

RECOMMENDATION ITU-R M.1082-1*

**INTERNATIONAL MARITIME MF/HF RADIOTELEPHONE SYSTEM
WITH AUTOMATIC FACILITIES BASED ON DIGITAL
SELECTIVE CALLING SIGNALLING FORMAT**

(Question ITU-R 93/8)

(1994-1997)

Summary

This Recommendation provides for a means to establish a fully automatic radiotelephone service for vessels to send and receive calls via the public switched telephone network (PSTN) using MF/HF equipment. The Recommendation contains detailed operational procedures, timing diagrams for call set-up sequences and a description of factors which differ between MF/HF and VHF systems.

The ITU Radiocommunication Assembly,

considering

- a) that a maritime MF/HF radiotelephone system providing automatic connection with the public switched telephone network (PSTN) would improve traffic handling and the efficiency of the use of the radio channels;
- b) that a maritime VHF radiotelephone system providing automatic connection with the PSTN is described in Recommendation ITU-R M.689 and might, suitably modified, be used in MF and HF;
- c) that international standardization is of great importance in the maritime mobile service;
- d) that the existing public correspondence channels listed in Article 60 (S52) of the Radio Regulations (RR) are in widespread use by ships and coast stations in the maritime mobile service;
- e) that RR Articles 60 (S52) and 65 (S57) do not permit coast stations to emit signals on idle radiotelephone working channels;
- f) that the digital selective-calling (DSC) system described in Recommendations ITU-R M.493 and ITU-R M.541 can be used for signalling over the radio path for an automatic system using a DSC channel;
- g) that the existing RR Article 60 (S52) channels can be used in such an automatic system without impairing their use for manual operations from ships or coast stations,

recommends

- 1 that the operational procedures described in Annex 1 be observed when operating an international radiotelephone system with automatic facilities based on the DSC signalling format and using the public correspondence channels listed in RR Article 60 (S52);
- 2 that the same RR Article 60 (S52) channel can be used for both automatic and manual operation by the same coast station depending on the requirements of the ship stations;
- 3 that the technical characteristics of the ship and coast station equipment should be in accordance with Annex 2.

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

ANNEX 1

Operational procedures**1 Introduction**

These procedures are initiated by using DSC on an appropriate MF or HF paired DSC calling channel and based on the technical characteristics and operational procedures detailed in Recommendations ITU-R M.493 and ITU-R M.541.

Connection to the PSTN is effected using any appropriate MF or HF public correspondence working channel listed in RR Article 60 (S52) without in any way impairing their use for manual operations.

Appendix 1 illustrates the timing of the call set-up, calling and acknowledgement sequences described by these procedures, in the ship-to-shore direction and in the shore-to-ship direction.

Appendix 2 indicates the factors which are not the same in MF/HF as in VHF.

2 Operational procedures in the ship-to-shore direction**2.1 Ship station initiates call**

2.1.1 The user aboard the ship (hereafter referred to as the user) composes the calling sequence (see Note 1) on his DSC equipment as follows:

- selects the format specifier 123 (individual station automatic/semiautomatic service);
- enters 9-digit address (identification) of required coast station;
- selects the category routine (100);
- (the ship station self-identification is entered automatically);
- selects first and second telecommands as appropriate (for a normal radiotelephone call these would be 109 (J3E) and 126 (no information) respectively);
- the ship's position should preferably be inserted so that the coast station can use this information to select the working channel and/or directional antennas. In the absence of any information, the symbol 126 will be automatically inserted 6 times (see Recommendation ITU-R M.493, Annex 1, § 8.2.2, Note and Table 7);
- inserts the required subscriber number (e.g. telephone number);
- selects "end of sequence" signal "RQ".

NOTE 1 – It is assumed that commercial equipment will be produced which simplifies the composition of the calling sequence. In practice the user should only need to key the coast station address and the required subscriber number, all other information being inserted automatically.

2.1.2 The user selects the MF or HF DSC ship-to-shore calling frequency appropriate to the coast station and transmits the calling sequence, after checking as far as possible that there are no DSC calls in progress on that frequency.

2.1.3 If the ship station does not receive an error-free acknowledgement from the called coast station on the paired DSC shore-to-ship frequency (see § 2.2) within 25 s, the user should:

- in the case of MF, repeat the transmission of the DSC call in accordance with § 2.1.2;
- in the case of HF, either repeat the transmission of the DSC call on the same frequency or initiate a call on another DSC frequency (which may prove better from the propagation standpoint than the frequency initially chosen).

2.2 Coast station acknowledgement

2.2.1 The coast station can comply immediately with the call request

2.2.1.1 If, on receipt of an error-free calling sequence, the coast station can comply immediately with the call request, then it should, within 3 s of receiving it, transmit an acknowledgement sequence on the paired DSC shore-to-ship frequency.

The acknowledgement sequence should contain the same information as in the call request, with the following exceptions:

- the address will be that of the ship,
- the self-identification will be that of the coast station,
- the working frequency/ies or channel number will be included (see Recommendation ITU-R M.493, Annex 1, § 8.2.2) and should be normally in the same band as that of the received DSC call,
- the “end of sequence” signal will be “BQ”.

2.2.1.2 After receiving the calling sequence, the coast station should within 10 s switch to the working frequency/ies indicated and then transmit an “engaged channel” signal on the working channel transmission frequency. In the case of an HF link, if the coast station uses directional antennas, it is possible to set up a transmission chain (one transmitter + one transmitting antenna and one receiver + one receiving antenna) corresponding to the geographical location of the ship station.

