

Private branch exchanges for connection to public switched telephone networks run by certain public telecommunication operators —

**Part 2: Specification for private branch
exchanges with terminating stations
treated as an entirety**

Committees responsible for this British Standard

- The preparation of this British Standard was entrusted by the Telecommunications Standards Policy Committee (TCT/-) to Technical Committee TCT/8, upon which the following bodies were represented:
- Association of British Telephone Attachment Suppliers Ltd.
 - Association of Manufacturers Allied to the Electrical and Electronic Industry (BEAMA)
 - British Approvals Board for Telecommunications
 - British Radio and Electronic Equipment Manufacturers' Association
 - British Security Industry Association
 - British Telecommunications
 - Business Equipment Trade Association
 - Cable and Wireless Limited
 - City of Kingston upon Hull Telephone Department
 - Committee of London Clearing Bankers on behalf of the Committee of Scottish Clearing Bankers, Co-operative Bank, Trustee Savings Banks and Yorkshire Bank
 - Communications Marketing and Servicing Association
 - Computing Services Association
 - Department of Trade and Industry
 - Electronic Engineering Association
 - Engineering Equipment and Materials Users' Association
 - Independent Broadcasting Authority
 - Independent Telecommunications Suppliers' Association
 - Mobile Radio Users' Association
 - OFTEL (Office of Telecommunications)
 - Post Office Engineering Union
 - Society of Telecom Executives
 - Telecommunications Managers' Association
 - Telecommunications Users' Association (TUA)
 - UK Offshore Operators' Association Ltd.

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- British Gas Corporation
- Central Computer and Telecommunications Agency
- Electricity Supply Industry in England and Wales
- Royal National Institute for the Blind

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Foreword

BS 6450 has been prepared under the direction of the Telecommunications Standards Policy Committee. It forms one of a series of British Standards that is being produced following the commencement of liberalization in October 1981 of the supply of certain telecommunications apparatus within the United Kingdom. Attention is drawn to the foreword of BS 6450-1:1993.

This Part of BS 6450 has been presented for designation under Section 22(6) of the Telecommunications Act, 1984.

This edition of BS 6450-2 replaces BS 6450-2:1983 which is superseded and withdrawn. This edition introduces technical changes but it does not reflect a full review or revision of the standard, which will be undertaken in due course.

The following are the more important changes.

- a) The sending characteristics have been altered (6.2.1).
- b) The receiving characteristics have been altered (6.2.2).
- c) Requirements to cover the use of connectors complying with BS 7266-1 have been added.
- d) Requirements to cover signal balance during MF signalling have been added.
- e) Requirements to allow through-fed PBXs to take advantage of “1 000 Ω ” lines have been added.
- f) Requirements to cover multi PSTN line calls have been added.
- g) The stability tests have been amended.
- h) Annex D, Annex E, Annex F and Annex G have been added.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations. In particular, attention is drawn to the Telecommunications Act, 1984.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 24, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

BS 6450 specifies requirements for private branch exchanges that are necessary for their connection to public networks run by certain public telecommunications operators.

This Part of BS 6450 specifies requirements for private branch exchanges to be connected at the users' premises to the analogue interfaces of a PSTN for those terminating stations and their cabling that are treated with the private branch exchange as an entirety, or for other analogue interfaces of the PSTN.

This Part of BS 6450 applies to PBXs with their terminating stations that are installed on a single set of premises.

This Part of BS 6450 does not of itself specify the complete requirements for a particular PBX installation and needs to be read in conjunction with Part 1 (see clause 4) and, as appropriate, other Parts of BS 6450.

Requirements for direct dialling in, for ports on the PBX to which private circuits or other voice or data terminating stations are connected, or for facilities, are not specified in this Part of BS 6450.

NOTE 1 Figure 1 shows the communications interfaces of a PBX complying with this Part of BS 6450.

NOTE 2 The titles of the publications referred to in this Part of BS 6450 are listed on the inside back cover.

NOTE 3 Where reference is made in this Part of BS 6450 to a particular clause in another publication, the requirements are applicable irrespective of the scope of that publication. Any clauses of another publication not specifically invoked do not apply.

