



INTERNATIONAL TELECOMMUNICATION UNION

**CCITT**

THE INTERNATIONAL  
TELEGRAPH AND TELEPHONE  
CONSULTATIVE COMMITTEE

**O.1**

(11/1988)

SERIES O: SPECIFICATIONS FOR MEASURING  
EQUIPMENT

General

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**SCOPE AND APPLICATION OF SERIES O  
RECOMMENDATIONS**

Reedition of CCITT Recommendation O.1 published in the  
Blue Book, Fascicle IV.4 (1988)

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## NOTES

1 CCITT Recommendation O.1 was published in Fascicle IV.4 of the *Blue Book*. This file is an extract from the *Blue Book*. While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).

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

## **Recommendation O.1**

### **SCOPE AND APPLICATION OF SERIES O RECOMMENDATIONS**

*(Melbourne, 1988)*

#### **1 Scope of Series O Recommendations**

The CCITT establishes various Recommendations covering:

- a) essential specifications for telecommunications equipments, and
- b) operational matters, e.g. procedures for bringing circuits into service and routing checks of performance.

The type of tests for checking compliance with these two categories of Recommendations are essentially different, and this often leads to a different choice of test equipment.

Category a) tests will normally be more comprehensive. Their purpose (often based upon measurements of sample or prototype equipments) is to certify compliance with design objectives and they may therefore be a prerequisite to equipment being accepted for installation in an Administration's network. Such tests are unlikely to be employed routinely and in general CCITT does not produce Recommendations for test equipment intended specifically for this purpose.

Category b) tests, however, are used systematically and repetitively and their widespread application may necessitate additional considerations, in particular the need for:

- 1) conformity of results when tests may be performed using test equipment supplied by more than one manufacturer, and
- 2) a common measurement technique to ensure compatibility when a test requires test equipment at both ends of an international circuit.

It is primarily for these circumstances that CCITT issues the Series O Recommendations.

The above remarks apply equally to analogue and digital techniques.

#### **2 Application of measuring equipment for use on digital transmission systems**

This section is presented as an aid to selecting and applying specifications in the Series O Recommendations concerning test and measuring equipment for use on primary PCM and data multiplexers and digital transmission systems.

Applications are divided into two categories:

- a) measurements and indications on primary PCM multiplexers;
- b) measurements and indications on digital transmission systems including digital line systems, digital circuits and digital multiplexers.

Figures 1/O.1 and 2/O.1 illustrate the range of test and measurement capabilities applicable to primary PCM multiplexers, in the send and receive directions, respectively.

Tables 1/O.1 and 2/O.1 illustrate the range of test and measurement capabilities applicable to digital transmission systems.

