

Recommendation ITU-R M.541-11

(11/2023)

M Series: Mobile, radiodetermination, amateur
and related satellite services

Operational procedures for the use of digital selective calling equipment in the maritime mobile service

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Note: This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.

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RECOMMENDATION ITU-R M.541-11*

Operational procedures for the use of digital selective calling equipment in the maritime mobile service

(1978-1982-1986-1990-1992-1994-1995-1996-1997-2004-2015-2023)

Scope

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 six annexes. In Annexes 1 and 2 the provisions and procedures are described for distress, urgency and safety calls and for routine calls, respectively. In Annexes 3, 4, 5 and 6 the operational procedures for ships, for coast stations and man overboard (MOB) devices are described, and Annex 7 lists the frequencies to be used for DSC.

Keywords

Digital selective calling, equipment, operational procedures, GMDSS, distress alert

Abbreviations/Glossary

ACS	Automatic connection system
AIS	Automatic identification system
AMRD	Autonomous maritime radio device
BQ	End of sequence for an acknowledge message
DSC	Digital selective calling
FEC	Forward error correction
kHz	Kilohertz
GMDSS	Global maritime distress and safety system
HF	High frequency
MF	Medium frequency
MHz	Megahertz
MMSI	Maritime mobile service identity
MOB	Man overboard
MSI	Maritime safety information
NBDP	Narrowband direct-printing
RCC	Rescue coordination centre
RQ	End of sequence acknowledge required
RR	Radio Regulations
SOLAS	International Convention for the Safety of Life at Sea
UTC	Coordinated universal time

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

VHF Very high frequency

Related ITU Recommendations

Recommendation ITU-R M.493 – Digital selective-calling system for use in the maritime mobile service

Recommendation ITU-R M.585 – Assignment and use of identities in the maritime mobile service

Recommendation ITU-R M.689 – International maritime VHF radiotelephone system with automatic facilities based on DSC signalling format

Recommendation ITU-R M.1082 – International maritime MF/HF radiotelephone system with automatic facilities based on digital selective calling signalling format

Recommendation ITU-R M.1171 – Radiotelephony procedures in the maritime mobile service

Recommendation ITU-R M.1371 – Technical characteristics for an automatic identification system using time-division multiple access in the VHF maritime mobile band

Recommendation ITU-R M.2135 – Technical characteristics of autonomous maritime radio devices operating in the frequency band 156-162.05 MHz

The ITU Radiocommunication Assembly,

considering

- a) that digital selective calling (DSC) will be used as described in Recommendation ITU-R M.493;
- b) that the requirements of Chapter IV of the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended, for the global maritime distress and safety system (GMDSS) are based on the use of DSC for distress alerting and calling and that operational procedures are necessary for the use of that system;
- c) that, as far as is practicable, operational procedures in all frequency bands and for all types of communications should be similar;
- d) that DSC provides the primary means of transmitting a distress alert. Provisions of transmitting a distress alert by other methods and procedures are described in the Radio Regulations (RR);
- e) 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, urgency 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 displaying the information in a user readable format;
 - 3.3 the verification and, if necessary, the correction of such manually formed sequences;
 - 3.4 automatically set the information when possible;
 - 3.5 a specific audible alarm to indicate receipt of a distress or urgency call or a call having distress category. It should not be possible to disable this alarm. Provisions should be made to ensure that they can be reset only manually;

3.6 audible indication: the term used to describe a brief self-terminating sound which is repeated once every 30 seconds until confirmation or self-terminating after 5 minutes indicating the reception of a DSC call of a category other than distress or urgency or a repetition of a call of categories distress or urgency already received;

3.7 visual indicators to indicate:

3.7.1 type of received call address (to all stations, to a group of stations, geographical, individual);

3.7.2 category of call;

3.7.3 identity of calling station;

3.7.4 numerical or alpha-numerical type of information, e.g. frequency information and telecommand;

3.7.5 type of “end of sequence” character;

3.7.6 detection of errors, if any;

4 that the equipment should be simple to operate;

5 that the operational procedures given in Annexes 3, 4 and 5, which are based on the relevant procedures from RR Chapter VII, Articles 30, 31, 32 and 33, be used as guidance for ships and coast stations;

6 that the operational characteristics of the automatic connection system (ACS) should be in conformity with Annex 5;

7 that the operational characteristics of the autonomous maritime radio devices (AMRD) Group A MOB devices should be in conformity with Annex 6;

8 that the frequencies used for DSC are those contained in Annex 7 to this Recommendation.

