

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

Part 8. Specification for apparatus for connection to digital circuits with interfaces according to CCITT G-series Recommendations

Section 8.1. G.703 services at 2048 kbit/s and 8448 kbit/s

Appareils destinés à être raccordés aux liaisons privées gérées par certaines entreprises de télécommunications publiques

Partie 8. Appareils destinés à être raccordés aux liaisons numériques avec interfaces conformes aux recommandations de la Série G du CCITT

Section 8.1 G.703, fonctionnement en 2048 kbit/s et 8448 kbit/s

Anschluß von Nebenstellen an das öffentliche Fernsprechnet, die von einigen Betreibern des öffentlichen Fernsprechnetzes bedient werden

Teil 8. Geräte zum Anschluß an digitale Stromkreise mit Schnittstellen nach der CCITT-Empfehlung, Serie G

Abschnitt 8.1 G.703 Dienste bei 2048 kbit/s und 8448 kbit/s

Committees responsible for this British Standard

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British Approvals Board for Telecommunications
British Facsimile Industry Consultative Committee
British Gas plc
British Telecommunications plc
Cable and Wireless plc
Department of Trade and Industry (Telecommunications and Posts Division)
Electricity Supply Industry in England and Wales
Electronics and Business Equipment Association (EEA)
GAMBICA (BEAMA Ltd.)
HM Treasury (Central Computer and Telecommunications Agency)
Independent Broadcasting Authority
Institution of Electrical Engineers
Mercury Communications Ltd.
National Communications Union
National Computing Centre Ltd.
OFTEL (Office of Telecommunications)
Telecommunication Engineering and Manufacturing Association
Telecommunications Managers' Association
Telecommunications Users' Association (TUA)

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Foreword

This Section of BS 6328 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.

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 network, and leased private circuits run by British Telecommunications plc, Kingston Communications (Hull) plc and Mercury Communications Ltd.

The requirements specified in the standards also apply to certain forms of 'indirect' connection of apparatus to public telecommunications 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 that 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.

Private circuits run by British Telecommunications plc, Kingston Communications (Hull) plc and Mercury Communications Ltd. 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 digital circuits according to CCITT G-series Recommendations and is published in Sections dealing with the different services. BS 6328 : Part 7 deals with digital circuits with interfaces according to CCITT Recommendation X.21 bis.

Other Parts of this standard cover apparatus for connection to other private circuits.

Information on the circuits of British Telecommunications plc, Kingston Communications (Hull) plc and Mercury Communications Ltd. is available from those organizations.

The private circuits, to which apparatus complying with this Part of BS 6328 may be connected, operate at several different rates with CCITT Recommendation G.703 interfaces. For the purposes of defining technical requirements these data rates and interfaces are grouped into 'service categories'. Identical technical requirements apply to all the data rates within any one service category. British Telecommunications plc, Kingston Communications (Hull) plc and Mercury Communications Ltd. do not necessarily offer services at all the data rates within a particular service category. Users should consult these operators for appropriate details of the services offered by each.

This Section of BS 6328 is presented for designation, or other ratification for approval purposes, under the Telecommunications Act 1984. Ratification for approval purposes other than by means of a designation is under consideration.

It is stipulated in the Telecommunications Act 1984 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. Exceptions may be determined by or under the designation, which may stipulate variations of, or additions to, the requirements of the standard and may also set conditions that have to be complied with as regards the apparatus, or its connection, or its use.

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

Some apparatus may incorporate facilities for which a mandatory standard is necessary, but for which no standard has yet been designated or otherwise ratified for approval purposes 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 British Approvals Board for Telecommunications (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.

During the preparation of this Section of BS 6328, work commenced in the European Conference of Postal and Telecommunication Administrations (CEPT) at the instigation of the Commission of the European Communities, on the preparation of European Telecommunications Standards (NETs).

In any country whose telecommunications administration has signed the CEPT Memorandum of Understanding on European Telecommunications Standards, compliance of apparatus with a NET, verified by an accredited laboratory in any of those countries, will be recognized for the purpose of approval of the apparatus for connection to that country's appropriate telecommunication network. National standards or requirements that are covered by the scope of a NET will not apply after a transition period. Accordingly this standard has been drafted to avoid overlap with NETs.

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

Specification

1 Scope

This Section of BS 6328 specifies requirements for apparatus to be connected to particular private digital circuits, according to CCITT G-series Recommendations, operated by certain public telecommunication operators (PTOs), either directly or by means of a connection to relevant branch systems for particular private digital circuits.

