

**DIGITAL SELECTIVE-CALLING SYSTEM
IN THE MARITIME MOBILE SERVICE**

RECOMMENDATION ITU-R M.493-9

DIGITAL SELECTIVE-CALLING SYSTEM
FOR USE IN THE MARITIME MOBILE SERVICE

RECOMMENDATION ITU-R M.541-8

OPERATIONAL PROCEDURES FOR THE USE OF
DIGITAL SELECTIVE-CALLING EQUIPMENT
IN THE MARITIME MOBILE SERVICE

RECOMMENDATION ITU-R M.493-9*

**DIGITAL SELECTIVE-CALLING SYSTEM FOR USE
IN THE MARITIME MOBILE SERVICE**

(Question ITU-R 9/8)

(1974-1978-1982-1986-1990-1992-1994-1995-1997)

Summary

This Recommendation contains, in Annex 1, the technical characteristics of digital selective calling (DSC) equipment which is used in the maritime-mobile service for calling ships and coast stations including calling for distress and safety purposes. Annex 2 contains the description of various classes of DSC equipment and the more limited technical characteristics of some of those classes.

Associated operational procedures are given in Recommendation ITU-R M.541.

The ITU Radiocommunication Assembly,

considering

- a) that selective calling in the shore-to-ship, ship-to-ship and ship-to-shore directions would expedite the handling of traffic in the maritime mobile service;
- b) that the International Maritime Organization (IMO) has listed a number of operational requirements that should be taken into account when designing a general purpose selective-calling system;
- c) that Chapter IV of the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended, requires the use of digital selective-calling for distress alerting and safety calling in the Global Maritime Distress and Safety System (GMDSS);
- d) that neither the selective-calling system described in Recommendation ITU-R M.257, nor that forming part of the systems described in Recommendations ITU-R M.476 and ITU-R M.625, can fully meet the IMO recommended performance standards;
- e) that several administrations have indicated an urgent need for a general purpose selective-calling system;
- f) that several administrations have been developing different systems;
- g) that the system should be applicable to the maritime mobile service, both for international and national needs;
- h) that it is desirable that the selective-calling system fulfil the requirements of all types of vessels desiring to use it;
- j) that Radio Regulations (RR) Appendix 43** adopted by the World Administrative Radio Conference for the Mobile Services (Geneva, 1983) (WARC MOB-83) has provided for the use of maritime mobile service identities by all administrations,

recommends

- 1** that where there is need for a general purpose digital selective-calling (DSC) system, the system should be designed in accordance with the characteristics given in Annex 1;
- 2** that where there is need for simplified versions of DSC equipment, they should be designed in accordance with Annex 2;

* This Recommendation should be brought to the attention of the International Maritime Organization (IMO).

** *Note by the Secretariat* – See RR Article S19 and the Preface to List VIIA of the RR as revised by the World Radiocommunication Conference (Geneva, 1995) (WRC-95).

3 that in a GMDSS coast radio station installation, sufficient separation should be provided between the DSC distress channel receiver antennas and any transmitting antennas within the installation. This is to avoid any de-sensitization of the DSC distress channel receivers if any transmitter is used at full power on any designated transmit frequency other than the DSC distress frequencies.

ANNEX 1

General purpose equipment characteristics

1 General

1.1 The system is a synchronous system using characters composed from a ten-bit error-detecting code as listed in Table 1.

1.1.1 The first seven bits of the ten-bit code of Table 1 are information bits. Bits 8, 9 and 10 indicate, in the form of a binary number, the number of B elements that occur in the seven information bits, a Y element being a binary number 1 and a B element a binary number 0. For example, a BYY sequence for bits 8, 9 and 10 indicates 3 ($0 \times 4 + 1 \times 2 + 1 \times 1$) B elements in the associated seven information bit sequence; and a YYB sequence indicates 6 ($1 \times 4 + 1 \times 2 + 0 \times 1$) B elements in the associated seven information bit sequence. The order of transmission for the information bits is least significant bit first but for the check bits it is most significant bit first.

1.2 Time diversity is provided in the call sequence as follows:

1.2.1 Apart from the phasing characters, each character is transmitted twice in a time-spread mode; the first transmission (DX) of a specific character is followed by the transmission of four other characters before the re-transmission (RX) of that specific character takes place, allowing for a time-diversity reception interval of:

1.2.1.1 400 ms for HF and MF channels, and

1.2.1.2 $33\frac{1}{3}$ ms for VHF radio-telephone channels.

1.3 The classes of emission, frequency shifts and modulation rates are as follows:

1.3.1 F1B or J2B 170 Hz and 100 Bd for use on HF and MF channels. When frequency-shift keying is effected by applying audio signals to the input of single-sideband transmitters (J2B), the centre of the audio-frequency spectrum offered to the transmitter is 1 700 Hz.

1.3.2 Frequency modulation with a pre-emphasis of 6 dB/octave (phase modulation) with frequency-shift of the modulating sub-carrier for use on VHF channels:

- frequency-shift between 1 300 and 2 100 Hz; the sub-carrier being at 1 700 Hz;
- the frequency tolerance of the 1 300 and 2 100 Hz tones is ± 10 Hz;
- the modulation rate is 1 200 Bd;
- the index of modulation is $2.0 \pm 10\%$.

1.3.3 The radio-frequency tolerances of new designs of both transmitters and receivers in the MF and HF bands should be:

- coast station: ± 10 Hz,
- ship station: ± 10 Hz,
- receiver bandwidth: should not exceed 300 Hz.

1.4 The higher frequency corresponds to the B-state and the lower frequency corresponds to the Y-state of the signal elements.

1.5 The information in the call is presented as a sequence of seven-bit combinations constituting a primary code.

1.5.1 The seven information bits of the primary code express a symbol number from 00 to 127, as shown in Table 1, and where:

1.5.1.1 the symbols from 00 to 99 are used to code two decimal figures according to Table 2;

TABLE 1

Ten-bit error-detecting code

Symbol No.	Emitted signal and bit position 1 2 3 4 5 6 7 8 9 10	Symbol No.	Emitted signal and bit position 1 2 3 4 5 6 7 8 9 10	Symbol No.	Emitted signal and bit position 1 2 3 4 5 6 7 8 9 10
00	BBBBBBYYY	43	YYBYBYBBY	86	BYYBYBYBY
01	YBBBBBYB	44	BBYYBYBB	87	YYYBYBYBY
02	BYBBBBYY	45	YBYBYBBY	88	BBYYBYBB
03	YYBBBBYB	46	BYYBYBBY	89	YBBYYBYBY
04	BBYBBBBY	47	YYYYBYBY	90	BYBYBYBY
05	YBYBBBBY	48	BBBBYBYB	91	YYBYBYBY
06	BYYBBBBY	49	YBBYBYBB	92	BBYYBYBY
07	YYBBBBYB	50	BYBBYBYB	93	YBYYBYBY
08	BBYBBBBY	51	YYBBYBBY	94	BYYBYBYB
09	YBBYBBYB	52	BBYBYBYB	95	YYYYBYBY
10	BYBYBBYB	53	YBYBYBBY	96	BBBBYYBY
11	YBYBBBYB	54	BYYBYBBY	97	YBBBYYBB
12	BBYBBBYB	55	YYBYBYBY	98	BYBBYYBB
13	YBYBBBYB	56	BBBYYBYB	99	YYBBYYBY
14	BYYBBBYB	57	YBBYYBBY	100	BBYBBYYB
15	YYYYBBBY	58	BYBYYBBY	101	YBYBBYYB
16	BBBBYBBY	59	YBYYBBYB	102	BYYBBYYB
17	YBBYBBYB	60	BBYBBYYB	103	YYYBBYYB
18	BYBBYBBY	61	YBYYBBYB	104	BBBYBYBB
19	YBBYBBYB	62	BYYBBYYB	105	YBBYBYBY
20	BBYBYBBY	63	YYYYBBBY	106	BYBYBYBY
21	YBYBYBBY	64	BBBBYYBY	107	YBYBYBYB
22	BYYBYBBY	65	YBBBBYYB	108	BBYYBYBY
23	YYBYBBYB	66	BYBBBBYB	109	YBYBYBYB
24	BBYBYBBY	67	YBBBBYYB	110	BYYBYBYB
25	YBBYBBYB	68	BBYBBYYB	111	YYYYBYBY
26	BYBYBBYB	69	YBBBYYBB	112	BBBBYYBB
27	YBYYBBYB	70	BYYBBYYB	113	YBBYYBYB
28	BBYYBBYB	71	YYBBYBYB	114	BYBBYYBY
29	YBYYBBYB	72	BBYBBYYB	115	YBBYYBYB
30	BYYBYYBY	73	YBBYBYBB	116	BBYBYBYB
31	YYYYBBYB	74	BYBYBYBB	117	YBYBYBYB
32	BBBBYBYB	75	YBYBBYBY	118	BYYBYBYB
33	YBBBBYBY	76	BBYBBYYB	119	YYYBYYBY
34	BYBBYBYB	77	YBYBBYBY	120	BBBYYBYB
35	YBBBYBYB	78	BYYBBYYB	121	YBBYYBYB
36	BBYBYBYB	79	YYYYBYBY	122	BYBYYBYB
37	YBYBYBYB	80	BBBBYBYB	123	YBYYYBYB
38	BYYBYBYB	81	YBBYBYBB	124	BBYYYYBY
39	YYBYYBYB	82	BYBBYBYB	125	YBYYYYBY
40	BBBYBYBY	83	YBBYBYBY	126	BYYYYBYB
41	YBBYBYBY	84	BBYBYBYB	127	YYYYYYBB
42	BYBYBYBY	85	YBYBYBYB		

B = 0
Y = 1
Order of bit transmission: bit 1 first.

1.5.1.2 the symbols from 100 to 127 are used to code service commands (see Table 3).

1.6 The receiver decoder should provide maximum utilization of the received signal, including use of the error-check character.

1.7 Where the distress call repetitions described in § 11 apply, the following conditions are considered necessary:

1.7.1 the transmitter encoder must provide repetitive transmission of the call sequence in accordance with § 11; and

1.7.2 the receiver decoder should provide maximum utilization of the received signal, including use of the error-check character and by using an iterative decoding process with adequate memory provision.

1.8 When the transmission of a DSC distress call is automatically repeated, ships' DSC equipments must be capable of automatically receiving a subsequent distress acknowledgement (see Recommendation ITU-R M.541, Annex 1, § 3.1.3.1, 3.1.3.2 and 3.3.5).

TABLE 2

Packing table for decimal numbers into ten-bit characters

The digits for the									
Thousands of millions D2	Hundreds of millions D1	Tens of millions D2	Millions D1	Hundreds of thousands D2	Tens of thousands D1	Thousands D2	Hundreds D1	Tens D2	Units D1
Caracter 5		Caracter 4		Caracter 3		Caracter 2		Caracter 1	

NOTE 1 – Character 1 is the last character transmitted

The digit sequence D2-D1 varies from 00 to 99 inclusive in each character (character 1 to 5 inclusive). The character that represents a particular two-decimal figure is transmitted as the symbol number (see Table 1) that is identical to that particular two-decimal figure.

When the number consists of an odd number of decimal digits, a zero shall be added in front of the most significant position to provide an integral number of ten-bit characters.

TABLE 3

Use of symbol Nos. 100 to 127

Symbol No.	Phasing and unique functions	Format specifier ⁽¹⁾	Category ⁽¹⁾	Nature of distress ⁽¹⁾	First telecommand ⁽¹⁾	Second telecommand ⁽¹⁾
100			Routine	Fire, explosion	F3E/G3E simplex TP	No reason given ⁽²⁾
101				Flooding	F3E/G3E duplex TP	Congestion at maritime switching centre
102		Geographical area		Collision	⁽³⁾	Busy ⁽²⁾
103		⁽⁴⁾	⁽⁴⁾	Grounding	Polling	Queue indication ⁽²⁾
104	Phasing RX-0 position			Listing, in danger of capsizing	Unable to comply	Station barred ⁽²⁾
105	Phasing RX-1 position			Sinking	End of call ⁽⁵⁾	No operator available ⁽²⁾
106	Phasing RX-2 position		Ship's business	Disabled and adrift	Data	Operator temporarily unavailable ⁽²⁾
107	Phasing RX-3 position			Undesignated distress	⁽³⁾	Equipment disabled ⁽²⁾
108	Phasing RX-4 position		Safety	Abandoning ship	⁽³⁾	Unable to use proposed channel ⁽²⁾
109	Phasing RX-5 position			Piracy/armed robbery attack	J3E TP	Unable to use proposed mode ⁽²⁾
110	Phasing RX-6 position	⁽⁶⁾	Urgency	Man over board	Distress acknowledgement	Ships and aircraft according to Resolution No. 18 (Mob-83)
111	Phasing RX-7 position				H3E TP	Medical transports (as defined in 1949 Geneva Conventions and additional Protocols)

TABLE 3 (continued)

Symbol No.	Phasing and unique functions	Format specifier ⁽¹⁾	Category ⁽¹⁾	Nature of distress ⁽¹⁾	First telecommand ⁽¹⁾	Second telecommand ⁽¹⁾
112		Distress	Distress	EPIRB emission	Distress relay	Pay-phone/public call office
113					F1B/J2B TTY-FEC	Facsimile/data according to Recommendation ITU-R M.1081
114		Ships having common interest			(3)	(3)
115					F1B/J2B TTY-ARQ	Data V.21
116		All ships			F1B/J2B TTY receive	Data V.22
117	Ack. RQ (EOS)				(7)	(7)
118					Test ⁽⁸⁾	Data V.22 bis
119					F1B/J2B TTY	Data V.23
120		Individual stations			A1A Morse TR	Data V.26 bis
121		Reserved for national non-calling purposes e.g. Report ITU-R M.1159			Ship position or location registration updating	Data V.26 ter
122	Ack. BQ (EOS)				(7)	(7)
123		Individual station semi-automatic/automatic service			A1A Morse	Data V.27 ter
124		(6)			F1C/F2C/F3C FAX	Data V.32
125	Phasing DX position				(7)	(7)
126	*				No information ⁽⁹⁾	No information ⁽⁹⁾
127	EOS				(7)	(7)

TR: tape recorder

TP: telephony

TTY: direct printing

ARQ: Rec. ITU-R M.476 or

Rec. ITU-R M.625 equipment

FAX: facsimile

* Symbol transmitted in place of unused message information.

(1) To allow for future uses of currently unassigned symbols, equipments should not reject calls containing such symbols.

(2) Currently unassigned when used with first telecommands other than symbol No. 104 – for future use.

(3) Currently unassigned – for future use.

(4) Used for selective call to a group of ships in a specified VTS area (Rec. ITU-R M.825). Should not be used in any future expansion.

(5) Only used for semi-automatic/automatic service.

(6) Used in the automatic VHF/UHF service (Rec. ITU-R M.586). Should not be used in any future expansion.

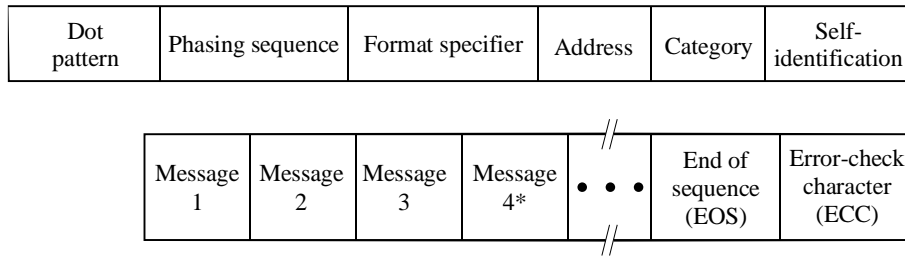
(7) Should not be used in any future expansion.

(8) See § 8.4.

(9) See § 8.2.1.1 and 8.2.1.2.

2 Technical format of a call sequence

2.1 The technical format of the call sequence is:



* Distress calls only.

0493-00

2.2 Examples of typical call sequences and the construction of the transmission format are given in Tables 4 to 7, and in Figs. 1 to 4.

2.3 The flow charts illustrating the operation of the DSC system are shown in Figs. 5a and 5b.

3 Dot pattern and phasing

3.1 The phasing sequence provides information to the receiver to permit correct bit phasing and unambiguous determination of the positions of the characters within a call sequence (see Note 1).

NOTE 1 – Acquisition of character synchronization should be achieved by means of character recognition rather than, for example, by recognizing a change in the dot pattern, in order to reduce false synchronization caused by a bit error in the dot pattern.

3.2 The phasing sequence consists of specific characters in the DX and RX positions transmitted alternatively. Six DX characters are transmitted.

3.2.1 The phasing character in the DX position is symbol No. 125 of Table 1.

3.2.2 The phasing characters in the RX position specify the start of the information sequence (i.e. the format specifier) and consist of the symbol Nos. 111, 110, 109, 108, 107, 106, 105 and 104 of Table 1, consecutively.

3.3 Phasing is considered to be achieved when two DXs and one RX, or two RXs and one DX, or three RXs in the appropriate DX or RX positions, respectively, are successfully received. These three phasing characters may be detected in either consecutive or non-consecutive positions but in both cases all bits of the phasing sequence should be examined for a correct 3-character pattern. A call should be rejected only if a correct pattern is not found anywhere within the phasing sequence.

3.4 To provide appropriate conditions for earlier bit synchronization and to allow for scanning methods to monitor several HF and MF frequencies by ship stations, the phasing sequence should be preceded by a dot pattern (i.e. alternating B-Y or Y-B sequence bit synchronization signals) with duration of:

3.4.1 200 bits

At HF and MF, for “distress”, “distress acknowledgement”, “distress relay” and “distress relay acknowledgement” calls and for all calling sequences to ship stations.

3.4.2 20 bits

At HF and MF, for all acknowledgement sequences (except distress acknowledgements and distress relay acknowledgements – see § 3.4.1 and Note 1) and for all calling sequences to coast stations (except distress relay calls – see § 3.4.1). At VHF for all calls.

NOTE 1 – In exceptional circumstances and only on national working frequencies the 200 bit dot pattern could also be included in acknowledgement sequences to ship stations.

4 Format specifier

4.1 The format specifier characters which are transmitted twice in both the DX and RX positions (see Fig. 1) are:

4.1.1 symbol No. 112 for a “distress” call (RR No. 3086 (Appendix S13, Part A3, § 1)); or

4.1.2 symbol No. 116 for an “all ships” call; or

4.1.3 symbol No. 114 for a selective call to a group of ships having a common interest (e.g. belonging to one particular country, or to a single shipowner, etc.); or

4.1.4 symbol No. 120 for a selective call to a particular individual station; or

4.1.5 symbol No. 102 for a selective call to a group of ships in a particular geographic area; or

4.1.6 symbol No. 123 for a selective call to a particular individual station using the semi-automatic/automatic service.

4.2 It is considered that receiver decoders must detect the format specifier character twice for “distress” calls and “all ships” calls to effectively eliminate false alerting. For other calls, the address characters provide additional protection against false alerting and, therefore, single detection of the format specifier character is considered satisfactory (see Table 8).

5 Address

5.1 “Distress” calls and “all ships” calls do not have addresses since these calls are implicitly addressed to all stations (ship stations and coast stations).

5.2 For a selective call directed to an individual ship, to a coast station or to a group of stations having a common interest, the address consists of the characters corresponding to the station’s maritime mobile service identity, the sequence consisting of characters coded in accordance with Table 2 (see Note 1).

