
British Standard

**Apparatus for connection to private circuits
run by certain public telecommunication
operators**

**Part 2. Specification for apparatus
for connection to baseband circuits**

Appareillage pour raccordement aux circuits privés exploités par certains opérateurs
de télécommunications publics

Partie 2. Appareillage pour raccordement aux circuits à bande de base — Spécifications

Geräte zum Anschluß an Nebenstellenanlagen mit eigener Vermittlungsstelle

Teil 2. Geräte zum Anschluß an niedrigstfrequente Schaltkreise

Foreword

This Part of BS 6328 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.

This series of standards will include product specifications giving particular requirements for individual items of apparatus, together with standards covering general requirements for the connection of apparatus to various public telecommunication systems (i.e. any telecommunication system designated as a public telecommunication system by an order made under Section 9 of the Telecommunications Act 1984). At the present time, these systems include the public switched telephone networks, the telex networks, the packet switching services and leased private circuits run by British Telecommunications plc and Kingston-upon-Hull City Council.

The requirements specified in the standards also apply to certain forms of 'indirect' connection of apparatus to public telecommunication systems. Because of the wording of Section 4(6) of the Telecommunications Act 1984, 'indirect' connection is referred to in these standards as connection to a relevant branch telecommunication system which is not itself a public telecommunication system, but is connected to one or more such systems.

The requirements specified in the standards are intended to ensure that apparatus complying with them, when connected to public or branch telecommunication systems, will neither adversely affect any public system nor interfere with the service available to other users of public telecommunication systems. The standards include safety requirements only for the protection of personnel operating the public telecommunication system and for the protection of users from hazards that may arise from the connection of the apparatus, directly or indirectly, to such a system.

Private circuits run by British Telecommunications plc or Kingston-upon-Hull City Council are classified into the following groups:

- (a) speechband circuits;
- (b) baseband circuits;
- (c) direct current circuits;
- (d) telegraph circuits using SCVF signalling;
- (e) wideband (FDM) circuits;
- (f) programme circuits;
- (g) digital circuits.

This Part of BS 6328 deals with baseband circuits. Other Parts of this standard cover apparatus for connection to other private circuits.

Some general information on British Telecommunications plc's private baseband circuits is given in appendix A. This information is also generally applicable to private circuits run by Kingston-upon-Hull City Council.

This standard has been presented for designation under Section 22(6) of the Telecommunications Act 1984. It is stipulated in that section of the Act that apparatus within the scope of a designated standard may only be approved for connection to a telecommunication system if it complies with that standard, subject to such exceptions as may be determined by or under the designation. While special arrangements apply to the approval of 'one-off' items of apparatus, type-approval for direct or 'indirect' connection (see the third paragraph) to public telecommunication systems run by British Telecommunications plc or Kingston-upon-Hull City Council may only be given by the Secretary of State, the British Approvals Board for Telecommunications (BABT) or British Telecommunications plc. The Director General of Telecommunications may also be authorized to grant approval, but neither he nor the Secretary of State will normally entertain applications for approval of apparatus. Such applications should be addressed in the first instance to the Director, British Approvals Board for Telecommunications, Mark House, The Green, 9–11 Queen's Road, Hersham, Walton-on-Thames, Surrey, KT12 5NA.

The designation of this standard may stipulate variations of, or additions to, the requirements of this standard and may also set conditions that have to be complied with as regards the apparatus or its connection or use. A copy of the designation will be included, when available, with all copies of this standard. Any further information on, or details of, the designation of this standard may be obtained from the Office of Telecommunications (OFTEL), Atlantic House, Holborn Viaduct, London EC1N 2HQ.

Some apparatus may incorporate facilities for which a mandatory standard is necessary, but for which no standard has yet been designated under the Telecommunications Act 1984. Other apparatus may incorporate innovative features not foreseen when the relevant standard was written and designated and for which that standard is not fully appropriate. The BABT can sometimes deal with these cases by writing a 'Special investigation test schedule' (SITS), which has the effect of stating requirements where there is no designated standard or of supplementing or varying the requirements in the application of the designated standard. Information on any relevant SITS may be obtained from the Director, BABT.

