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British Standard

Private branch exchanges for connection to public switched telephone network

run by certain public telecommunication operators

Part 5. Facilities on private branch exchanges

Section 5.1 Specification for facilities on private branch exchanges with terminating stations treated as an entirety

Centraux privés destinés à être raccordés aux réseaux téléphoniques publics
commutés de certaines entreprises de télécommunications publiques

Partie 5. Appareillage sur centraux privés

Section 5.1 Appareillage de centraux privés avec postes terminaux considérés
comme un tout — Spécifications

Anschluß von Nebenstellen an das öffentlichen Fernsprechnetz, die von einigen
Betreibern des öffentlichen Fernmeldenetzes bedient werden

Teil 5. Einrichtungen für Nebenstellenanlagen

Abschnitt 5.1 Einrichtungen für Nebenstellenanlagen, die zusammen mit
Endstellen eine Einheit bilden

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Foreword

1 BS 6450 has been prepared under the direction of the Telecommunications Standards 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.

1 Attention is drawn to the foreword of BS 6450 : Part 1 : 1983.

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

1 It is intended to amend this Section of BS 6450 at some time in the future by adding in 9.7.1 a requirement that, where the apparatus with the loudspeaking facility provides the capability of associated handset telephony, full hands free operation should not be available when the associated telephone is not connected.

It is intended to incorporate in this Section of BS 6450 requirements applicable for the following facilities as soon as they have been finalized:

- (1) call diversion over the PSTN;
- (2) PSTN call barring.

Requirements relating to PSTN calls to public emergency authorities are under consideration for possible future inclusion in this Section of BS 6450.

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

Subsection one. General requirements

1 Scope

This Section of BS 6450 specifies requirements for facilities incorporated in private branch exchanges within the scope of BS 6450 : Part 2 : 1983.

NOTE 1. Recommended user control protocols for PBX facilities are given in the CEPT Services and Facilities Handbook, Section 3.

NOTE 2. 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 3. The titles of the publications referred to in this Section of BS 6450 are listed on the inside back cover.

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

2 Method of application

As PBXs may contain a large variety of facilities many of which are only distinguished by the use of a marketing title, this Section of BS 6450 does not attempt to specify requirements for individually named facilities, but rather to specify requirements for the particular elements and phases of incoming and outgoing PSTN calls that the supplier has declared to be affected by the invocation, operation or cancellation for each of the facilities provided with the PBX. The relationship between these elements and phases at the corresponding states of the PBX and the PSTN is shown in figure 1.

This Section of BS 6450 considers those actions and states that constitute the fully automatic process of receiving or making a PSTN call, and the elements and phases shown in figure 1 form sequences that specify these complete processes. Facilities having an effect on one or more of these elements and phases of a PSTN call (such facilities being defined as PSTN-interacting facilities (see 3.1.1)) will fall within the scope of this Section of BS 6450, and the requirements for a given facility therefore comprise the requirements for those elements or phases during which the facility affects the PSTN call process.

 A further category of facilities within the scope of this Section of BS 6450 are those that can be invoked, operated or cancelled by terminating stations or other apparatus only when not involved in a PSTN call. In such circumstances the requirements refer to the non-interference with any PSTN call process. Such a facility is defined as a non PSTN-interacting facility (see 3.1.2).

In completing the declaration specified in clause 5, the supplier determines the particular requirements for his stated facilities, and thereby determines the conditions of use for which approval is sought.

3 Definitions and notation

3.1 Definitions

For the purposes of this Section of BS 6450, the definitions given in BS 6450 : Part 1 : 1983 and BS 6789 : Part 2 :

1984 and the standards referred to by BS 6450 : Part 1 : 1983 apply, together with the following.

3.1.1 PSTN-interacting facility. A facility that can be invoked, operated or cancelled during any element or phase of an incoming or outgoing PSTN call by a terminating station or other apparatus involved in the call.

3.1.2 non PSTN-interacting facility. A facility that can be invoked, operated and cancelled by a terminating station or other apparatus only when not involved in an incoming or outgoing PSTN call.

3.1.3 multi-party call. A call providing a common transmission path between more than two parties.

NOTE 1. A call involving n parties is known as an ' n -party call'.

NOTE 2. This facility permits a series of calls to be placed to other parties while holding each call in a suspended state. In the example of a 3-party call, when the third party answers, any of the following service options can be made at the terminating station:

- (a) transmit to a third party and then revert to the original call, releasing the third party;
- (b) transmit to a third party and transfer the call to the other two parties;
- (c) switch from one call to the other as required, secrecy being provided between the two calls;
- (d) introduce a common (3-way) transmission path.

