



INTERNATIONAL TELECOMMUNICATION UNION

# ITU-T

TELECOMMUNICATION  
STANDARDIZATION SECTOR  
OF ITU

# H.16

(10/84)

## SERIES H: TRANSMISSION OF NON-TELEPHONE SIGNALS

Characteristics of transmission channels used for other  
than telephone purposes

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### **Characteristics of an impulsive-noise measuring instrument for wideband data transmission**

ITU-T Recommendation H.16

Extract of **Red Book Fascicle III.4 (1984)**

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## NOTES

- 1 ITU-T Recommendation H.16 was published in Fascicle III.4 of the *Red Book*. This file is an extract from the *Red Book*. While the presentation and layout of the text might be slightly different from the *Red Book* version, the contents of the file are identical to the *Red 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.



**CHARACTERISTICS OF AN IMPULSIVE-NOISE MEASURING INSTRUMENT  
FOR WIDEBAND DATA TRANSMISSION**

*(Geneva, 1972 and 1980)*

The CCITT,

*considering*

that impulsive noise is of interest in wideband data transmission and that there is a need for a simple pulse counter suitable for field use,

provisionally *recommends*

that the instrument for impulsive-noise measurements should have the following characteristics:

**1 Types of measurements**

For the measurement of impulsive noise, the instrument should register a count whenever the instantaneous level applied to the input exceeds an adjustable threshold. This operation should be independent of the sense (or polarity) of the applied impulse.

For the measurement of circuit noise the instrument should provide means for indicating the average noise power.

**2 Input impedance**

The instrument should permit the measurements designated above on either balanced or unbalanced circuits at the nominal impedances which are used in wideband data transmission. On balanced circuits, the instrument should also be arranged to measure impulsive or circuit noise which is common to the two sides of the circuit with respect to earth.

Nominal input impedances should be provided as follows:

- a) 75 ohms unbalanced;
- b) 135 or 150 ohms balanced;
- c) 135 or 150 ohms balanced with 20 000 ohms from each side of the circuit to a common 600 ohms which is returned to earth (the noise measurement is made across the 600-ohm resistor).

For the balanced input impedance [b) above] the balance of the input circuit in relation to earth should be such that when a 25-kHz sine wave, whose level is 70 dB higher than the instrument's threshold setting, is applied between the midpoint of the source impedance and the earth terminal of the instrument, the counter should not operate. Similarly, a 560-kHz sine wave, whose level is 42 dB higher than the threshold, when applied between the source impedance and the earth terminal of the instrument should not operate it. The above balance requirements shall hold for signal levels ranging up to 30 volts r.m.s.

Input arrangement c) above is provided for use in measuring impulsive and circuit noise which is common to the two sides of a balanced circuit with respect to earth.

**3 Bandwidth and filter characteristics**

For the condition of maximum bandwidth, the response should be within  $\pm 1$  dB of that at 25 kHz in the frequency range 275 Hz to 552 kHz, and should provide attenuation of at least 10 dB (with respect to that at 25 kHz) at frequencies below 50 Hz and above 1500 kHz.

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<sup>1)</sup> This Recommendation corresponds to Recommendation O.72.

Provision should be made for measurements on other specific bandwidths such as group or supergroup bands. These bandwidths may be obtained by means of plug-in or external filters, the characteristics of which should be as described in §§ 3.1 to 3.3 below.

3.1 For measurements on basic group-band circuits, the attenuation of the filter with reference to that at 84 kHz should lie on or within the limits shown in Figure 1/H.16.

3.2 For measurements on supergroup-band circuits, the attenuation of the filter with reference to that at 412 kHz should lie on or within the limits shown in Figure 2/H.16.

3.3 For measurements on baseband circuits with an upper frequency limit of 48 kHz, the attenuation of the filter with reference to that at 25 kHz should lie on or within the limits shown in Figure 3/H.16.

*Note* – When measuring in basic group and basic supergroup bands, one may use through-connection filters.

