download Group ID commands (Service code 33)

For further information regarding the allocation of these ID's, refer to "Type Approval Procedures for Standard-C Ship Earth Stations" and "Commissioning Procedures for Standard-C Ship Earth Stations".

5.2.2 EGC Receiver Group Identities

FLEETNET™ services such as Group calls are only available to receivers having 24 bit Group Identities. The facility for downloading the 24 bit group identities, which are allocated by INMARSAT, over the satellite link is available as part of the FLEETNET™ service using service code 33. The group IDs stored in the EGC receiver shall only be accessible via the RF path.

After reception of a downloading command, the receiver shall output the group name together with an indication that a group identity was added or deleted.

5.3.3 Geographic Area Addressing

Geographic area addressing refers to messages transmitted to ships in a particular area. The area may be expressed in terms of a fixed, pre-defined area such as the Navarea, WMO area or NAVTEX service coverage area, or in terms of an absolute geographic address expressed as latitudinal and longitudinal coordinates on the surface of the earth.

An absolute geographic area address is a representation of a closed boundary on the surface of the earth given in the address field of the message header. The receiver shall recognize two forms of absolute geographic addressing: rectangular and circular. Each form is specified in terms of an absolute position in latitude and longitude and further parameters which completely specify the boundary.

In order to process a geographic area address, the receiver must be programmed with the ship's current position. The position may be entered manually or automatically from an external radio navigation aid. See Section 6.4. It is recommended that the receiver provide notification to the operator when the position has not been updated for 4 hours. If the ship's position has not been updated for more than 12 hours or is unknown because the equipment has been powered off, all geographically addressed and SAFETYNET messages with priorities higher than routine shall be displayed.

A geographic area address shall be considered valid for a particular ship if its current position falls inside or on the boundary specified by the geographic address. It is recommended that the possibility of accepting messages directed to other areas of interest be provided so that, for example, the receiver can receive messages directed to an area lying on the expected course of the ship.

5.3 MESSAGE SEQUENCING

All messages will be transmitted with a unique sequence number and the originating CES ID. Each subsequent transmission of the message will contain the original sequence number. This facility allows multiple printing of repeated messages to be inhibited.

When a message has been received error free, and a permanent record made, the unique 16 bit sequence number, the coast earth station identifier and the service code field associated with that message may be stored in memory and the information used to inhibit the printing of repeated transmissions of the same message.

If the printing of repeated messages is to be inhibited, the EGC receiver should be capable of internally storing at least 255 such message identifications. These message identifications should be stored with an indication of the number of hours that have elapsed since the message has been received. Subsequent reception of the same message identification shall reset this timer. After between 60 and 72 hours, message identifications may be automatically erased. If the number of received message identifications exceeds the capacity of memory allocated for the store, the oldest message identification may be erased.

5.4 TEXT PARAMETERS

For the EGC service, the International Reference Version of International Alphabet 5 (IA 5) as defined in CCITT Red Book Rec. T.50, is used. Characters are coded as 8 bits using odd parity. Other character sets according to ISO 2022 or CCITT Red Book Rec. T.61 are used optionally for certain services.

It is recommended that EGC equipment capable of receiving messages composed using International Telegraph Alphabet No. 2 (ITA 2) do not make use of national options for character Nos. 6, 7 and 8 in figure case to avoid varying interpretations in the international Standard C system (see CCITT Rec. S.1, §4.2). (revised as a consequence of CNs 38 & 51)

5.5 ERROR DETECTION

The EGC message will employ three levels of error detection:

- (i) an arithmetic checksum is used to detect packet errors;
- (ii) an arithmetic checksum is used to detect header errors; and
- (iii) parity checking is used to indicate character errors in the information field.

Only packets with header fields received without error shall be processed for local message recording (even if the packet itself contains an error). In the case of double header messages, the message may be processed even if only one header has been received correctly. A parity check on all incoming characters shall be performed and in the event of a parity error in a received character, the "low line" character (5/15 in T.50) shall be displayed and/or printed.