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 tuneable 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 “acknowledge RQ” (symbol No. 117) at the end of the sequence and no acknowledgement is received in this time interval.

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Annex 1

Operational procedures for distress, urgency and safety calls

A1-1 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, urgency and safety communications.

A1-1.1 Method of calling

The provisions of RR Chapter VII are applicable to the use of DSC in cases of distress, urgency or safety.

A1-2 Digital selective calling distress alert

The DSC distress alert provides for alerting, maritime mobile service identity (MMSI), ship's position including time, and if entered nature of distress as defined in the RR (see RR Chapter VII).

A1-3 Procedures for digital selective calling distress alerts

A1-3.1 Transmission by a mobile unit in distress

A1-3.1.1 The DSC equipment should be capable of being pre-set to transmit the distress alert on at least one distress alerting frequency.

A1-3.1.2 The distress alert shall be composed in accordance with Recommendation ITU-R M.493. Although the equipment may be able to automatically include the ship's position information and the time the position was valid, if this information is not available to the equipment then the operator has to manually enter the ship's position and time at which it was valid. Enter the nature of distress as appropriate.

A1-3.1.3 Distress alert attempt

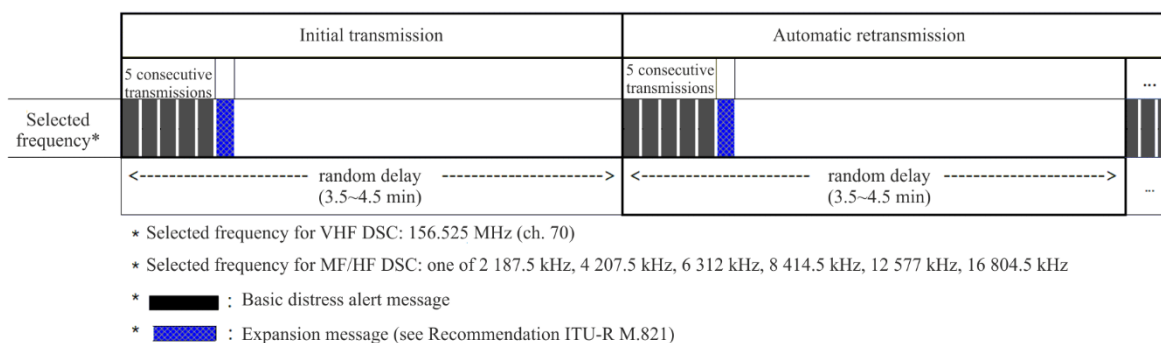
For MF/HF, a distress alert attempt should use multi-frequency call attempt (see § A3-6) by default, however, a single-frequency call attempt may be used when the operator wants to do so. A distress alert attempt for VHF can use single frequency call attempt only.

A1-3.1.3.1 Single frequency call attempt

A distress alert 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.

For MF/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.

