INTERNATIONAL STANDARD

ISO 16844-4

Third edition
2022-02

Road vehicles — Tachograph systems —

Part 4: Display unit communication interface

Véhicules routiers — Systèmes tachygraphes —

Partie 4: Interface de communication de l'unité d'affichage

Reference number
ISO 16844-4:2022(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 31, *Data communication*.

This third edition cancels and replaces the second edition (ISO 16844-4:2015), which has been technically revised.

The main changes are as follows:

— part 5 of this series (ISO 16844-5) has been removed due to its technical irrelevance,

— correction of the typos and mistakes in the text,

— adoption of the content according to the new version of the ISO guidelines,

— adoption of the content according to the new technical requirements,

— alignment of the content regarding to the referred standards.

A list of all parts in the ISO 16844 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

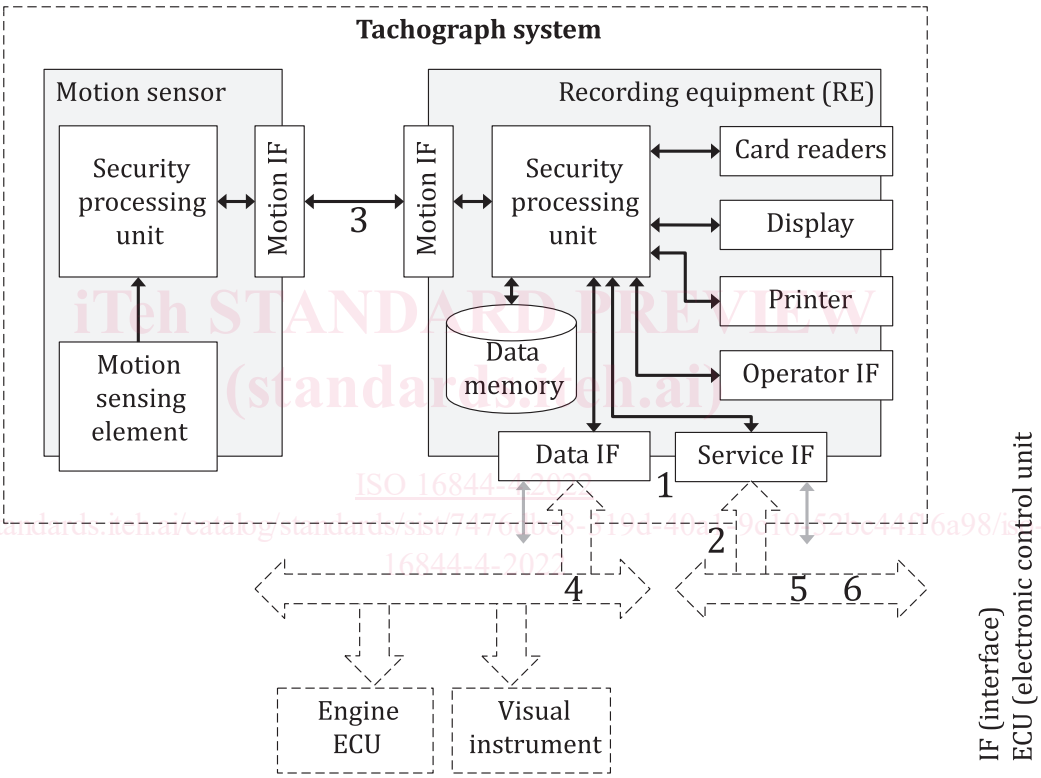
Introduction

This document supports and facilitates the communication between electronic control units (ECUs) and a digital tachograph.

The digital tachograph concept is based upon a recording equipment storing data, related to the activities of the various drivers driving the vehicle, on which it is installed.

During the normal operational status of the recording equipment, data stored in its memory are accessible to different entities (drivers, authorities, workshops, transport companies) in different ways (displayed on a screen, printed by a printing device, downloaded to an external device). Access to stored data is controlled by a smart card inserted in the tachograph.

A typical tachograph system is shown in Figure 1.



