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INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

J.34
(11/88)

TELEVISION AND SOUND TRANSMISSION

**CHARACTERISTICS OF EQUIPMENT
USED FOR SETTING UP 7 kHz TYPE
SOUND-PROGRAMME CIRCUITS**

ITU-T Recommendation J.34

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(Extract from the *Blue Book*)

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NOTES

1 ITU-T Recommendation J.34 was published in Fascicle III.6 of the *Blue Book*. This file is an extract from the *Blue Book*. While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).

2 In this Recommendation, the expression “Administration” is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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Recommendation J.34

CHARACTERISTICS OF EQUIPMENT USED FOR SETTING UP 7 kHz TYPE SOUND-PROGRAMME CIRCUITS

(Geneva, 1980)

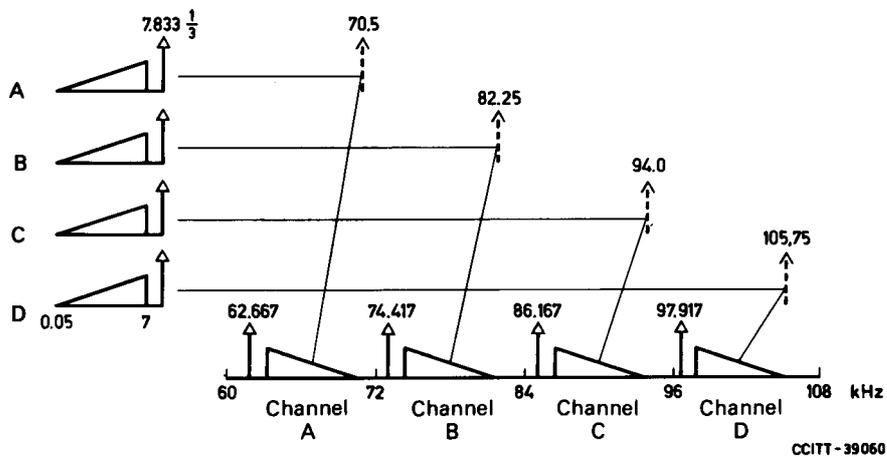
Introduction

An equipment allowing the establishment of 7 kHz type sound-programme circuits (in accordance with CCIR Recommendation 503 [1]) on carrier telephone systems which conform to the noise objectives in Recommendation G.222 [2] is defined here. The use of this equipment does not cause either a mean or a peak load higher than that of the telephone channels which it replaces. The sound-programme circuits set up on one group can be used only as monophonic circuits.

The following recommendations, covering frequency position, pre-emphasis, compandor and programme-channel pilot, are to be considered as integral parts of the Recommendation, forming the complete definition of the equipment covered by this Recommendation.

1 Frequency position in the basic group 60-108 kHz

The frequency position in the basic group is shown in Figure 1/J.34. For the programme channels, the stability of the virtual carrier frequency is $\pm 10^{-5}$ and the programme-channel pilot is fed in as $7833 \frac{1}{3}$ Hz (stability better than $\pm 10^{-5}$) in the audio-frequency position.



Note – The carrier frequencies are multiples of 11.75 kHz and can be derived from a common generator frequency.

FIGURE 1/J.34

Frequency allocation for four 7 kHz type sound-programme channels set up on one group

Note 1 – Programme channel D can be replaced by telephone channels 1 to 3; programme channel C by telephone channels 4 to 6; programme channel B by telephone channels 7 to 9; programme channel A by telephone channels 10 to 12.

Note 2 – The use of programme channel D is only compatible with group pilots at 84.14 and 84.08 kHz, but not at 104.08 kHz. Moreover, this channel cannot be used in Group 3 of a supergroup with a 411.92 kHz pilot or a 411.86 kHz pilot.

The frequency positions are as shown in Table 1/J.34.

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TABLE 1/J.34

Channel range (kHz)	Virtual carrier frequency ^{a)} (kHz)
60 to 72	Inverted position 70.5
72 to 84	Inverted position 82.25
84 to 96	Inverted position 94
96 to 108	Inverted position 105.75

a) The carrier frequencies are multiples of 11.75 kHz and can be derived from a common generator frequency.

2 Pre-emphasis and de-emphasis

Pre-emphasis and de-emphasis should be applied before the compressor and after the expander respectively in accordance with Recommendation J.17, the 800 Hz attenuation of the pre-emphasis being set to 6.5 dB.

3 7833 1/3-Hz pilot signal

At the sending end, the 7833 1/3-Hz pilot signal is fed in after the pre-emphasis and before the following modulator and compressor with a level of $-29 \text{ dBm0} \pm 0.1 \text{ dB}$ (the relative level at this point being defined under the assumption that the compressor is switched off and replaced by 0 dB loss). In the absence of a programme signal, this pilot level is increased by 14 dB by the compressor to -15 dBm0 on the carrier transmission path. After having passed through the expander, the pilot is branched off for control purposes after the demodulator and before the de-emphasis via a 7833 1/3-Hz bandpass filter and is then suppressed in the transmission channel.

The control functions of the pilot are frequency regeneration of the demodulator and compensation of the transmission loss deviations between compressor and expander. The frequency regeneration of the demodulator should be sufficiently accurate so that the frequency offset between the audio-frequency (AF) programmes at the transmit end and at the receive end is less than 0.6 Hz even if the frequency offset of the group connection is 2 Hz.

4 Compressor

The characteristic of the compressor is the same as in Recommendation J.31, § 1.5.1 with the only exception that the output level is decreased by 3 dB. The maximum compressor gain is 14 dB, the minimum compressor gain is -6.5 dB . With an input level of -18.5 dBm0 , its output level is -13 dBm0 .

The tolerance of the compressor gain is $\pm 0.5 \text{ dB}$, but it is $\pm 0.1 \text{ dB}$ at programme signal levels at the compressor input of $-\infty$, -15 and $+3 \text{ dBm0}$ (in agreement with Table 1 /J.31).

The amplification of the expander is 3 dB larger than that given in Recommendation J.31, § 1.5.1.

5 Attenuation/frequency distortion due to the sending and receiving equipments

The total attenuation/frequency distortion introduced by a sending and a receiving equipment should not exceed the following preliminarily recommended ranges:

0.05 to 0.1 kHz: $+0.7$ to -1.0 dB

0.1 to 6.4 kHz: $+0.5$ to -0.5 dB

6.4 to 7 kHz: $+0.7$ to -1.0 dB

relative to the gain at 800 or 1000 Hz.

Note – These values are still under study. Three carrier sections with two intermediate audio points according to the hypothetical reference circuit (h.r.c.), (Recommendation J.11), should comply with the CCIR Recommendation cited in [3].

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6 Suppression of carrier leaks

Carrier leaks which, after demodulation, fall into the AF programme band should have a level lower than –68 dBm0 in the carrier frequency position.

A carrier leak at, and residuals from pilots in the vicinity of, 64 kHz with a level above –68 dBm0 will generate an intolerable single-tone interference at 6.5 kHz in channel A. If required, it may be suppressed sufficiently with a lowpass filter at the AF output of channel A. Then this channel can be used for a 5 kHz type sound-programme circuit.

References

- [1] CCIR Recommendation *Performance characteristics of narrow-bandwidth sound-programme circuits*, Vol. XII, Rec. 503, ITU, Geneva, 1978.
- [2] CCITT Recommendation *Noise objectives for design of carrier-transmission systems of 2500 km*, Vol. III, Rec. G.222.
- [3] CCIR Recommendation *Performance characteristics of narrow-bandwidth sound-programme circuits*, Vol. XII, Rec. 503. § 3.3.1, ITU, Geneva, 1978.