INTERNATIONAL STANDARD

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Road vehicles — Interchange of digital information on electrical connections between towing and towed vehicles —

Part 3: Application layer for equipment other than brakes and running gear

Véhicules routiers — Échange d'informations numériques sur les connexions électriques entre véhicules tracteurs et véhicules tractés —

Partie 3: Couche d'application pour les équipements autres que les équipements de freinage et les organes de roulement

Reference number
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Contents

Page

Foreword ..... **iv**

Introduction ..... **v**

1 Scope **1**

2 Normative references **1**

3 Terms and definitions **1**

4 Abbreviations **1**

5 General specifications **2**

6 Application layer **2**
6.1 Message frame format **2**
6.2 Address assignment **4**
6.3 Message routing **6**
6.4 Parameters **7**
6.5 Messages **25**

7 Conformance tests **33**
7.1 General **33**
7.2 Conformance tests for commercial vehicles **33**
7.3 Conformance tests for towed vehicles **34**

Annex A (informative) **Parameter identification form** **36**

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.

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 11992-3 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 11992-3:1998), reviewed in the light of changing legislative requirements and which has been technically revised.

ISO 11992 consists of the following parts, under the general title *Road vehicles — Interchange of digital information on electrical connections between towing and towed vehicles*:

— *Part 1: Physical layer and data-link layer*

— *Part 2: Application layer for brakes and running gear*

— *Part 3: Application layer for equipment other than brakes and running gear*

Part 4, *Diagnostics*, is under preparation.

Introduction

This part of ISO 11992 is subject to additions which will become necessary in order to keep pace with experience and technical advances. Care has been taken to ensure that these additions can be introduced in a compatible way, and care will have to be taken in the future so that such additions remain compatible with previous versions. In particular, it may become necessary to standardize new parameters and parameter groups. ISO members may request that such new parameters and parameter groups be included in future editions of ISO 11992 by completing the *Parameter identification form* in Annex A and submitting it to ISO/TC 22/SC 3.

Road vehicles — Interchange of digital information on electrical connections between towing and towed vehicles —

Part 3: Application layer for equipment other than brakes and running gear

1 Scope

This part of ISO 11992 specifies the parameters and messages for electronically controlled braking systems other than systems for braking and running gear (i.e. steering, suspension and tyres), to ensure the interchange of digital information between road vehicles with a maximum authorized total mass greater than 3 500 kg and their towed vehicles, including communication between towed vehicles.

The objective of the data structure is to optimize the use of the interface, while preserving a sufficient reserve capacity for future expansion.

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 11898:1993[1)], *Road vehicles — Interchange of digital information — Controller area network (CAN) for high-speed communication*

ISO 11992-1, *Road vehicles — Interchange of digital information on electrical connections between towing and towed vehicles — Part 1: Physical layer and data-link layer*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11992-1 apply.

4 Abbreviations

ABS Anti-lock Braking System

ASR Anti Spin Regulation (traction control system)

CAN Controller Area Network

1) Amended in 1995. Under revision.

DA Destination Address

DP Data Page

ECU Electronic Control Unit

GE Group Extension

GPM General Purpose Message

MSB Most Significant Byte

ODD Obstacle Detection Device

P Priority

PDU Protocol Data Unit

PF PDU Format

PGN Parameter Group Number

PS PDU-Specific

PTO Power Take-Off

R Reserved

SA Source Address

5 General specifications

The data link and the physical layer shall be in accordance with ISO 11992-1.

To minimize bus loading on the towing/towed vehicle interface, appropriate messages are specified. These messages may be filtered by a device (node) on each vehicle that shall also provide address assignment and electrical isolation from the in-vehicle subnetwork.

The architecture was chosen to allow any combination of new and old towing and towed vehicles. Multiple towed vehicles can be connected in any combination; the network shall be capable of addressing any towed vehicle, including dollies. The truck operator can disconnect and connect towed vehicles at any time and in any order and the network shall adjust and respond accordingly.

6 Application layer

6.1 Message frame format

6.1.1 General

The application layer provides a string of information that is assimilated into a protocol data unit (PDU). The PDU provides a framework for organizing the information which will be sent by the CAN data frame.

The 29 bit identifier shall be in accordance with ISO 11898.

The PDU shall consist of seven fields in addition to the specific CAN fields (see Figure 1).

The PDU fields are Priority (P), Reserved (R), Data Page (DP), PDU Format (PF), PDU Specific (PS) — which can be a Destination Address (DA) or a Group Extension (GE) — Source Address (SA) and data field.

	P	R	DP	PF	PS	SA		Data field
Bits	3	1	1	8	8	8		0 to 64

Figure 1 — 29-bit CAN identifier

6.1.2 Priority

The three priority bits are used to optimize message latency for transmission onto the bus only. They shall be globally masked off by the receiver (ignored). The priority of any message may be set from highest, 0 (000_2), to lowest, 7 (111_2). The default for all control oriented messages is 3 (011_2). The default of all other informational messages is 6 (110_2).

6.1.3 Reserved bit (R)

The reserved bit is reserved for future expansion. This bit shall be set to zero for transmitted messages.

6.1.4 Data page (DP)

The DP bit selects an auxiliary page of parameter group descriptions.

6.1.5 PDU format (PF)

The PF field is an eight-bit field that determines the PDU format and is one of the fields used to determine the parameter group number assigned to the data field. Parameter group numbers shall be used to identify or label a set of commands and data.

6.1.6 PDU-specific (PS)

6.1.6.1 General

The PDU-specific field is an eight-bit field and depends on the PDU format. Depending on the PDU format, it can be a destination address or a group extension. If the value of the PDU format (PF) field is below 240, then the PDU-specific field is a destination address. If the value of the PF field is 240 to 255, then the PDU-specific field contains a group extension (GE) value (see Table 1).

Table 1 — PDU-specific field

	PDU format (PF) field	PDU-specific (PS) field
PDU 1 field	0 to 239	Destination address
PDU 2 field	240 to 255	Group extension

6.1.6.2 Destination address (DA)

The DA field contains the specific address of the towing or towed vehicle to which the message is being sent. The global destination address (255) requires all devices to listen.

6.1.6.3 Group extension (GE)

The GE field, in conjunction with the four least significant bits of the PDU format field, provides for 4 096 parameter groups per data page.

When the four most significant bits of the PDU format field are set, it indicates that the PS field is a group extension.

6.1.7 Source address (SA)

The SA field is eight bits long. There shall only be one device on the network with a given SA. Therefore, the SA field assures that the CAN identifier will be unique, as required by CAN.

6.1.8 Data field

A single CAN data frame provides a maximum of eight data bytes. All eight bytes shall be used, even if fewer than eight bytes are required for expressing a given parameter group number. This provides a means to easily add parameters, while remaining compatible with previous revisions which only specify part of the data field.

6.1.9 Parameter group number (PGN)

The PGN is a 24-bit number which contains: Reserved bit, Data page bit, PDU Format field (eight bits) and PDU-specific field (eight bits) (see Table 2).

If the PF value is less than 240 ($F0_{16}$; PDU 1 type message), then the lowest byte of the PGN is set to zero.

