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World Forum for Harmonization of Vehicle Regulations (WP.29)

Executive Committee (AC.3) of the 1998 Global Agreement

### PROPOSAL TO DEVELOP A GLOBAL TECHNICAL REGULATION CONCERNING ON-BOARD DIAGNOSTIC SYSTEM FOR HEAVY-DUTY VEHICLES AND ENGINES

Technical Sponsor: United States of America

Note : The text reproduced below was considered and adopted by the Executive Committee (AC.3) of the 1998 Global Agreement at its fourth session, in March 2002. It is based on document TRANS/WP.29/2002/26 that had been submitted by the United States of America, not amended (TRANS/WP.29/841, para. 168).

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<http://www.unece.org/trans/main/welcwp29.htm>

## **Objective of the proposal**

The advent of computer controlled drive trains in automobiles has led to the development and widespread use of sophisticated electronic systems that detect emission related malfunctions and alert the vehicle operator by the illumination of a light on the vehicle control panel, thereby helping to ensure that emissions reductions from in-use vehicles are maintained. These systems, commonly referred to as On-Board Diagnostic (OBD) systems, also assist the repair technicians in the identification and repair of the problem thereby reducing overall repair time.

Different OBD systems for light-duty vehicles exist throughout the world. The U.S. and the European Community are currently investigating the possible use of OBD systems on heavy-duty vehicles and engines. The United States believes that efforts to develop a harmonized OBD system for light-duty vehicles, heavy-duty vehicles, or both, would be beneficial. This proposal addresses the necessary elements to develop a global technical regulation (GTR) for heavy-duty vehicles and engines under Article 6.3 of the 1998 Global Agreement.

## **Description of the proposed regulation**

To meet customer demands, manufacturers of heavy-duty engines use on-board diagnostics to electronically monitor engine parameters to ensure proper engine performance and to assist in malfunction diagnostics and repair. To meet future heavy-duty engine standards, it is likely that manufacturers will implement electronically controlled emission control strategies such as exhaust gas recirculation (EGR) and fuel injection rate shaping. The technology to perform OBD on these emission control systems is available today.

Diesel oxidation catalysts are being used to provide a reduction in particulate matter (PM) on some light- and heavy-duty vehicles. In addition, PM traps and lean NO<sub>x</sub> catalysts may appear in the fleet in response to increasingly stringent standards around the world. Back-pressure sensors (soon to be available in the market) can monitor for complete failure of PM traps, and either a chemical sensor or potentially a temperature sensor could be used to monitor the performance of a lean NO<sub>x</sub> catalyst.

Direct emission measurement may be an important technology to achieve diesel engine closed-loop feedback and to monitor after-treatment devices. Researchers have achieved promising results on a compact NO<sub>x</sub> sensor that is capable of measuring NO<sub>x</sub> with reasonable accuracy under a wide range of operating conditions. Other potential technologies include in-cylinder measurement devices, on-board PM measurement devices, and predictive emission measurement systems such as neural networks.

The proposed GTR would require that manufacturers monitor emission related power train components to assure that malfunctions, which would cause emissions to exceed standards by a specified amount are detected, and the vehicle operator is alerted to the need for maintenance or repair.

## **Existing regulations**

Though there are no regulations currently contained in the Compendium of Candidates, the following regulations contain relevant applications of OBD requirements for light- and medium-duty vehicles which are available for technical reference in developing a new GTR:

U.S. Code of Federal Regulations (CFR) Title 40: Protection of the Environment; Part 86.005-17: On-board diagnostics.

40 CFR Part 86.094-17: Emission control diagnostic system for 1994 and later light-duty vehicles and light-duty trucks.

UNECE Regulation No. 83; Annex 11: On-board Diagnostics for Motor Vehicles

California Code of Regulations (CCR) Title 13, Section 1968.1: Malfunction and Diagnostic System Requirements - 1994 and Subsequent Model -Year passenger Cars, Light-duty Trucks, and Medium-duty Vehicles and Engines.: (OBDII)

## **International Voluntary Standards**

Society of Automotive Engineers (SAE) J1850 "Class B Data Communication Network Interface" (August 1991)

SAE J1979 "E/E Diagnostic Test Modes" (December 1991)

SAE J2012/ "Recommended Format and Messages for Diagnostic Trouble Code ISO DIS 15031-6 Definitions" (March 1992)

SAE J1962 "Diagnostic Connector" (June 1992)

ISO 2575-1982 "Road vehicles: Symbols for control indicators and tell-tales"

ISO 9142-2 "Road Vehicles' Diagnostic Systems' CARB Requirements for the Interchange of Digital Information"

ISO 11519-4 "Road Vehicles' Low Speed Serial Data Communication, Part 4: Class B Data Communication Interface (SAE J1850)

ISO DIS 14230 Part 4: "Road Vehicles' Diagnostic Systems Keyword protocol 2000"

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