

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

**Part 3: Direct dialling in on private
branch exchanges —**

**Section 3.1 Specification for direct
dialling in on private branch exchanges
with terminating stations treated as an
entirety**

Committees responsible for this British Standard

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- British Approvals Board for Telecommunications
- British Gas plc
- British Telecommunications plc
- Department of Trade and Industry (Telecommunications and Posts Division)
- EEA (the Association of Electronics, Telecommunications and Business Equipment Industries)
- Electricity Association
- Engineering Equipment and Materials Users' Association
- Independent Telecommunications Suppliers' Association
- Mercury Communications Limited
- Ministry of Defence
- OFTEL (Office of Telecommunications)
- Telecommunications Managers' Association
- Telecommunications Users' Association (TUA)

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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 standard is presented for designation under Section 22 of the Telecommunications Act 1984 [1] ("the Act"). When a standard has been designated in accordance with the Act, apparatus within the scope of that standard may only be approved for connection to a public telecommunication system if it conforms to that standard or such part of the standard as may be specified in such designation. The designation may also specify conditions which must be complied with.

The technical requirements contained in this Section of BS 6450 apply to apparatus in isolation. The approval granted to a particular item of apparatus may contain restrictions on the connections that may be made to the apparatus, and other requirements may be imposed by the licence under which the apparatus is run.

A copy of any designation will be included when available with all copies of this standard. Any further information on, or details of, the designation may be obtained from the Office of Telecommunications (OFTEL), Export House, 50 Ludgate Hill, London EC4M 7JJ.

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 and ii, 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 (PBXs) that are necessary for correct interworking with public switched telephone networks (PSTNs) run by certain public telecommunications operators (PTOs).

This Section of BS 6450 specifies requirements at the connection point (see clause 7 of BS 6450-1:1993) for direct dialling in (DDI) on PBXs connected at the user's premises directly or via one or more pieces of other apparatus or wiring to the 2-wire presented DDI analogue interface of a PSTN and where the terminating stations and their cabling are treated with the PBX as an entirety.

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

This Section of BS 6450 specifies requirements that apply in the event of a major equipment failure (MEF) of the PBX except that requirements for DDI exchange lines switched by the PBX to a port for the connection of external equipment to be used under MEF conditions, remain under consideration.

This Section of BS 6450 does not of itself specify the complete requirements for a particular PBX installation and needs to be read in conjunction with BS 6450-1:1993 and BS 6450-2:1993 (see clause 5 of this Section of BS 6450) and, as appropriate, BS 6450-5.1:1993, BS 6450-6.1:1993 and BS 6450-7:1990. This Section of BS 6450 does not at present specify the requirements for PSTN to PSTN connection.

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

NOTE 1 Where reference is made in this Section 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 2 Unless otherwise stated, all clause references refer to this Section of BS 6450.

NOTE 3 Background information is provided in Annex A on the DDI service, and in Annex B on standby power.

NOTE 4 Compliance with this Section of BS 6450 is intended to provide for safety and the prevention of interference with the PTO's networks and other users, but compliance will not necessarily ensure that the apparatus is satisfactory for the user's purpose.

2 References

2.1 Normative references

This Section of BS 6450 incorporates, by reference, provisions from specific editions of other publications. These normative references are cited at the appropriate points in the text and the publications are listed on the inside back cover. Subsequent amendments to, or revisions of, any of these publications apply to this Section of BS 6450 only when incorporated in it by updating or revision.

2.2 Informative references

This Section of BS 6450 refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this Section of BS 6450 are listed on the inside back cover, but reference should be made to the latest editions.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this Section of BS 6450, the definitions given in BS 6450-1:1993 and BS 6450-2:1993 apply, together with those given in all standards referred to in those standards and the following.

3.1.1

allocated DDI number range

set of numbers, within a group of PSTN numbers, that has been allocated to a particular DDI PBX for address purposes

3.1.2

assigned DDI number

number within the allocated DDI number range that has been assigned to a particular terminating station or group of terminating stations

3.1.3

call routing information

1) Loop-disconnect signalling

Form of signalling where the basic network loop is repeatedly interrupted by signalling pulses during which the current of the loop falls to a very low value.

NOTE 1 There are 10 discrete digits designated, 1 to 9 and 0. Each digit comprises the requisite number of pulses with each pulse consisting of a break period followed by a make period. The digit 0 is represented by 10 pulses.

Successive digits are separated by an interdigital pause.

2) Multi-frequency tone signalling

Signals comprising two groups of four single frequency tones with each digit represented by a combination of two tones, one from each group.