Table 2 — Content of the parameter group number

Byte 1 (MSB)			Byte 2	Byte 3
Bits 8...3	Bit 2	Bit 1		
000000_2	Reserved	Data Page	PDU format	PDU-specific

6.1.10 PDU 1 format

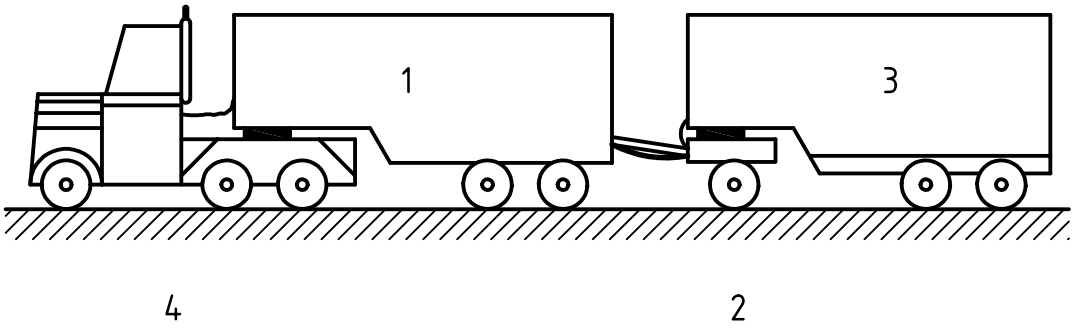
The PDU 1 format allows for applicable messages to be sent to either a specific or global destination. PDU 1 format messages are determined by the PF field. When the message's PF field value is 0 to 239, the message is a PDU 1 format.

6.1.11 PDU 2 format

The PDU 2 format may only be used to communicate global messages. PDU 2 format messages are those where the PF value is equal to 240 to 255.

6.2 Address assignment

A road train consists of one commercial vehicle and one or more towed vehicles. Dolly axles within the road train are treated as additional towed vehicles (see Figure 2).



Key

1 towed vehicle: position #1
2 towed vehicle: position #2
3 towed vehicle: position #3
4 commercial vehicle

Figure 2 — Example of possible road train configuration

The commercial vehicle is the towing vehicle of towed vehicle #1, towed vehicle #1 is the towing vehicle of towed vehicle #2 and so on.

The address of the commercial vehicle is fixed.

The respective address of a towed vehicle corresponds to its position within the road train and has to be newly assigned each time

— communication starts, or

— a towed vehicle has been connected.

For towing vehicle/towed vehicle communication, the addresses shown in Table 3 shall be used as SAs and DAs. To avoid any transmission conflict during the dynamic address assignment phase (power-up), the PDU 2 type message shall have even PS (GE) in the predecessor transmission direction and odd PS (GE) in the successor transmission direction. If the same message has to be sent in both transmission directions, two PSs (GE) are necessary.

The dynamic address assignment shall be handled by the respective towing vehicle/towed vehicle node and concerns the determination of the individual position within the road train. The global destination address shall only be used by the commercial vehicle to broadcast information to all towed vehicles simultaneously.

The dynamic address assignment is based on the transmission of the standard initialization message (see 6.4.2.4) by the respective predecessor within the road train.

Within a road train, the address assignment procedure shall be initiated by the commercial vehicle, using its standard address for the standard initialization message (see Table 3). A powered-up towed vehicle node shall use the towed vehicle #1 address as the default address for transmitting available information, until the standard initialization has been received and a valid address can be assigned.

Table 3 — Commercial vehicle/towed vehicle addresses

Name	Address	Predecessor	Successor
Commercial vehicle (position #0)	235 = EB_{16}	Not applicable	Towed vehicle position #1
Towed vehicle position #1	201 = $C9_{16}$	Commercial vehicle (position #0)	Towed vehicle position #2
Towed vehicle position #2	193 = $C1_{16}$	Towed vehicle position #1	Towed vehicle position #3
Towed vehicle position #3	185 = $B9_{16}$	Towed vehicle position #2	Towed vehicle position #4
Towed vehicle position #4	177 = $B1_{16}$	Towed vehicle position #3	Towed vehicle position #5
Towed vehicle position #5	169 = $A9_{16}$	Towed vehicle position #4	Undefined
Global destination address	255 = FF_{16}	Undefined	Undefined

This allows the towed vehicle node to communicate and to identify its presence to its predecessor immediately after power-up. This means that several towed vehicles can use the same address, until the address assignment procedure has been completed.

An assigned address based on a received predecessor address shall be valid as long as the towed vehicle is powered and no message from the predecessor with a different SA is received.

To provide address assignment for itself and for possible successors, a node shall be capable of continuously sending the standard initialization message with its own SA (see Figure 3).

Continuous sending of the initialization message is necessary to allow immediate towed vehicle address assignment any time a towed vehicle might be connected.

In addition, a towed vehicle node shall be capable of

— identifying its predecessor by the SA of the standard initialization message,

— assigning its own address based on the predecessors address, and

— identifying potential receiver(s) by the destination address and by the message type.

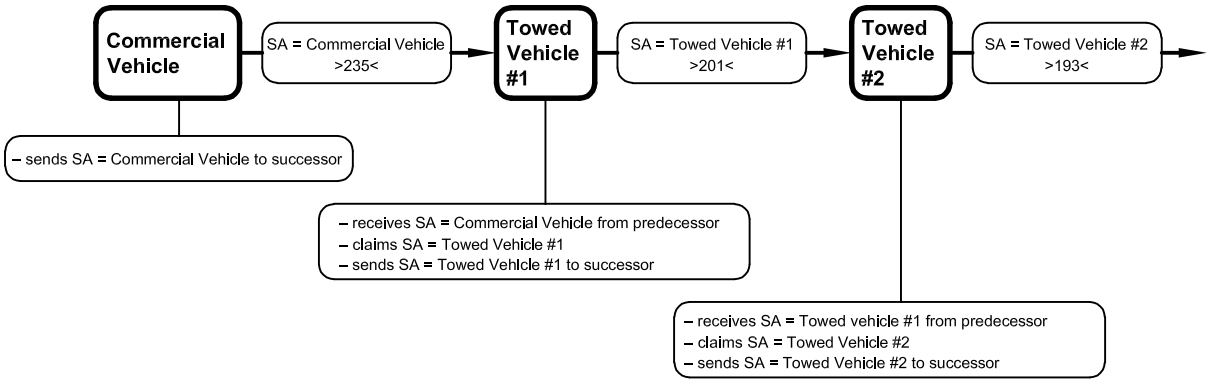


Figure 3 — Address assignment

6.3 Message routing

If there is no provision for a successor, the message routing function is not required.

To allow communication between towing and towed vehicles, a node shall be capable of

— receiving messages from its predecessor and successor within the road train,

— identifying receiver(s) by the destination address (PDU 1 type messages) or the PDU format (PDU 2 type messages),

— routing all messages from its predecessor(s) to its successor(s) within the road train by sending them with the unchanged SA and DA to its successor within a maximal delay time of t_d = 13 ms,

— routing all messages from its successor(s) to its predecessor(s) within the road train by sending them with the unchanged SA and DA to its predecessor within a maximal delay time of t_d = 13 ms.

A towed vehicle node shall not route messages to its successor or predecessor within the road train if the SA of a message received from its *predecessor* corresponds to a road train position higher or equal to its own or if the SA of a message received from its *successor* corresponds to a road train position lower or equal to its own.

Figures 4 to 9 illustrate the PDU type message sent in different directions.

