RECOMMENDATION ITU-R M.493-12*

Digital selective-calling system for use in the maritime mobile service


Scope

This Recommendation describes the digital selective-calling (DSC) system for use in the maritime mobile service covering general purpose and simplified versions of DSC equipment. A description of a generalized user interface as well as an automated procedure for the operation of shipborne equipment are also included.

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 (DSC) 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 performance standards for shipborne equipment;
e) that the DSC system should be applicable to the maritime mobile service, both for international and national needs;
f) that it is desirable that the DSC system fulfils the requirements of all types of vessels desiring to use it;
g) that the Radio Regulations (RR) adopted by the World Radiocommunication Conference (Geneva, 1997) (WRC-97) provided for the use of maritime mobile service identities by all administrations;
h) that after experience gained, a need exists to reduce unnecessary alarms and simplify operation of shipborne equipment;
j) that in certain applications there may be a need to disable DSC automatic channel switching when there is a requirement for vessels to maintain continuous radio watch on a specific radio telephony channel (e.g. port traffic control, bridge-to-bridge communications),

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

1 that DSC equipment should be designed in response to the operational requirements specified within Recommendation ITU-R M.541;

2 that where there is a need for a general purpose DSC system, the system should be designed in accordance with the characteristics given in Annex 1;

3 that where there is a need for simplified versions of DSC equipment, they should be designed in accordance with Annex 2;

4 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;

5 that shipborne equipment should also be designed in accordance with Annexes 3 and 4.

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 DSC calling 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. When a DSC call is transmitted on HF and MF working channels for public correspondence, the class of emission is J2B. In this case, audio tones with frequencies 1 700 Hz ± 85 Hz and modulation rate 100 Bd are used in order for the DSC call to be transmitted.
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 ± 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;
1.5.1.2 the symbols from 100 to 127 are used to code service commands (see Table 3).

1.6 Where the distress alert repetitions described in § 11 apply, the following conditions are considered necessary:
1.6.1 the transmitter encoder must provide repetitive transmission of the call sequence in accordance with § 11; and
1.6.2 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.

1.7 When the transmission of a DSC distress alert 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).