
**Road vehicles — Implementation of
World-Wide Harmonized On-Board
Diagnostics (WWH-OBD) communication
requirements —**

道路车辆—实现全球协调的在线诊断系统（WWH-OBD）通信
要求

**Part 1:
General information and use case definition**
通用信息和应用案例定义

*Véhicules routiers — Mise en application des exigences de
communication pour le diagnostic embarqué harmonisé à l'échelle
mondiale (WWH-OBD) — Partie 1: Informations générales et définition
de cas d'usage*





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Foreword 前言

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.

ISO(国际标准化组织)是一个全球性的国家标准机构联合会(国际标准化组织成员机构)。制定国际标准的工作通常是通过国际标准化组织技术委员会进行的。每一个对已设立技术委员会的主题感兴趣的成员机构都有权派代表参加该委员会。国际组织, 政府和非政府组织, 与国际标准化组织联系, 也参与了这项工作。ISO与国际电工委员会(IEC)就所有电工标准化问题密切合作。

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.
国际标准是根据ISO/IEC指令第2部分的规定起草的。

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.

技术委员会的主要任务是制定国际标准。各技术委员会通过的国际标准草案已分发给各成员机构表决。作为一项国际标准的出版需要至少75%的投票表决的成员机构的批准。

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.

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ISO 27145-1 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

ISO 27145-1是由技术委员会ISO/TC 22, 道路车辆, 小组委员会SC 3, 电气和电子设备编写的。

This first edition of ISO 27145-1 cancels and replaces ISO/PAS 27145-1:2006, which has been technically revised.

这个第一版的ISO 27145-1取消并取代了ISO/PAS 27145-1: 2006, 该标准已经进行了技术修订。

ISO 27145 consists of the following parts, under the general title *Road vehicles — Implementation of World-Wide Harmonized On-Board Diagnostics (WWH-OBD) communication requirement*.

ISO 27145由以下部分组成, 其总称为“道路车辆——全球统一协调在线诊断系统(WWH-OBD)”通信要求。

- *Part 1: General information and use case definition* 第一部分: 一般信息和用例定义
- *Part 2: Common data dictionary* 第2部分: 公共数据字典
- *Part 3: Common message dictionary* 第3部分: 公共信息词典
- *Part 4: Connection between vehicle and test equipment* 第4部分: 车辆与试验设备的连接

The following parts are under preparation: 以下部分正在编写之中:

- *Part 6: External test equipment* 第6部分: 外部测试设备

0 Introduction 介绍

0.1 Overview 概述

The ISO 27145 series includes the communication between the vehicle's on-board diagnostics (OBD) systems and external test equipment within the scope of the World-Wide Harmonized On-Board Diagnostics Global Technical Regulations (WWH-OBD GTR).

ISO 27145系列包括车载诊断系统(OBD)与全球协调统一在线诊断技术法规(WWH-OBD GTR)范围内的外部测试设备之间的通信。

It has been established in order to apply the unified diagnostic services (specified in ISO 14229-1) to WWH-OBD systems.

它的建立是为了将统一的诊断服务(在ISO 14229-1中指定)应用于WWH-OBD系统。

The ISO 27145 series includes the communication between the vehicle's WWH-OBD systems and external (off-board) "generic" test equipment within the scope of the country-specific regulatory requirements.

ISO 27145系列包括车辆的WWH-OBD系统与外部(非车载)“通用”测试设备之间的通信,这些测试设备属于国家特定法规要求的范围。

To achieve this, it is based on the Open Systems Interconnection (OSI) Basic Reference Model specified in ISO/IEC 7498-1 and ISO/IEC 10731, which structures communication systems into seven layers. Where mapped on this model, the services specified by ISO 27145 are divided into

为此,它基于ISO/IEC 7498-1和ISO/IEC 10731中规定的开放系统互连(OSI)基本参考模型,该模型将通信系统分为七层。在此模型上映射的服务,由iso 27145指定的服务被划分为

- diagnostic services (layer 7), specified in ISO 27145-3 with reference to ISO 14229-1, 诊断服务(第7层),在ISO 27145-3中参照ISO 14229-1指定
- presentation layer (layer 6), specified in ISO 27145-2 with reference to SAE J1930-DA, SAE J1939 Companion Spreadsheet (SPNs), SAE J1939-73:2010, Appendix A (FMI), SAE J1979-DA and SAE J2012-DA, 表示层(第6层),在ISO 27145-2中参照SAE J1930-DA、SAE J1939 Companion电子表格(SPN)、SAE J1939-73:2010、附录A(FMI)、SAE J1979-DA和SAE J2012-DA,指定了表示层(第6层)。
- session layer services (layer 5), specified in ISO 14229-2, 会话层服务(第5层),在ISO 14229-2中指定,
- transport layer services (layer 4), specified in ISO 27145-4 with reference to ISO 13400-2, ISO 15765-2 and ISO 15765-4, 传输层服务(第4层),在iso 27145-4中参照iso 13400-2、iso 15765-2和iso 15765-4指定
- network layer services (layer 3), specified in ISO 27145-4 with reference to ISO 15765-4, ISO 15765-2 and ISO 13400-2, 网络层服务(第3层),在ISO 27145-4中参照ISO 15765-4、ISO 15765-2和ISO 13400-2指定,
- data link layer (layer 2), specified in ISO 27145-4 with reference to ISO 11898-1, ISO 11898-2, ISO 15765-4, ISO 13400-3 and IEEE 802.3, and 数据链路层(第2层),在iso 27145-4中参照ISO 11898-1、ISO 11898-2、ISO 15765-4、ISO 13400-3和IEEE 802.3指定
- physical layer (layer 1), specified in ISO 27145-4 with reference to ISO 11898-1, ISO 11898-2, ISO 15765-4, ISO 13400-3 and IEEE 802.3, 物理层(第1层),在ISO 27145-4中参照ISO 11898-1、ISO 11898-2、ISO 15765-4、ISO 13400-3和IEEE802.3指定,

in accordance with Table 1.如下表1所示。

Table 1 — WWH-OBD specification reference applicable to the OSI layers

适用于OSI层的WWH-OBD规范参考文献

Applicability	OSI seven layer	WWH-OBD reference		
Seven layers according to ISO/IEC 7498-1 and ISO/IEC 10731	Application (layer 7)	ISO 14229-1, ISO 27145-3		
	Presentation (layer 6)	ISO 27145-2, SAE J1930-DA, SAE J1939 Companion Spreadsheet (SPNs), SAE J1939-73:2010, Appendix A (FMI), SAE J1979-DA, SAE J2012-DA		
	Session (layer 5)	ISO 14229-2		
	Transport (layer 4)	ISO 27145-4		ISO 13400-2 DoIP TCP and IP
	Network (layer 3)			
	Data link (layer 2)			ISO 13400-3 DoIP, IEEE 802.3
	Physical (layer 1)			

0.2 SAE document reference concept SAE文档参考概念

ISO 27145 makes reference to several SAE documents which contain the terms, data and diagnostic trouble code (DTC) definitions. ISO 27145引用了一些包含术语、数据和诊断故障代码定义的SAE文档。

ISO 27145-2 defines a common data dictionary for the ISO 27145 series, according to the definitions in the following documents (see Figure 1):

ISO27145-2中的定义定义了iso 27145系列的通用数据字典。以下文件(见图1)：

— SAE J1930-DA: this digital annex contains all standardized naming objects, terms and abbreviated terms. SAE J1930-DA：本数字附件包含所有标准化命名对象、术语和缩写术语。

— SAE J1939 Companion Spreadsheet and SAE J1939-73: SAE J1939 Companion Spreadsheet indexes names for suspect parameter numbers (SPNs) that provide an alternative presentation format for SAE J2012-DA DTCs. SPNs are combined with failure mode indicators (FMIs) to form the full alternative presentation. FMIs are described in SAE J1939-73:2010, Appendix A.

SAE J 1939 配套电子表格和SAE J1939-73：SAE J 1939配套电子表格索引可疑参数编号 (SPN)，为SAE J2012-DA DTCs提供一种替代的表示格式。SPN与故障模式指示器(FMI)相结合，形成完整的备选表示。FMI在SAE J 1939-73：2010，附录A中作了描述。

NOTE The SAE J1939 Companion Spreadsheet is a document which supplements the SAE J1939 family of standards and contains SPNs and parameter group numbers (PGNs).
注意，SAE J 1939附录电子表格是一份补充SAEJ 1939标准族的文档，其中包含SPN和参数组号(PGNs)。

— SAE J1979-DA: this digital annex contains all standardized data items such as data identifiers (DIDs), test identifiers (TIDs), monitor identifiers (MIDs) and infotype identifiers (ITIDs).

SAE J1979-DA：本数字附件包含所有标准化数据项，如数据标识符(DID)、测试标识符(TID)、监视器标识符(MID)和信息类型标识符(ITID)。

— SAE J2012-DA: this digital annex contains all standardized data items such as DTC definitions and FTB (failure type byte) definitions.

SAEJ2012-DA：本数字附件包含所有标准化数据项，如DTC定义和FTB(故障类型字节)定义。

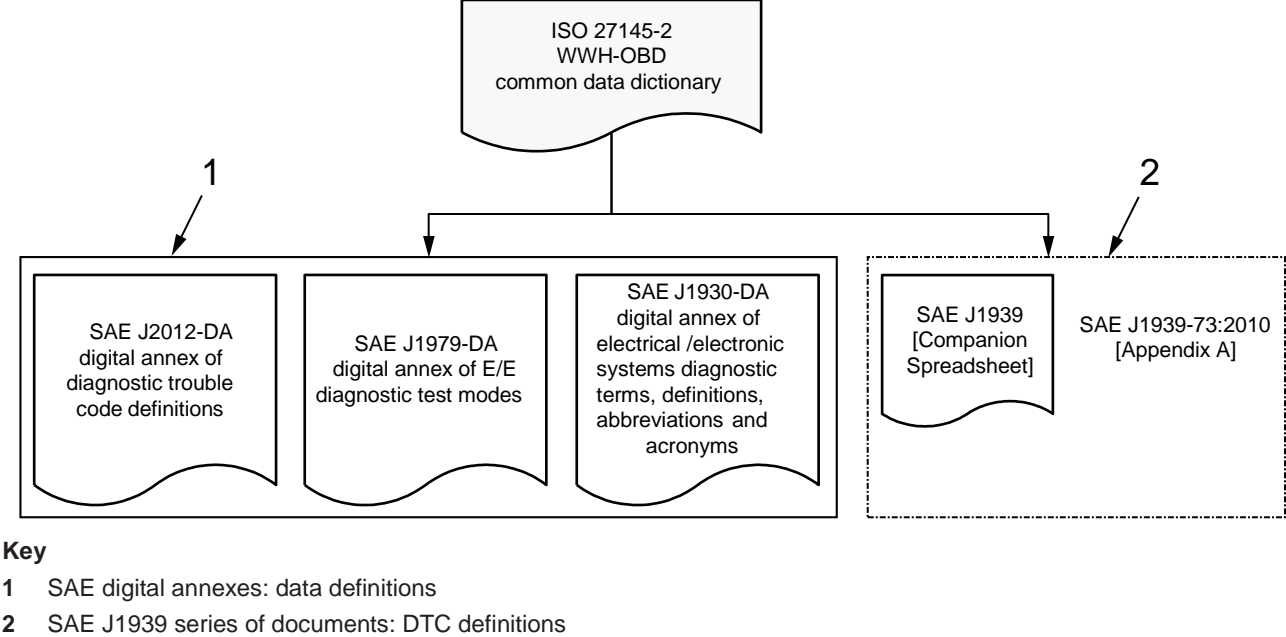


Figure 1 — SAE digital annex document reference SAE数字附件文档参考

0.3 SAE digital annex revision procedure SAE数字附件修订程序

New regulatory requirements drive new in-vehicle technology to lower emissions, improve safety, etc. It is important to standardize new technology-related OBD monitor data and DTCs in order to support the external (off-board) “generic” test equipment. All relevant information is proposed by the automotive industry, represented by members of the appropriate SAE task force.