NOTE 2 There are 16 combinations of tones, designated 1 to 9, 0, *, #, A, B, C and D. The allocation of tones to each combination is defined in Table 4 of BS 6305:1992.

Successive tone signals are separated by an interdigital pause.

NOTE 3 *, #, A, B, C and D when provided on terminal apparatus may be used for accessing supplementary services. It is recommended that a PBX does not misoperate on receipt of these signals.

3.1.4 DDI

mode of operation of a PBX that enables incoming PSTN calls to a PBX to be routed, by use of information provided by the public network during the call set-up phase, to individual terminating stations without the intervention of the PBX operator

NOTE The last two or more PSTN routing digits are utilized within the PBX switch rather than in the public exchange, thus the DDI PBX terminating station therefore becomes part of the public exchange (PE) numbering plan.

3.1.5 design date busy hour traffic load

maximum traffic load or call processing capacity for which the installation or configuration was dimensioned

3.1.6 diversion equipment (DE)

equipment integral with the PBX which provides the correct conditions to the PSTN to enable DDI calls to be handled under conditions of PBX MEF

3.1.7 diversion facility

facility that is invoked by a user, which causes a DDI call whose number is within the allocated number range addressed to a terminating station or group of terminating stations, to be routed to an alternative terminating station or a group of terminating stations or a recorded message

3.1.8 grade of service

relationship between traffic offered to a system and the traffic carried by that system

NOTE It is usually expressed as a probability of lost calls, e.g. 0.001 represents a grade of service of one lost call in 1 000 calls offered during the busy hour period.

3.1.9 interdigital pause (IDP)

interval between successive digit signals

3.1.10 interrupt facility

facility that enables a user with the appropriate class of service to break into an established telephone conversation, unless either party to the established conversation has the appropriate protection against interruption

3.1.11 major equipment failure (MEF) for the DDI mode of operation

that state in which a PBX is unable to handle incoming call attempts on not less than 60 % of the DDI exchange lines terminated on that PBX for a continuous period in excess of 16 s

NOTE There may be occasions when, by mutual agreement between the PBX maintainer and the PTO, the PBX can be withdrawn from service. Such occasions are not defined as major equipment failure.

3.1.12 password

a group of characters which, when entered into a PBX by an appropriate means of input, enables access to the relevant area of the PBX software

3.1.13 PBX software

processes, procedures and rules stored as electronic states within a PBX that enable the correct function of the PBX apparatus

3.1.14 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

3.1.15 wait on busy facility

facility that enables a user calling a busy extension to wait until the called number becomes free, when the call can be connected automatically

3.2 Abbreviations

For the purposes of this Section of BS 6450, the following abbreviations apply.

— DDI	direct dialling in
— DE	diversion equipment
— IDP	interdigital pause
— MEF	major equipment failure
— MF	multi-frequency
— PBX	private branch exchange
— PE	public exchange
— PSTN	public switched telephone network
— PTO	public telecommunications operator
— RLR	receiving loudness rating
— TDU	transmission decoupling unit

4 Conformance principles

4.1 Requirements

4.1.1 Where operating modes are not specified in this Section of BS 6450, the requirements of this Section shall apply to a PBX in all operating modes, but not in 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 clause 9 of this Section of BS 6450).

4.1.2 All direct current (d.c.) potentials shall be measured with respect to the earth reference point of the PBX unless otherwise specified.

4.2 Tests

4.2.1 Where operating modes are not specified in this Section of BS 6450, the tests of this Section shall be applied to a PBX in all operating modes, but not in 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 clause 9 of this Section of BS 6450).

NOTE Tests may be performed in any order.

4.2.2 The tests described in this Section of BS 6450 shall be type tests (see 3.1.14).

4.2.3 Tests shall be performed in accordance with the information provided by the supplier for the selection of the appropriate adjustments and/or options at the PSTN line interface. If the requirements for major equipment failure (see clause 7) are applicable, conformance shall be checked for each type of PSTN line interface circuit offered, including all PSTN line-dependent options and/or software options.

4.2.4 Where operating conditions are not specified in a particular test, the tests shall be performed under the normal operating conditions described in A.1.1 of BS 6305:1992.

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

4.2.6 Where positions of the volume control are not specified in a particular test, tests on apparatus fitted with user-controlled receive volume control shall be made at those positions of the volume control where the receiving loudness rating (RLR) lies between limits A and C or B and D of Figure 6 of BS 6450-2:1993 for the 8 dB PSTN line service, limits B and E for the 6 dB PSTN line service and limits B and F for the 3 dB PSTN line service.