3.1.4 intrusion (on a PSTN call). The capability of a terminating station to intrude on an established PSTN call.

NOTE. A terminating station with the appropriate class of service, finding a wanted terminating station busy, can intrude into the existing conversation by an appropriate procedure. The intrusion is preceded and accompanied by intrusion tone heard by all three parties concerned. Certain categories of call and some terminating stations may be protected against such intrusion. The established call is maintained during the intrusion.

3.2 Notation

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

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

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

NOTE to 3.2. Further information on all expressions for power levels used in this standard is given in CCITT Recommendation B.12 (1981).

4 Compliance principles

4.1 Requirements

 **4.1.1** Unless otherwise stated in this Section of BS 6450, the requirements of this Section 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 : Part 1 : 1983, clause 7 of BS 6450 : Part 2 : 1983, and clause 5).

4.1.2 For the requirements of BS 6450 : Part 1 : 1983 specified in this Section of BS 6450, the requirements of 3.1.2 of BS 6450 : Part 1 : 1983 shall apply. For the requirements of BS 6450 : Part 2 : 1983 specified in this Section of BS 6450, the requirements of 3.1.2 and 3.1.3 of BS 6450 : Part 2 : 1983 shall apply.

Call progression	Call element or phase	PBX state/signal	Direction of signals (see note 1)	PSTN state/signal	BS 6450 reference
1	—	Idle		Idle	Part 1 : 1983 clause 10 Part 1 : 1983 B.3, B.4
2	Incoming line seizure		<	PBX seize signal	7.1
3	Answering	PBX seized signal	>		7.2, 7.3
4	Conversational phase	Conversation (on-line)	> <	Conversation	Clauses 9 and 10
5	Call clearing (see note 2)	Clear	> <	Clear	Clause 11
6	—	Idle		Idle	Part 1 : 1983 clause 10 Part 1 : 1983 B.3, B.4

(a) Incoming PSTN call attempts

Call progression	Call element or phase	PBX state/signal	Direction of signals (see note 1)	PSTN state/signal	BS 6450 reference
1	—	Idle		Idle	Part 1 : 1983 clause 10 Part 1 : 1983 B.3, B.4
2	Outgoing line seizure	PSTN seize signal	> <	PSTN seized signal	8.1
3	Dialling and restoration	On-line (loop-disconnect or MF signals)	>		8.2
4	Determination of call status	On-line	> <	Tones	8.3
5	Conversational phase	Conversation (on-line)	> <	Conversation	Clauses 9 and 10
6	Call clearing (see note 2)	Clear	> <	Clear	Clause 11
7	—	Idle		Idle	Part 1 : 1983 clause 10 Part 1 : 1983 B.3, B.4

(b) Outgoing PSTN call attempts

NOTE 1. The arrow indicates the direction of signal, i.e. > signifies the direction PBX to PSTN, and < signifies the direction PSTN to PBX.

NOTE 2. Clearing can occur at any point in the call.

Figure 1. PSTN call attempt elements and phases

BS 6450 : Section 5.1 : 1984

Subsection one

4.2 Tests

4.2.1 Unless otherwise

stated in this Section of BS 6450 the tests of this Section 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 : Part 1 : 1983, clause 7 of BS 6450 : Part 2 : 1983, and clause 5).

NOTE. Tests may be performed in any order.

4.2.2 The tests described in this Section of BS 6450 shall be type tests as defined in 21.5 of BS 4778 : Part 2 : 1979.

4.2.3 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 of BS 6450 : Part 2 : 1983 are applicable, compliance shall be checked for each type of PSTN line interface circuit offered, including all PSTN line-dependent and/or software options.

4.2.4 Unless otherwise stated in a particular test, the tests shall be performed under the normal operating conditions specified in A.1.1 of BS 6305 : 1982.

4.2.5 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 : 1982 and described in table 2 of BS 6305 : 1982.

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

4.2.7 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.

4.2.8 For the purposes of this Section of BS 6450, references to 'apparatus' in BS 6305 : 1982 and BS 6317 : 1982 shall be assumed, when relevant, to refer to the PBX under the test conditions specified in 4.2.1.

4.2.9 The facility under test shall be invoked, operated and cancelled in accordance with the supplier's instructions (see 5.1.1.2).

4.2.10 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.

5 Information to be provided by the supplier

5.1 Information required for testing purposes

5.1.1 General

5.1.1.1 The supplier shall list the facilities provided by the PBX, both PSTN-interacting and non PSTN-interacting, in a format equivalent to that shown in table 1. For each PSTN-interacting facility, the supplier shall indicate on the form the applicable elements and phases specified in clauses 7 to 11 involved in the automatic application of the facility.

