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Class B Data Communication Network Messages—Part 3— Frame IDs for Single-Byte Forms of Headers

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1. ***Scope—***This SAE Recommended Practice defines the information contained in the header and data fields of non-diagnostic messages for automotive serial communications based on SAE J1850 Class B networks. This document describes and specifies the header fields, data fields, field sizes, scaling, representations, and data positions used within messages.

The general structure of a SAE J1850 message frame without in-frame response is shown in Figure 1. The structure of a SAE J1850 message with in-frame response is shown in Figure 2. Figures 1 and 2 also show the scope of frame fields defined by this document for non-diagnostic messages. Refer to SAE J1979 for specifications of emissions related diagnostic message header and data fields. Refer to SAE J2190 for the definition of other diagnostic data fields. The description of the network interface hardware, basic protocol definition, electrical specifications, and the CRC byte is given in SAE J1850.

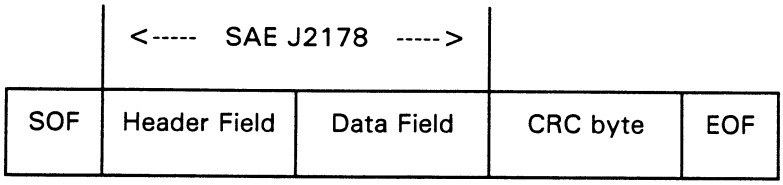

FIGURE 1—SCOPE OF SAE J2178 FOR A SAE J1850 FRAME WITHOUT IN-FRAME RESPONSE (IFR)

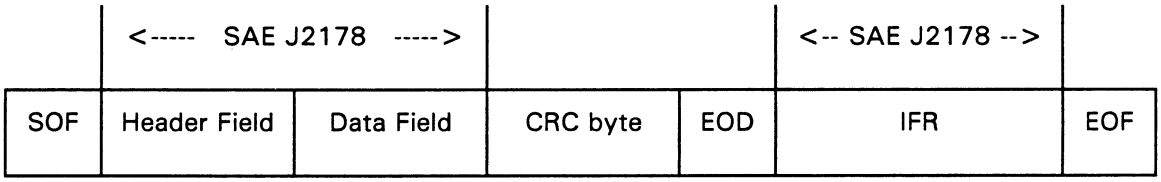

FIGURE 2—SCOPE OF SAE J2178 FOR A SAE J1850 FRAME WITH IN-FRAME RESPONSE (IFR)

SAE J1850 defines two and only two formats of message headers. They are the Single-Byte header format and the Consolidated header format. The Consolidated header format has two forms, a single-byte form and a three-byte form. This document covers all of these formats and forms to identify the contents of messages which could be sent on a SAE J1850 network.

This document consists of four parts, each published separately.

Part 1 of SAE J2178 (Titled: Detailed Header Formats and Physical Address Assignments) describes the two allowed forms of message header formats, Single-Byte and Consolidated. It also contains the physical node address range assignments for the typical sub-systems of an automobile.

Part 2 of SAE J2178 (Titled: Data Parameter Definitions) defines the standard parametric data which may be exchanged on SAE J1850 (Class B) networks. The parameter scaling, ranges, and transfer functions are specified. Messages which refer to these parametric definitions shall always adhere to these parametric definitions. It is intended that at least one of the definitions for each parameter in this part match the SAE J1979 definition.

Part 3 of SAE J2178 (this part, Titled: Frame IDs for Single-Byte Forms of Headers) defines the message assignments for the Single-Byte header format and the one-byte form of the Consolidated header format.

Part 4 of SAE J2178 (Titled: Message Definition for Three-Byte Headers) defines the message assignments for the three-byte form of the Consolidated header format.

1.1 Standardized Parameter Definitions—The parameters used to describe data variables are one of the most important functions of this document. To achieve commonality of messages in Class B networks, the data parameters must become standardized. This applies to data parameter definitions for use during normal vehicle operations as well as during diagnostic operations. By using common parameter definitions for non-diagnostic and diagnostic functions on the network, the modules which form the network can maintain one image or description of a data parameter.

Where parameters have been defined in the Diagnostic Test Modes documents (SAE J1979 and J2190), such as Parameter Identifiers for diagnostic purposes, the definitions in Part 2 of this document match the diagnostic definition.

SAE J2178-2 defines the parameters to be used for non-diagnostic and diagnostic data format definitions. For new parameter definitions which are needed in the future, the new definitions, if they are expected to become widely used, must be integrated into this document for commonality across these types of applications. Of course, manufacturers are free to assign their own definitions to data parameters which are unique or proprietary to their products. They are, however, restricted to using the "Manufacturer Reserved" message header assignments in Parts 3 and 4 of this document when using these unique or proprietary data parameter definitions.