Outputs for multi-packet messages which have been received incomplete should provide a positive indication of the position of the missed packet(s).

Subsequent receptions of messages printed with mutilated characters shall be output again until received error free.

5.6 DISTRESS PRIORITY MESSAGES

Receipt of a valid distress or urgent priority message shall cause the receiver to give an audible alarm. Provision shall be made to extend this alarm to the position from which the ship is normally navigated, or other remote positions. It shall only be possible to reset this alarm manually.

6 EGC RECEIVER ADDITIONAL REQUIREMENTS

6.1 MESSAGE OUTPUT

It is recommended that the EGC receiver has a printer.

The display, or printer if fitted, shall be capable of presenting at least 40 characters per line of text. The EGC receiver should ensure that if a word cannot be accommodated in full on its line it shall be transferred to the next line.

Where a printer is fitted, a local audible alarm shall be sounded to give advanced warning of a printer "paper-low" condition. It shall not be possible to confuse the sound of the "paper-low" alarm with that of the distress alarm described in Section 5.6 above.

All SAFETYNET™ messages shall be annotated with the time (UTC) and date of reception. This information shall be displayed or printed with the message. Note that UTC can be deduced from the frame count.

6.2 EGC RECEIVER MEMORY CAPACITY REQUIREMENTS

Both temporary and non-volatile memory is required in an EGC receiver for the following purposes :-

- (i) message buffering;
- (ii) maintaining message identification records;
- (iii) storing position coordinates, WMO and Navarea geographical area data;
- (iv) for storing group IDs; and
- (v) for storing expansion NCS common channel numbers.

6.2.1 Message Buffer

A message buffer memory with a capacity of not less than 32768 bytes shall be provided.

6.2.2 Non-volatile Memory

EGC receivers shall use non-volatile memory for storing group ID's and expansion NCS common channel numbers. Provision for storing at least ten 24 bit Group IDs and 16 NCS common channel numbers in non-volatile memory shall be available.

Additionally it is recommended that provision is made for non-volatile storage of position coordinates, WMO and Navarea geographical area data.

The non-volatile memory should be capable of retaining the stored data for a minimum of six months under the applicable environmental conditions and in the absence of applied primary power.

6.3 OPERATOR CONTROLS

The following control functions and displays shall be provided as a minimum:

indication of EGC carrier frame synchronization (or loss of synchronization):

- (a) selection of EGC carrier frequency (see Section 3.3);
- (b) means of inputting the following information:
 - (i) ships position coordinates;
 - (ii) current IMO/IHO Navarea;
 - (iii) current WMO area and NAVTEX service coverage area.

Receivers shall be fitted with operator controls to allow the operator to select desired geographical areas and message categories as described in Section 5. Details of the geographical areas and message categories which have been selected for reception by the operator, shall be readily available.

7 ELECTROMAGNETIC COMPATIBILITY

The electromagnetic compatibility requirements of Module 4, Section 10 are mandatory for EGC receivers intended for use aboard vessels meeting the IMO GMDSS carriage requirements.

8 ENVIRONMENTAL CONDITIONS

The environmental conditions of Module 4, Section 11 are mandatory for EGC receivers intended for use aboard vessels meeting the IMO GMDSS carriage requirements.

9 OPTIONAL FEATURES

9.1 RECEPTION OF SAFETYNET™ OR FLEETNET™ SERVICE ONLY

Manufacturers may choose to produce EGC receivers capable of receiving either the SAFETYNET™ service or the FLEETNET™ service only.

9.1.1 SAFETYNET™ Receivers

SAFETYNET™ only receivers shall not be required to respond to uniquely or group addressed messages, and therefore will not be required to have facilities for the storage of unique or group identities (required capabilities: a) and b) of section 2.1).

9.1.2 FLEETNET™ Receivers

FLEETNET™ only receivers shall not be required to respond to geographically addressed messages (required capabilities: a), c), d) and e) of section 2.1).

9.2 SELF MONITORING AND TESTING

It is recommended that all receivers should have some self testing capability. Means should also be provided for demonstrating that the receiver is functioning correctly and alerting the operator in the event of a malfunction.