NOTE 1 – According to RR ex Appendix 43 (Article S19), maritime mobile service identities are formed of a series of nine digits, consisting of three digits of the Maritime Identification Digits (MID) and six more digits.

These identities are included in the address and self-identification parts of the call sequence and are transmitted as five characters $C_5C_4C_3C_2C_1$, comprising the ten digits of:

$$(X_1, X_2) (X_3, X_4) (X_5, X_6) (X_7, X_8) \text{ and } (X_9, X_{10})$$

respectively, whereas digit X_{10} is always the figure 0 unless the equipment is also designed in accordance with Recommendation ITU-R M.1080.

Example:

MID $X_4 X_5 X_6 X_7 X_8 X_9$ being the ship station identity is transmitted by the DSC equipment as:

$$(M, I) (D, X_4) (X_5, X_6) (X_7, X_8) (X_9, 0)$$

5.3 For a selective call directed to a group of ships in a particular geographic area a numerical geographic coordinates address consisting of ten digits (i.e. 5 characters), is constructed as follows (see Fig. 6 and Note 1):

NOTE 1 – In order to comply with commonly accepted practice, the order of entry and read-out should be: first latitude and then longitude.

5.3.1 the designated geographic area will be a rectangle in Mercator projection;

5.3.2 the upper left-hand (i.e. North-West) corner of the rectangle is the reference point for the area;

5.3.3 the first digit indicates the azimuth sector in which the reference point is located, as follows:

5.3.3.1 quadrant NE is indicated by the digit “0”,

5.3.3.2 quadrant NW is indicated by the digit “1”,

5.3.3.3 quadrant SE is indicated by the digit “2”,

5.3.3.4 quadrant SW is indicated by the digit “3”;

- 5.3.4** the second and third digits indicate the latitude of the reference point in tens and units of degrees;
- 5.3.5** the fourth, fifth and sixth digits indicate the longitude of the reference point in hundreds, tens and units of degrees;
- 5.3.6** the seventh and eighth digits indicate the vertical (i.e. North-to-South) side of the rectangle, $\Delta\phi$, in tens and units of degrees;
- 5.3.7** the ninth and tenth digits indicate the horizontal (i.e. West-to-East) side of the rectangle, $\Delta\lambda$, in tens and units of degrees.

6 Category

- 6.1** The “category” information is coded as shown in Table 9 and defines the degree of priority of the call sequence.
- 6.2** For a “distress” call the priority is defined by the format specifier and no category information is included in the call sequence.
- 6.3** For safety related calls, the “category” information specifies:
- 6.3.1** distress (RR No. 3143); or
 - 6.3.2** urgency; or
 - 6.3.3** safety.
- 6.4** For other calls, the “category” information specifies:
- 6.4.1** ship’s business; to cater for shore-to-ship communications having priority category 6 as defined in RR No. 4441. Some coast stations do not use the ship’s business priority category;
 - 6.4.2** routine.

7 Self-identification

- 7.1** The maritime mobile service identity (MMSI) assigned to the calling station, coded as indicated in § 5.2 and its Note 1, is used for self-identification. The MMSI should be stored in the DSC unit and it should not be possible for the user to easily change it.

8 Messages

The messages that are included in a call sequence contain the following message elements, which are listed in the order in which they would appear in each message:

- 8.1** For a “distress” call (see Table 4 and Fig. 4a)) the distress information is contained in four messages in the following order:
- 8.1.1** Message 1 is the “nature of distress” message, coded as shown in Table 10, i.e.:
 - 8.1.1.1** fire, explosion;
 - 8.1.1.2** flooding;
 - 8.1.1.3** collision;
 - 8.1.1.4** grounding;
 - 8.1.1.5** listing, in danger of capsizing;
 - 8.1.1.6** sinking;
 - 8.1.1.7** disabled and adrift;
 - 8.1.1.8** undesignated distress;
 - 8.1.1.9** abandoning ship;

8.1.1.10 piracy/armed robbery attack;

8.1.1.11 man over board;

8.1.1.12 emergency position-indicating radiobeacon (EPIRB) emission.

8.1.2 Message 2 is the “distress coordinates” message, consisting of ten digits indicating the location of the vessel in distress, coded on the principles described in Table 2, in pairs starting from the first and second digits (see Note 1 to § 5.3):

8.1.2.1 The first digit indicates the quadrant in which the incident has occurred, as follows:

8.1.2.1.1 quadrant NE is indicated by the digit “0”,

8.1.2.1.2 quadrant NW is indicated by the digit “1”,

8.1.2.1.3 quadrant SE is indicated by the digit “2”,

8.1.2.1.4 quadrant SW is indicated by the digit “3”.

8.1.2.2 The next four figures indicate the latitude in degrees and minutes.

8.1.2.3 The next five figures indicate the longitude in degrees and minutes.

8.1.2.4 If “distress coordinates” cannot be included, or if the position information has not been updated for 23^{1/2} hours, the 10 digits following the “nature of distress” should be automatically transmitted as the digit 9 repeated 10 times.

8.1.2.5 DSC equipment should be provided with facilities for automatic position updating in accordance with NMEA 0183 (or IEC-1162) for input of data from a navigation equipment.

8.1.3 Message 3 is the time indication (UTC) when the coordinates were valid consisting of four digits coded on the principles described in Table 2, in pairs starting from the first and second digits.

8.1.3.1 The first two digits indicate the time in hours.

8.1.3.2 The third and fourth digits indicate the part of the hours in minutes.

8.1.3.3 If the time cannot be included the four time indicating digits should be transmitted automatically as “8 8 8 8”.

8.1.4 Message 4 is a single character to indicate the type of communication (telephone or teleprinter) which is preferred by the station in distress for subsequent exchange of distress traffic (RR No. 3143). This character is coded as shown in Table 11.

8.2 For other types of calls (see Table 5 and Figs. 2 and 3) except “distress relay”, “distress relay acknowledgement” and “distress acknowledgement” calls (see § 8.3), two messages are included in the following order:

8.2.1 Message 1 is the “telecommand” information and consists of 2 characters (first and second telecommand) coded as shown in Tables 11 and 12;

8.2.1.1 if no information additional to that conveyed by the first telecommand character is required, then the second telecommand signal should be symbol No. 126 (no information) – see Table 12;

8.2.1.2 if no telecommand information is used, symbol No. 126 is transmitted twice.

8.2.2 Message 2 may contain two “channel or frequency message” elements, each of which always consists of three characters, “character 1”, “character 2” and “character 3”, indicating the proposed working frequency (in the F1B/J2B mode the assigned frequency should be used) in multiples of 100 Hz or the channel number (coded in accordance with Table 13) or the ship’s position. The first frequency element (the RX field) in the call indicates the called station receive frequency and the second frequency element (the TX field) indicates the called station transmit frequency. In acknowledgements the RX and TX fields indicate the receive and transmit frequency of the acknowledging station respectively (see also Fig. 2 and Note 1).

NOTE 1 – If only one channel or frequency message element is used, this indicates the called station receive channel or frequency or a two-frequency (paired) channel. A second channel or frequency message element may be used to designate the called station transmit channel or frequency. If the calling station indicates only the called station receive

frequency (for broadcast mode transmissions) then the symbol No. 126 repeated three times should be transmitted instead of the called station transmit channel or frequency message element. If no “channel or frequency message” elements are used, the symbol No. 126 is transmitted six times. For calls using the semi-automatic/automatic VHF service (see Table 7) then only one “channel or frequency message” element is transmitted which indicates the paired channel number. In the absence of this element the symbol No. 126 should be transmitted three times.

8.2.2.1 Frequency information

The frequency (in the F1B/J2B mode the assigned frequency should be used) in multiples of 100 Hz may only be indicated as such when the frequency is below 30 MHz. The three characters provide for the required six decimal digits. Character 1 represents the units (U) and tens (T) of 100 Hz, character 2 the hundreds (H) and thousands (M) and character 3 the tens of thousands (TM) and hundreds of thousands (HM) of 100 Hz.

8.2.2.2 Channel information

8.2.2.2.1 HF and MF channels

If the HM digit is 3, this indicates that the number represented by the digits TM, M, H, T and U is the HF/MF working channel number (either single frequency or two frequency channels).

8.2.2.2.2 VHF channels

If the HM digit is 9, this indicates that the number represented by the values of the digits M, H, T and U is the VHF working channel number. If the M digit is 1, this indicates that the ship stations transmitting frequency is being used as a simplex channel frequency for both ship and coast stations. If the M digit is 2, this indicates that the coast stations transmitting frequency is being used as a simplex channel frequency for both ship and coast stations.

8.2.2.3 Ship's position information

8.2.2.3.1 Message 2 may contain the ship's position, consisting of the digit 5 repeated two times and ten digits (five characters) indicating this position, coded in accordance with § 8.1.2 to § 8.1.2.3 (see Table 14).

8.2.2.3.2 If a reply to a calling sequence requesting ship's position is required (see Fig. 3d) then message 2 consists of twelve digits (six symbols), the first of which should be coded in accordance with § 8.1.2 to § 8.1.2.3 followed by one symbol No. 126.

8.2.2.3.3 Message 3 follows message 2 in this case and contains the time (UTC) when the coordinates were valid, coded as indicated in § 8.1.3 to § 8.1.3.3.

8.2.3 Message 3 follows message 2 when using the DSC system for calls initiated by ship stations requiring a semi-automatic or automatic connection (see Table 7) and contains the public switched network number (e.g. telephone number). In this case the format specifier used is symbol No. 123.

8.2.3.1 This number is coded by up to nine symbols in a manner similar to that shown in Table 2, except that the first character transmitted should be either symbol No. 105 or No. 106 to indicate whether the network number contains an odd or even number of significant digits. As an example, the number 0012345 would be coded as symbol numbers 105 00 01 23 45 whereas the number 00123456 should be coded as symbol numbers 106 00 12 34 56.

8.3 For “distress relay” including shore-to-ship alerts, “distress relay acknowledgement” and “distress acknowledgement” calls, the message formats are indicated in Figs. 4b) and 4c) respectively.

8.3.1 For a distress relay where the identity of the station in distress is unknown, the “identification of the station in distress” should be automatically transmitted as the symbol No. 126 five times.

8.3.2 Distress call cancellation

To cancel an inadvertent transmitted “distress” call, a “distress cancellation” call in the format indicated in Fig. 4c) may be transmitted with the ship's own MMSI inserted as identification of ship in distress. This cancellation should be followed immediately by a voice cancellation procedure, as described in Recommendation ITU-R M.541.

8.4 For test calls on the exclusive distress and safety calling frequencies on MF and HF, the call sequence is given in Table 6 (see also Recommendation ITU-R M.541, Annex 1). Technical means should be included to prevent the transmission of this sequence on VHF. Furthermore, the first telecommand symbol No. 118 (see Table 3) should only be capable of being inserted into the sequence given in Table 6.

9 End of sequence

The “end of sequence” (EOS) character is transmitted three times in the DX position and once in the RX position (see Fig. 1b)). It is one of the three unique characters corresponding to symbol Nos. 117, 122 and 127 as follows:

- 9.1** symbol No. 117 if the call requires acknowledgement (Acknowledge RQ);
- 9.2** symbol No. 122 if the sequence is an answer to a call that requires acknowledgement (Acknowledge BQ);
- 9.3** symbol No. 127 for all other calls.

10 Error-check character

10.1 The error-check character (ECC) is the final character transmitted and it serves to check the entire sequence for the presence of errors which are undetected by the ten-unit error-detecting code and the time diversity employed.

10.2 The seven information bits of the ECC shall be equal to the least significant bit of the modulo-2 sums of the corresponding bits of all information characters (i.e. even vertical parity). The format specifier and the EOS characters are considered to be information characters. The phasing characters and the retransmission (RX) characters shall not be considered to be information characters. Only one format specifier character and one EOS character should be used in constructing the ECC. The ECC shall also be sent in the DX and RX positions.

10.3 Automatic acknowledgement transmissions should not start unless the ECC is received and decoded correctly. A received ECC which does not match that calculated from the received information characters may be ignored if this was due to an error detected in the ten-unit error-detecting code of the information characters which was correctable by use of the time diversity code.

11 Distress call attempt

11.1 Distress calls may be transmitted as a single frequency or a multi-frequency call attempt preceded by a dot pattern. Where a distress call attempt contains more than one consecutive distress call on the same frequency (see Recommendation ITU-R M.541, Annex 1, § 3.1.3), these consecutive calls may be transmitted with no gap between the end of one call and the start of the dot pattern of the following call to enable bit synchronization to be maintained (see Fig. 1c)).

11.2 A distress call should be activated only by means of a dedicated distress button which should be clearly identified and be protected against inadvertent operation. The initiation of a distress call should at least require two independent actions.

11.3 Calls with format specifier “distress” or category “distress”, “urgency” and “safety” should be initiated manually only. This applies also for ships equipped for automatic DSC operation. For automatic repetition of distress calls see Recommendation ITU-R M.541, Annex 1, §§ 3.1.3 and 3.3.5.

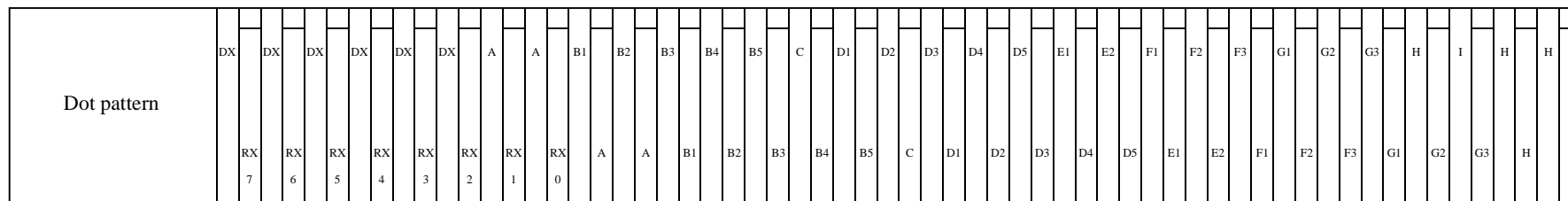
12 Audible alarm

An audible alarm and visual indicator should be provided upon reception of a distress call or a call with category distress (see Recommendation ITU-R M.541, § 3).

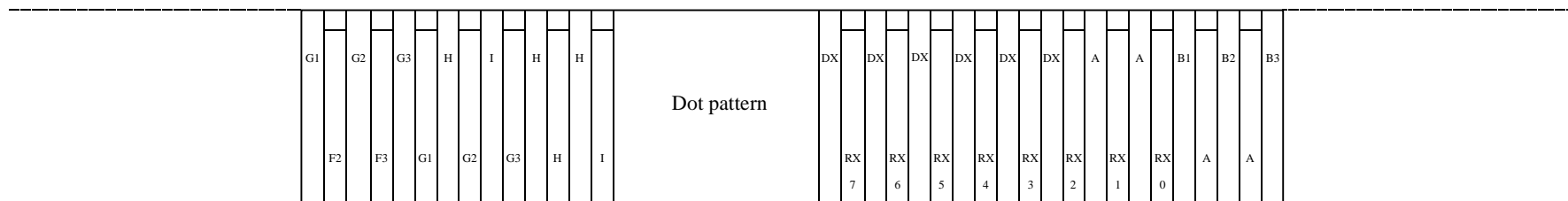
FIGURE 1
Construction of call sequence

Dot pattern	DX/RX Phasing sequence	A Format specifier 2 identical characters	B Called party address 5 characters	C Category 1 character	D Self-identification 5 characters	E Telecommand message 2 characters	F Frequency message 3 characters	G Frequency message 3 characters	H End of sequence 3 identical DX characters 1 RX character	I Error-check character 1 character
-------------	---------------------------	---	---	------------------------------	--	--	--	--	---	---

a) Technical format of a typical routine message



b) Transmission sequence corresponding to Fig. 1a)



