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INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

J.73
(11/88)

TELEVISION AND SOUND TRANSMISSION

USE OF A 12-MHz SYSTEM FOR THE SIMULTANEOUS TRANSMISSION OF TELEPHONY AND TELEVISION

ITU-T Recommendation J.73

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(Extract from the *Blue Book*)

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NOTES

1 ITU-T Recommendation J.73 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.73[1)]

USE OF A 12-MHz SYSTEM FOR THE SIMULTANEOUS TRANSMISSION OF TELEPHONY AND TELEVISION

(amended at Geneva, 1964 and 1980)

The 12-MHz system on 2.6/9.5-mm coaxial cable pairs and the 12-MHz system on 1.2/4.4-mm coaxial pairs are defined in Recommendations G.332 [1] and G.345 [2] respectively.

Any 12-MHz system equipped for television transmission should be capable of transmitting the signals used in all the television systems defined in CCIR having a video bandwidth up to 5.5 MHz if necessary, by means of the switching (in terminal equipments only) of certain components.

1 Carrier frequency

The CCITT recommends the use of a carrier frequency of 6799 kHz with a tolerance of ± 100 Hz for the transmission of all the television signals indicated above. The video band transmitted over the cable should be 5.5 MHz wide, whatever television system is to be used. The level recommended for this carrier has been defined for the interconnection points and is shown in Figures 1/J.73 and 2/J.73 (see Note 3 to these figures).

2 Modulation ratio

Amplitude modulation has to be used. The modulation ratio has to be higher than 100% (as indicated in Figure 3/J.73), so that, when the carrier is modulated by a signal corresponding to blanking level, its amplitude be equal to that of the carrier when it is modulated by a signal corresponding to the white level, assuming that the d.c. component is transmitted.

When a luminance bar (see CCIR Recommendation 567, Annex 1 to Part C, test signal element B2) is applied at a video junction point, the nominal peak voltage of the modulated carrier, at a point where the relative level for the television transmission is zero, should be as follows:

- for white or blanking level, 0.387 volt (i.e. the peak voltage of a sine-wave signal dissipating a power of 1 mW in a resistance of 75 ohms);
- for the synchronizing signals, 0.719 volt (i.e. the peak voltage of a sine-wave signal dissipating a power of 3.45 mW in a 75 ohm resistance).

[1)] Recommendations J.71 and J.72 of Volume III-2 of The *Orange Book* have been deleted.