If this course is not possible, British Telecommunications plc may nevertheless type-approve apparatus for connection to its public telecommunication systems or those run by Kingston-upon-Hull City Council, and to branch systems connected to any of these public systems.

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

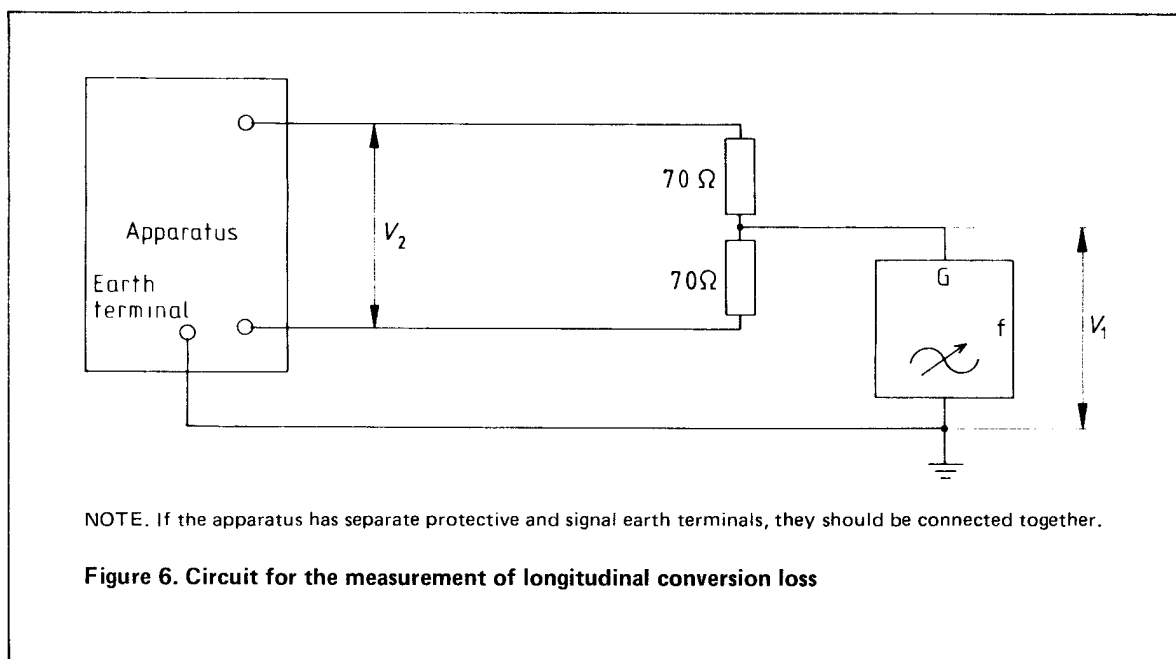
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Correction

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Figure 6. Circuit for the measurement of longitudinal conversion loss
Delete the existing figure and substitute the following figure.



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Specification

1 Scope

This Part of BS 6328 specifies requirements for apparatus in household, business or office environments, including specialized test apparatus, to be connected to baseband private circuits either directly or by means of connection to a relevant branch system for baseband circuits. This Part of BS 6328 does not apply to apparatus used to convey live speech which has been, or is to be, conveyed by means of a public switched telecommunication system except to the extent provided for in a relevant product standard.

NOTE 1. Under the 'Class Licence for the Running of Branch Telecommunication Systems', granted by the Secretary of State for Trade and Industry under Section 7 of the Telecommunications Act 1984, all branch systems, including therefore relevant branch systems for baseband circuits, have to be comprised entirely of apparatus approved for that purpose. This means that wiring or other apparatus not suitable for prior approval, has to be installed in accordance with a relevant code of practice or such other requirements as may be agreed with the operator of the baseband circuits or apply under the conditions of relevant licences or approvals.

