INTERNATIONAL STANDARD

ISO
11783-12

First edition
2009-03-01

Corrected version
2010-04-15

Tractors and machinery for agriculture and forestry — Serial control and communications data network —

Part 12:
Diagnostics services

Tracteurs et matériels agricoles et forestiers — Réseaux de commande et de communication de données en série —

Partie 12: Services de diagnostic

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

iTeh STANDARD PREVIEW

(standards.iteh.ai)

ISO 11783-12:2009
https://standards.iteh.ai/catalog/standards/sist/862460d0-ae10-4e53-9f3f-
b5a2e488d36e/iso-11783-12-2009

Contents

Page

ISO 11783-12:2009
https://standards.iteh.ai/catalog/standards/sist/862460d0-ae10-4e53-9f3f-
b5a2e488d36e/iso-11783-12-2009

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 11783-12 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 19, *Agricultural electronics*.

This corrected version of ISO 11783-12:2009 incorporates the following corrections:

— in B.6, the description of the transmission repetition rate has been clarified by additions, and the rate at which DM1 is broadcast has been corrected to 1,0 Hz.

ISO 11783 consists of the following parts, under the general title *Tractors and machinery for agriculture and forestry — Serial control and communications data network*:

— *Part 1: General standard for mobile data communication*

— *Part 2: Physical layer*

— *Part 3: Data link layer*

— *Part 4: Network layer*

— *Part 5: Network management*

— *Part 6: Virtual terminal*

— *Part 7: Implement messages application layer*

— *Part 8: Power train messages*

— *Part 9: Tractor ECU*

— *Part 10: Task controller and management information system data interchange*

— *Part 11: Mobile data element dictionary*

— *Part 12: Diagnostics services*

— *Part 13: File server*

Sequence control is to form the subject of a future part 14.

Introduction

ISO 11783 specifies a communications system for agricultural equipment based on the CAN 2.0 B [4] protocol. SAE J1939 [5] documents, on which parts of ISO 11783 are based, were developed jointly for use in truck and bus applications and for construction and agriculture applications. Joint documents were completed to allow electronic units that meet the truck and bus SAE J1939 specifications to be used by agricultural and forestry equipment with minimal changes.

General information on ISO 11783 is to be found in ISO 11783-1. The purpose of ISO 11783 is to provide an open, interconnected system for on-board electronic systems. It is intended to enable electronic control units (ECUs) to communicate with each other, providing a standardized system.

The International Organization for Standardization (ISO) draws attention to the fact that it is claimed that compliance with this part of ISO 11783 may involve the use of a patent concerning the controller area network (CAN) protocol referred to throughout the document.

ISO takes no position concerning the evidence, validity and scope of this patent.

The holder of this patent has assured ISO that he is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with ISO. Information may be obtained from:

Robert Bosch GmbH
Wernerstrasse 51
Postfach 30 02 20
D-70442 Stuttgart-Feuerbach
Germany

Attention is drawn to the possibility that some of the elements of this part of ISO 11783 may be the subject of patent rights other than those identified above. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 11783-12:2009
https://standards.iteh.ai/catalog/standards/sist/862460d0-ae10-4e53-9f3f-
b5a2e488d36e/iso-11783-12-2009

Tractors and machinery for agriculture and forestry — Serial control and communications data network —

Part 12:
Diagnostics services

1 Scope

ISO 11783 as a whole specifies a serial data network for control and communications on forestry or agricultural tractors and mounted, semi-mounted, towed or self-propelled implements. Its purpose is to standardize the method and format of transfer of data between sensors, actuators, control elements and information storage and display units, whether mounted on, or part of, the tractor or implement. This part of ISO 11783 describes the network's diagnostic system.

