

Recommended methods of measurement on receivers for television broadcast transmissions —

Part 5: Electrical measurements on multichannel sound television receivers using the NICAM two-channel digital sound-system

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ICS 33.160.25

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National foreword

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Summary of pages

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English version

Recommended methods of measurement on receivers
for television broadcast transmissions
Part 5: Electrical measurements on multichannel sound
television receivers using the NICAM two-channel digital
sound-system

(includes amendment A1:1999)
(IEC 60107-5:1992 + A1:1999)

Méthodes recommandées pour les mesures
sur les récepteurs de télévision
Partie 5: Mesures électriques sur les récepteurs
de télévision à plusieurs voies son utilisant le
système à deux voies son numérique NICAM
(inclut l'amendement A1:1999)
(CEI 60107-5:1992 + A1:1999)

Empfohlene Meßverfahren an Empfängern
für Fernseh Rundfunksendungen
Teil 5: Elektrische Meßverfahren an
Fernseh-Rundfunkempfängern für
Mehrkanalton nach dem NICAM
Zweikanal-Digitaltonverfahren
(enthält Änderung A1:1999)
(IEC 60107-5:1992 + A1:1999)

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B-1050 Brussels

Foreword

The text of document 12A (C.O.) 150, as prepared by Sub-Committee 12A: Receiving equipment, of IEC Technical Committee No. 12: Radiocommunications was submitted to the IEC-CENELEC parallel vote in May 1991.

The reference document was approved by CENELEC as EN 60107-5 on 10 December 1991.

The following dates were fixed:

- latest date of publication of an identical national standard (dop) 1993-08-15
- latest date of withdrawal of conflicting national standards (dow) 1993-08-15

Annexes designated “normative” are part of the body of the standard. In this standard, Annex ZA is normative.

Endorsement notice

The text of the International Standard IEC 60107-5:1992 was approved by CENELEC as a European Standard without any modification.

Foreword to amendment A1

The text of document 100A/113/FDIS, future amendment 1 to IEC 60107-5, prepared by SC 100A, Multimedia end-user equipment, of IEC TC 100, Audio, video and multimedia systems and equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A1 to EN 60107-5:1992 on 1999-04-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2000-01-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2002-01-01

Annexes designated “normative” are part of the body of the standard. In this standard, annex ZA is normative. Annex ZA has been added by CENELEC.

Endorsement notice

The text of amendment 1:1999 to the International Standard IEC 60107-5:1992 was approved by CENELEC as an amendment to the European Standard without any modification.

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1 Introduction

1.1 Scope

The methods of measurement described in this part of IEC 60107 apply to television receivers designed for the reception of television broadcasts using the two-channel digital sound system. The sound coding-system is based on NICAM 728 and is transmitted by a quadrature phase-shift keying (QPSK) modulated digital subcarrier.

NOTE NICAM 728 is the abbreviated form of Near Instantaneous Companded Audio Multiplex at 728 kbit/s.

1.2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60107. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 60107 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

[A1]

IEC 60107-1:1997, *Methods of measurement on receivers for television broadcast transmissions — Part 1: General considerations — Measurements at radio and video frequencies*.

IEC 60107-2:1997, *Methods of measurement on receivers for television broadcast transmissions — Part 2: Audio channels — General methods and methods for monophonic channels* [A1].

IEC 268-1:1985, *Sound system equipment — Part 1: General*.

[A1]

ITU-R Recommendation BT.470-5:1998, *Conventional television systems*.

ITU-R Recommendation 707-3:1998, *Transmission of multi-sound in terrestrial television systems PAL B, G, H and I, and SECAM D, K, K1 and L*.

ITU-T Recommendation J.17:1972, *Pre-emphasis used on sound-programme circuits* [A1].

2 General explanation of terms

The digital sound system offers the possibility of audio transmission using several different modes of operation:

- Dual sound: transmission of two independent sound signals.
- Stereophonic: transmission of a left and right channel sound signal.
- Monoaural: transmission of monoaural signal.

3 General notes on measurements

The decoder for this sound system is generally integrated into a television receiver and it is not always possible to measure the data before the D/A converter.

3.1 General conditions

Unless otherwise stated, measurements shall be carried out under the conditions described in IEC 60107-1 and IEC 60107-2.

3.2 Setting of the receiver

3.2.1 Introduction

Measurements should be carried out in accordance with the following conditions to ensure measurement reliability.

[A1]

3.2.2 Standard output power and voltage

3.2.2.1 Standard output power for loudspeaker

The standard output power shall be a power 10 dB below the rated output power (see 3.1 of IEC 60107-2). Alternatively, a stated, preferred value of output power, not directly related to the rated value, may be used; the preferred values are 500 mW, 50 mW and 5 mW. The corresponding levels are 27 dB(mW), 17 dB(mW) and 7 dB(mW), respectively. In all cases, the value chosen shall be stated with the results.

