



Overview of Provided Draft Heavy-Duty Inspection & Maintenance (HD I/M) OBD Specification/Schema Development Document

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■ Outline

- Background
- Purpose
- Proposed OBD Data Required for HD I/M
 - SAE J1939-compatible vehicles
 - SAE J1979-compatible vehicles
- Proposed Specifications of the Required Data
 - SAE J1939-compatible vehicles
 - SAE J1979-compatible vehicles
- Next Steps
 - Continued development of OBD specifications with stakeholders
 - Field testing

Background

- Key benefits of using vehicle's OBD data in I/M programs were discussed in the last workgroup meeting:
 - Increasing complexity of diagnosing and repairing vehicles
 - Enable earlier detection of problems
 - Current opacity test based methods not sufficient
- Upcoming HD I/M program would potentially require periodic submission of OBD data from 2013 MY and newer vehicles.
- Data collected through any method would need to meet certain specifications for submission to CARB HD I/M database.

Purpose

- Provide a high level overview of attached OBD specification and schema document
- Introduce standardized set of specifications for collecting vehicle OBD data and submitting it to CARB:
 - Tables of required OBD parameters and specifications
 - XML Schemas for encoding the above specs
- Start the discussion with vehicle manufacturers, telematics providers, OBD device developers, etc., on technical and practical aspects of OBD data collection and submission for HD I/M program
 - Receive feedback on proposed requirements.

Components of the Required OBD Data in HD I/M

- Required data would include:
 - i. OBD device and test information (e.g., device ID, test date/time)
 - ii. Vehicle/engine and controller information (e.g., VIN, controller ID)
 - iii. OBD data, as outlined in HD OBD regulations, sections 1971.1 and 1971.5, title 13, California Code of Regulations (available at: <https://oal.ca.gov/>).
 - Data includes MIL status, Diagnostic Trouble Codes (DTCs), readiness status, subset of data stream parameters, REAL data (NOx and GHG tracking starting with 2022 MY).

Proposed Required OBD Parameters from SAE J1939 Compatible Vehicles

- Engines manufactured by Cummins, Detroit Diesel (DDC), Navistar, and Paccar
- Data content (specified by PGN and SPN):
 - 1) Calibration information (DM19; Cal ID, CVN)
 - 2) MIL status and DTCs (DM01, DM06, DM12, DM23, DM28, DM29)
 - 3) Monitor support and readiness (DM05, DM21, DM26)
 - 4) Freeze frame and monitor performance ratio (DM24, DM25, DM20)
 - 5) EI-AECD info (DM33)
 - 6) NTE status (DM34)
 - 7) Data stream: e.g., engine speed, accelerator pedal position, DPF soot load
 - 8) REAL data: NOx and GHG tracking (e.g., active and stored 100 hour and lifetime fuel consumption, engine/tailpipe NOx mass, travelled distance)

Specifications for OBD Data from SAE J1939 Compatible Vehicles

Number/ID of the ECU
responding to the
request

Suspect Parameter
Number

Specified by CARB

integer, character
string, etc.

Allowed range
of the value

Field Description	Message	ECU#	PGN	SPN	Variable Name	Length	Type	Layout	Range	Comments
Monitoring Support Status & Performance Information										
SPN Support	DM24		64950							Expanded/Mfr-specific
SPN Supported				3297	DM24_SPNSupported	6	I	NNNNNN	0 - 524287	List of supported SPNs by the ECU in expanded freeze frame, data stream, and scaled results
Supported in Expanded Freeze Frame				4100	DM24_SupportExpFF	1	I	0/1	0-1	0/1 = supported/not supported
Supported in Data Stream				4101	DM24_SupportinDS	1	I	0/1	0-1	0/1 = not supported/supported
Supported in Scaled Test Results				4102	DM24_SupportinRes	1	I	0/1	0-1	0/1 = not supported/supported

Diagnostic message# or an
acronym assigned by SAE

Max number of
characters
allowed

Proposed Required OBD Parameters from SAE J1979 Compatible Vehicles

- Engine manufactured by Volvo, Ford, General Motors (GM), Isuzu, and Hino
- Data content (specified by Service Modes and PIDs):
 - 1) Current Powertrain Diagnostic Data (**Mode 01**) including MIL status, PID count, Readiness, Data stream, REAL data, etc.
 - 2) Freeze Frame (**Mode 02**)
 - 3) Active Emission-Related DTCs (**Mode 03**)
 - 4) Monitoring Test Results for Specific Monitored Systems (**Mode 06**)
 - 5) Pending Emission-Related DTCs (**Mode 07**)
 - 6) Vehicle Information/Identification (**Mode 09**)
 - 7) Permanent Emission-Related DTCs (**Mode 0A**)

Specifications for OBD Data from SAE J1979 Compatible Vehicles

Number/ID of the ECU
responding to the
request

Specified by
CARB

Max number of
characters allowed

integer, character
string, etc.

Field Description	ECU #	PID #	Variable Name	Length	Type	Layout	Comments
Service Mode \$01 - Current Powertrain Diagnostic Data							
MIL Status		PID 01	MIL	1	Integer	1/0	on/off
OBD requirements to which engine is certified		PID 1C	<u>OBD_Req</u>	n/a	String	n/a	
PID Count		n/a	<u>PID_Count</u>	3	Integer	NNN	
Number of emission-related DTCs		n/a	<u>DTC_Count</u>	2	Integer	NN	
Distance Travelled While MIL is Activated		PID 21	<u>DistanceSinceMil</u>	5	Integer	NNNNN	
Engine run time while MIL is activated		PID 4D	<u>RuntimeActiveMil</u>	5	Integer	NNNNN	
Distance Since Diagnostic Trouble Codes Cleared		PID 31	<u>DistanceSinceCC</u>	5	Integer	NNNNN	

Next Steps

- Seeking comments and feedback on proposed specifications
- Testing of proposed OBD specifications to be conducted in upcoming contract efforts:
 - HD OBD Data Collection Demonstration (contract with Eastern Research Group, Inc.)
 - Expected testing date: January 2020
 - Seeking interested fleets to participate
- Seeking OBD device vendors and telematics companies to test data collection specifications

Thank You!

Questions?

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