The requirements applicable to an apparatus are dependent on the service category to which the apparatus is to be connected and on the use to which the circuit is to be put. The requirements are specified for the following two categories of use:

- (a) the private circuit being used for any application, data or telephony, other than public telephony;
- (b) for public telephony in addition to any other use.

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 particular digital circuits, have to be comprised entirely of apparatus approved for the purpose. This means that cabling 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 particular digital circuits or apply under the conditions of relevant licences or approvals.

If the apparatus is also to be connected, either directly or by a relevant branch system, to other services run by certain PTOs, for the purpose of approval for connection it will have to meet any additional requirements specified in the standard covering attachments to those services.

The requirements are intended to minimize the risk of interference with other users and to ensure the integrity of the public telecommunications networks. The requirements provide for the safety of the public telecommunication systems from electrical conditions originating in the connected apparatus.

This Section of BS 6328 applies, for the purposes of connection, to digital private circuits offering the service categories, with various data rates according to CCITT G-series Recommendations, listed in table 1 and run by the PTOs referred to in that table. The requirements and tests for conformance for each service category are specified as indicated in table 1.

BS 6328 : Section 8.2 covers the CCITT Recommendation G.703 service at 64 kbit/s.

This Section 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 comes into effect. Neither does it apply to apparatus connected to any telecommunication system for development purposes or when under test.

NOTE 2. Compliance with this Section of BS 6328 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, nor that apparatus intended to work on one PTO's service will work on another PTO's service.

NOTE 3. PTOs may offer digital circuits under different names that may change from time to time. PTOs should specify which of their circuits are appropriate for the connection of apparatus complying with this Section of BS 6328 or any of the other Parts.

Table 1. Services covered

Service category	Interface type ¹⁾	Data rate	Clause giving requirements		Appendix describing tests	PTO		
	CCITT Recommendation		Public telephony use excluded	Public telephony use permitted		BT ²⁾	Hull ³⁾	MCL ⁴⁾
1	G.703	kbit/s 2048	5.1	5.3	A	Yes	Yes	Yes
2	G.703	8448	5.2	5.4	B	Yes		Yes

¹⁾ It should not be assumed that all PTOs will choose the same set of options available within the Recommendations.

²⁾ British Telecommunications plc.

³⁾ Kingston Communications (Hull) plc.

⁴⁾ Mercury Communications Ltd.



Documents

Document Sharing Hub

NOTE 4. The characteristics of British Telecommunications plc digital circuits are obtainable by writing to:

British Telecommunications plc
Corporate Relations Department
British Telecom Centre
Newgate Street
London EC1A 7AJ

The characteristics of Kingston Communications (Hull) plc digital circuits are obtainable by writing to:

Kingston Communications (Hull) plc
Telephone House
Carr Lane
Kingston-upon-Hull
HU1 3RE

For the attention of:
The Technical Support Unit
Transmission and Private Circuits Section

The characteristics of Mercury Communications Ltd. digital circuits are obtainable by writing to:

Mercury Communications Ltd.
Ninety Long Acre
London
WC2E 9NP

For the attention of:
Sales Support Engineering

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

2 Definitions and abbreviations

2.1 Definitions

For the purposes of this Section of BS 6328 the following definitions apply.

2.1.1 apparatus terminations

Any means associated with the apparatus for making an electrical connection to a particular digital circuit or a relevant branch system for particular digital circuits.

2.1.2 BNC connector

A type of coaxial connector with bayonet latching.

2.1.3 input port

Terminations through which an electrical signal from the NTP passes to the apparatus.

2.1.4 intrinsic jitter

Output jitter level when there is no jitter present on any input signal from which the timing of the output signal may be derived.

2.1.5 jitter

The short-term non-cumulative variation of the significant instant of a digital signal from its ideal position in time.

2.1.6 jitter gain

Twenty times the logarithm of the ratio of the jitter amplitudes of the output and input signals.

2.1.7 mask

Boundaries of the waveform.

2.1.8 non-reactive

Having an impedance whose reactive component is a negligible fraction of its resistive component at every frequency within its required operational range. Unless otherwise specified, a negligible fraction is taken to mean not exceeding one one-hundredth.

2.1.9 output port

Terminations through which an electrical signal originating in the apparatus passes to the NTP.