2.2.1.3 After receiving the acknowledgement sequence, the ship station should within 5 s switch to the working frequency/ies indicated.

2.2.2 The coast station cannot comply immediately with the call request

2.2.2.1 If the appropriate working frequency/ies or channel(s) are busy then the acknowledgement sequence should be as in § 2.2.1.1, except that the first telecommand should be 104 (unable to comply) and the second telecommand should be 102 (busy) and no working frequency/ies or channel should be included in the acknowledgement.

2.2.2.2 If the coast station cannot comply for other reasons, the acknowledgement sequence should be as in § 2.2.2.1 except that the second telecommand signal should be one of symbol numbers 100-109 as appropriate.

2.2.3 The ship station, on receipt of an acknowledgement indicating “unable to comply” in accordance with § 2.2.2.1 or 2.2.2.2 should, if an automatic connection is still required, initiate an appropriate new DSC call in accordance with § 2.1.

2.2.4 If the coast station transmitted an acknowledgement indicating “unable to comply” in accordance with § 2.2.2.1 or 2.2.2.2, then it should take no further action with respect to the call request.

2.3 Procedures subsequent to the exchange of initial DSC calls

2.3.1 Once tuned to the working frequency/ies indicated (see § 2.2.1.3), the ship station transmits on the ship-to-shore frequency of the working channel a DSC call identical to the initial call (see § 2.1.1).

If a DSC call containing the same self-identification as that of the calling ship is received on the coast station receive frequency of the working channel within 25 s, the coast station may, on the receipt of an error-free calling sequence, automatically measure the signal-to-noise (S/N) ratio of the received DSC call and compare this to the S/N ratio required for the mode requested (see Note 1).

NOTE 1 – Recommendation ITU-R F.339, Table 1 indicates that an RF S/N density ratio of > 61 dB/Hz should be obtained for a J3E telephony call having a marginally commercial grade of service under non-diversity fading conditions. S/N density ratios applicable to other classes of emission can also be obtained from this table. The quality of the working channel may alternatively be estimated by other methods.

2.3.2 The coast station should then stop the transmission of the “engaged channel” signal, and initiate the transmission of a DSC acknowledgement, within 5 s after receiving the call, on the shore-to-ship frequency of that working channel.

2.3.2.1 If the working channel quality evaluation indicates that the communication on the working channel will be satisfactory, then the acknowledgement should be identical to that transmitted in accordance with § 2.2.1.1. The coast station should then commence dialling the subscriber number.

2.3.2.2 If the working channel quality evaluation indicates that the communication on the working channel will not be satisfactory, but the coast station can offer an alternative working channel, then the acknowledgement should be identical to that transmitted in accordance with § 2.2.1.1 except that the indicated frequency is the frequency corresponding to that alternative working channel and the procedure should be repeated from § 2.3.1.

2.3.2.3 If the working channel quality evaluation again indicates that the communication on the new working channel will not be satisfactory, and if the coast station cannot offer an alternative working frequency, then the acknowledgement should be the same as that transmitted in § 2.2.1.1 except that the first telecommand should be 104 (unable to comply) and the second telecommand should be 108 (unable to use proposed channel).

2.3.3 If no such DSC call from the ship (§ 2.3.1) is received within 25 s, then the coast station should remove the “engaged channel” signal from the working channel.

2.3.4 If the coast station transmitted an acknowledgement indicating “unable to comply” in accordance with § 2.3.2.3, then it should remove the “engaged channel” signal from the working channel and take no further action with respect to the call request.

2.3.5 If the ship station receives an “unable to comply” acknowledgement in accordance with § 2.3.2.3 or if it receives no acknowledgement within 25 s from the start of transmission of the call described in § 2.3.1 and hears no indication that the connection to the requested subscriber has been effected, then the ship station should clear the call in accordance with § 2.5.1.

2.4 Call connection

2.4.1 Once the coast station begins dialling the subscriber number it should connect the line circuit to the radio path. Timing of the call for billing purposes should commence after the subscriber answers, i.e. “off-hook” condition detected.

2.4.2 If the called subscriber does not answer within a period of 1 min from completion of dialling or if anything other than ringing tones are received (e.g. engaged, number unobtainable, etc.), then the call should be considered as not started and the coast station should clear the circuit by disconnecting the line and radio circuit. The user, on hearing the ringing tones stop or hearing anything other than “ringing” tones, should refrain from any further transmissions on the working channel. If a further call is required, the user should initiate a new call on a DSC calling channel.

2.5 Call completion

2.5.1 When the ship station wishes to terminate the call connection to the subscriber it transmits an “end of call” DSC call on the ship-to-shore frequency of the working channel. The format of this call should be the same as that described in § 2.1.1 except that the first telecommand should be 105 (end of call) and the second telecommand should be 126.

2.5.2 On receipt of that call, if it contains the same self-identification as that of the calling ship, the landline is disconnected, the call timing is stopped and the coast station transmits a DSC acknowledgement on the shore-to-ship frequency of the working channel within 1 s of receipt. The format of that acknowledgement should be the same as that described in § 2.5.1 except that the “end of sequence” signal should be “BQ” and:

- the chargeable duration of the call should be inserted in the “frequency/channel” field by coding the first three characters as hours, minutes, seconds and the remaining three characters as symbols 126: e.g. a chargeable duration of 6 min and 50 s would be coded as 00 06 50 126 126 126;
- if the chargeable duration of the call is not available, then the “frequency/channel” field should contain six symbols 126.

2.5.3 If the ship station does not receive an “end of call acknowledgement” within 20 s then it should repeat the “end of call” and consider the call to be complete.