Key

1 data and service IF connector standardized in ISO 16844-1

2 electrical data and service IF requirements standardized in ISO 16844-2

3 communication interface between motion sensor and RE standardized in ISO 16844-3

4 CAN-based data IF including parameter groups standardized in this document

5 optional CAN-based service IF standardized in ISO 16844-6

6 data identifier (DID) specification for the optional service IF standardized in ISO 16844-7

Figure 1 — Typical ISO 16844-conformant tachograph system

Road vehicles — Tachograph systems —

Part 4: Display unit communication interface

1 Scope

This document specifies the CAN-based data communication between the display unit and other devices connected to an SAE J1939-based in-vehicle network. The provided requirements and recommendations cover physical, data link, network, and application layers according to the OSI reference model. Additionally, it specifies the parameter groups, which are supported.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 11898-1, *Road vehicles — Controller area network (CAN) — Part 1: Data link layer and physical signalling*

ISO 16844-1, *Road vehicles — Tachograph systems — Part 1: Recording equipment data and service connector*

ISO 16844-7, *Road vehicles — Tachograph systems — Part 7: Parameters*

SAE J1939-11, *Physical Layer-250K bits/s, Twisted Shielded Pair*

SAE J1939-14, *Physical Layer, 500 Kbps*

SAE J1939-21, *Data Link Layer*[1)]

SAE J1939-71, *Vehicle Application Layer*

SAE J1939DA, *Digital Annex*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 16844-1 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
visual instrument
speedometer and display(s) for odometer and trip meter data

1) SAE does not use the terminology of the OSI reference model: the application and transport layer is named data link layer (SAE J1939/21) and the parameter value specification is named vehicle application layer (SAE J1939/71). The parameter specifications are provided in SAE J1939DA.

4 Symbols and abbreviated terms

For the purposes of this document, the following the following symbols and abbreviated terms apply.

ACK	positive acknowledge
BAM	broadcast announce message
CAN	controller area network
DA	destination address
DP	data page
ECU	electronic control unit
EDP	extended data page
EOL	end-of-line
LSB	least significant bit/byte
MSB	most significant bit/byte
NACK	negative acknowledge
OSI	open systems interconnection
P	priority
PDU	protocol data unit
PF	PDU format
PG	parameter group
PGN	parameter group number
Phase_Seg1	phase buffer segment 1
Phase_Seg2	phase buffer segment 2
Prop_Seg	propagation time segment
PS	PDU specific
RE	recording equipment
SA	source address
Sync_Seg	synchronization segment
TP.DT	transport protocol data transfer
t_{BIT}	bit time
t_q	time quanta
t_{SEG1}	timing segment 1
t_{SEG2}	timing segment 2

t_{SJW}	synchronization jump width
VIN	vehicle identification number

5 CAN physical layer requirements

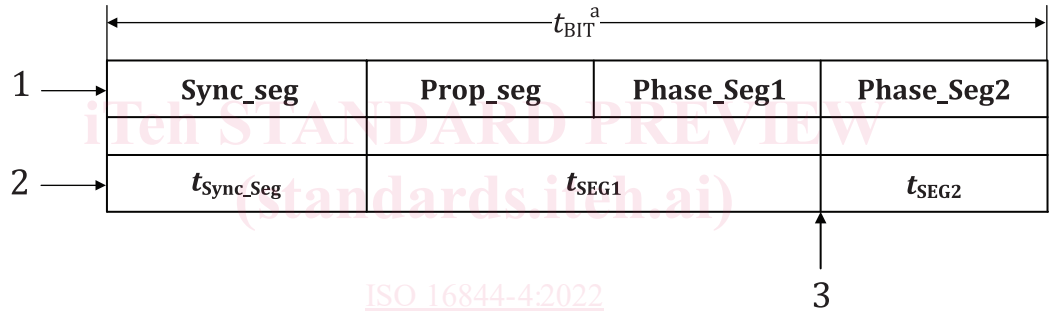
5.1 General

The CAN physical layer interface shall meet the requirements of SAE J1939-11 and SAE J1939-14 unless otherwise specified in this document. The CAN cabling and termination is not in the scope of this document.

5.2 CAN bit-timing requirements

5.2.1 General

Figure 2 shows the terms used in this document and those defined in ISO 11898-1. According to ISO 11898-1 the t_{Sync_Seg} has the length of 1 t_q.



