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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Industrial asynchronous data link and physical layer —

Part 1:

Physical interconnection and two-way alternate
communication

Liaison de données industrielle, asynchrone et couche physique —

Partie 1: Liaison physique et transmission deux voies à l'alternat

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Contents

	Page
Foreword	iii
Introduction	iv
1 Scope and field of application	1
2 Normative references	1
3 Definitions and abbreviations of the transmission control characters	1
4 Data signalling rate	2
5 Physical layer (Layer 1)	2
6 Data link layer (Layer 2)	6
Annexes	
A Timer values	8
B Flow charts	9

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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 8867-1 was prepared by Technical Committee ISO/TC 184, *Industrial automation systems*.

ISO 8867 consists of the following parts, under the general title *Industrial asynchronous data link and physical layer*:

- *Part 1: Physical interconnection and two-way alternate communication*
- *Part 2: Two-way simultaneous communication*
- *Part 3: HDLC based asynchronous transmission*

Annexes A and B of this part of ISO 8867 are for information only.

Introduction

The ISO Reference model of Open Systems Interconnection (ISO 7498) gives a framework for the exchange of information among systems with a layered architecture. This concept is used in the specification of the connection between a host computer and NC machines or other equipment for workshop automation.

ISO 8867, which consists of the following three parts, provides three classes of point-to-point communications:

Part 1 — Physical interconnection and two-way alternate communication

Part 2 — Two-way simultaneous communication

Part 3 — HDLC based asynchronous transmission

Parts 1, 2 and 3 have the same physical layer.

Industrial asynchronous data link and physical layer —

Part 1:

Physical interconnection and two-way alternate communication

1 Scope

This part of ISO 8867 describes physical interfaces and protocols to link computer controlled devices in an automated workshop, such as NC machines, industrial robots, programmable controllers, measuring equipment or other equipment for workshop automation, with a host computer via point-to-point connection. The communication protocol used ensures secure data transmission. Data is transmitted bit-serially and asynchronous. This part of ISO 8867 corresponds to functions as described in layer 1 (physical) and 2 (data link) of ISO 7498.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 8867. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 8867 are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

2.1 International Standards

ISO 646 : 1983, *Information processing — ISO 7-bit coded character set for information interchange*.

ISO 1177 : 1981, *Information processing — Character structure for start/stop and synchronous character oriented transmission*.

ISO 1745 : 1975, *Information processing — Basic mode control procedures for data communication systems*.

ISO 2110 : 1980, *Data communication — 25-pin DTE/DCE interface connector and pin assignments*.

ISO 2111 : 1985, *Data communication — Basic mode control procedures — Code independent information transfer*.

ISO 2382/9 : 1984, *Data processing — Vocabulary — Part 09: Data communication*.

ISO 2628 : 1973, *Basic mode control procedures — Complements*.

ISO 4873 : 1986, *Information processing — ISO 8-bit code for information interchange — Structure and rules for implementation*.

ISO 4902 : 1980, *Data communication — 37-pin DTE/DCE interface connectors and pin assignments*.

ISO 4903 : 1980, *Data communication — 15-pin DTE/DCE interface connector and pin assignments*.

ISO 7498 : 1984, *Information processing systems — Open Systems Interconnection — Basic Reference Model*.

ISO 8481 : 1986, *Data Communication — DTE to DTE physical connection using X.24 interchange circuits with DTE provided timing*.

2.2 CCITT Recommendations

CCITT Recommendation V.11 : 1984, *Electrical characteristics for balanced double-current interchange circuits for general use with integrated circuit equipment in the field of data communications*.

CCITT Recommendation V.24 : 1984, *List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)*.

CCITT Recommendation V.28 : 1984, *Electrical characteristics for unbalanced double-current interchange of circuits*.

CCITT Recommendation X.20 : 1984, *Interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for start-stop transmission services on public data networks (PDN)*.

CCITT Recommendation X.21 : 1984, *Interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for synchronous operation on public data networks*.

CCITT Recommendation X.24 : 1984, *List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) on public data networks*.

3 Definitions and abbreviations of the transmission control characters

For the purposes of this part of ISO 8867, the definitions given in ISO 1745, ISO 2111 and ISO 2628 and the following definitions apply.

3.1 Data Link Escape (DLE): A transmission control character which forms a transmission control function with the subsequent eight-bit-character.

Only those characters listed in 6.1 can be used in the DLE sequences.

3.2 enquiry (DLE ENQ)¹⁾: A transmission control character sequence used as a request for a response from a remote station and also used to solicit a retransmission of the last reply (ACK N/DLE NAK).

3.3 block abort: The sending station may send DLE ENQ at an arbitrary point of data transmission.

Transmission will be terminated and deleted. The receiving station must reply with DLE NAK. A DLE sequence may not be interrupted.

3.4 end of transmission (DLE EOT)¹⁾: A transmission control character issued by the sending station to indicate the conclusion of the transmission or an abnormal termination.

3.5 abort: DLE EOT is used to abort a receiving station or a sending station.

When an abort occurs, both receiving stations and both sending stations are simultaneously aborted.

3.6 negative acknowledge (DLE NAK)¹⁾: A transmission control character sequence transmitted by a receiving station as a negative response to a sending station, when it is not ready to receive or when the transmitted data were incorrectly received.

3.7 end of text (DLE ETX)¹⁾: DLE ETX indicates the end of a text.

DLE ETX specifies that the subsequent characters from the block check sequence (BCS) are used for block verification. DLE ETX is always included in the block check.

3.8 start of text (DLE STX)¹⁾: The transmission control character sequence DLE STX appears immediately before the text.

DLE STX is not included in the block check. DLE STX places the data link in a condition to transmit message text.

3.9 ACK N — Alternating positive responses (ACK 0 and ACK 1) (DLE 0 and DLE 1)¹⁾: Transmission control sequences that are used as positive responses into the text transmission phase, beginning with DLE 1 and then alternating.

DLE 0 is used as the positive response in the initialization phase.

3.10 WACK — Wait after positive acknowledgement (DLE;²⁾: A transmission control sequence issued by a receiving station as an alternative affirmative response to a sending station and also as an indication that the receiving station is temporarily unable to receive data.

It is used in lieu of DLE 0 or DLE 1.

3.11 positive acknowledgement with interrupt (DLE <)¹⁾: A transmission control sequence issued by the receiving station as a positive acknowledgement with an interrupt in place of the normal positive acknowledgement DLE 0 or DLE 1.

The sending station replies with DLE EOT.

3.12 double DLE (DLE DLE)¹⁾: A transmission character sequence that indicates that a single DLE character is being transmitted as data.

4 Data signalling rate

The interface shall permit at least the data signalling rates 600/1 200/2 400/4 800/9 600 bit/s and preferably in addition 110/300/19 200 bit/s.

NOTE — 19 200 bit/s is not a CCITT recommended speed.

5 Physical layer (Layer 1)

5.1 Mechanical interface

Two alternative mechanical interfaces may be used: the 37-pole connector of ISO 4902 or the 15-pole connector of ISO 4903.

5.2 Electrical interface

The electrical interface according to CCITT Recommendation V.11 shall be used.

5.3 Interchange circuits

The interchange circuits depend on the mechanical interface used.

1) The two character control sequences DLE ENQ and DLE NAK conform to existing installed equipment, but are defined as single Transmission Control Characters in ISO 1745. DLE ETX and DLE STX are defined in ISO 2111. DLE 0 and DLE 1 are defined in an annex to ISO 1745. DLE < is defined in ISO 2628.

2) This Transmission Control Character is not defined in ISO 1745.