RADIO CODE OF PRACTICE

ON TECHNICAL STANDARDS

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Contents

SECTION 1 STANDARDS FOR MF/AM SOUND BROADCASTING SERVICE

1.1 TECHNICAL STANDARDS

Monophonic sound broadcasting service in the MF band shall use double sideband amplitude modulation, suitable for conventional envelope detection by receivers.

For stereophonic sound broadcasting service in the MF band, the compatible quadrature amplitude modulation system (C-QUAM) as specified in CCIR Report 458-5 (Volume X — Part 1, Geneva 1990) shall be employed.

1.2 CHARACTERISTICS OF AUDIO SIGNALS

The analogue audio signal shall be confined to the nominal frequency range of 0 to 10 kHz.

1.3 CHARACTERISTICS OF RADIO FREQUENCY SIGNALS

1.3.1 *Transmission Band*

The transmitter shall operate within the frequency band of 526.5 to 1606.5 kHz.

1.3.2 *Modulation Depth*

The positive peak of the modulated envelope waveform shall be limited to a maximum of 125% whereas the negative peak of the modulated envelope waveform shall be limited to a maximum of 100%.

1.3.3 *Carrier Frequency Stability*

The carrier frequency shall remain within ±10 Hz from the nominal frequency.

1.3.4 *Carrier Level Stability*

The carrier level shall not vary by more than ±5% from its unmodulated level under any condition of modulation.

1.3.5 *Polarization*

Vertical polarization shall be employed unless otherwise specified by the Telecommunications Authority.

1.3.6 *Operating Power*

The transmitter output power into the aerial system shall be maintained as near as is practicable to the authorized value and may not be less than 90% or more than 105% of the authorized value.

1.4 SPURIOUS AND OUT-OF-BAND EMISSIONS

With the transmitter operating at its specified power into its designed load impedance, or into the aerial system at the authorized power, the power of any spurious emissions (spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products) and out-of-band emissions measured downstream of all filters, combiners, and multiplexers, shall not exceed the following limits:

— a value of 25 dB below the unmodulated carrier power for emissions 10.2 kHz to 20 kHz away from the carrier;

— a value of 35 dB below the unmodulated carrier power for emissions 20 kHz to 30 kHz away from the carrier;

— a value of (5 + f) dB below the unmodulated carrier power for emissions 30 kHz to 60 kHz away from the carrier, where f is the frequency in kHz away from the carrier;

— a value of 65 dB below the unmodulated carrier power for emissions 60 kHz to 75 kHz away from the carrier;

— a value of [43 + 10 $\log_{10}$(transmitter power in watts)] dB below the unmodulated carrier power, or 80 dB below the unmodulated carrier power, whichever is the lesser attenuation, except for transmitters having power less than 158 watts, where the attenuation shall be at least 65 dB below the unmodulated carrier power, for emissions more than 75 kHz away from the carrier.

SECTION 2 STANDARDS FOR VHF/FM SOUND BROADCASTING SERVICE

2.1 TECHNICAL STANDARDS

The transmission under VHF/FM sound broadcasting service shall comply with CCIR Recommendation 450-1 (Volume X — Part 1, Geneva 1990) and shall adhere to additional provisions and certain options specified in this Code.

For stereophonic VHF/FM sound broadcasting service, the pilot-tone system specified in section 2.2 of CCIR Recommendation 450-1 (Volume X — Part 1, Geneva 1990) shall be employed.

2.2 CHARACTERISTICS OF AUDIO SIGNALS

2.2.1 The analogue audio signals shall be confined to the nominal frequency range of 0 to 15 kHz.

2.2.2 The audio signal shall be subject to pre-emphasis with a time-constant of 50 μs ± 2 μs.

2.3 CHARACTERISTICS OF SUPPLEMENTARY SIGNALS

2.3.1 The rest frequency of any sub-carrier of the supplementary signal sent in addition to the main monophonic or stereophonic programme shall be no more than 76 kHz with respect to the main carrier.

2.3.2 The instantaneous sideband occupancy of any sub-carrier of the supplementary signal within the baseband multiplex shall be within a limit of 80 kHz with respect to the main carrier. This containment is defined as an amplitude of -20 dB with respect to the sub-carrier amplitude, at the frequency limit of 80 kHz given above.

2.3.3 The arithmetic sum of the supplementary signals shall have a maximum amplitude of 10% of the maximum permitted baseband signal value, corresponding to a deviation of the main carrier by ±7.5 kHz. The maximum permitted baseband signal value corresponds to the maximum deviation of ±75 kHz of the main carrier. See also section 2.4.3 below.

2.3.4 Where Radio Data System (RDS) is transmitted, the characteristics of RDS shall follow CCIR Recommendation 643-1 (Volume X — Part 1, Geneva 1990). The following group types are permitted:

type 0 groups : basic tuning and switching information

type 1 groups : programme item number

type 2 groups	:	only radiotext directly related to the sound broadcast programme may be transmitted
type 4A groups	:	clock-time and date
type 6 groups	:	in-house application may be allowed subject to prior approval given by the Telecommunications Authority
type 14 groups	:	enhanced other networks information
type 15B groups	:	fast basic tuning and switching information

2.3.5 Where systems other than RDS conforming to CCIR Recommendation 643-1 (Volume X — Part 1, Geneva 1990) are transmitted, the greatest incursion by the sidebands of the sub-carriers of such systems shall not, within the baseband multiplex, i.e., prior to modulation of the main carrier, extend below a frequency of 60 kHz, this limit being defined as a signal amplitude of -30 dB with respect to the sub-carrier amplitude. Under no circumstances shall the deviation of the main carrier by these systems, taken together, (excluding that attributable to RDS) exceed ±5 kHz. The use of these systems for carrying any supplementary information shall be subject to prior approval given by the Telecommunications Authority.