2.1.10 particular digital circuit

A point-to-point digital telecommunication circuit run by a PTO for the transfer of digital signals at the data rate of transmission specified for the applicable service category of table 1.

2.1.11 public telephony

The conveyance of encoded live speech signals that are also conveyed by a public switched network.

2.1.12 relevant branch system for particular digital 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 particular digital circuits of the same service category of table 1; and
- (c) is such that any apparatus to which this standard applies that 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 particular digital circuit or vice versa except by means having characteristics that do not introduce degradation greater than that specified in the appropriate part of appendix C, into the signal paths between that apparatus and the particular digital circuit.

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

NOTE 2. Unless provided otherwise in the licence referred to in item (a), all the apparatus comprised in or connected to a relevant branch system has to be approved apparatus (see note 1 to clause 1).

Items such as cabling and passive accessories, e.g. junction boxes, that can not be said to satisfy compatibility or safety requirements prior to installation have to be installed in such a way that the criterion of item (c) is met. An appropriate code of practice is in preparation. All other apparatus has to be type-approved in the usual way or be the subject of individual approval.

2.1.13 return loss

The ratio of the power level of the incident signal to the power level of the reflected signal expressed in decibels.

NOTE. Return loss is an indication of the impedance matching of the apparatus to the circuit. A large value of return loss represents a good impedance match.

2.1.14 slip

The loss or gain of a digit position or a set of consecutive digit positions in a digital signal resulting from an aberration of the timing processes associated with transmission or switching of a digital signal.

2.1.15 unit interval

Time required for one element of data.

2.1.16 wander

The long-term non-cumulative variation of the significant instant of a digital signal from its ideal position in time.

2.2 Abbreviations

The following abbreviations are used in this Section of BS 6328.

2.2.1 HDB3

High density bipolar (3) coding.

2.2.2 NCOP

Network Code of Practice.

2.2.3 NTP

Network termination point.

NOTE. NTP is defined in the PTO's licence.

2.2.4 PTO

Public telecommunication operator.

2.2.5 UI

Unit interval.

3 General requirements**3.1 Safety requirements for connection to a digital interface**

Apparatus shall comply with BS 6301 : 1987, except as follows.

NOTE 1. Foreword, paragraph 2. The text 'for the protection of users from electrical hazards that may arise from the connection of the apparatus to the network' is not applicable to the following alterations.

NOTE 2. Foreword, paragraph 4. In line 2, 'all' is not applicable to the following alterations.

(a) Clause 1, paragraph 2, lines 4 to 6. The text 'and to reduce adequately the risk of conditions on the telecommunication networks creating electrical hazards for persons using the apparatus.' does not apply.

(b) Note 1 to clause 1 does not apply.

(c) Clause 4 does not apply.

(d) Subclause 5.3.3 does not apply.

(e) Subclause 6.1 does not apply.

(f) Subclause 9.2. Delete the two warnings:

'for a single port: **WARNING. CONNECT ONLY APPARATUS COMPLYING WITH BS 6301 TO THIS PORT**'.

for a group of ports: **WARNING. CONNECT ONLY APPARATUS COMPLYING WITH BS 6301 TO THESE PORTS**.'

Substitute: 'SAFETY WARNING. See instructions for use.'

(g) Subclause 10.11 does not apply;

Subclause 10.12 does not apply;

Subclause 10.13 : the references to 4.2(a) and A.3.1.1 do not apply;

Subclause 10.21 does not apply.

(h) Subclause 11.2 item (b) does not apply;

Subclause 11.2 item (c) does not apply, instead the following text applies.

'(c) If the apparatus has ports marked in accordance with 5.2, where the option of providing, within the instructions for use, an indication of ports requiring special attention has been selected, the supplier shall indicate unambiguously the port(s) to which the warning applies.

A warning shall be given that:

'The port(s) indicated by (supplier inserts means by which he has identified the port(s)) does (do) not provide isolation sufficient to satisfy the requirements of BS 6301. Apparatus connected to this (these) port(s) must have either been evaluated to relevant parts of BS 6301 or have previously been evaluated against British Telecom (Post Office) Technical Guides 2 or 26 and given permission to attach. Other usage will invalidate any approval given to this apparatus.'

Subclause 11.2 item (f) does not apply.

(i) Clause B.0 does not apply;

Subclause B.1 item (b) and subsequent references to it in appendix B do not apply; clause B.2, paragraph 3, commencing 'In, for example, ...', does not apply.