NOTE. An example of a completed form is shown in table 2.

5.1.1.2 The supplier shall give a detailed operational guide to the invocation, operation and cancellation of each PSTN-interacting facility and each non PSTN-interacting facility.

The supplier shall state whether there are any limitations on the use of a facility.

The supplier shall state whether there are any restrictions to the combinations of facilities that can be invoked, operated or cancelled at one time.

5.1.2 Answering incoming PSTN calls

5.1.2.1 For a facility involving the automatic answering of an incoming PSTN call, the supplier shall state whether a terminating station using that facility is capable of automatically receiving and acting upon non-speech information only (see 7.3).

5.1.2.2 For a facility involving the automatic answering of an incoming PSTN speech call, the supplier shall state:

- (a) whether the automatic facility can operate additionally to the manual answering of the PSTN call by the terminating station user; and
- (b) whether the terminating station user has the ability to cancel the automatic answering facility.

NOTE. See 7.3.1.

5.1.3 Outgoing PSTN call attempt elements and phases

5.1.3.1 Selection and seizure

5.1.3.1.1 Repeat attempts. Where the PBX or the terminating station is capable of making an automatic repeat attempt sequence (see 8.1.4.1), the supplier shall state which call pattern (patterns) from table 3 is (are) applicable.

NOTE 1. The PBX or terminating station may be capable of being configured to operate in more than one of the call patterns given in table 3.

NOTE 2. The actual durations between call attempts of a repeat attempt sequence or sequences configured into the type of PBX submitted for approval need not be stated.

5.1.3.1.2 Termination of selection and seizure. The supplier shall state, for the appropriate facility, whether control of dialling can be returned to the user at the completion of the selection and seizure phase (see 8.1.5).

5.1.3.2 Dialling and restoration. The supplier shall state, for the appropriate facility, whether control of an outgoing automatic PSTN call can be returned to the user after completion of the dialling phase (see 8.2.3).

If, for the appropriate facility, control of the call is returned to the user after completion of the dialling phase, the supplier shall state which of 8.2.3.1(a), (b), (c) or (d) is being complied with, and if 8.2.3.1(d), what kind of indication is provided at the terminating station.

5.1.3.3 Determination of call status

5.1.3.3.1 The supplier shall state:

- (a) whether the PBX is capable of recognizing PSTN tones; and
- (b) whether the PBX is capable of discriminating between PSTN tones.

NOTE. See 8.1.4.1, 8.3.2, 8.3.3 and 8.3.4.

5.1.3.3.2 For a PBX capable of recognizing and discriminating between PSTN tones, the supplier shall state whether the PBX, on receipt of special information tone, complies with:

- (a) 8.3.2.2 (a); or
- (b) 8.3.2.2(b); or
- (c) 8.3.2.2(a) and (b) and, if so, how the PBX may be configured for each option.

5.1.3.3.3 The supplier shall state the specification of the answer signal for those facilities requiring the receipt of such a signal before commencement of the conversational phase (see 8.3.2.1.2(b)(1), 8.3.3.1.2(b)(1), 8.3.4(a)(2) and 8.3.4(b)(2)).

5.1.3.3.4 The supplier shall state, for the appropriate facility, whether control of an outgoing automatic PSTN call can be returned to the user after completion of the determination of call status phase.

5.1.4 Conversational phase: PSTN calls under user control

5.1.4.1 The supplier shall state whether a facility declared to affect the call element specified in clause 9 is used to provide music/speech/tones under hold conditions (see 9.3.2).

5.1.4.2 If applicable, the supplier shall state the definition of the electrical termination required in 9.4.2(a) for a facility involving a multi-party call.

5.1.4.3 Where a PBX is capable of intrusion (see 9.6.1) or loss of privacy (see 9.6.2) on PSTN calls, the supplier shall state:

- (a) which of the absolute signalling power level requirements in 9.6.1.2.3(a) or (b) is applicable; and
- (b) if 9.6.1.2.3(a) is applicable, the supplier shall state which type of termination specified in table 6 is to be used.

5.1.4.4 Where the PBX provides the facility of loudspeaking, the supplier shall state the information required in 4.1(a), (d), (e), (f) and (g) of BS 6789 : Part 2 : 1984.

5.1.5 Conversational phase: PSTN calls under automatic control. For a facility declared to affect the call element specified in clause 10, the supplier shall state whether the facility is used for the transmission and/or reception of:

- (a) speech information; or
- (b) non-speech information; or
- (c) speech and non-speech information; or
- (d) neither speech nor non-speech information.

