INTERNATIONAL TELECOMMUNICATION UNION

ITU-T R.39

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

TELEGRAPHY

TELEGRAPH TRANSMISSION

VOICE - FREQUENCY TELEGRAPHY ON RADIO CIRCUITS

ITU-T Recommendation R.39

(Extract from the *Blue Book*)

NOTES

1 ITU-T Recommendation R.39 was published in Fascicle VII.1 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.

Recommendation R.39

VOICE-FREQUENCY TELEGRAPHY ON RADIO CIRCUITS

(former CCIT Recommendation B.49, Geneva, 1956; amended at Geneva, 1964, Mar del Plata, 1968, Geneva, 1976 and Melbourne, 1988)

It is necessary to distinguish between the case in which the radio frequency used is below approximately 30 MHz, and the case in which the radio frequency used is greater than approximately 30 MHz.

1 Radio circuits the frequency of which is below approximately 30 MHz

1.1 In the case of radio circuits whose frequency is less than approximately 30 MHz, it appears that the use of amplitude-modulated voice-frequency telegraph systems, as defined by Recommendation R.31, cannot be recommended. In such a case, the nature of the telephone-type circuits available for telegraph operation may vary widely according to the radio system used, and several systems of telegraph transmission are available (e.g. two- or four-tone telegraph systems, frequency modulated systems, etc.).

1.2 However, frequency-shift systems are in use on many routes and the frequency-exchange method (Definition 32-32, Recommendation R.140) of operation is in use on long routes suffering from severe multipath distortion.

1.3 *Synchronous telegraphy operating at approximately 100 bauds* (see CCIR Recommendation 436-2 [1])

Radiotelegraph channels that operate synchronously at a modulation rate of 96 bauds and employ automatic error correction are being increasingly used. The channel arrangement shown in Table 1/R.39 is preferred for voice-frequency multi-channel frequency-shift systems operating at a modulation rate of approximately 100 bauds over HF radio circuits. For frequency-exchange systems (Definition 32.32, Recommendation R.140), the central frequencies of Table 1/R.39 should be used, and should be paired in the manner found to be best suited to the propagation conditions of the route. (A typical arrangement would take alternate pairs giving 340 Hz between tones.)

TABLE 1/R.39

Central frequencies of voice-frequency frequency-shift telegraph channels with a channel separation of 170 Hz and a modulation index of about 0.8

(Frequency shift: ± 42.5 Hz or ± 40 Hz)

Channel position	Central frequency (Hz)	Channel position	Central frequency (Hz)
1	425	8	1615
2	595	9	1785
3	765	10	1955
4	935	11	2125
5	1105	12	2295
6	1275	13	2465
7	1445	14	2635
		15	2805

1.4 *Start-stop telegraphy at 50 bauds*

For several years, various Administrations have had in service, on certain selected circuits, equipment with a channel spacing of 120 Hz, the central frequencies and frequency deviations of which are in agreement with Recommendation R.35. The central frequencies of these systems are given in Table 2/R.39.

TABLE 2/R.39

Central frequencies of voice-frequency frequency-shift telegraph channels with a channel separation of 120 Hz and a modulation index of about 1.4

(Frequency shift: ± 35 Hz or ± 30 Hz)

Channel position	Central frequency (Hz)	Channel position	Central frequency (Hz)
1	420	11	1620
2	540	12	1740
3	660	13	1860
4	780	14	1980
5	900	15	2100
6	1020	16	2220
7	1140	17	2340
8	1260	18	2460
9	1380	19	2580
10	1500	20	2700

2 Radio circuits whose frequency is greater than approximately 30 MHz

The use of voice-frequency telegraphy on line-of-sight radio-relay links and on trans-horizon radio-relay systems is under study.

Reference

[1] CCIR Recommendation *Arrangement of voice-frequency telegraph channels working at a modulation rate of about 100 bauds over HF radio circuits*, Vol. III, Rec. 436-2, ITU, Geneva, 1978.