

RECOMMENDATION 494*

**TECHNICAL CHARACTERISTICS OF SINGLE-SIDEBAND EQUIPMENT
IN THE MF AND HF LAND MOBILE RADIOTELEPHONE SERVICE**

(1974)

The CCIR,

CONSIDERING

- (a) that the growing use of single-sideband equipment in the land mobile service makes standardization increasingly important if mutual interference with other services is to be minimized;
- (b) that some administrations have developed technical standards for single-sideband equipment operating in the MF and HF land mobile radiotelephone service;
- (c) that the preferred technical characteristics for land mobile services should, as far as practicable, be compatible with those established for the aeronautical mobile (R) service and the maritime mobile services,

UNANIMOUSLY RECOMMENDS

1. that the preferred technical characteristics for MF and HF single-sideband land mobile equipment should be as follows:

1.1 *General*

- 1.1.1 class of emission J3E should be used; other classes of emission, e.g. H3E and R3E may be permitted, when necessary;
- 1.1.2 base and mobile stations should use the upper sideband;
- 1.1.3 the assigned frequency should be 1400 Hz higher than the carrier (reference) frequency;
- 1.1.4 for private mobile systems, the audio-frequency band should be 350-2700 Hz. For systems that can be connected to the public telephone network, the audio-frequency band may be increased to 300-3400 Hz.

1.2 *Transmitters*

- 1.2.1 the frequency tolerance should be ± 100 Hz. For short periods, of the order of 15 min, the maximum deviation of ± 40 Hz should not be exceeded. The unwanted frequency modulation of the carrier should be sufficiently low to prevent harmful distortion;
- 1.2.2 the permitted amplitude variation without pre-emphasis should not exceed 6 dB over the audio-frequency band specified in § 1.1.4, in either case;

* This Recommendation terminates the study of Question 8/8, which has been deleted.

1.2.3 the power levels of unwanted emissions supplied to the antenna transmission line on any discrete frequency should, when the transmitter is driven at the rated output power* be in accordance with the following table:

TABLE I

Separation, Δ , in kHz between the frequency of the unwanted emission and the assigned frequency (kHz)	Minimum attenuation below the level of either fundamental sideband component when modulated by two tones (dB)
$1.6 < \Delta \leq 4.8$	25
$4.8 < \Delta \leq 8.0$	32
$8.0 < \Delta$	37 (without exceeding the power of 50 mW)

Transmitters, using suppressed carrier emission may, as far as spurious emissions are concerned, be tested for compliance with this table by means of an input signal consisting of two audio tones that produce fundamental components of equal amplitude sufficient to produce the rated output of the transmitter, with a frequency separation between the tones such that all intermodulation products occur at frequencies at least 1.6 kHz removed from the assigned frequency;

1.2.4 for J3E emission, the power of the carrier should be at least 40 dB below the rated output power. In the case of hand portable equipment the power of the carrier need not be less than 1 mW;

1.2.5 the in-band intermodulation products should be in accordance with Recommendation 326. The test frequencies should be:

$$f_1 = 1900 \text{ Hz}, f_2 = 2600 \text{ Hz}$$

1.3 *Technical characteristics of receivers*

1.3.1 the sensitivity should be such that for a 12 dB signal plus noise plus distortion to noise plus distortion (SINAD) ratio, the input signal should not be more than -131 dBW**;

1.3.2 the two-signal selectivity should be such that the ratio of the level of the unwanted signal to the level of the wanted signal should be at least +60 dB when the level of the wanted signal is set at the sensitivity level given in § 1.3.1 and the level of the unwanted signal is adjusted until the 12 dB SINAD ratio is degraded by 6 dB**. The standard signal spacing for measuring receiver adjacent-signal selectivity should be 5 kHz;

1.3.3 the permitted amplitude variations without post-detector de-emphasis should not exceed 6 dB over the audio-frequency band specified in § 1.1.4, in either case;

1.3.4 the frequency stability should be within ± 100 Hz (with a maximum deviation of ± 60 Hz for short periods of the order of 15 minutes);

1.3.5 unwanted emissions on any discrete frequency should not exceed 2 nanowatts, measured either as a power level at the antenna terminals or as an effective radiated power from the equipment itself;

1.3.6 the spurious response rejection ratio should not be less than 60 dB in relation to the sensitivity of the receiver measured in accordance with § 1.3.1. In certain cases, the image frequency attenuation can be reduced to 50 dB for technical and economic reasons;

2. that a special requirement, necessary for single-sideband equipment used in the MF and HF land mobile service, is that, when an internal audio-frequency generator is used to modulate a transmitter to facilitate receiver tuning, the audio frequency should be $1000 \text{ Hz} \pm 1 \text{ Hz}$.

* The rated output power may differ from that which would be established by Recommendation 326 and may be limited, on the other hand, by reasons of thermal dissipation, supply current limitations, or factors other than intermodulation products.

** The methods of measuring these characteristics should follow, as far as practicable, the practices as defined by the IEC.