SURFACE VEHICLE RECOMMENDED PRACTICE

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Superseding J1939-74 SEP2015

Application - Configurable Messaging

RATIONALE

This technical report is being stabilized because it covers technology, products, or processes which are mature and not likely to change in the foreseeable future.

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Foreword

This series of SAE Recommended Practices have been developed by the Truck and Bus Control and Communications Network Subcommittee of the Truck and Bus Electrical and Electronics Committee. The objectives of the subcommittee are to develop information reports, recommended practices, and standards concerned with the requirements, design, and usage of devices that transmit electronic signals and control information among vehicle components. The usage of these Recommended Practices is not limited to truck and bus applications; other applications may be accommodated with immediate support being provided for construction and agricultural equipment, and stationary power systems.

These SAE Recommended Practices are intended as a guide toward standard practice and are subject to change so as to keep pace with experience and technical advances.

This application layer may be used for all SAE J1939 applications. It is the characteristic that is common across all SAE J1939 applications.

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1. Scope

The SAE J1939 documents are intended for light, medium, and heavy-duty vehicles used on or off road as well as appropriate stationary applications which use vehicle derived components (e.g. generator sets). Vehicles of interest include, but are not limited to, on- and off-highway trucks and their trailers, construction equipment, and agricultural equipment and implements.

The purpose of these documents is to provide an open interconnect system for electronic systems. It is the intention of these documents to allow Electronic Control Units to communicate with each other by providing a standard architecture.

This particular document, SAE J1939-74, describes the message structure for a set of messages which enable the user to determine and announce to others on the network, the parameter placement within a particular message from the special set of messages defined within this document.

1.1 Rationale

SAE J1939-74 has been reaffirmed to comply with the SAE 5-Year Review policy.

2. References

2.1 Applicable Publications

General information regarding this series of recommended practices is found in SAE J1939. The latest issue of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS

Available from SAE, 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 J1939—Recommended Practice for a Serial Control and Communications Vehicle Network is the parent document and should be referenced in general
SAE J1939-21—Data Link Layer
SAE J1939-71—Vehicle Application Layer
SAE J1939-73—Application Layer - Diagnostics
SAE J1939-81—Network Management

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this document.

2.2.1 ISO PUBLICATIONS

Available from ANSI, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org.

ISO 11783—Tractors, machinery for agriculture and forestry Serial control and communications data network

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3. Definitions

Terms and definitions are defined in SAE J1939.

4. Abbreviations

CA Controller Application – the function of a system receiving a NAME within an ecu – see SAE J1939–81, Network Management, for more details
SPN Suspect Parameter Number

See SAE J1939 for any terms and or definitions not found in this document.

5. Technical Requirements

This configurable messaging application provides for the variable packing of certain parameters within a particular message from a set of messages.

5.1 General

The definitions provided herein are intended to satisfy the needs of all potential users of the SAE J1939 network. These definitions are intended to be suitable for applications in any of the industry groups defined within SAE J1939. The capabilities provided allow CAs to configure and identify to other network CAs the location of certain parameters (each identified by its SPN) within certain special messages (each identified by PGN). These capabilities also provide the means by which a CA can request the identification of the message (PGN) containing a certain parameter (SPN). This document will define the configuration process, a set of messages which can and may be configured, and the messages used to identify this configuration to the rest of a network. This document will also contain the definitions of the only set of parameters (identified by SPN) to be used exclusively within one of the configured messages defined herein. It is intended that these parameters be completely defined within this document before use on a network. New features, Parameter Groups and Parameter definitions will be added over time; it is anticipated that this document will continuously evolve as long as the SAE J1939 network is an active Recommended Practice. Such growth will be implemented in such a way as to ensure backward compatibility with earlier versions. At the time of initial publication, many of these growth areas are identified but are yet to be defined. Such identification is provided so that the reader will be aware of those additions that are already planned for the document. This procedure will define a number of messages that may be configured, presently there are 16 configurable PDU 1 messages.

5.2 Overview of Configuration Services

The configuration messages and processes are intended to provide services needed to improve utilization of bus bandwidth, facilitate organization of data within messages in a fashion that can allow optimization of vehicle topology, and allow identification of this organization to other CAs.

