SLOVENSKI STANDARD
SIST EN 60835-1-3:2002/A1:2002

01-oktober-2002

Methods of measurement for equipment used in digital microwave radio transmission systems - Part 1: Measurements common to terrestrial radio-relay systems and satellite earth stations - Section 3: Transmission characteristics - Amendment A1 (IEC 60835-1-3:1992/A1:1995)

Methods of measurement for equipment used in digital microwave radio transmission systems -- Part 1: Measurements common to terrestrial radio-relay systems and satellite earth stations -- Section 3: Transmission characteristics

Meßverfahren für Geräte in digitalen Mikrowellen-Funkübertragungssystemen -- Teil 1: Messungen an terrestrischen Richtfunksystemen und Satelliten-Erdfunkstellen -- Hauptabschnitt 3: Übertragungseigenschaften

Méthodes de mesure applicables au matériel utilisé pour les systèmes de transmission numérique en hyperfréquence -- Partie 1: Mesures communes aux faisceaux hertziens terrestres et aux stations terriennes de télécommunications par satellite -- Section 3: Caractéristiques de transmission

Ta slovenski standard je istoveten z: **EN 60835-1-3:1995/A1:1995**

ICS:

33.060.30	Radiorelejni in fiksni satelitski komunikacijski sistemi	Radio relay and fixed satellite communications systems

SIST EN 60835-1-3:2002/A1:2002 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 60835-1-3/A1

May 1995

IEC/SC 12L

UDC 621.396.6:620.1:621.317.08
ICS 33.060.30

Descriptors: Radiocommunications, telecommunications, satellite broadcasting, communication equipment, earth stations, radio-relay systems, microwave frequencies, characteristics, measurements

English version

Methods of measurement for equipment used in digital microwave radio transmission systems Part 1: Measurements common to terrestrial radio-relay systems and satellite earth stations Section 3: Transmission characteristics (IEC 835-1-3:1992/A1:1995)

Méthodes de mesure applicables au matériel utilisé pour les systèmes de transmission numérique en hyperfréquence
Partie 1: Mesures communes aux faisceaux hertziens terrestres et aux stations terriennes de télécommunications par satellite
Section 3: Caractéristiques de transmission
(CEI 835-1-3:1992/A1:1995)

Meßverfahren für Geräte in digitalen Mikrowellen-Funkübertragungssystemen
Teil 1: Messungen an terrestrischen Richtfunksystemen und Satelliten-Erdfunkstellen
Hauptabschnitt 3: Übertragungseigenschaften
(IEC 835-1-3:1992/A1:1995)

This amendment A1 modifies the European Standard EN 60835-1-3:1995; it was approved by CENELEC on 1995-05-15. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This amendment exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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 12E(CO)167, future amendment 1 to IEC 835-1-3:1992, prepared by SC 12E, Radio relay and fixed satellite communication systems, of IEC TC 12, Radiocommunications, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A1 to EN 60835-1-3:1992 on 1995-05-15.

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) 1996-02-15
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 1996-02-15

Endorsement notice

The text of amendment 1:1995 to the International Standard IEC 835-1-3:1992 was approved by CENELEC as an amendment to the European Standard without any modification.

NORME INTERNATIONALE
INTERNATIONAL STANDARD

CEI
IEC
60835-1-3

1992

AMENDEMENT 1
AMENDMENT 1

1995-03

Amendement 1

Méthodes de mesure applicables au matériel utilisé pour les systèmes de transmission numérique en hyperfréquence –

Partie 1:
Mesures communes aux faisceaux hertziens terrestres et aux stations terriennes de télécommunications par satellite –
Section 3: Caractéristiques de transmission

Amendment 1

Methods of measurement for equipment used in digital microwave radio transmission systems –

Part 1:
Measurements common to terrestrial radio-relay systems and satellite earth stations –
Section 3: Transmission characteristics

Bureau Central de la Commission Electrotechnique Internationale 3, rue de Varembé Genève, Suisse

Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

CODE PRIX
PRICE CODE H

Pour prix, voir catalogue en vigueur
For price, see current catalogue

FOREWORD

This amendment has been prepared by sub-committee 12E: Radio relay and satellite communication systems, of IEC technical committee 12: Radiocommunications.

The text of this amendment is based on the following documents:

DIS	Report on voting
12E(CO)167	12E/252/RVD

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

Page 3

CONTENTS

Add the following items:

Figures

Page 23

Add the following new clause:

6 Delay difference between two transmission paths

6.1 *Definitions and general considerations*

The delay difference between two transmission paths is an important parameter with respect to the availability of radio links for the following reasons:

– the delay difference should be kept within certain limits in order to achieve slipless switching between any main and a stand-by channel;

– the delay difference greatly influences the performance of functions such as diversity switching and combining between any two channels.

NOTE – This clause refers only to i.f. delay-difference measurements. Baseband delay-difference measurements are dealt with in IEC 835-2-5: 1993, *Methods of measurement for equipment used in digital microwave radio transmission systems – Part 2: Measurements on terrestrial radio-relay systems – Section 5: Digital signal processing sub-system.*

In terrestrial systems, means are provided to equalize delay differences either manually or automatically. In order to assess the performance of these methods, the limiting delay values which can be equalized by such techniques shall be measured using simulated transmission paths during factory tests.

