INTERNATIONAL STANDARD

**ISO 16844-2**

Second edition
2011-03-01

# Road vehicles — Tachograph systems —

## Part 2: Electrical interface with recording unit

*Véhicules routiers — Systèmes tachygraphes —*

*Partie 2: Interface électrique avec unité d'enregistrement*



Reference number
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# Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 16844-2 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

This second edition cancels and replaces the first edition (ISO 16844-2:2004), which has been technically revised.

ISO 16844 consists of the following parts, under the general title *Road vehicles — Tachograph systems*:

— *Part 1: Electrical connector*

— *Part 2: Electrical interface with recording unit*

— *Part 3: Motion sensor interface*

— *Part 4: CAN interface*

— *Part 5: Secured CAN interface*

— *Part 6: Diagnostics*

— *Part 7: Parameters*

# Introduction

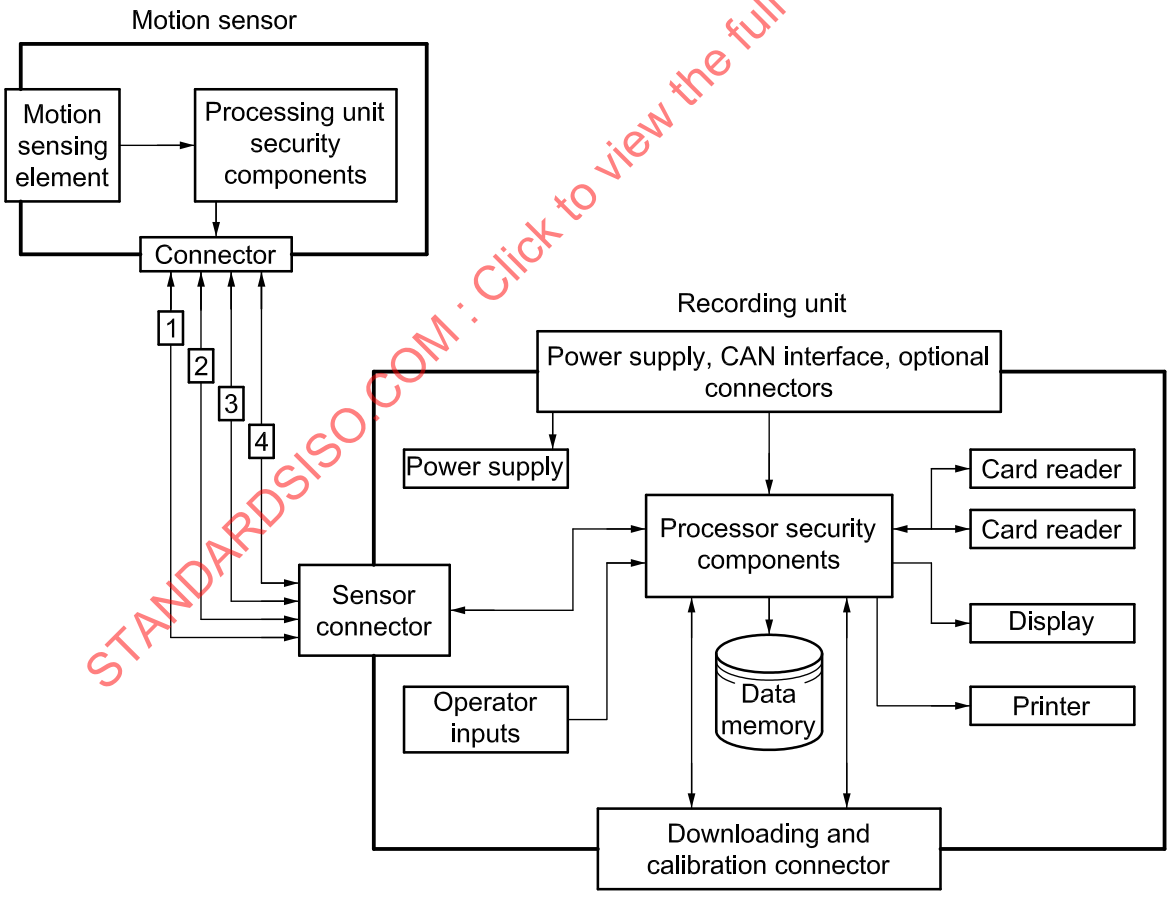
This part of ISO 16844 supports and facilitates the communication between electronic units and a tachograph. The tachograph is based upon European Council Regulation (EC) No. 561/2006 and (EEC) No. 3821/85 as last amended.

Its purpose is to ensure compatibility of tachographs from various tachograph manufacturers.

