

RECOMMENDATION ITU-R M.627-1*

**TECHNICAL CHARACTERISTICS FOR HF MARITIME RADIO
EQUIPMENT USING NARROW-BAND PHASE-SHIFT
KEYING (NBPSK) TELEGRAPHY**

(Question ITU-R 54/8)

(1986-1995)

Summary

The Recommendation provides in Annex 1 technical characteristics for narrow-band phase-shift keying (NBPSK) telegraphy equipment used in the HF bands of the maritime-mobile service.

The ITU Radiocommunication Assembly,

considering

- a) the fact that direct printing communication modes are currently being widely introduced in the maritime mobile service;
- b) that the frequency stability of ship radio receivers and transmitters has considerably improved;
- c) that synchronous 7-unit signal codes with error detection are widely used in direct-printing links;
- d) that the load on direct-printing channels in the HF maritime mobile service has increased;
- e) that NBPSK signals are received with better noise immunity than FSK signals at the same transmitter power;
- f) that the use of NBPSK telegraphy allows two PSK channels to be accommodated in one standard channel of narrow-band telegraphy in the maritime mobile service at a modulation rate in each channel of 100 Bd or one PSK channel at a modulation rate of 200 Bd;
- g) that the level of mutual channel interference in PSK mode does not exceed that of FSK mode,

recommends

- 1 that when NBPSK telegraphy equipment is used in the HF maritime mobile service, the equipment characteristics should meet the requirements indicated in Annex 1.

ANNEX 1

- 1 The modulation rate on the radio link should be 100 or 200 Bd.

- 2 The carrier wave phase modulation rule should be the following:

In the transmission of signal element *Y*, the carrier wave phase changes by 180° relative to the phase of the preceding bit; but in the transmission of signal element *B*, the carrier wave phase remains the same as for the preceding bit.

NOTE 1 – Signal elements *B* and *Y* are defined in Recommendations ITU-R M.625 and ITU-R M.490.

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

3 The deviation of the information sequence transmission rate from the nominal value must not exceed ± 0.01 bit/s.

4 The necessary transmission bandwidth should be:

4.1 not more than 110 Hz for a rate of 100 Bd;

4.2 not more than 210 Hz for a rate of 200 Bd.

5 The reduction of the mean transmitter output power at the maximum modulation rate compared with that of the unmodulated carrier should not exceed 4 dB.

6 The levels of the out-of-band emission at the transmitter output at a modulation rate of 100 Bd should be:

6.1 –30 dB referred to unmodulated carrier for a bandwidth of not more than 260 Hz;

6.2 –40 dB referred to unmodulated carrier for a bandwidth of not more than 500 Hz;

6.3 –50 dB referred to unmodulated carrier for a bandwidth of not more than 700 Hz;

6.4 –60 dB referred to unmodulated carrier for a bandwidth of not more than 900 Hz.

7 The levels of the out-of-band emission at the transmitter output at a modulation rate of 200 Bd should be:

7.1 –30 dB referred to unmodulated carrier for a bandwidth of not more than 520 Hz;

7.2 –40 dB referred to unmodulated carrier for a bandwidth of not more than 1 000 Hz;

7.3 –50 dB referred to unmodulated carrier for a bandwidth of not more than 1 400 Hz;

7.4 –60 dB referred to unmodulated carrier for a bandwidth of not more than 1 800 Hz.

8 The standard maritime mobile service narrow-band telegraphy channel may accommodate two PSK sub-channels at a maximum modulation rate of 100 Bd in each PSK sub-channel.

The frequency of one PSK sub-channel should be 130 Hz lower than the assigned frequency of a standard narrow-band telegraphy channel, and the frequency of the second sub-channel should be 130 Hz higher than the assigned frequency.

9 The transmitter should use class of emission G1B or G7B or single-sideband classes J2B or J7B.

10 If class J2B is used, the frequency of the sub-carrier signal to the audio frequency input of the transmitter should be 1 570, 1 700 or 1 830 Hz, while the frequency tolerance of the sub-carrier from the nominal value should not exceed ± 0.5 Hz.

11 If class J7B is used, the frequencies of the sub-carrier signals to the audio frequency input of the transmitter must be 1 570 and 1 830 Hz, while the tolerance of the sub-carrier frequency from the nominal value should not exceed ± 0.5 Hz.

12 The maximum transmitter frequency tolerance from the nominal value should not exceed ± 5 Hz.

13 The linearity of the amplitude characteristics of the transmitter information signal amplification channel should be such that the level of intermodulation components does not exceed –31 dB for the third order, –38 dB for the fifth order, and –43 dB for the seventh order.

14 The maximum frequency tolerance of the receiver tuning from the nominal value should not exceed ± 5 Hz.