c) Transmission sequence for repetition of a distress call according to § 11

FIGURE 2

Examples of a calling sequence and reply sequences for typical individual calls

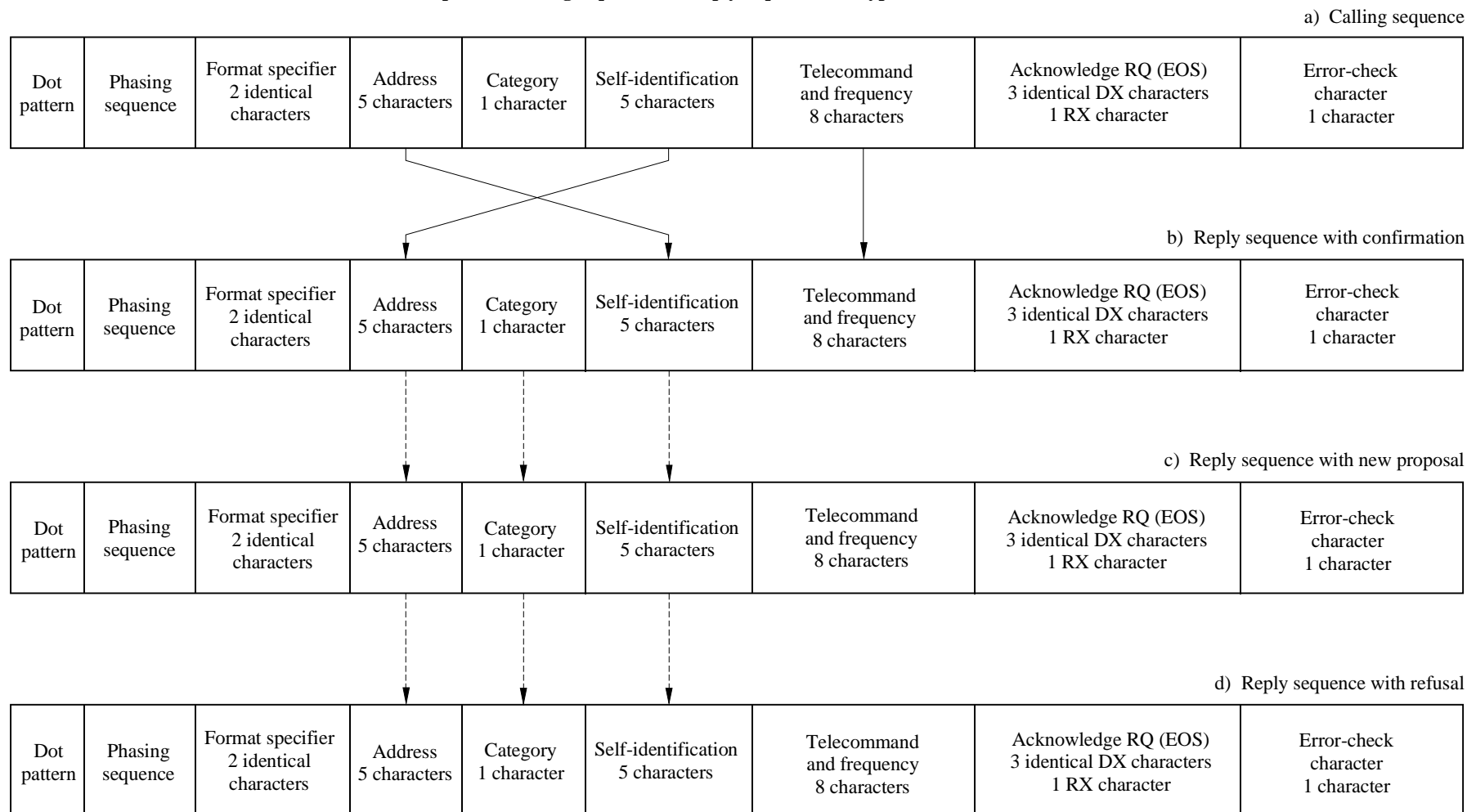
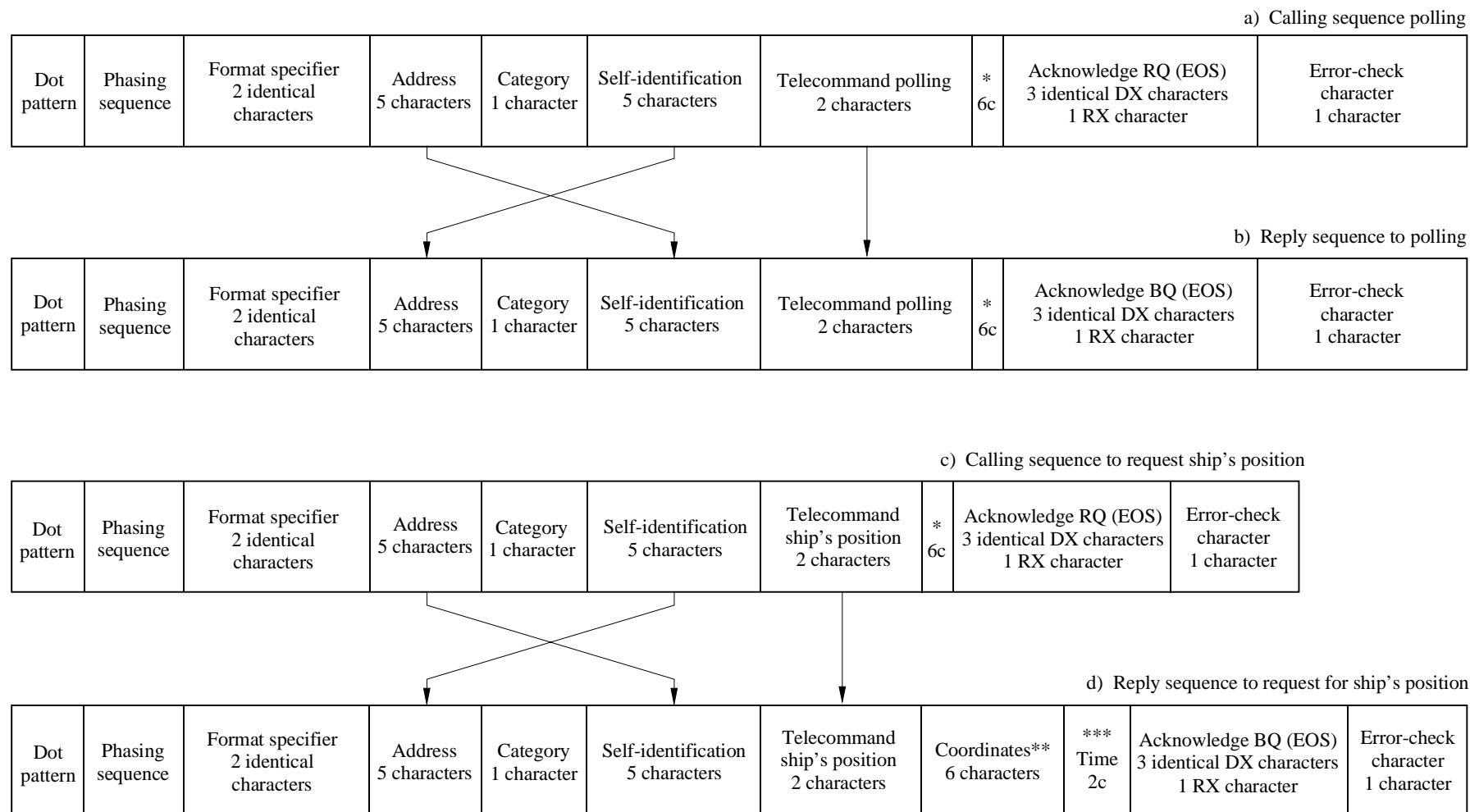


FIGURE 3

Calling sequences and reply sequences for polling and ship's position

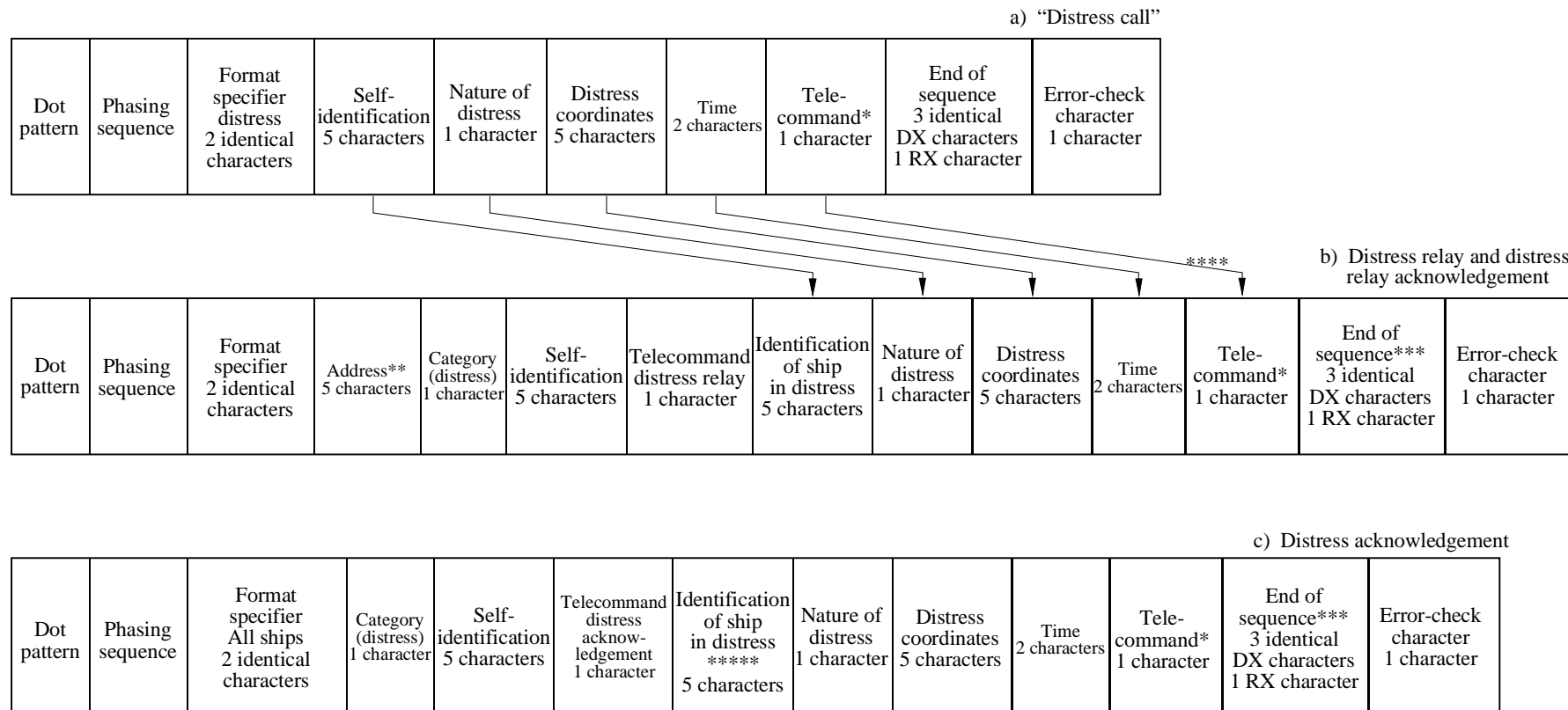


* The symbol No. 126 repeated six times should be included (see § 8.2.2, Note 1).

** See § 8.2.2.3.2 (6 characters).

*** See § 8.2.2.3.3 (2 characters).

FIGURE 4
Sequences of “distress call”, distress relay call and distress acknowledgement and distress relay acknowledgement



* Type of subsequent communication (radiotelephony or teleprinter – see Table 11 and § 8.1.4).

** Address is not included if the format specifier is “all ships”.

*** If the format specifier is “all ships” then the “end of sequence” character is symbol No. 127. For a distress relay call addressed to an individual coast station, the “end of sequence” character is RQ (symbol No. 117). For a distress relay acknowledgement call transmitted by a coast station, the “end of sequence” character is BQ (symbol No. 122).

**** Sequences a) and b) demonstrate how a DSC distress relay call may be constructed from a received DSC distress call. It should also be possible to generate distress relay calls in response to a distress situation observed or notified by non-DSC means.

***** In case of cancellation of an inadvertent transmitted “distress” call insert self-indication (own ship’s MMSI).

FIGURE 5a
Example of operational flow chart

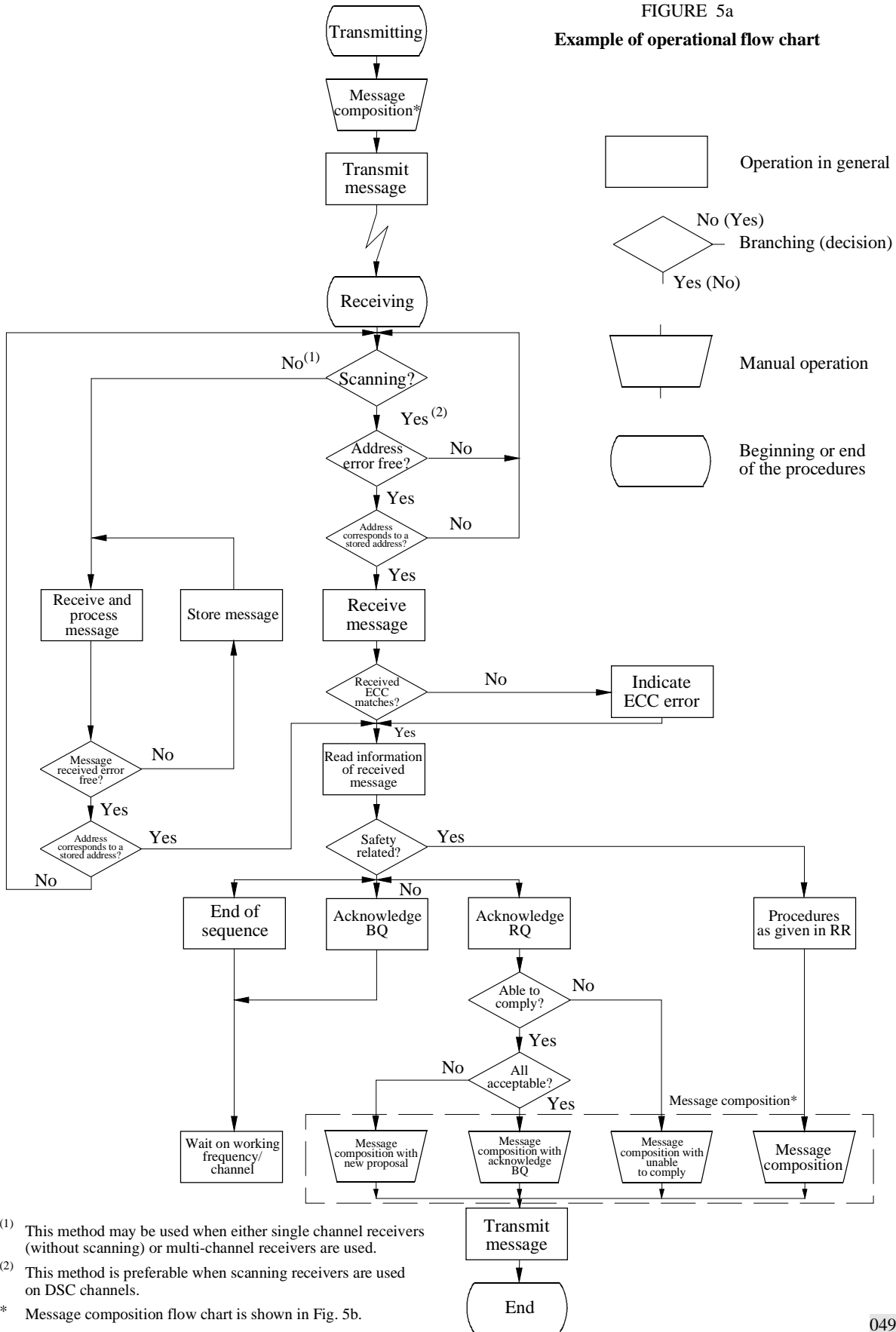
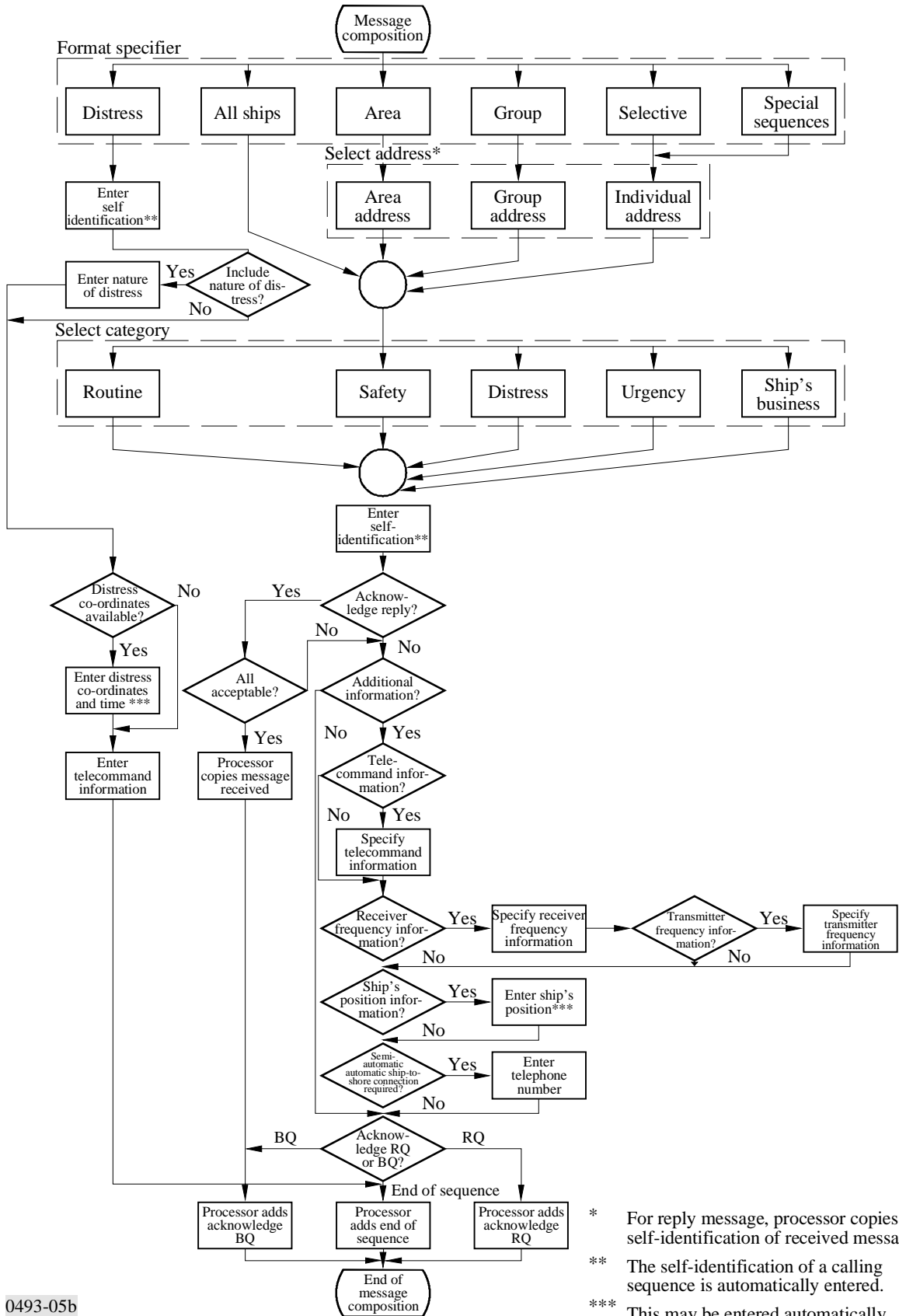


FIGURE 5b

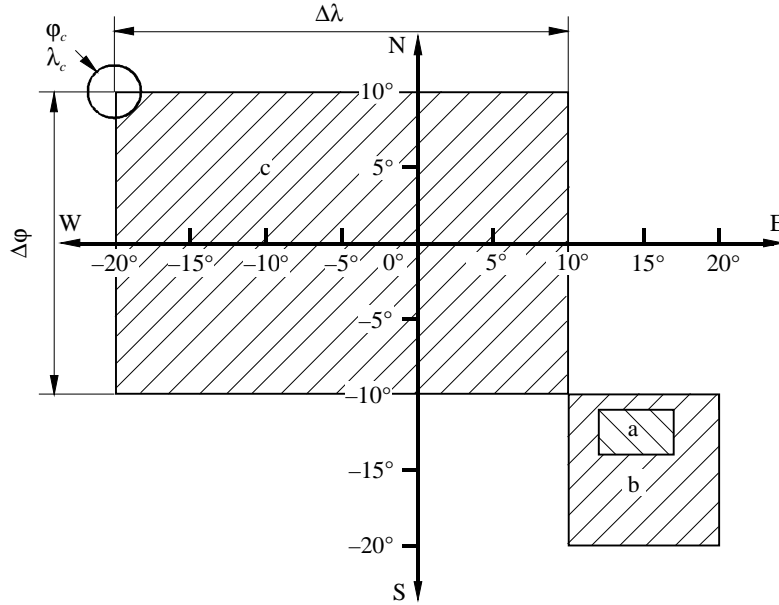
Message composition flow chart



0493-05b

* For reply message, processor copies self-identification of received message.
 ** The self-identification of a calling sequence is automatically entered.
 *** This may be entered automatically.

FIGURE 6
Geographic coordinates



a) $\phi_a = -11^\circ$ (South) $\lambda_a = 12^\circ$ (East) $\Delta\phi = 3^\circ$ $\Delta\lambda = 5^\circ$

Format specifier	2	1	1	0	1	2	0	3	0	5	Category
	Sector		ϕ_a		λ_a		$\Delta\phi$		$\Delta\lambda$		

b) $\phi_b = -10^\circ$ (South) $\lambda_b = 10^\circ$ (East) $\Delta\phi = 10^\circ$ $\Delta\lambda = 10^\circ$

Format specifier	2	1	0	0	1	0	1	0	1	0	Category
------------------	---	---	---	---	---	---	---	---	---	---	----------

c) $\phi_c = 10^\circ$ (North) $\lambda_c = -20^\circ$ (West) $\Delta\phi = 20^\circ$ $\Delta\lambda = 30^\circ$

Format specifier	1	1	0	0	2	0	2	0	3	0	Category
------------------	---	---	---	---	---	---	---	---	---	---	----------

TABLE 4

Call sequences of “distress call” and “all ships call”

(2) Format specifier	(5) Address	(1) Category	(5) Self-identification	Message				(1)* EOS	(1) ECC
				1	2	3	4		
Distress call 112	_____	_____	00-----99	(1) Nature of distress 100-----124	(5) Distress coordinates 00-----99	(2) Time	(1)** Telecommand 100, 109 ou 113	127	ECC
All ships call 116	_____	Distress 112 Urgency 110 Safety 108	00-----99	(2) Telecommand 100-----126 except 117, 122 and 125	(6) Frequency or channel 00-----99	not used	not used	EOS 127	ECC

(): number of characters

* See § 9.