FIGURE A1-1
Single-frequency call attempts



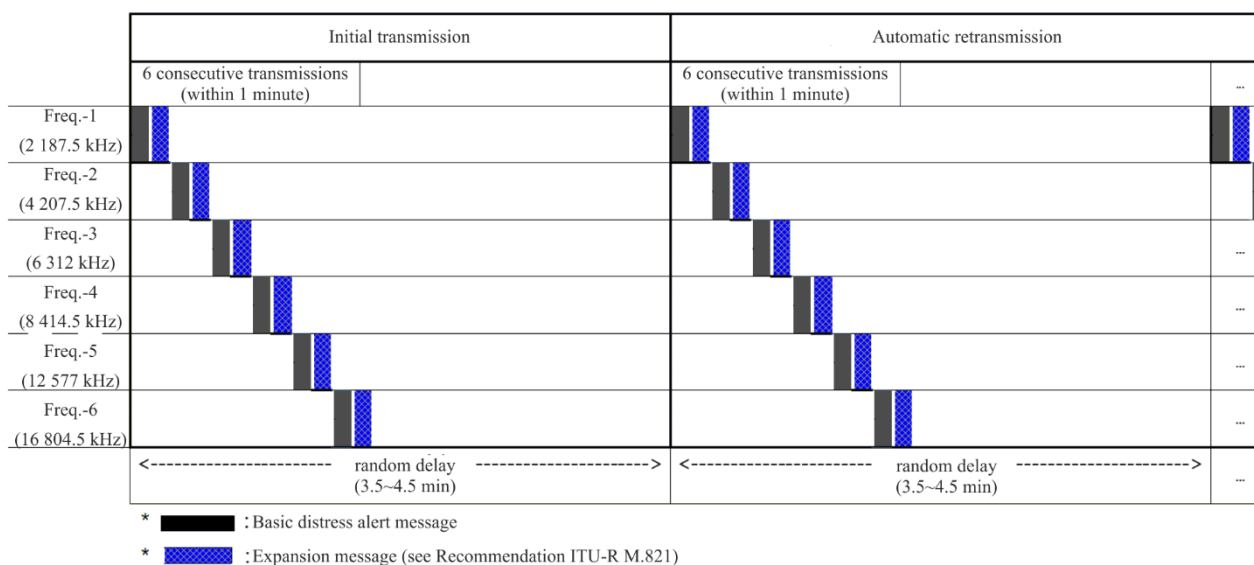
M.0541-A1-01

A1-3.1.3.2 Multi-frequency call attempt

A distress alert attempt may be transmitted as up to six consecutive calls dispersed over a maximum of six distress frequencies (one at MF and five at HF). A VHF call may be transmitted simultaneously with an MF/HF call. Stations transmitting multi-frequency distress alert 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.

FIGURE A1-2
Multi-frequency call attempts



M.0541-A1-02

A1-3.1.4 Distress

In the case of distress the operator should transmit a distress alert as described in Annex 3.

A1-3.2 Reception

The DSC equipment, except AMRD Group A MOB devices, should be capable of maintaining a reliable watch on a 24-hour basis on appropriate DSC distress alerting frequencies.

A1-3.3 Acknowledgement of distress alerts

Acknowledgements of distress alerts should be initiated manually.

Acknowledgements by DSC should be transmitted on the same frequency as the distress alert was received.

A1-3.3.1 Distress alerts should normally be acknowledged by DSC only by appropriate coast stations. Coast stations should, in addition, set watch on frequencies associated with the frequency on which the distress alert was received.

A1-3.3.2 Acknowledgements by coast stations of DSC distress alerts transmitted on MF or HF should be initiated with a minimum delay of 1 min after receipt of a distress alert, and normally within a maximum delay of 2½ 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 alert. Acknowledgements by coast stations on VHF should be transmitted as soon as practicable.

A1-3.3.3 The acknowledgement of a distress alert consists of a single DSC distress acknowledgement call and automatically includes the MMSI of the ship whose distress alert is being acknowledged.

A1-3.3.4 Ships receiving a DSC distress alert from another ship should set watch on an associated radiotelephone distress and safety traffic frequency in order to receive subsequent distress calls and messages. The acknowledgement of a DSC distress alert from another ship should be made by radiotelephony after a short interval so that a coast station may acknowledge receipt in the first instance (see RR Nos. 32.28 – 32.35).

A1-3.3.5 The automatic retransmission of a distress alert attempt should be terminated automatically on receipt of a DSC distress alert acknowledgement.

A1-3.4 Distress alert relays

Distress alert relays should be initiated manually.