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5.2.1 Developmental History

These messages were originally proposed for Agricultural Applications, but have been harmonized and standardized for all Industry Groups. In the Agricultural Industry specific example, self-propelled vehicles with very different topologies need to use common parameters, so that third party vendors can know the identity of parameters on the networks. But the message groupings must fit the vehicle topology in order to have sufficient time to transmit all of the parameters. For this Agricultural need it is desired that the source and destination addresses, as well as, the message configuration, be used to identify the data within a particular message (just as source and destination address are needed to identify the data within the proprietary A message identified in SAE J1939-21). These messages need to be configurable in the sense that the groupings of parameters within a message were not predefined within one of the network standard documents, but by the data within another message (the Proprietary Message Configuration Identification Message). The parameters being used are to be predefined within this network document, just as other parameters are defined within one of the other network documents.

The Agricultural need was limited to destination specific messages and thus the original proposal was tailored to that end. Several revisions studied allowing other messages, but committee work has deemed it best to maintain this restriction, that the only configurable messages are destination specific messages.

The new aspect of this document is the technique by which the grouping of certain parameters (defined within this standard) can be arranged appropriately for the vehicle topology and then identified to other network members by a configuration process, using the data content of a special initialization message. This configuration process identifies the message being configured (by PGN), the parameters being sent within said message (by SPN), as well as their placement within said message (by bit position). After some discussion it was deemed that the feature could be handy for all Industry Groups and a working group was sent out to develop a harmonized version.

5.2.2 Harmonization

These messages have been harmonized for use in all Industry Groups. It is not the intent that all CAs will use (or even need) these processes, but should they be used, this application document (SAE J1939-74) is to be considered the driving document. This document defines the configuration process, the configurable messages, the configuration messages and an associated set of certain parameters, which are envisioned only for transmission within one of the configurable messages. There are 16 destination specific messages (5.3.3), which are labeled as proprietarily configurable (5.3.1.5.1). These messages may only include parameters from this application document (in other words parameters from the other SAE J1939 documents are not to be sent via the configurable messages at this time, see also 5.3.1.2 and 5.3.1.5). Transmission of the Configuration Identification Message (5.3.1) is the means used to identify the data within one of these messages. Transmission of the Configuration Identification Message is required if using any configurable messages. This is to provide the information about each message's contents to potential receivers as the Agricultural Industry Group desired.

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5.2.3 Operation and Related Requirements

This configuration is not meant to be a dynamic process but rather is normally expected to be alterable only at initialization. In fact in most systems the topology will be stable and hence the configuration will likely not change from one ignition cycle (power-up of the system) to another (5.2.3.4). It is required that CAs receiving configured messages check the NAMEs of the CA configuring the particular messages and verify that they have not changed since a complete configuration list was received for each particular message. If a NAME change is detected then the complete configuration list for the particular message should be requested. It is also required that CAs on an agricultural implement bus must maintain the latest configuration while powered down (this is just like the current addresses association requirement of all network members of an agricultural implement bus). For this reason and since it is desired to have the quickest possible initialization process, there exists a bit parameter (5.3.1.7) that identifies that only the data relevant to the first configured parameter (by SPN) is being identified with a Configuration Identification Message. This is used so that the software may verify that a given message still comes from a particular CA. (The reasoning here is that it is highly unlikely that a CA with the same NAME of Controller Application parameter (SPN 2848) will be transmitting a message with a particular configured message containing the same first parameter but with differences in the remainder of the message and without knowing about it. Hence, this partial "Claim" will suffice to show others on the network whether the list of messages in their memory is still usable). This form is to be used on each power-up event for each CA transmitting a configurable message. Should a receiver note that the NAME of the source, the number of parameters or the location of a parameter does not match what is contained within it's own memory then it should request the complete configuration identification between that CA and itself. Should a transmitting CA know that it has changed (or will change) the message content of a configured message, it should send (re-send) the complete new configuration identification for that message, whether it is at start-up or during operation. Should the location of individual specific SPNs be needed after a network is running, the Parameter Locate message (5.3.2) can be used. Should a complete configuration between any two CAs be needed, a destination specific 'Request for' of the PGN of the Configuration Identification Message can be used. The complete configuration of the specific message (identified by PGN) from that particular source would then be transmitted upon the network.

