INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

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STANDARDIZATION SECTOR
OF ITU

R.9

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TELEGRAPHY

TELEGRAPH TRANSMISSION

HOW THE LAWS GOVERNING DISTRIBUTION OF DISTORTION SHOULD BE ARRIVED AT

ITU-T Recommendation R.9

(Previously “CCITT Recommendation”)

FOREWORD

The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the International Telecommunication Union. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, established the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

ITU-T Recommendation R.9 was revised by the ITU-T Study Group IX (1988-1993) and was approved by the WTSC (Helsinki, March 1-12, 1993).

NOTES

1 As a consequence of a reform process within the International Telecommunication Union (ITU), the CCITT ceased to exist as of 28 February 1993. In its place, the ITU Telecommunication Standardization Sector (ITU-T) was created as of 1 March 1993. Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.

In order not to delay publication of this Recommendation, no change has been made in the text to references containing the acronyms "CCITT, CCIR or IFRB" or their associated entities such as Plenary Assembly, Secretariat, etc. Future editions of this Recommendation will contain the proper terminology related to the new ITU structure.

2 In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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HOW THE LAWS GOVERNING DISTRIBUTION OF DISTORTION SHOULD BE ARRIVED AT

(Geneva, 1964; revised at Helsinki, 1993)

The CCITT,

considering

(a) that for the sake of comparative studies of degrees of distortion, it would be well if the procedures for measurement of distortion, and the layout of results, could be standardized. The distortion in question is:

– start-stop individual;

– isochronous individual;

– degree of start-stop distortion;

(b) that the degree of isochronous distortion is of no great practical interest, since it is the individual isochronous distortion that, when isochronous distortion is present, supplies all the useful information. Hence it is not proposed to include the degree of isochronous distortion in this Recommendation.

(c) Recommendations R.54 and R.55,

unanimously declares the following view:

1 Start-stop individual distortion

1.1 As regards start-stop individual distortion, the distribution curves will be plotted by means of a statistical distortion analyser. The width of the measurement steps should make it possible to take measurements with steps of 1%, 2%, 4%, 8%. A measurement will cover about 20 000 transitions (measurement duration of about 15 minutes at 50 bauds: three transitions on the average per start-stop alphabetic signal).

1.2 The results will be shown on the graphs on the linear scale with distributional representation, or on the normal probability scale with cumulative representation, the ordinates being the probabilities or probability density and the abscissae the degree of distortion.

1.3 For individual distortion, the curves will give negative (early) and positive (late) distortion.

1.4 For more detailed studies, the number of transitions to be examined may be higher than 20 000, the number depending on the chosen probability that the nominal figure will be exceeded.

2 Isochronous individual distortion

2.1 There is the difficulty of synchronism between the transmitter and the distortion analyser, when the measurements are made at two different points; moreover, the average propagation time of the signals is to be taken into consideration when loop measurements are made.

2.2 The methods of measuring and presenting the results will be the same as for the preceeding case, but the transmitter and the analyser will have to be synchronized as accurately as possible, taking into account the distortion values to be measured.

3 Start-stop distortion

3.1 This is a matter of the (maximum) degree noted during a measurement. It is then necessary to decide on the length of the sample to be measured; the text to be measured will be composed at random. The measurement at 50 bauds will last 30 seconds, distributed as specified in clause 5/R.5.

3.2 Distribution curves of these degrees of start-stop distortion will be drawn as a function of the number of samples.