The requirements provide for the safety of the public telecommunication systems from electrical conditions originating in the connected apparatus and vice versa. The requirements are also intended both to minimize the risk of interference with other users and to minimize the risk of malfunctioning of public telecommunication public operators' main transmission plant both from signals of excessive power level and signals that have frequency components which lie outside the normal frequency bands.

This Part of BS 6328 does not apply to apparatus approved under Section 16(2) of the British Telecommunications Act 1981 or Section 22 of the Telecommunications Act 1984 before this Part of BS 6328 is designated. Neither does it apply to apparatus connected with the consent of a public telecommunication operator to any telecommunication system run by that operator, for development purposes or when under test.

NOTE 2. Compliance with this Part of BS 6328 is intended to provide for safety and the absence of interference with networks and other users, but compliance will not necessarily ensure that the equipment is satisfactory for the user's purposes.

NOTE 3. Public telecommunication operators may offer baseband circuits under a different name that may change from time to time. Public telecommunication operators should specify which of their circuits are appropriate for the connection of apparatus complying with this Part of BS 6328 or any of the other Parts.

NOTE 4. The characteristics of British Telecommunications plc baseband circuits are given in appendix A. The characteristics of Kingston-upon-Hull baseband circuits are obtainable by writing to:

Kingston-upon-Hull Telephone Department
Telephone House
Carr Lane
Kingston-upon-Hull HU1 3RE

For the attention of:

The Technical Support Unit
Transmission and Private Circuits Section
(Reference B.12)

NOTE 5. The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this Part of BS 6328, the following definitions, together with those given in BS 4727, apply. One of the definitions given below differs from that given in BS 4727; it is marked with an asterisk.

NOTE. The relevant BS 4727 publications concerned are:

Part 1: Group 01: 1983;
Part 3: Group 01: 1971;
Part 3: Group 02: 1971.

2.1 2-wire circuit. A circuit that is presented to the apparatus in the form of two conductors.

2.2 4-wire circuit. A circuit that is presented to the apparatus in the form of four conductors. Each direction of transmission is formed by two conductors.

2.3 baseband circuit. Any baseband circuit run by British Telecommunications plc or by Kingston-upon-Hull City Council under a public telecommunication operator's licence granted under Section 7 of the Telecommunications Act 1984.

NOTE. Baseband circuits may be offered under other names.

2.4 longitudinal conversion loss. A measure of the immunity of the apparatus to interference from longitudinal voltages.

It is expressed in decibels as the ratio between a sinusoidal voltage applied between earth and the centre-point of a balanced connection to the output terminals of the apparatus and any resultant voltage appearing across those terminals.

NOTE. When the longitudinal conversion loss is large, the apparatus has a good ability to reject longitudinal signals and not reproduce them as noise.

2.5 relevant branch system for baseband circuits. A telecommunication system, other than a public telecommunication system, that:

- (a) is run under a licence granted, or having effect as if granted, under Section 7 of the Telecommunications Act 1984; and
- (b) is connected to one or more baseband circuits; and
- (c) is such that any apparatus to which this standard applies which forms part of it, or is connected via it, is so connected that no signals of any kind may be conveyed between that apparatus and a baseband circuit or vice versa except by means of other apparatus which does not materially affect the electrical conditions presented to one another by that apparatus and the baseband circuit.

NOTE 1. For the purposes of this definition, any apparatus is treated as connected to a baseband circuit if it is connected to a relevant branch system for baseband circuits which is itself connected to the baseband circuit or is regarded as being so connected by virtue of this provision.

NOTE 2. Unless provided otherwise in the licence referred to in (a), all the apparatus comprised in or connected to a relevant branch system has to be apparatus approved for that purpose.

Items such as wiring and accessories, e.g. junction boxes, that cannot be said to satisfy compatibility or safety requirements prior

to installation have to be installed safely and in such a way that the criterion of item (c) is met. An appropriate code of practice is under consideration. All other apparatus has to be type-approved in the usual way or be the subject of individual approval.