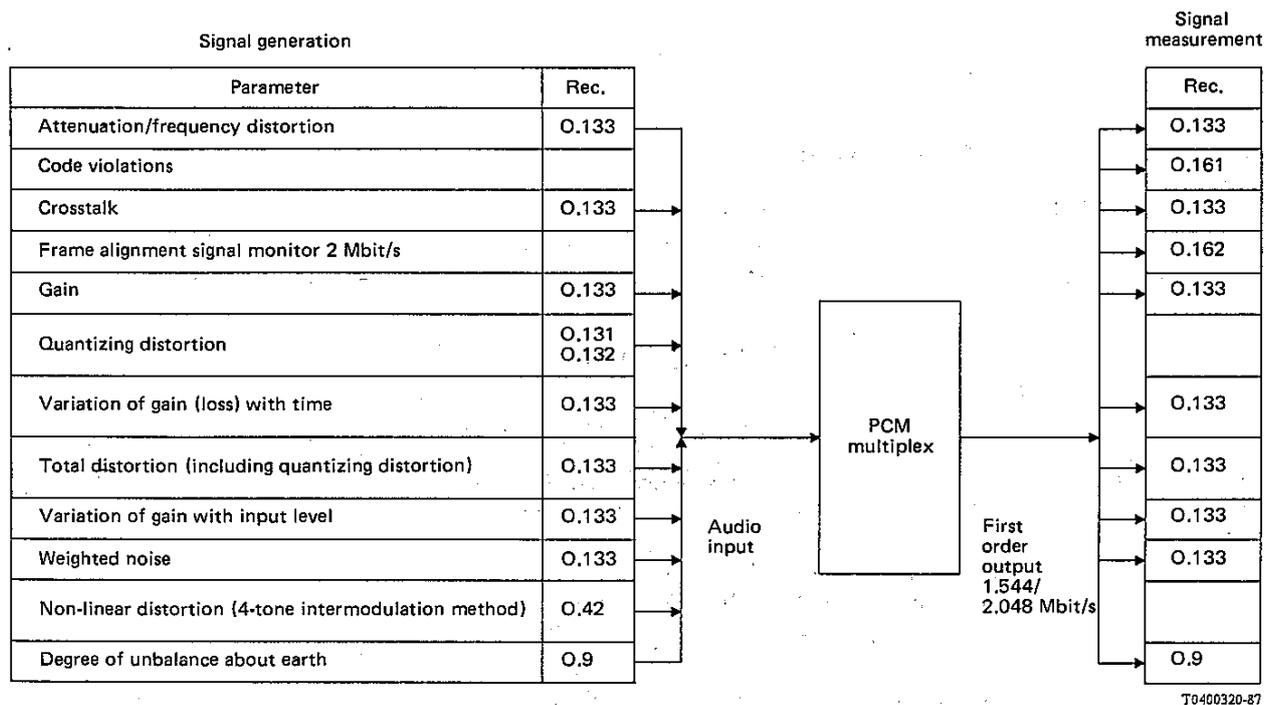
The figures indicate the relevant Series O Recommendations to be applied for each test and measurement parameter, and also show the connection interface for the test instrument.

*Example:*

To measure quantising distortion on a primary PCM multiplexer:

Figure 1/O.1 shows that instruments conforming to Recommendations O.131 and O.132 can be employed, connected to the audio input interface of the send encoder.

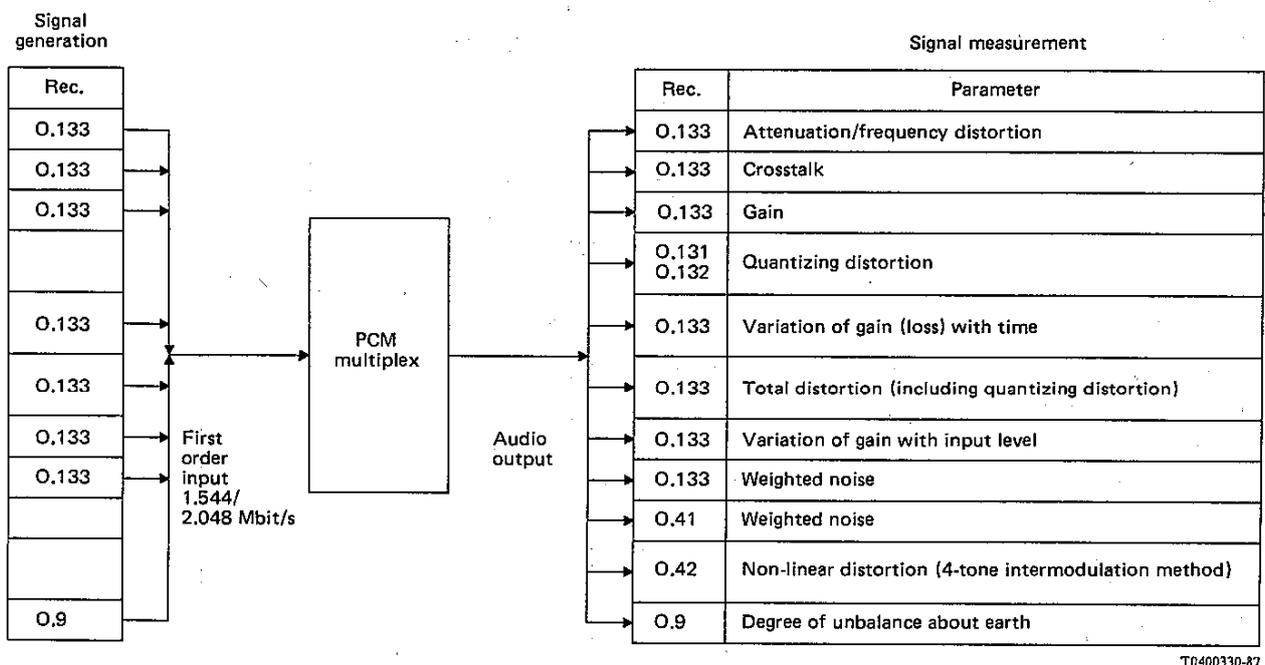
Figure 2/O.1 shows that similar instruments are connected to the audio output interface of the receive decoder to complete the measurement path.