Key

1 ISO 11898 terms
2 ISO 16844 terms
3 sample-point
a Nominal bit-time.

Figure 2 — Partition of bit time

For both specified bit-rates, 250 kbit/s and 500 kbit/s, the single sampling mode shall be used. The sample-point shall be between 80 % and 88 % of the nominal bit-time.

The following formula is used to calculate t_{SEG1}:

$$t_{SEG1} = t_{BIT} - t_q - t_{SEG2}$$

5.2.2 CAN bit-timing requirements for 250 kbit/s

Table 1 specifies the CAN bit-timing parameters for 250 kbit/s.

Table 1 — CAN bit-timing parameter values for 250 kbit/s, single data sampling mode

Parameter	Timing setting		
	Minimum	Nominal	Maximum
t_{BIT}	3 980 ns	4 000 ns	4 020 ns

Table 1 *(continued)*

Parameter	Timing setting		
	Minimum	Nominal	Maximum
t_q	—	—	400 ns

Table 2 specifies t_{SJW} and t_{SEG2} for several t_q values.

Table 2 — CAN bit-timing parameter values for 250 kbit/s for a given time quanta, t_q

t_q	t_{SJW}	t_{SEG2}
200 ns	600 ns	600 ns
250 ns	500 ns	750 ns
334 ns	668 ns	668 ns
400 ns	800 ns	800 ns

5.2.3 CAN bit-timing requirements for 500 kbit/s

Table 3 specifies the CAN bit-timing parameters for 500 kbit/s.

Table 3 — CAN bit-timing parameter values for 500 kbit/s, single data sampling mode

Parameter	Timing setting		
	Minimum	Nominal	Maximum
t_{BIT}	1 980 ns	2 000 ns	2 020 ns
t_q	—	—	200 ns

Table 4 specifies t_{SJW} and t_{SEG2} for several t_q values.

Table 4 — CAN bit-timing parameter values for 500 kbit/s for a given time quanta, t_q

t_q	t_{SJW}	t_{SEG2}
100 ns	300 ns	400 ns
125 ns	375 ns	375 ns
167 ns	334 ns	334 ns
200 ns	400 ns	400 ns

6 CAN data link layer requirements

The CAN data link layer shall comply with ISO 11898-1. Only CAN frames in classical extended frame format (CEFF) shall be transmitted. Remote frames shall not be transmitted.

7 Transport layer requirements

The transport layer shall comply with BAM as well as TP.DT as specified in SAE J1939-21.

8 Application layer

8.1 General requirements and permissions

The application layer shall comply with SAE J1939-21.

If the RE can provide the requested PG, it shall transmit it. If the RE cannot provide the requested PG, it shall respond with a NACK as specified in SAE J1939-21 in the case that it is addressed directly with addresses as specified in Clause 10. In case of a global address, the RE shall ignore the RQST parameter group.

The CAN interface of the RE shall support the following messages (for details see SAE J1939DA):

— time/date (TD);

— vehicle identification (VI);

— high-resolution vehicle distance (HRVD);

— service information (SERV);

— reset (RESET);

— tachograph (TCO1);

— driver's identification (DI);

— time/date adjust (TDA);

— electronic engine controller 1 (EEC1).

The CAN interface of the RE may support the following messages (for details see SAE J1939DA):

— cab illumination (CL);

— and those specified in the Clause 9.

Each parameter placed in the PG data field shall be implemented as specified in ISO 16844-7.

For parameters with a length of more than one byte, the LSB shall be located on the lower byte position. ASCII data shall be transmitted with the first character first. Exceptions are noted where applicable.

NOTE The PGNs in Clause 8 can also be specified in SAE J1939[4] but are added here to provide an application specific baseline. Compatibility issues are addressed in the definition.

8.2 RQST — Request message

The request message shall comply with SAE J1939-21.

8.3 ACKM — Acknowledgement message

The acknowledgement message shall be according to SAE J1939-71. Table 6 specifies the control byte values.

Table 6 — Control byte specification

Control byte	Definition	Use
0	Positive acknowledgment	— When the local time adjustment was successful (see 8.11). — When the trip distance was reset (see 8.8).
1	Negative acknowledgment	— When a non-supported PGN was requested with a specific request. — When the local time adjustment was not successful (see 8.11).
3	Cannot respond	— When the PGN is supported but RE is busy and cannot respond now. Repeat request later.