

RECOMMENDATION 703*

CHARACTERISTICS OF AM SOUND BROADCASTING REFERENCE RECEIVERS FOR PLANNING PURPOSES

(1990)

The CCIR,

CONSIDERING

- (a) that frequency assignment plans must of necessity take into account the characteristics of receivers;
- (b) that the range of performance of receivers used by the public is very large;
- (c) that a reference receiver with characteristics based on currently available receivers may be useful in a planning context;
- (d) that standards for reference receivers should therefore be defined, which can be taken as a basis for frequency planning purposes;
- (e) that these standards need to be taken into account by receiver manufacturers,

UNANIMOUSLY RECOMMENDS

that the receiver characteristics contained in Annex I should be used for AM sound broadcasting planning purposes.

ANNEX I

In deriving the recommended characteristics, the parameters contained in Annex II were also considered.

1. Sensitivity

For planning purposes, "sensitivity" is understood to mean "noise-limited sensitivity", given in terms of field strength, required to achieve a specified signal-to-noise ratio at the audio output.

Most commonly available AM receivers are now provided with built-in antennas. In the LF and MF bands, these are usually ferrite antennas (see Note 1). For the HF bands, when included, telescopic rod antennas are frequently used. Therefore, receivers using these types of antennas should be used as a reference, even though a variety of external antennas may occasionally be used to improve reception.

For those Administrations that employ wide-band systems (see Note 2) in the MF band, the use of monopole antennas is preferred as a reference.

Sensitivity should be presented as a single mean figure for each broadcasting band, from which the minimum usable field strength may be calculated taking into account other influences (e.g. man-made noise). The following values are suggested for the minimum sensitivity of an average receiver:

Band 5 (LF):	66 dB(μ V/m)
Band 6 (MF):	60 dB(μ V/m) (see Note 3)
Band 7 (HF):	40 dB(μ V/m) (see Note 4)

These values are based upon an AF signal-to-unweighted noise (r.m.s.) ratio of 26 dB and are related to a modulation of 30%. For other AF signal-to-noise ratios the corresponding minimum sensitivity can be easily calculated (see Annex II, § 6). The AF signal-to-noise measurement is made according to IEC Publication 315-3; the field-strength values for the LF and MF band are measured according to IEC Publication 315-1.

* The Director of the CCIR is requested to bring this Recommendation to the attention of the IEC. This Recommendation supersedes Report 617-2 (Dubrovnik, 1986) which is hereby deleted.

Note 1 — A special arrangement of two ferrite rod antennas with their outputs separately received and processed up to the stage of detection has been reported to substantially reduce the effects of fading in the night-time interference zone in band 6 (MF) and 7 (HF) [CCIR, 1970-74].

Note 2 — According to present day planning arrangements in the various ITU Regions, in general a "narrow-band system" refers to one in which the system bandwidth is less than 5 kHz. A "wide-band system" refers to one with a system bandwidth greater than 5 kHz.

Note 3 — Values of 54 dB(μ V/m) and 40 dB(μ V/m) were also supported respectively by [CCIR, 1982-86a and b] and [CCIR, 1986-90a].

Note 4 — The WARC HFBC(2), Geneva 1987, adopted this value for DSB and SSB reception.

2. Selectivity

Selectivity of a receiver is a measure of its ability to discriminate between a wanted signal to which the receiver is tuned and unwanted signals entering through the antenna circuit.

The selectivity is understood as an effective selectivity comprising RF selectivity, IF selectivity, demodulator and AF frequency response.

The selectivity shall be sufficient, so that the relative RF protection ratios given in § 2.1, 2.2 and 2.3 are met. Relative RF protection ratios are defined in Recommendation 560 and should be measured according to Recommendation 559.

2.1 For LF, MF, HF bands in case of DSB reception in a narrow band system (see Note 2 of § 1), the relative RF protection ratios of Recommendation 560, curve D, should be met for a carrier frequency separation ≤ 20 kHz. For a carrier frequency separation > 20 kHz a constant value of -55 dB should be met.

The use of curve D is suitable for a situation where a maximum number of channels is to be planned in a given area and where quality criteria are not considered as a priority factor.

The protection ratio curves of Recommendation 560 are based on a single receiver selectivity curve. It should, however, be noted that other combinations of 3 dB bandwidth and selectivity roll-off can also meet the relative protection ratio curves shown in Recommendation 560. (Examples see Annex II, § 2.)

2.2 For wide-band systems, in the MF band, where a wider bandwidth of the audio-frequency modulating signal is employed, the use of the relative protection ratios of Recommendation 560, curve A or B, may be more appropriate. However, these curves were based upon the EBU MBF reference receiver.

2.3 For HF bands, in the case of SSB reception (after the transition period) see Report 1059. The relative protection ratios of Fig. 1 should be met for a carrier frequency separation ≤ 10 kHz. For a carrier frequency separation > 10 kHz a constant value of -57 dB should be met (see also Recommendation 640).

Relative RF-protection ratios A_{rel} for SSB are given with respect to the frequency difference Δf between the wanted carrier f_w and the interfering carrier f_i : $\Delta f = f_w - f_i$, thus, negative Δf describes interference from the upper adjacent channel.

3. Performance in the presence of strong signals

AM broadcasting receivers overloading by strong input signals may result in:

- desensitization;
- cross-modulation and intermodulation;
- AF signal distortion in the amplifier stages and/or in the demodulator.

Limiting values of maximum input voltage to the receiver to be taken into account in planning, cannot be recommended due to the unavoidable occurrence of the phenomenon in close proximity of AM transmitters.

These difficulties may be alleviated by a careful choice of the transmitter site at the planning stage and/or by implementing case by case solutions (ruggedized receivers) when receiving locations near the transmitting station cannot be avoided.