5.2.3.1 Effects Upon Request Messages

For a CA seeking to find the configuration of messages on a network (necessary when for example it has powered up separately from the rest of the network), there are two choices. It may send a "Request for" (PGN 59904, see SAE J1939-21) the PGN of the Configuration Identification Message or it may send a Request for Complete Configurable Message Set. A CA might also need the data from one of the configurable messages, which is found by sending a 'Request For' the PGN of Any of the Configurable Messages. The rules for these cases are outlined in the following sections.

5.2.3.1.1 Global Request for PGN of Configuration Identification Message

A global 'Request for' the PGN of the Configuration Identification Message is intended to cause all CAs that transmit a configurable message to send only the shortened Configuration Identification Message (where only the first SPN is identified (5.3.1.7)) for the configurable messages that they transmit, regardless of source of the request. These messages should be sent exactly as at power-up. A response is required for a 'Request for' message for the PGN of the Configuration Identification Message. (If a tool (or other CA) should need to obtain the complete configuration on a vehicle, it should use the Request for Complete Configurable Message Set message (5.3.3 & 5.2.3.1.3)).

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5.2.3.1.2 Directed Request for PGN of Configuration Identification Message

A ‘Request for’ the PGN of the Configuration Identification Message directed to a specific address is intended to cause the CA at that address to transmit (or answer with) the complete sequence of configuration identification messages for all of the configured messages that said destination sends to the source of the request. Hence it is preferred that the 'Request for Configuration Identification Message' be sent only to one specific destination at a time. (If a tool (or other CA) should need to obtain the complete configuration on a vehicle, it should use the Request for Complete Configurable Message Set message (5.3.3 & 5.2.3.1.3)).

5.2.3.1.3 Request for Complete Configurable Message Set

There exists a separate message (5.3.3) designed to cause all CAs to respond with the complete sequence of configuration identification messages for the configurable messages that they send. The request may be for all configurable messages sent or a particular one, identified by PGN (5.3.3.2), controlled by the parameter, Message Selection Control (5.3.3.1). If a tool (or other CA) is using this message to obtain the complete configuration on a vehicle, it must then also listen for all Configuration Identification Messages regardless of the actual destination address of the Configuration Identification Message. This is required since each of the Proprietarily Configured messages may be for a CA other than said Tool, and hence the Configuration Identification Messages will not be directed to said Tool. (Note that this requirement is only for a tool (or another CA needing the complete configurable set for the vehicle) and normal CAs need understand only what is sent to it by any of the other CAs.)

5.2.3.1.4 ‘Request For’ the PGN of Any of the Configurable Messages

A ‘Request for’ message for the PGN of any of the Configurable Messages (5.3.3) is intended to function just like a ‘Request for’ any PGN defined elsewhere within SAE J1939. The CA receiving the ‘Request for’ the PGN of one of the Configurable Messages should then send the message identified by said PGN and the data values appropriate for that message (providing of course that it sends said configurable message).

5.2.3.1.5 Software Mapping of Message Configurations

Configuration maps should be made a function of the NAME of Address Claimed of the CAs (this is not to say that the parameter NAME of Controller Application (SPN 2848) should be the index or pointer but only that an association should be maintained with the NAME of Address Claimed parameter). The address tables may be used to translate from network address to a particular function by this association with NAME of Address Claimed parameter. This way it is possible for a CA to recognize that it has been moved or that another CA has been added or changed. Then the CA may appropriately request the configuration of the new network. Note that a CA need only request a configuration update if a CA that it communicates with using a configurable message has been changed (in other words if the change is in a CA that is not communicated with, there is no need to form a configuration map).

5.2.3.1.6 Time-Outs Needed for Request for PGN of the Configuration Identification Message

Any CA which plans to make requests for the PGN of the Configuration Identification Message will need to have a time-out mechanism to determine when the list of configuration identification messages has ended. This is due in part to the fact that the number of configured messages is not known prior to sending the request. The value of this time-out will need to be based upon the actual application being handled and is not identified within this document.

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5.2.3.2 Additional CA Requirements

The length of each parameter must be known from the SLOT assignment in the definition of that particular parameter. This requires that any CA that is going to use a particular parameter must contain the SLOT data for that parameter.

