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Agricultural vehicles — Standardized access to repair and maintenance information (RMI) —

Part 2:
Vehicle on-board diagnostics

Partie 2: Systèmes de diagnostic embarqué

Reference number
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Contents

Page

Foreword

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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).

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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 23, *Tractors and machinery for agriculture and forestry*.

A list of all parts in the ISO 22172 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.

Agricultural vehicles — Standardized access to repair and maintenance information (RMI) —

Part 2: Vehicle on-board diagnostics

1 Scope

This document specifies the access to vehicle on-board diagnostics (OBD) by describing minimum hardware and software requirements including requirements for reprogramming, calibration and configuration after repair works. In addition, it provides hardware and software specifications for diagnostic tools.

This document does not apply to retrofit kits as these kits are not an integrated part of the vehicle.

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 11783-2, *Tractors and machinery for agriculture and forestry — Serial control and communications data network — Part 2: Physical layer*

ISO 11783-12, *Tractors and machinery for agriculture and forestry — Serial control and communications data network — Part 12: Diagnostics services*

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

ISO 11898-2, *Road vehicles — Controller area network (CAN) — Part 2: High-speed medium access unit*

ISO 13400-2, *Road vehicles — Diagnostic communication over Internet Protocol (DoIP) — Part 2: Transport protocol and network layer services*

ISO 13400-3, *Road vehicles — Diagnostic communication over Internet Protocol (DoIP) — Part 3: Wired vehicle interface based on IEEE 802.3*

ISO 13400-4, *Road vehicles — Diagnostic communication over Internet Protocol (DoIP) — Part 4: Ethernet-based high-speed data link connector*

ISO 14229-3, *Road vehicles — Unified diagnostic services (UDS) — Part 3: Unified diagnostic services on CAN implementation (UDSonCAN)*

ISO 14229-5, *Road vehicles — Unified diagnostic services (UDS) — Part 5: Unified diagnostic services on Internet Protocol implementation (UDSonIP)*

ISO 14230-1, *Road vehicles — Diagnostic communication over K-Line (DoK-Line) — Part 1: Physical layer*

ISO 15031-3, *Road vehicles — Communication between vehicle and external equipment for emissions-related diagnostics — Part 3: Diagnostic connector and related electrical circuits: Specification and use*

ISO 15765-2, *Road vehicles — Diagnostic communication over Controller Area Network (DoCAN) — Part 2: Transport protocol and network layer services*

ISO 15765-4, *Road vehicles – Diagnostic communication over Controller Area Network (DoCAN) – Part 4: Requirements for emissions-related systems*

ISO 22172-1, *Agricultural vehicles — Standardized access to repair and maintenance information (RMI) — Part 1: User interface requirements for web-based information systems*

ISO 22900-2, *Road vehicles — Modular vehicle communication interface (MVCI) — Part 2: Diagnostic protocol data unit (D-PDU API)*

ISO 27145-6, *Road vehicles — Implementation of World-Wide Harmonized On-Board Diagnostics (WWH-OBD) communication requirements — Part 6: External test equipment*

SAE J1939-13, *Off-Board Diagnostic Connector*

SAE J1939-73, *Application Layer – Diagnostics*

SAE J1962, *Diagnostic connector*

SAE J2534-2, *Optional Pass-Thru Features*

RP1210, Programming interface for accessing diagnostic interfaces

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 22172-1 and the following apply.

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

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

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

3.1
diagnostics
process that identifies, with precision, potential malfunction causes

Note 1 to entry: A precise diagnosis can be achieved in several ways, whereby the operator might be requested to perform test actions on vehicle or to enter symptoms.