2. References

2.1 Applicable Publications—The following publications form a part of the specification to the extent specified herein. Unless otherwise indicated, the latest revision of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J1213/1 JUN91—Glossary of Vehicle Networks for Multiplex and Data Communication
SAE J1850 AUG91—Class B Data Communication Network Interface
SAE J1930 SEP91—Electrical/Electronic Systems Diagnostic Terms, Definitions, Abbreviations, and Acronyms
SAE J1979 DEC91—E/E Diagnostic Test Modes
SAE J2190 JUN93—Enhanced E/E Diagnostic Test Modes

2.2 Other Publications

ANSI/IEEE Std 754-1985
August 12, 1985—IEEE Standard for Binary Floating-Point Arithmetic

3. Definitions

3.1 Data [Data Field]—Data and data field are used interchangeably in this document and they both refer to a field within a frame that may include bytes with parameters pertaining to the message and/or secondary ID and/or extended addresses and/or test modes which further defines a particular message content being exchanged over the network.

3.2 Extended Address—The extended address is a means to allow a message to be addressed to a specific geographical location or zone of the vehicle, independent of any node's physical address.

3.3 Frame—A frame is one complete transmission of information which may or may not include an In-Frame Response. The frame is enclosed by the start-of-frame and end-of-frame symbols. For Class B networks, each frame contains one and only one message (see "message" definition).

3.4 Frame ID—The Frame ID is the header byte for the Single-Byte Header format and the one-byte form of the consolidated header format. The definition of the Frame ID is found in SAE J2178-3. This header byte defines the target and source and content of the frame.

3.5 Functional Addressing—Functional addressing allows a message to be addressed or sent to one or more nodes on the network interested in that function. Functional addressing is intended for messages that may be of interest to more than a single node. For example, an exterior lamp "off" message could be sent to all nodes controlling the vehicle exterior lamps by using a functional address. The functional address consists of a primary ID and may include a secondary ID and may also include an extended address.

3.6 Header [Header Field]—The header (or header field, used interchangeably) is a one- or three-byte field within a frame which contains information about the message priority, message source and target addressing, message type, and in-frame response type.

3.7 In-Frame Response (IFR) Type—The IFR type identifies the form of the in-frame response which is expected within that message.

3.8 Load—The load command indicates the operation of directly replacing the current/existing value of a parameter with the parameter value(s) contained in the message.

3.9 Message—A message consists of all of the bytes of a frame excluding the delimiter symbols (SOF, EOD, EOF, NB).

3.10 Modify—The modify command indicates the operation of using the message data parameter value to change (e.g., increment, decrement, or toggle) the current/existing value.

3.11 Parameter—A parameter is the variable quantity included in some messages. The parameter value, scaling, offset, units, transfer function, etc., are unique to each particular message. (The assigned parameters are contained herein.)

3.12 Physical Addressing—Physical addressing allows a message to be addressed to a specific node or to all nodes or to a non-existent, null node. The information in this message is only of relevance to a particular node, so the other nodes on the bus should ignore the message, except for the case of the "all nodes" address.

3.13 Primary ID—The primary ID identifies the target for this functional message. This is the primary discriminator used to group functions into main categories.

3.14 Priority—The priority describes the rank order and precedence of a message. Based upon the SAE J1850, Class B arbitration process, the message with the highest priority will win arbitration.

3.15 Report—A report indicates the transmission of parametric data values, based on: a change of state; a change of value; on a periodic rate basis; or as a response to a specific request.

3.16 Request—A request is a command to, or a query for data, or action from another node on the network.

3.17 Response Data—The response data is the information from a node on the network in response to a request from another node on the network. This may be an in-frame response or a report type of message.

3.18 Secondary ID—The secondary ID (along with the primary ID or Frame ID) identifies the functional target node for a message. The purpose of the secondary ID field within the frame is to further define the function or action being identified by the primary ID.