2.4 CHARACTERISTICS OF RADIO FREQUENCY SIGNALS

2.4.1 *Transmission Band*

The transmitter shall operate within the frequency band of 87 to 108 MHz.

2.4.2 *Channel Separation*

Channel assignments shall be separated by an integral multiple of 100 kHz.

2.4.3 *Maximum Frequency Deviation*

The maximum frequency deviation applied to the radio frequency carrier shall not exceed ±75 kHz under all circumstances. The means of achieving this shall include the insertion of audio limiters at appropriate points in the programme input equipment of the transmitter. These limiters may be separate or combined, or integral to equipment used for other purposes.

2.4.4 *Carrier Frequency Stability*

The transmitter RF carrier frequency, in the absence of modulation, shall not vary by more than ±2 kHz.

2.4.5 *Change of Carrier Centre Frequency*

The transmitter RF carrier centre frequency shall not vary by more than ±200 Hz under any modulation condition up to ±75 kHz peak deviation.

2.4.6 *Carrier Amplitude Modulation*

The amplitude modulation of the RF carrier shall not exceed 1% depth of modulation.

2.4.7 *Polarization*

Circular polarization shall be employed (left-hand rotation as observed from the receiving antenna when facing the transmitter) unless otherwise specified by the Telecommunications Authority.

2.4.8 *Operating Power*

The transmitter output power into the aerial system shall be maintained as near as is practicable to the authorized value and may not be less than 90% or more than 105% of the authorized value.

2.5 SPURIOUS AND OUT-OF-BAND EMISSIONS

With the transmitter operating at any power up to its specified power level into its designed load impedance, the level of any spurious emissions (spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products) and out-of-band emissions measured downstream of all filters, combiners, and multiplexers, above a frequency of 100 kHz, excluding the range ±150 kHz relative to the unmodulated carrier frequency, shall not exceed the following limits:

— a value of 40 dB below the unmodulated carrier power, for erp ≤ -6 dBW (250 mW)

— a value of (46 + erp in dBW) dB below the unmodulated carrier power, for -6 dBW (250 mW) < erp ≤ 14 dBW (25 W)

— a value of 60 dB below the unmodulated carrier power, for 14 dBW (25 W) < erp ≤ 30 dBW (1 kW)

— a value of (30 + erp in dBW) dB below the unmodulated carrier power, for erp > 30 dBW (1 kW)

and in the band 118 — 137 MHz:

— a value of (46 + erp in dBW) dB below the unmodulated carrier power, for -6 dBW (250 mW) < erp ≤ 39 dBW (7.9 kW)

— a value of 85 dB below the unmodulated carrier power, for erp > 39 dBW (7.9 kW)

also, in the band 108 — 118 MHz:

— a value of (46 + erp in dBW) dB below the unmodulated carrier power, for -6 dBW (250 mW) < erp ≤ 30 dBW (1 kW)

— a value of [76 + (erp in dBW - 30)/2] dB below the unmodulated carrier power, for 30 dBW (1 kW) < erp ≤ 48 dBW (63 kW)

— a value of 85 dB below the unmodulated carrier power, for erp > 48 dBW (63 kW)

where erp refers to system effective radiated power.

SECTION 3 TRANSMITTER EQUIPMENT

3.1 ACCESS TO ADJUSTMENTS

All controls and adjustments which, if maladjusted, might result in any transgression of the requirements of this Code, shall not be accessible without the use of a tool.

3.2 METERING AND MONITORING

The transmitter shall incorporate a suitable meter indicating, or uniquely related to, the RF output power. Moreover, a monitoring point shall be provided, presented as a fixed BNC coaxial connector (50 or 75 ohm), fed via suitable coupling mechanism from the transmitter RF output. A similar monitoring point shall also be provided from the combiner RF output if any. A monitor point, presented either as a fixed BNC coaxial connector, or as a fixed audio line jack socket, shall be provided, fed via a suitable coupling mechanism from the feed to the modulator input.

3.3 FEEDER ARRANGEMENTS AND PERFORMANCE

3.3.1 Where more than one transmitter is installed for the service (to enable continuity of service in the event that one transmitter fails), the feeder and combiner arrangements shall allow either transmitter to be tested separately off-air, feeding into a dummy load provided by the operator.

3.3.2 Where only one transmitter is installed for the service, the feeder arrangement shall enable (by switching or by an easy change of connection) the transmitter to be tested off-air feeding into a dummy load provided by the operator.

3.3.3 In the case of VHF transmissions, the transmitting aerial shall be matched to the characteristic impedance of its RF feeder cable to provide a return loss of not less than 16 dB. The return loss presented to the transmitter RF output shall not be less than 14 dB. This performance shall be achieved over a bandwidth of at least ±150 kHz relative to the unmodulated carrier frequency.

3.3.4 In case of MF transmissions, the transmitter should be capable of meeting the requirements of this Code, when transmitting into an aerial whose return loss is 20 dB at the carrier frequency, and 10 dB at ±10 kHz from the carrier.

3.4 ENVIRONMENTAL AND RELIABILITY REQUIREMENTS

Compliance with the above requirements for the characteristics and limits of the transmissions shall be achieved over the following ranges:

— Ambient temperature -5°C to 40°C

— Relative humidity 0% to 95%

— Variations in the range +6% to -10% of the nominal value of the mains power supply, and also when operating from any reserve power arrangements sourced locally.

Outside these limits any degradation shall not be harmful to the radio spectrum.