It is recommended that, in common with SES's, EGC receivers should utilize the received carrier bulletin board error rate as a measure of link performance. See Module 4, Section 9.2.

9.3 EGC RECEPTION WITH STANDARD-A OR STANDARD-B SESs

An EGC receiver may be used with existing type approved Standard-A or Standard-B SES equipment. In such cases the interconnection may be made at IF so that the EGC receiver will not require an antenna and low noise down converter. The requirements of Section 3.1 will not apply.

The EGC receiver shall meet the technical requirements of Sections 4,5,6,7,8 and 9 of this document with a specific model or models of a type approved Standard-A or Standard-B SES. The performance of the SES shall not be affected in any way by the provision for, or inclusion of the EGC receiver option.

9.4 NAVIGATIONAL INTERFACE

In order that a receiver's position may be automatically updated for geographically addressed messages receivers may be equipped with an interface to navigational instruments. A suggested standard interface is the NMEA 0183 Standard for Interfacing Electronic Marine Navigational devices.

ANNEX 8

IMO REQUIREMENTS FOR THE AVAILABILITY OF THE EGC RECEIVER FACILITY

1 The EGC receiver should normally be available for reception of maritime safety information for at least 98% of the time. This will permit the use of Standard-C class 2 equipment. Where 98% availability cannot be achieved because the equipment is expected to be used for other purposes, it is recommended that Administrations consider requiring the carriage of a second EGC receiver facility. The estimated availability of different types of EGC receiver facilities is summarized in the following table:

EGC RECEIVER AVAILABILITY

EQUIPMENT	STANDARD-C TRAFFIC/DAY (EITHER DIRECTION)	AVAILABILITY OF EGC RECEIVER
STANDARD-C CLASS 2 (SWITCHABLE STD-C/EGC OPERATION)	1 call 5 calls 10 calls	99.87% 99.36% 98.73%
STANDARD-C CLASS 3 DEDICATED INTEGRAL EGC RECEIVER	ANY	100%
STANDARD-C AND EGC Rx (SEPARATE)	ANY	100%

2 These availability estimates have been taken into account when deciding the need to repeat broadcasts of "vital" messages.

ANNEX 9

AUTHORIZATION AND REGISTRATION OF INFORMATION PROVIDERS

Two distinct and separate processes must be completed before an information provider can be granted access to the SafetyNET broadcast service. They have been established to protect the integrity of the SafetyNET information service and clearly establish a qualification to the special SafetyNET tariff.

Authorization

- 1 Authorization is carried out by IMO in consultation with IHO and WMO.
- 2 In order to obtain authorization to broadcast information through the SafetyNET service, an information provider:
 - .1 must inform IMO, through the relevant national maritime administration, of the desire to provide broadcast information via SafetyNET;
 - .2 hydrographic authorities should also inform IHO;
 - .3 meteorological authorities should also inform WMO.
- 3 IMO will arrange for the co-ordination of applications to be carried out by the IMO Sub-Committee on Life-Saving, Search and Rescue (LSR) or in co-operation with IHO or WMO as appropriate.
- 4 After the co-ordination process has been completed, IMO will consider whether authorization should be granted and decide accordingly. In reaching its decision, the Organization will take into account:
 - .1 advice received from IHO, WMO or the LSR Sub-Committee, as appropriate;
 - .2 the present and expected availability of other information sources for the area concerned; and
 - .3 the need to minimize duplication of information as much as possible.
- 5 The Organization will advise the applicant Administration, IHO, WMO and INMARSAT of its decision.
- 6 INMARSAT will maintain the master list of all authorized information providers.

Registration

- 1 After receiving authorization from IMO, an information provider may conclude an agreement with any Standard-C CES operator(s) to obtain access to the system.
- 2 This will involve, in addition to the contractual aspects, registration of the information providers' identity which must be programmed into the CES control equipment.
- 3 CES operators will only register information providers which have received authorization from IMO.