** Type of subsequent communication, see Table 11 and § 8.1.4.

TABLE 5

Call sequences of selective calls

(2) Format specifier	(5) Address	(1) Category	(5) Self-identification	Message *		(1)** EOS	(1) ECC
				1	2		
Geographical area call 102	00-----99	Distress 112 Urgency 110 Safety 108	00-----99	(2) Telecommand 100-----126 except 117, 122 and 125	(6) Frequency, channel or ship's position *** 00-----99	EOS 127	ECC
Ships having common interest call 114	See § 5 of Annex 1	Ship's business 106					
Individual call 120		Routine 100				Ack. RQ 117 or Ack. BQ 122 EOS 127	

(): number of characters

* A message 3 is required for a reply sequence to a request for ship's position (see Fig. 3d)).

** See § 9.

*** See § 8.2.2.3.1 and 8.2.2.3.2.

TABLE 6

**Call sequence of selective calls for testing the equipment used
for distress and safety calls**

(2) Format specifier	(5) Address	(1) Category	(5) Self- identification	Message		(1)* EOS	(1) ECC
				1	2		
Individual call 120	00-----99	Safety 108	00-----99	(2) First telecommand 118; second telecommand 126	(6) Frequency or channel 126 transmitted six times	Ack. RQ 117 or Ack. BQ 122	ECC

(): number of characters

* See § 9.

TABLE 7

Call sequence of semi-automatic/automatic ship-to-shore call

(2) Format specifier	(5) Address	(1) Category	(5) Self- identification	Message			(1)* EOS	(1) ECC
				1	2	3		
123	00-----99	Routine 100	00-----99	(2) VHF calls – first telecommand 100, 101, 104, 105, 106, 121 or 124; calls – first telecommand 102 ... 124, except 110, 112, 117 or 122; second telecommand in accordance with Table 12	(6)** Frequency, channel or ship's position 00-----99	(2-9) Selection information 105 or 106, followed by 00-----99 see § 8.2.3.1	Ack. RQ 117 or Ack. BQ 122	ECC

(): number of characters

* See § 9.

** Only 3 for VHF calls.

TABLE 8
Format specifier

Symbol No.	Format specifier
112	Distress call
116	All ships call
	<i>Selective call to:</i>
120	– Individual stations
102	– Ships in a particular geographic area
114	– Ships having a common interest
123	Semi-automatic/automatic service

TABLE 9
Category

Symbol No.	Category
	<i>Safety related:</i>
112	Distress
110	Urgency
108	Safety
	<i>Others:</i>
106	Ship's business
100	Routine

TABLE 10
Nature of distress

Symbol No.	Nature of distress
100	Fire, explosion
101	Flooding
102	Collision
103	Grounding
104	Listing, in danger of capsizing
105	Sinking
106	Disabled and adrift
107	Undesignated distress
108	Abandoning ship
109	Piracy/armed robbery attack
110	Man overboard
112	EPIRB emission

TABLE 11

First telecommand character

Symbol No. ⁽¹⁾	Use and/or mode	Terminal equipment
100	F3E/G3E simplex	Telephone
101	F3E/G3E duplex	Telephone
102	(2)	–
103	Polling	–
104	Unable to comply ⁽³⁾	–
105	End of call ⁽⁴⁾	–
106	Data ⁽⁵⁾	Modem
107	(2)	–
108	(2)	–
109	J3E	Telephone
110	Distress acknowledgement	–
111	H3E	Telephone
112	Distress relay	–
113	F1B/J2B FEC	Teleprinter ⁽⁶⁾
114	(2)	–
115	F1B/J2B ARQ	Telex/teleprinter ⁽⁶⁾
116	F1B/J2B receive	Teleprinter
118	Test ⁽⁷⁾	–
119	F1B/J2B	Teleprinter
120	A1A Morse	Tape recorder
121	Ship position or location registration updating	–
123	A1A Morse	Morse key/head-set
124	F1C/F2C/F3C	Facsimile machine
126	No information ⁽⁸⁾	–

(1) Symbols 117, 122, 125 and 127 should not be used.

(2) Currently unassigned – for future use.

(3) One of second telecommand symbols 100-109 must follow (see Table 12).

(4) Only used for semi-automatic/automatic service.

(5) One of second telecommand symbols 115-124 should follow (see Table 12).

(6) Equipment according to Recommendation ITU-R M.476 or Recommendation ITU-R M.625.

(7) See § 8.4.

(8) See § 8.2.1.2.

TABLE 12
Second telecommand character

Symbol No. ⁽¹⁾	Meaning	For use with the following first telecommand signals
100	No reason given ⁽²⁾	104 (Unable to comply) ⁽³⁾
101	Congestion at maritime switching centre ⁽²⁾	
102	Busy ⁽²⁾	
103	Queue indication ⁽²⁾	
104	Station barred ⁽²⁾	
105	No operator available ⁽²⁾	
106	Operator temporarily unavailable ⁽²⁾	
107	Equipment disabled ⁽²⁾	
108	Unable to use proposed channel ⁽²⁾	
109	Unable to use proposed mode ⁽²⁾	
110	Ships and aircraft according to Resolution No. 18 (Mob-83)	Any except 104, 105, 106, 110, 112 or 118
111	Medical transport (as defined in 1949 Geneva Convention and additional Protocols)	
112	Pay-phone public call office	100, 101, 109, 115 or 124
113	Facsimile/data according to Recommendation ITU-R M.1081	106
114	⁽⁴⁾	–
115	Data V.21 ⁽⁵⁾	106 (Data)
116	Data V.22 ⁽⁵⁾	
118	Data V.22 <i>bis</i> ⁽⁵⁾	
119	Data V.23 ⁽⁵⁾	
120	Data V.26 <i>bis</i> ⁽⁵⁾	
121	Data V.26 <i>ter</i> ⁽⁵⁾	
123	Data V.27 <i>ter</i> ⁽⁵⁾	
124	Data V.32 ⁽⁵⁾	
126	No information ⁽⁶⁾	Any except 104, 110 or 112

(1) Symbols 117, 122, 125 and 127 should not be used.

(2) Currently unassigned when used with first telecommands other than symbol No. 104 – for future use.

(3) When second telecommands 100-109 are given alternative assignments (see ⁽²⁾), they may be used with first telecommands other than symbol No. 104.

(4) Currently unassigned – for future use.

(5) Data communication in accordance with these ITU-T Recommendations may require special provision at coast stations and may not be practicable in all frequency bands.

(6) See § 8.2.1.1.

TABLE 13

Frequency or channel information

Frequency	0 1 2	X X X	X X X	X X X	X X X	X X X	The frequency in multiples of 100 Hz as indicated by the figures for the digits HM, TM, M, H, T, U.
Channels	3	X	X	X	X	X	The HF/MF working channel number indicated by the values of the digits TM, M, H, T and U.
	8	X	X	X	X	X	Only used for Recommendation ITU-R M.586 equipment.
	9	O	X ⁽¹⁾	X	X	X	The VHF working channel number indicated by the values of the digits M, H, T and U.
	HM	TM	M	H	T	U	
	Character 3	Character 2		Character 1 ⁽²⁾			

⁽¹⁾ If the M digit is 1 this indicates that the ship stations transmitting frequency is being used as a simplex channel frequency for both ship and coast stations. If the M digit is 2 this indicates that the coast stations transmitting frequency is being used as a simplex channel frequency for both ship and coast stations.

⁽²⁾ Character 1 is the last character transmitted.

TABLEAU 14

Position information (Annex 1, § 8.2.2.3)

	Quadrant digit NE = 0 NW = 1 SE = 2 SW = 3	Latitude				Longitude				
		Tens of degrees	Units of degrees	Tens of minutes	Units of minutes	Hundreds of degrees	Tens of degrees	Units of degrees	Tens of minutes	Units of minutes
55	X	X	X	X	X	X	X	X	X	X
Character 6	Character 5		Character 4		Character 3		Character 2		Character 1 ⁽¹⁾	

⁽¹⁾ Character 1 is the last character transmitted.

ANNEX 2

Equipment classes

1 Class A equipment, which includes all the facilities defined in Annex 1, will comply with the IMO GMDSS carriage requirements for MF/HF installations.

Class B equipment providing minimum facilities for equipment on ships not required to use Class A equipment and complying with the minimum IMO GMDSS carriage requirements for MF and/or VHF installations.

Class D equipment is intended to provide minimum facilities for VHF DSC distress, urgency and safety as well as routing calling and reception, not necessarily in full accordance with IMO GMDSS carriage requirements for VHF installations.

Class E equipment is intended to provide minimum facilities for MF and/or HF DSC distress, urgency and safety as well as routine calling and reception, not necessarily in full accordance with IMO GMDSS carriage requirements for MF/HF installations.

Class F equipment is intended to provide for VHF DSC distress, urgency and safety calling and also for reception of acknowledgements to its own distress calls (in order to terminate the transmission) (see Note 1).

Class G equipment is intended to provide for MF DSC distress, urgency and safety calling and also for reception of acknowledgements to its own distress calls (in order to terminate the transmission).

NOTE 1 – Class C equipment as defined in earlier versions of this Recommendation (e.g., Recommendation ITU-R M.493-5 (Geneva, 1992)) has been replaced by Class F equipment.

2 The technical requirements for Class B, D, E, F and G are given in § 3, 4, 5, 6 and 7 below.

3 Class B (MF and/or VHF only)

3.1 Transmit capabilities

3.1.1 Format specifier: Distress call
All ships call
Individual station call
Semi-automatic/automatic service call.

3.1.2 The numerical identification of the called station (address).

3.1.3 Category: Distress
Urgency
Safety
Routine.

3.1.4 Self-identification (automatically inserted).

3.1.5 Messages

3.1.5.1 For distress calls:

Message 1: Nature of distress, defaulting to undesignated distress

Message 2: Distress coordinates

Message 3: Time for last position update

Message 4: Type of subsequent communication:
MF: H3E or J3E
VHF: F3E/G3E simplex

3.1.5.2 For distress relay calls:

First telecommand: Distress relay
 Identification of the ship: As defined in Annex 1
 Messages 1 to 4: As § 3.1.5.1

3.1.5.3 For distress acknowledgement calls:

First telecommand: Distress acknowledgement
 Identification of the ship: As defined in Annex 1
 Messages 1 to 4: As § 3.1.5.1

3.1.5.4 For all other calls:

First telecommand:

Unable to comply

MF: for individual station calls H3E, J3E or “test” (see Annex 1 § 8.4); for calls using the semi-automatic/automatic MF-services H3E, J3E or “end of call”.

VHF: for individual station calls F3E/G3E simplex or duplex; for calls using the semi-automatic/automatic VHF-services F3E/G3E simplex or duplex or “end of call”.

Second telecommand: No information

Frequency/channel or ship’s position: As defined in Annex 1

Selection information

(semi-automatic/automatic service): Telephone number of public telephone subscriber

3.1.6 End of sequence character: as defined in Annex 1.

3.2 Receive capabilities

3.2.1 Receive and be capable of displaying all the information in calls listed in § 3.1 plus all distress relay calls having the format specifier “geographical area calls”, all distress acknowledgement calls and all “unable to comply” calls.

3.2.2 Audible alarm upon reception of any DSC call.

4 Class D (VHF only)**4.1 Transmit capabilities**

4.1.1 Format specifier: Distress call
 All ships call
 Individual station call.

4.1.2 The numerical identification of the called station (address).

4.1.3 Category: Distress
 Urgency
 Safety
 Routine.

4.1.4 Self-identification (automatically inserted).

4.1.5 Messages

4.1.5.1 For distress calls:

Message 1: Nature of distress, defaulting to undesignated distress

Message 2: Distress coordinates

Message 3: Time for last position update

Message 4: Type of subsequent communication: F3E/G3E simplex.

4.1.5.2 For all other calls:

First telecommand:	F3E/G3E simplex Unable to comply
Second telecommand:	No information
Frequency/channel information:	VHF working channel, defaulting to channel 16 for urgency and safety calls.

4.1.6 End of sequence character: as defined in Annex 1.

4.2 Receive capabilities

Receive and be capable of displaying all the information in calls listed in § 4.1 plus all distress relay calls except those having the format specifier “geographical area calls”, all distress acknowledgement calls and all “unable to comply” calls.

5 Class E (MF and/or HF only)

5.1 Transmit capabilities

5.1.1 Format specifier: Distress call
All ships call
Individual station call.

5.1.2 The numerical identification of the called station (address).

5.1.3 Category: Distress
Urgency
Safety
Routine.

5.1.4 Self-identification (automatically inserted).

5.1.5 Messages

5.1.5.1 For distress calls:

Message 1: Nature of distress, defaulting to undesignated distress
 Message 2: Distress coordinates
 Message 3: Time for last position update
 Message 4: Type of subsequent communication: H3E or J3E

5.1.5.2 For all other calls:

First telecommand:	J3E telephony Unable to comply No information
Second telecommand:	No information
Frequency/channel information:	MF/HF working channel, on MF defaulting to 2 182 kHz for urgency and safety calls.

5.1.6 End of sequence character: as defined in Annex 1.

5.2 Receive capabilities

Receive and be capable of displaying all the information in calls listed in § 5.1 plus all distress relay calls having the format specifier “geographical area calls”, all distress acknowledgement calls and all “unable to comply” calls.

6 Class F (VHF only)

6.1 Transmit capabilities

6.1.1 Format specifier: Distress call
All ships call.

6.1.2 Category: Distress
Urgency
Safety.

6.1.3 Self-identification (automatically inserted).

6.1.4 Messages

6.1.4.1 For distress calls:

Message 1: Undesignated distress

Message 2: Distress coordinates (see Note 1)

Message 3: Time for last position update (see Note 1)

Message 4: F3E/G3E simplex.

NOTE 1 – The distress coordinates and time information may be provided solely by means of the interface specified in Annex 1, § 8.1.2.5. In the absence of this information, Annex 1, § 8.1.2.4 and 8.1.3.3 apply.

6.1.4.2 For all other calls:

First telecommand: F3E/G3E simplex

Second telecommand: No information

Frequency/channel information: channel 16.

6.2 Receive capabilities

The equipment should be able to receive acknowledgements to its own distress calls.

7 Class G (MF only)

7.1 Transmit capabilities

7.1.1 Format specifier: Distress call
All ships call.

7.1.2 Category: Distress
Urgency
Safety.

7.1.3 Self-identification (automatically inserted).

7.1.4 Messages

7.1.4.1 For distress calls:

Message 1: Undesignated distress

Message 2: Distress coordinates (see Note 1 of § 6.1.4.1)

Message 3: Time for last position update (see Note 1 of § 6.1.4.1)

Message 4: J3E telephony.

7.1.4.2 For other calls:

First telecommand: J3E telephony

Second telecommand: No information

Frequency/channel information: 2 182 kHz.

7.2 Receive capabilities

The equipment should be able to receive acknowledgements to its own distress calls.

RECOMMENDATION ITU-R M.541-8*

**OPERATIONAL PROCEDURES FOR THE USE OF DIGITAL SELECTIVE-CALLING
EQUIPMENT IN THE MARITIME MOBILE SERVICE**

(Question ITU-R 9/8)

(1978-1982-1986-1990-1992-1994-1995-1996-1997)

Summary

The Recommendation contains the operational procedures for digital selective-calling (DSC) equipment whose technical characteristics are given in Recommendation ITU-R M.493. The Recommendation contains four annexes. In Annexes 1 and 2 the provisions and procedures are described for distress and safety calls and for non-distress and safety calls, respectively. In Annexes 3 and 4 the operational procedures for ships and for coast stations are described and Annex 5 lists the frequencies to be used for DSC.

The ITU Radiocommunication Assembly,

considering

- a) Resolution No. 311 and Recommendation No. 312 of the World Administrative Radio Conference (Geneva, 1979) (WARC-79);
- b) that digital selective-calling (DSC) will be used as described in Recommendation ITU-R M.493;
- c) that the requirements of Chapter IV of the 1988 Amendments to the International Convention for the Safety of Life at Sea (SOLAS), 1974, for the Global Maritime Distress and Safety System (GMDSS) are based on the use of DSC for distress alerting on terrestrial frequencies and that operational procedures are necessary for transition to, and implementation of, that system;
- d) that, as far as is practicable, operational procedures in all frequency bands and for all types of communications should be similar;
- e) that DSC may provide a useful supplementary means of transmitting a distress call in addition to the provisions of transmitting the distress call by existing methods and procedures in the Radio Regulations (RR);
- f) that conditions when alarms have to be actuated should be specified,

recommends

- 1** that the technical characteristics of equipment used for DSC in the maritime mobile service should be in conformity with the relevant ITU-R Recommendations;
- 2** that the operational procedures to be observed in the MF, HF and VHF bands for DSC should be in accordance with Annex 1 for distress and safety calls and Annex 2 for other calls;
- 3** that provisions should be made at stations equipped for DSC for:
 - 3.1** the manual entry of address, type of call, category and various messages into a DSC sequence;
 - 3.2** the verification and if necessary the correction of such manually formed sequences;
 - 3.3** a specific aural alarm and visual indication 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 indication. Provisions should be made to ensure that they can be reset only manually;

* This Recommendation should be brought to the attention of the International Maritime Organization (IMO) and the ITU Telecommunication Standardization Sector (ITU-T).

- 3.4 aural alarm(s) and visual indication for calls other than distress and urgency. The aural alarm(s) may be capable of being disabled;
- 3.5 such visual indicators to indicate:
- 3.5.1 type of received call address (to all stations, to a group of stations, geographical, individual);
- 3.5.2 category;
- 3.5.3 identity of calling station;
- 3.5.4 numerical or alpha-numerical type of information, e.g. frequency information and telecommand;
- 3.5.5 type of “end of sequence” character;
- 3.5.6 detection of errors, if any;
- 3.6 monitoring the VHF channel used for digital selective-calling purposes to determine the presence of a signal and, except for distress and safety calls, provide facilities for automatically preventing the transmission of a DSC call until the channel is free;
- 3.7 ship originated routine all-ships calls on VHF should be transmitted at a power level of 1 W or less. Integrated VHF DSC equipment should automatically reduce power for transmission of these calls;
- 4 that the equipment should be simple to operate;
- 5 that the operational procedures given in Annex 3, which are based on the relevant procedures from Annexes 1 and 2 and from the RR, be used as guidance for ships and coast stations;
- 6 that the frequencies used for distress and safety purposes using DSC are those contained in Annex 4 to this Recommendation (see also RR Article 38 (Appendix S13, Part A2)).

NOTE 1 – The following definitions are used throughout this Recommendation:

Single frequency: the same frequency is used for transmission and reception;

Paired frequencies: frequencies which are associated in pairs; each pair consisting of one transmitting and one receiving frequency;

International DSC frequencies: those frequencies designated in the RR for exclusive use for DSC on an international basis;

National DSC frequencies: those frequencies assigned to individual coast stations or a group of stations on which DSC is permitted (this may include working frequencies as well as calling frequencies). The use of these frequencies must be in accordance with the RR;

Automatic DSC operation at a ship station: a mode of operation employing automatic tunable transmitters and receivers, suitable for unattended operation, which provide for automatic call acknowledgements upon reception of a DSC and automatic transfer to the appropriate working frequencies;

Call attempt: one or a limited number of call sequences directed to the same stations on one or more frequencies and within a relatively short time period (e.g. a few minutes). A call attempt is considered unsuccessful if a calling sequence contains the symbol RQ at the end of the sequence and no acknowledgement is received in this time interval.