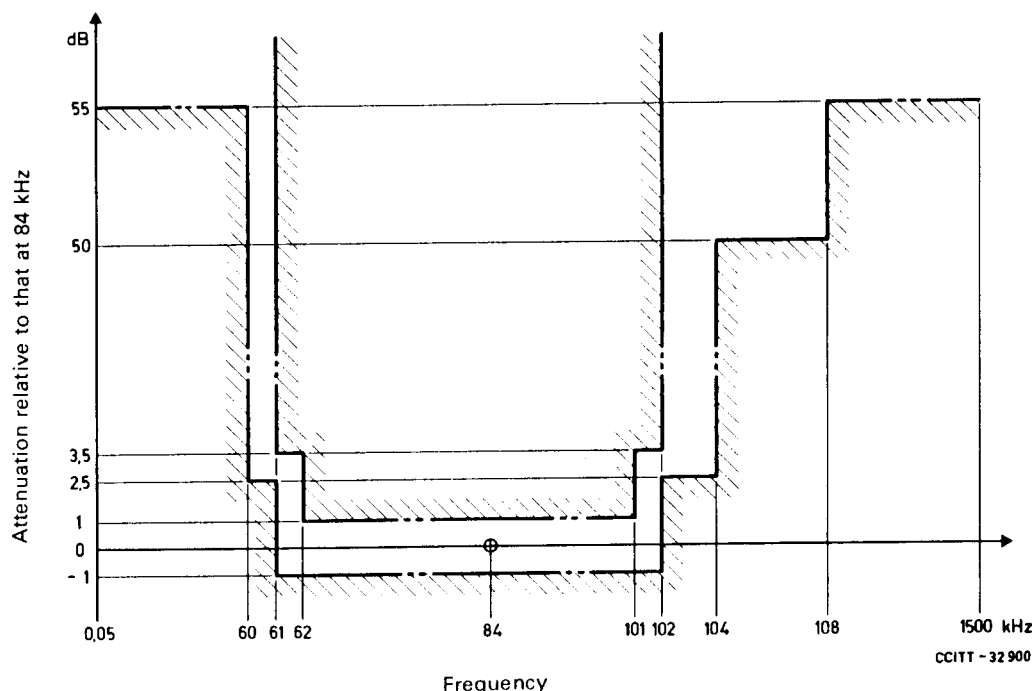


FIGURE 1/H.16

**Permissible limits for the attenuation, relative to that at 84 kHz, of the filter for impulsive-noise measurements on a basic group band**

#### 4 Sensitivity and accuracy

For the measurement of impulsive noise, the threshold should be adjustable in steps of 1 dB for instantaneous levels from  $-60$  to  $+20$  dBm. For the measurement of circuit noise the sensitivity of the instrument should be  $-90$  to  $+10$  dBm at the calibration frequency. The accuracy of the instrument shall be  $\pm 0.5$  dB for any threshold setting or input polarity. The relative response to other signals should depend only on the attenuation characteristics for the maximum bandwidth or other selected bandwidths. The sensitivity of the instrument may be 30 dB less when used in the condition to measure circuit noise and impulsive noise common to the two sides of a balanced circuit with respect to earth.

