



SURFACE VEHICLE RECOMMENDED PRACTICE

J1708™

SEP2016

Issued 1986-01
Revised 2010-12
Stabilized 2016-09

Superseding J1708 DEC2010

Serial Data Communications Between Microcomputer Systems in Heavy-Duty Vehicle Applications

RATIONALE

This document has been determined to contain basic and stable technology which is not dynamic in nature.

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FOREWORD

The SAE group responsible for the content of this recommended practice was revised to the SAE Low Speed Communications Network Subcommittee sponsored by the SAE Truck and Bus Electrical and Electronics Committee. This Document was revised to comply with the new SAE Technical Standards Board format.

Earlier versions of this document stated: This SAE/TMC Joint Recommended Practice has been developed by the Truck and Bus Electronic Interface Subcommittee of the Truck and Bus Electrical Committee and by the S.1 Study Group of the Maintenance Council. The objectives of the subcommittee are to develop information reports, recommended practices, and standards concerned with the interface requirements and connecting devices required in the transmission of electronic signals and information among truck and bus components.

Objectives: Some of the goals of the subcommittee in developing this document were to:

- a. Minimize hardware cost and overhead.
- b. Provide flexibility for expansion and technology advancements with minimum hardware and software impact on in-place assemblies.
- c. Utilize widely accepted electronics industry standard hardware and protocol to give designers flexibility in parts selection.
- d. Provide a high degree of electromagnetic compatibility.
- e. Provide original equipment manufacturers, suppliers, and aftermarket suppliers the flexibility to customize for product individuality and for proprietary considerations.

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1. SCOPE

This SAE Recommended Practice defines a recommended practice for implementing a bidirectional, serial communication link among modules containing microcomputers. This document defines those parameters of the serial link that relate primarily to hardware and basic software compatibility such as interface requirements, system protocol, and message format. The actual data to be transmitted by particular modules, which is an important aspect of communications compatibility, is not specified in this document. These and other details of communication link implementation and use should be specified in the separate application documents referenced in Section 2.

1.1 Purpose

The purpose of this document is to define a general-purpose serial data communication link that may be utilized in heavy-duty vehicle applications. It is intended to serve as a guide toward standard practice to promote serial communication compatibility among microcomputer-based modules. The primary use of the general-purpose communications link is expected to be the sharing of data among stand-alone modules to cost effectively enhance their operation. Communication links used to implement functions that require a dedicated communication link between specific modules may deviate from this document.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

It is recommended that a separate applications document be published by the manufacturer for each device using the serial link. These documents should define the data format, message I.D.s, message priorities, error detection (and correction), maximum message length, percent bus utilization, and methods of physically adding/removing units to/from the line for the particular application.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J1455	Recommended Environmental Practices for Electronic Equipment Design in Heavy-Duty Vehicle Applications
SAE J1587	Electronic Data Interchange Between Microcomputer Systems in Heavy-Duty Vehicle Applications
SAE J1922	Powertrain Control Interface for Electronic Controls Used in Medium- and Heavy-Duty Diesel On-Highway Vehicle Applications
SAE J2497	Power Line Carrier Communications for Commercial Vehicles

2.1.2 EIA Publication

Available from Electronic Industries Alliance, 2500 Wilson Boulevard, Arlington, VA 22201-3834, Tel: 703-907-7500, www.eia.org.

EIA RS-485	Standard for Electrical Characteristics of Generators and Receivers for Use in Balanced Digital Multipoint Systems, April 1983
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3. DEFINITIONS

3.1 BUS ACCESS TIME

A time duration equal to the minimum time of an Idle Line plus the product of 2 bit times and the message priority (which ranges from 1 to 8). An example is shown in 5.2.2.3.

3.2 BAUD

The maximum number of analog signal transitions per second that can occur on a channel. In this coding system, this is the reciprocal of the bit time.

3.3 BIT TIME

Duration or period of one unit of information.

3.4 CHARACTER

A character shall consist of 10 bit times. The character must start with a low-logic bit, then 8 bits of data (least significant bit first) followed by a high-logic level stop bit.

3.5 CHARACTER TIME

The duration of one character which is equal to 10 bit times.

3.6 CONTENTION

A state of the bus in which two or more transmitters are turned on simultaneously to conflicting logic states.

3.7 DIFFERENTIAL SIGNAL

A two-wire process in which both lines are switched as opposed to a single-ended signal wherein one line is grounded and the signal line is switched between logic states.

3.8 IDLE STATE

The state that produces a high-logic level on the input of the bus receiver when all transmitters on the network are turned off.

3.9 IDLE LINE

The condition that exists when the bus has remained in a continuous high-logic state for at least 10 bit times after the end of the last stop bit. The minimum time duration of an idle line is 10 bit times. An example is shown in 5.2.1.

NOTE: The idle line serves as the delimiter between messages on the bus.

3.10 MESSAGE PRIORITY

A measure of message criticality assigned on a scale of 1 to 8 by the appropriate applications document. The most critical message has a priority of one.

3.11 NODE

A receiver or transceiver circuit connected to the bus.