新的法规要求推动新的车内技术降低排放，提高安全性等。重要的是标准化新技术相关的OBD监测数据和DTCs，以支持外部(非车载)“通用”测试设备。所有相关信息都由汽车行业提出，由适当的SAE工作队成员代表。

ISO 27145-2 references a “Change request form” for use with new data items to be defined by the SAE

task force for standardization. It is intended that the standardized data items be defined in SAE J1930-DA, SAE J1979-DA, SAE J2012-DA and SAE J1939. It is intended that the documents be published on the SAE store website once the information has been balloted and approved. Iso 27145-2引用了一个“更改请求表”，以便与标准化小组定义的新数据项一起使用。其目的是在SAE J1930-DA、SAE J1979-DA、SAE J2012-DA和SAE J1939中定义标准化数据项。一旦信息被投票和批准，这些文件将被公布在SAE商店的网站上。

The revision request forms and instructions for updating the registers to ISO 27145 can be obtained on the following data registration websites可在下列数据注册网站上获得更新到ISO 27145的注册表的修订请求表格和说明。

- For SAE J1930-DA: <http://www.sae.org/servlets/works/committeeHome.do?comtID=TEVDS7>

The column entitled “Resources” shows a document with the title: J1930-DA_Revision_Request_Form.doc. Double click on the name to download the document with the filename: “SAE_J1930-DA_Revision_Request_Form.doc”.

题为“参考资料”的列显示了一个标题为：J1930-DA_REVIEW_REVENT_FORM的文档。医生。双击文件名下载文档的名称：“SAE_J1930-DA_REVIEW_Request_Form.doc”。

- For SAE J1939: <http://www.sae.org/>

Search “J1939 Request”, select “J1939 Request Processing Group”, and select “J1939 Request Processing Form and Guidelines”.

搜索“J 1939请求”，选择“J 1939请求处理组”，并选择“J 1939请求处理表单和指南”。

- For SAE J1979-DA: <http://www.sae.org/servlets/works/committeeHome.do?comtID=TEVDS14>

The column entitled “Resources” shows a document with the title: J1979-DA_Revision_Request_Form.doc. Double click on the name to download the document with the filename: “SAE_J1979-DA_Revision_Request_Form.doc”.

题为“参考资料”的一栏显示了一个标题为：J1979-DA_REVIEW_REVENT_FORM的文档。医生。双击文件名下载文档：“SAE_J1979-DA_REVIEW_Request_Form.doc”。

- For SAE J2012-DA: <http://www.sae.org/servlets/works/committeeHome.do?comtID=TEVDS9>

The column entitled “Resources” shows a document with the title: J2012-DA_Revision_Request_Form.doc. Double click on the name to download the document with the filename: “SAE_J2012-DA_Revision_Request_Form.doc”.

题为“参考资料”的列显示了一个标题为：J2012-DA_REVIEW_Request_FORM的文档。医生。双击文件名下载文档的名称：“SAE_J2012-DA_REVIEW_Request_Form.doc”。

It is intended that the revision request form be filled out with the request.
需要该版本的请填写相关请求。

It is intended that e-mails with completed revision request forms as attachments be sent to:
并将填好的请求表作为附件的电子邮件发送至：

E-mail: saej1930@sae.org

E-mail: saej1979@sae.org

E-mail: saej2012@sae.org

E-mail: saej1939@sae.org

Road vehicles — Implementation of World-Wide Harmonized On-Board Diagnostics (WWH-OBD) communication requirements —

Part 1:

General information and use case definition

1 Scope 范围

This part of ISO 27145 provides an overview of the structure and the partitioning of the different parts of ISO 27145 and shows the relationship between the parts. In addition, it outlines the use case scenarios where the ISO 27145 series is used. All terminology that is common throughout the ISO 27145 series is also outlined. ISO 27145的这一部分概述了ISO 27145不同部分的结构和分区，并显示了各部分之间的关系。此外，它还概述了使用ISO 27145系列的用例场景。所有术语，是通用的整个ISO 27145系列也被概述。

ISO 27145 is intended to become the single communication standard for access to OBD-related information. To allow for a smooth migration from the existing communication standards to this future world-wide communication standard, the initial communication concept is based on the ISO 15765 series, i.e. Diagnostic communication over Control Area Network (DoCAN).

ISO 27145旨在成为访问与obd相关信息的单一通信标准。为了使从现有通信标准顺利过渡到未来的全球通信标准，最初的通信概念基于ISO 15765系列，即通过控制区域网络(DoCAN)的诊断通信。

The intention is for the future communication concept to be based on the ISO 13400 series, i.e. Diagnostic communication over Internet Protocol (DoIP) utilizing Ethernet. In view of the usage of standard network layer protocols, future extensions to optional physical layers (e.g. wireless) are possible.

未来的通信概念将基于ISO 13400系列，即利用以太网在Internet协议上进行诊断通信。考虑到标准网络层协议的使用，未来对可选物理层(例如无线)的扩展是可能的。

ISO 27145 has been extended to define the world-wide harmonized On-Board Diagnostics (OBD) communication standard. Based on the results of the initialization, the external test equipment determines which protocol and diagnostic services are supported by the vehicle's emissions-related system, i.e.

国际标准化组织27145已被扩展到定义全球统一的在线诊断(OBD)通信标准。根据初始化结果，外部测试设备确定车辆的排放相关系统支持哪种协议和诊断服务。

— legislated OBD: ISO 15031 series (based on DoCAN), and
法定的OBD: ISO 15031系列(基于DoCAN)，以及

— legislated WWH-OBD: ISO 27145 series (based on DoCAN and DoIP).
法定的WWH-OBD: ISO 27145系列(基于DoCAN和DoIP)

IMPORTANT — Use cases deriving from country-specific implementation of Global Technical

重要的——从各国具体执行全球技术的情况中得出的用例

Regulation (GTR) No. 5 into local legislation are not included in this part of ISO 27145.

国际标准化组织27145的这一部分不包括地方立法中的第5号条例。

2 Normative references 规范性参考文件

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. 下列参考文件对于本文档的应用是必不可少的。对于日期较长的参考资料，只适用于引用的版本。对于未注明日期的参考资料，适用参考文件的最新版本(包括任何修改)。

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

ISO 14229-2, Road vehicles — Unified diagnostic services (UDS) — Part 2: Session layer services

ISO 27145-2, Road vehicles — Implementation of World-Wide Harmonized On-Board Diagnostics (WWH-OBD) communication requirements — Part 2: Common data dictionary

ISO 27145-3, Road vehicles — Implementation of World-Wide Harmonized On-Board Diagnostics (WWH-OBD) communication requirements — Part 3: Common message dictionary

ISO 27145-4, Road vehicles — Implementation of World-Wide Harmonized On-Board Diagnostics (WWH-OBD) communication requirements — Part 4: Connection between vehicle and test equipment

3 Terms, definitions and abbreviated terms 术语、定义和缩写术语

3.1 Terms and definitions

For the purposes of this document, the terms and definitions in ISO 14229-1 and the following apply.
为本文件的目的, ISO 14229-1 和以下的条款和定义适用于

3.1.1

calibration identifier 校准标识符

CALID

identification code for a specific software/calibration contained in a server/ECU服务器/ECU 中包含的特定软件/校准的识别码

NOTE If regulations require calibration identifications for emissions-related software, these are reported in a standardized format as specified in ISO 27145-2. 如果法规要求与排放相关的软件校准标识, 则以 ISO 27145-2 中指定的标准格式报告这些规则。

3.1.2

class A, B1, B2, C malfunction A类, B1, B2, C故障

attribute of a DTC, which characterizes the impact of a failure on emissions or on the OBD system's monitoring capability according to the requirements of the WWH-OBD GTR。DTC 的属性, 其特征是故障对排放的影响, 或根据 WWH-OBD GTR 的要求对系统的监控能力进行了描述。Diagnostic Trouble Code (DTC) 诊断故障代码

3.1.3

continuous malfunction indicator 连续故障指示器

continuous-MI

malfunction indicator showing a steady indication at all times while the key is in the on (run) position with the engine running [ignition ON – engine ON] 故障指示器在所有时间显示一个稳定的指示, 而关键是在 (运行) 位置与发动机运行 [点火启动 – 引擎启动]

3.1.4

continuous malfunction indicator counter 连续故障指示器计数器

continuous-MI counter

conveys the amount of time the OBD system was operational during the time a continuous-MI was last activated
在连续 MI 上次激活时, 传递了该系统运行的时间量

NOTE For a detailed definition, see GTR No. 5. 有关详细定义的说明, 请参阅5号 GTR。

3.1.5

confirmed and active DTC 确认和主动 DTC

DTC status, which is detected during two consecutive operation cycles, in which the DTC is still present and commands the MI to be on if the DTC class is A, B1 or B2。DTC状态, 在两个连续的操作周期中检测到, 其中 dtc 仍然存在, 并且如果 DTC 类是 B1 或 B2, 则命令 MI 处于 on。

NOTE For a DTC of class C, the MI is not illuminated. 对于 C 类的 DTC, MI 没有被照亮。

3.1.6

cumulative continuous malfunction indicator counter 累计连续故障指示器计数器

cumulative continuous-MI counter 累计连续 MI 计数器

cumulated operating hours with a continuous-MI activated 连续-MI 激活的累计工作时间

NOTE The cumulative continuous-MI counter counts up to the maximum value provided in a 2-byte counter with 1 h resolution and holds that value. The cumulative continuous-MI counter is not reset to zero by the engine system, a scan tool or a disconnection of a battery. 累计连续 MI 计数器计数为2字节计数器中提供的最大值 (1 h 分辨率), 并保留该值。累积连续 MI 计数器不会被引擎系统、扫描工具或电池断开而重置为零。

The cumulative continuous-MI counter operates in the following manner: 累计连续 MI 计数器以下列方式运行

- the cumulative continuous-MI counter begins counting once the continuous-MI is activated; 当连续 MI 激活后, 累计连续 MI 计数器开始计数;
- the cumulative continuous-MI counter halts and holds its existing value once the continuous-MI is no longer activated; 当连续 MI 不再激活时, 累计连续 MI 计数器暂停并保存其现有值

- c) the cumulative continuous-MI counter continues counting from the point at which it had been held when a continuous-MI was activated. 累计连续 MI计数器继续从在激活连续 MI时所持的点开始计数

3.1.7

calibration verification number 校准验证号

CVN

server/ECU calculated verification number used to verify the integrity of the software/calibration contained in a server/ECU. 服务器/ECU 计算验证编号, 用于验证服务器/ECU 中包含的软件/校准的完整性

NOTE If regulations require calibration identifications for emissions-related software, those are reported in a standardized format as specified in ISO 27145- 2. 如果法规要求与排放相关的软件校准标识, 则以 ISO 27145-2 中指定的标准格式报告这些规则。

3.1.8

discriminatory display 歧视性显示

requires the MI to be activated according to the class in which a malfunction has been classified 要求 MI 被激活根据故障被分类的类

3.1.9

Malfunction 故障

failure or deterioration of a vehicle or engine system or component, including the OBD system, during which the WWH-OBD GTR specifically identifies the conditions which are considered to be failures 汽车或发动机系统或部件 (包括 OBD 系统) 的故障或损坏, 在WWH-OBD GTR特殊识别被认为是失败的条件。

3.1.10

malfunction indicator 故障指示器

MI

display or gauge that clearly informs the driver of the vehicle in the event of a malfunction/failure 在发生故障/故障时明确通知车辆驾驶员的显示器或仪表

NOTE Additional details are included in the WWH-OBD GTR.