2.6 specialized test apparatus. Apparatus whose sole purpose is to determine the transmission parameters of, or monitor the performance of, private or other circuits.

NOTE. Examples of specialized test apparatus are signal generators and group delay measuring apparatus.

2.7 terminals*. Any means associated with the apparatus for making an electrical connection to any baseband circuit or relevant branch system for baseband circuits.

NOTE 1. Output or transmit terminals are those through which an electrical signal originating in the apparatus passes to a private circuit.

NOTE 2. Input or receive terminals are those through which an electrical signal from a private circuit passes into the apparatus.

2.8 transverse conversion loss. A measure of the impedance balance between the output terminals of the apparatus and earth.

It is expressed in decibels as the ratio between a sinusoidal voltage applied across the output terminals and any resultant voltage appearing between the centre-point of a balanced connection to the output terminals and earth.

NOTE. When the transverse conversion loss is large, the apparatus is said to be balanced. A balanced apparatus has a good ability to prevent crosstalk between circuits.

3 Reference level

The reference level for all power levels expressed in dBm shall be 1 mW.

NOTE. Further information on all expressions for power levels used in this Part of BS 6328 is given in CCITT Recommendation B.12 (1981).

4 General requirements

4.1 Safety requirements

Apparatus shall comply with BS 6301 : 1982.

If it is necessary to use apparatus with a separate protection barrier or barriers between the apparatus and a baseband circuit in order to satisfy the requirements of BS 6301, such a protection barrier or barriers shall comply with BS 6301. In addition the apparatus shall be marked as specified in clause 8 of this standard and shall be provided with the information specified in clause 9 of this standard. Compliance shall be checked by inspection.

4.2 General test requirements

NOTE. The tests described in this standard are type tests as defined in BS 4778 : 1979.

For the purpose of the tests specified in this standard, the apparatus shall be supplied with either:

- (a) 2.5 ± 0.25 m length of cable having solid copper wire conductors of nominal size between 0.4 mm and 0.6 mm diameter, or
- (b) 2.5 ± 0.25 m of flexible cable connected to a plug complying with BS 6312 : 1982.

One end of the cable, in option (a), or the alternate end to that with the plug in option (b), shall be connected to the apparatus. In option (a), the function and identification of the cable conductors shall be specified by the supplier. In option (b), the plug connections shall be compatible with the connection arrangements for the line jack unit shown in table 1.

Compliance shall be checked by inspection.

Apparatus approved following tests using one of these methods of connection (see items (a) and (b)) shall be deemed to be approved for use in accordance with any of the arrangements of clause 7.

4.3 Environment for tests

Unless otherwise specified in a particular test, the tests are made under normal operating conditions with:

- (a) an ambient temperature in the range 15°C to 25°C ;
- (b) a relative humidity in the range 45 % to 75 %;
- (c) an air pressure in the range 86 kPa to 106 kPa.

4.4 Test frequency range

Unless otherwise specified in this standard, the test frequency range shall be 0 Hz to 10 MHz.

4.5 Normal operating modes and non-operating states for test

Where relevant, the requirements of this Part shall be complied with in all normal operating modes of the apparatus as well as non-operating states (see 9.3(g)). Tests shall be carried out in such non-operating states or combinations of normal operating modes as are appropriate to demonstrate such compliance, taking account of the operating principles of the apparatus.

NOTE. Simulation of normal operating modes or non-operating states, for example by the use of terminating components, is acceptable.

4.6 Termination of output terminals for tests

Unless otherwise specified in a particular test, tests shall be performed with the output terminals of the apparatus terminated with a $140\ \Omega$ non-reactive resistor.

4.7 Tolerance on components for test

Unless otherwise specified in this standard, all resistors and capacitors assigned values in this standard for the purpose of testing shall be within $\pm 0.5\%$ of their nominal value.