*Note* — Measurements performed via the digital interface of a primary PCM multiplexer are generally applicable also to transmultiplexers conforming to Recommendations G.793 [1] and G.794 [2]. Where relevant, a suitable analogue test signal generator is assumed.

FIGURE 1/O.1

**List of tests and measurements applicable to primary PCM multiplexers in the send direction**



*Note* — Measurements performed via the digital interface of a primary PCM multiplexer are generally applicable also to transmultiplexers conforming to Recommendations G.793 [1] and G.794 [2]. Where relevant, a suitable analogue test signal measurement capability is assumed.

FIGURE 2/O.1

**List of tests and measurements applicable to primary PCM multiplexers in the receive direction**

TABLE 1/O.1

**List of tests and measurements applicable to digital transmission systems in the send direction**

System hierarchical level		First order	Second order	Third order	Fourth order
Bit rate	64 kbit/s	1544 2048 kbit/s	6312 8448 kbit/s	32 064 34 368 44 736 kbit/s	139.264 Mbit/s
Parameter	Recommendation				
Error performance	O.152	O.151	O.151	O.151	O.151
Timing jitter	O.171	O.171	O.171	O.171	O.171

TABLE 2/O.1

**List of tests and measurements applicable to digital transmission systems in the receive direction**

System hierarchical level		First order	Second order	Third order	Fourth order
Bit rate	64 kbit/s	1544 2048 kbit/s	6312 8448 kbit/s	32 064 34 368 44 736 kbit/s	139.264 Mbit/s
Parameter	Recommendation				
Error performance	O.152	O.151	O.151	O.151	O.151
Code violations		O.161	O.161		
Frame alignment Signal monitor		O.162 (2 Mbit/s)			
Timing jitter	O.171	O.171	O.171	O.171	O.171

**3 Application of measuring equipment for use on analogue transmission systems**

Under study.

**References**

- [1] CCITT Recommendation *Characteristics of 60-channel transmultiplexing equipments*, Vol. III, Rec. G.793.  
 [2] CCITT Recommendation *Characteristics of 24-channel transmultiplexing equipments*, Vol. III, Rec. G.794.

## ITU-T RECOMMENDATIONS SERIES

Series A	Organization of the work of the ITU-T
Series B	Means of expression: definitions, symbols, classification
Series C	General telecommunication statistics
Series D	General tariff principles
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media, digital systems and networks
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	Transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Construction, installation and protection of cables and other elements of outside plant
Series M	TMN and network maintenance: international transmission systems, telephone circuits, telegraphy, facsimile and leased circuits
Series N	Maintenance: international sound programme and television transmission circuits
<b>Series O</b>	<b>Specifications of measuring equipment</b>
Series P	Telephone transmission quality, telephone installations, local line networks
Series Q	Switching and signalling
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks and open system communications
Series Y	Global information infrastructure and Internet protocol aspects
Series Z	Languages and general software aspects for telecommunication systems