3.2
diagnostic information
description of an error or symptom and a list of potential causes or hints or further investigation of the same level and content as provided to AR

3.3
reprogramming
flashing of software of an ECU, excluding

— the *calibration* (3.4), or

— the configuration of the ECU to maintain the original *configuration* (3.5), or

— the manufacturer's latest required configuration

3.4
calibration
optimizing the functionality of a vehicle by performing adjustments either manually or through automated routines using manufacturer specified processes

3.5
configuration
adjust manufacturer defined parameters of the control unit / system to allow the vehicle to perform as required

4 Symbols and abbreviated terms

API	application programming interface
CAN	controller area network
DoCAN	diagnostic communication over controller area network
DoIP	diagnostic communication over internet protocol
ECU	electronic control unit
EMC	electromagnetic compatibility
IBBC	Implement bus breakaway connector
ISOBUS	communications system for agricultural equipment specified by ISO 11783
FD	flexible data rate
IP	internet protocol
OBD	on-board diagnostic
PC	personal computer
PIN	product identification number
TECU	tractor electronic control unit
UDS	unified diagnostic services
USB	universal serial bus
VCI	vehicle communication interface
VIN	vehicle identification number
VM	vehicle manufacturer
WWH	world-wide harmonized

5 Requirements

5.1 Vehicle hardware

5.1.1 Diagnostic connectors

The diagnostic connector shall comply with one of the following standards:

— SAE J1939 diagnostic connectors according to SAE J1939-13

Type 1 (Black or grey, 250 kbps) (or, alternatively ISO 11783-2)

Type 2 (Green, 250/500 kbps)

— ISOBUS diagnostic connector according to ISO 11783-2 (ISOBUS diagnostic connectors) (or, alternatively SAE J1939-13 type 1)

— OBD II diagnostic connector according to ISO 15031-3 (or, alternatively, SAE J1962)/ISO 13400-4

Type A (12V)

Type B (24V)

The ISOBUS diagnostic connector shall be installed on ISOBUS vehicles and may be installed on non-ISOBUS vehicles.

5.1.2 Power

Battery power – switch or direct – of 12V to 24V on the diagnostic connector is required.

If a diagnostic connector is present on the implement it shall be connected to ECU_PWR. If permanent power is not possible, the implement ECUs shall be capable of its own flashing/configuration and diagnostic processes.

5.1.2.1 Engine bus

The engine connector may be accessed via a separate diagnostic connector complying with SAE J1939-13, ISO 11783-2, ISO 15031-3 or ISO 13400-4.

5.1.2.2 Inaccessible subnets

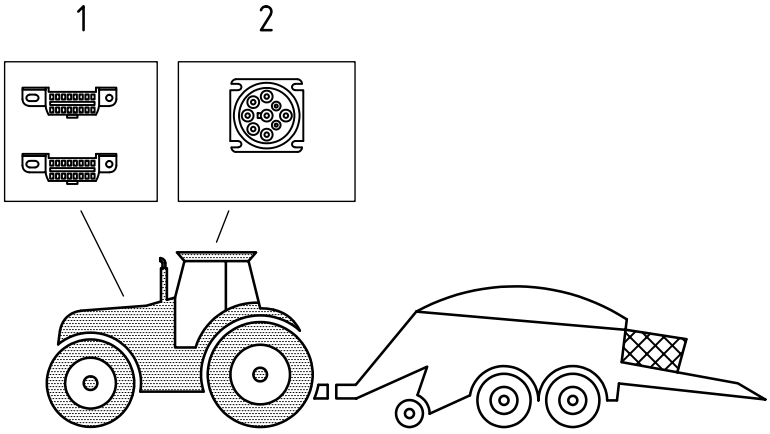
For systems which have subnets which are not accessible from the primary diagnostic interface, and where diagnostic access is required in support of this document, those subnets shall provide a separate diagnostic connector complying with SAE J1939-13, ISO 11783-2, ISO 15031-3 or ISO 13400-4.

5.1.3 Vehicles using ISO 11783 (ISOBUS)

ISOBUS vehicles shall provide the diagnostic information described in ISO 11783-12.

5.1.3.1 ISOBUS tractor

ISOBUS tractors shall have as a minimum one SAE J1939-13 type 1 or one ISOBUS diagnostic connector. Additional standard connectors such as OBD II and SAE J1939-13 type 2 as shown in Figure 1 are also allowed.