4.8 Tolerance on test measurements of power

Unless otherwise specified in this standard, the tolerance shall be ± 0.2 dB.

4.9 Resistors for tests

All resistors in this standard, specified for use in testing shall be nominally non-reactive, such that any resistor or group of resistors shall have a reactive impedance at any frequency in the range to be measured, not exceeding 0.5 % of the nominal impedance.

5 Electrical requirements for apparatus other than specialized test apparatus

NOTE. Return loss is not specified.

5.1 Apparatus balance-about-earth

NOTE. There is no requirement for longitudinal conversion loss. It is recommended that apparatus should comply with A.3.6.

5.1.1 The transverse conversion loss shall be not less than 46 dB in the frequency range 100 Hz to 100 kHz when measured by the method described in appendix C.

Compliance shall be checked by measurement.

5.1.2 The power level of individual spectral components of any longitudinal component of the output signal shall not exceed -46 dBm for frequencies from 100 Hz to 100 kHz, and -70 dBm for frequencies from 250 kHz to 10 MHz. For frequencies between 100 kHz and 250 kHz, the power level shall not exceed a value determined by a logarithmic interpolation of the frequency between -46 dBm at 100 kHz and -70 dBm at 250 kHz (see figure 1). The power level shall be measured by the method described in appendix D. Apparatus with variable power levels shall have the one-minute mean power level set to +10 dBm, or the maximum if less than +10 dBm.

Compliance shall be checked by measurement.

NOTE. The requirement to test up to 10 MHz is under consideration.

5.2 Signal power levels

5.2.1 For apparatus with a fixed power level, the maximum one-minute mean power level of the signal shall not exceed +10 dBm.

Compliance shall be checked by measurement in accordance with items (a) and (c) of appendix E.

For apparatus with variable power levels, either:

- (a) it shall not be possible for the maximum one-minute mean power level to exceed +10 dBm; or

(b) the means of adjustment

- (1) shall not be accessible to the user of the apparatus without the use of tools; or
- (2) shall be rendered inaccessible or non-operative by physical guards which can only be released by the use of tools; or
- (3) shall be operable only after the release of software locks requiring skills and detailed knowledge which are not made available to the user of the apparatus.

Compliance shall be checked for alternative (a) by measurement of the maximum one-minute mean power level, such measurement being made in accordance with item (a) of appendix E at maximum, minimum and one other setting of a user-controlled adjustment or by inspection for alternative (b).

NOTE. Out-of-band noise is under consideration.

5.2.2 The total power level in any 3 kHz band contained wholly above 200 Hz shall not exceed the power level shown in figure 2 at the centre of that band. Apparatus with variable power levels shall have the one-minute mean power level set to +10 dBm, or the maximum if less than +10 dBm.

Compliance shall be checked by measurement in accordance with items (b) and (c) of appendix E.

5.2.3 The level of the impulsive noise appearing at the output terminals of the apparatus shall not exceed 2 V peak when measured on an a.c. coupled balanced oscilloscope with bandwidth of at least 20 MHz. Apparatus with variable power levels shall have the one-minute mean power level set to +10 dBm, or the maximum if less than +10 dBm.

Compliance shall be checked by measurement.

5.2.4 If the apparatus is intended to be powered from other apparatus via the private circuit, it shall comply with 5.2.1 to 5.2.3 when the terminals of the apparatus are connected to one pair of terminals of an artificial line made up of 75 of the 0.1 km segments shown in figure 14 of BS 6305 : 1982, when the other pair of terminals is connected to a low impedance source of e.m.f. of either 75 V or any lower voltage specified in the instructions for use (see 9.3(i)). The terminals of the apparatus shall either be connected to the measuring instrument or to the test circuit as appropriate (see figure 3). Apparatus with variable power levels shall have the one-minute mean power level set to +10 dBm, or the maximum if less than +10 dBm.

Compliance shall be checked by conducting the tests of 5.2.1 to 5.2.3 with both polarities of the e.m.f.