

INTERNATIONAL STANDARD

ISO
8482

First edition
1987-11-15



INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
ORGANISATION INTERNATIONALE DE NORMALISATION
МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Information processing systems — Data communication — Twisted pair multipoint interconnections

*Systèmes de traitement de l'information — Communication de données — Interconnexions
multipoints par paire torsadée*

Reference number
ISO 8482:1987 (E)



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8482 was prepared by Technical Committee ISO/TC 97, *Information processing systems*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Information processing systems — Data communication — Twisted pair multipoint interconnections

1 Scope and field of application

1.1 This International Standard specifies the physical medium characteristics for

- twisted pair multipoint interconnections in either 2-wire or 4-wire network topology in order to provide for half duplex or duplex data transmission capability, respectively;
- a binary and bidirectional signal transfer of the inter-connected endpoint systems;
- the electrical and mechanical design of the endpoint system branch cables and the common trunk cable, which may be up to 500 m in length;
- the component measurements of the integrated circuit type generators and receivers within the endpoint systems;
- the applicable data signalling rate up to 1 Mbit/s.

1.2 The defined electrical component characteristics and measurements are in close conformance with the twisted pair point-to-point characteristics given in CCITT Recommendation V.11.

1.3 This International Standard does not describe a complete physical interface and has no functional interface characteristics, such as

- number of interchange data and control circuits;
- type, size and pin allocation of the endpoint system branch cable connectors;
- data and control signal encoding;
- time relations between signals on the interchange circuits;
- mode of synchronous or asynchronous transmission;
- signal quality for transmission and reception.

1.4 This International Standard does not specify special environmental conditions, such as galvanic isolation, electromagnetic interference (EMI), radio frequency interference (RFI), and human safety. This may form the subject of a future addendum.

1.5 This International Standard is primarily a component specification. It is not sufficiently specified for satisfactory interoperations in all possible configurations. It is the responsibility of implementors to ensure that their intended configuration will allow satisfactory interoperation.

1.6 This International Standard may be combined with any appropriate set of functional and additional environmental characteristics so as to meet the practical data transmission requirements in the field of local or wide area networks.

2 Reference

CCITT Recommendation V.11, *Electrical characteristics for balanced double-current interchange circuits for general use with integrated circuit equipment in the field of data communications*.

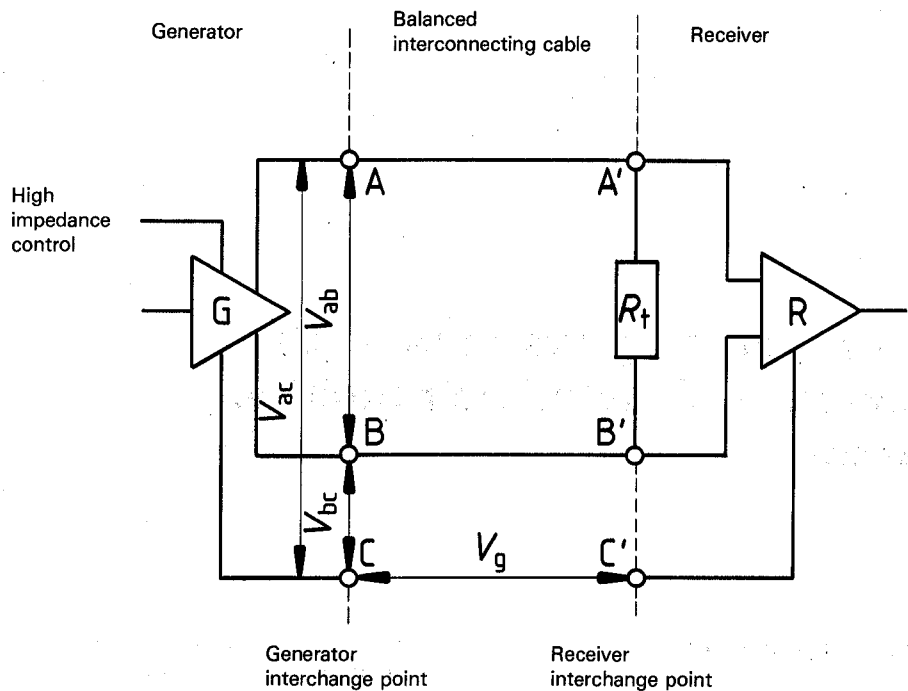
3 Definitions

The definitions of the specified electrical characteristics are given in annex B.