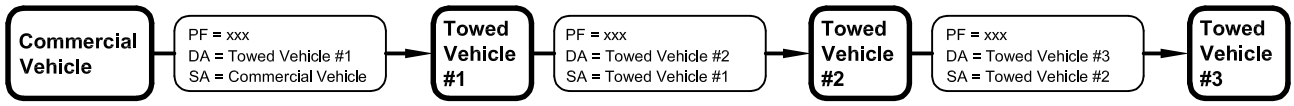


Figure 4 — Example of PDU 1 type messages from towing vehicles to succeeding towed vehicles

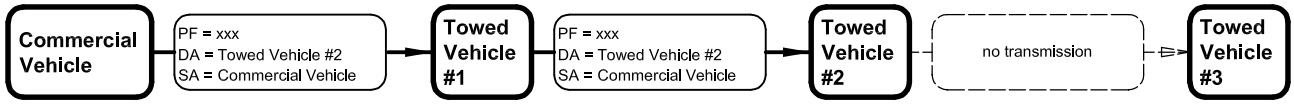


Figure 5 — Example of PDU 1 type message from commercial vehicle to towed vehicle #2

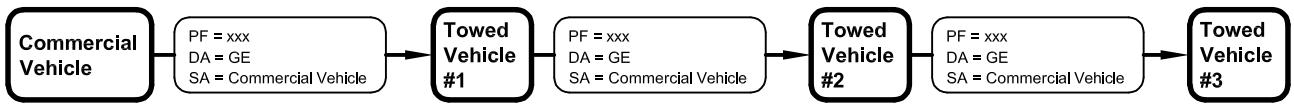


Figure 6 — Example of PDU 2 type message from commercial vehicle to all towed vehicles

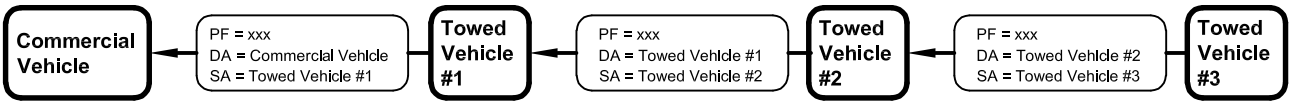


Figure 7 — Example of PDU 1 type messages from towed vehicles to preceding towing vehicles

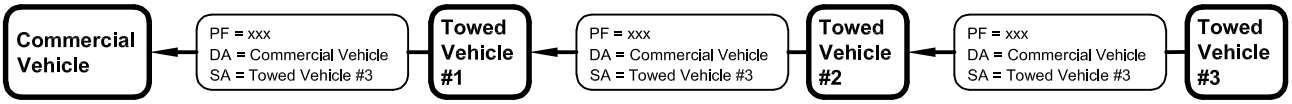


Figure 8 — Example of PDU 1 type message from towed vehicle #3 to commercial vehicle

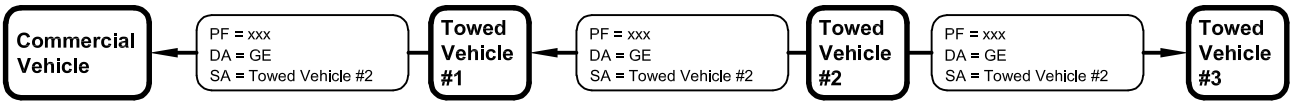


Figure 9 — Example of PDU 2 type message from towed vehicle #2

6.4 Parameters

6.4.1 Parameter ranges

Table 4 specifies the ranges used to determine the validity of transmitted signals.

Table 5 specifies the ranges used to denote the state of a discrete parameter and Table 6 the ranges used to denote the state of a control mode command.

The values in the range “error indicator” provide a means for a module to immediately indicate that valid parameter data is not currently available, owing to some type of error in the sensor, subsystem or module. Additional information about the failure may be available using diagnostic requests.

The values in the range “not available” provide a means for a module to transmit a parameter that is not available or not supported in that module. This value does not replace the “error indicator”.

The values in the range “not requested” provide a means for a device to transmit a command message and identify those parameters where no response is expected from the receiving device.

After power-on, a node shall internally set the “availability bits” of received parameters as not available and operate with default values until valid data is received. When transmitting, undefined bytes shall be sent as 255 (FF_{16}) and undefined bits shall be sent as “1”.

If a component failure prevents the transmission of valid data for a parameter, the error indicator, as specified in Tables 4 and 5, shall be used in place of that parameter data. However, if the measured or calculated data has yielded a value that is valid yet exceeds the defined parameter range, the error indicator shall not be used. The data shall be transmitted using the appropriate minimum or maximum parameter value.

A word (16 bit) parameter shall be sent least significant byte first, most significant byte second.

Table 4 — Transmitted signal ranges

Parameter	Unit	Value range	
		1 byte	2 bytes
Signal range	Dec	0 to 250	0 to 64 255
	Hex	00_{16} to FA_{16}	0000_{16} to $FAFF_{16}$
Reserved range for future indicator bits	Dec	251 to 253	64 256 to 65 023
	Hex	FB_{16} to FD_{16}	$FB00_{16}$ to $FDFF_{16}$
Error indicator	Dec	254	65 024 to 65 279
	Hex	FE_{16}	$FExx_{16}$
Not available or not requested	Dec	255	65 280 to 65 535
	Hex	FF_{16}	$FFxx_{16}$

Table 5 — Transmitted values for discrete parameters (measured)

Range name	Transmitted value
Disabled (off, passive, insufficient)	00
Enabled (on, active, sufficient)	01
Error indicator	10
Not available or not installed	11

Table 6 — Transmitted values for control requests (status)

Range name	Transmitted value
Request to disable function (turn off, etc.)	00
Request to enable function (turn on, etc.)	01
Reserved	10
Don't care/ take no action (leave function as is)	11

6.4.2 Parameter specifications

6.4.2.1 General

A description of each parameter is given in 6.4.2.2 to 6.4.2.88. The description includes data length, data type, resolution and range for reference.

The type of data shall also be identified for each parameter. Data may be either status or measured.

Status specifies a command requesting an action to be performed by the receiving node. Examples of status-type data are “requested engine torque limit” and “anti-theft device request”.

Measured data conveys the current value of a parameter as measured or observed by the transmitting node to determine the condition of the defined parameter. Examples of measured-type data are “thermal body temperature” and “engine oil pressure warning”. Note that a measured-type parameter can indicate the condition of the defined parameter, even if no measurement has been taken. For example, the measured-type parameter can indicate that a solenoid has been activated, even if no measurement has been taken to ensure the solenoid accomplished its function.

A negative-signed torque parameter indicates deceleration, whereas positive-signed torque indicates acceleration in accordance with the drive line of the vehicle.

6.4.2.2 Rear obstacle distance[2)]

The actual distance between the back of the towed vehicle and any obstacle.

Data length: 1 byte

Resolution: 2 cm/bit gain, 0 cm offset

Data range: 0 cm to 500 cm

Type: Measured

6.4.2.3 Thermal body temperature

The actual temperature in a thermal body on the towed vehicle.

Data length: 1 byte

Resolution: 1 °C/bit gain, − 125 °C offset

Data range: − 125 °C to 125 °C

Type: Measured

6.4.2.4 Obstacle detection device (ODD) request

Command signal to switch on or off the obstacle detection device (ODD).

00 — ODD off

01 — ODD on

11 — Take no action

Type: Status

6.4.2.5 Anti-theft device request

Command signal to activate the anti-theft device.