NOTE 4 Unless otherwise stated, all clause references refer to this Part of BS 6450.

NOTE 5 Compliance with this Part of BS 6450 will not necessarily ensure that the apparatus is satisfactory for the user's purposes.

2 Abbreviations, definitions, notation and symbol

2.1 Abbreviations and definitions

For the purposes of this Part of BS 6450, the abbreviations and definitions given in BS 6450-1:1993 apply, together with those given in other British Standards referred to by BS 6450-1:1993, and the following.

2.1.1

through-fed mode

a mode of operation of a PBX where the current feeding the terminating station is derived from the PSTN and not the PBX

NOTE A PBX can operate in the through-fed mode during normal operation or under power and equipment failure conditions described in clause 19 of BS 6450-1:1993.

2.1.2

type test

test or series of tests directed towards approval of a design, conducted to determine whether an item is capable of meeting the requirements of the product specification

2.2 Notation

2.2.1 dBm

Absolute power level with respect to 1 mW, expressed in decibels.

2.2.2 dBmp

Absolute psophometric power level (weighted for telephony) with respect to 1 mW, expressed in decibels.

2.2.3 dBPa

Absolute sound pressure level with respect to 1 Pa, expressed in decibels.

2.2.4 dBPap

Absolute psophometric sound pressure level (weighted for telephony) with respect to 1 Pa, expressed in decibels.

2.2.5 dBV

Absolute voltage level with respect to 1 V, expressed in decibels.

NOTE to 2.2 Further information on all expression for power levels used in this standard is given in CCITT Recommendation B.12.

2.3 Symbol

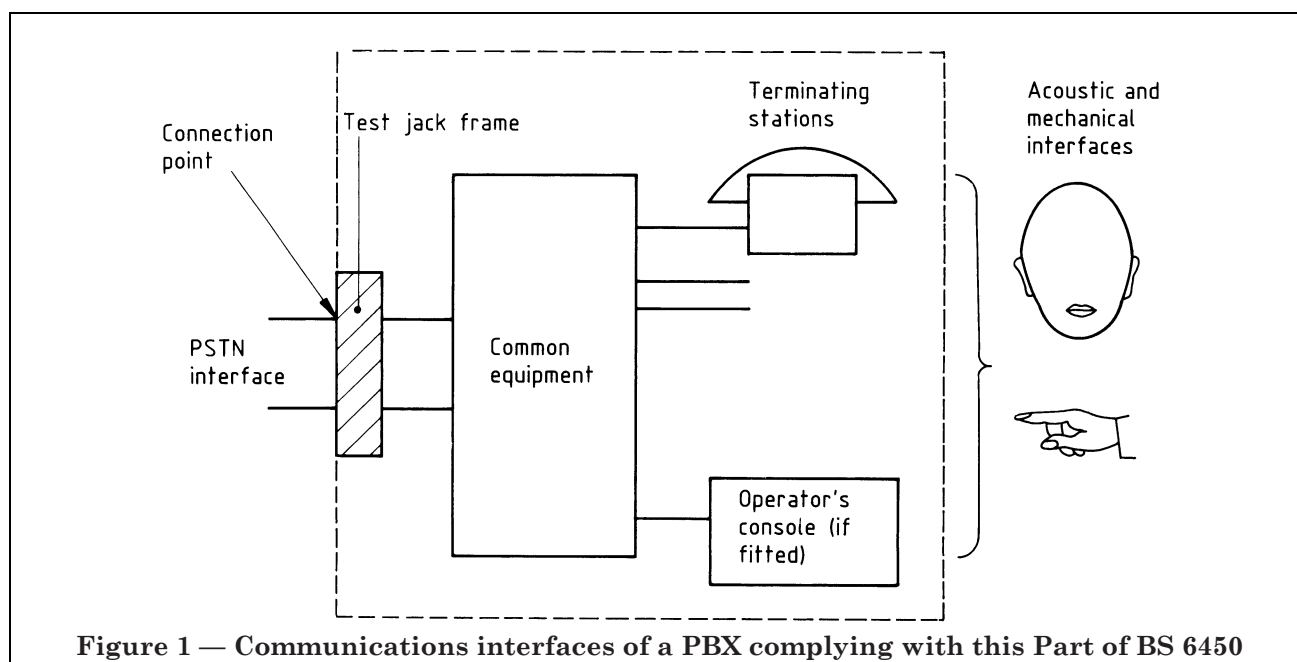
Y parameter relating to insertion loss, and having a value between 0 dB and 2 dB (see 6.2.3 and 7.1.1).