4. Abbreviations and Acronyms

4WD — Four (4) Wheel Drive
A/C — Air Conditioning
ASC — ASCII Encoded SLOT
BCD — Binary Coded Decimal (BCD) SLOT
BMM — Bit Mapped with Mask SLOT
BMP — Bit Mapped without Mask SLOT
CRC — Cyclic Redundancy Check
CS — Checksum
DTC — Diagnostic Trouble Code
EOD — End of Data
EOF — End of Frame
ERR — Error Detection
EV-ETS — Electric Vehicle Energy Transfer System
EVSE — Electric Vehicle Supply Equipment
HVAC — Heating, Ventilation, Air Conditioning
ID — Identifier
IFR — In-Frame Response
LSB — Least Significant Bit/Byte
MAF — Mass Air Flow
MAP — Manifold Absolute Pressure
MIL — Malfunction Indicator Lamp
MSB — Most Significant Bit/Byte
NB — Normalization Bit
PID — Parameter Identification (number, NOT the primary ID, see J2178-2, Section 6)
PKT — Multiple Parameter Packet SLOT
PRN — Parameter Reference Number
PRNDL — Park, Reverse, Neutral, Drive, and Low - Indicator
RPM — Revolutions Per Minute
SED — State Encoded SLOT
SFP — Signed Floating Point (Scientific Notation) SLOT
SLOT — Scaling, Limit, Offset, and Transfer Function (see J2178-2, Section 7)
SNM — 2's Complement Signed Numeric SLOT
SOF — Start of Frame
UNM — Unsigned Numeric SLOT
VIN — Vehicle Identification Number

5. General Information

5.1 Document Overview—The messages defined by this document are specified for networks using one-byte headers or the single-byte form of the consolidated header as specified in SAE J1850. This document focuses on the Frame ID which is the first byte of the message. The first byte of the one-byte header is defined in Section 6 under Frame ID as an 8-Bit hexadecimal number and the first byte of the single-byte form of the consolidated header is defined under Frame ID as a 7-Bit hexadecimal number. Bit four (H bit) of the 7-Bit header is always a logic "1" (See Section 5 of SAE J2178-1). The information in the header field implicitly defines the target, source, priority, and message type information, while the data field contains additional addressing and parametric information (See Section 4 of SAE J2178-1). The header defines the Message Identifier or Frame ID and becomes the name that is broadcast periodically under normal circumstances to all the nodes on the network.

This document describes the overall structure of messages and is expected to have wide application. Designers are required to use the defined messages on SAE J1850 networks in the exact way that they are defined here. There are a large number of message codes which are reserved for each manufacturer to define. If the user cannot find a needed message, the implementer is expected to define a manufacturer specific message in these reserved codes. Therefore, messages on different manufacturer's products using these "Manufacturer Reserved" codes will only have meaning for that manufacturer or specific vehicle. These will most likely be different between manufacturers. The codes that are defined here however, shall always carry the same meaning from one manufacturer to another and from one model and year to the next.

5.2 Parameter Reference Number (PRN)—With the Single-Byte form of header, the Frame ID corresponds with a particular Parameter Reference Number (PRN) or a grouping of PRNs (See Section 6 of SAE J2178-2). The PRN is an arbitrarily assigned number and defines the following:

a. Length of data in number of bits
b. Units
c. Scaling, Limit, Offset, and Transfer Function, i.e., SLOT (See Section 7 of SAE J2178-2)
d. Type or category of data

SAE J2178-2, Section 7 defines the following data types:

(1) BMP Bit Mapped
(2) UNM Unsigned Numeric
(3) SNM 2's Complement Signed Numeric
(4) SED State Encoded
(5) ASC ASCII Encoded
(6) BCD Binary Coded Decimal
(7) SFP Signed Floating Point (Scientific Notation)

5.3 Message Identification (FRAME ID)—The FRAME ID of the single-byte header implicitly and uniquely defines the following characteristics of the message:

a. The message priority
b. The data content of the message specified by a PRN or packet of PRNs
c. The length of message
d. Source of the message
e. Type of the message
f. The event or repetition rate for transmission
g. CRC byte requirements

5.3.1 PRN ASSIGNMENTS—A FRAME ID shall have one or more PRNs assigned to it. Some PRNs may be composed of a packet (PKT) of PRNs (See 7.1 of SAE J2178-2). The bytes of the data field shall be composed of the parameter given in the "PRNs" column of the figure defined in Section 6. When more than one PRN is shown, the data field shall contain the PRNs in the order given left to right.

5.3.2 IN-FRAME RESPONSE (IFR) TYPE—The IFR Type shall be given under "IFR Type" column of the figure defined in Section 6. The different IFR Types are defined in Section 4 of J2178-1.

5.3.3 REPETITION RATE—The vehicle manufacturer shall choose which message frames are event driven or defined by a repetition rate. Refer to SAE J2178-1, Appendix A for further information on event- or time-based message frames.