3.1.11

malfunction indicator counter 故障指示器计数器

MI counter

conveys the amount of time during which the OBD system operates while a failure/breakdown is active 传递在故障/故障处于活动状态时, 系统运行的时间量

3.1.12

non-discriminatory display 非歧视性显示

indicator requiring only a single type of MI activation 仅需要单一类型的 MI 激活的指示器

3.1.13

on-board diagnostics 车载在线诊断系统

OBD

system that monitors some or all computer input and control signals 监控部分或全部计算机输入和控制信号的系统

NOTE Signal(s) outside of the predetermined limits imply a fault in the system or in a related system. 在预定限制之外的信号意味着系统或相关系统中有故障

3.1.14

previously active DTC 历史 DTC

DTC status that is first detected during two consecutive operation cycles but later detection shows that the fault is no longer present 在连续两个操作周期中首次检测到的 DTC 状态, 但以后的检测显示故障不再存在

3.1.15

vehicle identification number 车辆识别码

VIN

numeral identifying and specific and unique to each vehicle according to the applicable legal provisions of each national/regional authority

3.1.16

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vehicle on-board diagnostics 车载诊断

providing a single access point for external test equipment to retrieve all data of the OBD system

3.2 Abbreviated terms

CALID	calibration identification 标定标识
CVN	calibration verification number 校准验证号
DTC	diagnostic trouble code 诊断故障代码
DID	diagnostic data identifier 诊断数据标识符
DLL	data link layer 数据链路层
ECM	engine control module 发动机控制模块
ECU	electronic control unit 电子控制单元
FMI	failure mode indicator 故障模式指示器
FTB	failure type byte 故障类型字节
GTR	global technical regulations 全球技术法规
HS	high speed 高速
HS-LPM	high speed – low power mode 高速-低功耗模式
MI	malfunction indicator 故障指示器
SPN	suspect parameter number 可疑参数编号
UDS	unified diagnostic services 统一诊断服务
VIN	vehicle identification number 车辆标识号
VOBD	vehicle on-board diagnostics 车载诊断
WLAN	wireless local area network 无线局域网
WWH-OBD	world-wide harmonized on-board diagnostics 全球统一的在线诊断
WWH-OBDonCAN	world-wide harmonized on-board diagnostics on controller area network 基于CAN协议的全球统一的在线诊断
WWH-OBDonIP	world-wide harmonized on-board diagnostics on internet protocol 基于互联网协议的全球统一的在线诊断

4 Conventions 公约

The ISO 27145 series is based on the conventions discussed in the OSI Service Conventions (ISO/IEC 10731) as they apply to diagnostic services.

ISO 27145 系列基于 OSI 服务公约 (iso/IEC 10731) 中讨论的约定, 因为它们适用于诊断服务。

5 Document overview 文档预览

Figure 2 shows the reference documents for the ISO 27145 series. 图2显示了 ISO 27145 系列的参考文档。

The ISO 27145 series specifies or includes the following references. ISO 27145 系列指定或包含以下引用。

- a) This part of ISO 27145 specifies the general structure of the ISO 27145 series and the WWH-OBd GTR applicable use cases. ISO 27145 的这一部分指定 ISO 27145 系列的一般结构和 WWH 的适用用例。
- b) ISO 27145-2 specifies the common data dictionary with references to: ISO 27145-2 指定通用数据字典引用
- 1) SAE J1930-DA, which defines the terms, definitions, abbreviated terms, etc.; SAE J1930-DA 定义术语、定义、缩写词等。
 - 2) SAE J1939 Companion Spreadsheet, which specifies the SPNs; SAE J1939 包含的 SPNs 电子表格
 - 3) SAE J1939-73:2010, Appendix A, which specifies the FMIs; SAE J1939-73:2010 附录 A 指定信息系统
 - 4) SAE 1979-DA, which specifies all data items; SAE 1979-DA, 它指定所有数据项
 - 5) SAE J2012-DA, which specifies the DTC definitions and FTB definitions. SAE J2012-DA, 它指定 DTC 定义和 FTB 定义

NOTE 1 The SAE J1939 series of documents is concerned with the definition of emissions-related SPNs and FMIs for use as DTCs. SAE J1939 系列文件涉及与排放相关的 SPN 和信息系统的定义, 用作 DTCs。

- c) ISO 27145-3 specifies the diagnostic services defined in ISO 14229-1 that are applicable to WWH-OBd GTR. ISO 27145-3 指定了在 ISO 14229-1 中定义的诊断服务, 改诊断服务用于 WWH-OBd GTR。
- d) ISO 14229-2 specifies the standardized service primitive interface to separate application and session layers from protocol transport and network layers.

ISO 14229-2 指定标准化的服务基元接口, 将应用程序和会话层与协议传输和网络层分开。

- e) ISO 27145-4 specifies the initialization procedure and includes references to ISO 27145-4 指定初始化过程, 并包括对

- 1) ISO 15765-4 DoCAN, and ISO 15765-4 DoCAN 和
- 2) ISO 13400 (all parts) DoIP. ISO 13400 (所有部件) DoIP

The ISO 27145 series provides an implementer with all documents and references required to support the implementation of legislated on-board diagnostics in accordance with the requirements set forth in the GTR.

ISO 27145 系列为实施者提供了必要的所有文件和参考, 以支持根据 GTR 规定的要求执行立法的在线诊断。

- This part of ISO 27145: general information and use case definitions, providing an overview of the series along with the use case definitions and a common set of resources (definitions, references) for use by all subsequent parts. ISO 27145 的这一部分: 一般信息和用例定义, 提供系列的概述以及用例定义和一组共同的资源 (定义、引用), 供所有后续部件使用
- ISO 27145-2: common data dictionary, which provides the general data identifier, ranges and record definitions. The actual data are defined in separate/referenced documents, e.g. emissions-related legislated diagnostics in the SAE digital annexes (see also Note 2). 通用数据字典, 它提供一般数据标识符、范围和记录定义。实际数据是在单独/参考的文件中定义的, 例如 SAE 数字附件中与排放有关的立法诊断 (见附注 2)
- ISO 27145-3: common message dictionary, which provides the message implementation details from ISO 14229-1 and ISO 14229-2 (UDS) to support the required legislated OBD. 通用消息字典, 它提供了来自 iso 14229-1 和 iso 14229-2 (UDS) 的消息实现详细信息, 以支持所需的法定的标准。
- ISO 27145-4: connection between vehicle and test equipment, which defines the details necessary to implement the communication between the vehicle's OBD systems and test equipment, including the definition/reference of physical layers, data link layers, network layer, transport layer and session layer. It is expected to extend ISO 27145-4 as necessary due to the introduction of additional communication media. 车辆与测试设备之间的连接, 它定义了实现车辆的系统和测试设备之间通信所需的详细信息, 包括物理层的定义/参考、数据链路层、网络层、传输层和会话层。由于引入了更多的通信媒体, 预计将在必要时扩展

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ISO 27145-4。

- ISO 27145-5: conformance test, which provides test cases for the vehicle and external test equipment to verify conformance.
一致性测试, 为车辆和外部测试设备提供测试用例, 以验证一致性。
- ISO 27145-6: external test equipment, which provides the requirements to be fulfilled by any external test equipment connected to the vehicle.
外部测试设备, 它提供了与车辆连接的任何外部测试设备所需满足的要求。

NOTE 2 It is intended to introduce additional parts of ISO 27145 as necessary in order to consider additional OBD systems not yet covered.

注2 计划在必要时引入 ISO 27145 的其他部分, 以便考虑尚未涵盖的其他系统。

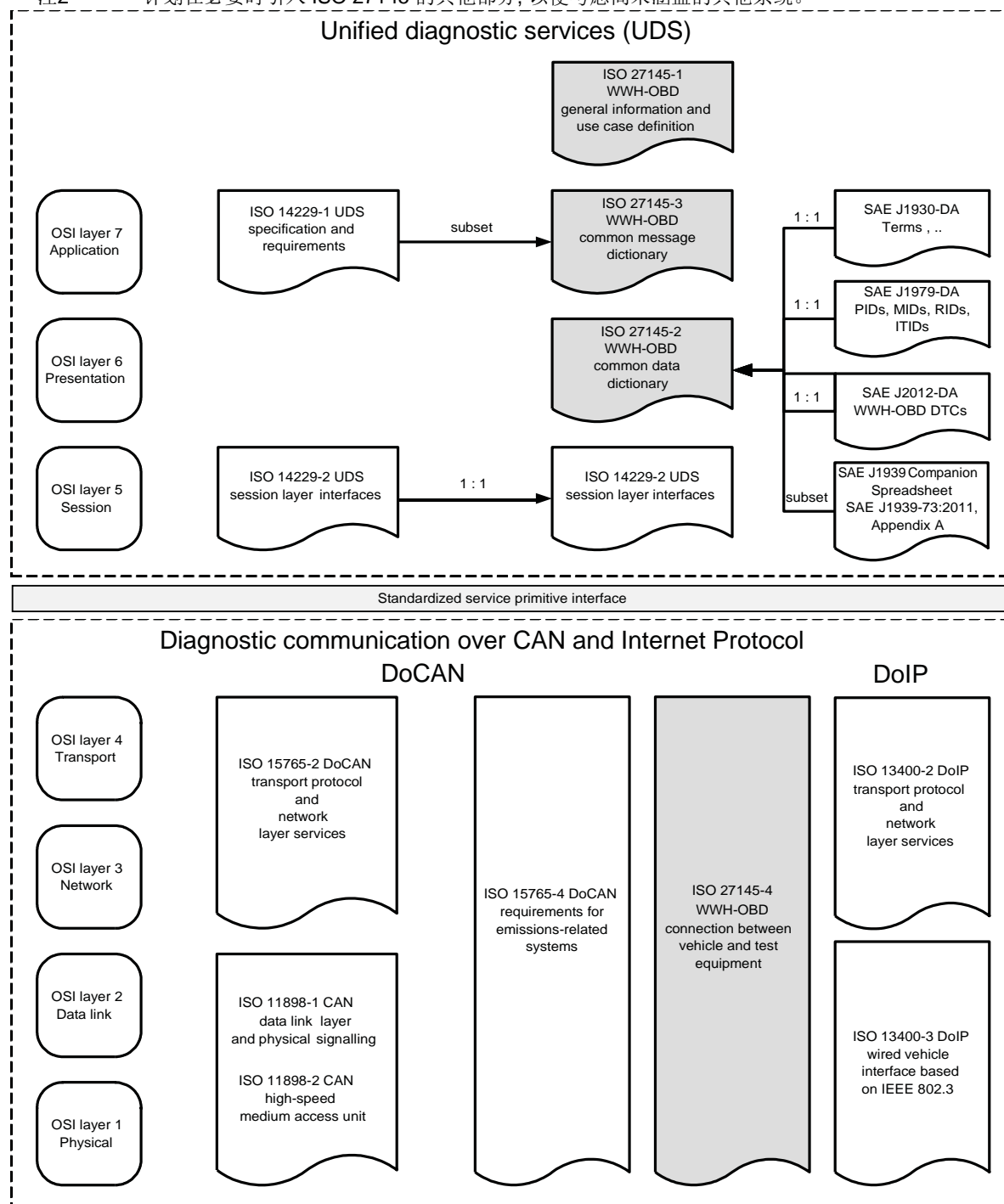


Figure 2 — Implementation of WWH-OBDonCAN and WWH-OBDonIP document reference according to OSI model

6 WWH-OBD use case overview 应用案例概述

6.1 Overview

The OBD system is required to make available vehicle diagnostic information under several different use cases as specified by the GTR. These use cases provide the implementer with guidance in the implementation of the VOBD (described in Clause 8), and methodology used on the vehicle to make the required data available.