3 Compliance principles

3.1 Requirements

3.1.1 Unless otherwise stated in this Part of BS 6450, the requirements of this Part of BS 6450 shall apply to a PBX in all operating states (but not overload conditions) under all combinations of terminating stations, switching paths and connections to PSTN lines and with all the possible combinations of PBX facilities in use, under the full range of installation-dependent parameters as defined by the supplier (see clause 24 of BS 6450-1:1993 and 7.1).

3.1.2 Unless specific PSTN line polarities are stated in this Part of BS 6450, the requirements shall be met for both polarities of PSTN line connection when the PBX is configured for signalling methods other than the earth calling signalling method.



NOTE PSTN line polarity reversals, other than as part of the operation of a signalling system, will occur only when the PBX is in the idle state.

3.1.3 The requirements of this Part of BS 6450 shall continue to be met for all PSTN signalling systems if the PSTN line polarity is reversed after answer of an outgoing PSTN call and remains in this state for the duration of the call.

3.2 Tests

3.2.1 Unless otherwise stated in this Part of BS 6450, the tests of this Part of BS 6450 shall be applied to a PBX in all operating states (but not overload conditions) under all combinations of terminating stations, switching paths and connections to PSTN lines and with all the possible combinations of PBX facilities in use, under the full range of installation-dependent parameters as defined by the supplier (see clause 24 of BS 6450-1:1993 and 7.1).

NOTE Tests may be performed in any order.

3.2.2 The tests described in this Part of BS 6450 shall be type tests (see 2.1.2).

3.2.3 Tests shall be performed following the information provided by the supplier for the selection of the appropriate adjustments and/or options at the PSTN line interface. Where the requirements of 6.1 are applicable, compliance shall be checked for each type of PSTN line interface circuit offered, including all PSTN line-dependent and/or software options.

3.2.4 Unless otherwise stated in a particular test, the tests shall be performed under the normal operating conditions described in A.1.1 of BS 6305:1992.

3.2.5 Unless otherwise stated in a particular test, the tests shall be performed under d.c. conditions over the range in which the d.c. characteristics of the apparatus lie within the acceptable area shown in Figure 4 of BS 6305:1992 and described in Table 2 of BS 6305:1992.

3.2.6 When tests require the use of artificial lines, the PBX shall be adjusted (if necessary) for the appropriate PSTN line length.

3.2.7 Unless otherwise specified in a particular test, tests on apparatus fitted with user-controlled receiving volume control shall be made at the maximum (i.e. the loudest) setting of the volume control.

3.2.8 For the purposes of this Part of BS 6450, references to “apparatus” in BS 6305:1992 and BS 6317:1992 shall be assumed, when relevant, to refer to the PBX under the test conditions specified in 3.2.1.

3.2.9 Where figures show an earth, this earth shall be connected to the PBX earth reference point.

NOTE Where figures do not show an earth, and where for signalling purposes the line potential(s) need to be referenced to earth, the PBX may need to be artificially set in the appropriate signalling state for the test.

3.2.10 Unless otherwise stated in this Part of BS 6450, the tolerances associated with values of components and quantities shall be as specified in Table 7 of BS 6305:1992, except that the tolerances given for the item “current” shall be replaced by the single entry “ $\pm 1\%$ ”. In addition the tolerance for measurements of sound pressure level shall be ± 0.5 dB.

NOTE In this Part of BS 6450, requirements that are stated in terms independent of PSTN exchange line length apply equally to 3 dB, 6 dB and 8 dB PSTN exchange line services.

4 General

The PBX shall comply with BS 6450-1:1993.

NOTE The requirements of clause 3 of BS 6450-1:1993 apply only to the requirements of BS 6450-1:1993. For the requirements of BS 6450-2:1993, the requirements of clause 3 of BS 6450-2:1993 apply.