Figure 8 shows an example of a space diversity receiving system.

Another parameter to be measured is the absolute delay of receiver components during production or acceptance testing. For example, this measurement is of great importance in satellite earth station systems where "frequency-hopping" is used. In this case, the delay difference between switched transmission paths should be adjusted to minimum.

Such absolute delay equalization can be carried out at the i.f. interfaces of the concerned radio link receivers using commercially available test equipment.

6.2 *Method of measurement*

The arrangement for measuring delay difference between two branches of a diversity reception system is shown in figure 9. At the test transmitter, a radio link measuring set or microwave link analyser (MLA) supplies a similar test signal to that normally used for group-delay frequency-response measurements to the i.f. input of the system (see 4.2). The only difference between this measurement and the usual measurements is that a sweep width of less than 1 MHz is needed at the centre frequency.

The output of the test transmitter is divided by a power splitter, connected to the input port of the main and diversity receivers with cables of identical length.

At the reception side, an electronic change-over switch is placed between the two i.f. outputs concerned and the i.f. input of the test-receiver, operating in its group-delay measurement mode. The length of the cables between the two i.f. outputs and the i.f. switch should be identical. The sweep signal recovered from the test receiver is used as the drive signal for the switch. The result displayed on the test-receiver CRT is a step function (see figure 10). Because the screen is calibrated, the delay difference $\Delta\tau$ can be obtained from the step height.

An alternative method uses a square wave voltage from a function generator as a drive signal for the switch. In this case, the switch is not normally synchronized with the CRT-sweep of the test receiver and the result is similar to that shown in figure 11.

NOTE – As an example, this method is applicable to the measurement and adjustment of delay difference of baseband switching equipment in diversity systems. An arrangement for measuring the switch-over characteristics as a function of delay is shown in figure 12. For adjustment or verification of $\Delta\tau$, the manual switch SW1 is in the position marked "delay difference" and the test receiver is used as shown in figure 9. For measurement of BER, the manual switch SW1 is in the position marked "BER". Measurements of BER alarm and recovery time as well as synchronization time as a function of delay difference are possible using a similar equipment arrangement to that shown in figure 12 (see 835-2-7: 1993, *Methods of measurement for equipment used in digital microwave radio transmission systems – Part 2: Measurements on terrestrial radio-relay systems – Section 7: Diversity switching and combining equipment*).

The measurement of the absolute delay of an i.f. component or sub-assembly can be carried out using the simple arrangement shown in figure 13.

One input port of the i.f. switch is connected to one output port of a power splitter, the remaining output of which is connected to the input of the i.f. component or sub-assembly under test. The output of the item under test is connected to the second input of the i.f. switch.

The sum of the lengths of the two cables required for connecting the test item to the power splitter and to the i.f. switch should be made equal to the length of the cable in the reference path. By excluding the test item and interconnecting the two cables directly, the correct cable length can be verified by noting the display which should then show two coinciding group-delay lines.

In the group-delay measurement mode, the absolute delay of the item under test is indicated as $\Delta\tau$ on the CRT display as is illustrated in figure 10.

6.3 *Presentation of results*

Results shall be presented either as a plot or photograph of the CRT display or the measured values of $\Delta\tau$ shall be noted.

6.4 *Details to be specified*

The following items shall be included, as required, in the detailed equipment specification:

a) maximum allowed delay difference or absolute delay;

b) the values of $\Delta\tau$ to be adjusted for certain tests;

c) interface points of measurement;

d) measuring equipment parameters, test frequency, switching frequency, sweep width and centre frequency.

Add the following new figures:

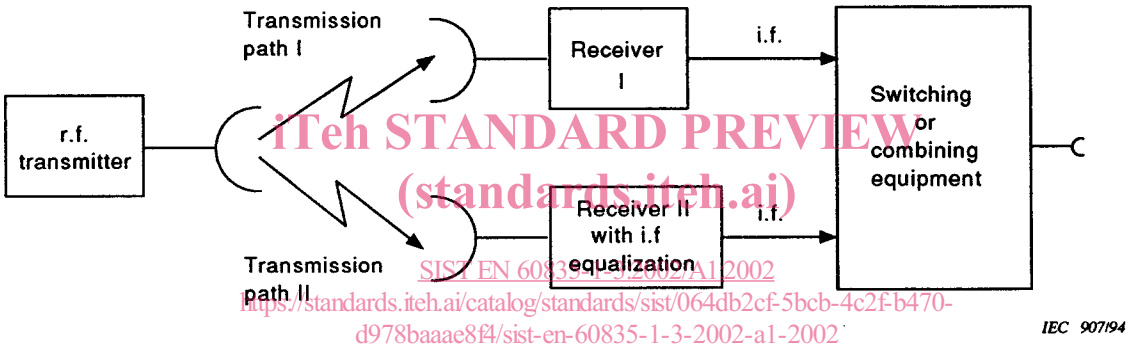

Figure 8 – Example of space diversity receiving system where delay difference could be a problem