OBD系统是必要的, 使可用的车辆诊断信息下的由 GTR 指定几个不同的使用情况下。这些用例为实施者提供了执行 VOBD 的指导 (第8条所述), 以及在车辆上使用的方法, 使所需的数据可用。

NOTE WWH-OBD GTR No. 5 defines the basis for world-wide harmonized regulatory requirements. Translation of GTR No. 5 into country-specific regulatory language can define additional use cases. WWH-OBD GTR No.5定义了全球统一监管要求的基础。将GTR No.5 转换为特定国家的可以定义其他用例的管理语言。

6.2 WWH-OBD use case clusters 使用案例群集

The following is a summary of the use cases applicable to WWH-OBD systems.

以下是适用于 WWH-OBD 系统的用例的摘要。

Table 2 provides an overview of the main WWH-OBD use cases. A main WWH-OBD use case cluster may have one or more use case definition(s). 表2概述了主要的 WWH-OBD 使用情况。主要的 WWH-OBD 使用案例群集可能有一个或多个用例定义。

Table 2 — WWH-OBD main use case clusters

No.	Main title of use case cluster	Brief description
1	Information about the emissions-related OBD system state 有关排放相关的系统状态的信息	The purpose of this information package is to provide the minimum data set specified as necessary by the WWH-OBD GTR to obtain the vehicle or engine state with respect to its emissions performance, as specified in the GTR. A typical use of this information package may be a "roadside check" performed by an enforcement authority. 此信息包的目的是提供 WWH-OBD GTR所需的最小数据集, 以获得在其排放性能方面的车辆或引擎状态, 如在GTR 中所述。此信息包的典型用途可能是执行机构执行的 "路边检查"。
2	Information about active emissions-related malfunctions 有关激活排放相关故障的信息	The purpose of this information package is to provide access to the expanded data set specified as necessary by the WWH-OBD GTR to determine vehicle readiness and characterize the malfunctions detected by the OBD system. A typical use of this information package may be a periodic inspection by enforcement authorities. 该信息包的目的是提供对 WWH-OBD GTR 的扩展数据集的访问, 以确定车辆的准备情况, 并描述了该系统检测到的故障。这种信息包的典型用途可能是执行当局定期检查。
3	Information related to diagnosis for the purpose of repair 以修复为目的与诊断相关的信息	The purpose of this information package is to provide access to all OBD data required by the WWH-OBD GTR and available from the OBD system. A typical use of this information package may be the diagnostic servicing of the vehicle or system in a workshop environment. 此信息包的目的是提供对 WWH-OBD GTR 所需的所有非稳态数据的访问, 并可从该系统获得。此信息包的典型用途可能是在车间环境中对车辆或系统进行诊断服务。

Detailed definitions of each data item listed in the use cases can be found in the emissions-related module of the WWH-OBD GTR. 使用案例中列出的每个数据项的详细定义可以在 WWH-OBD GTR的排放相关模块中找到。

7 WWH-OBd use case definition 应用案例定义

7.1 UC 1 — Information about the emissions-related OBd system state 有关排放的OBd系统状态信息

Table 3 specifies the data set to be supported by the emissions-related VOBD system. 指定与排放相关的 VOBD 系统支持的数据集

Table 3 — UC 1 Information about the emissions-related OBd system state

Actor	Enforcement agency 执法机构
Goal	This use case provides an enforcement agency with the malfunction indication (MI) status and associated vehicle system data (e.g. MI counter, readiness status, etc.). 此用例提供了一个具有故障指示 (mi) 状态和相关车辆系统数据 (如 MI 计数器、就绪状态等) 的强制执行机构。
Use case input	Broadcast request message to retrieve the emissions-related WWH-OBd system state. 广播请求消息以检索与排放相关的 WWH-OBd系统状态。
Use case output	<ul style="list-style-type: none"> — Discriminatory/non-discriminatory display strategy 歧视性/非歧视性显示策略 — The VIN (vehicle identification number) 车辆识别号码 — Presence of a continuous-MI 连续 MI 的存在 — The readiness status of the OBd system 系统的就绪状态 — The number of engine operating hours during which a continuous-MI was last activated (continuous-MI counter) 上次激活连续 mi 的发动机运行小时数 (连续 mi 计数器) — This information shall be read-only access (i.e. no clearing) within the context of use case 1. 在用例1的上下文中, 此信息应为只读访问 (即无清除)
Brief description	The OBd system shall provide the data items as required by the emissions-related module of the WWH-OBd GTR and in the format as specified in ISO 27145-2 for the external roadside check test equipment to assimilate and provide the enforcement agency with the following information. OBd系统应根据 WWH-OBd GTR 的排放相关模块提供所需的数据项, 并按照 ISO 27145-2 中指定的格式, 为外部路边检查试验设备进行同化, 并向执行机构提供以下信息。
Typical example	The vehicle's emissions-related system is checked against roadworthiness at the roadside. 车辆与排放有关的系统在路边进行检查。

7.2 UC 2 — Information about active and confirmed emissions-related malfunctions 有关活动和确认的与排放有关的故障的信息

Table 4 specifies the data set to be supported by the emissions-related vehicle system if inspection/maintenance (I/M) external test equipment is connected.

指定当检测/维护 (I/M) 外部测试设备连接时, 与排放相关的车辆系统支持的数据集。

**Table 4 — UC 2 Information about active and confirmed emissions-related malfunctions
有关活动和确认的与排放有关的故障的信息**

Actor	Any inspection station (I/M station).
Goal	This information provides any inspection station with a subset of engine-related OBD data, including the malfunction indicator status and associated data (MI counters), a list of active/confirmed malfunctions of classes A and B, and associated data (e.g. B1-counter). 此信息为任何检查站提供与引擎相关的检测数据的子集, 包括故障指示器状态和相关数据 (MI 计数器)、A和B类的主动/确认故障列表以及相关数据 (例如,B1-counter)。
Use case input	A predefined sequence of message and data exchange between the I/M equipment and the vehicle's WWH-OBd system ECU(s). 一个预定义的消息和数据交换序列之间的 I/M 设备和车辆的 WWH-OBd系统 ECU (s)。
Use case output	<ul style="list-style-type: none"> — The GTR (and revision) number GTR (和修订) 号 — Discriminatory/non-discriminatory display strategy歧视性/非歧视性显示策略 — The VIN (vehicle identification number) 车辆识别号码 — The malfunction Indicator status 故障指示器状态 — The readiness status of the OBD system OBD 系统的就绪状态 — The number of warm-up cycles and number of engine operating hours since recorded OBD information was last cleared 最后清除了自记录的全数字信息后预热周期和发动机工作小时数 — The number of engine operating hours since the MI was activated (continuous-MI counter) 自 MI激活后的发动机操作小时数 (连续 MI 计数器) — The value of the B1 counter with the highest number of engine operating hours B1 计数器的价值最高的发动机运行小时数 — The cumulated operating hours with a continuous-MI (cumulative continuous-MI counter) 累积的工作时间与连续 mi (累计连续 mi 计数器) — The confirmed and active DTCs for class A malfunctions A类故障的确认和主动 DTCs — The confirmed and active DTCs for classes B (B1 and B2) malfunctions B类 (B1 和 B2) 的确认和主动 DTCs 故障 — The software calibration identification(s) 软件校准标识 (s) — The calibration verification number(s) 校准验证编号 (s) — This information shall be read only access (i.e. no clearing) within the context of use case 2. 此信息应在使用情况下只读访问 (即无结算)案例2。
Brief description	The OBD system shall provide the data items as required by the emissions-related module of the WWH-OBd GTR and in the format as specified in ISO 27145-2 for the external inspection test equipment to assimilate the data and provide an inspector with the following information. OBd系统应按照 ISO 27145-2 所规定的 WWH-OBd GTR 的排放相关模块提供所需的数据项, 供外部检验测试设备吸收数据, 并向检查员提供以下信息。
Typical example	The vehicle's emissions-related system is tested at an I/M station.

7.3 UC 3 — Information related to diagnosis for the purpose of repair 以修理为目的的诊断信息

Table 5 specifies the data set which shall be supported by the emissions-related vehicle system if a repair shop diagnostic external test equipment is connected. 与指定的修理车间诊断外部测试设备连接时, 车辆相关的排放系统需要支持相应的数据集