ANNEX 1

Provisions and procedures for distress and safety calls

1 Introduction

The terrestrial elements of the GMDSS adopted by the 1988 Amendments to the International Convention for SOLAS, 1974, are based on the use of DSC for distress and safety communications.

1.1 Method of calling

The provisions of Chapter NIX (SVII) are applicable to the use of DSC in cases of distress, urgency or safety.

2 DSC distress call and message

The DSC “distress call” provides for alerting, self-identification, ship’s position including time, nature of distress and contains both the distress call (RR No. 3091 and 3092 (Appendix S13, Part A3, § 4)) and the distress message (RR No. 3093 and 3094 (Appendix S13, Part A3, § 5)) as defined in the RR.

3 Procedures for DSC distress calls

3.1 Transmission by a mobile unit in distress

3.1.1 The DSC equipment should be capable of being preset to transmit the distress call on at least one distress alerting frequency.

3.1.2 The distress call shall be composed in accordance with Recommendation ITU-R M.493; the ship’s position information, the time at which it was taken and the nature of distress should be entered as appropriate. If the position of the ship cannot be entered, then the position information signals shall be transmitted automatically as the digit 9 repeated ten times. If the time cannot be included, then the time information signals shall be transmitted automatically as the digit 8 repeated four times.

3.1.3 Distress call attempt

At MF and HF a distress call attempt may be transmitted as a single frequency or a multi-frequency call attempt. At VHF only single frequency call attempts are used.

3.1.3.1 Single frequency call attempt

A distress call attempt should be transmitted as 5 consecutive calls on one frequency. To avoid call collision and the loss of acknowledgements, this call attempt may be transmitted on the same frequency again after a random delay of between 3½ and 4½ min from the beginning of the initial call. This allows acknowledgements arriving randomly to be received without being blocked by retransmission. The random delay should be generated automatically for each repeated transmission, however it should be possible to override the automatic repeat manually.

At MF and HF, single frequency call attempts may be repeated on different frequencies after a random delay of between 3½ and 4½ min from the beginning of the initial call. However, if a station is capable of receiving acknowledgements continuously on all distress frequencies except for the transmit frequency in use, then single frequency call attempts may be repeated on different frequencies without this delay.

3.1.3.2 Multi-frequency call attempt

A distress call attempt may be transmitted as up to 6 consecutive (see Note 1) calls dispersed over a maximum of 6 distress frequencies (1 at MF and 5 at HF). Stations transmitting multi-frequency distress call attempts should be able to receive acknowledgements continuously on all frequencies except for the transmit frequency in use, or be able to complete the call attempt within 1 min.

Multi-frequency call attempts may be repeated after a random delay of between 3½ and 4½ min from the beginning of the previous call attempt.

NOTE 1 – A VHF call may be transmitted simultaneously with an MF/HF call.

3.1.4 Distress

In the case of distress the operator should:

3.1.4.1 enter the desired mode of the subsequent communication and if time permits, enter the ship’s position and time (see Note 1) it was taken and the nature of distress (see Note 1);

NOTE 1 – If these are not provided automatically.

3.1.4.2 select the distress frequency(ies) to be used (see Note 1 of § 3.1.4.1);

3.1.4.3 activate the “distress call” attempt by a dedicated distress button.

3.1.5 Cancellation of an inadvertent distress call

A station transmitting an inadvertent distress call shall immediately cancel the alert over each channel on which the distress call was transmitted. For this purpose, a "distress cancellation" call in the format indicated in Recommendation ITU-R M.493, Fig. 4c) may be transmitted with own ship's maritime mobile service identity (MMSI) inserted as identification of ship in distress.

This distress cancellation should be followed immediately by the voice cancellation procedure as described in Annex 3 (§ 1.7).

3.2 Reception

The DSC equipment should be capable of maintaining a reliable watch on a 24-hour basis on appropriate DSC distress alerting frequencies.

3.3 Acknowledgement of distress calls

Acknowledgements of distress calls should be initiated manually.

Acknowledgements should be transmitted on the same frequency as the distress call was received.

3.3.1 Distress calls should normally be acknowledged by DSC only by appropriate coast stations. Coast stations should, in addition, set watch on radiotelephony and, if the «mode of subsequent communication» signal in the received distress call indicates teleprinter, also on narrow-band direct-printing (NBDP) (see Recommendation ITU-R M.493). In both cases, the radiotelephone and NBDP frequencies should be those associated with the frequency on which the distress call was received.

3.3.2 Acknowledgements by coast stations of DSC distress calls transmitted on MF or HF should be initiated with a minimum delay of 1 min after receipt of a distress call, and normally within a maximum delay of 2¼ min. This allows all calls within a single frequency or multi-frequency call attempt to be completed and should allow sufficient time for coast stations to respond to the distress call. Acknowledgements by coast stations on VHF should be transmitted as soon as practicable.

3.3.3 The acknowledgement of a distress call consists of a single DSC acknowledgement call which should be addressed to “all ships” and include the identification (see Recommendation ITU-R M.493) of the ship whose distress call is being acknowledged.

3.3.4 Ship stations should, on receipt of a distress call, set watch on an associated radiotelephone distress and safety traffic frequency and acknowledge the call by radiotelephony. If a ship station continues to receive a DSC distress call on an MF or VHF channel, a DSC acknowledgement should be transmitted to terminate the call and should inform a coast station or coast earth station by any practicable means.

3.3.5 The automatic repetition of a distress call attempt should be terminated automatically on receipt of a DSC distress acknowledgement.

3.3.6 When distress and safety traffic cannot be successfully conducted using radiotelephony, an affected station may indicate its intention (using an “all ships” DSC call, with the category distress, and normally indicating the frequency of the associated NBDP channel) to conduct subsequent communications on the associated frequency for NBDP telegraphy.

3.4 Distress relays

Distress relay calls should be initiated manually.

3.4.1 A distress relay call should use the telecommand signal “distress relay” in accordance with Recommendation ITU-R M.493 and the calling attempt should follow the procedures described in § 3.1.3 to 3.1.3.2 for distress calls.

3.4.2 Any ship, receiving a distress call on an HF channel which is not acknowledged by a coast station within 5 min, should transmit a distress relay call to the appropriate coast station.

3.4.3 Distress relay calls transmitted by coast stations, or by ship stations addressed to “all ships”, should be acknowledged by ship stations using radiotelephony. Distress relay calls transmitted by ships should be acknowledged by a coast station transmitting a “distress relay acknowledgement” call in accordance with the procedures for distress acknowledgements given in § 3.3 to 3.3.3.

4 Procedures for DSC urgency and safety calls (see Note 1)

4.1 DSC, on the distress and safety calling frequencies, should be used by coast stations to advise shipping, and by ships to advise coast stations and/or ship stations, of the impending transmission of urgency, vital navigational and safety messages, except where the transmissions take place at routine times. The call should indicate the working frequency which will be used for the subsequent transmission of an urgent, vital navigational or safety message.

4.2 The announcement and identification of medical transports should be carried out by DSC techniques, using appropriate distress and safety calling frequencies. Such calls should use the category “urgency”, and telecommand “medical transport” and be addressed to “all ships”.

4.3 The operational procedures for urgency and safety calls should be in accordance with the relevant parts of Annex 2, § 2.1 or 2.2.

NOTE 1 – Use of the DSC distress and safety calling frequencies for urgency and safety calls is acceptable, technically, provided that the total channel loading is maintained below 0.1 E.

5 Testing the equipment used for distress and safety calls

Testing on the exclusive DSC distress and safety calling frequencies should be avoided as far as possible by using other methods. There should be no test transmissions on the DSC calling channel on VHF. However, when testing on the exclusive DSC distress and safety calling frequencies on MF and HF is unavoidable, it should be indicated that these are test transmissions (see RR No. N 3068 (S31.3)). The test call should be composed in accordance with Recommendation ITU-R M.493 (see Table 6) and the call should be acknowledged by the called coast station. Normally there would be no further communication between the two stations involved.

ANNEX 2

Provisions and procedures for calls other than distress and safety

1 Frequency/channels

1.1 As a rule, paired frequencies should be used at HF and MF, in which case an acknowledgement is transmitted on the frequency paired with the frequency of the received call. In exceptional cases for national purposes a single frequency may be used. If the same call is received on several calling channels, the most appropriate shall be chosen to transmit the acknowledgement. A single frequency channel should be used at VHF.

1.2 International calling

The paired frequencies listed in RR Appendix 31 (Appendix S17, Part A) and in Annex 5 of this Recommendation should be used for international DSC calling.

1.2.1 At HF and MF international DSC frequencies should only be used for shore-to-ship calls and for the associated call acknowledgements from ships fitted for automatic DSC operation where it is known that the ships concerned are not listening to the coast station’s national frequencies.

1.2.2 All ship-to-shore DSC calling at HF and MF should preferably be done on the coast station's national frequencies.

1.3 National calling

Coast stations should avoid using the international DSC frequencies for calls that may be placed using national frequencies.

1.3.1 Ship stations should keep watch on appropriate national and international channels. (Appropriate measures should be taken for an even loading of national and international channels.)

1.3.2 Administrations are urged to find methods and negotiate terms to improve the utilization of the DSC channels available, e.g.:

- coordinated and/or joint use of coast station transmitters;
- optimizing the probability of successful calls by providing information to ships on suitable frequencies (channels) to be watched and by information from ships to a selected number of coast stations on the channels watched on-board.

1.4 Method of calling

1.4.1 The procedures set out in this section are applicable to the use of DSC techniques, except in cases of distress, urgency or safety, to which the provisions of RR Chapter NIX (SVII) are applicable.

1.4.2 The call shall contain information indicating the station or stations to which the call is directed, and the identification of the calling station.

1.4.3 The call should also contain information indicating the type of communication to be set up and may include supplementary information such as a proposed working frequency or channel; this information shall always be included in calls from coast stations, which shall have priority for that purpose.

1.4.4 An appropriate digital selective calling channel chosen in accordance with the provisions of RR Nos.43235 to 4323AB (S52.128 to S52.137) or Nos. 4323AJ to 4323AR (S52.145 to S52.153), as appropriate, shall be used for the call.

2 Operating procedures

The technical format of the call sequence shall be in conformity with the relevant ITU-R Recommendations.

The reply to a DSC requesting an acknowledgement shall be made by transmitting an appropriate acknowledgement using DSC techniques.

Acknowledgements may be initiated either manually or automatically. When an acknowledgement can be transmitted automatically, it shall be in conformity with the relevant ITU-R Recommendations.

The technical format of the acknowledgement sequence shall be in conformity with the relevant ITU-R Recommendations.

For communication between a coast station and a ship station, the coast station shall finally decide the working frequency or channel to be used.

The forwarding traffic and the control for working for radiotelephony shall be carried out in accordance with Recommendation ITU-R M.1171.

A typical DSC calling and acknowledgement sequence contains the following signals (see Recommendation ITU-R M.493).

Composition of a typical DSC calling and acknowledgement sequence

<i>Signal</i>	<i>Method of composition</i>
– format specifier	selected
– address	entered
– category	selected
– self-identification	pre-programmed
– telecommand information	selected

- frequency information (if appropriate) entered
- telephone number (semi-automatic/automatic ship-to-shore connections only) entered
- end of sequence signal selected (see Note 1).

NOTE 1 – If the calling sequence EOS signal incorporates a request for acknowledgement “RQ” (117) an acknowledgement is mandatory and shall incorporate the EOS signal “BQ” (122).

The method of composing a DSC sequence is illustrated in the flow diagram of Fig. 5.

2.1 Coast station initiates call to ship

Figures 1 and 2 illustrate the procedures below in flow chart and by time sequence diagram respectively.

2.1.1 There are two categories of calls for commercial communications:

- routine call;
- ship’s business call (see Recommendation ITU-R M.493, Annex 1, § 6.4.1).

2.1.2 If a direct connection exists between the calling subscriber and the coast station, the coast station asks the calling subscriber for the approximate position of the ship.

2.1.3 If the ship’s position cannot be indicated by the caller, the coast station operator tries to find the location in the information available at the coast station.

2.1.4 The coast station checks to see whether the call would be more appropriate through another coast station (see § 1.3.2).

2.1.5 The coast station checks to see whether the transmission of a DSC is inappropriate or restricted (e.g. ship not fitted with DSC or barred).

2.1.6 Assuming a DSC is appropriate the coast station composes the calling sequence as follows:

- selects format specifier,
- enters address of the ship,
- selects category,
- selects telecommand information,
- inserts working frequency information in the message part of the sequence, if appropriate,
- usually selects “end of sequence” signal “RQ”. However, if the coast station knows that the ship station cannot respond or the call is to a group of ships the frequency is omitted and the end of sequence signal should be 127, in which case the following procedures (§ 2.1.13 to 2.1.15) relating to an acknowledgement are not applicable.

2.1.7 The coast station verifies the calling sequence.

The call shall be transmitted once on a single appropriate calling channel or frequency only. Only in exceptional circumstances may a call be transmitted simultaneously on more than one frequency.

2.1.8 The coast station operator chooses the calling frequencies which are most suitable for the ship’s location.

2.1.8.1 After checking as far as possible that there are no calls in progress, the coast station operator initiates the transmission of the sequence on one of the frequencies chosen. Transmission on any one frequency should be limited to no more than 2 call sequences separated by intervals of at least 45 s to allow for reception of an acknowledgement from the ship, or exceptionally (see Recommendation ITU-R M.493) to one “call attempt” consisting of up to five transmissions.

2.1.8.2 If appropriate, a “call attempt” may be transmitted, which may include the transmission of the same call sequence on other frequencies (if necessary with a change of working frequency information to correspond to the same band as the calling frequency) made in turn at intervals of not less than 5 min, following the same pattern as in § 2.1.8.1.

2.1.9 If an acknowledgement is received further transmission of the call sequence should not take place.

The coast station shall then prepare to transmit traffic on the working channel or frequency it has proposed.

2.1.10 The acknowledgement of the received call should only be transmitted upon receipt of a calling sequence which terminates with an acknowledgement request.

2.1.11 When a station called does not reply, the call attempt should not normally be repeated until after an interval of at least 15 min. The same call attempt should not be repeated more than five times every 24 h. The aggregate of the times for which frequencies are occupied in one call attempt, should normally not exceed 1 min.

The following procedures apply at the ship:

2.1.12 Upon receipt of a calling sequence at the ship station, the received message is recorded and an appropriate indication is activated as to whether the call category is "routine" or "ship's business". The category does not affect the DSC procedures at the ship.

2.1.13 When a received call sequence contains an end of sequence signal RQ, an acknowledgement sequence should be composed and transmitted in accordance with § 2.

The format specifier and category information should be identical to that in the received calling sequence.

2.1.13.1 If the ship station is not equipped for automatic DSC operation, the ship's operator initiates an acknowledgement to the coast station after a delay of at least 5 s but no later than 4½ min of receiving the calling sequence, using the ship-to-shore calling procedures detailed in § 2.2. However the transmitted sequence should contain a "BQ" end of sequence signal in place of the "RQ" signal.

If such an acknowledgement cannot be transmitted within 5 min of receiving the calling sequence then the ship station should instead transmit a calling sequence to the coast station using the ship-to-shore calling procedure detailed in § 2.2.

2.1.13.2 If the ship is equipped for automatic DSC operation, the ship station automatically transmits an acknowledgement with an end of sequence signal "BQ". The start of the transmission of this acknowledgement sequence should be within 30 s for HF and MF or within 3 s for VHF after the reception of the complete call sequence.

2.1.13.3 If the ship is able to comply immediately the acknowledgement sequence should include a telecommand signal which is identical to that received in the calling sequence indicating that it is able to comply.

If no working frequency was proposed in the call, the ship station should include a proposal for a working frequency in its acknowledgement.

2.1.13.4 If the ship is not able to comply immediately the acknowledgement sequence should include the telecommand signal 104 (unable to comply), with a second telecommand signal giving additional information (see Recommendation ITU-R M.493).

At some later time when the ship is able to accept the traffic being offered, the ship's operator initiates a call to the coast station using the ship-to-shore calling procedures detailed in § 2.2.

2.1.14 If a call is acknowledged indicating ability to comply immediately and communication between coast station and ship station on the working channel agreed is established, the DSC call procedure is considered to be completed.

2.1.15 If the ship station transmits an acknowledgement which is not received by the coast station then this will result in the coast station repeating the call (in accordance with § 2.1.11). In this event the ship station should transmit a new acknowledgement. If no repeated call is received the ship station should transmit an acknowledgement or calling sequence in accordance with § 2.1.13.1.