NOTE 1. See 7.3, 8.3.2.1.2, 8.3.3.1.2 and 8.3.4.

NOTE 2. Music is considered to be non-speech.

5.2 Instructions for use

5.2.1 General. The instructions for use shall be supplied with the apparatus, and shall be written in English.

NOTE. The information may also be provided in other languages.

5.2.2 Loudspeaking. Where a socket is provided for associated handset telephony, the instructions for use shall state that a terminating station connected to that socket has to be of a type approved for use with the PBX.

NOTE. See 7.1.1(c) of BS 6450 : Part 2 : 1983.

6 General

6.1 PSTN-interacting facilities

6.1.1 The PBX shall comply with those requirements from clauses 7 to 11 corresponding to the facilities, elements and phases declared by the supplier in accordance with 5.1.1.1 with respect to the automatic application of one or more of the call attempt elements and phases.

NOTE. Selection of the appropriate requirements from clauses 7 to 11 relating to the elements and phases declared for each facility (and the selection of requirements within those specified for each element and phase) and the appropriate compliance checks on the part of the approval authority is determined by the supplier in accordance with the information required in 5.1.1 to 5.1.5 (see also clause 2).

6.1.2 The PBX shall comply with BS 6450 : Part 1 : 1983 and BS 6450 : Part 2 : 1983 for any of the call attempt elements and phases under direct user control, e.g. where control of the call is returned to the user following the completion of an automatic phase, with the exception of a facility invoked, operated or cancelled during the conversational phase of a PSTN call under the direct control of the user, for which the requirements of clause 9 of this Section of BS 6450 shall apply instead of BS 6450 : Part 1 : 1983 and BS 6450 : Part 2 : 1983.

6.2 Non PSTN-interacting facilities

The PBX shall comply with BS 6450 : Part 1 : 1983 and BS 6450 : Part 2 : 1983 in respect of the states and combinations of those PBX facilities declared by the supplier in accordance with 5.1.1.1 to be non PSTN-interacting when they are invoked, operated or cancelled.

1

Table 1. Format of statement to be provided by supplier

Table 1. Format of statement to be provided by supplier								
Facility	Element or phase for PSTN-interacting facility (see 6.1)							Non PSTN-interacting facility (see 6.2)
	Elements peculiar to incoming PSTN calls		Elements peculiar to outgoing PSTN calls					
	Answering (see clause 7)	Call clearing (see clause 11)	Selection and seizure (see 8.1)	Dialling and restoration (see 8.2)	Determination of call status (see 8.3)	Call clearing (see clause 11)	Conversational phase	
							Calls under user control (see clause 9)	Calls under automatic control (see clause 10)
(as listed by the supplier)								
NOTE 1. To complete the table, it is intended that the supplier ticks the appropriate column or columns for each facility (see 5.1.1.1).								
NOTE 2. The supplier may provide additional information to complement the entries given in the table.								
NOTE 3. The call clearing phase is indicated separately for incoming and outgoing calls in order to identify the appropriate tests for compliance with clause 11, which are similarly separated.								

Table 2. Example of statement completed by supplier, listing facilities provided by a PBX

Table 2. Example of statement completed by supplier, listing facilities provided by a PBX							
Facility	Element or phase for PSTN-interacting facility (see 6.1)						Non PSTN-interacting facility (see 6.2)
	Elements peculiar to incoming PSTN calls		Elements peculiar to outgoing PSTN calls				
	Answering (see clause 7)	Call clearing (see clause 11)	Selection and seizure (see 8.1)	Dialling and restoration (see 8.2)	Determination of call status (see 8.3)	Call clearing (see clause 11)	
Auto-calling modem	—	—	✓	✓	✓	—	—
	—	—	—	—	—	—	✓
Calendar	—	—	—	—	—	—	—
3-party call	—	—	—	—	—	✓	—
Out-of-hours answering machine	✓	✓	—	—	—	—	—
Auto-dialler	—	—	✓	✓	—	—	—

Subsection two. Particular requirements

7 Facilities incorporating automatic answering of incoming PSTN calls

NOTE 1. This element of an incoming PSTN call involves the automatic application of the on-line state in response to the call arrival indication from the PSTN.

NOTE 2. Requirements for the conversational phase are specified in clauses 9 and 10, and requirements for call clearing are specified in clause 11.

7.1 General

Prior to incoming PSTN calls being answered automatically, the PBX shall comply with the following clauses of BS 6450 : Part 1 : 1983:

9, 11, 18.1, 18.2, 18.4.