Table 5 — UC 3 Information related to diagnosis for the purpose of repair

Actor	Repair technicians 维修技术员
Goal	This information provides repair technicians with all OBD data specified in the GTR (e.g. freeze frame information). 此信息为维修技术员提供了在 GTR 中指定的所有的所有的数据 (如冻结帧信息)。
Use case input	A predefined sequence of message and data exchange between the external diagnostic test equipment and the vehicle's WWH-OBD system ECU(s) 外部诊断测试设备与车辆 WWH-OBD 系统 ECU 之间的预定义消息和数据交换序列
Use case output	<ul style="list-style-type: none"> — The GTR (and revision) number GTR (和修订) 号 — The VIN (vehicle identification number) 车辆识别号码 — The MI status MI 状态 — The readiness status of the OBD system OBD系统的就绪状态 — The number of warm-up cycles and number of engine operating hours since recorded OBD information was last cleared 最后清除了自记录的全数字信息后预热周期和发动机工作小时数 — The monitor status (i.e. disabled for the rest of this driver cycle, complete this drive cycle, or not complete this drive cycle) since last engine shut-off for each monitor used for readiness status 显示器状态 (即禁用此驱动程序周期的其余部分, 完成此驱动器周期, 或不完成此驱动器周期), 因为用于监测最后一个引擎关闭以来的每个状态 — The number of engine operating hours since the MI was activated (continuous-MI counter) 自 MI激活后的发动机操作小时数 (连续 MI 计数器) — The confirmed and active DTCs for class A malfunctions A类故障的确认和主动 DTCs — The confirmed and active DTCs for class B (B1 and B2) malfunctions B 类 (B1 和 B2) 的确认和主动 DTCs 故障 — The confirmed and active DTCs for class B1 malfunctions and the number of engine operating hours from the B1 counters B1 故障的确认和主动 DTCs, 以及从 B1 计数器的发动机运行小时数 — The cumulated operating hours with a continuous-MI (cumulative continuous-MI counter) 累积的工作时间与连续 MI (累计连续MI计数器) — The value of the B1 counter with the highest number of engine operating hours B1 计数器的价值最高的发动机运行小时数 — The confirmed and active DTCs for class C malfunctions C 类故障的确认和主动 DTCs — The pending DTCs and their associated classes挂起的 DTCs 及其关联的类 — The previously active DTCs and their associated classes 历史 DTCs 及其关联的类 — Real-time information on OEM selected and supported sensor signals, internal parameters and output signals关于 OEM 选定和支持的传感器信号的实时信息, 内部参数和输出信号 — The freeze frame data 冻结数据帧 — The software CALID(s) [calibration identification(s)] 软件 CALID (s) [校准标识] — The CVN(s) [calibration verification number(s)] CVN [校准验证号] — The OBD system shall clear all the recorded information related to malfunctions of the engine system and related data (operating time information, freeze frame, etc.) according to the provisions of the WWH-OBD GTR, where this request is provided via the external repair test equipment in accordance with ISO 27145-2. OBD系统应根据 WWH -OBD GTR 的规定, 清除与发动机系统故障和相关数据 (操作时间信息, 冻结帧等) 有关的所有记录信息, 在此要求是通过外部根据 ISO 27145-2 维修测试设备。
Brief description	The OBD system shall provide the data items as required by the emissions-related module of the WWH-OBD GTR and in the format as specified in ISO 27145-2 for the external repair test equipment to assimilate the data and provide a repair technician with the following information:
Typical example	The vehicle's emissions-related system is diagnosed by external diagnostic test equipment in a repair shop. 该车辆与排放有关的系统可以由修理店的外部诊断测试设备诊断。

8 Vehicle on-board diagnostic 车辆在线诊断

8.1 VOBD definition VOBD 定义

The following specifies general VOBD information including, but not limited to, minimum functionality, system data storage, and application examples. The information provided in this part of ISO 27145 should be used as a reference framework for VOBD system implementers. 以下内容指定一般 VOBD 信息, 包括但不限于最小功能、系统数据存储和应用程序示例。ISO 27145 这一部分提供的信息应用作 VOBD 系统实施者的参考框架。

The VOBD consists of VOBD包括以下部分

- the VOBD system, which consists of the individual OBD system(s) (e.g. ECUs), VOBD 系统由单个的系统 (如 ECUs) 组成
- a “single VOBD access method” as required by the WWH-OBD GTR to provide access to the VOBD data set and all other diagnostic functions, and WWH VOBD 的 “单一的访问方法”, 以提供对 VOBD 数据集和所有其他诊断功能的访问, 并
- the “VOBD data set”, which is defined as a limited set of data provided by the OBD systems to fulfil the requirements of the various use cases as defined in the WWH-OBD GTR. “VOBD 数据集”, 它被定义为一个有限的数据集, 由该系统提供, 以满足 WWH 所定义的各种用例的要求。

The VOBD always supports the same request and response behaviour while communicating with the external test equipment. 在与外部测试设备通信时, VOBD 始终支持相同的请求和响应行为。

8.2 The VOBD system

821 The VOBD system shall be implemented in the vehicle’s electrical architecture and shall meet the communication performance requirements as specified in the WWH-OBD GTR.

VOBD 系统应在车辆的电气结构中实施, 并应符合 WWH-OBD GTR 的要求。

The VOBD system provides the flexibility for the extension of the use of the ISO 27145 series (e.g. adding the wireless access to emissions-related OBD data defined in use case 1 in the future). VOBD 系统为扩展 ISO 27145 系列的使用提供了灵活性 (例如, 在将来的用例1中增加了无线接入与排放相关的标准数据)。

One of the ECU(s) of the VOBD system may act as a gateway between the external test equipment and the other ECU(s) of the VOBD system in case the OSI layers 1 to 4 of the in-vehicle network are different from those defined within this part of ISO 27145. VOBD 系统的ECU之一可能充当外部测试设备和 VOBD 系统的其他ECU之间的网关, 以防在车载网络中的 OSI 层1到4与在 ISO 27145 的这一部分中定义的内容不同。

The VOBD system may be (a) dedicated ECU(s), or be provided by another vehicle ECU or system. It is possible that the VOBD functionality can exist as a “software only” module in a vehicle system. The VOBD system provides the flexibility to support not only emissions-related OBD systems, but also other legislated vehicle systems which can be under consideration. VOBD 系统可能是 (a) 专用ECU, 或由另一辆汽车ECU 或系统提供。VOBD 功能可能在车辆系统中作为 “仅软件” 模块存在。VOBD 系统提供了灵活性, 不仅支持与排放有关的系统, 而且还可以考虑其他立法的车辆系统。

The following are examples for the implementation of the VOBD system in the vehicle’s network.

以下是在车辆网络中实施 VOBD 系统的例子

Figure 3 shows two implementation examples of the VOBD system in a gateway ECU and the engine ECU (ECU 1). The gateway ECU is not part of the example of an emissions-related OBD system.

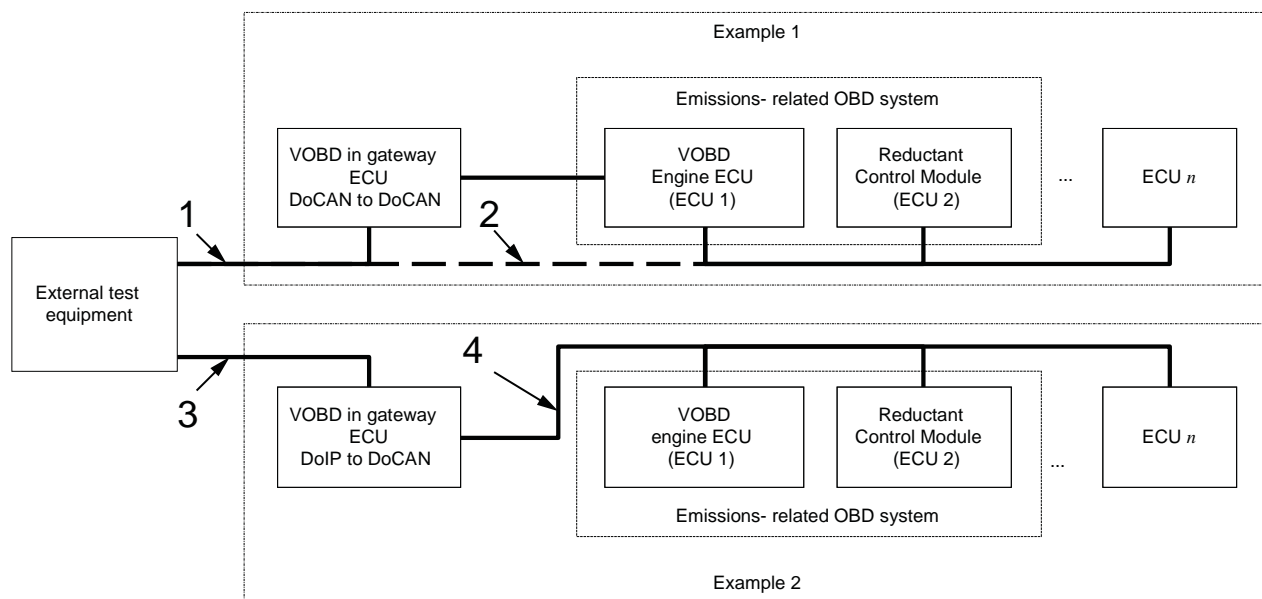
图3显示了网关ECU 和引擎ECU (ECU 1) 中 VOBD 系统的两个实现示例。网关 ECU 不属于与排放相关的系统的例子。

EXAMPLE 1 The external test equipment communicates to the vehicle gateway or directly to the WWH-OBD GTR compliant emissions-related ECUs using the ISO 27145-4 and ISO 15765-4 DoCAN protocol. The VOBD system is implemented in the gateway ECU and engine ECU (ECU 1).

示例1外部测试设备使用ISO 27145-4 和ISO 15765-4 DoCAN 协议, 与车辆网关或直接 WWH 与 ECUs 符合的与排放相关的与发射有关的产品进行通信。VOBD 系统在网关ECU 和引擎ECU (ECU 1) 中实现。

EXAMPLE 2 The external test equipment communicates to the vehicle gateway using the ISO 27145-4 and ISO 13400-2 DoIP protocol. The gateway communicates to the WWH-OBD GTR compliant emissions-related ECUs using the ISO 15765-4 DoCAN protocol. The VOBD system is implemented in the gateway ECU and engine ECU (ECU 1).

示例2外部测试设备使用ISO 27145-4 和 ISO13400-2 DoIP 协议与车辆网关通信。该网关通过 ISO 15765-4 DoCAN 协议, 与 WWH 的符合 ECUs 的排放相关的。VOBD 系统在网关 ECU和引擎 ECU (ECU 1) 中实现。



Key

- 1 connection according to ISO 27145-4 and ISO 15765-4 DoCAN
- 2 connection according to ISO 27145-4 and ISO 15765-4 DoCAN (in-vehicle network)
- 3 connection according to ISO 27145-4 and ISO 13400 DoIP
- 4 connection according to ISO 27145-4 and ISO 15765-4 DoCAN (in-vehicle network)

Figure 3 — Implementation example of VOBD in a gateway ECU and engine ECU

822 Figure 4 shows two implementation examples of the VOBD system in an engine ECU (ECU 1), which is part of the example of an emissions-related OBD system.