NOTE 3. BS 6301 : 1987 was written primarily for apparatus for connection to analogue networks, and the above amendments are considered necessary to adapt it for apparatus for connection to digital interfaces. Requirements for the safety of apparatus for connection to digital interfaces remain under consideration.

3.2 General test requirements

Tests for compliance with the requirements of this standard shall be type tests as defined in BS 4778.

If the apparatus can be connected to more than one particular digital circuit, the requirements of this Section of BS 6328 shall apply to each individual connection.

3.3 Environment for tests

All tests shall be performed at:

- (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.

3.4 Power supply limitations

For apparatus that is directly powered from the mains supply all tests shall be carried out within $\pm 5\%$ of the normal operating voltage. If apparatus is powered by other means and those means are not supplied as part of the apparatus, e.g. batteries, stabilized a.c. supplies and d.c., all tests shall be carried out within the power supply limit declared by the supplier. If the power supply is a.c., the tests shall be conducted within $\pm 4\%$ of the stated frequency as declared by the supplier.

3.5 Test equipment requirements

Unless otherwise specified in this Section of BS 6328 test equipment used to measure voltage shall have a minimum resistance of 5 M Ω . Current measurements shall be made using a current measuring device of resistance no greater than 1 Ω .

3.6 Tolerances on test measurements

Unless otherwise specified in this Section of BS 6328 all voltage, current and resistance measurements specified in the tests shall be made with an accuracy of $\pm 1\%$.

3.7 Tolerances on test components

Unless otherwise specified in this Section of BS 6328 test components, assigned values shall be within $\pm 1\%$ of nominal value. All resistors specified shall be non-reactive (see 2.1.8).

3.8 Test connections

Apparatus shall be submitted for approval with apparatus terminations as supplied to the user.

NOTE 1. It is recommended that apparatus submitted for approval is designed to comply with the appropriate specification of the PTO to ensure a usable connection.

NOTE 2. It is recommended that the Test House should terminate the test equipment leads in a manner compatible with the apparatus terminations.

3.9 Compliance testing

Compliance testing shall be applied at the apparatus terminations, i.e. for apparatus complying with:

- (a) 4.2, at the connectors that mate with 75 Ω BNC sockets;
- (b) 4.3 (a), at the means of connection to the apparatus;
- (c) 4.3 (b), at the means of connection to the apparatus.

3.10 Apparatus normal operating modes

Unless otherwise specified in this Section of BS 6328 all functional tests shall be performed with the apparatus in its normal operating modes as defined by the requirements of 7.1.6.

4 Connection requirements

4.1 Means of connection to particular digital circuits

The supplier shall provide means for connection of the apparatus to one of the following:

- (a) a particular digital circuit directly or a relevant branch system for particular digital circuits, in accordance with 4.2 in which case the statement made in accordance with 7.1.7 shall include that given in 7.1.7 (a);
- (b) a relevant branch system for particular digital circuits only, in accordance with 4.3, in which case the statement made in accordance with 7.1.7 shall include that given in 7.1.7 (b).

Compliance shall be checked by inspection.

4.2 Integral connection arrangement

If apparatus is provided with connecting cables that can not be detached without the use of tools, the cables provided for connection to the relevant branch system for particular digital circuits or the particular digital circuit shall terminate on connectors capable of being properly mated with 75 Ω BNC sockets. Physical dimensions required for compatibility are specified in figure 2 of BS 9210 N0001 : Part 2 : 1982.

NOTE. The two connectors on the NTP to which the apparatus has to connect will be 75 Ω BNC sockets labelled TFC IN and TFC OUT.

Each cable or associated connection shall carry means of identification such that:

- (a) the apparatus transmit cable or termination shall be identified as for the forward direction of transmission associated with the PTO's socket labelled TFC IN;
- (b) the apparatus receive cable or termination shall be identified as for the reverse direction of transmission associated with the PTO's socket labelled TFC OUT.

Compliance shall be checked by inspection.

4.3 Non-integral connection arrangement

If the apparatus is either:

- (a) not provided with connecting cables; or
- (b) provided with connecting cables that are detachable by the user without the use of tools;

no requirements are specified for the means of connection to the apparatus (i.e. the point of connection between the apparatus and the detachable cables), except that the input and output connections at the apparatus shall have means of identification in accordance with 4.2(a) and 4.2(b).