00 — Anti-theft device off

01 — Anti-theft device on

11 — Take no action

Type: Status

6.4.2.6 Obstacle detection device (ODD) active

Signal which indicates that an obstacle detection device (ODD) is active/inactive.

00 — ODD inactive

01 — ODD active

Type: Measured

2) Replaces *obstacle detection device* (ODD) of ISO 11992-3:1998.

6.4.2.7 Anti-theft device

Signal which indicates that the anti-theft device is switched on or off.

00 — Anti- theft device off

01 — Anti-theft device on

Type: Measured

6.4.2.8 Vehicle type

Information to identify a dolly axle within a road train.

00 — Tractor or trailer

01 — Dolly axle

Type: Measured

6.4.2.9 Percent clutch slip

Signal that represents the ratio of input shaft speed to current engine speed:

$$\text{Percent clutch slip} = \frac{\text{Engine speed} - \text{Input shaft speed}}{\text{Engine speed}} * 100$$

Data length: 1 byte

Resolution: 0,4 %/bit gain, 0 % offset

Data range: 0 % to 100 %

Type: Measured

6.4.2.10 Current gear

The gear currently engaged in the transmission or the last gear engaged while the transmission is in process of shifting to the new or selected gear. Transitions toward a destination gear will not be indicated. Once the selected gear has been engaged the current gear will reflect that gear.

NOTE 1 Negative values are reverse gears, positive values are forward gears, zero is neutral.

NOTE 2 Parameter specific indicator: 251 (FB_{16}) is park.

Data length: 1 byte

Resolution: 1 gear value/bit, − 125 offset

Data range: − 125 to 125

Type: Measured

6.4.2.11 Accelerator pedal low idle switch

Switch signal that indicates whether the accelerator pedal low idle switch is opened or closed.

00 — Accelerator pedal low idle switch not in low idle condition

01 — Accelerator pedal low idle switch in low idle condition

Type: Measured

6.4.2.12 Engine control allowed

Switch signal which indicates that engine control is allowed.

00 — Engine control not allowed

01 — Engine control allowed

Type: Measured

6.4.2.13 PTO control allowed

Switch signal which indicates that PTO control is allowed.

00 — PTO control not allowed

01 — PTO control allowed

Type: Measured

6.4.2.14 Vehicle speed

Speed of vehicle as calculated from tailshaft speed or taken from tachograph.

Data length: 2 bytes

Resolution: 1/256 km/h/bit gain, 0 km/h offset

Data range: 0 km/h to 250,996 km/h

Type: Measured

6.4.2.15 Engine speed

Actual engine speed.

Data length: 2 bytes

Resolution: 0,125 r/min/bit gain, 0 r/min offset

Data range: 0 r/min to 8 031,875 r/min

Type: Measured

6.4.2.16 Driver's demand engine percent torque

The torque output of the engine requested by the driver. The data is transmitted in indicated torque as a percentage of the indicated peak engine torque.

Data length: 1 byte

Resolution: 1 %/bit gain, – 125 % offset

Data range: – 125 % to 125 %

Type: Measured

6.4.2.17 Actual engine percent torque

The calculated output torque of the engine. The data is transmitted in indicated torque as a percentage of the reference engine torque.

Data length: 1 byte

Resolution: 1 %/bit gain, – 125 % offset

Data range: – 125 % to 125 %

Type: Measured

6.4.2.18 Reference engine torque

The 100 % reference value for all specified indicated engine torque parameters.

Data length: 2 bytes

Resolution: 1 N·m/bit gain, 0 N·m offset

Data range: 0 N·m to 64 255 N·m

Type: Measured

6.4.2.19 Percent load at current speed

The ratio of actual engine percent torque to maximum indicated torque available at the current engine speed, clipped to zero torque during engine braking.

Data length: 1 byte

Resolution: 1 %/bit gain, 0 % offset

Data range: 0 % to 125 %

Type: Measured

6.4.2.20 Maximum vehicle speed limit

Maximum vehicle velocity allowed.

Data length: 1 byte

Resolution: 1 km/h/bit gain, 0 km/h offset

Data range: 0 km/h to 250 km/h

Type: Measured

6.4.2.21 Engine speed upper limit

The engine speed that cannot be exceeded.

Data length: 2 bytes

Resolution: 0,125 r/min/bit gain, 0 r/min offset

Data range: 0 r/min to 8 031,875 r/min

Type: Measured

6.4.2.22 Engine speed lower limit

The minimum engine speed that the engine is allowed to reach.

Data length: 2 bytes

Resolution: 0,125 r/min/bit gain, 0 r/min offset

Data range: 0 r/min to 8 031,875 r/min

Type: Measured

6.4.2.23 Engine coolant temperature warning

Signal which indicates that the engine coolant temperature has reached its warning level.

000 — No warning

001 — Prewarning

010 — Warning

011 to 101 — Not defined

Type: Measured

6.4.2.24 Engine oil pressure warning

Signal which indicates that the engine oil pressure has reached its warning level.

00 — No warning

01 — Warning

Type: Measured

6.4.2.25 Engine oil temperature

Temperature of the engine lubricant.

Data length: 2 bytes

Resolution: 0,03 125 °C/bit gain, – 273 °C offset

Data range: – 273 °C to 1735 °C

Type: Measured

6.4.2.26 Engine coolant temperature

Temperature of the liquid in the engine cooling system.

Data length: 1 byte

Resolution: 1 °C/bit gain, − 40 °C offset

Data range: − 40 °C to 210 °C

Type: Measured

6.4.2.27 Engine oil pressure

Gauge pressure of the oil in the engine lubrication system as provided by the oil pump.

Data length: 1 byte

Resolution: 4 kPa/bit gain, 0 kPa offset

Data range: 0 kPa to 1 000 kPa

Type: Measured

6.4.2.28 Torque converter oil temperature warning

Signal which indicates that the torque converter oil temperature has reached its warning level.

000 — No warning

001 — Prewarning

010 — Warning

011 to 101 — Not defined

Type: Measured

6.4.2.29 Torque converter oil temperature

Temperature of the torque converter lubricant.

Data length: 2 bytes

Resolution: 0,03 125 °C/bit gain, − 273 °C offset

Data range: − 273 °C to 1 735 °C

Type: Measured

6.4.2.30 First clutch-dependent PTO feedback

Signal that indicates the current state of the first clutch dependent power take-off.

00 — Not engaged

01 — Engaged

Type: Measured

6.4.2.31 Second clutch-dependent PTO feedback

Signal that indicates the current state of the second clutch dependent power take-off.

00 — Not engaged

01 — Engaged

Type: Measured

6.4.2.32 Clutch-independent PTO feedback

Signal that indicates the current state of the clutch independent power take-off.

00 — Not engaged

01 — Engaged

Type: Measured

6.4.2.33 First engine-mounted PTO feedback

Signal that indicates the current state of the first engine-mounted power take-off.

00 — Limits not activated

01 — Limits activated

Type: Measured

6.4.2.34 Second engine-mounted PTO feedback

Signal that indicates the current state of the second engine-mounted power take-off.

00 — Limits not activated

01 — Limits activated

Type: Measured

6.4.2.35 Starter active

Signal that indicates whether the starter is in use.

00 — Starter not active

01 — Starter active

Type: Measured

6.4.2.36 Engine running

Signal that indicates whether the engine is running.

