



INTERNATIONAL TELECOMMUNICATION UNION

**ITU-T**

TELECOMMUNICATION  
STANDARDIZATION SECTOR  
OF ITU

**J.66**

**(ex CMTT.572)**

**(02/78)**

**TELEVISION AND SOUND TRANSMISSION**

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**TRANSMISSION OF ONE SOUND-  
PROGRAMME ASSOCIATED WITH  
AN ANALOGUE TELEVISION SIGNAL  
BY MEANS OF TIME-DIVISION MULTIPLEX  
IN THE LINE SYNCHRONIZING PULSE**

**ITU-T Recommendation J.66**

(Formerly Recommendation ITU-R CMTT.572)

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## FOREWORD

The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the International Telecommunication Union. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, established the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

ITU-T Recommendation J.66 (formerly Recommendation ITU-R CMTT.572) was elaborated by the former ITU-R Study Group CMTT. See Note 1 below.

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## NOTES

1 As a consequence of a reform process within the International Telecommunication Union (ITU), the CCITT ceased to exist as of 28 February 1993. In its place, the ITU Telecommunication Standardization Sector (ITU-T) was created as of 1 March 1993. Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector (ITU-R).

Conforming to a joint decision by the World Telecommunication Standardization Conference (Helsinki, March 1993) and the Radiocommunication Assembly (Geneva, November 1993), the ITU-R Study Group CMTT was transferred to ITU-T as Study Group 9, except for the satellite news gathering (SNG) study area which was transferred to ITU-R Study Group 4.

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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(1978)

The CCIR,

CONSIDERING

- (a) that if the sound and picture components of a television signal are transmitted over different circuits or by different methods, there may be an error of timing between the signals at the receiving end;
- (b) that one method of solving this problem would be to transmit both signals over the same circuit by multiplexing;
- (c) that it is desirable when sound and video signals are transmitted by time division multiplex to standardize on a particular solution,

UNANIMOUSLY RECOMMENDS

that for the transmission of one sound-programme signal together with an analogue television signal by time-division multiplex, a pulse-code modulation system should be used, in which the most important principles are as follows:

1. the sound-programme signal should be sampled at twice the rate of the video-line frequency (see Note 3);
2. the samples should be encoded in binary PCM form suitably companded into 10 bit words;
3. alternate coded samples should be delayed by half a line period, one 10 bit word from each pair of samples being complemented, and the digits of the two samples should be interleaved so that similarly numbered digits from the two samples appear consecutively;
4. the individual digit pulses should be shaped into pulses of sine-squared form, of duration and spacing such that 21 pulses can be inserted into the line synchronizing pulse. In television systems employing equalizing pulses in the field blanking interval, the duration of the appropriate equalizing pulses should be lengthened at the coder, and restored to normal at the decoder;
5. the combined and shaped pulse groups (20 bits) together with a marker pulse (similarly shaped) should be inserted in the line synchronizing pulses so that the marker pulse followed by the least significant digits are nearest to the leading edge of the synchronizing pulse, and the most significant digits are nearest to the trailing edge of the synchronizing pulse. The pulse amplitude should extend from sync bottom to peak white;
6. pre- and de-emphasis should be used, the curve in accordance with CCITT Recommendation J.17 being suitable for this purpose. The low-frequency gain should be fixed in conjunction with the compandor to minimize any impairment due to programme-modulated noise which may occur with critical programme material;
7. protection should be provided so that in the event of the decoded samples being in error due to either the video waveform or the audio pulses being non-standard, any resulting audio disturbance is minimized. For example, this may be achieved by means of holds, i.e. by the repetition of previous samples for a short duration of errors, and by muting the audio output for a longer duration of errors, or if too many holds occur in a short time;

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<sup>1)</sup> Formerly Recommendation ITU-R CMTT.572.

8. for three codecs in tandem, the characteristics should conform to Recommendation 505 (see Note 3);
9. the video performance of the system should be such that a single coder and decoder introduces negligible distortion, compared with the limiting values for the television hypothetical reference circuit, given in Recommendation 567;
10. the quality of the decoded sound obtained from one codec should not be adversely affected if the television circuit between the coder and the decoder is such that its performance is equivalent to a long international television connection (see Recommendation 603); equalized if necessary.

*Note 1* – Circuits using sync bottom clamps are not suitable for use with this system.

*Note 2* – For use over satellite circuits which involve 17.5 MHz bandwidth operation at IF, it is desirable to reduce the pulse amplitude by 6 dB.

*Note 3* – It may be difficult to obtain a response extending to 15 kHz as the sampling rate is twice line-frequency (see § 1 above). Hence the highest frequency at which the hypothetical reference circuit amplitude/frequency response is specified may be modified to 14 kHz.