图4显示了 VOBD 系统在发动机 ECU (ECU 1) 中的两个实现示例, 这是与排放相关的系统的例子之一。

EXAMPLE 1 The external test equipment communicates directly to the WWH-OBd GTR compliant emissions-related ECUs using the ISO 27145-4 and ISO 15765-4 DoCAN protocol. The VOBD system is implemented in the engine ECU (ECU 1).
示例1外部测试设备直接与 WWH 符合的与排放相关的ECUs 使用 ISO27145-4 和 ISO15765-4 DoCAN 协议。VOBD 系统在发动机 ECU (ECU1) 中实现。

EXAMPLE 2 The external test equipment communicates to the vehicle gateway using the ISO 27145-4 and ISO 13400-2 DoIP protocol. The gateway communicates to the WWH-OBd GTR compliant emissions-related ECUs using the ISO 15765-4 DoCAN protocol. The VOBD system is implemented in the engine ECU (ECU 1).
示例2外部测试设备使用 ISO27145-4 和ISO13400-2 DoIP 协议与车辆网关通信。该网关通过 ISO 15765-4 DoCAN 协议, 与 WWH 的符合 ECUs 的排放相关的。VOBD 系统在发动机ECU (ECU 1) 中实现。

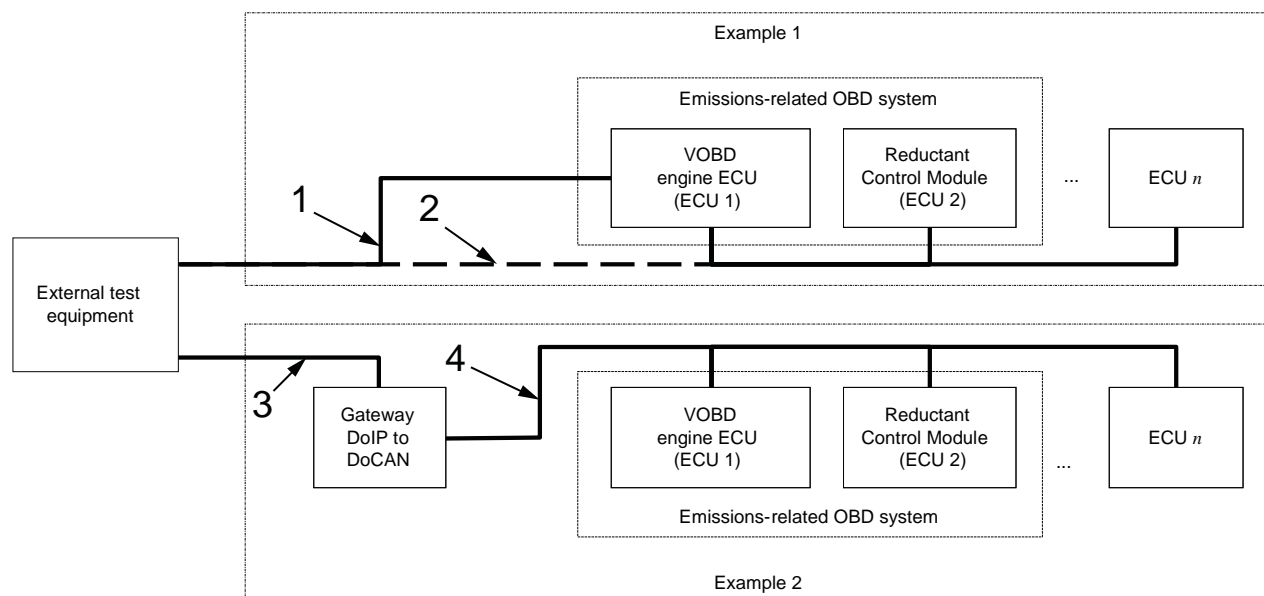
823 Figure 5 shows two implementation examples of the VOBD system in an engine ECU (ECU 1) and a Reductant Control Module (ECU 2). Both are part of the example of an emissions-related OBD system.

EXAMPLE 1 The external test equipment communicates directly to the WWH-OBd GTR compliant emissions-related ECUs using the ISO 27145-4 and ISO 15765-4 DoCAN protocol. The VOBD system is implemented in the engine ECU (ECU 1) and a Reductant Control Module (ECU 2).

EXAMPLE 2 The external test equipment communicates with the vehicle gateway using the ISO 27145-4 and ISO 13400-2 DoIP protocol. The gateway communicates with the WWH-OBd GTR compliant emissions-related ECUs using the ISO 15765-4 DoCAN protocol. The VOBD system is implemented in the engine ECU (ECU 1) and a Reductant Control Module (ECU 2).

IMPORTANT — It is the manufacturer's responsibility to decide/determine whether the implementation of the example of an emissions-related OBD system is implemented in a single ECU or distributed across multiple networked ECUs.

重点——制造商有责任决定/确定是否在单个ECU中实施与排放相关的ECUs系统的示例, 或在多个网络上分布

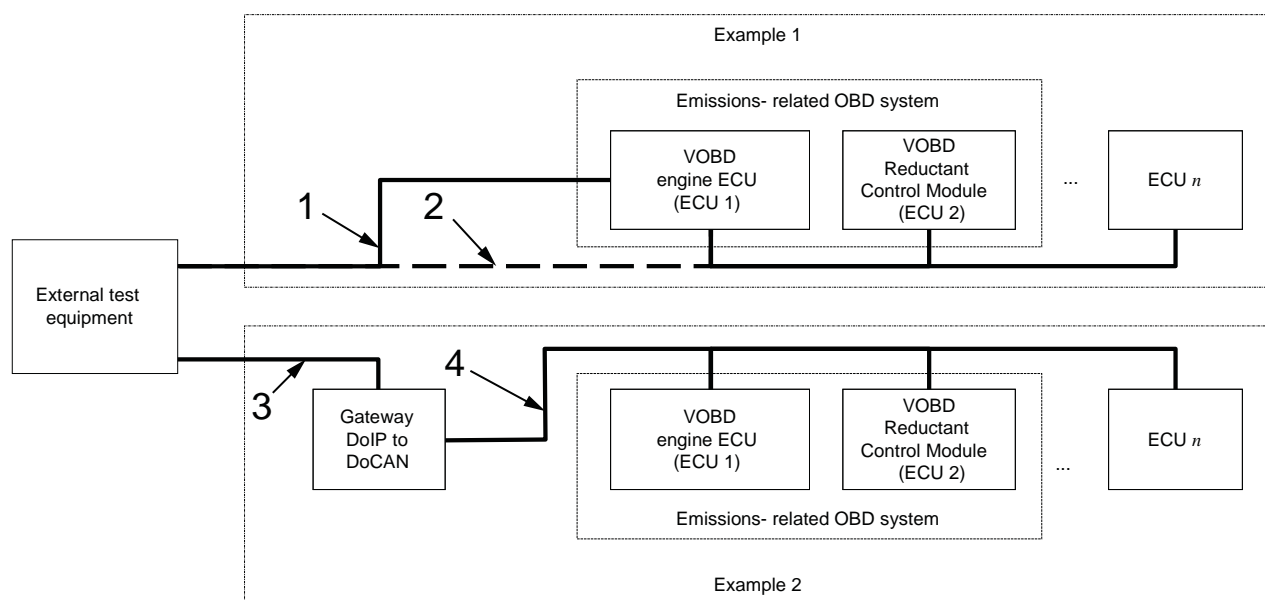


Key

- 1 connection according to ISO 27145-4 and ISO 15765-4 DoCAN
- 2 connection according to ISO 27145-4 and ISO 15765-4 DoCAN (in-vehicle network)
- 3 connection according to ISO 27145-4 and ISO 13400 DoIP
- 4 connection according to ISO 27145-4 and ISO 15765-4 DoCAN (in-vehicle network)

Figure 4 — Implementation example of VOBD in an engine ECU

VOBD 在发动机 ECU 中的实现实例



Key

- 1 connection according to ISO 27145-4 and ISO 15765-4 DoCAN
- 2 connection according to ISO 27145-4 and ISO 15765-4 DoCAN (in-vehicle network)
- 3 connection according to ISO 27145-4 and ISO 13400 DoIP
- 4 connection according to ISO 27145-4 and ISO 15765-4 DoCAN (in-vehicle network)

Figure 5 — Implementation example of VOBD in an engine ECU and a Reductant Control Module

8.3 The VOBD data set VOBD 数据设置

The VOBD data is defined as all data available from the VOBD system. Depending on the various use cases, the OBD data may be provided by the individual OBD systems [e.g. emissions-related ECU(s)] or may be pre-collected. VOBD 数据定义为从 VOBD 系统中可用的所有数据。根据不同的使用情况, 可由单个的系统 (如与排放相关的 ECU) 提供的, 或可能预先收集到的。

Therefore, the following two types of data are defined. 因此, 定义了以下两种类型的数据。

- a) Burst access data is defined as a limited set of read-only data which shall be provided by the VOBD system upon request from the external test equipment in a very fast manner. Furthermore, the transmission has to be finished within a limited amount of time under all circumstances. Burst access data may be accessed via data caching mode and direct access mode (see 8.4 for the criteria to identify the appropriate method to implement access to this type of data). The VOBD data sets which shall be implemented as burst access data are defined as a limited set of the overall data provided by the OBD system(s) to meet the requirements of the various use cases as defined in the specific modules of the WWH-OBD GTR.

突发访问数据被定义为一组有限的只读数据, VOBD 系统应根据外部测试设备的要求, 以非常快的方式提供。此外, 在任何情况下, 传输必须在有限的时间内完成。可以通过数据缓存模式和直接访问模式访问突发访问数据 (请参见 8.4, 以确定用于实现对此类数据的访问的适当方法) 的条件。作为突发访问数据实施的 VOBD 数据集被定义为用于满足 WWH-OBD GTR 的特定模块中定义的各种用例要求的一套有限的全系统数据。

- b) Normal access data requires extended transmission time and includes further diagnostic functionality which requires bi-directional interaction between the external test equipment and the VOBD system. Due to its nature, normal access data is only supported via the direct access method defined in 8.4 as the external test equipment can require interaction with the individual OBD system(s). Normal access data is all data defined by the modules of the WWH-OBD GTR, which is not explicitly defined to be of the type burst access data.

正常的访问数据需要延长传输时间, 并包括进一步的诊断功能, 这需要外部测试设备和 VOBD 系统之间的双向交互。由于外部测试设备需要与个别的系统进行交互, 因此, 由于其性质, 正常的访问数据仅通过8.4 中定义的直接访问方法来支持。正常访问数据是由 WWH-OBD GTR 的模块定义的所有数据, 没有明确定义为类型突发访问数据。

Table 6 includes example data (e.g. roadworthiness data) of the VOBD system, which consists of, for example, two emissions-related OBD ECUs. 包括 VOBD 系统的示例数据 (如车辆行驶数据), 其中包括两个与排放有关的 ECUs。

Table 6 — Example of a VOBD pre-collected emissions OBD vehicle information
VOBD 预收集的排放量的示例车辆信息

Data element	Data (in accordance with ISO 27145-2)
VOBD determined WWH-OBD GTR number	WWH-OBD GTR no.
VOBD determined VIN number	1FMDK02145GA02359
VOBD determined MI status	OFF
VOBD determined readiness status	READY
VOBD determined emissions readiness status	READY
VOBD determined MI counter	0 hours

8.4 The VOBD access method VOBD存取方法

8.4.1 Overview

The VOBD access method facilitates the access to the vehicle's OBD system(s). The VOBD access method supports two modes: VOBD 接入方法方便了对车辆的车载系统的访问。VOBD 访问方法支持两种模式:

- a) VOBD data caching mode (optional), and/or VOBD 数据缓存模式 (可选) 和/或
- b) VOBD direct data mode (mandatory). VOBD 直接数据模式 (强制)

The two operating modes are referred to as the single OBD access method as required by the specific modules of the WWH-OBD GTR. 这两种操作模式被称为 WWH-OBD GTR 的特定模块所要求的单一的双向接入方法。

8.4.2 VOBD data caching mode VOBD数据缓存模式

8.4.2.1 General description

The intention of the data caching mode is to ensure OBD system(s) data availability upon external test equipment request for specific use cases requiring the OBD system(s) to provide burst read-only data access for in-vehicle network communication architectures, which due to their nature are not optimized for the specific use cases. This type of data is referred to as burst access data as defined in 8.3.

数据缓存模式的目的是确保在外部测试设备要求的情况下,对特定使用情况的系统数据可用性,要求该系统为车载网络通信体系结构提供突发只读数据访问,由于他们的自然不是优选的为具体用例。此类数据称为8.3中定义的突发访问数据

The periodic precollected/precached data (data caching) mode is recommended in case the in-vehicle network connecting the OBD system(s) and relevant ECU(s) is too busy with normal operation communication to provide the burst access data as specified in the WWH-OBd GTR.