4 Symbolic representation of an interchange circuit (see figure 1)

The symbolic representation of an interchange circuit is in principle as given in CCITT Recommendation V.11.

However, the generator of this International Standard includes an additional control to place the device into the active state or the inactive, high impedance zero voltage state. This addition is shown in the symbolic representation reproduced in figure 1.



- V_{ab} = Generator output voltage between points A and B
- V_{ac} = Generator voltage between points A and C
- V_{bc} = Generator voltage between points B and C
- V_g = Ground potential difference
- R_t = Cable termination resistor
- A, B and A', B' = Interchange points
- C, C' = Zero volt reference interchange points (Signal ground)

NOTES

- Two interchange points are shown. The output characteristics of the generator, excluding any interconnecting cable, are defined at the "generator interchange point". The electrical characteristics to which the receiver must respond are defined without the cable termination resistor at the "receiver interchange point".
- Points C and C' may be interconnected and further connected to protective ground if required by national regulations.

Figure 1 — Symbolic representation of interchange circuit

5 Interconnection configurations (see figures 2 and 3)

In general, the interconnection configuration consist of one balanced trunk cable, which may be up to 500 m in length, and several balanced branch cables, each connecting an individual endpoint system to the common trunk cable. The branch cable connection points may be spaced as appropriate. A branch cable may be up to 5 m in length.

The balanced trunk cable shall be terminated by a termination resistor at each end. At the individual endpoint system connecting points, a branch/trunk cable connector shall be used. This facilitates the generator/receiver load measurements defined in 6.1.2. The female connector(s) at each end of the trunk cable shall accommodate the termination resistor(s).

All balanced cables may be shielded if required by local regulations. It may also be necessary to extend shielding across the branch/trunk cable connectors.

Depending on the type of multipoint operation, either a two wire or a four wire interconnection configuration may be used. Figure 2 shows a two wire multipoint configuration for half duplex data transmission, while figure 3 shows a four wire multipoint configuration for either half duplex or duplex data transmission.

6 Load on the multipoint medium

Each endpoint system represents a load to the multipoint medium. The load consists of a passive generator and/or a receiver with associated internal wiring and a balanced branch

cable as shown in figures 2 and 3. In accordance with the multi-point half duplex data transmission principle, only one generator is in the active state at a given time.

Successful operation requires specification of the load in terms of d.c. and a.c. loading. For d.c. loading, the component

specifications in clauses 8 and 9 are selected such that an active generator can drive the interconnecting trunk cable, terminated at each end with not less than $120\ \Omega$, and 32 so-called Unit Loads (ULs), representing the total load of all endpoint systems. The value of 1,0 UL is defined in 6.1.1.

