PART 5B: AVAILABILITY, PERFORMANCE OBJECTIVES AND INTERWORKING WITH TERRESTRIAL NETWORKS

RECOMMENDATION 547

NOISE OBJECTIVES IN THE HYPOTHETICAL REFERENCE CIRCUIT FOR SYSTEMS IN THE MARITIME MOBILE-SATELLITE SERVICE

(Study Programme 17A/8)

(1978)

The CCIR,

CONSIDERING

(a) that the hypothetical reference circuit is intended as a guide to the design and construction of actual systems;

(b) that the costs of establishing and maintaining maritime mobile satellite systems are critically dependent on the overall signal-to-noise performance requirements;

(c) that maritime mobile satellite systems will be connected to the international telephone network implying that CCITT Recommendation G.473 should be met;

(d) that the total noise power in the hypothetical reference circuit (subjectively equivalent) should not unduly degrade conversation in most telephone calls;

(e) that voice companding most probably will be used in order to reduce the constraint imposed by power limitation of the satellites;

(f) that the extent of fading cannot be determined fully until more experimental data are available;

(g) that the fading will depend on the elevation angle of the ship-borne antenna, the antenna directivity, the occurrence of calm sea conditions in various ocean areas, and the location of the ship-borne antenna relative to the reflecting surfaces of the ship;

(h) that operator-to-operator calls should be possible even at small angles of elevation though with a degraded performance;

(j) that there may be other sources of noise of short duration,

UNANIMOUSLY RECOMMENDS

1. that the subjectively equivalent speech signal to psophometrically weighted noise ratio in the hypothetical reference circuit as defined in Recommendation 546 should exceed the values shown in Fig. 1;

2. that these values of signal-to-noise ratio should be referred to non-faded conditions and to an angle of elevation of 10° of the ship-borne antennas;

3. that the modulation technique should give an acceptable decrease in quality with decreasing carrier-to-noise density ratio;

4. that the modulation technique and voice processing method adopted should permit quality comparable to that obtained in the fixed-satellite service when more satellite power is available.

Note 1. – The noise objectives indicated in RECOMMENDS 1 above should include the effect of interchannel interference noise, co-channel interference noise, intermodulation noise as well as noise from atmospheric sources.

Note 2. – The noise objectives stated in this Recommendation are applicable to systems using ship terminals with high-gain antennas (see Report 594).

Note 3. – The requirement for non-faded condition will probably be met for more than 80% of the time. When sufficient data on fading become available, this Recommendation should be supplemented to give noise objectives in terms of two percentages of time, e.g. 80% and 99%.

Note 4. – The requirement in RECOMMENDS 1 corresponds to a noise level of 10 000 pW0p for speech levels below –35 dBm0 and of 25 000 pW0p at a speech level of –20 dBm0. For speech levels above –20 dBm0, the speech signal to psophometrically weighted noise ratio should exceed 26 dB.

Note 5. – The speech level is defined as the mean (time average) speech power while active.

Note 6. – As soon as sufficient experimental and theoretical data for a particular system are available this Recommendation should be supplemented by a Recommendation stating the performance objectives in terms of measurable quantities such as idle channel noise power and test-tone-to-noise ratio.

Note 7. – It is assumed that noise surges and clicks from power supply systems and from switching apparatus are reduced to negligible proportions and therefore will not be taken into account when calculating the noise power.

Note 8. – This Recommendation does not take into account requirements to be met if facsimile and data transmission are required over telephone channels.

Note 9. – In order to assure proper quality for high speech levels the minimum overload point of the channel should be defined.

It should be taken into account that the average speech level and the range of variation of level as will be experienced at the inputs to the satellite system, may be different for shore originated and ship originated calls.

It should be further noted that different modulation techniques may require different overload levels in order to yield an optimum performance.

Note 10. – For an explanation of subjectively equivalent noise, and for methods by which it can be derived, see Report 751.

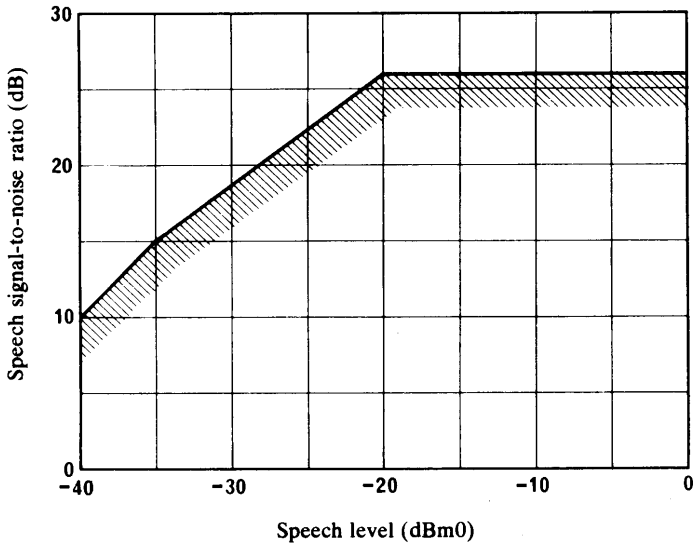

FIGURE 1 – *Limits of subjectively equivalent speech signal to psophometrically weighted noise ratio as a function of speech level*