4.2.7 For the purposes of this Section 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 4.2.1.

4.2.8 For apparatus with protection barriers, the protection barrier shall be connected in its normal operating position for the tests.

4.2.9 Where the number, type and value of resistance of resistors is not specified the tests in this Section of BS 6450 shall be performed with three non-reactive 50 k Ω resistors, one between the relevant A- and B-wires and one between each wire and earth.

NOTE These resistances simulate the worst conditions present on the PSTN.

4.2.10 Where the position of a measurement is not specified in this Section of BS 6450, measurement shall be made at the connection point of the PBX.

4.2.11 Where tolerances are not specified in this Section of BS 6450, the tolerances associated with values of components and physical quantities referred to in the tests and figures shall be as given in Table 7 of BS 6305:1992 as amended by 3.2.7 of BS 6450-1:1993.

5 General

5.1 The PBX shall conform to the following clauses of BS 6450-1:1993:

- a) clause 4;
- b) clause 6;
- c) clause 7, except that 7.6 does not apply;
- d) clause 9, except that all supervisory tones referred to in this Section of BS 6450 shall conform to this clause for frequency and cadence characteristics, and the levels of the supervisory tones shall conform to 6.1 of this Section of BS 6450;
- e) subclause 10.3, except that Figure 7 of BS 6305:1992 shall be replaced by Figure 1 of this Section of BS 6450 with S1 open;

f) subclause **12.1**, except that Figure 12 of BS 6305:1992 shall be replaced by Figure 2 of this Section of BS 6450 and the minimum current will be the value when the 1.9 k Ω variable resistor is at its maximum, and the tests shall be conducted at values of apparatus current given in **A.5** of BS 6305:1992 which can be obtained when the variable resistor in the transmission decoupling unit (TDU) is adjusted throughout its range;

g) subclause **12.3**, except that Figure 7 of BS 6305:1992 is replaced by Figure 1 of this Section of BS 6450, and the tests shall be conducted at values of apparatus current specified in **A.6** of BS 6305:1992 which can be obtained when the variable resistor in the (TDU) is adjusted throughout its range;

h) subclause **18.3**, **18.4**;

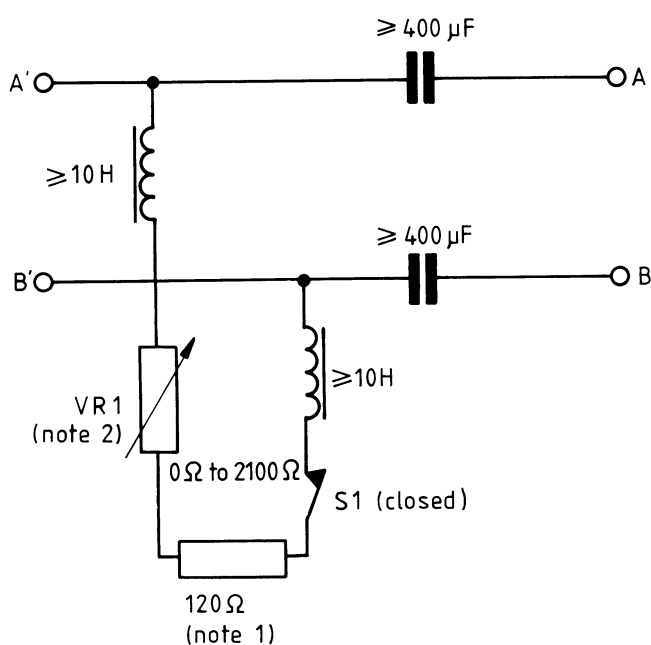
i) clause **20**;

j) clause **21**;

k) clause **22**;

l) clause **23**;