5.3.4 CRC BYTE REQUIREMENTS—The CRC byte requirements shall be defined by the manufacturer as specified by SAE J1850.

6. Frame IDs for Single-Byte Forms of Headers—Figures 3A, 3B, 3C, 3D, 3E, 3F, 3G, 3H, 3I, and 3J defines the Frame ID for one-byte headers and the first byte of the Single-Byte form of the Consolidated header.

6.1 Message Header—The message header can be from one to three bytes in length. The message header defines the message type, message priority, and the addressing mode used. There are two addressing strategies used for messages: physical addressing and functional addressing. In physical addressing, messages are exchanged between nodes based on unique physical addresses assigned to the nodes. In functional addressing, the data content of messages are functionally partitioned and each node is assigned the messages it shall transmit and receive.

6.1.1 FRAME ID SINGLE-BYTE FORM—Messages using the single Frame ID byte form shall use functional addressing. The Frame ID, uniquely defines the message type, priority, target addressing, data content, length, source, event or repetition rate for transmission, In-Frame Response type, and CRC Byte requirements.

6.1.2 PHYSICAL ADDRESSING (TWO BYTE) FORM—Physically Addressed, two-byte header format messages include both non-diagnostic messages and the SAE J2190-compliant enhanced diagnostic messages. The first byte of a diagnostic request message shall be $24; the second byte of a diagnostic request message shall be physical address of the module of which the diagnostic request is being made. The first byte of a diagnostic response message shall be $26; the second byte of a diagnostic response shall be the physical address of the responding module.

6.1.3 FUNCTIONAL ADDRESSING (TWO BYTE) FORM—A two-byte header format message may use the second byte of a two-byte header as a functional address. The first byte of a functionally addressed two-byte header is used to determine the broad class of message functionality. For example, the Frame ID $F8 is used to identify the Vehicle Identification Number; it is the first byte of a functionally addressed two-byte header. The functional address following $F8 determines the specific VIN data (PRNs) which follow the header.

FRAME ID				
7 Bit	8 Bit	IFR Type	Function	PRNs
10	00		Reserved - SAE	
	01		Reserved - SAE	
11	02		Reserved - Mfg.	
	03		Reserved - Mfg.	
12	04		Reserved - Mfg.	
	05		Reserved - Mfg.	
13	06		Reserved - Mfg.	
	07		Reserved - Mfg.	
14	08		Reserved - SAE	
	09		Reserved - SAE	
15	0A		Reserved - Mfg.	
	0B		Reserved - Mfg.	
16	0C		Reserved - Mfg.	
	0D		Reserved - Mfg.	
17	0E		Reserved - Mfg.	
	0F		Reserved - Mfg.	
18	10		Engine RPM, Speed, and MAP	000C, 6001, 000B
	11		Reserved - SAE	
19	12		Reserved - Mfg.	
	13		Reserved - Mfg.	
1A	14		Reserved - Mfg.	
	15		Reserved - Mfg.	
1B	16		Reserved - Mfg.	
	17		Reserved - Mfg.	
1C	18		Reserved - SAE	
	19		Reserved - SAE	
1D	1A		Reserved - Mfg.	
	1B		Reserved - Mfg.	
1E	1C		Reserved - SAE	

FIGURE 3A—FRAME IDS FOR SINGLE-BYTE FORMS OF HEADERS

FRAME ID				
7 Bit	8 Bit	IFR Type	Function	PRNs
	1D		Reserved - SAE	
1F	1E		Reserved - Mfg.	
	1F		Reserved - Mfg.	
N/A	20-70	2	Function EV-ETS Command Message	See Section 7
N/A	20-71	2	Function EV-ETS Status Message	See Section 7
N/A	21-70	1	Broadcast EV-ETS Command Message	See Section 7
N/A	21-71	1	Broadcast EV-ETS Status Message	See Section 7
31	22		Reserved - Mfg.	
	23		Reserved - Mfg.	
32	24-(A019)	0	J2190 Diagnostic Request	
	25		Reserved - Mfg.	
33	26-(A019)	0	J2190 Diagnostic Report	
	27		Reserved - Mfg.	
N/A	28-70		Function Command/Status EV-ETS Command Message	See Section 7
N/A	28-71		Function Command/Status EV-ETS Status Message	See Section 7
N/A	29-70		Function Request/Query EV-ETS Command Message	See Section 7
N/A	29-71		Function Request/Query EV-ETS Status Message	See Section 7
35	2A		Reserved - Mfg.	
	2B		Reserved - Mfg.	
36	2C		Reserved - Mfg.	
	2D		Reserved - Mfg.	
37	2E		Reserved - Mfg.	
	2F		Reserved - Mfg.	
38	30		Reserved - SAE	
	31		Reserved - SAE	
39	32		Reserved - Mfg.	