7.2 Application of on-line state

A PSTN call shall be answered by the connection of the on-line state as specified by 12.1 to 12.5 of BS 6450 : Part 1 : 1983 and 6.2.12 of BS 6450 : Part 2 : 1983.

7.3 Particular requirements for answering PSTN speech calls

NOTE 1. The requirements of 7.3 do not apply to the answering of PSTN non-speech calls (see 5.1.2.1).

NOTE 2. Where a terminating station is capable of automatically receiving and acting on speech information, it is recommended that the PSTN call should be automatically answered during a period of between 6 s to 15 s from the reception of commencement of the first period of call arrival indication.

7.3.1 If it is possible for the automatic answering facility to operate additionally to the manual answering of the PSTN call by the terminating station user (see 5.1.2.2), then, during a simultaneous connection, either:

- (a) the PBX shall comply with clause 9; or
- (b) the terminating station user shall have the ability to cancel the automatic answering facility.

Compliance for (b) shall be checked by inspection of the supplier's declaration.

NOTE 1. It is recommended that an audible signal be generated prior to the answering (either automatically or manually) of the PSTN call. This audible signal may be capable of being switched off.

NOTE 2. If the user of the terminating station answers the PSTN call prior to the automatic answer, it is recommended that:

- (a) generation of any audible signal (see note 1) should cease; and
- (b) the automatic answering facility should not operate.

NOTE 3. An answering machine is considered to be a party in a multi-party call (see 9.4 and 9.5).

7.3.2 Where the conversational phase of the PSTN call does not comprise solely a pre-stored announcement generated by the PBX (see 7.3.3) but commences with a pre-stored announcement, the PBX shall detect whether paytone is present at a level between 0 dBm and -37 dBm during the 3 s period immediately following connection of the on-line state.

NOTE 1. Paytone is described in C.2 of BS 6305 : 1982.

If paytone is not present, the PBX shall commence the announcement at the end of the 3 s period.

If paytone is present, the PBX shall delay starting the announcement until there has been a period of at least 0.25 s without paytone (measured from the cessation of the

latest period of tone), unless the paytone detected by the PBX continues for a period exceeding 12 s after the 3 s period, in which case the PBX shall commence the announcement after that 12 s period.

NOTE 2. This requirement is needed to avoid callers from pay-on-answer payphones missing all or part of the answering message while paytone is on the line.

NOTE 3. It is recommended that all pre-stored announcements should commence with the beginning of the message.

Compliance shall be checked by inspection and measurement at a sufficient number of levels between 0 dBm and -37 dBm, and with no noise present at the connection point that could impede measurement in this range.

NOTE 4. When a PBX is connected to the PSTN, network conditions may impede detection of paytone over the full range 0 dBm to -37 dBm (see C.7.4 of BS 6305 : 1982).

7.3.3 Where the conversational phase of the PSTN call comprises solely a pre-stored announcement generated by the PBX, the PBX shall repeat the announcement until the call is cleared.

Compliance shall be checked by inspection.

NOTE. It is recommended that all announcements should commence with the beginning of the message.

8 Facilities incorporating automatic outgoing PSTN call attempt elements and phases

NOTE. Requirements for the conversational phase are specified in clauses 9 and 10, and requirements for call clearing are specified in clause 11.

8.1 Selection and seizure of PSTN lines

8.1.1 *General.* The automatic selection and seizure of a PSTN line shall not commence before the end of the minimum period specified in:

- (a) 15.2.5.1(b) of BS 6450 : Part 1 : 1983, for the earth calling signalling method;
- (b) 15.3.4 of BS 6450 : Part 1 : 1983, for the loop calling, disconnect clearing signalling method;
- (c) 15.4.4 of BS 6450 : Part 1 : 1983, for the loop

8.1.2 Application of PSTN seize signal

8.1.2.1 For PBXs configured for the earth calling signalling method, the application of the PSTN seize signal and detection of the PSTN seized signal shall comply with clause 14, 15.2.1 and 15.2.2.1 of BS 6450 : Part 1 : 1983.

8.1.2.2 For PBXs configured for the loop calling, disconnect clearing signalling method, the application of the PSTN seize signal shall comply with clause 14 and 15.3.1 of BS 6450 : Part 1 : 1983.