5.2.3.3 Application for New Parameter Definitions

All parameters need to be requested, defined, and assigned SPNs just as is currently done (see SAE J1939 no-dash appendices). The placement of the new parameter(s) within this document (by whatever database means) will identify that the new parameter may be used within the Proprietarily Configurable messages. CAs using these parameters will need additional application software to handle the calculation work which must be done to determine the location of the particular parameter within the message and whether the total length of the configured message will be such that transport protocol will be required (5.3.1.6).

5.2.3.4 Continuity Across Power Cycles

It is required that any CA sending or using one of the configured messages remember the configuration across power cycles.

5.3 The Configuration Service

The Proprietarily Configurable Messaging application includes a service to identify the configuration of messages, including the association of parameters within the particular message. (Note: This means to identify by listing the details of what exists and is not a capability to command (or force) a particular configuration).

5.3.1 CONFIGURATION IDENTIFICATION MESSAGE

This is the message used to identify the data content (by SPN) of one of the configurable messages (identified by PGN). Configuration is normally a vehicle build occurrence with a short Initialization procedure to enable Controller Applications, CAs (see SAE J1939-81), to verify that they are operating on the same network with the same other CAs as when they last operated (see 5.2.3.4 & 5.3.1.7 for discussion). The Configuration Identification message identifies the configuration (or location within a message) of only one parameter at a time. Therefore, it takes 'n' transmissions of this Configuration Identification Message to completely identify the configuration of one of the Configurable Messages in which 'n' parameters will be transmitted.

This message is also used to identify the location within a message of any particular parameter (identified by SPN), in response to the Parameter Locate Message (5.3.2). In this role, a Configuration Identification message is sent whenever a CA receives a Parameter Locate Message for a parameter that it is transmitting.

The rules regarding use of this message are in 5.3.1.9. The rules regarding interaction between this message and the ‘Request for PGN’ (PGN 59904, see SAE J1939-21) are outlined in 5.2.3.1. Remember that since the Destination Address is used to help define (interpret) the data content, the Configuration Identification Messages is NOT necessarily sent to the address from which the ‘Request for’ message was sent. Since this would effectively change the configuration and meaning of these Proprietarily Configured Messages, the destination of each Configuration Identification Message must be the address to which the configured message will normally be sent.

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Transmission Rate: As needed

Data Length: 8

Data Page: 0

PDU Format: 176

PDU Specific: DA

Default Priority: 6

Parameter Group Number: 45056

CONFIGURATION_IDENTIFICATION_MESSAGE

Byte:	1-3	PGN Of Message Being Configured	5.3.1.1
		(bit order per SAE J1939-21 Table 2)	
Byte:	4	bits 8-1 Parameter Being Included, 8 least significant bits	5.3.1.2
		(most significant at bit 8)	
Byte:	5	bits 8-1 Parameter Being Included, second byte	
		(most significant at bit 8)	
Byte:	6	bits 8-6 Parameter Being Included, 3 most significant bits	
		(most significant at bit 8)	
		bits 5-1 Position Of Configured Parameter	5.3.1.3
		(most significant at bit 5)	
Byte:	7	bit 8 Message Will Be Used Proprietarily	5.3.1.5
		bit 7 Message Will Use Transport Protocol	5.3.1.6
		bit 6 First Parameter Only Being Identified	5.3.1.7
		bits 5-1 Number Of Parameters Included	5.3.1.4
		(most significant at bit 5)	
Byte:	8	Starting Bit For This Parameter	5.3.1.8

5.3.1.1 PGN of Message Being Configured

This is the PGN of the message whose configuration is being identified by this Configuration Identification Message. A 3 byte slot is used.

Data Length: 24 bits (3 bytes)

Resolution: 1 message/count

Data Range: (16 Numeric values, one for each configurable message, to be selected by database after ballot approval from the range 0, 256, … 61184, 61440, 61441, … 65535, 65536, 65792, … 126720, 126976, 126977, … 131071 – i.e. Only 8672 values are available/valid even though 24 bits)

Type: Measured

Suspect Parameter Number: 3146

Reference: 5.3.1

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5.3.1.2 Parameter Being Included

