

## RECOMMENDATION ITU-R F.401-2\*\*\*

**Frequencies and deviations of continuity pilots for frequency modulation radio-relay systems for television and telephony**

(1956-1959-1963-1966-1970)

The ITU Radiocommunication Assembly,

*considering*

- a) that special pilots are required on radio-relay systems to indicate the continuity of the circuit;
- b) that these pilots should be situated outside the range of frequencies occupied by the telephony or the television signals (Recommendation ITU-R F.381);
- c) that typically, a frequency about 10% higher than the upper limit of the transmitted baseband is desirable depending upon the necessary suppression desired (see Recommendation ITU-R F.381);
- d) that, in determining the upper frequency limit of continuity pilots, compatibility with radio-relay channel arrangements, and equipment passband characteristics need to be taken into account;
- e) that some administrations wish to use the same continuity pilot characteristics in various radio-relay systems for multi-channel telephony and television;
- f) that, to reduce intelligible cross-talk, the continuity pilot should, when possible, have a frequency of  $(4n - 1)$  kHz, where  $n$  is an integer,

*recommends*

- 1 that for frequency-division multiplex telephony and television radio-relay systems, when the continuity pilot is above the baseband, its frequency and deviation should be that shown in Table 1;
- 2 that a continuity pilot situated below the baseband may be used after agreement between the administrations concerned;
- 3 that the frequency stability of the continuity pilot should be better than 5 parts in  $10^5$ .

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\* This Recommendation applies to line-of-sight and near line-of-sight radio-relay systems and also, where appropriate, to trans-horizon radio-relay systems.

\*\* Radiocommunication Study Group 9 made editorial amendments to this Recommendation in 2001 in accordance with Resolution ITU-R 44.

TABLE 1

System capacity (channels)	Limits of band occupied by telephone channels (kHz)	Frequency limits of baseband (kHz) <sup>(1)</sup>	Continuity pilot frequency (kHz)	Deviation (r.m.s) produced by the pilot (kHz) <sup>(2)</sup> <sup>(5)</sup>
24	12-108	12-108	116 or 119	20
60	12-252 60-300	12-252 60-300	304 or 331	25, 50, 100 <sup>(3)</sup>
120	12-552 60-552	12-552 60-552	607 <sup>(4)</sup>	25, 50, 100 <sup>(3)</sup>
300	60-1 300	60-1 364	1 499, 3 200 <sup>(6)</sup> or 8 500 <sup>(6)</sup>	100 or 140
600	60-2 540 64-2 660	60-2 792	3 200 or 8 500	140
960 } 900 }	60-4 028 } 316-4 188 }	60-4 287	4 715 or 8 500	140
1 260 } 1 200 }	60-5 636 } 60-5 564 } 316-5 564 }	60-5 680	{ 6 199 8 500	100 or 140 140
1 800	312-8 120 316-8 204	300-8 248	9 023	100
2 700	312-12 388 316-12 388	308-12 435	13 627	100
Television			{ 8 500 9 023	140 100

(1) Including pilot or other frequencies which might be transmitted to line.

(2) Other values may be used by agreement between the Administrations concerned.

(3) Alternative values dependent on whether the deviation of the signal is 50, 100 or 200 kHz (Recommendation ITU-R F.404).

(4) Alternatively 304 kHz may be used by agreement between the Administrations concerned.

(5) This deviation does not depend on whether or not a pre-emphasis network is used in the baseband.

(6) For compatibility in the case of alternate use with 600-channel telephony systems and television systems.

(7) The frequency 9 023 kHz is used for compatibility purposes between 1 800 channels telephony systems and television systems, or when the establishment of multiple sound channels so indicates.