建议使用周期性的 precollected/预缓存数据 (数据缓存) 模式,以使与该系统连接的车载网络和相关的 ECU 忙于正常的操作通信,以提供WWH-OBd GTR。

In this mode, the data cache of the VOBD acts as the source of information defined by those use cases, which require the OBD system(s) to make burst access data available upon the external test equipment's request. The VOBD system continuously caches information from the relevant OBD system(s). This information is then available for specimen/sample inspection by external inspection test equipment.

在这种模式下,VOBD 的数据缓存充当这些用例所定义的信息的来源,这些用例要求在外部的测试设备的请求下,使用该系统来使突发访问数据可用。VOBD 系统不断地从相关的系统中缓存信息。此信息可供外部检验测试设备进行试样/样品检验。

The information requested by the external test equipment depends on the specific use cases as specified by the specific modules of the WWH-OBd GTR. Each use case requires a set of data supported by the individual OBD system(s).

外部测试设备要求的信息取决于 WWH 的特定模块所指定的特定用例。每个用例都需要一组独立的系统支持的数据。

IMPORTANT — It is the manufacturer's responsibility to determine the necessity of the implementation of VOBD data caching mode to support the burst data access in order to comply with the WWH-OBd GTR communication performance requirements.

重点——制造商有责任确定实现 VOBD 数据缓存模式的必要性,以支持突发数据访问,以符合 WWH -OBd GTR 通信性能要求。

8.4.2.2 VOBD data caching sampling period definition VOBD 数据缓存采样周期定义

The maximum age of each data item is defined in ISO 27145-4 in compliance with the requirements of the WWH-OBd GTR, which is referred to as maximum data age. In case additional modules of the WWH-OBd GTR are legislated, the ISO 27145 series is expected to be extended accordingly.

每个数据项的最大寿命在 ISO 27145-4 中被定义为符合 WWH-OBd GTR 的要求,它被称为最大数据年龄。如果 WWH-OBd GTR 的其他模块的立法,ISO 27145 系列预计将相应扩大。

IMPORTANT — The maximum data age is different from the communication timing requirements associated with burst access data and normal access data.

最大数据寿命与突发访问数据和正常访问数据关联的通信定时要求不同。

EXAMPLE A specific data item can be required not to be older than 10s, but can be required to be implemented as burst access data.

举例：可以要求特定数据项不超过十秒,但可以要求将其作为突发访问数据实现。

8.4.2.3 VOBD caching mode implementation VOBD 缓存模式实现

This subclause describes the implementation of the VOBD data caching mode. The gateway ECU utilizes the same diagnostic services that the external test equipment would use in direct data mode to cache read-only data from the example of an emissions-related OBD system ECU(s). Alternatively, the gateway ECU may retrieve the requested information via normal communication on the vehicle's network.

本小节描述了 VOBD 数据缓存模式的实现。网关 ECU 利用外部测试设备在直接数据模式下使用的同样的诊断服务,从与排放相关的检测系统 ECU 的例子中缓存只读数据。或者,网关 ECU 可以通过车辆网络上的正常通信来检索所请求的信息。

ISO 27145-1:2012(E)

The data caching process (see Figure 6, key items 1 and 2) is continuously executed independent of any request from the external test equipment to the VOBD system in the gateway ECU (see Figure 6, key item 3) and the response (see References [8] and [9]) from the VOBD system in the gateway ECU to the external test equipment (see Figure 6, key item 4). The response (see References [8] and [9]) from the VOBD system in the gateway ECU contains previously cached data (e.g. roadworthiness data of the emissions-related OBD system) (see Figure 6, key items 1 and 2).

数据缓存过程 (参见图 6, 关键项目 1 和 2) 连续执行独立于外部测试设备对网关 ECU 中的 VOBD 系统的任何请求 (参见图 6、关键项 3) 和响应 (参见参考 [8] 和 [9]) 从 VOBD 体系 m 在网关 ECU 到外部测试设备 (参见图 6, 关键项目 4)。响应 (参见参考 [8] 和 [9]) 从网关 ECU 中的 VOBD 系统中包含以前缓存的数据 (例如与排放相关的系统的车辆化数据) (见图 6, 关键项目 1 和 2)。

In Figure 4, the VOBD caching mode is implemented in the gateway ECU. Key items 1 and 2 show the process of caching burst access data. This process shall be implemented in a way to meet the maximum data age requirements from the specific modules of the WWH-OBD GTR.

在图 4 中, VOBD 缓存模式在网关 ECU 中实现。关键项目 1 和 2 显示了缓存突发访问数据的过程。此过程应以满足 WWH 的特定模块的最大数据年龄要求的方式实施。

Figure 6, key items 3 and 4, describe the process of the gateway ECU providing previously cached data upon request for burst access data from the external test equipment.

图 6, 关键项目 3 和 4 描述了网关 ECU 在请求从外部测试设备获得突发访问数据时提供以前缓存数据的过程。

- a) The gateway ECU periodically collects (requests) updated roadworthiness data from the emissions-related OBD system which is implemented in ECU 1 and 2.

网关 ECU 定期收集 (要求) 更新的与排放有关的系统的车辆行驶数据, 这是在 ECU 1 和 2 中实施的。

- b) The OBD system(s) (example of an emissions-related OBD system) responds with the requested data if this specific data is supported by the individual OBD system.

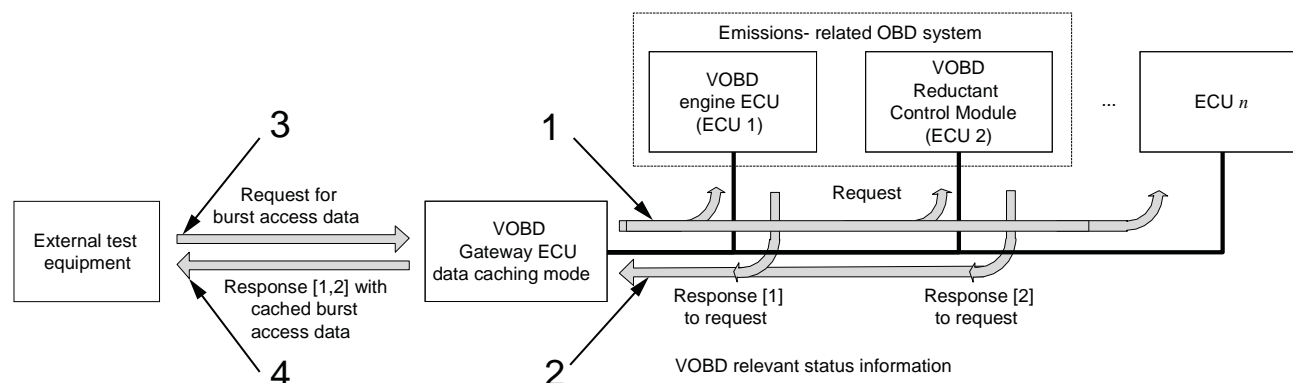
如果请求的数据得到独立的 OBD 系统的支持, 则该 OBD 系统 (与排放相关的 OBD 系统) 需响应所要求的数据。

- c) Where the external test equipment requests burst access data, the gateway ECU implementing the VOBD caching mode responds to specific data requests from the external test equipment.

当外部测试设备请求突发访问数据时, 实现 VOBD 缓存模式的网关 ECU 响应外部测试设备的特定数据请求。

- d) The gateway ECU implementing the VOBD caching mode sends response messages to the external test equipment from its data cache from each example of an emissions-related OBD system ECU(s) which are part of the VOBD system. In Figure 6, the response (see Reference [8]) contains cached roadworthiness data from ECU 1 and the response (see Reference [9]) contains cached roadworthiness data from ECU 2.

实现 VOBD 缓存模式的网关 ECU 从其数据缓存中向外部测试设备发送响应消息, 从每个与排放相关的 VOBD 系统 ECU 的示例中都可以得到这些信息。在图 6 中, 响应 (参见参考 [8]) 包含来自 ECU1 的高速缓存的标准数据, 响应 (请参见参考 [9]) 包含来自 ECU2 的缓存的车辆行驶数据。



Key

- 1 request from gateway ECU to emissions-related OBD system ECUs to cache burst access data
从网关 ECU 到排放相关的 ECUs 系统的请求缓存突发访问数据
- 2 gateway ECU collects response (see Reference [8]) from engine ECU (ECU 1) and response (see Reference [9]) from Reductant Control Module (ECU 2)
网关 ECU 收集反应 (参见参考 [8]) 从引擎 ECU (ECU 1) 和反应 (参见参考 [9]) 从还原器控制模块 (ECU 2)
- 3 request from external test equipment to the VOBD system to retrieve emissions-related burst access data

外部测试设备要求 VOBD 系统检索与排放有关的突发访问数据

- 4 response (see References [8] and [9]) from VOBD system in the gateway ECU containing the cached data (e.g. roadworthiness data) of the emissions-related OBD system.

响应 (参见参考 [8] 和 [9]) 从 VOBD 系统在包含缓存数据的网关 ECU (例如, 车辆行驶数据) 与排放相关的系统。

Figure 6 — VOBD caching methodology of roadworthiness data in a gateway ECU

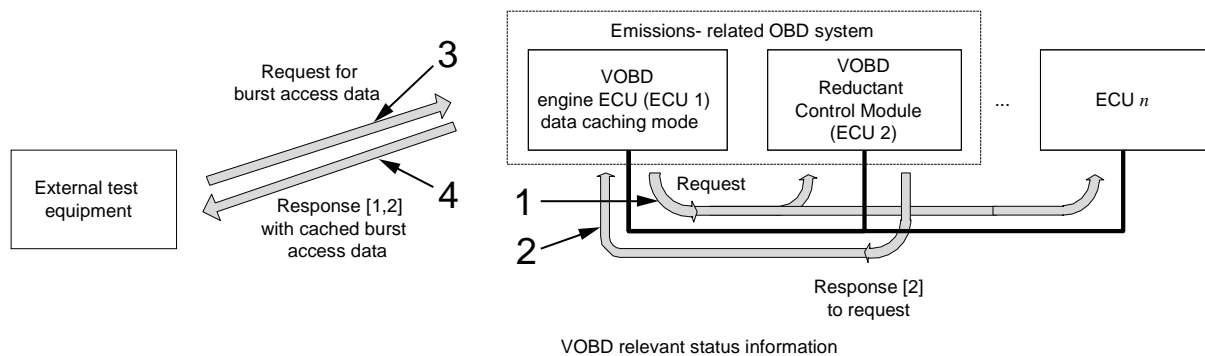
网关 ECU 中 VOBD 数据的缓存方法

In Figure 7, the VOBD caching mode is implemented in the engine ECU. The engine ECU utilizes the same diagnostic services that the external test equipment would use in direct data mode to cache read-only data from the example of an emissions-related OBD system ECU(s).

在图7中, VOBD 缓存模式在引擎 ECU 中实现。发动机 ECU 利用外部测试设备在直接数据模式下使用的同样的诊断服务, 从与排放相关的可测量系统 ECU 的例子中缓存只读数据。

The data caching process (see Figure 7, key items 1 and 2) is continuously executed independent of any request from the external test equipment to the VOBD system in the engine ECU (see Figure 7, key item 3) and the response (see References [8] and [9]) from the VOBD system in the gateway ECU to the external test equipment (see Figure 7, key item 4). The response (see References [8] and [9]) from the VOBD system in the gateway ECU contains previously cached data (e.g. roadworthiness data of the emissions-related OBD system) (see Figure 7, key items 1 and 2).