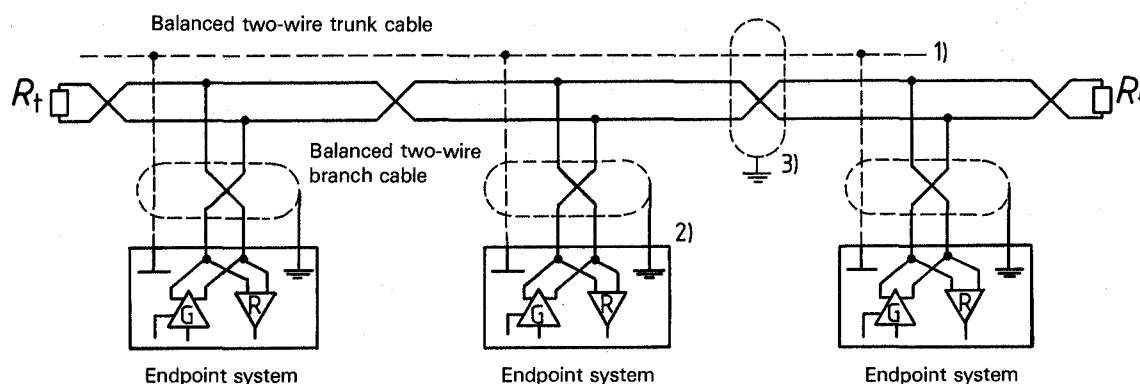
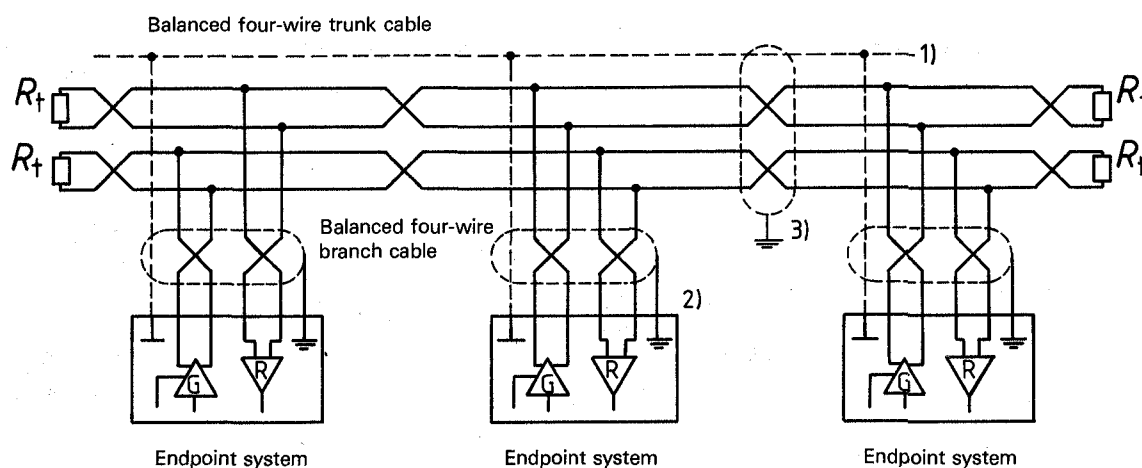


Figure 2 — Two-wire multipoint configuration



Legend: $\perp$ Signal ground $\perp$ Protective ground

NOTES

- 1) Interconnection of the endpoint system signal ground is optional and depends on local regulations.
- 2) Branch cable shield is optional and, when provided, it connects to the endpoint system protective ground, which may be further connected to the signal ground.
- 3) Trunk cable shield is optional and, when provided, it connects to a protective ground at one place. Interconnection of shield to branch cable shields may be necessary.

Figure 3 — Four-wire multipoint configuration

6.1 Specification of d.c. loading

The d.c. loading specification limits the current of an active generator to a practical value. For this reason, a hypothetical Unit Load (UL) is defined for a current/voltage measurement.

6.1.1 UL definition (see figure 4)

The value of 1,0 UL is defined by a current ranging between -0,8 mA and +1,0 mA when varying the voltage between -7 V and +12 V. The correspondent current/voltage diagram is shown in figure 4.

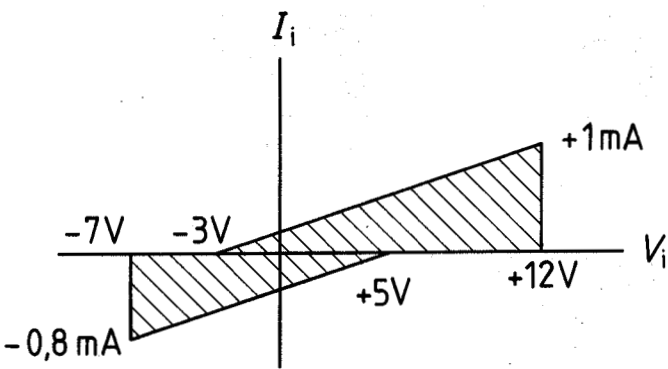


Figure 4 – Current limit of 1,0 UL

The voltage range takes into account the output and offset voltage of the generator, the common mode and internal voltage of the receiver and the power supply voltage.

