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TELEVISION AND SOUND TRANSMISSION

DEFINITIONS OF PARAMETERS FOR SIMPLIFIED AUTOMATIC MEASUREMENT OF TELEVISION INSERTION TEST SIGNALS

ITU-T Recommendation J.64

(Formerly Recommendation ITU-R CMTT.569)

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 J.64 (formerly Recommendation ITU-R CMTT.569) was elaborated by the former ITU-R Study Group CMTT. See Note 1 below.

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 Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector (ITU-R).

Conforming to a joint decision by the World Telecommunication Standardization Conference (Helsinki, March 1993) and the Radiocommunication Assembly (Geneva, November 1993), the ITU-R Study Group CMTT was transferred to ITU-T as Study Group 9, except for the satellite news gathering (SNG) study area which was transferred to ITU-R Study Group 4.

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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DEFINITIONS OF PARAMETERS FOR SIMPLIFIED AUTOMATIC MEASUREMENT OF TELEVISION INSERTION TEST SIGNALS

(1978; revised in 1982 and 1986)

The CCIR,

CONSIDERING

- (a) that Recommendation 567 is the basic reference which defines the parameters which are to be measured and the test signal elements and measuring methods which are to be used, in order to determine the performance of a television transmission circuit;
- (b) that Reports 628 and 411 describe various techniques for automatic measurement and monitoring of the performance of television chains which make use of insertion test signals;
- (c) that operational measurements are commonly carried out using insertion test signals which are defined in Recommendation 473;
- (d) that Report 314 describes the allocation of lines in the field-blanking interval for special purposes;
- (e) that, although automatic measuring equipment exists that can make measurements in accordance with Recommendation 567, simplified automatic measuring equipment also exists that requires modifications of the measurement methods and definitions;
- (f) that such simplified automatic measurement of insertion test signals suits the requirements of operational staffs and makes the analysis of measurement results easier,

UNANIMOUSLY RECOMMENDS,

that, when simplified automatic measuring equipment is used to make measurements of an insertion test signal, and when a normalized form of presentation of the results is desired, the definitions used in quantifying the parameters of that signal should be those which are given in Annex I.

ANNEX I

1. Introduction

The need for each of the measurements described in this Recommendation (and possibly other measurements) will depend upon the type of plant in use and the policy of the administrations.

The test signals specified are those shown in Recommendation 473.

The definitions assume that the performance of the measuring equipment employed is such that any harmonic components of the incoming signal, occurring above the nominal video band, will not give rise to measurement errors which exceed the specified accuracy of that equipment. The definitions also assume instrumentation that will substantially eliminate the effects of any noise present on the incoming signal from the measurement of any test signal parameter.

The magnitude of distortions exhibited by signals which have passed through a non-linear transmission circuit tend to vary with average picture level. Therefore it may be desirable also, to measure automatically the value of Average Picture Level (APL) associated with any particular magnitude of distortion or error.

¹⁾ Formerly Recommendation ITU-R CMTT.569.

2. Definitions

2.1 Luminance bar amplitude

The luminance bar amplitude is defined as the difference between the level corresponding to the mid-point of the bar (element B_2) and the level corresponding to a point immediately following the composite pulse (element F). These points are shown as b_2 and b_1 respectively in Figs. 1 and 2. It is to be expressed as a percentage of the nominal bar amplitude (0.7 V for 625-line signals, 0.714 V for 525-line signals).

2.2 Luminance bar amplitude error

The luminance bar amplitude error is defined as the difference between the actual luminance bar amplitude and the nominal value expressed as a percentage of the nominal value (0.7 V for 625-line signals, 0.714 V for 525-line signals).

2.3 Bar tilt

The luminance bar tilt is defined as the difference between the level of the luminance bar one microsecond after the half amplitude point of its leading edge (point b_3 in Figs. 1 and 2), and the level one microsecond before the half amplitude point of its trailing edge, (point b_4 in Figs. 1 and 2) expressed as a percentage of the luminance bar amplitude. The sign of the difference is positive if b_4 is higher than b_3 .

Note. – The parameter bar tilt as defined above is a unique measurement by automatic devices of a specific form of line time waveform distortion, i.e. the difference in the level of the line bar at two specific reference points. This measurement is different to the measurements of line time waveform distortion described in Recommendation 567 (§ C.3.5.1.3 and Annex III to Part C, § 2.1) where the maximum difference in level at any point between defined reference points is measured.

2.4 Base-line distortion

The base-line distortion is defined as the difference between the levels of the signal at point b_7 , which is located after the mid-amplitude point of the trailing edge of the bar (element B_2) at a distance of 400 ns for 625-line systems and 500 ns for 525-line systems (see Figs. 1 and 2), and at a reference point b_1 located before the beginning of the staircase in line 17 (see also Figs. 1 and 2).

The base-line distortion is expressed as a percentage of the luminance bar amplitude. It is to be measured after the bandwidth of the signal has been limited (see Note). The sign of the difference is positive if the signal level at point b_7 is higher than the level of reference point b_1 .

Note. – Limitation may be achieved by the use of a network, the design of which is based on “Solution 3” [Thomson, 1952], having its first zero at 3.3 MHz, or by an equivalent technique.

2.5 $2T$ pulse/bar ratio error

The $2T$ sine-squared pulse/bar ratio error is defined as the difference between the amplitudes of the $2T$ pulse (element B_1) and the luminance bar (element B_2), expressed as a percentage of the luminance bar amplitude. The peak amplitude of the $2T$ pulse is referred to a reference point b_1 (see Note) (Figs. 1 and 2) before the first riser of the staircase. The sign of the difference is positive if the $2T$ pulse amplitude is greater than the luminance bar amplitude.

Note. – To avoid error due to line tilt, it may be preferable to use a reference point exclusively for the measurement of $2T$ pulse/bar ratio error, which is defined to be the linear mean level of the insertion test signal during the periods: 2 to 1 μ s before, and 1 to 2 μ s after the $2T$ pulse.

2.6 $2T$ pulse shape distortion

This definition requires further study.

2.7 Chrominance-luminance gain inequality

The chrominance-luminance gain inequality is defined as the difference between the peak-to-peak amplitude of the chrominance component of the element G , G_1 , G_2 and the amplitude of the luminance bar (element B_2) expressed as a percentage of the luminance bar amplitude. The sign of the difference is positive if the amplitude of the chrominance component is greater than that of the luminance bar. Note that in the 525-line case the nominal amplitude of element G is 80 IRE units. This factor must be taken into account when normalizing results.

If for any reason signal elements G , G_1 or G_2 are not available, the measurement can be made with the chrominance component of element F .