A1-3.4.1 A distress alert relay should use the call format for distress alert relays as specified in Recommendation ITU-R M.493 and the calling attempt should follow the procedures described in §§ A1-3.1.3 to A1-3.1.3.2 for distress alerts, except that the distress relay is sent manually as a single call on a single frequency. Ship stations not provided with the DSC distress alert relay function should relay the alert by radio telephony.

A1-3.4.2 Any ship, receiving a distress alert on an HF channel which is not acknowledged by a coast station within 5 min, should transmit an individual distress alert relay addressed to the appropriate coast station or rescue coordination centre.

A1-3.4.3 Distress alert relays transmitted by coast stations, or by ship stations addressed to more than one vessel, should be acknowledged by ship stations using radiotelephony. Distress alert relays transmitted by ship stations should be acknowledged by a coast station transmitting a “distress alert relay acknowledgement” call in accordance with the procedures for distress acknowledgements given in §§ A1-3.3 to A1-3.3.3.

A1-4 Procedures for digital selective calling urgency and safety calls

A1-4.1 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.

A1-4.2 The announcement and identification of medical transports should be carried out by DSC transmission, using appropriate distress and safety calling frequencies. Such calls should use the call format for an urgency call of the type medical transport and be addressed to all ships at VHF and Geographic Area at MF/HF.

A1-4.3 The operational procedures for urgency and safety calls should be in accordance with the relevant parts of §§ A3-2, A3-3, A3-6, A4-2, A4-3 and A4-6.

A1-5 Testing the equipment used for distress and safety calls

Testing on the exclusive DSC distress and safety calling frequencies should be limited as far as possible. DSC test calls should be in accordance with Recommendation ITU-R M.493 and the call should be acknowledged by the called station. Normally there would be no further communication between the two stations involved.

Annex 2

Operational procedures for routine calls

A2-1 Frequency/channels

A2-1.1 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.

A2-1.2 International calling

The paired frequencies listed in RR Appendix 17 and in Annex 6 of this Recommendation should be used for international DSC calling at HF.

A2-1.2.1 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.

A2-1.2.2 All ship-to-shore DSC calling at HF and MF should preferably be done on the coast station's national frequencies.

A2-1.3 National calling

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

A2-1.3.1 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.)

A2-1.3.2 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.

A2-1.4 Method of calling

A2-1.4.1 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 VII are applicable.

A2-1.4.2 The call shall contain information indicating the station or stations to which the call is directed, and the identification of the calling station.

A2-1.4.3 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.

A2-1.4.4 An appropriate digital selective calling channel chosen in accordance with the provisions of RR Nos. 52.128 to 52.137 or Nos. 52.145 to 52.153 as appropriate, shall be used for the call.

A2-2 Operating procedures

The technical format of the call sequence shall be in conformity with Recommendation ITU-R M.493.

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

Acknowledgements may be initiated either manually or automatically. When an acknowledgement can be transmitted automatically, it shall be in conformity with Recommendation ITU-R M.493.

The technical format of the acknowledgement sequence shall be in conformity with Recommendation ITU-R M.493.

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.

A2-2.1 Coast station initiates call to ship station (see Note 1)

If a ship station has to be called, the coast station selects the appropriate MMSI, frequency band and transmitter site, if available.

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

A2-2.1.1 The call is composed by the coast station as follows:

- format specifier,
- address of the ship (MMSI),
- category of call,
- self-identification (MMSI) of the coast station, which is included automatically,
- telecommand information,
- working frequency information in the message part of the sequence, if appropriate,
- usually “end of sequence” signal “acknowledge RQ” (symbol No. 117). However, if the coast station knows that the ship station cannot respond or the call is to a group of ships the end of sequence signal should be 127, in which case the following procedures (§ A2-2.2) relating to an acknowledgement are not applicable.

A2-2.1.2 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.

A2-2.1.3 The coast station operator chooses the calling frequencies which are most suitable for the ship’s location.

A2-2.1.3.1 The coast station initiates the transmission of the sequence on one of the frequencies chosen. Transmission on any one frequency should be limited to no more than two call sequences separated by intervals of at least 45 s to allow for reception of an acknowledgement from the ship.