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 11783-1, *Tractors and machinery for agriculture and forestry — Serial control and communications data network — Part 1: General standard for mobile data communication*

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

ISO 11783-3:2007, *Tractors and machinery for agriculture and forestry — Serial control and communications data network — Part 3: Data link layer*

ISO 11783-5, *Tractors and machinery for agriculture and forestry — Serial control and communications data network — Part 5: Network management*

ISO 11783-7, *Tractors and machinery for agriculture and forestry — Serial control and communications data network — Part 7: Implement messages application layer*

ISO 14229-1, *Road vehicles — Unified diagnostic services (UDS) — Part 1: Specification and requirements*

ISO 14230 (all parts), *Road vehicles — Diagnostic systems — Keyword Protocol 2000*

ISO 15765-3, *Road vehicles — Diagnostics on Controller Area Networks (CAN) — Part 3: Implementation of unified diagnostic services (UDS on CAN)*

SAE J1939-73, *Application Layer — Diagnostics*

3   Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11783-1, ISO 14229-1 and SAE J1939-73, and the following, apply.

3.1
level 0 diagnostics
diagnostics not completely meeting the requirements of level 1 diagnostics

3.2
level 1 diagnostics
diagnostics as specified in this part of ISO 11783

3.3
level 2 diagnostics
diagnostics based on level 1 diagnostics and specifying a limited level of diagnostics interoperability between the vendor's unique protocols and/or applications

NOTE   This level of diagnostics is additional to ISO 15765-3 and SAE J1939-73 diagnostics and is intended to be defined in an amendment to this part of ISO 11783.

3.4
suspect parameter number
SPN
19-bit number used to identify the item for which diagnostics are being reported

NOTE   Suspect parameter numbers are assigned to each individual parameter in a parameter group and to items that are relevant to diagnostics, but are not a parameter in a parameter group.

4   Symbols and abbreviated terms

DM1   Active trouble code message

DM2   Previously active trouble code message

DM3   Clear previously active trouble code message

DTC   Diagnostic trouble code

ECU   Electronic control unit

FMI   Failure mode indicator

OC   Occurrence count

PGN   Parameter group number

SPN   Suspect parameter number

5   General description

The standard diagnostic system specified in this part of ISO 11783 requires that all units connected to an ISO 11783 network provide the information specified in this part of ISO 11783 to enable the operator and/or service technician to complete network diagnostics and identify which unit has failed or is operating in a faulty state.

6   Requirements

An interface is required for an operator or service technician in order to diagnose problems and faults on an ISO 11783 network. This diagnostic user interface can be provided by the virtual terminal or another type of user interface connected to the network. The information specified in the following subclauses shall be provided to the operator or service technician by this user interface for diagnosing problems and faults of the suspect connected ECU, sensor or actuator.

6.1   Diagnostics capability level

This part of ISO 11783 specifies the different levels of diagnostics capability of a function controller. These capability levels should be applied to new designs as well as existing or legacy ISO 11783-compliant controllers:

a)   level 0 diagnostics;

b)   level 1 diagnostics;

c)   level 2 diagnostics.

Function controllers capable of level 1 diagnostics may use single-frame messages to provide the requested diagnostic information.

6.2   Network information

iTeh STANDARD PREVIEW

All function controllers connected to the ISO 11783 network shall provide level 1 diagnostics information to the diagnostic user interface. This information provides an overview of the status of all communicating function controllers connected to the operating network. It shall include:

a)   the part number, serial number and manufacturer's name of the connected ECU containing the function controller;

b)   the NAME of each function controller as defined in ISO 11783-5;

c)   the version of the software for the controller;

d)   the compliance test data, including the laboratory that performed the test, certificate data and year tested.

All function controllers shall use the messages defined in Annex B to provide the above information when requested by the diagnostic interface. The diagnostic user interface shall also monitor the messages on the network to obtain information from the address claim process and shall request the additional information using the messages specified in Annex B. Parameters for these messages are defined in Annex A. A typical network status screen is shown in Annex D.

6.3   Network statistics

The user interface that displays the network status shall also use its network connection to measure the network bus statistics. These network statistics shall include the bus load and any of the CAN errors detected while sending or receiving messages, as well as the average bus voltages. The voltages shall be averaged over a time period of 250 ms to 5 s.

A typical screen of the network statistics is presented in Annex D.