This is the SPN of the parameter whose location is presently being identified for grouping into the message whose PGN is in this Configuration Identification Message. The 19 bit SPN slot is to be used (with a bit arrangement as in SAE J1939-73 diagnostics). The least significant bit is to be in data bit 25 of the message (i.e. the lowest bit of data byte 4), with eight bits in byte 4, the next 8 bits in byte 5, and the final 3 bits in byte 6, with the most significant bit to be in data bit 48 (i.e. the 8th bit of data byte 6). (Note: This leaves bits 1 through 5 of data byte 6 for assignment to other parameters, see 5.3.1.3). The list of parameters that may be located is contained within Appendix C. (This again indicates that the configurable messages are, at this time, not to be used with parameters from other of the SAE J1939 documents, see also 5.2.2 and 5.3.1.5.)

Data Length: 19 bits

Resolution: 1 parameter(or object)/count

Data Range: 0 to 524,287

Type: Measured

Suspect Parameter Number: 3147

Reference: 5.3.1

5.3.1.3 Position of Configured Parameter

This is a number identifying a particular parameter's position within a configured message in particular for differentiating the parameter (identified by SPN) whose location is presently being identified from the other parameters which will be grouped into the message whose PGN is in this Configuration Identification Message. It is used to verify that all of the parameters to be included within the message being configured have been received. A 5 bit slot with the values 0 and 31 is NOT allowed (0, since it would imply no SPNs and 31, since it would imply an unknown number).

Data Length: 5 bits

Resolution: 1 item/count

Data Range: 1 to 30

Type: Measured

Suspect Parameter Number: 3148

Reference: 5.3.1

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5.3.1.4 Number of Parameters Included

This is the number of parameters, which will be grouped into the message whose PGN is in this Configuration Identification Message. It is used in the verification that all of the SPNs to be included within the message being configured have been received. A 5 bit slot with 0 and 31 are NOT allowed (0, since it would imply this is not a member and 31, since it would imply that the member is not known - both poor choices).

Data Length: 5 bits

Resolution: 1 parameter/count

Data Range: 1 to 30

Type: Measured

Suspect Parameter Number: 3152

Reference: 5.3.1

5.3.1.5 Message Will Be Used Proprietarily

This is a single bit flag used to indicate that the message being configured is a member of the set of destination specific proprietarily configurable messages, and that hence the Source Address and Destination Address are needed to interpret the data as with the destination specific Proprietary A message of SAE J1939-21. A single bit slot is needed. This parameter is necessary in case the application is ever expanded to allow inclusion of parameters from other SAE J1939 documents. Since this is not presently allowed this parameter should always be set to a ‘1’. (This again indicates that the configurable messages are, at this time, not to be used with parameters from other of the SAE J1939 documents, see also 5.2.2 and 5.3.1.2.)

Data Length: 1 bit

Resolution: n/a

Data Range: 1 (0 would be added should the committee ever decide to allow this application for standard SAE J1939 parameters)

Type: Measured

Suspect Parameter Number: 3149

Reference: 5.3.1

5.3.1.5.1 Proprietarily Configured Message

A ‘1’ in this parameter signifies that the message being configured is a member of the set of destination specific proprietarily configurable messages (presently the only option) and that the interpretation of the data is to be based upon a combination of the source address, the destination address and the SPN of the specific data item. Hence the only parameters, which may be used, are those identified within this document. Also any CA wishing to use data from the message being configured must associate the source and the destination addresses as well as the Configuration Identification Message for the desired SPN within said configured message to obtain an interpretation of the data. Presently a ‘1’ is the only option here and this parameter only exists to allow future expansion of this application should the committee ever deem necessary.

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5.3.1.5.2 Not Proprietarily Configured Message

This is identified only as the mechanism necessary to extend this application to all SAE J1939 parameters, should the committee ever deem necessary. A value of ‘0’ in this parameter would then be used to signify that the parameters were not necessarily from within this document. Presently a value of ‘0’ is not allowed.

5.3.1.6 Message Will Use Transport Protocol

This is a single bit flag used to indicate that the message being configured is one that will use transport protocol. This bit must be properly set by all CAs configuring messages, as some receivers may need to know this (as opposed to being able to calculate), since the length of the SPN is not contained within the Configuration Identification Message and receivers are only required to know the length of SPNs they are using (i.e. NOT all existing SPNs), and hence may not be able to calculate how long any particular message is going to be. A single bit slot is needed.