00 — Engine not running

01 — Engine running

Type: Measured

6.4.2.37 Engine torque mode

Signal that indicates which engine torque mode is currently generating, limiting or controlling the torque. Not all modes could be relevant for a given device.

0000 — Low idle governor/no request (default mode)

0001 — Accelerator pedal

0010 — Cruise control

0011 — PTO governor

0100 — Road speed governor

0101 — ASR control

0110 — Transmission control

0111 — ABS control

1000 — Torque limiting

1001 — High speed governor

1010 — Braking system

1011 — Remote accelerator

1100 — Not defined

1101 — Others

Type: Measured

6.4.2.38 First clutch-dependent PTO switch

Signal that indicates the state of the first clutch-dependent power take-off switch.

00 — Switched off

01 — Switched on

Type: Measured

6.4.2.39 Second clutch-dependent PTO switch

Signal that indicates the state of the second clutch-dependent power take-off switch.

00 — Switched off

01 — Switched on

Type: Measured

6.4.2.40 Clutch-independent PTO switch

Signal that indicates the state of the clutch-independent power take-off switch.

00 — Switched off

01 — Switched on

Type: Measured

6.4.2.41 First engine-mounted PTO switch

Signal that indicates the state of the first engine-mounted power take-off switch.

00 — Switched off

01 — Switched on

Type: Measured

6.4.2.42 Second engine-mounted PTO switch

Signal that indicates the state of the second engine-mounted power take-off switch.

00 — Switched off

01 — Switched on

Type: Measured

6.4.2.43 Requested percent clutch slip

Command signal to influence the clutch.

Data length: 1 byte

Resolution: 0,4 %/bit gain, 0 % offset

Data range: 0 % to 100 %

Type: Status

6.4.2.44 Starter lockout switch

Signal that indicates the state of the starter lockout switch.

00 — Switched off

01 — Switched on

Type: Measured

6.4.2.45 Engine start switch

Signal that indicates the state of the engine start switch.

00 — Switched off

01 — Switched on

Type: Measured

6.4.2.46 Engine stop switch

Signal that indicates the state of the engine stop switch.

00 — Switched off

01 — Switched on

Type: Measured

6.4.2.47 Requested engine speed upper limit

The requested engine speed which is not to be exceeded.

Data length: 2 bytes

Resolution: 0,125 r/min/bit gain, 0 r/min offset

Data range: 0 r/min to 8 031,875 r/min

Type: Status

6.4.2.48 Requested engine speed lower limit

The requested minimum engine speed that the engine is to allow.

Data length: 2 bytes

Resolution: 0,125 r/min/bit gain, 0 r/min offset

Data range: 0 r/min to 8 031,875 r/min

Type: Status

6.4.2.49 Requested engine torque limit

The requested engine torque that the engine is not allowed to exceed, indicated as a ratio of the reference engine torque.

Data length: 1 byte

Resolution: 1 %/bit gain, – 125 % offset

Data range: – 125 % to 125 %

Type: Status

6.4.2.50 Requested vehicle speed limit

The requested vehicle speed that the vehicle is not allowed to exceed.

Data length: 1 byte

Resolution: 1 km/h/bit gain, 0 km/h offset

Data range: 0 km/h to 250 km/h

Type: Status

6.4.2.51 Refuse packer step switch

Signal that indicates the state of the refuse packer step switch.

00 — Switched off

01 — Switched on

Type: Measured

6.4.2.52 Operating panel active

Signal which indicates that the operating panel is active.

00 — Operating panel not active

01 — Operating panel active

Type: Measured

6.4.2.53 Requested engine speed

The engine speed at which the engine is expected to operate.

Data length: 2 bytes

Resolution: 0,125 r/min/bit gain, 0 r/min offset

Data range: 0 r/min to 8 031,875 r/min

Type: Status

6.4.2.54 Accelerator pedal position

The ratio of actual accelerator pedal position to maximum pedal position.

Data length: 1 byte

Resolution: 0,4 %/bit gain, 0 % offset

Data range: 0 % to 100 %

Type: Measured

6.4.2.55 Ambient air temperature

Temperature of air surrounding vehicle.

Data length: 2 bytes

Resolution: 0,03 125 °C/bit gain, – 273 °C offset

Data range: – 273 °C to 1 735 °C

Type: Measured

6.4.2.56 Fuel level warning

Signal that indicates the decrease of the fuel level to a certain minimum.

00 — Fuel level warning off

01 — Fuel level warning on

Type: Measured

6.4.2.57 Trailer left-hand stop light(s)

Signal that indicates the state of the trailer left-hand stop light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.58 Trailer right-hand stop light(s)

Signal that indicates the state of the trailer right-hand stop light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.59 Trailer left-hand direction indicator light(s)

Signal that indicates the state of the trailer left-hand direction indicator light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.60 Trailer right-hand direction indicator light(s)

Signal that indicates the state of the trailer right-hand direction indicator light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.61 Trailer left-hand rear light(s)

Signal that indicates the state of the trailer left-hand rear position light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.62 Trailer right-hand rear light(s)

Signal that indicates the state of the trailer right-hand rear position light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.63 Trailer left-hand rear fog light(s)

Signal that indicates the state of the trailer left-hand rear fog light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.64 Trailer right-hand rear fog light(s)

Signal that indicates the state of the trailer right-hand rear fog light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.65 Trailer left-hand reversing light(s)

Signal that indicates the state of the trailer left-hand reversing light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.66 Trailer right-hand reversing light(s)

Signal that indicates the state of the trailer right-hand reversing light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.67 Trailer left-hand side marker light(s)

Signal that indicates the state of the trailer left-hand side marker light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.68 Trailer right-hand side marker light(s)

Signal that indicates the state of the trailer right-hand side marker light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.69 Trailer left-hand rear width indicator light(s)

Signal that indicates the state of the trailer left-hand rear width indicator light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.70 Trailer right-hand rear width indicator light(s)

Signal that indicates the state of the trailer right-hand rear width indicator light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.71 Trailer left-hand corner marker light(s)

Signal that indicates the state of the trailer upper left-hand corner marker light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.72 Trailer right-hand corner marker light(s)

Signal that indicates the state of the trailer upper right-hand corner marker light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.73 Trailer left-hand rear registration-plate light(s)

Signal that indicates the state of the trailer left-hand rear registration-plate light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.74 Trailer right-hand rear registration-plate light(s)

Signal that indicates the state of the trailer right-hand rear registration-plate light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.75 Trailer rear warning light(s)

Signal that indicates the state of the trailer rear warning light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.76 Trailer rotating identification light(s)

Signal that indicates the state of the trailer rotating identification light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.77 Trailer interior light(s)

Signal that indicates the state of the trailer interior light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.78 Trailer work light(s)

Signal that indicates the state of the trailer work light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.79 Body fluid level

The actual fluid level in a body on the towed vehicle.

Data length: 2 bytes

Resolution: 2 l/bit gain, 0 l offset

Data range: 0 l to 128 510 l

Type: Measured

6.4.2.80 Body pressure

The actual pressure in a body on the towed vehicle.

Data length: 1 byte

Resolution: 10 kPa/bit gain, 0 kPa offset

Data range: 0 kPa to 2 500 kPa

Type: Measured

6.4.2.81 Rear black-out marker select

Command signal to activate the trailer rear black-out marker light(s).

00 — Trailer rear black-out marker light(s) off

01 — Trailer rear black-out marker light(s) on

Type: Status

6.4.2.82 Convoy lamp select

Command signal to activate the trailer convoy lamp.