FIGURE 3B—FRAME IDS FOR SINGLE-BYTE FORMS OF HEADERS (CONTINUED)

FRAME ID				
7 Bit	8 Bit	IFR Type	Function	PRNs
	33		Reserved - Mfg.	
3A	34		Reserved - Mfg.	
	35		Reserved - Mfg.	
3B	36		Reserved - Mfg.	
	37		Reserved - Mfg.	
3C	38		Reserved - SAE	
	39		Reserved - SAE	
3D	3A	0	Transmission Gear & Lock-up Status	180F
	3B		Reserved - Mfg.	
3E	3C		Reserved - Mfg.	
	3D		Reserved - Mfg.	
3F	3E		Reserved - Mfg.	
	3F		Reserved - Mfg.	
50	40		Reserved - Mfg.	
	41	1	Reserved Diagnostic Report	
51	42	0	Last Ignition Off Duration	604C
	43		Reserved - SAE	
52	44		Reserved - Mfg.	
	45		Reserved - Mfg.	
53	46		Reserved - Mfg.	
	47		Reserved - Mfg.	
54	48	0	Leg. Diagnostic Report	Per SAE J1979
	49		Reserved - SAE	
55	4A		Reserved - SAE	
	4B		Reserved - SAE	
56	4C		Reserved - Mfg.	
	4D		Reserved - Mfg.	
57	4E		Reserved - Mfg.	
	4F		Reserved - Mfg.	

FIGURE 3C—FRAME IDS FOR SINGLE-BYTE FORMS OF HEADERS (CONTINUED)

FRAME ID				
7 Bit	8 Bit	IFR Type	Function	PRNs
58	50		Reserved - SAE	
	51		Reserved - SAE	
59	52		Reserved - Mfg.	
	53		Reserved - Mfg.	
5A	54		Reserved - Mfg.	
	55		Reserved - Mfg.	
5B	56		Reserved - Mfg.	
	57		Reserved - Mfg.	
5C	58		Reserved - SAE	
	59		Reserved - SAE	
5D	5A		Reserved - Mfg.	
	5B		Reserved - Mfg.	
5E	5C		Reserved - Mfg.	
	5D	0	Distance Pulses, Injector On Time, and Fuel Used	601B, 1016, 603C
5F	5E		Reserved - Mfg.	
	5F		Reserved - Mfg.	
70	60	0	Dimming and Lamp Code	602B, 604D
	61		Reserved Diagnostic Request	
71	62		Reserved - Mfg.	
	63		Reserved - Mfg.	
72	64		Reserved - Mfg.	
	65		Reserved - Mfg.	
73	66		Reserved - SAE	
	67		Reserved - SAE	
74	68	0	Leg. Diagnostic Req.	Per SAE J1979
	69		Reserved - SAE	
75	6A		Reserved - Mfg.	
	6B		Reserved - Mfg.	

FIGURE 3D—FRAME IDS FOR SINGLE-BYTE FORMS OF HEADERS (CONTINUED)

FRAME ID				
7 Bit	8 Bit	IFR Type	Function	PRNs
76	6C		Reserved - Mfg.	
	6D		Reserved - Mfg.	
77	6E		Reserved - Mfg.	
	6F		Reserved - Mfg.	
78	70		Reserved - SAE	
	71		Reserved - SAE	
79	72	0	Vehicle Odometer	6031
	73		Reserved - Mfg.	
7A	74	0	Trip Odometer 1	6032
	75		Reserved - Mfg.	
7B	76	0	Trip Odometer 2	6032
	77		Reserved - Mfg.	
7C	78		Reserved - SAE	
	79		Reserved - SAE	
7D	7A		Reserved - Mfg.	
	7B		Reserved - Mfg.	
7E	7C		Reserved - Mfg.	
	7D		Reserved - Mfg.	
7F	7E	0	Elapsed Ignition On Time	6025
	7F		Reserved - Mfg.	
90	80	0	Current Time	6030
	81		Reserved - SAE	
91	82		Reserved - Mfg.	
	83		Reserved - Mfg.	
92	84		Reserved - SAE	
	85		Reserved - Mfg.	
93	86		Reserved - Mfg.	
	87		Reserved - Mfg.	
94	88		Reserved - SAE	

FIGURE 3E—FRAME IDS FOR SINGLE-BYTE FORMS OF HEADERS (CONTINUED)