6.1.2 UL determination of the endpoint systems (see figures 5 and 6)

When measuring the current/voltage characteristics at the male pin branch/trunk cable connector of one endpoint system, the measured generator shall be in the inactive state. The measurement configuration is shown in figure 5.

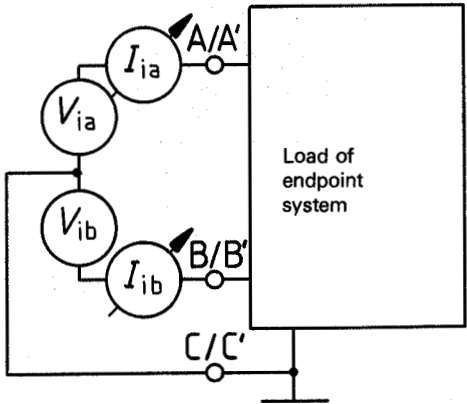


Figure 5 – Input current/voltage measurement

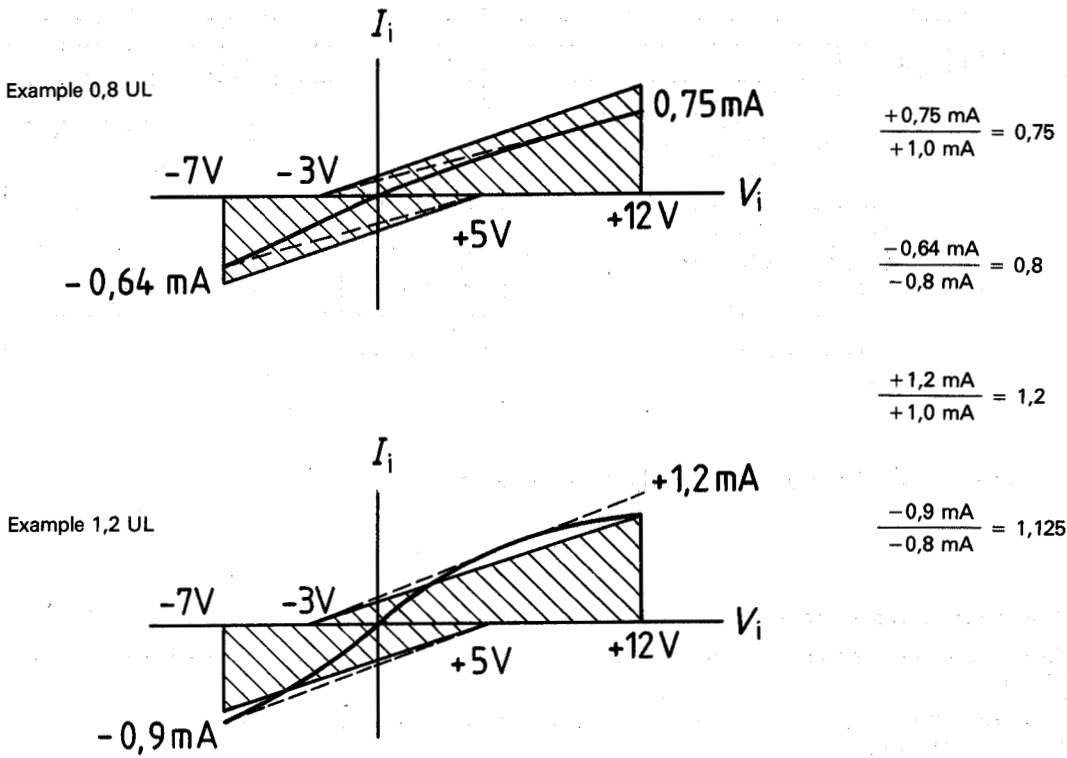


Figure 6 – UL value determination