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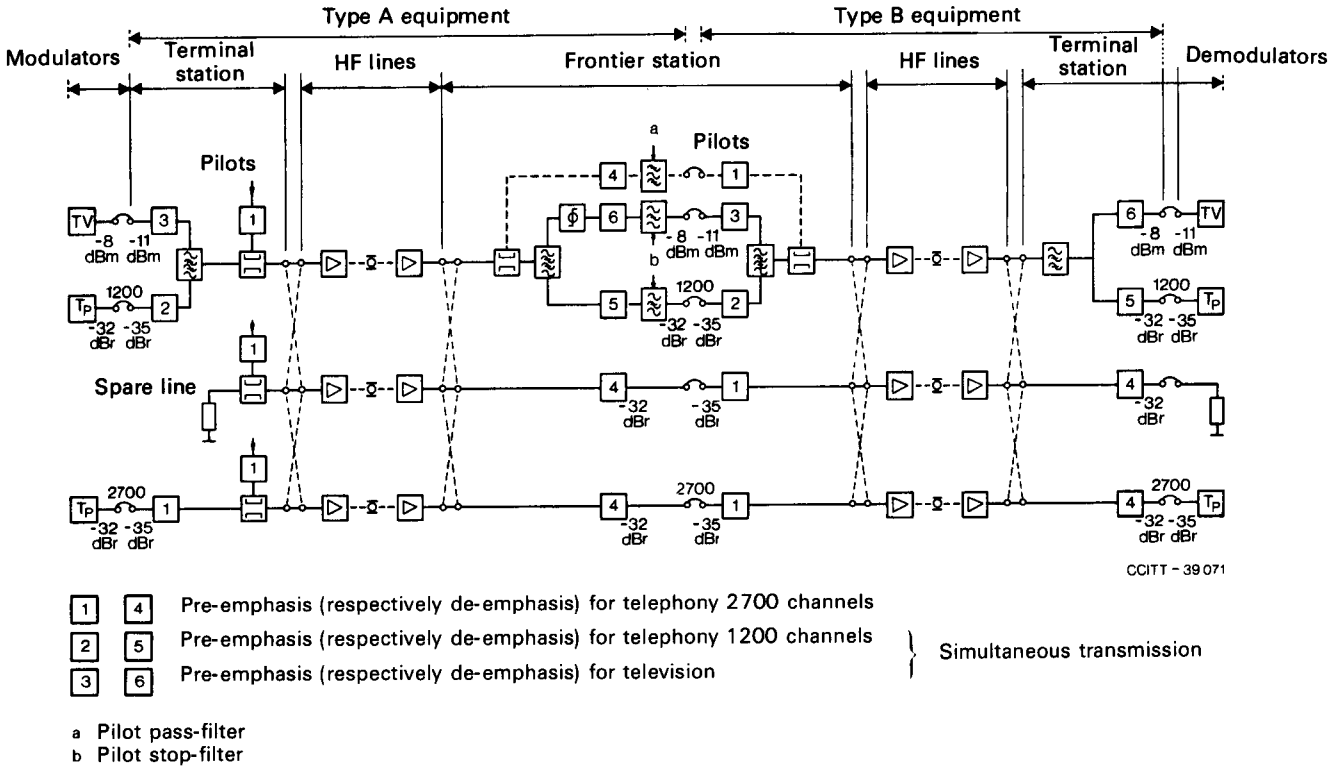
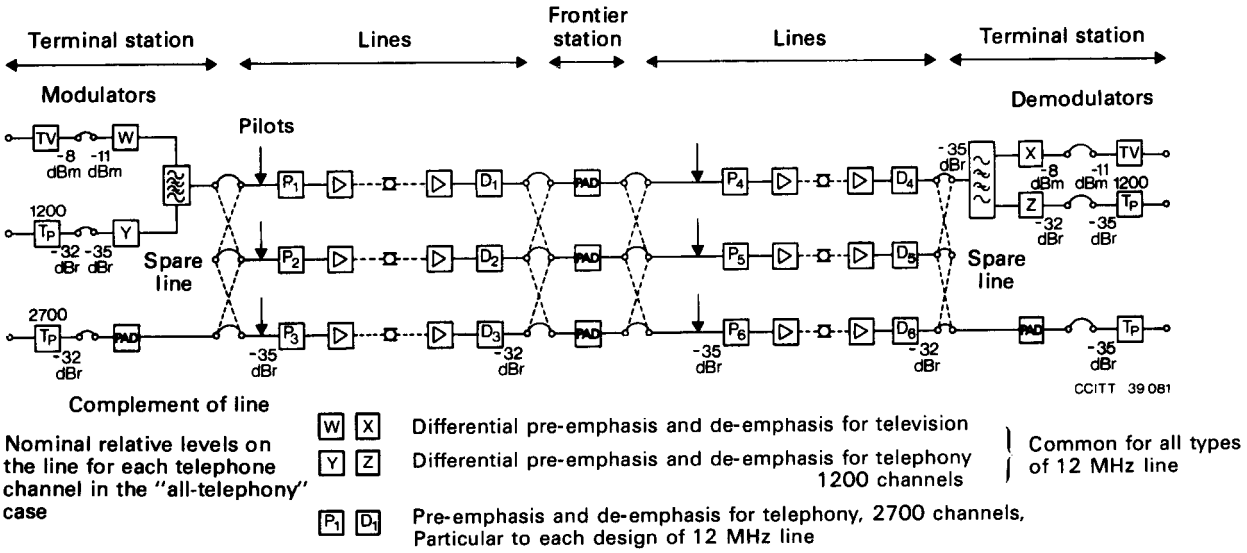


FIGURE 1/J.73

General case of interconnection of 12-MHz lines



Notes to Figures 1/J.73 and 2/J.73

Note 1 – Interconnection of pilots, e.g. blocking and re-injecting or by-passing, should be agreed between Administrations.

Note 2 – The level of the line pilots is fixed at −10 dBm0 for the all-telephony case. When the line is used to transmit telephony and television simultaneously, different values of pre-emphasis may be rquired; although the absolute levels of the pilots will remain the same, they may no longer be at −10 dBm0.

Note 3 – The television levels shown, are those of the modulated carrier relative to the white or blanking level (0 dBm) of the idealized reference signal described in § 2 of this Recommendation. This means that the television levels are indicated in dBm values.

Note 4 – The characteristics of the filters in Figure 1/J.73 (used for separating and combining the telephony and television bands so that the necessary arrangements for pre-emphasis and de-emphasis can be made), must be agreed between Administrations.