00 — Convoy lamp off

01 — Convoy lamp on

Type: Status

6.4.2.83 Black-out brake/stop lamp select

Command signal to activate the trailer black-out brake/stop lamp.

00 — Trailer black out brake/stop lamp off

01 — Trailer black out brake/stop lamp on

Type: Status

6.4.2.84 Trailer left hand black-out rear light(s)

This signal indicates the state of the trailer left-hand black-out rear light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.85 Trailer right-hand black-out rear light(s)

This signal indicates the state of the trailer right hand black-out rear light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.86 Trailer left-hand black-out brake/stop light(s)

This signal indicates the state of the trailer left-hand black-out brake/stop light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.87 Trailer right-hand black-out brake/stop light(s)

This signal indicates the state of the trailer right-hand black-out brake/stop light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.4.2.88 Trailer rear convoy light(s)

This signal indicates the state of the trailer rear convoy light(s).

00 — Lamp(s) not lit

01 — Lamp(s) lit

Type: Measured

6.5 Messages

6.5.1 General

The following specifies the messages for use on the electrical connection between towing and towed vehicles.

All undefined bits shall be transmitted with a value of “1”. All undefined bits shall be treated as “don’t care” (either masked out or ignored). This permits them to be defined and used in the future without causing any incompatibilities.

A message is described by a short form of the function (e.g. GPM for general purpose message) and two numbers.

The first number stands for the transmission direction:

— towing to towed vehicle, 1

— towed to towing vehicle, 2

The second is the message number.

For the dynamic address assignment, one of the PDU 1 type messages to be sent from the towing vehicle to the towed vehicle with the lowest transmission repetition time is specified as the standard initialization message. This message, as well as one of the PDU 1 type messages to be sent from a towed vehicle to its predecessor with the lowest transmission repetition time, shall be sent continuously.

For PDU 1 type and PDU 2 type messages, see Tables 7 and 8.

The messages transmitted on the data link are distinguished by their unique identifier. The transmission repetition times are specified for messages with particular identifiers.

The messages GPM 11 and GPM 21 shall be transmitted only between two coupled vehicles.

Table 7 — PDU 1 type messages

Repetition time	Data specification	P	R	DP	PF	PS	PGN	Remarks
⩾ 100 ms	General purpose #1/1 — GPM 11	6	0	0	226	DA	$00E200_{16}$	Replaces GFM 11 of ISO 11992-3:1998
⩾ 100 ms	General purpose #2/1 — GPM 21	6	0	0	225	DA	$00E100_{16}$	Replaces GFM 21 of ISO 11992-3:1998

Table 8 — PDU 2 type messages

Repetition time	Data specification	P	R	DP	PF	PS (GE)	PGN	Remarks
⩾ 500 ms	General purpose #1/2 — GPM 12	6	0	0	254	93	$00FE5D_{16}$	
⩾ 50 ms	General purpose #1/3 — GPM 13	3	0	0	254	95	$00FE5F_{16}$	
⩾ 100 ms	General purpose #1/4 — GPM 14	6	0	0	254	97	$00FE61_{16}$	
⩾ 1 000 ms	General purpose #1/5 — GPM 15	6	0	0	254	99	$00FE63_{16}$	
⩾ 1 000 ms	General purpose #1/6 — GPM 16	6	0	0	254	101	$00FE65_{16}$	
⩾ 100 ms	General purpose #2/2 — GPM 22	6	0	0	254	200	$00FEC8_{16}$	Replaces GFM 24 of ISO 11992-3:1998
⩾ 100 ms	General purpose #2/3 — EBS 23	3	0	0	254	96	$00FE60_{16}$	
⩾ 100 ms	General purpose #2/4 — GPM 24	3	0	0	254	98	$00FE62_{16}$	
⩾ 100 ms	General purpose #2/5 — GPM 25	6	0	0	254	100	$00FE64_{16}$	
⩾ 100 ms	Military application #1/1 — MAM 11	6	0	0	253	221	$00FDDD_{16}$	
⩾ 100 ms	Military application #2/1 — MAM 21	6	0	0	253	222	$00FDDE_{16}$	

6.5.2 Message specifications, transmission direction from towing to towed vehicle

6.5.2.1 Towing vehicle message, electronic brake system #1/1, GPM 11

This message is specified as the standard initialization message for address assignment of the receiving vehicle. Sending of this message is required.

Transmission repetition time: 100 ms ± 10 ms

Data length: 8 bytes

Data page: 0

PDU format: 226

PDU specific: address of the successor

Default priority: 6

Byte	1	Towing vehicle system status 1	Bits	1 to 2	Vehicle type	(see 6.4.2.8)
			Bits	3 to 8	Not defined	
Byte	2	Towing vehicle general function	Bits	1 to 2	Anti-theft device request	(see 6.4.2.5)
			Bits	3 to 4	ODD request	(see 6.4.2.4)
			Bits	5 to 8	Not defined	
Bytes	3 to 8	Not defined	Bits			

6.5.2.2 Towing vehicle message, general purpose message #1/2, GPM 12

Transmission repetition time: 500 ms ± 50 ms

Data length: 8 bytes

Data page: 0

PDU format: 254

PDU specific: 93

Default priority: 6

Bytes	1 to 2	Engine speed upper limit	(see 6.4.2.21)
Bytes	3 to 4	Engine speed lower limit	(see 6.4.2.22)
Byte	5	Maximum vehicle speed limit	(see 6.4.2.20)
Bytes	6 to 8	Not defined	

6.5.2.3 Towing vehicle message, general purpose message #1/3, GPM 13

Transmission repetition time: 50 ms ± 5 ms

Data length: 8 bytes

Data page: 0

PDU format: 254

PDU specific: 95

Default priority: 3

Byte	1	Towing vehicle general function	Bits	1 to 4	Engine torque mode	(see 6.4.2.37)
			Bits	5 to 6	Engine control allowed	(see 6.4.2.12)
			Bits	7 to 8	Engine running	(see 6.4.2.36)
Byte	2	Driver's demand engine percent torque				(see 6.4.2.16)
Byte	3	Actual engine percent torque				(see 6.4.2.17)
Bytes	4 to 5	Engine speed				(see 6.4.2.15)
Byte	6	Percent load at current speed				(see 6.4.2.19)
Bytes	7 to 8	Vehicle speed				(see 6.4.2.14)

6.5.2.4 Towing vehicle message, general purpose message #1/4, GPM 14

Transmission repetition time: 100 ms ± 10 ms

Data length: 8 bytes

Data page: 0

PDU format: 254

PDU specific: 97

Default priority: 6

Byte	1	Percent clutch slip				(see 6.4.2.9)
Byte	2	Current gear				(see 6.4.2.10)
Byte	3	Towing vehicle general function	Bits	1 to 2	First clutch-dependent PTO feedback	(see 6.4.2.30)
			Bits	3 to 4	Second clutch-dependent PTO feedback	(see 6.4.2.31)
			Bits	5 to 6	Clutch-independent PTO feedback	(see 6.4.2.32)
			Bits	7 to 8	First engine-mounted PTO feedback	(see 6.4.2.33)
Byte	4	Towing vehicle general function	Bits	1 to 2	Second engine-mounted PTO feedback	(see 6.4.2.34)
			Bits	3 to 4	PTO control allowed	(see 6.4.2.13)
			Bits	5 to 7	Torque converter oil temperature warning	(see 6.4.2.28)
			Bit	8	Not defined	
Bytes	5 to 6	Torque converter oil temperature				(see 6.4.2.29)
Byte	7	Towing vehicle general function	Bits	1 to 2	Starter active	(see 6.4.2.35)
			Bits	3 to 4	Accelerator pedal low idle switch	(see 6.4.2.11)
			Bits	5 to 8	Not defined	
Byte	8	Accelerator pedal position				(see 6.4.2.54)