3.2.2.2 Standard line output voltage

The standard output voltage at a line output terminal shall be 500 mV r.m.s. at 1 kHz when terminated with a resistor equal to the rated load impedance.

NOTE If the output is not adjustable, the output voltage when the standard r.f. television signal is applied to the receiver at the r.f. input signal level specified in 3.2.6, should be used as the standard output voltage. [A1]

3.2.3 Setting of tone controls

Unless otherwise stated, the tone controls that have an influence on the frequency characteristics shall be adjusted for a practically flat response characteristic at the volume control position specified for the measurement. If the volume control is physiologically weighted (loudness control) and the compensation cannot be switched off, it shall be set for minimum compensation effect and the $\overline{A_1}$ standard $\overline{A_1}$ output power obtained by adjusting the audio input level and this value stated with the results.

3.2.4 Setting of stereo balance control

Unless otherwise specified, the balance control(s) shall be adjusted so that the output powers of the two channels are of the same value at the volume control position specified for measurement.

3.2.5 Receiver tuning

Tuning shall be done in accordance with $\overline{A_1}$ 3.6.3 of IEC 60107-1 $\overline{A_1}$ and shall remain unaltered during the whole series of measurements. The criteria used according to $\overline{A_1}$ 3.6.3 of IEC 60107-1 $\overline{A_1}$ shall be stated.

3.2.6 Radio frequency signals

Unless otherwise stated, a standardized colour TV signal $\overline{A_1}$ (ITU-R Recommendation BT.470-5) with two-channel digital sound system (ITU-R Recommendation BS.707-3) $\overline{A_1}$ and a colour bar video modulation shall be used. The r.f. input level of the receiver (the r.m.s. value of the picture carrier during the sync pulse interval) shall be set at 70 dB (μ V) across 75 Ω . The amplitude of the residual carrier at peak white level shall be between 10 % and 12,5 % of the picture carrier amplitude. The FM carrier shall be modulated with an audio frequency sine wave signal of 1 kHz, and a modulation factor of 30 %.

A representation of the complete r.f. signal generator including the digital sound signal and the arrangement for measuring the r.f. signal levels, is shown in Figure 1. A representation of a basic NICAM receiver is shown in Figure 2.

3.3 Test signals

3.3.1 Audio test signals

The audio test signals necessary to perform the test described in this document are defined as follows:

Frequencies: 40 Hz to 15 kHz. If the test generator only provides a given number of discrete frequencies they should be:

40 Hz, 100 Hz, 200 Hz, 500 Hz and 1 kHz, 2 kHz, 5 kHz, 7,5 kHz, 10 kHz, 12 kHz, 14 kHz.

Amplitude: The test signal applied to the NICAM coder shall be corrected in accordance with the pre-emphasis $\overline{A_1}$ (ITU-T Recommendation J.17) $\overline{A_1}$, see Figure 9.

All amplitudes of the test signals are referred to full scale.

Full scale is defined, for a digital signal, as the maximum signal in accordance with the encoding system specification. Full scale amplitude is defined after pre-emphasis and is the same for all frequencies after encoding.

3.3.2 Data test signal

The data test signal is a pseudo random binary sequence (PRBS). The sequence shall have more than 15 stages.

3.4 Measuring instrument

3.4.1 R F test signal generator

The test generator shall be capable of providing a radio frequency signal as specified in 3.2.6. The digital sound part of the test generator shall have separate data and clock inputs to the QPSK modulator. An example of the test generator is shown in Figure 1.

3.4.2 Audio signal generator

The audio signal generator shall be capable of providing signals as specified in 3.3.1.

3.4.3 Pseudo-random binary sequence (PRBS) generator and bit error rate counter

This equipment shall be able to handle the PRBS signal specified in 3.3.2.

3.4.4 Oscilloscope

The oscilloscope shall have dual trace and frequency range 40 Hz to 15 kHz.

3.4.5 Distortion and level meter

Frequency range 40 Hz to 15 kHz.

3.4.6 Quasi-peak voltmeter and weighting filter

The quasi-peak voltmeter and the weighting filter are described in $\overline{A_1}$ 2.5.4 of IEC 60107-2. $\overline{A_1}$

4 Methods of measurements

4.1 Bit error rate due to the input signal level

4.1.1 Definition

This test measures the bit error rate of a digital sound signal due to the input level of the television receiver. The digital signal will be influenced by random noise when the input signal is decreased.