Data Length: 1 bit
Resolution: n/a
Data Range: 0 or 1
Type: Measured
Suspect Parameter Number: 3150
Reference: 5.3.1

5.3.1.6.1 Transport Required

A ‘1’ in this parameter signifies that the message being configured will require transport protocol.

5.3.1.6.2 Transport Not Required

A ‘0’ in this parameter signifies that the message being configured will NOT require transport protocol.

5.3.1.7 First Parameter Only Being Identified

This is a single bit, which is used to identify that only the first parameter that will be sent within one of the Configurable Messages is being identified with a Configuration Identification Message. This form is to be used on each power-up event for any CA. This function has been generated so that the software can verify that a given message still comes from a particular CA but with the shortest possible initialization times. Identification of the location of individual specific parameters can then be handled with the Parameter Locate message (5.3.2).

Data Length: 1 bit
Resolution: n/a
Data Range: 0 or 1
Type: Measured
Suspect Parameter Number: 3151
Reference: 5.3.1

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5.3.1.7.1 First Parameter Only

A ‘1’ in this parameter signifies that only the first parameter of the particular message being configured is being identified with a Configuration Identification message. See use note in 5.3.1.7.2.1.

5.3.1.7.2 All Parameters Being Identified

A ‘0’ in this parameter signifies that all of the parameters that will be transmitted in the particular configurable message, are being identified using a separate Configuration Identification message for each parameter (identified by SPN).

5.3.1.7.2.1 Configuration Change

Should a transmitting CA know that it has changed message content it should send (re-send) the whole configuration identification list, thus this parameter would be ‘0’, whether at start-up or during operation.

5.3.1.8 Starting Bit for this Parameter

The bit position within the configurable message being identified by the PGN in bytes 1-3 that the least significant bit of the data for the parameter, whose SPN is identified in bytes 4-6, is to occupy. This parameter will use an 8 bit SLOT with range of 0 to 250. Bit numbering is detailed below (see 5.3.1.8.1). Since this parameter identifies only the position of the least significant bit, it must be remembered that the length is to already be in the CA’s parameter database (see 5.3.1.9.2). This parameter is to be in data byte 8 of the configuration message. (Note: While the data range maximum of 250 does not allow a full-length transport message to be generated it allows quite a long message, which was felt to be a suitable compromise necessary to generate this service. Remember this service is about improving throughput and an extremely long message certainly will not help that much).

Data Length: 8 bits (1 byte)

Resolution:

Data Range: 0 to 250

Type: Measured

Suspect Parameter Number: 3153

Reference: 5.3.1

5.3.1.8.1 Bit Numbering

The bit numbering within the data fields is defined with 1 for the least significant bit of the first data byte, 8 for the most significant bit of the first data byte, 9 for the least significant bit of the second data byte. . .(continuing sequence) , 57 for the least significant bit of the eighth data byte, and 64 for the most significant bit of the eighth data byte. For messages using SAE J1939 transport protocol the bit numbering is the same (remember however that the first data byte (bits 1 through 8) of each transport packet contains the sequence number). However for transport messages the complete bit identification is the sequence number times the bit number within the packet less eight (SAE J1939-21 3.10.1.2 Sequence Numbers & 3.10.1.3 Packetization). (Also remember that bits 1 through 8 of each packet are not available for data as they contain the sequence numbers). (see: Byte alignment requirements).