Key

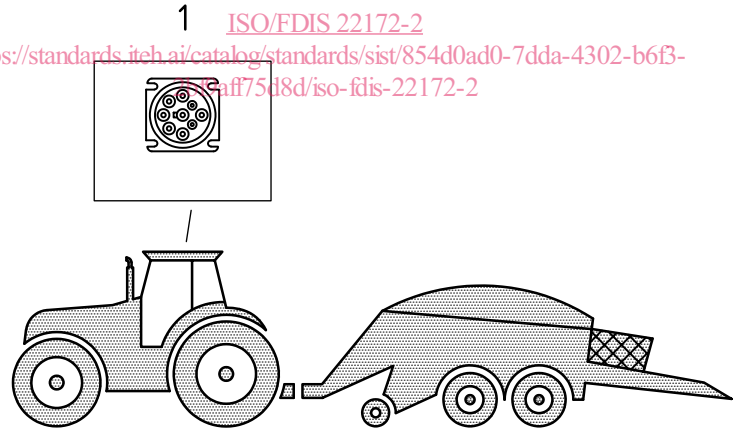
1 OBD II (12V or 24V)

2 SAE J1939/ISOBUS (SAE J1939-13/ISO11783-2) Type 1 (black or grey)

Figure 1 — Diagnostic connector options on ISOBUS tractors

5.1.3.2 ISOBUS implements

ISOBUS implements should be connected via the ISOBUS tractor SAE J1939-13/ISOBUS connector. Additional diagnostic connectors on the implement are allowed. Power to the implement shall be provided from IBBC of the tractor (see Figures 2 and 6). OBD II diagnostic connector is also allowed (see Figure 7).



Key

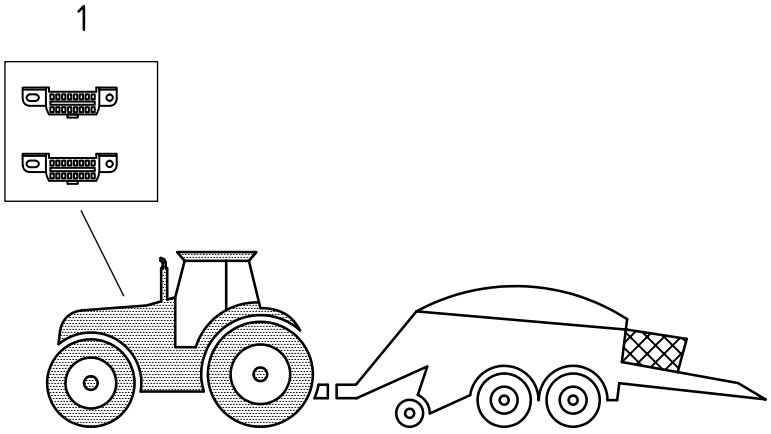
1 SAE J1939/ISOBUS (SAE J1939-13/ISO 11783-2) Type 1 (black or grey)

Figure 2 — ISOBUS implements

5.1.4 Vehicles not using ISO 11783 (Non-ISOBUS)

5.1.4.1 Non-ISOBUS tractor

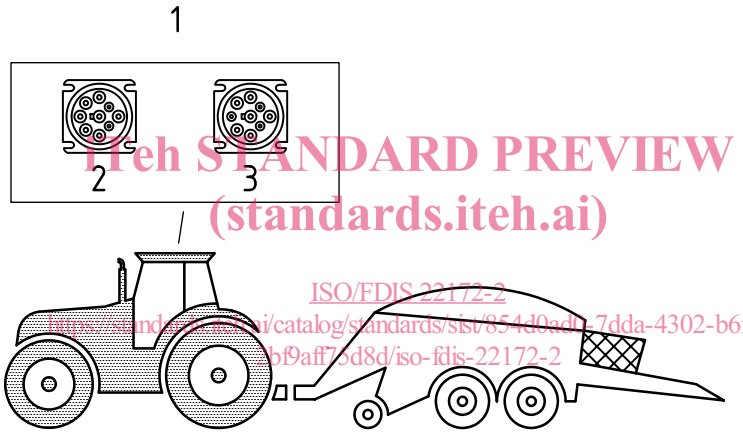
Non-ISOBUS tractors shall at a minimum have a standard diagnostic connector as shown in Figures 3 and 4. It is allowed to have another standard diagnostic connector simultaneously as shown in Figure 5.



