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Radio equipment used in mobile services – Methods of measurement –

Part 6: Data equipment

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Partie 6: Matériel numérique

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organization.
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4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extend possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60489-6 has been prepared by IEC technical committee 102: Equipment used in radio communications for mobile services and for satellite communication systems.

This third edition of IEC 60489-6 cancels and replaces the second edition, published in 1987, amendment 1 (1989) and amendment 2 (1991). This third edition constitutes a technical revision.

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

FDIS	Report on voting
102/44/FDIS	102/54/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

IEC 60489-6 forms one of a series of publications under the general title*: Radio equipment used in mobile services – Methods of measurement.* Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next revision.

Annexes A, B, C, E, F and G form an integral part of this standard.

Annexes D, H and I are for information only.

A bilingual version of this standard may be issued at a later date.

RADIO EQUIPMENT USED IN MOBILE SERVICES – METHODS OF MEASUREMENT –

Part 6: Data equipment

1 General

1.1 Scope and object

This part of IEC 60489 refers specifically to mobile radio transmitters and receivers for the transmission of data (telegraphy) signals having the emission characteristics given in 1.2.

This standard is intended to be used in conjunction with IEC 60489-1. The terms and definitions and the conditions of measurement set forth in this standard are intended for type and acceptance tests.

The object of this standard is to standardize the definitions, the conditions and the methods of measurement used to ascertain the radio-frequency performance of data and selective call equipment, thus making possible meaningful comparisons of the results of measurements made by different observers and on different equipment.

This standard will cover the following types of data signals:

– bit streams;
– character strings;
– messages;
– selective calling.

Selective calling differs from messages in their intended functions; it may be considered as data signals, analogous to messages transmitting only the information required to activate an alarm on one receiver or a group of receivers.

The methods of measurements for the radio-frequency parameters are appropriate for the four types of data signals.

To differentiate between the radio-frequency parameters (e.g. adjacent channel power, frequency error) measured in this standard from those in associated standards, the name of each parameter is followed by either “(bit stream)” or “(character string)” or “(message)” or “(selective calling)”. After each radio-frequency parameter the general term “(data)” is used. When each equipment is measured, the proper data type “(bit stream)” “(character string)” “(message)” or “(selective calling)” will be substituted for “(data)”.

1.2 Emission characteristics

This standard is applicable to the following emission characteristics expressed according to the ITU Radio Regulations Emission Designation.

Emission characteristics are expressed by four symbols:

a) – b) – c) – d)

where

a) is the type of modulation of the main carrier;

b) is the nature of signals modulating the main carrier;

c) is the type of information to be transmitted;

d) is the detail of signal(s) (optional).

a) Type of modulation of the main carrier (first symbol):

(A) double-sideband;

(H) single-sideband, full carrier;

(R) single-sideband, reduced or variable level carrier;

(J) single-sideband, suppressed carrier;

(F) frequency modulation;

(G) phase modulation.

b) Nature of signal(s) modulating the main carrier (second symbol):

(1) a single channel containing quantized or digital information without the use of a modulating sub-carrier;

(2) a single channel containing quantized or digital information with the use of a modulating sub-carrier;

(3) two or more channels containing quantized or digital information.

c) Type of information to be transmitted (third symbol):

(A) telegraphy – for aural reception;

(B) telegraphy – for automatic reception;

(C) facsimile;

(D) data transmission, telemetry or telecommand.

d) Details of signal(s) (fourth symbol, optional):

(A) two-condition code with elements of differing numbers and/or durations;

(B) two-condition code with elements of the same number and duration without error-correction;

(C) two-condition code with elements of the same number and duration with error-correction;

(D) four-condition code in which each condition represents a signal element (of one or more bits);

(E) multi-condition code in which each condition represents a signal element (of one or more bits);

(F) multi-condition code in which each condition or combination of conditions represents a character.

NOTE – See ITU Radio Regulations (edition 1982), Article 4 and Appendix 6 (AP6, part A) for details and definition of the emission characteristics.

1.2 System characteristics

1.2.1 Transmitter

The transmitters that are measured using the methods in this standard may be capable of simultaneously transmitting two or more data signals or voice and a data signal. The operational characteristics of the system in which the transmitter will be used will establish if the transmitter will be required to simultaneously transmit several types of signals.

Many of the systems that require the transmitter to transmit both analogue voice and data arrange it so that either voice or data are transmitted, but not simultaneously. In this instance this standard would be used to measure the transmitter radio-frequency parameters with the transmitter in the data mode only. IEC 60489-2 should be used to measure the radio-frequency parameters with the transmitter in the analogue voice mode.

When the system requires that the transmitter transmit simultaneously more than one signal, the radio-frequency parameters will be measured with the transmitter transmitting only the maximum number of simultaneous signals required by the system. For example, a transmitter may be capable of transmitting three types of signals, but the system may require under some circumstances that two signals be transmitted simultaneously and, at all other times, only one signal will be transmitted. In this case, the measurements should be made while the transmitter is transmitting the two simultaneous signals.

When the system requires that input signals, other than the data signal to be used in the measurement, be applied simultaneously with the data signal to the transmitter under test, they should be applied to the proper port and at the signal levels specified by the manufacturer. The measurements in this standard will then be made using simultaneously the data signal and the other required signals (see figure 1).

1.3.2 Receiver

In this standard, the subclauses entitled “Method of measurement” are designed to measure the value of a radio-frequency parameter. In some cases, it is only necessary to determine if the receiver-decoder is compliant with the radio-frequency parameter specification. This can usually be done more simply and with less effort than measuring the radio-frequency parameter. For the more frequently measured radio-frequency parameters, a compliance test method is included in the appropriate clauses. The specified value for the radio-frequency parameter will be the appropriate value specified by a regulation, contract or equipment specification.

The degradation measurements for receivers (4.3 to 5.1) requires the knowledge of the sensitivity. This sensitivity is used to derive a value for the wanted signal level. In one case, the sensitivity to use is the measured usable sensitivity – MUS – (determined according to 4.2 for every equipment under test). Alternatively, it is possible to use the specified usable sensitivity – SUS – applicable for a set of equipment.

According to the type of measurement performed, it is necessary to add, immediately after the name of each measured parameter, either “(referred to MUS)” or “(referred to SUS)”.

1.4 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60489. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 60489 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60050(721), *International Electrotechnical Vocabulary – Chapter 721: Telegraphy, facsimile and data communication*

IEC 60489-1, *Methods of measurement for radio equipment used in the mobile services – Part 1: General definitions and standard conditions of measurement*

IEC 60489-2, *Methods of measurement for radio equipment used in the mobile services – Part 2: Transmitters employing A3E, F3E or G3E emissions*