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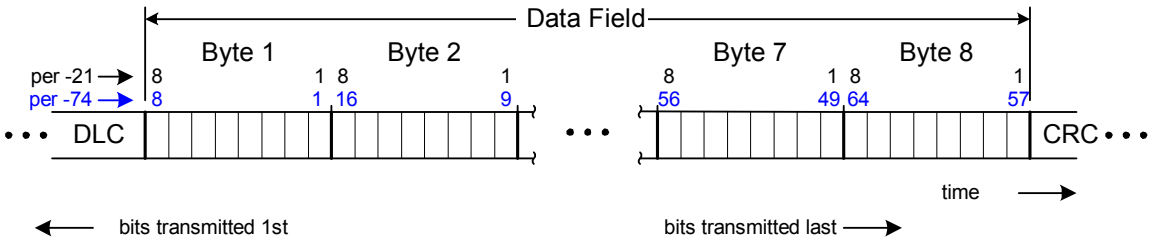
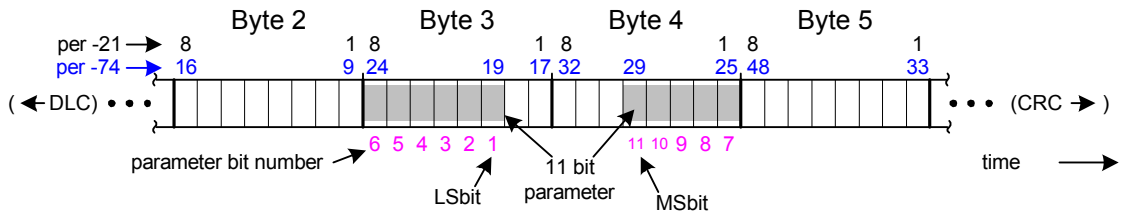


DATA FIELD BIT NUMBERING DRAWING FOR 5.3.1.8.1.

5.3.1.8.2 Bit Placement Within A Message

Bit placement should be sequential from the starting bit. For example an '11' bit parameter with a starting bit of 19 (message data byte 3 bit 3) should end (bit containing its MSB) at bit 29 (message data byte 4 bit 5).



EXAMPLE FOR 5.3.1.8.2

5.3.1.8.3 Placing Undefined Bits Within a Message

Undefined bits may be placed between parameters within a configured message (although the DLC is to be maintained at 8, see 5.4.1.2). By undefined bits it is meant, bits to which no parameter is associated. Undefined bits should simply be ignored by any receivers of the particular configured message. Since undefined bits have no particular parameter association they should have no meaning associated with them.

This feature is used when it is desired to justify a particular parameter to a specific bit location within the configured message. To accomplish this the user need simply start the particular parameter where desired, leaving however many undefined bits between it and the previous parameter.

5.3.1.8.4 Configured Message Length

The length of any given configured message may be undeterminable to the CA(s) receiving it. This is because the CAs are only required to know the length of any parameters (identified by SPN) that they wish to receive and the last parameter may not be one they want to receive. Hence, the total message length will be is effectively unknown to them. Thus application software for configurable messaging does not need to check for length. Also any software that was cross linking layers and being used to check for length should be modified (updated) to recognize this possibility. Remember that data length of a message is always a number of bytes since the protocol controllers have no provision to send part of a byte.

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5.3.1.9 Requirements Related to Configuration Identification Message

The Configuration Identification message (5.3.1) is used to identify the data content (by SPN) of any of the configurable messages (identified by their PGN). This identification is handled by reporting the location of one parameter within one message with each Configuration Identification Message. For this application to be useful some requirements (restrictions) must be enforced on all. Some SAE J1939 documents allow non-interference to be exchanged with compliance. This document, however, must be interpreted more literally and hence any failure to conform exactly is considered non-compliance. Since features or parameters may be added to this application, no CA should use this application (or its parameters and messages) without having provisions for field updating of its application software to the newest application level of the document.

5.3.1.9.1 When Must a Configuration Identification Message Be Used

The Configuration Identification is required whenever a CA is using any of the Configurable Messages (5.4 & 5.3). When identifying configurable messages using the word ‘proprietarily’, it is meant that the data content of the particular configurable message can only be fully identified by combining the source and the destination addresses of the particular configurable message with the data content of all the configuration identification messages that have been sent for that particular configurable message.

5.3.1.9.2 CA Parameter Database

Receivers planning to use Configurable Messaging are required to know the SLOT of the parameters they are expecting to use. (They are not required to know the length of all existing parameters).

5.3.2 PARAMETER LOCATE MESSAGE

This message is designed to cause other CAs to respond with the identity of any message that they send in which the particular parameter (identified by specific SPN) is contained. A command byte (5.3.2.2) within this message is used to select the function to identify the location of a parameter. Other functions may be added later (in fact the remainder of the command byte is reserved). The destination to which this message is sent is to determine who answers. If the ‘global’ destination address is used then all CAs (supporting this function of course) that know and send the identified parameter will answer with a CONFIGURATION IDENTIFICATION MESSAGE identifying any message, where this parameter is presently being sent within 200 mS of the receipt of the Parameter Locate Message. If the parameter is not being sent then there will be no response sent. In light of this and the fact that the number messages containing a given SPN may not be known there must be time-outs (250 mS) in the CA sending the Parameter Locate Message to identify that no one is going to answer and/or that the answering is done. If this message is sent to a specific destination address then only the CA at that address should answer.