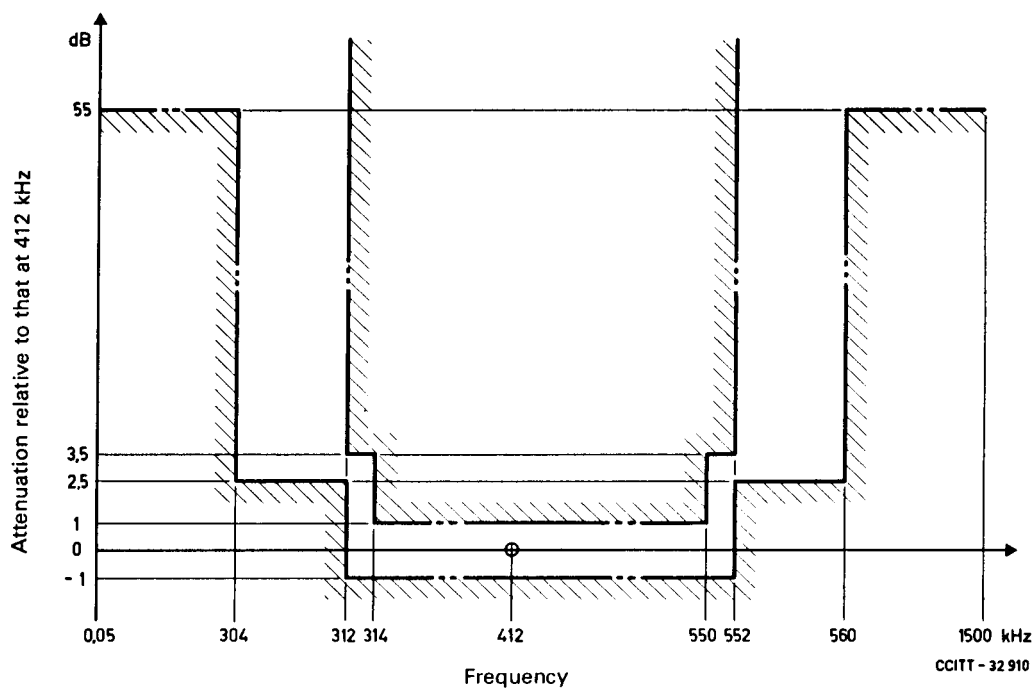


FIGURE 2/H.16

Permissible limits for the attenuation, relative to that at 412 kHz, of the filter for impulsive-noise measurements on a basic supergroup band

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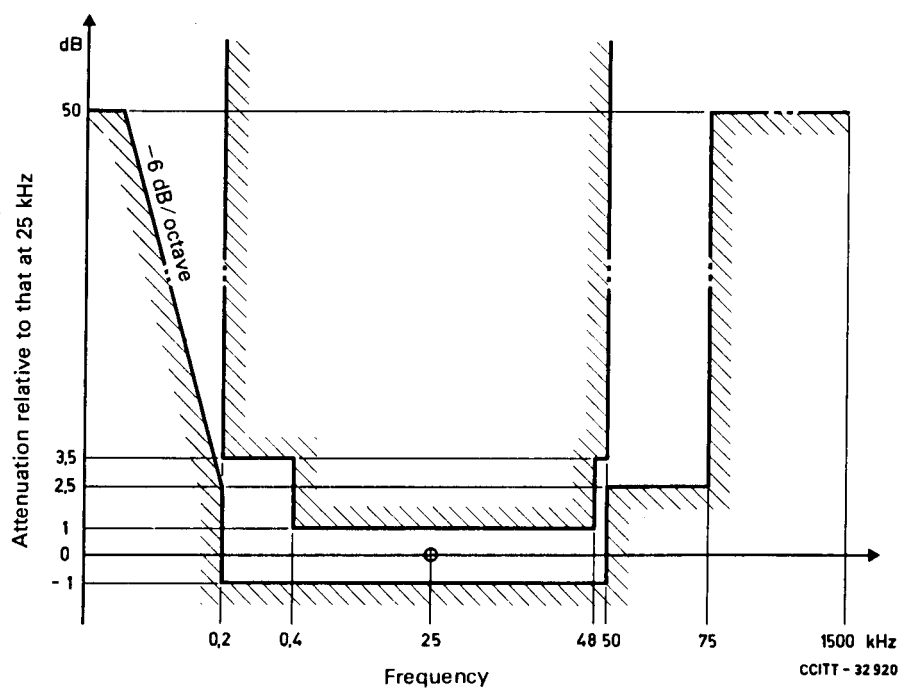


FIGURE 3/H.16

Permissible limits for the attenuation, relative to that at 25 kHz, of the filter for impulsive-noise measurements on a 48-kHz baseband circuit

## **5 Counting rate**

Dead-time is defined as the time from the start of an impulse being registered until the counter is ready to register another impulse. A dead-time of  $125 \pm 25$  ms shall be provided within the instrument.

Thus, the maximum counting rate is nominally eight impulses per second. The capacity of the counter shall be at least 999.

## **6 Calibration**

Calibration should be possible from an internal signal or from the peaks of an externally applied sine-wave signal. For measurement of impulsive noise the calibration should be such that with the threshold adjusted to +3 dBm, the peaks of a 0 dBm sine wave will just operate the counter.

## **7 Timer**

A built-in timer, continuously adjustable from 5 to 60 minutes, shall be provided. The accuracy shall be within  $\pm 10\%$  of the setting.

## **8 Temperature stability**

All of the preceding clauses shall be satisfied when the ambient temperature varies between +10 °C and +40 °C.