5 Connection of terminating stations

NOTE If the operation of any terminating stations is polarity dependent (see 7.1.1 g), the tests specified in clause 5 are carried out in accordance with the instructions for use required by 7.2.2.

5.1 Each terminating station shall be connected to the PBX in accordance with either 5.2, 5.3 or 5.4.

5.2 The terminating station shall be connected to the PBX by means requiring the use of a tool for the establishment and/or disconnection of the electrical connection.

Compliance shall be checked by inspection.

5.3 The terminating station shall be connected to the PBX by means of a plug.

Where a terminating station can be connected to the PBX by six conductors or less using unscreened multi-conductor cable, the following requirements shall apply.

- a) Connection shall be made by a plug complying with BS 6312.

Compliance shall be checked by inspection.

- b) Any connections to pins 1, 2, 5 and 6 of the plug shall comply with clause 3 of BS 6301:1989.

NOTE 1 Connections to pins 1, 2, 5 and 6 of the plug are equivalent to an NTP port for the purposes of compliance with clause 3 of BS 6301:1989.

- c) If pins 2 and 5 of the plug are used, signal power between pins 2 and 5 shall comply with 4.3.5 of BS 6305:1992.

NOTE 2 Selection of the appropriate requirements of 4.3.5 of BS 6305:1992 and the application of the corresponding compliance check on the part of the approval authority are dependent on the terminating station signalling power classification determined by the supplier in accordance with 7.1.1 and 7.1.2 of this Part of BS 6450.

5.4 The terminating station shall be connected to the PBX by means of a plug complying with BS 7266-1. Where connections are made to pins 3, 4, 5 or 6, the requirements of 5.5 and 5.6 shall be met.

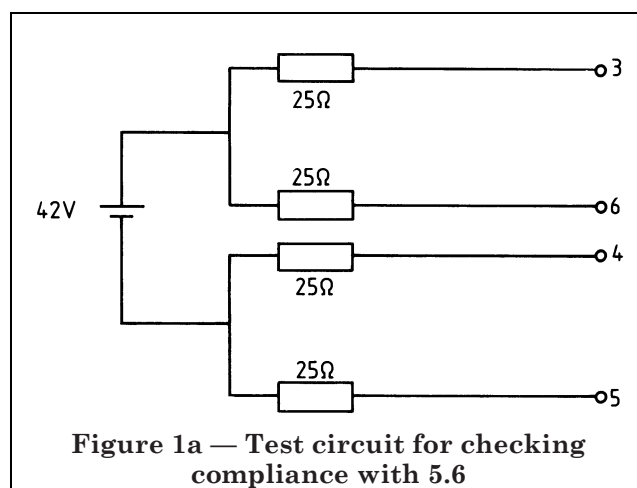
Compliance shall be checked by inspection.

5.5 Any connections to pins 3, 4, 5, or 6 of the plug shall comply with clause 3 of BS 6301:1989.

NOTE Connections to pins 3, 4, 5 or 6 of the plug are equivalent to an NTP port for the purposes of compliance with clause 3 of BS 6301:1989.

5.6 When connected to the test circuit of Figure 1a the voltages measured between pins 3 and 6, and between pins 4 and 5 of the plug shall not exceed 0.85 V peak-to-peak for frequencies up to 1 MHz.

Compliance shall be checked by measurement.



6 Electrical characteristics

6.1 Multi-frequency (MF) tone signalling

NOTE 1 When PBXs are configured for signalling to the PSTN by the earth calling signalling method (see item 5 of Table 1 of BS 6450-1:1993), the requirement of 3.1.2 does not apply.

NOTE 2 The PBX needs to be placed in the signalling phase before performing the tests specified in 6.1.

NOTE 3 Suppliers are reminded that if they wish to use MF signals to transmit data once a call has been established, then they should allow for a possible PSTN line polarity reversal upon the answer of an outgoing PSTN call.

NOTE 4 Unless otherwise stated, measurements are made at the PSTN line connection point of the PBX.