FRAME ID				
7 Bit	8 Bit	IFR Type	Function	PRNs
	89		Reserved - SAE	
95	8A		Reserved - Mfg.	
	8B		Reserved - Mfg	
96	8C		Reserved - Mfg.	
	8D		Reserved - Mfg.	
97	8E		Reserved - Mfg.	
	8F		Reserved - Mfg.	
98	90	0	Fuel Efficiency Average and Instantaneous	6029, 6041
	91		Reserved - Mfg.	
99	92		Reserved - Mfg.	
	93		Reserved - Mfg.	
9A	94		Reserved - Mfg.	
	95		Reserved - Mfg.	
9B	96		Reserved - SAE	
	97		Reserved - SAE	
9C	98		Reserved - Mfg.	
	99		Reserved - Mfg.	
9D	9A		Reserved - Mfg.	
	9B		Reserved - Mfg.	
9E	9C		Reserved - SAE	
	9D		Reserved - Mfg.	
9F	9E		Reserved - Mfg.	
	9F		Reserved - Mfg.	
B0	A0	0	Distance to Empty	601D
	A1		Reserved - SAE	
B1	A2		Reserved - Mfg.	
	A3		Reserved - Mfg.	
B2	A4	0	Fuel Tank Level	6005

FIGURE 3F—FRAME IDS FOR SINGLE-BYTE FORMS OF HEADERS (CONTINUED)

FRAME ID				
7 Bit	8 Bit	IFR Type	Function	PRNs
	A5	0	Unscaled and Average Fuel Level	604E, 604F
B3	A6		Reserved - Mfg.	
	A7		Reserved - Mfg.	
B4	A8		Reserved - SAE	
	A9		Reserved - SAE	
B5	AA		Reserved - Mfg.	
	AB		Reserved - Mfg.	
B6	AC		Reserved - Mfg.	
	AD		Reserved - Mfg.	
B7	AE		Reserved - Mfg.	
	AF		Reserved - Mfg.	
B8	B0	1	Malfunction Indicator Lamp (MIL)	1017, 0002
	B1		Reserved - Mfg.	
B9	B2		Reserved - SAE	
	B3		Reserved - SAE	
BA	B4		Reserved - Mfg.	
	B5		Reserved - Mfg.	
BB	B6		Reserved - Mfg.	
	B7		Reserved - Mfg.	
BC	B8		Reserved - Mfg.	
	B9		Reserved - Mfg.	
BD	BA		Reserved - Mfg.	
	BB		Reserved - Mfg.	
BE	BC		Reserved - Mfg.	
	BD		Reserved - Mfg.	
BF	BE		Reserved - Mfg.	
	BF		Reserved - Mfg.	
D0	C0	0	Engine Gauge Data	600A, 102F, 0005, 600B

FIGURE 3G—FRAME IDS FOR SINGLE-BYTE FORMS OF HEADERS (CONTINUED)

FRAME ID				
7 Bit	8 Bit	IFR Type	Function	PRNs
	C1		Reserved - SAE	
D1	C2		Reserved - Mfg.	
	C3		Reserved - Mfg.	
D2	C4		Reserved - Mfg.	
	C5		Reserved - Mfg.	
D3	C6		Reserved - Mfg.	
	C7		Reserved - Mfg.	
D4	C8		Reserved - SAE	
	C9		Reserved - SAE	
D5	CA		Reserved - Mfg.	
	CB		Reserved - Mfg.	
D6	CC	0	Outside Temperature	602D
	CD		Reserved - Mfg.	
D7	CE		Reserved - Mfg.	
	CF		Reserved - Mfg.	
D8	D0		Reserved - Mfg.	
	D1		Reserved - Mfg.	
D9	D2	0	Barometer, Air Temp, Refrig Pressure, and Methanol %	1025, 000F, 9813, 1032
	D3		Reserved - Mfg.	
DA	D4		Reserved - Mfg.	
	D5		Reserved - Mfg.	
DB	D6		Reserved - Mfg.	
	D7		Reserved - Mfg.	
DC	D8		Reserved - SAE	
	D9		Reserved - SAE	
DD	DA		Reserved - Mfg.	
	DB		Reserved - Mfg.	
DE	DC		Reserved - Mfg.	