FIGURE 2/J.73

Showing use of differential emphasis networks to simplify interconnection of 12 MHz lines of different designs

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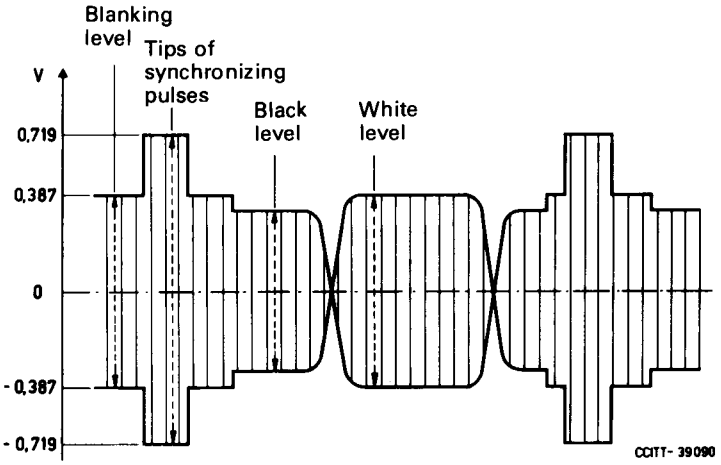

Note – The voltages shown are the values measured at a zero relative level point for television transmission in the 12 MHz system.

FIGURE 3/J.73
Envelope of carrier modulated by Test Signal No. 2

3 Vestigial-sideband shaping

The shaping of the vestigial-sideband signal has to be carried out entirely at the transmit point. Provisionally, the vestigial sideband should not exceed a width of 500 kHz. Figure 4/J.73 shows the frequency arrangement recommended for television transmission over the 12 MHz system.

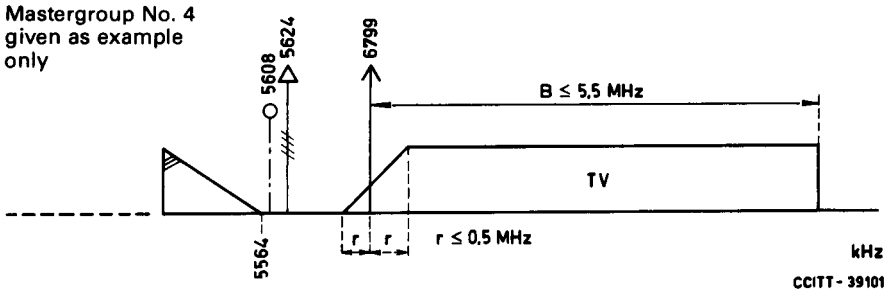

FIGURE 4/J.73
Frequency allocation for television on a 12 MHz system

4 Relative power levels and interconnection at a frontier section

It is not possible to recommend relative power levels at the output of intermediate repeaters since they are very closely linked to the inherent design of each Administration's system.

When interconnection between two telephone systems is effected via a cable section that crosses a frontier, in accordance with Recommendation G.352 [3], each Administration should accept, on the receiving side, the level conditions which normally apply to the incoming system used in the other country. It may be possible to comply with this condition simply by insertion of a correcting network at the receiving end. The repeater section crossing the frontier, should then be less than 4.5 km long, the details being agreed directly between the Administrations concerned before the repeater stations are sited.

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Where a line is to be used alternatively for "all-telephony" or for "telephony-plus-television", such a solution is not generally applicable. In this case, one of the frontier stations may act as a main station having the necessary types of pre-emphasis and de-emphasis networks to permit interconnection at flat points at the recommended levels. Figure 1/J.73 shows how this may be done in the general case and also shows how, at terminal stations, the same interconnections levels are used when connecting the line to telephony and television translating equipment.

However, if a common differential characteristic can be agreed for all types of 12-MHz line, then free interconnection of the full line-bandwidth becomes possible, both nationally (e.g. between working and spare lines) and internationally (between national systems of different designs). This method leads to the simpler interconnection arrangement of Figure 2/J.73.

In this arrangement, the circuit is always lined up for "all-telephony". For telephony-plus-television, the emphasis characteristic used for the "all-telephony" case is modified by the insertion, at the terminal equipment stations only, of differential pre-emphasis and de-emphasis networks additional to those used for "all-telephony" transmission.

5 Interference

Recommendation J.61 (equal to CCIR-Recommendation 567, Part D), indicates the overall values relative to the hypothetical reference circuit for television transmissions which are taken as objectives for design projects.

In the experience of certain Administrations, the weighted psophometric power can be distributed between the terminal equipment and the line in the ratio of 1 to 4.

In particular, the Administration of the Federal Republic of Germany uses, for the 12 MHz system, the following signal-to-weighted noise ratio:

- for terminal modulation equipment: 70 dB
- for terminal demodulation equipment: 64 dB
- for a line 840 km in length: 58 dB

These values result in a signal-to-noise ratio of 52 dB at the end of the reference circuit.

References

[1] CCITT Recommendation *12-MHz systems on standardized 2.6/9.5-mm coaxial cable pairs*, Vol. III, Rec. G.332.

[2] CCITT Recommendation *12-MHz systems on standardized 1.2/4.4-mm coaxial cable pairs*, Vol. III, Rec. G.345.

[3] CCITT Recommendation *Interconnection of coaxial carrier systems of different designs*, Vol. III, Rec. G.352.