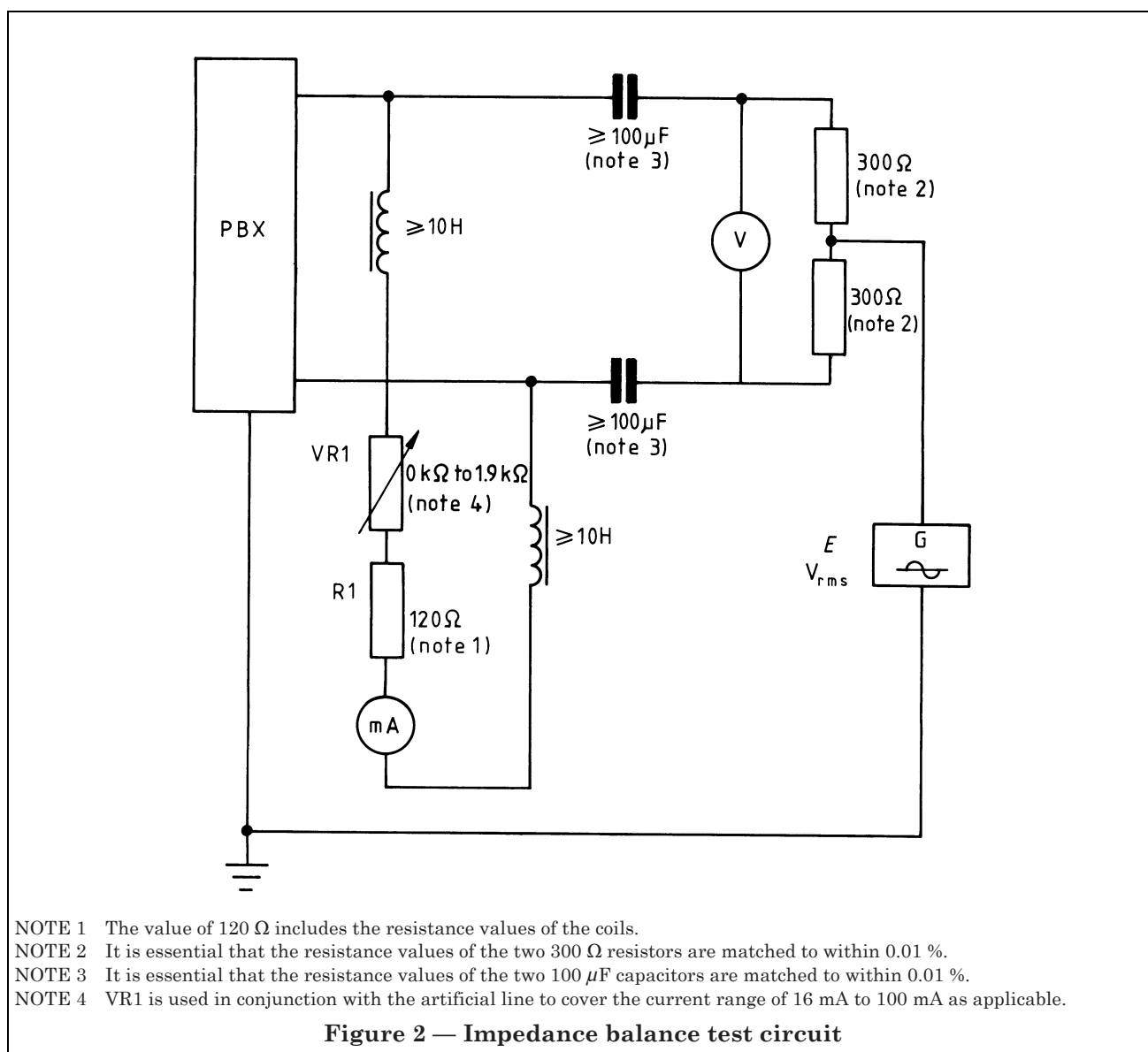
m) clause **24**, as appropriate.



NOTE 1 The value of 120 Ω includes the resistance values of the coils.

NOTE 2 VR1 is used in conjunction with the artificial line to cover the current range of 16 mA to 100 mA as applicable.

Figure 1 — Transmission decoupling unit (no d.c. feed)



5.2 Where appropriate, the PBX shall conform to the following clauses of BS 6450-2:1993:

- a) clause 5;
- b) clause 7.1, as appropriate;
- c) clause 7.2.

5.3 The information for test shall include how the PBX shall be configured such that DDI terminating stations can be accessed either individually or in groups by the significant digits of an allocated DDI number range from a PSTN (see A.2.6).

The instructions for use shall contain information giving the range of configurations that are possible to enable DDI calls to access terminating stations within the allocated DDI number range from a PSTN (see A.2.6).

NOTE The number used for internal calls may differ from the assigned DDI number.

Conformance shall be checked by inspection.

5.4 The PBX shall operate DDI exchange lines in the incoming direction only.

Conformance shall be checked by inspection.

NOTE Other exchange lines to and from the PBX may be provided as necessary and the PBX should conform to the appropriate parts of BS 6450.

5.5 A PBX operator's console if provided, shall be treated as a terminating station for the purpose of assigning one or more numbers from the allocated DDI number range.

Conformance shall be checked by inspection.