RECOMMENDATION 408-6*

STANDARDS OF SOUND RECORDING ON MAGNETIC TAPE FOR THE INTERNATIONAL EXCHANGE OF PROGRAMMES

(Question 52/10)

(1951-1953-1956-1959-1963-1966-1970-1974-1982-1990-1992)

The CCIR,

recommends

that monophonic and stereophonic recordings on magnetic tape for the international exchange of programmes should be made in accordance with the current edition of IEC Publication 94, and amendments thereof, with the following additional requirements:

1. Speed of tape

Only two speeds should be used: 38.1 cm/s (15 in/s) nominal value;
19.05 cm/s (7½ in/s) nominal value.

2. Width of tape

$$6.3\ \text{mm}\ {}^{+0}_{-0.06}\ \text{mm}\quad\left(0.248\ \text{in}\ {}^{+0}_{-0.003}\ \text{in}\right)$$

3. Strength of tape

The tape should be suitable for use on a machine exerting a maximum (transient) stress of 10 N.

4. Maximum diameter of a full spool

For Type I: 290 mm (11.5 in)
(In France, the maximum diameter is 270 mm)

For Type II: 267.5 mm (10.5 in).

5. Additional information on the tape container

MONO or STEREO in Latin characters.

Width of track. (For stereophony only.)

MAXIMUM RECORDED LEVEL (in nWb/m).

6. Additional requirements for stereophonic recordings

The minimum width of a recorded track should be 2 mm.

The outside limits of both tracks should coincide with the edges of the tape.

The distance between the tracks, situated symmetrically with respect to the central axis of the tape should be at least 0.75 mm. (The central axis is defined as a line situated at a distance of 3.125 mm from the reference edge.)

The edge of Track No. 1 is taken as the reference edge.

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* This Recommendation should be brought to the attention of the International Electrotechnical Commission (IEC).

7. Beginning of a programme

The programme material should be preceded by a reference signal of 1 000 Hz recorded at a level of 9 dB below maximum permitted programme peaks.

On monophonic tapes, this reference signal should have a duration of about 10 s, with a pause of about 5 s before the start of the programme modulation.

On stereophonic tapes, this reference signal should be recorded in the *A*-(left) channel for about 5 s, then in both channels for about 10 s, with a pause of about 5 s before the start of the programme modulation.

Note 1 – The recording of the reference signal in both channels may be followed by the recording of a signal for testing frequency response and phase (see Annex 1).

8. For reference purposes, a hypothetical recording-duplicating chain is specified. It is expected that exchanged recordings will be made by using a chain similar to the hypothetical reference recording-duplicating chain here described.

Note 1 – The basic concept of the recording-duplicating chain can also be adapted to other media for the international exchange of recordings.

The hypothetical reference recording-duplicating chain consists of a master recorder and the duplicating replay-recorder equipment. The input of the recording-duplicating chain is the input of the master recorder. The output of the recording section of the duplicating equipment, i.e. the short-circuit flux of the magnetic tape for the exchange, is the output of the recording-duplicating chain.

The preferred performance characteristics of the hypothetical reference recording-duplicating chain are detailed in § 8.1 to 8.6.

The chain should be considered as a complete system. The chain's overall characteristics are measured by feeding electronic test signals to the input of the reference recorder and measuring the output tape recording produced by the duplicating equipment. This measurement is carried out by means of a test reproducing chain. The amplitude/frequency response of the chain should conform to that of the reproduction chain characteristic for professional equipment as specified in IEC Publication 94-3.

The performance characteristics of the test reproducing chain should be good enough not to introduce significant distortion into the measurement.

8.1 Amplitude/frequency response of the two channels*

The tolerances on the amplitude/frequency response of the two channels *A* and *B* shall be as follows:

40	to	125 Hz:	+2	to –3	dB
125	to	630 Hz:	+1	to –1	dB
630	to	1 250 Hz:	+0.5	to –0.5	dB
1 250 Hz	to	10 kHz:	+1	to –1	dB
10	to	15 Hz:	+2	to –3	dB

8.2 Difference in recorded level between tracks*

In the frequency range of 125 to 10 000 Hz, a difference in level of 1.5 dB is admissible. Beyond these limits, a progressive increase up to 2 dB is admissible at 40 and 16 000 Hz.

8.3 Phase difference between tracks*

In the frequency range from 250 to 4 000 Hz, the maximum phase difference should be 15°. Outside these frequency limits, a progressive increase of this value is admissible; it can reach 30° at 40 Hz and 65° at 16 000 Hz.

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* For the special case of quadraphonic matrix recording, stricter specifications may be required, particularly in level and phase differences between tracks.

8.4 Crosstalk

In the frequency range from 250 to 4 000 Hz, crosstalk should not exceed −35 dB. Outside these frequency limits, a progressive increase up to −20 dB at 40 Hz and −25 dB at 16 000 Hz is admissible.

8.5 Weighted signal-to-noise ratio

The weighted signal-to-noise ratio of the *A*, *B* and *M* signals should be at least 51 dB.

Note 1 – This value represents the difference in level between the noise measured with the meter and weighting network defined in Recommendation 468 and a signal, the amplitude of which corresponds to the maximum level of programme peaks indicated.

8.6 Non-linearity distortions

The total percentage harmonic distortion of the *A*, *B* and *M* signals should be less than or equal to the following values:

2% from 40 Hz to 125 Hz

1.6% from 125 Hz to 8 kHz.

ANNEX 1

Use of special section for checking the technical parameters of stereophonic tapes

1. Extensive studies carried out in the OIRT, in Australia and some other countries have shown that the quality of the international exchange of programmes recorded on stereophonic tapes can be improved, if the recordings have at the beginning a special section containing alignment test signals.

2. It is advisable from the point of view of the OIRT, that such a special section contains alignment test signals as described in Table 1, so that each tape will contain, in the following order (see Fig. 1):

2.1 the tape identification strip for the beginning of the tape, as specified in IEC Publication 94-3; the leader should preferably be coloured or annotated;

2.2 a special section for the alignment of the reproducing equipment, recorded under the same conditions as those applying to the programme itself. For this purpose, sinusoidal test signals, identical in phase, should be fed to the inputs of both recording channels.

In general, these test signals will be generated electronically and recorded directly onto the master copy (see Note 1) of the programme intended for international exchange. This section consists of three parts as listed in Table 1.

Note 1 – Master copy: in the assembly of a recorded programme by editing techniques, the first tape produced which contains all the intended programme durations and sequences.

2.3 A second leader for stereophonic recordings following the special alignment section, for operational purposes:

2.4 the stereophonic programme section of the tape;

2.5 the red identification strip marking the end of the tape (as specified in IEC Publication 94-3).

TABLE 1

Special section

Recorded signal	Frequency (Hz)	Level (1) (2) (dB)	Duration (s)	Channel
1. Signal for testing, or adjusting, level and balance of channels	1 000	–10	$10\binom{+1}{-0}$	*A, B*
2. Signal for testing frequency response and phase	40	–10	$5\binom{+1}{-0}$	*A, B*
	10 000	–10	$10\binom{+1}{-0}$	*A, B*

(1) According to the present practice in the OIRT, this is 10 dB below the nominal value of the maximum recorded level.

(2) A proposal has been made that these test tone levels should be in accordance with CCITT practice (CCITT Recommendation N.13, Geneva, 1981).

FIGURE 1

Different parts of a tape