FIGURE 1

Flow chart of operational procedures for calling in the shore-to-ship direction

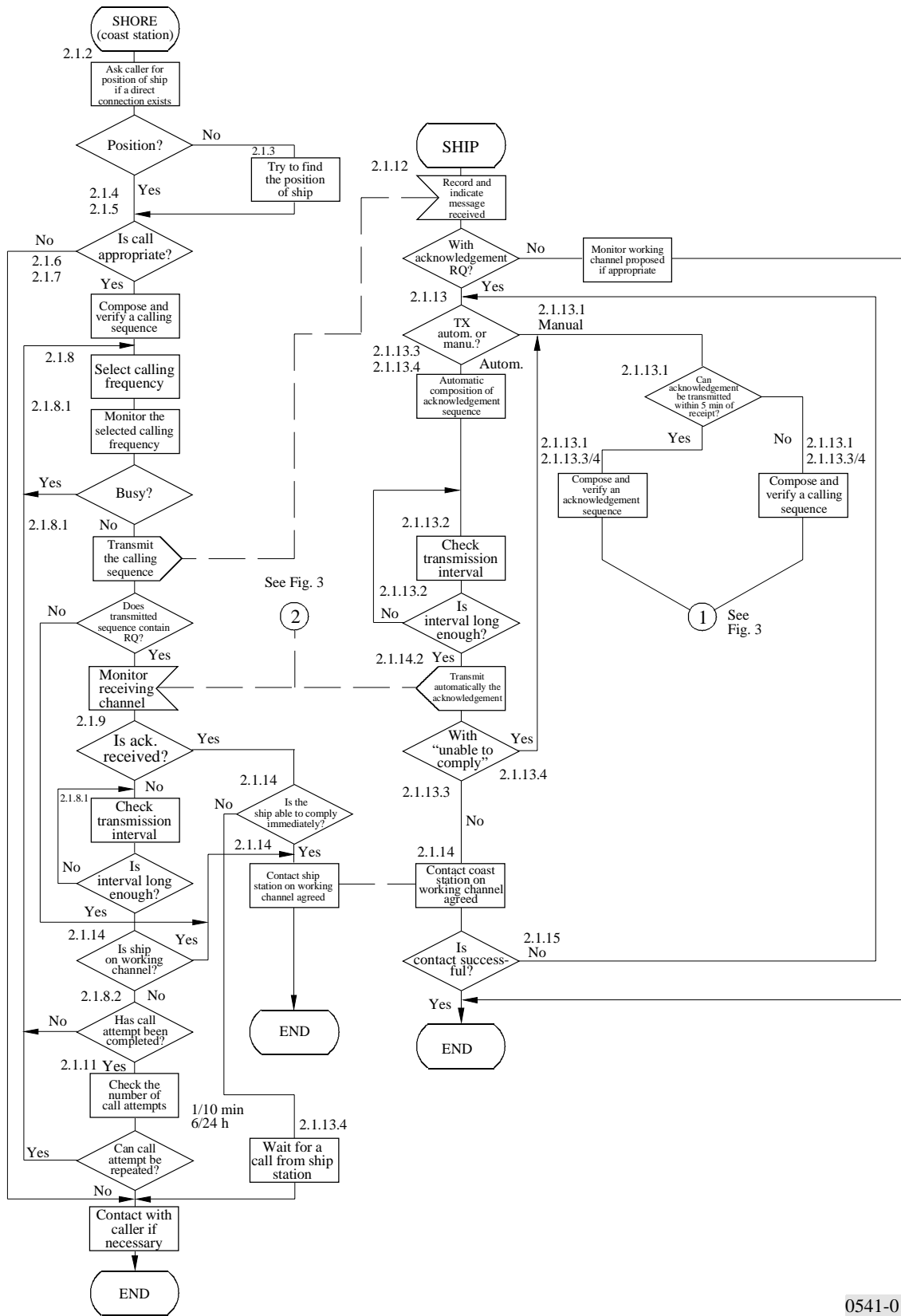
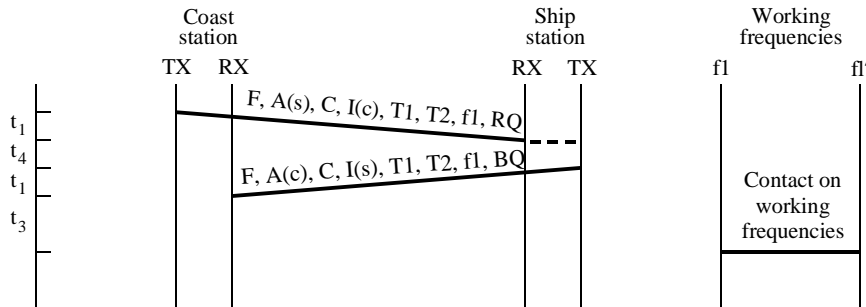
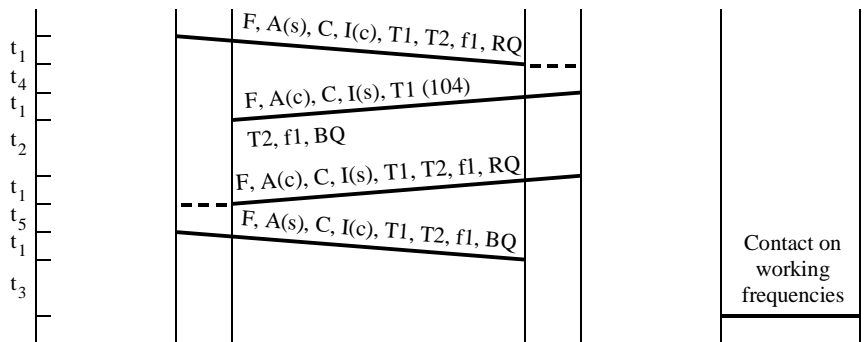


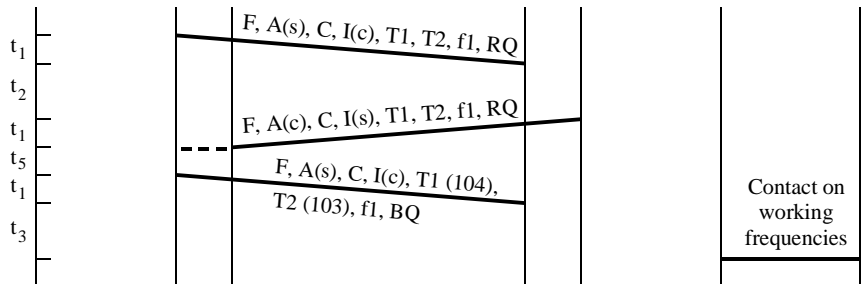
FIGURE 2
Examples of timing diagrams for calling in shore-to-ship direction



a) Automated transmitter (able to comply)



b) Automated transmitter (unable to comply)



c) Ship transmitter not automated. Ship makes a delayed (>5 min) response to coast station and encounters queue on working frequency

- | | | |
|--|-----------|--|
| t_1 : transmission time of a DSC sequence | F | : format specifier |
| t_2 : interval between the DSC reception at the ship and transmission from the ship after the operator's appearance in the radio room (from several minutes up to several hours) | A | : called station address |
| t_3 : transition time from calling to working frequency including, if necessary, the time for working channel clearing (queue waiting time) | I | : calling station self-identification |
| t_4 : as defined in § 2.1.13.2 | C | : category |
| t_5 : time for coast station to prepare acknowledgment (see § 2.2.6) | T1 | : first telecommand signal, (104) indicates unable to comply |
| | T2 | : second telecommand signal, (103) indicates queue |
| | $f1, f1'$ | : working frequencies |
| | RQ, BQ | : end of sequence signals |

2.2 Ship station initiates call to coast station (see Note 1)

Figures 3 and 4 illustrate the procedures below in flow chart and by time sequence diagram respectively.

This procedure should also be followed both as a delayed response to a call received earlier from the coast station (see § 2.1.13.1) and to initiate traffic from the ship station.

NOTE 1 – See Recommendations ITU-R M.689 and ITU-R M.1082 for further details of procedures applicable only to the semi-automatic/automatic services.

2.2.1 The ship composes the calling sequence as follows:

- selects the format specifier,
- enters address,
- selects the category,
- selects the telecommand information,
- inserts working frequency information in the message part of the sequence if appropriate,
- inserts telephone number required (semi-automatic/automatic connections only),
- selects the “end of sequence” signal RQ.

2.2.2 The ship verifies the calling sequence.

2.2.3 The ship selects the single most appropriate calling frequency preferably using the coast station’s nationally assigned calling channels, for which purpose it shall send a single calling sequence on the selected frequency.

2.2.4 The ship initiates the transmission of the sequence on the frequency selected after checking as far as possible that there are no calls in progress on that frequency.

2.2.5 If a called station does not reply, the call sequence from the ship station should not normally be repeated until after an interval of at least 5 min for manual connections, or 5 s or 25 s in the case of semi-automatic/automatic VHF or MF/HF connections respectively. These repetitions may be made on alternative frequencies if appropriate. Any subsequent repetitions to the same coast station should not be made until at least 15 min have elapsed.

2.2.6 The coast station should transmit an acknowledgement sequence (after checking as far as possible that there are no calls in progress on the frequency selected), after a delay of at least 5 s but not later than 4½ min for manual connections, or, within 3 s for semi-automatic/automatic connections, containing the format specifier, the address of the ship, the category, the coast station self-identification and:

- if able to comply immediately on the working frequency suggested, the same telecommand and frequency information as in the call request;
- if no working frequency was suggested by the ship station then the acknowledgement sequence should include a channel/frequency proposal;
- if not able to comply on the working frequency suggested but able to comply immediately on an alternative frequency, the same telecommand information as in the call request but an alternative working frequency;
- if unable to comply immediately the telecommand signal 104 with a second telecommand signal giving additional information. For manual connections only, this second telecommand signal may include a queue indication.

The end of sequence signal BQ should also be included.

2.2.7 For manual connections, if a working frequency is proposed in accordance with § 2.2.6 but this is not acceptable to the ship station, then the ship station should immediately transmit a call to the coast station indicating (by the use of telecommand signals 104 and 108) that it cannot comply on that frequency.

2.2.7.1 The coast station should then transmit an acknowledgement in accordance with § 2.2.6 either accepting the ship station’s original suggested frequency or proposing a second alternative.

FIGURE 3

Flow chart of operational procedures for calling in the ship-to-shore direction

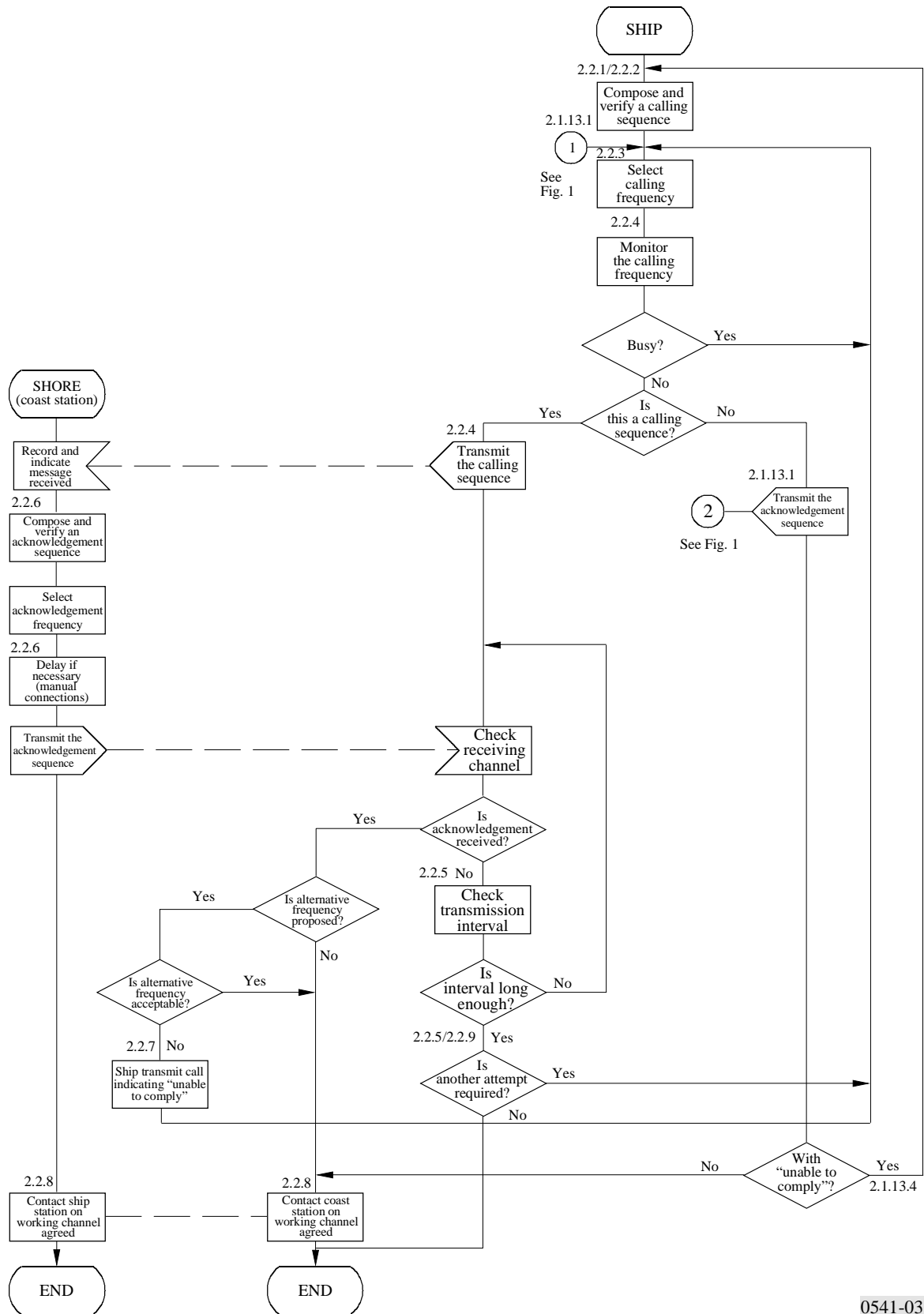
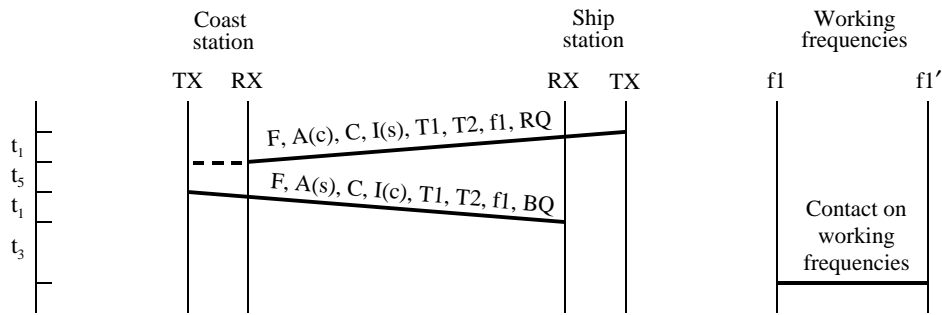
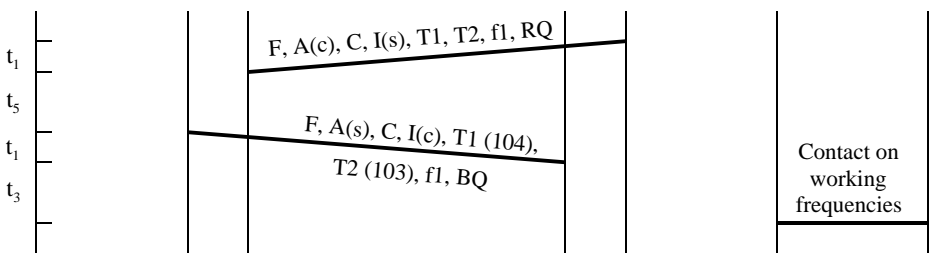


FIGURE 4
Examples of timing diagrams for calling in ship-to-shore direction



a) Able to comply immediately



b) Queue exists on working frequency

- t_1 : transmission time of a DSC sequence
- t_3 : transition time from calling to working frequency including, if necessary, the time for working channel clearing (queue waiting time)
- t_5 : time for coast station to prepare acknowledgement (see § 2.2.6)
- F : format specifier
- A : called station address
- I : calling station self-identification
 - { suffix (c) or (s) indicates coast station
 - \ or ship station respectively
- C : category
- T1 : first telecommand signal, (104) indicates unable to comply
- T2 : second telecommand signal, (103) indicates queue
- $f1, f1'$: working frequencies
- RQ, BQ : end of sequence signals

0541-04

2.2.8 If an acknowledgement is received further transmission of the call sequence should not take place. On receipt of an acknowledgement which indicates ability to comply, the DSC procedures are complete and both coast station and ship station should communicate on the working frequencies agreed with no further exchange of DSC calls.

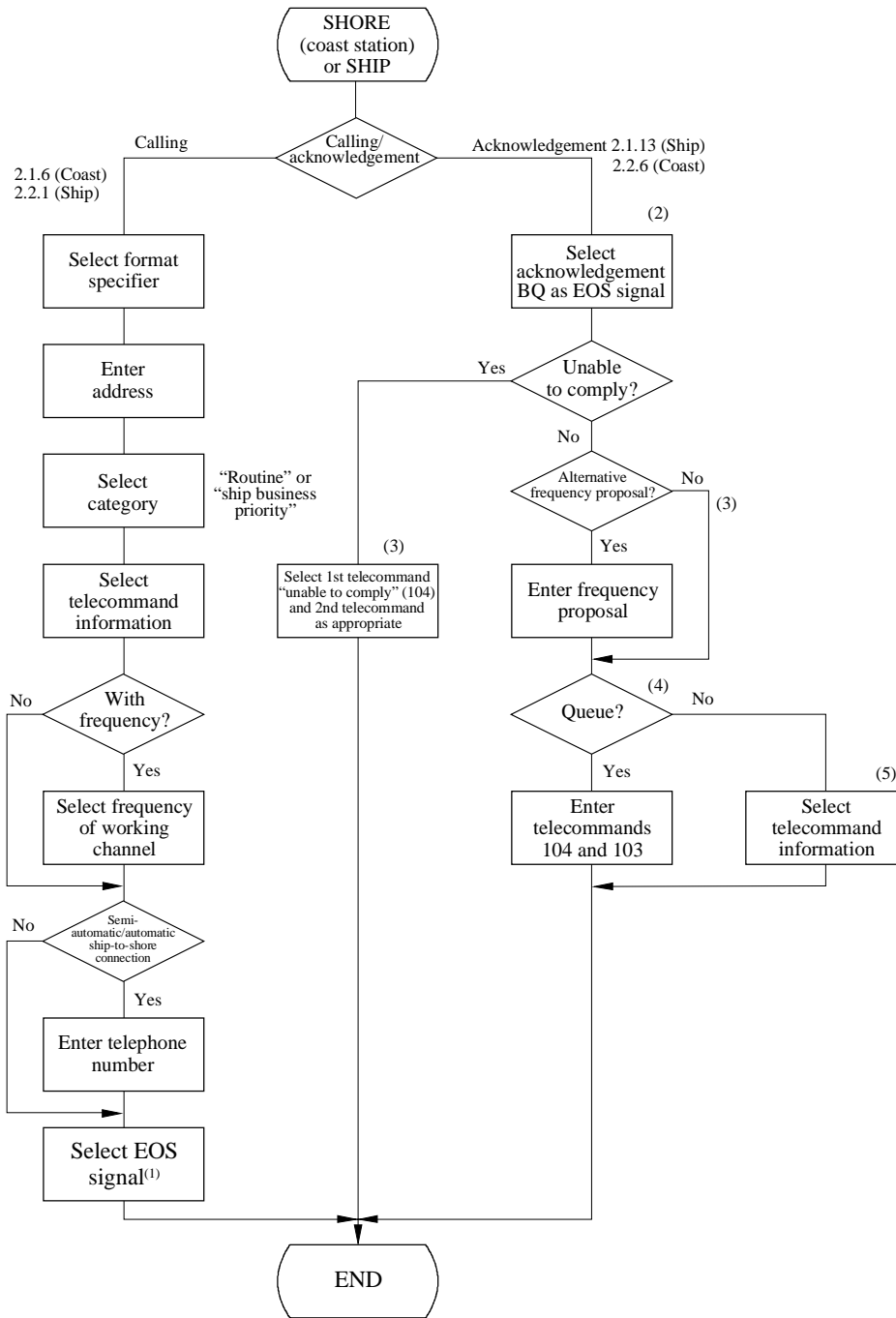
2.2.9 If the coast station transmits an acknowledgement which is not received at the ship station then the ship station should repeat the call in accordance with § 2.2.5.

2.3 Ship station initiates call to ship station

The ship-to-ship procedures should be similar to those given in § 2.2, where the receiving ship station complies with the procedures given for coast stations, as appropriate, except that, with respect to § 2.2.1, the calling ship should always insert working frequency information in the message part of the calling sequence.

FIGURE 5

Composition procedures for calling and acknowledgement sequences
(for calls other than distress and safety)



- (1) Normally acknowledgement RQ may automatically be selected as an EOS signal of a calling sequence to an individual station.
- (2) The format specifier and the category are automatically transferred from the received call. The self-ID in the received sequence is automatically transferred into the address part of acknowledgement sequence by selecting acknowledgement BQ.
- (3) The frequency information is automatically transferred from the received call.
- (4) This procedure is only for coast stations.
- (5) When able to comply, and no queue exists, then the telecommand information is automatically transferred from the received call.

ANNEX 3

Operational procedures for ships for DSC communications on MF, HF and VHF**Introduction**

Procedures for DSC communications on MF and VHF are described in § 1 to 5 below.

The procedures for DSC communications on HF are in general the same as for MF and VHF. Special conditions to be taken into account when making DSC communications on HF are described in § 6 below.

1 Distress**1.1 Transmission of DSC distress alert**

A distress alert should be transmitted if, in the opinion of the Master, the ship or a person is in distress and requires immediate assistance.