NOTE to 8.1.2. The time interval for call-routing information commencement specified in clause 14 of BS 6450 : Part 1 : 1983 allows the user to look up information. However, the following time intervals are recommended prior to an automatic dialling phase:

- (a) where the call is under the control of the user, i.e. the user is able to hear proceed indication, it is recommended that the PBX should commence to clear down the call attempt in accordance with clause 11 if dialling has not commenced within 5 s of the receipt of a signal from the user that dialling may commence;
- (b) where the call is not under the control of the user, i.e. if dialling has not commenced within 10 s of the receipt of proceed indication, it is recommended that the PBX should commence to clear down the call attempt in accordance with clause 11 within 2 s from the end of the 10 s period.

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Subsection two

8.1.2.3 For PBXs configured for the loop calling, guarded clearing signalling method, the application of the PSTN seize signal shall comply with clause 14 and 15.4.1 of BS 6450 : Part 1 : 1983.

8.1.3 Multiple seizures and outgoing PSTN line selection. Selection and seizure of a PSTN line shall comply with 17.2 and 17.3 of BS 6450 : Part 1 : 1983.

8.1.4 Particular requirements for PSTN line seizure and selection: repeat attempts

8.1.4.1 General. Where selection and seizure of a PSTN line is a part of a repeat attempt sequence invoked by a terminating station in respect of the same PSTN directory number without direct user intervention between call attempts of that sequence, the number of repeat call attempts and the minimum durations between these repeat call attempts shall comply with the call pattern or patterns nominated by the supplier from those given in table 3 (see 5.1.3.1.1).

NOTE 1. No requirements are specified for the minimum duration between call attempts where the selection and seizure of a PSTN line is under the direct control of the user.

For call patterns A and B given in table 3, a terminating station shall not invoke a subsequent sequence of the nominated pattern to the same PSTN directory number within a period of 2 h from the commencement of the initial call attempt of the preceding sequence.

NOTE 2. No limitation is specified for the period between the invocation of one repeat attempt sequence and the invocation of a subsequent repeat attempt sequence where the invocation of the subsequent repeat attempt sequence is under the direct control of the user.

Call pattern D shall be nominated only where the PBX is capable of recognizing path engaged indication (see 5.1.3.3.1), where path engaged indication is as described in C.2 of

BS 6305 : 1982. The PBX shall not be capable of operating in accordance with call pattern D unless it is receiving and recognizing path engaged indication.

In any one repeat attempt sequence, a terminating station shall not be capable of operating in a combination of call patterns A, B and C.

If call pattern D is entered on receipt and recognition of path engaged indication via one of call patterns A, B or C:

(a) the 5 s minimum duration specified for call pattern D in table 3 shall not be used; and

(b) the terminating station shall revert to the remainder of the originating call pattern on receipt and recognition by the PBX of PSTN tones other than path engaged indication.

NOTE 3. It is recommended that, if all repeat call attempts in call patterns A or B, or a large number of repeat call attempts in call patterns C or D, are unsuccessful, a terminating station should not enter a subsequent sequence of call patterns A or B or continue indefinitely call patterns C or D, but should alert the user so that a check of the PSTN directory number may be made. Where possible, the PBX should record data on unsuccessful call attempts to assist the user in investigating their cause.

Compliance shall be checked by appropriate functional tests.

8.1.4.2 Termination of repeat attempt sequence. When a call attempt within a repeat attempt sequence is successful, that repeat attempt sequence shall terminate for the PSTN number being called, i.e. the sequence is considered to have stopped.

Table 3. Repeat attempts: number of attempts and durations between attempts

Call attempt	Minimum duration between call attempts for call pattern:			
	A	B	C	D
Initial attempt	5 s	5 s	5 s	5 s
1st repeat attempt	1 min	2 min	10 min	3 min
2nd repeat attempt	1 min	2 min	10 min	3 min
3rd repeat attempt	1 min	2 min	10 min	3 min
4th repeat attempt	End of sequence (see note 1)	2 min	10 min	3 min
5th repeat attempt		2 min	10 min	3 min
6th repeat attempt		End of sequence (see note 1)	10 min	3 min
7th repeat attempt			10 min	3 min
n th repeat attempt (see note 2)			10 min	3 min

NOTE 1. The maximum number of calls for repeat attempt call pattern A is 5, and for call pattern B is 7.

NOTE 2. No limit is specified for the value of n .

NOTE 3. The durations between call attempts given in table 3 are measured from the restoration of the PSTN interface idle state conditions to the start of the subsequent call attempt.



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8.1.5 Termination of selection and seizure phase. After completion of the selection and seizure phase, either:

- (a) the PBX shall return control of dialling to the user; or
- (b) the PBX shall comply with 8.2.

NOTE. See 5.1.3.1.2.