6.5.2.5 Towing vehicle message, general purpose message #1/5, GPM 15

Transmission repetition time: 1 000 ms ± 100 ms

Data length: 8 bytes

Data page: 0

PDU format: 254

PDU specific: 99

Default priority: 6

Bytes	1 to 2	Engine oil temperature				(see 6.4.2.25)
Byte	3	Engine coolant temperature				(see 6.4.2.26)
Byte	4	Engine oil pressure				(see 6.4.2.27)
Byte	5	Towing vehicle general function	Bits	1 to 3	Engine coolant temperature warning	(see 6.4.2.23)
			Bits	4 to 5	Engine oil pressure warning	(see 6.4.2.24)
			Bits	6 to 7	Fuel level warning	(see 6.4.2.56)
			Bit	8	Not defined	
Bytes	6 to 7	Reference engine torque				(see 6.4.2.18)
Byte	8	Not defined				

6.5.2.6 Towing vehicle message, general purpose message #1/6, GPM 16

Transmission repetition time:	1000 ms ± 100 ms
Data length:	8 bytes
Data page:	0
PDU format:	254
PDU specific:	101
Default priority:	6

Bytes	1 to 2	Ambient air temperature	(see 6.4.2.55)
Bytes	3 to 8	Not defined	

6.5.2.7 Towing vehicle message, military applications message #1/1, MAM 11

Transmission repetition time:	100 ms ± 10 ms
Data length:	8 bytes
Data page:	0
PDU format:	253
PDU specific:	221
Default priority:	6

Byte	1	Lighting control	Bits	1 to 2	Rear black out-marker select	(see 6.4.2.81)
			Bits	3 to 4	Convoy lamp select	(see 6.4.2.82)
			Bits	5 to 6	Black out-brake/stop lamp select	(see 6.4.2.83)
			Bits	7 to 8	Not defined	
Bytes	2 to 8	Not defined				

6.5.3 Message specifications, transmission direction from towed to towing vehicle

6.5.3.1 Towed vehicle message, general purpose message #2/1, GPM 21

Sending this message is required.

Transmission repetition time:	100 ms ± 10 ms
Data length:	8 bytes
Data page:	0
PDU format:	225
PDU specific:	Address of the predecessor
Default priority:	6

Byte	1	Towed vehicle system status 1	Bits	1 to 2	Vehicle type	(see 6.4.2.8)
			Bits	3 to 8	Not defined	
Bytes	2 to 8	Not defined				

6.5.3.2 Towed vehicle message, general purpose message #2/2, GPM 22

Transmission repetition time:	100 ms ± 10 ms
Data length:	8 bytes
Data page:	0
PDU format:	254
PDU specific:	200
Default priority:	6

Byte	1	Towed vehicle system status 2	Bits	1 to 2	ODD	(see 6.4.2.6)
			Bits	3 to 4	Anti-theft device	(see 6.4.2.7)
			Bits	5 to 8	Not defined	
Byte	2	Towed vehicle system status 3			Not defined	
Byte	3	Rear obstacle distance				(see 6.4.2.2)
Byte	4	Thermal body temperature				(see 6.4.2.3)
Bytes	5 to 6	Body fluid level				(see 6.4.2.79)
Byte	7	Body pressure				(see 6.4.2.80)
Byte	8	Not defined				

6.5.3.3 Towed vehicle message, general purpose message #2/3, GPM 23

Transmission repetition time:	100 ms ± 10 ms
Data length:	8 bytes
Data page:	0

PDU format: 254

PDU specific: 96

Default priority: 3

Byte	1 to 2	Requested engine speed	(see 6.4.2.53)
Bytes	3 to 4	Requested engine speed upper limit	(see 6.4.2.47)
Bytes	5 to 6	Requested engine speed lower limit	(see 6.4.2.48)
Byte	7	Requested engine torque limit	(see 6.4.2.49)
Byte	8	Requested vehicle speed limit	(see 6.4.2.50)

6.5.3.4 Towed vehicle message, general purpose message #2/4, GPM 24

Transmission repetition time: 100 ms ± 10 ms

Data length: 8 bytes

Data page: 0

PDU format: 254

PDU specific: 98

Default priority: 3

Byte	1	Requested percent clutch slip				(see 6.4.2.43)
Byte	2	Towed vehicle general function	Bits	1 to 2	Starter lockout switch	(see 6.4.2.44)
			Bits	3 to 4	Engine start switch	(see 6.4.2.45)
			Bits	5 to 6	Engine stop switch	(see 6.4.2.46)
			Bits	7 to 8	Not defined	
Byte	3	Towed vehicle general function	Bits	1 to 2	Refuse packer step switch	(see 6.4.2.51)
			Bits	3 to 4	Operating panel active	(see 6.4.2.52)
			Bits	5 to 6	Not defined	
			Bits	7 to 8	First clutch-dependent PTO switch	(see 6.4.2.38)
Byte	4	Towed vehicle general function	Bits	1 to 2	Second clutch-dependent PTO switch	(see 6.4.2.39)
			Bits	3 to 4	Clutch-independent PTO switch	(see 6.4.2.40)
			Bits	5 to 6	First engine-mounted PTO switch	(see 6.4.2.41)
			Bits	7 to 8	Second engine-mounted PTO switch	(see 6.4.2.42)
Bytes	5 to 8	Not defined				

6.5.3.5 Towed vehicle message, general purpose message #2/5, GPM 25

Transmission repetition time: 100 ms ± 10 ms

	Data length:	8 bytes				
	Data page:	0				
	PDU format:	254				
	PDU specific:	100				
	Default priority:	6				
Byte	1	Towed vehicle lights status 1	Bits	1 to 2	Trailer left-hand stop light(s)	(see 6.4.2.57)
			Bits	3 to 4	Trailer right-hand stop light(s)	(see 6.4.2.58)
			Bits	5 to 6	Trailer left-hand direction indicator light(s)	(see 6.4.2.59)
			Bits	7 to 8	Trailer right-hand direction indicator light(s)	(see 6.4.2.60)
Byte	2	Towed vehicle lights status 2	Bits	1 to 2	Trailer left-hand rear light(s)	(see 6.4.2.61)
			Bits	3 to 4	Trailer right-hand rear light(s)	(see 6.4.2.62)
			Bits	5 to 6	Trailer left-hand rear fog light(s)	(see 6.4.2.63)
			Bits	7 to 8	Trailer right-hand rear fog light(s)	(see 6.4.2.64)
Byte	3	Towed vehicle lights status 3	Bits	1 to 2	Trailer left-hand reversing light(s)	(see 6.4.2.65)
			Bits	3 to 4	Trailer right-hand reversing light(s)	(see 6.4.2.66)
			Bits	5 to 6	Trailer left-hand side marker light(s)	(see 6.4.2.67)
			Bits	7 to 8	Trailer right-hand side marker light(s)	(see 6.4.2.68)
Byte	4	Towed vehicle lights status 4	Bits	1 to 2	Trailer left-hand rear width indicator light(s)	(see 6.4.2.69)
			Bits	3 to 4	Trailer right-hand rear width indicator light(s)	(see 6.4.2.70)
			Bits	5 to 6	Trailer left-hand corner marker light(s)	(see 6.4.2.71)
			Bits	7 to 8	Trailer right-hand corner marker light(s)	(see 6.4.2.72)
Byte	5	Towed vehicle lights status 5	Bits	1 to 2	Trailer left-hand rear registration-plate light(s)	(see 6.4.2.73)
			Bits	3 to 4	Trailer right-hand rear registration-plate light(s)	(see 6.4.2.74)
			Bits	5 to 6	Trailer rear warning light(s)	(see 6.4.2.75)
			Bits	7 to 8	Trailer rotating identification light(s)	(see 6.4.2.76)
Byte	6	Towed vehicle lights status 6	Bits	1 to 2	Trailer interior light(s)	(see 6.4.2.77)
			Bits	3 to 4	Trailer work light(s)	(see 6.4.2.78)
			Bits	5 to 8	Not defined	
Byte	7 to 8	Not defined				