FIGURE 3H—FRAME IDS FOR SINGLE-BYTE FORMS OF HEADERS (CONTINUED)

FRAME ID				
7 Bit	8 Bit	IFR Type	Function	PRNs
	DD		Reserved - Mfg.	
DF	DE		Reserved - Mfg.	
	DF		Reserved - Mfg.	
F0	E0		Reserved - Mfg.	
	E1		Reserved - SAE	
F1	E2		Reserved - SAE	
	E3		Reserved - Mfg.	
F2	E4		Reserved - Mfg.	
	E5		Reserved - Mfg.	
F3	E6		Reserved - Mfg.	
	E7		Reserved - Mfg.	
F4	E8		Reserved - SAE	
	E9		Reserved - SAE	
F5	EA	0	Transmission Oil Temperature	180B
	EB		Reserved - Mfg.	
F6	EC		Reserved - Mfg.	
	ED		Reserved - Mfg.	
F7	EE		Reserved - Mfg.	
	EF		Reserved - Mfg.	
F8-01	F0-01	0	Vehicle Identification Number 1	100D
F8-02	F0-02	0	Vehicle Identification Number 2	E022
F8-06	F0-06	0	Vehicle Identification Number 3	E023
F8-0A	F0-0A	0	Vehicle Identification Number 4	E024
F8-0E	F0-0E	0	Vehicle Identification Number 5	E025
	F1		Reserved - Mfg.	
F9	F2		Reserved - Mfg.	
	F3		Reserved - Mfg.	
FA	F4		Reserved - Mfg.	
	F5		Reserved - Mfg.	

FIGURE 3I—FRAME IDS FOR SINGLE-BYTE FORMS OF HEADERS (CONTINUED)

FRAME ID				
7 Bit	8 Bit	IFR Type	Function	PRNs
FB	F6		Reserved - Mfg.	
	F7		Reserved - SAE	
FC	F8		Reserved - SAE	
	F9		Reserved - Mfg.	
FD	FA		Reserved - Mfg.	
	FB		Reserved - Mfg.	
FE	FC		Reserved - Mfg.	
	FD		Reserved - Mfg.	
FF	FE		Reserved - Mfg.	
	FF		Reserved - Mfg.	

FIGURE 3J—FRAME IDS FOR SINGLE-BYTE FORMS OF HEADERS (CONTINUED)

7. EV-ETS Message Requirements—The Electric Vehicle Energy Transfer System in the Single-Byte Forms of Header requires the second and third message byte to be the Functional Address of the message. The second byte shall be a $70 for Command Messages and a $71 for Status Messages. The third message byte is defined as the Secondary ID for EV-ETS Messages as shown in Figure 4, where the C Bit is defined by Figure 5, and the Q Bit is defined by Figures 6A and 6B.

Bit 7	6	5	4	3	2	1	0
Q	C	Secondary Address (6 bits)					
Secondary ID							

FIGURE 4—SECONDARY ID BYTE FORMAT

	C Bit	
	C = 0	C = 1
Command (70)	Load	Modify
Status (71)	Report	Not Defined

FIGURE 5—C BIT DEFINITION

Bit(7)				
Q = 1	Q = 0	Sec. Add	EV-ETS Function	PRN's
Yes	No	01	ETS Sleep	N/A
Yes	No	02	Delay Timer Expired	N/A
N/A	N/A	03	App Comm State	C825
N/A	N/A	04	EVSE Configuration	C808
N/A	N/A	05	Transfer Type	C81E
N/A	N/A	06	Voltage Mode Control	C823
Yes	No	07	Pulse Mode Enable	N/A
N/A	N/A	08	Vehicle Ready	C821
N/A	N/A	09	EVSE Ready	C809
Yes	No	0A	Coupling Proximity Detected	N/A
N/A	N/A	0B	Power Out of Range	C817
Yes	No	0C	Sw DC Present	N/A
Yes	No	0D	Sw AC Present	N/A
Yes	No	0E	Transfer Ready	N/A
N/A	N/A	0F	Pulse Period	C81A
N/A	N/A	10	Power Level	C816
N/A	N/A	16	Max Transfer Power	C813