A DSC distress alert should as far as possible include the ship's last known position and the time (in UTC) when it was valid. The position and the time may be included automatically by the ship's navigational equipment or may be inserted manually.

The DSC distress alert is transmitted as follows:

- tune the transmitter to the DSC distress channel (2 187.5 kHz on MF, channel 70 on VHF (see Note 1)).

NOTE 1 – Some maritime MF radiotelephony transmitters shall be tuned to a frequency 1 700 Hz lower than 2 187.5 kHz, i.e. 2 185.8 kHz, in order to transmit the DSC alert on 2 187.5 kHz;

- if time permits, key in or select on the DSC equipment keyboard
 - the nature of distress,
 - the ship's last known position (latitude and longitude),
 - the time (in UTC) the position was valid,
 - type of subsequent distress communication (telephony),

in accordance with the DSC equipment manufacturer's instructions;

- transmit the DSC distress alert (see Note 2);
- prepare for the subsequent distress traffic by tuning the transmitter and the radiotelephony receiver to the distress traffic channel in the same band, i.e. 2 182 kHz on MF, channel 16 on VHF, while waiting for the DSC distress acknowledgement.

NOTE 2 – Add to the DSC distress alert, whenever practicable and at the discretion of the person responsible for the ship in distress, the optional expansion in accordance with Recommendation ITU-R M.821, with additional information as appropriate, in accordance with the DSC equipment manufacturer's instructions.

1.2 Actions on receipt of a distress alert (see Note 1)

Ships receiving a DSC distress alert from another ship should normally not acknowledge the alert by DSC since acknowledgement of a DSC distress alert by use of DSC is normally made by coast stations only.

Only if no other station seems to have received the DSC distress alert, and the transmission of the DSC distress alert continues, the ship should acknowledge the DSC distress alert by use of DSC to terminate the call. The ship should then, in addition, inform a coast station or a coast earth station by any practicable means.

Ships receiving a DSC distress alert from another ship should also defer the acknowledgement of the distress alert by radiotelephony for a short interval, if the ship is within an area covered by one or more coast stations, in order to give the coast station time to acknowledge the DSC distress alert first.

Ships receiving a DSC distress alert from another ship shall:

- watch for the reception of a distress acknowledgement on the distress channel (2 187.5 kHz on MF and channel 70 on VHF);
- prepare for receiving the subsequent distress communication by tuning the radiotelephony receiver to the distress traffic frequency in the same band in which the DSC distress alert was received, i.e. 2 182 kHz on MF, channel 16 on VHF;
- acknowledge the receipt of the distress alert by transmitting the following by radiotelephony on the distress traffic frequency in the same band in which the DSC distress alert was received, i.e. 2 182 kHz on MF, channel 16 on VHF:
 - “MAYDAY”,
 - the 9-digit identity of the ship in distress, repeated 3 times,
 - “this is”,
 - the 9-digit identity or the call sign or other identification of own ship, repeated 3 times,
 - “RECEIVED MAYDAY”.

NOTE 1 – Ships out of range of a distress event or not able to assist should only acknowledge if no other station appears to acknowledge the receipt of the DSC distress alert.

1.3 Distress traffic

On receipt of a DSC distress acknowledgement the ship in distress should commence the distress traffic by radiotelephony on the distress traffic frequency (2 182 kHz on MF, channel 16 on VHF) as follows:

- “MAYDAY”,
- “this is”,
- the 9-digit identity *and* the call sign or other identification of the ship,
- the ship’s position in latitude and longitude or other reference to a known geographical location,
- the nature of distress and assistance wanted,
- any other information which might facilitate the rescue.

1.4 Transmission of a DSC distress relay alert

A ship knowing that another ship is in distress shall transmit a DSC distress relay alert if

- the ship in distress is not itself able to transmit the distress alert,
- the Master of the ship considers that further help is necessary.

The DSC distress relay alert is transmitted as follows:

- tune the transmitter to the DSC distress channel (2 187.5 kHz on MF, channel 70 on VHF),
- select the distress relay call format on the DSC equipment,
- key in or select on the DSC equipment keyboard:
 - All Ships Call or the 9-digit identity of the appropriate coast station,
 - the 9-digit identity of the ship in distress, if known,
 - the nature of distress,
 - the latest position of the ship in distress, if known,
 - the time (in UTC) the position was valid (if known),
 - type of subsequent distress communication (telephony);

- transmit the DSC distress relay call;
- prepare for the subsequent distress traffic by tuning the transmitter and the radiotelephony receiver to the distress traffic channel in the same band, i.e. 2 182 kHz on MF and channel 16 on VHF, while waiting for the DSC distress acknowledgement.

1.5 Acknowledgement of a DSC distress relay alert received from a coast station (see Note 1 of § 1.2 of this Annex)

Coast stations, after having received and acknowledged a DSC distress alert, may if necessary, retransmit the information received as a DSC distress relay call, addressed to all ships, all ships in a specific geographical area, a group of ships or a specific ship.

Ships receiving a distress relay call transmitted by a coast station shall not use DSC to acknowledge the call, but should acknowledge the receipt of the call by radiotelephony on the distress traffic channel in the same band in which the relay call was received, i.e. 2 182 kHz on MF, channel 16 on VHF.

Acknowledge the receipt of the distress alert by transmitting the following by radiotelephony on the distress traffic frequency in the same band in which the DSC distress relay alert was received:

- “MAYDAY”,
- the 9-digit identity or the call sign or other identification of the calling coast station,
- “this is”,
- the 9-digit identity or call sign or other identification of own ship,
- “RECEIVED MAYDAY”.

1.6 Acknowledgement of a DSC distress relay alert received from another ship

Ships receiving a distress relay alert from another ship shall follow the same procedure as for acknowledgement of a distress alert, i.e. the procedure given in § 1.2 above.

1.7 Cancellation of an inadvertent distress alert (distress call)

A station transmitting an inadvertent distress alert shall cancel the distress alert using the following procedure:

1.7.1 Immediately transmit a DSC “distress cancellation” if provided in accordance with Recommendation ITU-R M.493, § 8.3.2 e.g. with own ship’s MMSI inserted as identification of ship in distress. In addition cancel the distress alert aurally over the telephony distress traffic channel associated with each DSC channel on which the “distress call” was transmitted.

1.7.2 Monitor the telephony distress traffic channel associated with the DSC channel on which the distress was transmitted, and respond to any communications concerning that distress alert as appropriate.

2 Urgency

2.1 Transmission of urgency messages

Transmission of urgency messages shall be carried out in two steps:

- announcement of the urgency message,
- transmission of the urgency message.

The announcement is carried out by transmission of a DSC urgency call on the DSC distress calling channel (2 187.5 kHz on MF, channel 70 on VHF).

The urgency message is transmitted on the distress traffic channel (2 182 kHz on MF, channel 16 on VHF).

The DSC urgency call may be addressed to all stations or to a specific station. The frequency on which the urgency message will be transmitted shall be included in the DSC urgency call.

The transmission of an urgency message is thus carried out as follows:

Announcement:

- tune the transmitter to the DSC distress calling channel (2 187.5 kHz on MF, channel 70 on VHF);
- key in or select on the DSC equipment keyboard:
 - All Ships Call or the 9-digit identity of the specific station,
 - the category of the call (urgency),
 - the frequency or channel on which the urgency message will be transmitted,
 - the type of communication in which the urgency message will be given (radiotelephony),in accordance with the DSC equipment manufacturer's instructions;
- transmit the DSC urgency call.

Transmission of the urgency message:

- tune the transmitter to the frequency or channel indicated in the DSC urgency call;
- transmit the urgency message as follows:
 - “PAN PAN”, repeated 3 times,
 - “ALL STATIONS” or called station, repeated 3 times,
 - “this is”,
 - the 9-digit identity *and* the call sign or other identification of own ship,
 - the text of the urgency message.

2.2 Reception of an urgency message

Ships receiving a DSC urgency call announcing an urgency message addressed to all ships shall NOT acknowledge the receipt of the DSC call, but should tune the radiotelephony receiver to the frequency indicated in the call and listen to the urgency message.

3 Safety

3.1 Transmission of safety messages

Transmission of safety messages shall be carried out in two steps:

- announcement of the safety message,
- transmission of the safety message.

The announcement is carried out by transmission of a DSC safety call on the DSC distress calling channel (2 187.5 kHz on MF, channel 70 on VHF).

The safety message is normally transmitted on the distress and safety traffic channel in the same band in which the DSC call was sent, i.e. 2 182 kHz on MF, channel 16 on VHF.

The DSC safety call may be addressed to all ships, all ships in a specific geographical area or to a specific station.

The frequency on which the safety message will be transmitted shall be included in the DSC call.

The transmission of a safety message is thus carried out as follows:

Announcement:

- tune the transmitter to the DSC distress calling channel (2 187.5 kHz on MF, channel 70 on VHF);
- select the appropriate calling format on the DSC equipment (all ships, area call or individual call);

- key in or select on the DSC equipment keyboard:
 - specific area or 9-digit identity of specific station, if appropriate,
 - the category of the call (safety),
 - the frequency or channel on which the safety message will be transmitted,
 - the type of communication in which the safety message will be given (radiotelephony),
 in accordance with the DSC equipment manufacturer's instructions;
- transmit the DSC safety call.

Transmission of the safety message:

- tune the transmitter to the frequency or channel indicated in the DSC safety call;
- transmit the safety message as follows:
 - “SECURITE”, repeated 3 times,
 - “ALL STATIONS” or called station, repeated 3 times,
 - “this is”,
 - the 9-digit identity *and* the call sign or other identification of own ship,
 - the text of the safety message.

3.2 Reception of a safety message

Ships receiving a DSC safety call announcing a safety message addressed to all ships shall NOT acknowledge the receipt of the DSC safety call, but should tune the radiotelephony receiver to the frequency indicated in the call and listen to the safety message.

4 Public correspondence

4.1 DSC channels for public correspondence

4.1.1 VHF

The VHF DSC channel 70 is used for DSC for distress and safety purposes as well as for DSC for public correspondence.

4.1.2 MF

International and national DSC channels separate from the DSC distress and safety calling channel 2 187.5 kHz are used for digital selective-calling on MF for public correspondence.

Ships calling a coast station by DSC on MF for public correspondence should preferably use the coast station's national DSC channel.

The international DSC channel for public correspondence may as a general rule be used between ships and coast stations of different nationality. The ships transmitting frequency is 2 189.5 kHz, and the receiving frequency is 2 177 kHz.

The frequency 2 177 kHz is also used for DSC between ships for general communication.

4.2 Transmission of a DSC call for public correspondence to a coast station or another ship

A DSC call for public correspondence to a coast station or another ship is transmitted as follows:

- tune the transmitter to the relevant DSC channel;
- select the format for calling a specific station on the DSC equipment;
- key in or select on the DSC equipment keyboard:
 - the 9-digit identity of the station to be called,
 - the category of the call (routine),

- the type of the subsequent communication (normally radiotelephony),
- a proposed working channel if calling another ship. A proposal for a working channel should NOT be included in calls to a coast station; the coast station will in its DSC acknowledgement indicate a vacant working channel,

in accordance with the DSC equipment manufacturer's instructions;

- transmit the DSC call.

4.3 Repeating a call

A DSC call for public correspondence may be repeated on the same or another DSC channel, if no acknowledgement is received within 5 min.

Further call attempts should be delayed at least 15 min, if acknowledgement is still not received.

4.4 Acknowledgement of a received call and preparation for reception of the traffic

On receipt of a DSC call from a coast station or another ship, a DSC acknowledgement is transmitted as follows:

- tune the transmitter to the transmit frequency of the DSC channel on which the call was received,
- select the acknowledgement format on the DSC equipment,
- transmit an acknowledgement indicating whether the ship is able to communicate as proposed in the call (type of communication and working frequency),
- if able to communicate as indicated, tune the transmitter and the radiotelephony receiver to the indicated working channel and prepare to receive the traffic.

4.5 Reception of acknowledgement and further actions

When receiving an acknowledgement indicating that the called station is able to receive the traffic, prepare to transmit the traffic as follows:

- tune the transmitter and receiver to the indicated working channel;
- commence the communication on the working channel by:
 - the 9-digit identity or call sign or other identification of the called station,
 - “this is”,
 - the 9-digit identity or call sign or other identification of own ship.

It will normally rest with the ship to call again a little later in case the acknowledgement from the coast station indicates that the coast station is not able to receive the traffic immediately.

In case the ship, in response to a call to another ship, receives an acknowledgement indicating that the other ship is not able to receive the traffic immediately, it will normally rest with the called ship to transmit a call to the calling ship when ready to receive the traffic.

5 Testing the equipment used for distress and safety

Testing on the exclusive DSC distress and safety calling frequency 2 187.5 kHz should be avoided as far as possible by using other methods.

No test transmission should be made on VHF DSC calling channel 70.

Test calls should be transmitted by the ship station and acknowledged by the called coast station. Normally there would be no further communication between the two stations involved.

A test call to a coast station is transmitted as follows:

- tune the transmitter to the DSC distress and safety calling frequency 2 187.5 kHz,
- key in or select the format for the test call on the DSC equipment in accordance with the DSC equipment manufacturer's instructions,
- key in the 9-digit identity of the coast station to be called,

- transmit the DSC call after checking as far as possible that no calls are in progress on the frequency,
- wait for acknowledgement.

6 Special conditions and procedures for DSC communication on HF

General

The procedures for DSC communication on HF are – with some additions described in § 6.1 to 6.5 below – equal to the corresponding procedures for DSC communications on MF/VHF.

Due regard to the special conditions described in § 6.1 to 6.5 should be given when making DSC communications on HF.

6.1 Distress

6.1.1 Transmission of DSC distress alert

DSC distress alert should be sent to coast stations – e.g. in A3 and A4 sea areas on HF – and on MF and/or VHF to other ships in the vicinity.

The DSC distress alert should as far as possible include the ship's last known position and the time (in UTC) it was valid. If the position and time is not inserted automatically from the ship's navigational equipment, it should be inserted manually.

Ship-to-shore distress alert

Choice of HF band

Propagation characteristics of HF radio waves for the actual season and time of the day should be taken into account when choosing HF bands for transmission of DSC distress alert.

As a general rule the DSC distress channel in the 8 MHz maritime band (8414.5 kHz) may in many cases be an appropriate first choice.

Transmission of the DSC distress alert in more than one HF band will normally increase the probability of successful reception of the alert by coast stations.

DSC distress alert may be sent on a number of HF bands in two different ways:

- a) either by transmitting the DSC distress alert on one HF band, and waiting a few minutes for receiving acknowledgement by a coast station;

if no acknowledgement is received within 3 min, the process is repeated by transmitting the DSC distress alert on another appropriate HF band etc.;
- b) or by transmitting the DSC distress alert at a number of HF bands with no, or only very short, pauses between the calls, without waiting for acknowledgement between the calls.

It is recommended to follow procedure a) in all cases, where time permits to do so; this will make it easier to choose the appropriate HF band for commencement of the subsequent communication with the coast station on the corresponding distress traffic channel.

Transmitting the DSC alert (see Note 1):

- tune the transmitter to the chosen HF DSC distress channel (4207.5, 6312, 8414.5, 12577, 16804.5 kHz) (see Note 2);
- follow the instructions for keying in or selection of relevant information on the DSC equipment keyboard as described in § 1.1;
- transmit the DSC distress alert.

NOTE 1 – Ship-to-ship distress alert should normally be made on MF and/or VHF, using the procedures for transmission of DSC distress alert on MF/VHF described in § 1.1.

NOTE 2 – Some maritime HF transmitters shall be tuned to a frequency 1 700 Hz lower than the DSC frequencies given above in order to transmit the DSC alert on the correct frequency.

In special cases, for example in tropical zones, transmission of DSC distress alert on HF may, in addition to ship-to-shore alerting, also be useful for ship-to-ship alerting.

6.1.2 Preparation for the subsequent distress traffic

After having transmitted the DSC distress alert on appropriate DSC distress channels (HF, MF and/or VHF), prepare for the subsequent distress traffic by tuning the radiocommunication set(s) (HF, MF and/or VHF as appropriate) to the corresponding distress traffic channel(s).

If method b) described in § 6.1.1 has been used for transmission of DSC distress alert on a number of HF bands:

- take into account in which HF band(s) acknowledgement has been successfully received from a coast station;
- if acknowledgements have been received on more than one HF band, commence the transmission of distress traffic on one of these bands, but if no response is received from a coast station then the other bands should be used in turn.

The distress traffic frequencies are:

HF (kHz):

Telephony	4 125	6 215	8 291	12 290	16 420
Telex	4 177.5	6 268	8 376.5	12 520	16 695

MF (kHz):

Telephony	2 182
Telex	2 174.5

VHF: Channel 16 (156.800 MHz).

6.1.3 Distress traffic

The procedures described in § 1.3 are used when the distress traffic on MF/HF is carried out by *radiotelephony*.

The following procedures shall be used in cases where the distress traffic on MF/HF is carried out by *radiotelex*:

- The forward error correcting (FEC) mode shall be used unless specifically requested to do otherwise;
- all messages shall be preceded by:
 - at least one carriage return,
 - line feed,
 - one letter shift,
 - the distress signal MAYDAY;
- The ship in distress should commence the distress telex traffic on the appropriate distress telex traffic channel as follows:
 - carriage return, line feed, letter shift,
 - the distress signal “MAYDAY”,
 - “this is”,
 - the 9-digit identity and call sign or other identification of the ship,
 - the ship’s position if not included in the DSC distress alert,
 - the nature of distress,
 - any other information which might facilitate the rescue.

6.1.4 Actions on reception of a DSC distress alert on HF from another ship

Ships receiving a DSC distress alert on HF from another ship shall *not* acknowledge the alert, but should:

- watch for reception of a DSC distress acknowledgement from a coast station;
- while waiting for reception of a DSC distress acknowledgement from a coast station:

prepare for reception of the subsequent distress communication by tuning the HF radiocommunication set (transmitter and receiver) to the relevant distress traffic channel in the same HF band in which the DSC distress alert was received, observing the following conditions:

- if radiotelephony mode was indicated in the DSC alert, the HF radiocommunication set should be tuned to the radiotelephony distress traffic channel in the HF band concerned;
- if telex mode was indicated in the DSC alert, the HF radiocommunication set should be tuned to the radiotelex distress traffic channel in the HF band concerned. Ships able to do so should additionally watch the corresponding radiotelephony distress channel;
- if the DSC distress alert was received on more than one HF band, the radiocommunication set should be tuned to the relevant distress traffic channel in the HF band considered to be the best one in the actual case. If the DSC distress alert was received successfully on the 8 MHz band, this band may in many cases be an appropriate first choice;
- if no distress traffic is received on the HF channel within 1 to 2 min, tune the HF radiocommunication set to the relevant distress traffic channel in another HF band deemed appropriate in the actual case;
- if no DSC distress acknowledgement is received from a coast station within 3 min, and no distress communication is observed going on between a coast station and the ship in distress:
 - transmit a DSC distress relay alert,
 - inform a Rescue Coordination Centre (RCC) via appropriate radiocommunications means.

6.1.5 Transmission of DSC distress relay alert

In case it is considered appropriate to transmit a DSC distress relay alert:

- considering the actual situation, decide in which frequency bands (MF, VHF, HF) DSC distress relay alert(s) should be transmitted, taking into account ship-to-ship alerting (MF, VHF) and ship-to-shore alerting;
- tune the transmitter(s) to the relevant DSC distress channel, following the procedures described in § 6.1.1 above;
- follow the instructions for keying in or selection of call format and relevant information on the DSC equipment keyboard as described in § 1.4;
- transmit the DSC distress relay alert.