数据缓存过程 (参见图 7, 关键项目1和 2) 是连续执行独立的任何要求从外部测试设备到 VOBD 系统在发动机 ECU (见图 7, 关键项目 3) 和响应 (见参考 [8] 和 [9]) 从 VOBD 系统在网关 ECU 的外部测试设备 (见图 7, 关键项目 4)。响应 (参见参考 [8] 和 [9]) 从网关 ECU 中的 VOBD 系统中包含以前缓存的数据 (例如与排放相关的系统的车辆化数据) (见图 7, 关键项目1和 2)。



Key

- 1 request from engine ECU (ECU 1) to emissions-related OBD system ECUs and the engine ECU's internal VOBD implementation to cache burst access data
从发动机 ECU (ECU 1) 到排放相关的 ECUs 系统的要求和发动机 ECU 的内部 VOBD 实现缓存突发访问数据
- 2 engine ECU (ECU 1) collects response (see Reference [8]) from its internal VOBD implementation and response (see Reference [9]) from the Reductant Control Module (ECU 2)
发动机 ECU (ECU 1) 从其内部 VOBD 实现和响应 (参见 [9]) 中收集还原器控制模块 (ECU 2) 中的响应 (见参考 [8])
- 3 request from external test equipment to VOBD system in the engine ECU (ECU 1) to retrieve burst access data
来自外部测试设备的请求, 到 VOBD 系统在发动机 ECU (ECU 1) 检索突发访问数据
- 4 response (see References [8] and [9]) from VOBD system in the engine ECU (ECU 1) containing the cached data (e.g. roadworthiness data) of the emissions-related OBD system
响应 (参见参考 [8] 和 [9]) 从 VOBD 系统在发动机 ECU (ECU 1) 包含被缓存的数据 (例如车辆数据) 与排放相关的 OBD 系统

Figure 7 — Example of VOBD cached roadworthiness data in the engine ECU

8.4.3 VOBD direct data mode VOBD 直接数据模式**8.4.3.1 General description**

The pass-through data (direct data) mode is recommended in case the in-vehicle network connecting the OBD system(s) and relevant ECU(s) meet the communication performance requirements of the specific module of the WWH-OBD GTR. This mode of operation is recommended for the burst data access, if the OBD system and vehicle network performance is sufficient to comply with the WWH-OBD GTR communication performance requirements. This choice should minimize the impact of possible future evolutions, e.g. new OBD systems required by specific modules of the WWH-OBD GTR.

建议采用直通数据 (直接数据) 模式, 以使在车载网络中连接的OBD系统和相关 ECU 满足WWH-OBD GTR特定模块的通信性能要求。对于突发数据访问, 建议采用这种操作模式, 如果该系统和车载网络性能足以符合 WWH 的 GTR 通信性能要求。这一选择应尽量减少未来可能的演变的影响, 例如 WWH 的特定模块所需的新的系统。

In this mode, the VOBD system is in a pass-through (direct data) mode of operation and acts as a message header converter in case the data link between the external test equipment and the ECU(s), containing the VOBD system, is different.

在这种模式下, VOBD系统是在一个直通 (直接数据) 模式的操作, 并作为一个消息头转换器, 以防外部测试设备和 ECU之间的数据链路, 包含VOBD系统, 是不同的。

8.4.3.2 VOBD direct data mode implementation VOBD 直接数据模式实现

The external test equipment requests VOBD emissions-related OBD system status information (e.g. roadworthiness data) from the VOBD.

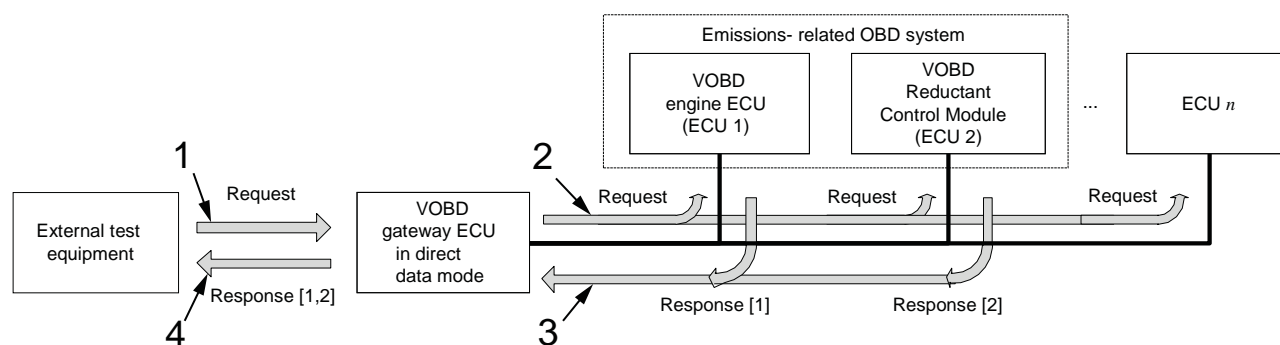
外部测试设备从VOBD请求 VOBD 排放相关OBD系统状态信息 (例如, 车辆行驶数据)。

The implementation is based on the VOBD direct data mode in an ECU (e.g. gateway ECU) which is not part of the sample/specimen emissions-related OBD system. The VOBD in direct data mode performs any necessary modifications to the original external test equipment request and forwards this request to the vehicle's internal network. The emissions-related OBD system, which is implemented in ECU 1 and 2, sends two response messages to the gateway ECU containing the VOBD function in direct data mode. ECU *n* does not send a response message because it is not part of the emissions-related OBD system. The VOBD function passes the response messages through and the gateway ECU performs any necessary modifications to the message frame to meet the data link requirements of the connection between the vehicle and the external test equipment.

该实现是基于 VOBD 直接数据模式的ECU(如网关 ECU), 这不是样本/样本排放相关的系统的一部分。直接数据模式下的 VOBD 对原始外部测试设备请求进行必要的修改, 并将此请求转发到车辆的内部网络。在ECU1和2中实现的与排放相关的系统, 在直接数据模式下, 向包含 VOBD 函数的网关 ECU 发送两个响应消息。ECU 不发送响应消息, 因为它不是与排放相关的系统的一部分。VOBD 函数传递响应消息, 网关 ECU 对消息帧执行任何必要的修改, 以满足车辆与外部测试设备之间连接的数据链路要求。

In Figure 8, the VOBD function is implemented in the gateway ECU, engine ECU and Reductant Control Module. The gateway ECU routes the request from the external test equipment to the example of an emissions-related OBD system ECU(s). Those ECU(s) respond individually on the request if the requested data is supported by the ECUs. The gateway ECU routes the two response messages back to the external test equipment, one response (see Reference [8]) containing roadworthiness data from ECU 1 and one response (see Reference [9]) containing roadworthiness data from ECU 2.

在图8中, VOBD 函数是在网关ECU、发动机 ECU 和还原器控制模块中实现的。网关 ECU 将请求从外部测试设备路由到与排放相关的系统 ECU 的示例。如果 ECUs 支持请求的数据, 这些 ECU 就会对请求进行个别响应。网关 ECU 将两个响应消息路由回外部测试设备, 一个响应 (见参考 [8]), 其中包含来自ECU1 和一个响应 (见参考 [9]), 其中包含来自ECU2 的车辆行驶数据。



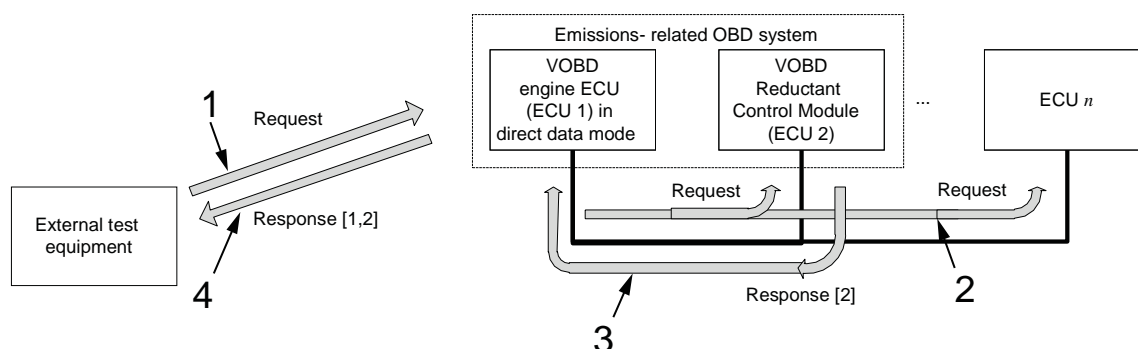
Key

- 1 request from external test equipment to VOBD system to retrieve normal access data or burst access data
外部测试设备要求 VOBD 系统检索正常访问数据或突发访问数据
- 2 gateway ECU routes external test equipment request to emissions-related OBD system ECUs
网关 ECU 路由外部测试设备要求与排放相关的 ECUs 系统
- 3 response (see Reference [8]) of the engine ECU (ECU 1) and response (see Reference [9]) of the Reductant Control Module (ECU 2) containing data of the emissions-related OBD system
响应(参见参考 [8]) 引擎 ECU (ECU1) 和响应 (参见 [9]) 的还原控制模块 (ECU 2) 包含与排放相关的系统数据
- 4 gateway ECU routes response (see Reference [8]) of the engine ECU (ECU 1) and response (see Reference [9]) of the Reductant Control Module (ECU 2) to the external test equipment
网关 ECU 路线反应 (参见参考 [8]) 引擎 ECU (ECU1) 和响应 (参见 [9]) 还原剂控制模块 ECU2) 对外部测试设备

Figure 8 — Implementation example of VOBD direct data mode in a gateway ECU

In Figure 9, the VOBD function is implemented in an engine ECU (ECU 1) which is part of the sample emissions-related OBD system. The response behaviour of the engine ECU is the same as described for the gateway ECU in the previous example.

在图9中, VOBD 函数是在一个引擎 ECU(ECU 1) 中实现的, 它是与样本排放相关的系统的一部分。引擎ECU的响应行为与前面示例中的网关ECU描述的相同。



Key

- 1 request from external test equipment to VOBD system to retrieve normal access data or burst access data
外部测试设备要求 VOBD 系统检索正常访问数据或突发访问数据
- 2 engine ECU routes external test equipment request to emissions-related OBD system ECUs
发动机 ECU 路由外部测试设备要求与排放相关的 ECUs 系统
- 3 response (see Reference [9]) of the Reductant Control Module (ECU 2) containing access data of the emissions-related OBD system
响应 (参见 [9]) 还原器控制模块 (ECU 2) 包含与排放相关的系统的访问数据
- 4 engine ECU (ECU 1) sends its response (see Reference [8]) and routes response (see Reference [9]) of the Reductant Control Module (ECU 2) to the external test equipment
发动机ECU(ECU1) 发送它的响应 (请参见参考 [8]) 和路由响应 (请参见参考 [9])。还原器控制模块 (ECU 2) 到外部测试设备

Figure 9 — Implementation example of VOBD direct data mode in an engine ECU

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