6.4 Controller information

Each function controller shall provide additional fault information to the level 1 diagnostics user interface when requested. This information provides additional data to enable the operator or service technician to determine the problem or fault on a specific ECU. It includes:

a) the specific protocol of an ECU required for non-ISO 11783 or ISO 11783 level 2 diagnostics;

b) active diagnostic trouble codes (suspect parameter numbers and failure mode indicators);

c) previously active diagnostic trouble codes (suspect parameter numbers and failure mode identifiers);

d) fault occurrences (if available);

e) clearing previously active diagnostic trouble codes (if required).

All function controllers including all members of working sets shall use the messages defined in Annex B to provide the above information when requested by the diagnostic user interface. The diagnostic user interface shall request the function controller's suspect parameter number and fault mode indicator information using the messages specified in Annex B. Parameters for these messages are defined in Annex A or in the appropriate part of ISO 11783. A typical screen of the above function controller information is presented in Annex D. In addition, the user interface shall provide an equivalent screen of the network status. Annex E provides the definition of each failure mode indicator.

6.5 Controller diagnostics

Once a problem or fault has been isolated to a particular function controller, as displayed on the controller information screen, a service tool that uses the identified protocol of that particular function controller can be connected to the network via the diagnostic connector specified in ISO 11783-2. The tool can then be used to troubleshoot the problem identified by the displayed diagnostic trouble code.

Annex A
(normative)

Diagnostic information parameter definitions

A.1 ECU part number

The part number of the physical ECU connected to the ISO 11783 network. This parameter is the same as SPN 2901 as defined in SAE J1939-71 [6].

Data length:	Variable — up to 200 characters
Resolution:	ASCII (1 byte), 0 offset
Data range:	0 to 255 per byte Operational range: same as data range
Type:	Measured

The ASCII character "*" shall not be used in the ECU part number because it is used as a parameter delimiter.

A.2 ECU serial number

The serial number of the physical ECU connected to the ISO 11783 network. This parameter is the same as SPN 2902 as defined in SAE J1939-71 [6].

Data length:	Variable — up to 200 characters
Resolution:	ASCII (1 byte), 0 offset
Data range:	0 to 255 per byte Operational range: same as data range
Type:	Measured

The ASCII character "*" shall not be used in the ECU serial number because it is used as a parameter delimiter.

A.3 Number of software identification fields

Number of software identification designators represented in the software identification parameter group. This parameter is the same as SPN 965 as defined in SAE J1939-71 [6].

Data length:	1 byte
Resolution:	1 step/bit, 0 offset
Data range:	0 to 250 steps Operational range: 0 to 125
Type:	Measured

A.4 ECU software identification

The identification of the software of an ECU connected to the ISO 11783 network. Individual software module identifications are to be separated by "#". This parameter is similar to SPN 234 as defined in SAE J1939-71 [6].

Data length: Variable — up to 200 characters

Resolution: ASCII (1 byte), 0 offset

Data range: 0 to 255 per byte   Operational range: same as data range

Type: Measured

The ASCII characters "*" and "#" shall not be used in the software identification parameters because they are used as parameter delimiters.

A.5 ECU manufacturer name

The manufacturer name is a human-readable string that can be interpreted by a service technician. The same text as registered with the manufacturer code can be used and may contain branding information as well. It may contain the manufacturer's name as well as the OEM integrator. This information aids the service technician to acquire service help.

Data length: Variable — up to 200 characters

Resolution: ASCII (1 byte), 0 offset

Data range: 0 to 255 per byte   Operational range: same as data range

Type: Measured

The ASCII character "*" shall not be used in the ECU manufacturer name because it is used as a parameter delimiter.

A.6 ECU diagnostic protocol identification

This 8-bit parameter indicates the diagnostic protocol that the ECU supports for ISO 11783 Level 2 or for proprietary troubleshooting of a fault code.

Data length: 8 bits

Value: Meaning:

00000000   Only ISO 11783 Level 1 diagnostics

00000001   J1939-73

00000010   ISO 14230 (KWP 2000 over K line)

00000100   ISO 15765-3 (UDS on CAN)

00001000   ISO 11783 Level 2

00010000   Reserved for ISO assignment

00100000   Reserved for ISO assignment

01000000   Reserved for ISO assignment

10000000   Reserved for ISO assignment

Type: Measured