6.1.6 Acknowledgement of a HF DSC distress relay alert received from a coast station

Ships receiving a DSC distress relay alert from a coast station on HF, addressed to all ships within a specified area, should NOT acknowledge the receipt of the relay alert by DSC, but by *radiotelephony* on the telephony distress traffic channel in the same band(s) in which the DSC distress relay alert was received.

6.2 Urgency

Transmission of urgency messages on HF should normally be addressed:

- either to all ships within a specified geographical area,
- or to a specific coast station.

Announcement of the urgency message is carried out by transmission of a DSC call with category urgency on the appropriate DSC distress channel.

The transmission of the urgency message itself on HF is carried out by radiotelephony or radiotelex on the appropriate distress traffic channel in the same band in which the DSC announcement was transmitted.

6.2.1 Transmission of DSC announcement of an urgency message on HF

- choose the HF band considered to be the most appropriate, taking into account propagation characteristics for HF radio waves at the actual season and time of the day; the 8 MHz band may in many cases be an appropriate first choice;
- tune the HF transmitter to the DSC distress channel in the chosen HF band;
- key in or select call format for either geographical area call or individual call on the DSC equipment, as appropriate;
- in case of area call, key in specification of the relevant geographical area;
- follow the instructions for keying in or selection of relevant information on the DSC equipment keyboard as described in § 2.1, including type of communication in which the urgency message will be transmitted (radiotelephony or radiotelex);
- transmit the DSC call; and
- if the DSC call is addressed to a specific coast station, wait for DSC acknowledgement from the coast station. If acknowledgement is not received within a few minutes, repeat the DSC call on another HF frequency deemed appropriate.

6.2.2 Transmission of the urgency message and subsequent action

- tune the HF transmitter to the distress traffic channel (telephony or telex) indicated in the DSC announcement;
- if the urgency message is to be transmitted using *radiotelephony*, follow the procedure described in § 2.1;
- if the urgency message is to be transmitted by *radiotelex*, the following procedure shall be used:
 - use the forward error correcting (FEC) mode unless the message is addressed to a single station whose radiotelex identity number is known;
 - commence the telex message by:
 - at least one carriage return, line feed, one letter shift,
 - the urgency signal “PAN PAN”,
 - “this is”,
 - the 9-digit identity of the ship and the call sign or other identification of the ship,
 - the text of the urgency message.

Announcement and transmission of urgency messages addressed to all HF equipped ships within a specified area may be repeated on a number of HF bands as deemed appropriate in the actual situation.

6.2.3 Reception of an urgency message

Ships receiving a DSC urgency call announcing an urgency message shall NOT acknowledge the receipt of the DSC call, but should tune the radiocommunication receiver to the frequency and communication mode indicated in the DSC call for receiving the message.

6.3 Safety

The procedures for transmission of DSC safety announcement and for transmission of the safety message are the same as for urgency messages, described in § 6.2, *except* that:

- in the DSC announcement, the category SAFETY shall be used,
- in the safety message, the safety signal “SECURITE” shall be used instead of the urgency signal “PAN PAN”.

6.4 Public correspondence on HF

The procedures for DSC communication for public correspondence on HF are the same as for MF.

Propagation characteristics should be taken into account when making DSC communication on HF.

International and national HF DSC channels different from those used for DSC for distress and safety purposes are used for DSC for public correspondence.

Ships calling a HF coast station by DSC for public correspondence should preferably use the coast station's national DSC calling channel.

6.5 Testing the equipment used for distress and safety on HF

The procedure for testing the ship's equipment used for DSC distress, urgency and safety calls on HF by transmitting DSC test calls on HF DSC distress channels is the same as for testing on the MF DSC distress frequency 2 187.5 Hz.

ANNEX 4

Operational procedures for coast stations for DSC communications on MF, HF and VHF

Introduction

Procedures for DSC communications on MF and VHF are described in § 1 to 5 below.

The procedures for DSC communications on HF are in general the same as for MF and VHF. Special conditions to be taken into account when making DSC communications on HF are described in § 6 below.

1 Distress (see Note 1)

1.1 Reception of a DSC distress alert (distress call)

The transmission of a distress alert indicates that a mobile unit (a ship, aircraft or other vehicle) or a person is in distress and requires immediate assistance. The distress alert is a digital selective call using a distress call format (distress call).

Coast stations in receipt of a distress call shall ensure that it is routed as soon as possible to an RCC. The receipt of a distress call is to be acknowledged as soon as possible by the appropriate coast station.

NOTE 1 – These procedures assume that the RCC is sited remotely from the DSC coast station; where this is not the case, appropriate amendments should be made locally.

1.2 Acknowledgement of a DSC distress alert (distress call)

The coast station shall transmit the acknowledgement on the distress calling frequency on which the call was received and should address it to all ships. The acknowledgement shall include the identification of the ship whose distress call is being acknowledged.

The acknowledgement of a DSC distress call is transmitted as follows:

- use a transmitter which is tuned to the frequency on which the distress call was received;
- in accordance with the DSC equipment manufacturer's instructions, key in or select on the DSC equipment keyboard (see Note 1):
 - distress call acknowledgement,
 - 9-digit identity of the ship in distress,
 - nature of distress,
 - distress coordinates,
 - the time (in UTC) when the position was valid.

NOTE 1 – Some or all of this information might be included automatically by the equipment;

- transmit the acknowledgement;
- prepare to handle the subsequent distress traffic by setting watch on radiotelephony and, if the “mode of subsequent communication” signal in the received distress call indicates teleprinter, also on NBDP, if the coast station is fitted with NBDP. In both cases, the radiotelephony and NBDP frequencies should be those associated with the frequency on which the distress call was received (on MF 2 182 kHz for radiotelephony and 2 174.5 kHz for NBDP, on VHF 156.8 MHz/channel 16 for radiotelephony; there is no frequency for NBDP on VHF).

1.3 Transmission of a DSC distress relay alert (distress relay call)

Coast stations shall initiate and transmit a distress relay call in any of the following cases:

- when the distress of the mobile unit has been notified to the coast station by other means and a broadcast alert to shipping is required by the RCC; and
- when the person responsible for the coast station considers that further help is necessary (close cooperation with the appropriate RCC is recommended under such conditions).

In the cases mentioned above, the coast station shall transmit a shore-to-ship distress relay call addressed, as appropriate, to all ships, to a selected group of ships, to a geographical area or to a specific ship.

The distress relay call shall contain the identification of the mobile unit in distress, its position and other information which might facilitate rescue.

The distress relay call is transmitted as follows:

- use a transmitter which is tuned to the frequency for DSC distress calls (2 187.5 kHz on MF, 156.525 MHz/channel 70 on VHF);
- in accordance with the DSC equipment manufacturer's instructions, key in or select on the DSC equipment keyboard (see Note 1 of § 1.2 of this Annex):
 - distress relay call,
 - the format specifier (all ships, group of ships, geographical area or individual station),
 - if appropriate, the address of the ship, group of ships or geographical area (not required if the format specifier is “all ships”),
 - 9-digit identity of the ship in distress, if known,
 - nature of distress,
 - distress coordinates,
 - the time (in UTC) when the position was valid;
- transmit the distress relay call;
- prepare for the reception of the acknowledgements by ship stations and for handling the subsequent distress traffic by switching over to the distress traffic channel in the same band, i.e. 2 182 kHz on MF, 156.8 MHz/channel 16 on VHF.

1.4 Reception of a distress relay alert (distress relay call)

If the distress relay call is received from a ship station, coast stations on receipt of the distress relay call shall ensure that the call is routed as soon as possible to an RCC. The receipt of the distress relay call is to be acknowledged as soon as possible by the appropriate coast station using a DSC distress relay acknowledgement addressed to the ship station. If the distress relay call is received from a coast station, other coast stations will normally not have to take further action.

2 Urgency

2.1 Transmission of a DSC announcement

The announcement of the urgency message shall be made on one or more of the distress and safety calling frequencies using DSC and the urgency call format.

The DSC urgency call may be addressed to all ships, to a selected group of ships, to a geographical area or to a specific ship. The frequency on which the urgency message will be transmitted after the announcement shall be included in the DSC urgency call.

The DSC urgency call is transmitted as follows:

- use a transmitter which is tuned to the frequency for DSC distress calls (2 187.5 kHz on MF, 156.525 MHz /channel 70 on VHF);
- in accordance with the DSC equipment manufacturer's instructions, key in or select on the DSC equipment keyboard (see Note 1 of § 1.2 of this Annex):
 - the format specifier (all ships call, group of ships, geographical area or individual station),
 - if appropriate, the address of the ship, group of ships or geographical area (not required if the format specifier is "all ships"),
 - the category of the call (urgency),
 - the frequency or channel on which the urgency message will be transmitted,
 - the type of communication in which the urgency message will be transmitted (radiotelephony);
- transmit the DSC urgency call.

After the DSC announcement, the urgency message will be transmitted on the frequency indicated in the DSC call.

3 Safety

3.1 Transmission of a DSC announcement

The announcement of the safety message shall be made on one or more of the distress and safety calling frequencies using DSC and the safety call format.

The DSC safety call may be addressed to all ships, to a group of ships, to a geographical area or to a specific ship. The frequency on which the safety message will be transmitted after the announcement shall be included in the DSC safety call.

The DSC safety call is transmitted as follows:

- use a transmitter which is tuned to the frequency for DSC distress calls (2 187.5 kHz on MF, 156.525 MHz/channel 70 on VHF);
- in accordance with the DSC equipment manufacturer's instructions, key in or select on the DSC equipment keyboard (see Note 1 of § 1.2 of this Annex):
 - the format specifier (all ships call, group of ships, geographical area or individual station),
 - if appropriate, the address of the ship, group of ships or geographical area (not required if the format specifier is "all ships"),
 - the category of the call (safety),

- the frequency or channel on which the safety message will be transmitted,
- the type of communication in which the safety message will be transmitted (radiotelephony);
- transmit the DSC safety call.

After the DSC announcement, the safety message will be transmitted on the frequency indicated in the DSC call.

4 Public correspondence

4.1 DSC frequencies/channels for public correspondence

4.1.1 VHF

The frequency 156.525 MHz/channel 70 is used for DSC for distress and safety purposes. It may also be used for calling purposes other than distress and safety, e.g. public correspondence.

4.1.2 MF

For public correspondence national and international frequencies are used which are different from the frequencies used for distress and safety purposes.

When calling ship stations by DSC, coast stations should use for the call, in the order of preference:

- a national DSC channel on which the coast station is maintaining watch;
- the international DSC calling channel, with the coast station transmitting on 2 177 kHz and receiving on 2 189.5 kHz. In order to reduce interference on this channel, it may be used as a general rule by coast stations to call ships of another nationality, or in cases where it is not known on which DSC frequencies the ship station is maintaining watch.

4.2 Transmission of a DSC call to a ship

The DSC call is transmitted as follows:

- use a transmitter which is tuned to the appropriate calling frequency;
- in accordance with the DSC equipment manufacturer's instructions, key in or select on the DSC equipment keyboard (see Note 1 of § 1.2 of this Annex):
 - the 9-digit identity of the ship to be called,
 - the category of the call (routine or ship's business),
 - the type of subsequent communication (radiotelephony),
 - working frequency information;
- after checking as far as possible that there are no calls in progress, transmit the DSC call.

4.3 Repeating a call

Coast stations may transmit the call twice on the same calling frequency with an interval of at least 45 s between the two calls, provided that they receive no acknowledgement within that interval.

If the station called does not acknowledge the call after the second transmission, the call may be transmitted again on the same frequency after a period of at least 30 min or on another calling frequency after a period of at least 5 min.

4.4 Preparation for exchange of traffic

On receipt of a DSC acknowledgement with the indication that the called ship station can use the proposed working frequency, the coast station transfers to the working frequency or channel and prepares to receive the traffic.

4.5 Acknowledgement of a received DSC call

Acknowledgements shall normally be transmitted on the frequency paired with the frequency of the received call. If the same call is received on several calling channels, the most appropriate channel shall be chosen for transmission of the acknowledgement.

The acknowledgement of a DSC call is transmitted as follows:

- use a transmitter which is tuned to the appropriate frequency;
- in accordance with the DSC equipment manufacturer's instructions, key in or select on the DSC equipment keyboard (see Note 1 of § 1.2 of this Annex):
 - the format specifier (individual station),
 - 9-digit identity of the calling ship,
 - the category of the call (routine or ship's business),
 - if able to comply immediately on the working frequency suggested by the ship station, the same frequency information as in the received call,
 - if no working frequency was suggested by the calling ship station, then the acknowledgement should include a channel/frequency proposal,
 - if not able to comply on the working frequency suggested, but able to comply immediately on an alternative frequency, the alternative working frequency,
 - if unable to comply immediately the appropriate information in that regard;
- transmit the acknowledgement (after checking as far as possible that there are no calls in progress on the frequency selected) after a delay of at least 5 s, but not later than 4½ min.

4.6 Preparation for exchange of traffic

After having transmitted the acknowledgement, the coast station transfers to the working frequency or channel and prepares to receive the traffic.

5 Testing the equipment used for distress and safety calls

Testing on the exclusive DSC distress and safety calling frequencies should be avoided as far as possible by using other methods. There should be no test transmissions on the DSC calling frequency 156.525 MHz/channel 70. However, when testing on the exclusive DSC distress and safety calling frequency 2 187.5 kHz is unavoidable, it should be indicated that these are test transmissions (e.g. special test calls).

Test calls should be transmitted by the ship station and acknowledged by the called coast station. Normally there would be no further communications between the two stations involved.

Acknowledgement of a DSC test call

The acknowledgement of a DSC test call is transmitted as follows:

- use a transmitter which is tuned to 2 187.5 kHz;
- in accordance with the DSC equipment manufacturer's instructions, key in or select on the DSC equipment keyboard:
 - test call acknowledgement,
 - 9-digit identity of the calling ship station;
- transmit the acknowledgement.

6 Special conditions and procedures for DSC communication on HF

General

The procedures for DSC communication on HF are – with some additions described in § 6.1 to 6.4 below – equal to the corresponding procedures for DSC communications on MF/VHF.

Due regard to the special conditions described in § 6.1 to 6.4 should be given when making DSC communications on HF.

6.1 Distress

6.1.1 Reception and acknowledgement of a DSC distress alert on HF

Ships in distress may in some cases transmit the DSC distress alert on a number of HF bands with only short intervals between the individual calls.

The coast station shall transmit DSC acknowledgement on all HF DSC distress channels on which the DSC alert was received in order to ensure as far as possible that the acknowledgement is received by the ship in distress and by all ships which received the DSC alert.

6.1.2 Distress traffic

The distress traffic should, as a general rule, be initiated on the appropriate distress traffic channel (radiotelephony or NBDP) in the same band in which the DSC alert was received.

For distress traffic by NBDP the following rules apply:

- all messages shall be preceded by at least one carriage return, line feed, one letter shift and the distress signal MAYDAY;
- FEC broadcast mode should normally be used.
ARQ mode should be used only when considered advantageous to do so in the actual situation and provided that the radiotelex number of the ship is known.

6.1.3 Transmission of DSC distress relay alert on HF

HF propagation characteristics should be taken into account when choosing HF band(s) for transmission of DSC distress relay alert.

IMO Convention ships equipped with HF DSC for distress and safety purposes are required to keep continuous automatic DSC watch on the DSC distress channel in the 8 MHz band and on at least one of the other HF DSC distress channels.

In order to avoid creating on board ships uncertainty regarding on which band the subsequent establishment of contact and distress traffic should be initiated, the HF DSC distress relay alert should be transmitted on one HF band at a time and the subsequent communication with responding ships be established before eventually repeating the DSC distress relay alert on another HF band.

6.2 Urgency

6.2.1 Transmission of urgency announcement and message on HF

For urgency messages by NBDP the following apply:

- the urgency message shall be preceded by at least one carriage return, line feed, one letter shift, the urgency signal PAN PAN and the identification of the coast station;
- FEC broadcast mode should normally be used.
ARQ mode should be used only when considered advantageous to do so in the actual situation and provided that the radiotelex number of the ship is known.

6.3 Safety

6.3.1 Transmission of safety announcements and messages on HF

For safety messages by NBDP the following apply:

- the safety message shall be preceded by at least one carriage return, line feed, one letter shift, the safety signal SECURITE and the identification of the coast station;
- FEC broadcast mode should normally be used.
ARQ mode should be used only when considered advantageous to do so in the actual situation and provided that the radiotelex number of the ship is known.

6.4 Testing the equipment used for distress and safety

The procedures for ships testing their equipment used for DSC distress, urgency and safety calls on HF DSC distress channels and the acknowledgement of the test call by the coast station are the same as for testing on the MF DSC distress frequency 2 187.5 kHz.

ANNEX 5

Frequencies used for DSC

1 The frequencies used for distress and safety purposes using DSC are as follows (see also RR Article 38 (Appendix S13, Part A2)):

2 187.5	kHz
4 207.5	kHz
6 312	kHz
8 414.5	kHz
12 577	kHz
16 804.5	kHz
156.525	MHz (Note 1)

NOTE 1 – The frequency 156.525 MHz may also be used for DSC purposes other than distress and safety.

2 The frequencies assignable on an international basis to ship and coast stations for DSC, for purposes other than distress and safety, are as follows:

2.1 Ship stations (see Note 1)

458.5			kHz
2 177 (Note 2)	2 189.5		kHz
4 208	4 208.5	4 209	kHz
6 312,5	6 313	6 313.5	kHz
8 415	8 415.5	8 416	kHz
12 577.5	12 578	12 578.5	kHz
16 805	16 805.5	16 806	kHz
18 898.5	18 899	18 899.5	kHz
22 374.5	22 375	22 375.5	kHz
25 208.5	25 209	25 209.5	kHz
		156.525	MHz (Note 3)

2.2 Coast stations (see Note 1)

455.5			kHz
2 177			kHz
4 219.5	4 220	4 220.5	kHz
6 331	6 331.5	6 332	kHz
8 436.5	8 437	8 437.5	kHz
12 657	12 657.5	12 658	kHz
16 903	16 903.5	16 904	kHz
19 703.5	19 704	19 704.5	kHz
22 444	22 444.5	22 445	kHz
26 121	26 121.5	26 122	kHz
		156.525	MHz (Note 3)

NOTE 1 – The following (kHz) paired frequencies (for ship/coast stations) 4 208/4 219.5, 6 312.5/6 331, 8 415/8 436.5, 12 577.5/12 657, 16 805/16 903, 18 898.5/19 703.5, 22 374.5/22 444 and 25 208.5/26 121 are the first choice international frequencies for DSC.

NOTE 2 – The frequency 2 177 kHz is available to ship stations for intership calling only.

NOTE 3 – The frequency 156.525 MHz is also used for distress and safety purposes (see Note 1 of § 1 of this Annex).

3 In addition to the frequencies listed in § 2 above, appropriate working frequencies in the following bands may be used for DSC:

415-526.5	kHz	(Regions 1 and 3)
415-525	kHz	(Region 2)
1 606.5-4 000	kHz	(Regions 1 and 3)
1 605-4 000	kHz	(Region 2) (For the band 1 605-1 625 kHz, see RR No. 480 (S5.89))
4 000-27 500	kHz	
156-174	kHz	