The basis of the digital tachograph concept is a Recording Unit (RU) that stores data related to the activities of the drivers of the vehicle on which it is installed. When the RU is in normal operation status, the data stored in its memory are made accessible to various entities such as drivers, authorities, workshops and transport companies in a variety of ways: they may be displayed on a screen, printed by a printing device or downloaded to an external device. Access to stored data is controlled by a smart card inserted in the tachograph.

In order to prevent manipulation of the tachograph system, the speed signal sender (motion sensor) is provided with an encrypted data link.

A typical tachograph system is shown in Figure 1.




**Key**

1 positive supply
2 battery minus
3 speed signal, real time
4 data signal in/out

**Figure 1 — Typical tachograph system**

# Road vehicles — Tachograph systems —

## Part 2:
## Electrical interface with recording unit



## 1 Scope

This part of ISO 16844 specifies the electrical connection between the recording unit, and the vehicle network and the motion sensor, in tachograph systems used in road vehicles.

## 2 Normative references

The following referenced documents are indispensable for the application 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 16844-1, *Road vehicles — Tachograph systems — Part 1: Electrical connector*

ISO 16844-4, *Road vehicles — Tachograph systems — Part 4: CAN interface*

## 3 Requirements

### 3.1 Connector

The connector used for the recording unit shall be in accordance with ISO 16844-1.

### 3.2 Electrical connection

#### 3.2.1 Standard connector — Module A

The electrical requirements of module A of the standard connector, used for power supply and CAN bus connection, shall be in accordance with Table 1.

**Table 1 — Electrical requirements — Standard connector — Module A**

| Connector contact no. and function | Parameter | Electrical requirement[a] | | | Remarks |
|---|---|---|---|---|---|
| | | Minimum | Typical | Maximum | |
| A1<br>Permanent power | Voltage and nominal fuse link current | 20 [10,8] V | | 32 [16] V<br>5 A | Referred to pin A5 |
| A2<br>Illumination | Current | — | 100 mA | — | — |
| A3<br>Ignition | Voltage and nominal fuse link current | 20 [10,8] V | | 32 [16] V<br>5 A | Referred to pin A6 |
| A4<br>CAN1_H | | Powered by ignition | | | [b] |
| A5<br>Battery minus | | | | | |
| A6<br>Ground, GND | | | | | |
| A7<br>CAN1_GND | | | | | [b] |
| A8<br>CAN1_L | | Powered by ignition | | | [b] |

[a] Values between square brackets refer to networks of 12 V nominal supply voltage.

[b] Electrical requirements shall be according to ISO 16844-4.

### 3.2.2 Standard connector — Module B

#### 3.2.2.1 Electrical requirements

The electrical requirements of module B of the standard connector, used for tachograph speed transmitter connection, shall be in accordance with Table 2.

#### 3.2.2.2 Speed pulse output and distance signal 4 pulse/m — Block diagram

The block diagram of the speed pulse output and distance signal 4 pulse/m shall be according to Figure 2.

#### 3.2.2.3 Speed pulse output — Timing diagram

The timing diagram of speed pulse output (connector contact B7) versus the motion sensor speed signal (connector contact B3) shall be according to Figure 3.

**Table 2 — Electrical requirements — Standard connector — Module B**

| Connector contact no. and function | Parameter | Electrical requirement | | Remarks |
|---|---|---|---|---|
| | | Minimum | Maximum | |
| B1<br>Positive supply[a] | Voltage | 6,5 V | 9 V | |
| B2<br>Battery minus[a] | | | | |
| B3<br>Speed signal, real time[a] | $U_{low}$ | | 1,0 V | $I = 250$ µA |
| | $U_{high}$ | 3,8 V | | $I = -150$ µA |
| B4<br>Data signal[a] | $U_{low}$ (input) | | 1,2 V | $I = -1$ mA |
| | $U_{high}$ (input) | 5,2 V | | $I = -0,5$ mA |
| | $U_{low}$ (output) | | 1,0 V | $I = 1$ mA |
| | $U_{high}$ (output) | 5,4 V | | $I = -20$ µA |
| | Transmission speed | 1 164 bit/s | 1 236 bit/s | |
| B5 | — | — | — | Not allocated |
| B6<br>Speed pulse output[b] | | | | c |
| B7<br>Speed pulse output[b]<br>see 3.2.2.2 | $U_{low}$ | | 1,5 V | $I = 1$ mA |
| | $U_{high}$ | 5,5 V | | $I = -1$ mA |
| | Frequency ($1/T$) | | < 1,6 kHz | |
| | Pulse duration (t) | 0,64 ms | 4 ms | |
| | Pulse duration | | 1 % | |
| | Accuracy | | | |
| | Tachograph constant (k) | 4 000 pulse/km | 25 000 pulse/km | |
| B8<br>Distance signal,<br>4 pulse/m (optional)[b]<br>see 3.2.2.3 | $U_{low}$ | | 1,5 V | $I = 1$ mA |
| | $U_{high}$ | 5,5 V | | $I = -1$ mA |
| | Frequency | | 244 Hz | $v = 220$ km/h |
| | Pulse duration [$t_1$] | 1,6 ms | | |

a Permanently powered: battery minus. See ISO 16844-3.

b Powered by ignition: Ground.

c The values can be different to B7.