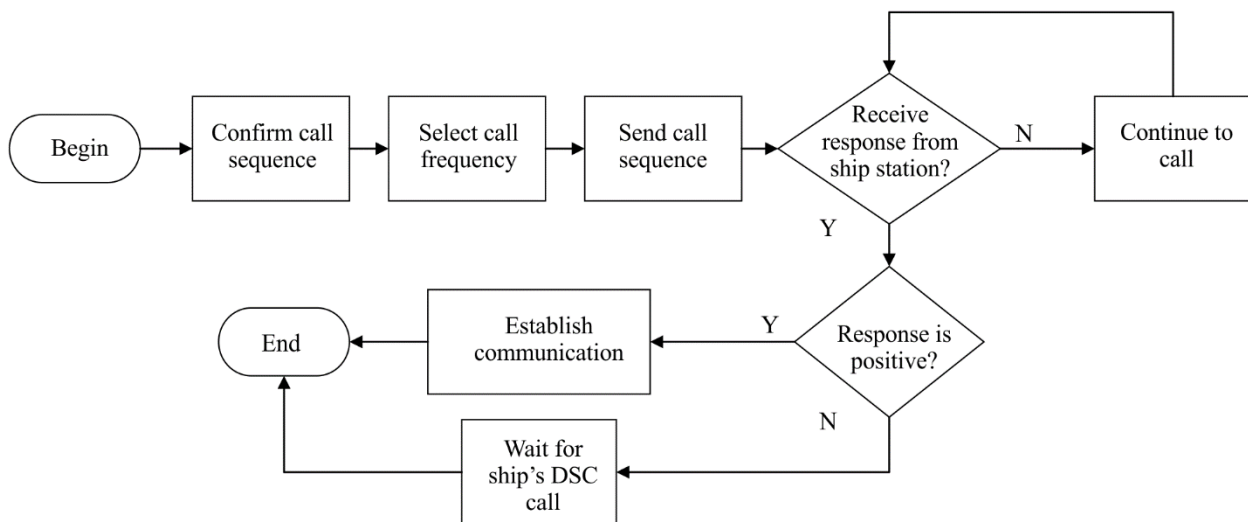
A2-2.1.3.2 If appropriate, a “call attempt” may be transmitted, which may include the transmission of the same call sequence on other frequencies (if necessary with a change of working frequency information to correspond to the same band as the calling frequency) made in turn at intervals of not less than 5 min, following the same pattern as in § A2-2.1.3.1.

A2-2.1.4 If an acknowledgement is received further transmission of the call sequence should not take place.

If the acknowledgement is positive, the coast station shall then prepare to transmit traffic on the working channel or frequency it has proposed. If the acknowledgement is negative, the coast station should await the call from the ship station.

A2-2.1.5 When a station called does not reply, the call attempt should not normally be repeated until after an interval of at least 10 min. The aggregate of the times for which frequencies are occupied in one call attempt, should normally not exceed 1 min.

FIGURE A2-1
Procedure for coast station which initiates call to ship station



M.0541-A2-01

A2-2.2 The following procedures apply at the ship stations:

A2-2.2.1 Upon receipt of a calling sequence at the ship station, the received message should be displayed.

A2-2.2.2 When a received call sequence contains an end of sequence signal “acknowledge RQ” (symbol No. 117), an acknowledgement sequence should be composed and transmitted.

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

A2-2.2.3 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. However the transmitted sequence should contain an “acknowledge BQ” (symbol No. 122) end of sequence signal in place of the “acknowledge RQ” (symbol No. 117) 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 § A2-2.2.

A2-2.2.4 If the ship is equipped for automatic DSC operation, the ship station automatically transmits an acknowledgement with an end of sequence signal “acknowledge BQ” (symbol No. 122). 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.

A2-2.2.5 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.

A2-2.2.6 If the ship is not able to comply immediately the acknowledgement sequence should include the first telecommand signal “unable to comply” (symbol No. 104), with a second telecommand signal giving additional information (see Recommendation ITU-R M.493).