6.5.3.6 Towed vehicle message, military applications message #2/1, MAM 21

Transmission repetition time:	100 ms ± 10 ms
Data length:	8 bytes
Data page:	0
PDU format:	253
PDU specific:	222
Default priority:	6

Byte	1	Lighting information #1	Bits	1 to 2	Trailer left-hand black-out rear light(s)	(see 6.4.2.84)
			Bits	3 to 4	Trailer right-hand black-out rear light(s)	(see 6.4.2.85)
			Bits	5 to 6	Trailer left-hand black-out brake/stop light(s)	(see 6.4.2.86)
			Bits	7 to 8	Trailer right-hand black-out brake/stop light(s)	(see 6.4.2.87)
Byte	2	Lighting information #2	Bits	1 to 2	Trailer rear convoy light(s)	(see 6.4.2.88)
			Bits	3 to 8	Not defined	
Bytes	3 to 8	Not defined				

7 Conformance tests

7.1 General

The conformance tests specify methods for checking the message transmission of the towing and towed vehicles to ensure compatibility.

The data content of the parameters is not part of the conformance tests.

A test arrangement as shown in Figure 10 shall be used. The test device shall at least perform the required communication with the ECU in accordance with this part of ISO 11992.

7.2 Conformance tests for commercial vehicles

7.2.1 Test of presence of required messages

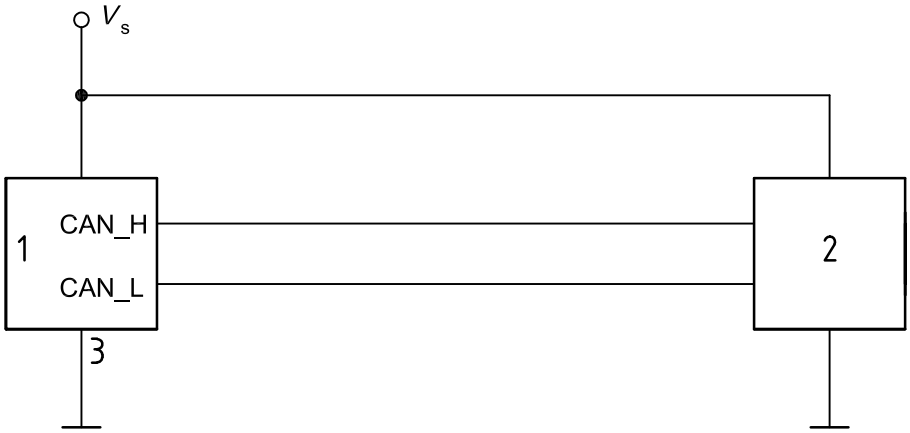
After power-on, the test device shall communicate with the ECU to verify that all required messages are transmitted by the ECU at least once.

7.2.2 Test of correct repetition time for all transmitted messages

The test device (see Figure 10) shall be configured to receive all messages from the ECU. After receiving the messages under test, the repetition time (time between start or end of one message and the next message with the same identifier) is measured for 101 messages.

Each measured repetition time shall be between 70 % and 130 % of the nominal specified value.

The average of the repetition times measured shall be between 90 % and 110 % of the nominal specified value.



Key

1 ECU
2 test device
3 ground

Figure 10 — Test arrangement

7.2.3 Test of absence of non-standardized messages

The test device shall check that there are no messages present other than those specified in this part of ISO 11992.

Starting with power-up, the test and logging shall be performed for a minimum time of 10 s.

7.3 Conformance tests for towed vehicles

7.3.1 General

The test specified in 7.2 shall also be performed with the ECUs of towed vehicles.

The following test procedure applies to the predecessor data connection of a towed vehicle ECU. If provided for, it also applies to the successor data connection.

7.3.2 Procedure

After power-on, the test device shall send the standard initialization message with the SA corresponding to position #0.

Check the SA of the messages sent by the ECU on the predecessor data connection and, if provided for, also on the successor data connection.

After power-on, check that the ECU sends all messages with the SA corresponding to position #1.

After reception of at least five of these messages, the test device shall start to send the standard initialization message with the SA corresponding to position #0 via the predecessor data connection.

The test device shall then check that the ECU sends all messages with the SA corresponding to position #1.

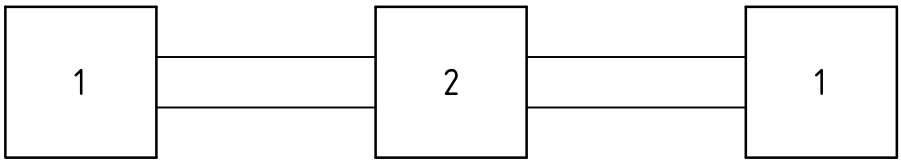
After reception of at least five of these messages, the test device shall start to send the standard initialization message with the SA corresponding to the next position. The test device shall then check that the ECU sends all messages with SA corresponding to the next higher position.

Continue this procedure until the ECU has sent all messages with the SA corresponding to position #5.

7.3.3 Message routing test

This test applies only to ECUs with provision for a successor. The test arrangement shall be as shown in Figure 11. A bus load of at least 50 % on both data connections during each 10 ms time slot shall be present.

The ECU tested with the configuration corresponding to position #1 shall route the messages from the two test devices within the delay time t_d specified in 6.3.



Key

1 test device
2 ECU

Figure 11 — Test arrangement

Annex A
(informative)

Parameter identification form

A.1 Applicant

Name: _____ Date: _____

Company: _____

_____

Address: _____

_____

Phone: _____ Facsimile:_____

A.2 Description of the request

_____

_____

_____

_____

_____

A.3 Additional information

A.3.1 Application

Braking or running gear application? Other application?

A.3.2 New parameter

New message?		Existing standardized message?					
Command, information or request?							
Message priority:		High		Medium		Low	
Maximum latency time:							
Transmission repetition time:							
Data length:							
Transmission direction:							

A.3.3 Data field of new parameter

Byte	Parameter	Range	Resolution	Offset
1				
2				
3				
4				
5				
6				
7				
8				

A.3.4 Purpose/Application

For use by ISO only

Approved: _____ Rejected: _____

Comments: _____

_____

Signature: _____ Date: _____

ICS 43.040.15

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