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Road vehicles — Diagnostic systems —

Part 3:
Verification of the communication between vehicle and OBD II scan tool

Véhicules routiers — Systèmes de diagnostic —

Partie 3: Vérification de la communication entre un véhicule et un outil d'analyse OBD II

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Contents

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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.

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.

International Standard ISO 9141-3 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

ISO 9141 consists of the following parts, under the general title *Road vehicles — Diagnostic systems*:

— *Part 2: CARB requirements for interchange of digital information*

— *Part 3: Verification of the communication between vehicle and OBD II scan tool*

NOTE ISO 9141:1989, *Road vehicles — Diagnostic systems — Requirements for interchange of digital information*, is regarded as being part 1 of this International Standard.

Annexes A to D form an integral part of this part of ISO 9141. Annex E is for information only.

Road vehicles — Diagnostic systems —

Part 3:
Verification of the communication between vehicle and OBD II scan tool

1 Scope

This part of ISO 9141 establishes recommended test methods, test procedures and specific test parameters in order to verify a vehicle or OBD II scan tool can communicate on a bus according to ISO 9141-2. It is not applicable as a test for a single module or for any subpart of an ISO 9141-2 network.

The test described is not provided to verify any tool or vehicle requirement not described in ISO 9141-2. In particular it does not check any requirement described in SAE J1962, SAE J1978, ISO 15031-5 or the expanded diagnostic protocol for scan tool.

The procedures and methods test a set of specific requirements applicable to all road vehicles and scan tools which make use of ISO 9141-2.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 9141. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 9141 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 9141:1989, *Road vehicles — Diagnostic systems — Requirements for interchange of digital information.*

ISO 9141-2:1994, *Road vehicles — Diagnostic systems — Part 2: CARB requirements for interchange of digital information,* and its Amendment 1:1996.

ISO 15031-5:—[1)], *Road vehicles — Emission-related diagnostics — Communication between vehicle and external equipment — Part 5: Emission-related diagnostic services*.

SAE J1962:1995, *Diagnostic Connector.*

SAE J1978:1994, *OBD II Scan Tool*.

3 Definitions and abbreviations

For the purposes of this part of ISO 9141, the definitions given in ISO 9141:1989 and the following abbreviations apply.

DSO Digital storage oscilloscope

1) To be published.

DUT Device under test

NA Not applicable

NAD Network access device

PC Personal computer

PID Parameter identifier

PS Power supply

4 General

4.1 Test procedure overview

Three test procedures are identified to test ISO 9141-2 implementations. The following is a short synopsis of the purpose of each of the tests.

4.1.1 Message structure test

The message structure test verifies that the DUT responds correctly to both correct and incorrect messages generated by the NAD. This includes both the correct logical response and the correct response or request message.

4.1.2 Initialization test

The initialization test verifies that the DUT can complete the initialization sequence with correct timing and that it responds correctly to errors from the vehicle or the OBD II scan tool.

4.1.3 Physical layer test

The physical layer test verifies that the DUT shall receive and transmit data within physical parameter limits specified in ISO 9141-2.

4.2 Test conditions

4.2.1 General test conditions

The maximum electrical vehicle load shall be as specified in ISO 9141:1989.

The tests shall be conducted when the DUT is stable within the operating range specified in ISO 9141-2:1994, 8.3. If a vehicle is being tested then it shall be stationary and with engine idling for the duration of the process unless specified otherwise for an individual test.

4.2.2 Digital storage oscilloscope requirements

The DSO shall meet the following physical parameters:

20 pF maximum,

10 MΩ minimum,

50 MHz minimum.

4.2.3 Power supply requirements

The PS shall be capable of supplying 5 A in a voltage range between 0 V and 20 V.

4.2.4 Network access device requirements

The NAD shall be able to access and monitor the bus, display the initialization sequence and all messages. The NAD is used to simulate the ISO 9141-2 behaviour of an OBD II scan tool or a vehicle. For more information, refer to annex D.

Any inaccuracy in the NAD will result in possible errors in simulating and measuring timing, voltage and current limits. This document accommodates the non-ideal NAD by adjusting these limits according to the tolerance of the NAD (ΔNAD, see annex C). This adjustment necessarily narrows the range of acceptable DUT behaviour to prevent a positive indication for a DUT that may fail in the field.

Conversely a good DUT may be rejected due to a large ΔNAD. For this reason it is recommended that a NAD is selected which has the smallest ΔNAD.

5 Message structure test

5.1 Purpose

The message test verifies that the DUT transmits and interprets correctly messages whose structure and timing are standardized in ISO 9141-2. Additionally, this test verifies that the DUT responds correctly to message structure or message timing errors.

5.2 Equipment

— NAD,

— PS.

5.3 Test set-up

— Connect the communication lines of the NAD to the DUT.

— If the DUT is an OBD II scan tool, connect it as shown in figure A.1.

— If the DUT is a vehicle, connect it as shown in figure A.2.

— Set PS to 13,5 V ± 0,5 V.

5.4 Procedure

5.4.1 OBD II scan tool

5.4.1.1 Message structure test

Configure the NAD as a simulated vehicle with key bytes 08 08 and communication timing parameters P_1 = 10 ms, P_2 = 30 ms. Cause the scan tool to initialize the simulated vehicle, as described in ISO 9141-2:1994, clauses 6 and 7. Cause the OBD II scan tool to transmit a request message mode 1 PID 0 (request current powertrain data). Configure the NAD to respond with the simulated vehicle response messages shown in table 1. Verify the OBD II scan tool behaviour according to table 1.

5.4.1.2 Message timing test

Configure the NAD as a simulated vehicle with keybytes 08 08. Cause the scan tool to initialize the simulated vehicle, as in ISO 9141-2:1994, clauses 6 and 7. Cause the OBD II scan tool to transmit a request message mode 1 PID 1 (request current powertrain data). Configure the NAD to respond with the simulated vehicle response message 48 6B D1 41 00 CB 4D 28 00 06 using the timing parameter values shown in table 2. Verify the OBD II scan tool behaviour according to table 2.