FIGURE 6A—EV-ETS MESSAGE FUNCTION DEFINITION

Bit(7)				
Q=1	Q=0	Sec. Add	EV-ETS Function	PRN's
N/A	N/A	17	Conversion Power Range	C803
N/A	N/A	18	Requested Stage Index	C81B
N/A	N/A	19	Stage Power Range	C81D
Yes	No	1A	LMS Preference Toggle	N/A
Yes	No	1B	LMS Preference Override	N/A
Yes	No	1C	Base Charging Complete	N/A
N/A	N/A	1D	Battery Design Capacity	C800
N/A	N/A	1E	Battery SOC	C801
N/A	N/A	1F	Conversion Load	C802
N/A	N/A	20	Current Limit	C804
N/A	N/A	21	Current Limit Mandate	C805
N/A	N/A	22	Delay Timer Count	C806
Yes	No	23	Delay Timer Enable	N/A
N/A	N/A	24	Delay Timer Period	C807
INDOOR	OUTDOOR	25	EVSE Location	N/A
N/A	N/A	26	LMS Current Limit Mandate	C80A
N/A	N/A	27	LMS Current Limit Preference	C80B
N/A	N/A	28	LMS Power Limit Mandate	C80C
N/A	N/A	29	LMS Power Limit Preference	C80D
N/A	N/A	2A	Max Power Level	C80F
N/A	N/A	2B	Max Power Level Mandate	C810
Yes	No	2C	Recovery Timeout	N/A
Yes	No	2D	Stage Power Limited	N/A
Yes	No	2E	Transfer Type Valid	N/A
N/A	N/A	2F	Usage Mode	C81F
N/A	N/A	30	Usage Mode Time	C820
Yes	No	31	Vent Fault	N/A
Yes	No	32	Vent Required	N/A
N/A	N/A	33	App Service Request Enable	C827
N/A	N/A	34	App Service Request	C826
N/A	N/A	35	Transfer Type Preference	C82C
Yes	No	36	Vent Confirmed	N/A
Yes	No	37	Vent Request	N/A

FIGURE 6B—EV-ETS MESSAGE FUNCTION DEFINITION (CONTINUED)

8. Notes

8.1 Marginal Indicia—The change bar (l) located in the left margin is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. An (R) symbol to the left of the document title indicates a complete revision of the report.

PREPARED BY THE SAE VEHICLE NETWORK FOR DATA
COMMUNICATION STANDARDS COMMITTEE

SAE J2178-3 Revised MAR1999

Rationale—SAE J2178-3 was revised to include terms appliable to electric vehicles and to agree with SAE J2293. Minor typographical errors were also corrected.

Relationship of SAE Standard to ISO Standard—Not applicable.

Application—This SAE Recommended Practice defines the information contained in the header and data fields of non-diagnostic messages for automotive serial communications based on SAE J1850 Class B networks. This document describes and specifies the header fields, data fields, field sizes, scaling, representations, and data positions used within messages.

The general structure of a SAE J1850 message frame without in-frame response is shown in Figure 1. The structure of a SAE J1850 message with in-frame response is shown in Figure 2. Figures 1 and 2 also show the scope of frame fields defined by this document for non-diagnostic messages. Refer to SAE J1979 for specifications of emissions related diagnostic message header and data fields. Refer to SAE J2190 for the definition of other diagnostic data fields. The description of the network interface hardware, basic protocol definition, electrical specifications, and the CRC byte is given in SAE J1850.

SAE J1850 defines two and only two formats of message headers. They are the Single-Byte header format and the Consolidated header format. The Consolidated header format has two forms, a single-byte form and a three-byte form. This document covers all of these formats and forms to identify the contents of messages which could be sent on a SAE J1850 network.

This document consists of four parts, each published separately.

Part 1 of SAE J2178 (Titled: Detailed Header Formats and Physical Address Assignments) describes the two allowed forms of message header formats, Single-Byte and Consolidated. It also contains the physical node address range assignments for the typical sub-systems of an automobile.

Part 2 of SAE J2178 (Titled: Data Parameter Definitions) defines the standard parametric data which may be exchanged on SAE J1850 (Class B) networks. The parameter scaling, ranges, and transfer functions are specified. Messages which refer to these parametric definitions shall always adhere to these parametric definitions. It is intended that at least one of the definitions for each parameter in this part match the SAE J1979 definition.

Part 3 of SAE J2178 (this part, Titled: Frame IDs for Single-Byte Forms of Headers) defines the message assignments for the Single-Byte header format and the one-byte form of the Consolidated header format.

Part 4 of SAE J2178 (Titled: Message Definition for Three-Byte Headers) defines the message assignments for the three-byte form of the Consolidated header format.

Reference Section

SAE J1213/1 JUN91—Glossary of Vehicle Networks for Multiplex and Data Communication

SAE J1850 AUG91—Class B Data Communication Network Interface

SAE J1930 SEP91—Electrical/Electronic Systems Diagnostic Terms, Definitions, Abbreviations, and Acronyms

SAE J1979 DEC91—E/E Diagnostic Test Modes

SAE J2190 JUN93—Enhanced E/E Diagnostic Test Modes

ANSI/IEEE Std 754-1985

August 12, 1985—IEEE Standard for Binary Floating-Point Arithmetic

Developed by the SAE Vehicle Network for Data Communication Standards Committee