Key

1 OBD II (12V or 24V)

Figure 3 — Tractor with non-ISOBUS OBD



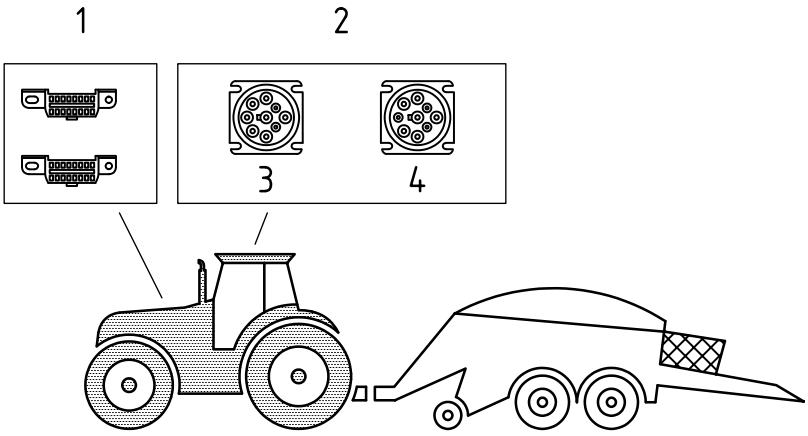
Key

1 SAE J1939-13

2 type 1 (black or grey) (SAE J1939-13/ISO 11783-2)

3 type 2 (green) (SAE J1939-13)

Figure 4 — Tractor with non-ISOBUS SAE J1939-13 connector



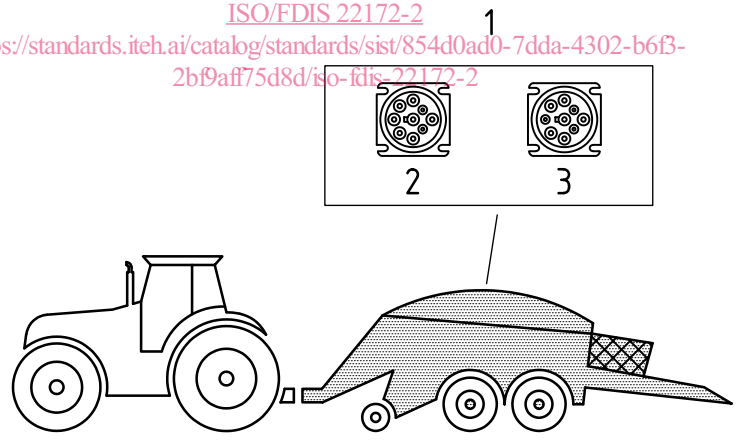
Key

1 OBD II (12V or 12V)
2 SAE J1939-13
3 type 1 (black or grey) (SAE J1939-13/ISO 11783-2)
4 type 2 (green) (SAE J1939-13)

Figure 5 — Tractor with non-ISOBUS OBD and SAE J1939-13 connector

5.1.4.2 Non-ISOBUS implements

On a non-ISOBUS implement, a standard diagnostic connector shall be available for diagnostics purpose. The SAE J1939-13/ISOBUS connector is recommended.



Key

1 SAE J1939-13
2 type 1 (black or grey) (SAE J1939-13/ISO 11783-2)
3 type 2 (green) (SAE J1939-13)

Figure 6 — Implement with non-ISOBUS SAE J1939-13 connector