8.2 Dialling and restoration of transmission paths

8.2.1 Commencement of dialling

8.2.1.1 PBXs configured for the earth calling signalling method shall comply with 15.2.3 of BS 6450 : Part 1 : 1983.

8.2.1.2 PBXs configured for the loop calling, disconnect clearing signalling method shall comply with 15.3.2 of BS 6450 : Part 1 : 1983.

8.2.1.3 PBXs configured for the loop calling, guarded clearing signalling method shall comply with 15.4.2 of BS 6450 : Part 1 : 1983.

8.2.2 Dialling

8.2.2.1 Loop-disconnect dialling from the PBX to the PSTN shall comply with 13.1 and 13.2 of BS 6450 : Part 1 : 1983.

8.2.2.2 MF tone signalling from the PBX to the PSTN shall comply with 6.1.1 to 6.1.13 of BS 6450 : Part 2 : 1983.

8.2.3 Restoration

8.2.3.1 Where control of the call attempt is returned to the user after completion of the dialling phase, the PBX shall comply with one or more of the following:

- (a) 13.3 and 13.4 of BS 6450 : Part 1 : 1983; or
- (b) 6.1.14 of BS 6450 : Part 2 : 1983; or
- (c) 7.2 and 7.4 of BS 6789 : Part 2 : 1984, except that references to PSTN line lengths of 7.5 km shall be replaced by 6 km; or
- (d) an indication provided at the terminating station to indicate to the user that the dialling phase is complete.

If only option (d) is provided, it shall not be possible for the indication to be disabled by the user.

Compliance for (d) shall be checked by inspection and appropriate functional tests.

NOTE. Compliance with more than one of (a) to (d) is acceptable (see 5.1.3.2). It is recommended that where (d) is chosen, either:

- (1) the indication is, or is accompanied by, an audible indication; or
- (2) the indication is accompanied by compliance with (a) and/or (b) and/or (c).

8.2.3.2 Where control of the call attempt is not returned to the user after completion of the dialling phase, the PBX shall comply with 8.3.

8.3 Determination of call status

NOTE 1. PSTN tones relevant to this phase are described in C.2 of BS 6305 : 1982.

NOTE 2. Requirements for actions on receipt of PSTN tones apply where the PSTN tone is the first one received after completion of dialling.

NOTE 3. For the purposes of 8.3, a speech message preceded by special information tone is regarded as commencing the subsequent conversational phase with transmission of speech information.

8.3.1 General. The PBX shall comply with clause 12 of BS 6450 : Part 1 : 1983 and 6.2.12 of BS 6450 : Part 2 : 1983 throughout this call element.

8.3.2 PBXs capable of recognizing and discriminating between PSTN tones

NOTE. It is recommended that PBXs capable of recognizing and discriminating between PSTN tones are not used to make automatic calls to networks other than the PSTN as they are likely to encounter tones other than those described in C.2 of BS 6305 : 1982.

8.3.2.1 Action on receipt of awaiting answer indication

8.3.2.1.1 When awaiting answer indication is recognized, the call attempt shall be held for a period not exceeding 60 s from the commencement of awaiting answer indication whilst awaiting answer indication continues, after which period the PBX shall commence to clear down the call attempt in accordance with clause 11 within 2 s from the end of the 60 s period.

Compliance shall be checked by the methods described in A.1 and A.2.1.1.

8.3.2.1.2 If the call attempt is answered (i.e. awaiting answer indication ceases) during the 60 s period, the PBX shall comply with one of the following:

- (a) both the forward and receive transmission paths to the terminating station shall be restored within 4 s from the cessation of the last period of awaiting answer indication and control of the call shall be returned to the user of the terminating station; or
- (b) where the PBX commences the subsequent conversational phase with transmission of non-speech information (but see note 3 to 8.3), either:

- (1) the PBX shall comply with clause 10 on receipt of the answer signal specified by the supplier (e.g. data tone); or
- (2) in the absence of the answer signal specified by the supplier being received within a period of 5 s from the cessation of the last period of the awaiting answer indication, the PBX shall commence to clear down the call attempt in accordance with clause 11 within 2 s from the end of the 5 s period;

or

- (c) where the PBX commences the subsequent conversational phase with transmission of speech information, the PBX shall comply with clause 10 within a period of 4 s from the cessation of the last period of the awaiting answer indication.

Compliance shall be checked by the methods described in A.1 and A.2.1.2.

8.3.2.2 Action on receipt of special information tone.

On receipt of special information tone the PBX shall:

- (a) commence to clear down the call attempt in accordance with clause 11 within 2 s from the commencement of receipt of the special information tone; or
- (b) take no action in response to the special information tone, in which case its subsequent actions shall comply with 8.3.2.1, 8.3.2.3 or 8.3.2.4.

