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SERIES H: TRANSMISSION OF NON-TELEPHONE SIGNALS

Use of telephone-type circuits for voice-frequency telegraphy

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Basic characteristics of telegraph equipments used in international voice-frequency telegraph systems

ITU-T Recommendation H.23

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

NOTES

1 ITU-T Recommendation H.23 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.

Recommendation H.23

BASIC CHARACTERISTICS OF TELEGRAPH EQUIPMENTS USED IN INTERNATIONAL VOICE-FREQUENCY TELEGRAPH SYSTEMS[1)]

(Mar del Plata, 1968; amended at Geneva, 1976)

1 Limiting power per channel

1.1 *Amplitude-modulated voice-frequency telegraph (AMVFT)* systems at 50 bauds

Administrations will be able to provide the telegraph services with carrier telephone channels permitting the use of 24 VFT channels (each capable of 50 bauds) on condition that the power of the telegraph channel signal on each channel, when a continuous marking signal (Z polarity) is transmitted, does not exceed 9 mW0.

For 18 telegraph channels only, the power so defined may be increased to 15 μW0 per telegraph channel so that even telephone channels with a relatively high noise level can then be used.

The power per telegraph channel should never exceed 35 μW0, however few channels there may be.

These limits are summarized in Table 1/H.23.

TABLE 1/H.23

Limiting power per telegraph channel when sending a continuous marking signal in AMVFT systems at 50 bauds

System	Limiting power at zero relative level point per telegraph channel when sending a continuous marking singal	
	μW0	dBm0
12 telegraph channels or less	35	–14.5
18 telegraph channels	15	–18.3
24 telegraph channels	9	–20.5

1.2 *Frequency-modulated voice-frequency telegraphy (FMVFT) systems at 50 bauds*

The mean power transmitted to line by 50-baud FMVFT systems is limited to 135 μW0 when all channels of the system are sending. This gives the limits shown in Table 2/H.23 for the mean permissible power per telegraph channel at a zero relative level point.

Some Administrations have bilateral agreements to reduce the total mean power level of FMVFT systems to –13 dBm0 (50 μW0). The CCITT encourages such reduction where feasible. The above Administrations have made their own determination of the feasibility of operating at the reduced level. As a guide, other Administrations may wish to use the suggested parameters provided by Study Group IX as given in Annex A to this Recommendation.

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1) This Recommendation reproduces, for information, some characteristics given in Recommendations R.31 [1] and R.35 [2]

TABLE 2/H.23

Normal limiting power per telegraph channel in 50-band FMVFT systems

System	Permissible mean power at zero relative level point per telegraph channel	
	μW0	dBm0
12 telegraph channels or less	11.25	–19.5
18 telegraph channels	7.5	–21.3
24 telegraph channels	5.6	–22.5

2 Telegraph channel frequencies

For international VF 24-channel, 50-baud, non-synchronous telegraph systems the frequency series consisting of odd multiples of 60 Hz has been adopted, the lowest frequency being 420 Hz as shown in Table 3/H.23. In the case of frequency-modulated systems, these frequencies are the centre frequencies of the telegraph channels, the frequency of the signal sent to line being 30 Hz (or 35 Hz) above or below the centre frequency according to whether A or Z polarity is being sent.

TABLE 3/H.23

Telegraph channel position	Frequency (Hz)	Telegraph channel position	Frequency (Hz)
1	420	13	1860
2	540	14	1980
3	660	15	2100
4	780	16	2220
5	900	17	2340
6	1020	18	2460
7	1140	19	2580
8	1260	20	2700
9	1380	21	2820
10	1500	22	2940
11	1620	23	3060
12	1740	24	3180

In addition a pilot channel using a frequency of 300 Hz (or 3300 Hz) can be used. For details of the normal frequencies used in other types of telegraph system, see Recommendations R.37 [3], R.38 A [4] and R.38 B [5].

ANNEX A

(to Recommendation H.23)

Limits required by Study Group IX in respect of the bearer circuit for FMVFT if the total telegraph power is to be reduced to 50 microwatts (from 135 microwatts)

A.1 *Loss/frequency distortion*

The variation with frequency of the overall loss of the link with respect to the loss at 800 Hz should not exceed the limits given in Table A-1/H.23.

TABLE A-1/H.23

Frequency range (Hz)	Overall loss relative to that at 800 Hz
Below 300	Not less than –2.0 dB, otherwise unspecified
300- 500	–2.0 to +4.0 dB
500-2800	–1.0 to +3.0 dB
2800-3000	–2.0 to +3.0 dB
3000-3250	–2.0 to +4.0 dB
3250-3350	–2.0 to +7.0 dB
Above 3350	Not less than –2.0 dB, otherwise unspecified

A.2 *Random noise*

The mean psophometric noise power referred to a point of zero relative level should not exceed 32 000 pW0p (–45 dBm0p), using a psophometer in accordance with Recommendation P.53 [6].

A.3 *Impulsive noise*

The number of impulsive noise peaks exceeding –28 dBm0 should not be more than 18 in 15 minutes when measured with an impulsive noise counter in accordance with the Recommendation cited in [7].

References

[1] CCITT Recommendation *Standardization of AMVFT systems for a modulation rate of 50 bauds*, Vol. VII, Rec. R.31.

[2] CCITT Recommendation *Standardization of FMVFT systems for a modulation rate of 50 bauds*, Vol. VII, Rec. R.35.

[3] CCITT Recommendation *Standardization of FMVFT systems for a modulation rate of 100 bauds*, Vol. VII, Rec. R.37.

[4] CCITT Recommendation *Standardization of FMVFT systems for a modulation rate of 200 bauds with channels spaced at 480 Hz*, Vol. VII, Rec. R.38A.

[5] CCITT Recommendation *Standardization of FMVFT systems for a modulation rate of 200 bauds with channels spaced at 360 Hz usable on long intercontinental bearer circuits generally used with a 3-kHz spacing*, Vol. VII, Rec. R.38B.

[6] CCITT Recommendation *Psophometers (apparatus for the objective measurement of circuit noise)*, Vol. V, Rec. P.53. (Recommendation O.41.)

[7] CCITT Recommendation *Characteristics of an impulsive-noise measuring instrument for telephone-type circuits*, Orange Book, Vol. III-2, Rec. H.13, § h), ITU, Geneva, 1977.