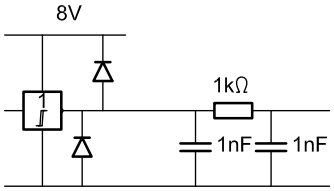
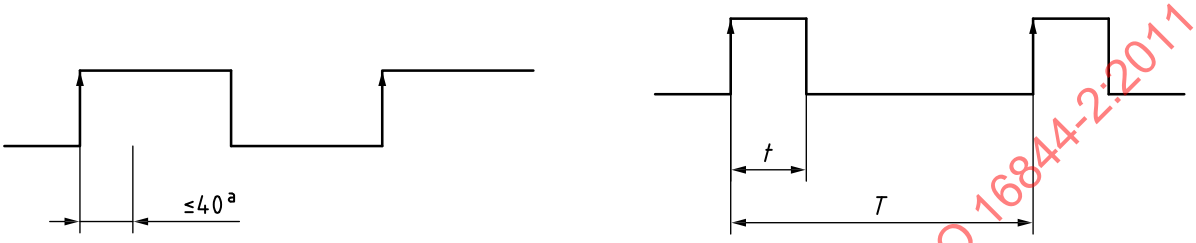



**Figure 2 — Block diagram**




**a) Motion sensor speed signal (contact B3)** **b) Speed pulse output (contact B7)**

[a] Max. 40 µs delay, ±10 µs jitter.

**Figure 3 — Speed pulse output**

Equations (1) to (4) describe the relationship between speed ($v$), tachograph constant (k) and speed pulse output ($T$ and $t$).

$$T = \frac{1}{f_{\text{motion sensor}}} \tag{1}$$

where

$T$ is the complete speed pulse duration in seconds (s);

$f$ is the speed pulse frequency in hertz (Hz).

$$t = \frac{16\,000}{\text{k}} \tag{2}$$

where

$t$ is the positive speed pulse duration in milliseconds (ms);

k is the tachograph constant in pulses per kilometre (pulse/km).

$$v = \frac{3\,600}{\text{k} \times T} \tag{3}$$

where

$v$ is the vehicle speed above ground in kilometres per hour (km/h);

k is the tachograph constant in pulses per kilometre (pulse/km);

$T$ is the complete speed pulse duration in seconds (s).

$$v = \frac{3\,600}{(16/t) \times T} = 225 \text{ km/h} \times \frac{t}{T} \quad (4)$$

where

$v$ is the vehicle speed above ground in kilometres per hour (km/h);

$T$ is the complete speed pulse duration in seconds (s);

$t$ is the positive speed pulse duration in milliseconds (ms).

#### 3.2.2.4 Distance signal 4 pulse/m — Timing diagram

The timing diagram of the distance signal 4 pulse/m (connector contact B8) shall be according to the example in Figure 4, where each positive edge represents a distance of 250 mm, as averaged over 1 km.

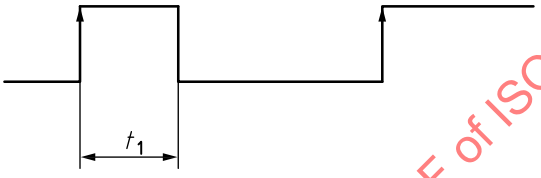



**Figure 4 — Distance signal**

### 3.2.3 Module C (optional)

The optional module C of the standard connector shall be used for engine revolution sensor connection and the second CAN interface (CAN2). The connector connections shall be in accordance with ISO 16844-1.

### 3.2.4 Module D (optional)

The optional module D of the standard connector, used for optional functions (and recommended for connector pinning when used), shall be in accordance with Table 3.

All functions of this module shall be powered over ignition switch.

**Table 3 — Remarks on the optional module D of the standard connector**

| Connector contact no. and function | Remarks |
|---|---|
| D1<br>Status input 1 | |
| D2<br>Status input 2 | |
| D3 | Not allocated |
| D4<br>General tachograph warning output | Open collector 10 mA, active pull down |
| D5 | Not allocated |
| D6<br>Speed pulse output for instrument | |
| D7<br>Data communication I/O | Speedometer interface or K-Line |
| D8 | Not allocated |