



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Q.45 *bis*

**GENERAL RECOMMENDATIONS ON TELEPHONE
SWITCHING AND SIGNALLING**

**INTERNATIONAL AUTOMATIC AND
SEMI-AUTOMATIC WORKING**

**TRANSMISSION CHARACTERISTICS OF AN
ANALOGUE INTERNATIONAL EXCHANGE**

ITU-T Recommendation Q.45 *bis*

(Extract from the *Blue Book*)

NOTES

1 ITU-T Recommendation Q.45 *bis* was published in Fascicle VI.1 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.

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TRANSMISSION CHARACTERISTICS OF AN ANALOGUE INTERNATIONAL EXCHANGE

1 Introduction

1.1 General

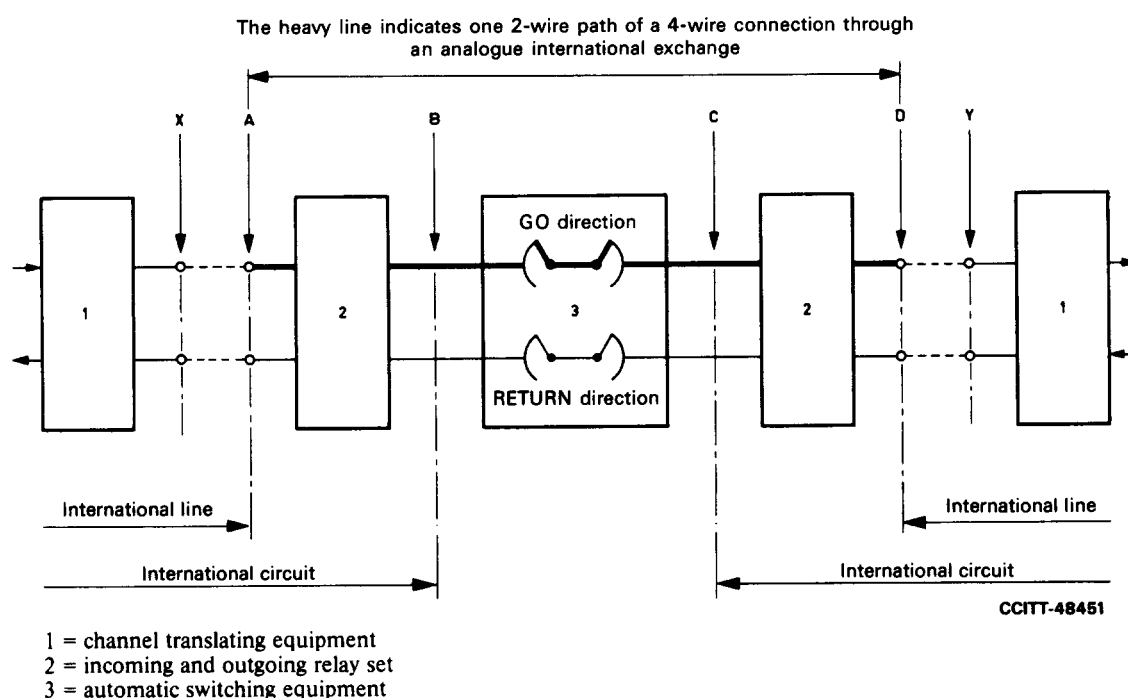
1.1.1 The concern of this Recommendation is the transmission performance of an analogue international exchange in terms of design objectives [1]. Related commissioning objectives [1] may be based on this Recommendation.

For the purposes of this Recommendation an analogue international exchange is a collection of equipment regarded as an entity by the Administration concerned. In the case of an analogue international transit exchange, it extends from the end of the incoming international line (point A of Figure 1/Q.45 bis) to the beginning of the outgoing international line (point D of Figure 1/Q.45 bis).

Exchange testing uses measuring points at boundaries of the same exchange individually agreed upon.

In contrast to exchange testing, circuit testing [2] is recommended between circuit access points expected to be located at or near by the actual analogue switching points (points B or C of Figure 1/Q.45 bis). For the purpose of circuit line-up and maintenance procedures, automatic international exchanges should be provided with circuit test access points.

Applying this Recommendation due account should be taken to the different constitution of the section of transmission under test compared to circuit testing [2].



Note – Between points X and A and points D and Y, there may be equipment such as echo suppressors, compandors, equalizers, line signal receivers, etc., in addition to the cabling.

FIGURE 1/Q.45 bis
Analogue international exchange

1.1.2 The essential transmission requirements for an international exchange are:

- a) The transmission loss through the exchange should be substantially constant with time and independent of the routing through the exchange.
- b) Crosstalk and noise contribution should be negligible compared with other transmission sections in a world-wide connection [3].
- c) The distortion introduced should be small. These include attenuation distortion, non-linear distortion and intermodulation products.
- d) Impedance and balance with respect to earth at the points in the international exchange to which the lines are connected should be closely controlled.

1.1.3 This Recommendation applies to analogue automatic 4-wire international exchanges. It is desirable that it should also apply to analogue national 4-wire exchanges.

The following requirements are intended to be used only for type tests, acceptance tests, or for special investigations. They do not constitute a complete specification. Generally the recommended tests should be conducted on a sampling basis.

1.2 Definitions

1.2.1 connection through an analogue international exchange

A connection through an analogue international exchange comprises the 4-wire speechpath between the exchange boundaries denoted by points A and D of Figure 1/Q.45 *bis*. However with exception of crosstalk all transmission requirements are addressed to the 2-wire path of each direction. The GO direction is indicated by a heavy line in Figure 1/Q.45 *bis* and referred to as a typical section of transmission in the context of this Recommendation.

1.2.2 Reference points

1.2.2.1 exchange input and output ports

An exchange input and output port has to be defined for unidirectional measuring access. For the GO direction of transmission indicated by a heavy line in Figure 1/Q.45 *bis*, the boundary at the point A constitutes the input port and the boundary at the point D constitutes the output port respectively. For the RETURN direction of transmission the constitution is approached vice versa.

The exact location of each of the points A and D, and hence of input and output ports depends on national practice and therefore it is unnecessary for the CCITT to define it. Only the national authority responsible for each international transit exchange can fix the location of these points and thus define the boundaries of the exchange concerned.

1.2.2.2 virtual analogue switching points (VASP)

The virtual analogue switching points are theoretical points. They are fixed by convention as points where two circuits are considered to be directly connected without any additional loss or gain [4, 5]. Depending on the transmission loss T of the circuits to be connected the relative levels at the virtual analogue switching point can be different for the incoming and outgoing direction respectively. The relative levels agreed upon by CCITT are shown in a hypothetical arrangement in Figure 2a/Q.45 *bis*. The corresponding relative levels at actual switching points may differ in values, as for example indicated in Figure 2b/Q.45 *bis*.

1.2.3 Relative levels

1.2.3.1 nominal relative levels at exchange boundaries

For the GO direction of transmission indicated by the heavy line in Figure 1/Q.45 *bis*:

- the nominal relative level at the exchange input port at point A is designated L_i ;
- the nominal relative level at the exchange output port at point D is designated L_o .