6.1.1 General

The requirements specified in 6.1.2 to 6.1.15 shall apply when the PBX is in the on-line state and where:

- a) the PBX is capable of originating MF signals for transmission to the PSTN independently of, or in response to, any terminating station signals; and/or

- b) the PBX is “transparent” to MF signals originating at the terminating station(s) (see note to 6.1.14).

NOTE A statement by the supplier on whether the PBX is capable of signalling to the PSTN in the MF mode is a requirement of BS 6450-1:1992.

6.1.2 Speech suppression

The PBX shall comply with 4.4.3.1 of BS 6305:1992.

6.1.3 Impedance presented to the PSTN

The impedance presented to the PSTN shall comply with either:

- a) 4.4.3.2 a) of BS 6305:1992; or
- b) 4.4.3.2 b) of BS 6305:1992; or
- c) 4.3.2.1 of BS 6305:1992.

NOTE Selection of the appropriate impedance requirement a), b) or c), and the application of the appropriate compliance check on the part of the approval authority, is dependent on the impedance classification determined by the supplier in accordance with 7.1.2.

6.1.4 Coding format

The coding format shall comply with 4.4.3.6 of BS 6305:1992 except that paragraph three shall be replaced by:

“The difference between each measured frequency and the corresponding nominal frequency shall be not more than $(0.015f + 0.4)$ Hz, where f is the corresponding nominal frequency, in Hz.”

6.1.5 Absolute signalling power levels to the PSTN

The absolute signalling power levels shall comply with either a) or b).

- a) The absolute signalling power levels shall be as given in Table 1.

Compliance shall be checked by measurement, with the PSTN line connection point of the PBX connected to the circuit shown in Figure 2 with a direct current of 25 mA flowing through the milliammeter. Compliance shall also be checked at the maximum current level flow in the circuit when it is connected to an e.m.f. of 50 V in series with a resistance of 400 Ω .

- b) The absolute signalling power levels shall lie within the appropriately marked areas of Figure 3.

Compliance shall be checked by measurement, with the PBX connected at its PSTN line connection point to the circuit shown in Figure 4, with terminals A and B, terminated with a 600 Ω non-reactive resistor, connected to a high impedance measuring set.

NOTE 1 to 6.1.5 Selection of the appropriate absolute signalling power level requirement, and the application of the corresponding compliance check on the part of the approval authority, is dependent on the absolute signalling power level classification determined by the supplier in accordance with 7.1.2.

NOTE 2 to 6.1.5 The coding frequencies are specified in 4.4.3.6 of BS 6305:1992.

NOTE 3 to 6.1.5 See also 6.2.0.2 and 6.2.0.3.

6.1.6 Differential level of the two components

When measured in accordance with 6.1.5, the high tone shall have a signal level between 1 dB and 4 dB higher than the low tone.

6.1.7 Transients

The peak voltage of transients presented to the PSTN during MF transmission shall not exceed 5 V.

Compliance shall be checked in accordance with paragraph two of 4.4.3.4 of BS 6305:1992.

6.1.8 Stability

The steady-state power of the composite MF signal shall not vary by more than ± 1 dB.

Compliance shall be checked by measurement, using the test circuit shown in Figure 2.

6.1.9 Unwanted frequency components during signalling

The total power of unwanted frequency components shall comply with 4.4.3.7.5 of BS 6305:1992.

The power level of a single unwanted frequency component during signalling shall comply with 4.4.3.7.3 of BS 6305:1992.

6.1.10 Spillover

6.1.10.1 Signalling state

Where a PBX is capable of receiving digit information from a terminating station in MF form, and is re-transmitting the digits in MF form, no frequency component of the MF signals received from the terminating station shall exceed a power level of -33 dBm for a period in excess of 15 ms.

Compliance shall be checked by measurement.

NOTE This requirement avoids the unintentional operation of any PSTN MF equipment.

6.1.10.2 Silent period

When a PBX is not re-transmitting the digits in MF form, the total power of all signals shall be not greater than -60 dBm.

Compliance shall be checked in accordance with paragraph two of 4.4.3.7.4 of BS 6305:1992, with the acoustic environment complying with A.7.1 of BS 6317:1992.