NOTE. See 5.1.3.3.2.

Compliance shall be checked by the methods described in A.1 and A.2.2.

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8.3.2.3 Action on receipt of tones other than awaiting answer indication and special information tone. On receipt of a PSTN tone other than awaiting answer indication and special information tone, the PBX shall commence to clear down the call attempt in accordance with clause 11 within 2 s from the commencement of receipt of the tone.

Compliance shall be checked by the methods described in A.1 and A.2.3.

8.3.2.4 Action where no PSTN tone is received. Where no PSTN tone is received within 25 s from the completion of the transmission of the last digit of call-routing information to the PSTN, the PBX shall commence to clear down the call attempt in accordance with clause 11 within 2 s from the end of the 25 s period.

Compliance shall be checked by the methods described in A.1 and A.2.4.

8.3.3 PBXs capable of recognizing but not discriminating between PSTN tones

8.3.3.1 Action on receipt of any PSTN tone

8.3.3.1.1 Where any PSTN tone is received after the completion of transmission of the last digit of call-routing information, the call attempt shall be held for a period not exceeding 40 s from the commencement of the tone whilst the tone continues, after which period the PBX shall commence to clear down the call attempt in accordance with clause 11 within 2 s.

Compliance shall be checked by the methods described in A.1 and A.3.1.1.

8.3.3.1.2 If the call attempt is answered (i.e. the PSTN tone ceases) during the 40 s period, the PBX shall comply with one of the following:

(a) both the forward and receive transmission paths to the terminating station shall be restored within 4 s from the cessation of the last period of the tone and control of the call shall be returned to the user of the terminating station; or

(b) where the PBX commences the subsequent conversational phase with transmission of non-speech information (but see note 3 to 8.3), either:

(1) the PBX shall comply with clause 10 on receipt of the answer signal specified by the supplier (e.g. data tone); or

(2) in the absence of the answer signal specified by the supplier being received within a period of 5 s from the cessation of the last period of the PSTN tone, the PBX shall commence to clear down the call attempt in accordance with clause 11 within 2 s from the end of the 5 s period;

or

(c) where the PBX commences the subsequent conversational phase with transmission of speech information, the PBX shall comply with clause 10 within a period of 4 s of the cessation of the PSTN tone.

Compliance shall be checked by the methods described in A.1 and A.3.1.2.

8.3.3.2 Action where no PSTN tone is received. In the absence of any PSTN tone being received within 25 s from the completion of the transmission of the last digit of call-

routing information to the PSTN, the PBX shall commence to clear down the call attempt in accordance with clause 11 within 2 s from the end of the 25 s period.

Compliance shall be checked by the methods described in A.1 and A.3.2.

8.3.4 PBXs incapable of recognizing PSTN tones. After completion of the dialling phase, the PBX shall comply with either (a) or (b).

(a) Where, subsequent to call answer, the PBX will commence the conversational phase with transmission of speech information, either:

(1) if the PBX does not recognize an answer within 60 s from the completion of transmission of the last digit of call-routing information, the PBX shall commence to clear down the call attempt in accordance with clause 11 within 2 s from the end of the 60 s period; or

(2) if the PBX recognizes an answer, then within 4 s either:

(i) the PBX shall comply with clause 10; or

(ii) the PBX shall restore both the forward and receive transmission paths to the terminating station and control of the call shall be returned to the user of the terminating station.

(b) Where, subsequent to call answer, the PBX will commence the conversational phase with transmission of non-speech information (but see note 3 to 8.3), either:

(1) if the PBX does not recognize an answer within 60 s from the completion of the transmission of the last digit of call-routing information, the PBX shall commence to clear down the call attempt in accordance with clause 11 within 2 s from the end of the 60 s period; or

(2) the PBX shall determine that the call has been answered by the detection of a supplier-specified answer signal (e.g. data tone), and when the PBX has determined that the call has been answered, then within 4 s either:

(i) the PBX shall comply with clause 10; or

(ii) both the forward and receive transmission paths to the terminating station shall be restored and control of the call shall be returned to the user of the terminating station.

Compliance shall be checked by the methods described in A.1 and A.4.

9 Conversational phase of PSTN calls: calls under user control

NOTE 1. Requirements for the conversational phase include not only real time conversation between users but also transfer of information between fully automatic equipments via the PSTN. In the latter case the user has no real time control over this phase of the call (see clause 10). The requirements in clause 9 apply when a facility is invoked during the conversational phase of a call under the direct control of a user.

NOTE 2. It is recommended that any pre-stored announcement is preceded by special information tone.