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Transmission Rate: As needed
Data Length: 8
Data Page: 0
PDU Format: 175
PDU Specific: DA
Default Priority: 6
Parameter Group Number: 44800
PARAMETER_LOCATE

Byte:	1	bits 8-1	Parameter to be located, 8 least significant bits (most significant at bit 8)		5.3.2.1
Byte:	2	bits 8-1	Parameter to be located, second byte of SPN (most significant at bit 8)		
Byte:	3	bits 8-6	Parameter to be located, 3 most significant bits (most significant at bit 8)		
		bits 5-1	Reserved	(to be '11111_2')	
Byte:	4	bits 8-1	Reserved	(to be sent as '11111111_2')	
Byte:	5	bits 8-1	Reserved	(to be sent as '11111111_2')	
Byte:	6	bits 8-1	Reserved	(to be sent as '11111111_2')	
Byte:	7	bits 8-1	Reserved	(to be sent as '11111111_2')	
Byte:	8	bits 8-1	Parameter Locate Command		5.3.2.2

5.3.2.1 Parameter to be Located

This is the parameter, identified by SPN, that it is desired to locate or initiate the transmission of. Locating implies identifying any message from the given source (i.e. the destination of this Parameter LOCATE MESSAGE, all other CAs when 'global' address is used) that contains this particular parameter.

Data Length: 19 bit
Resolution: 1 parameter (or object)/count
Data Range: 0 to 524,287
Type: Measured
Suspect Parameter Number: 3154
Reference: 5.3.2

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5.3.2.2 Parameter Locate Command

A byte used to identify the particular command that the Parameter Locate message is presently being used for.

Data Length: 8 bit

Resolution: 1 command/count

Data Range: 0 with 1 to 250 reserved by SAE

Type: Measured

Suspect Parameter Number: 3155

Reference: 5.3.2

5.3.2.2.1 Identify Parameter's Location

This is the state of the Parameter Locate Command parameter (value of '0') used to identify that the intent of this Parameter Locate message is to request that the position of a particular parameter (identified by SPN) within any transmitted message being used by the identified destination. This value is to mean that the position of said parameter within any message where it is presently being transmitted by the destination of this Parameter Locate message will be identified using a Configuration Identification message. The destination of this particular Parameter Locate message will identify whether all (the global destination address)other CAs, which contain the particular parameter or only a specific CA should answer with the messages.

5.3.3 REQUEST FOR COMPLETE CONFIGURABLE MESSAGE SET

This message is designed to cause all CAs to respond with the complete sequence of configuration identification messages for a particular one or all of the configurable messages that they send. The choice of all configurable messages or a particular one, identified by PGN, is controlled by the Message Selection Control parameter (5.3.3.1). A receiving CA which uses no configurable messages is not required to take any action in response to this request. The requesting CA must build the message set table and consider that any network CAs not heard from are not using this service.

Transmission Rate: As needed

Data Length: 8

Data Page: 0

PDU Format: 253

PDU Specific: 173

Default Priority: 6

Parameter Group Number: 64941

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REQUEST_FOR_COMPLETE_CONFIGURABLE_MESSAGE_SET

Byte:	1	bits 8-1	Message selection control		5.3.3.1
Byte:	2-4		PGN of configurable message desired		5.3.3.2
			(bit order per SAE J1939-21 Table 2)		
Byte:	5	bits 8-1	Reserved	(to be sent as ‘11111111_2’)	
Byte:	6	bits 8-1	Reserved	(to be sent as ‘11111111_2’)	
Byte:	7	bits 8-1	Reserved	(to be sent as ‘11111111_2’)	
Byte:	8	bits 8-1	Reserved	(to be sent as ‘11111111_2’)	

5.3.3.1 Message Selection Control

This is the parameter that identifies whether the configuration set is desired for a particular configurable message or for all of the configurable messages.

Data Length: 8 bits

Resolution: 1 choice (or object)/count

Data Range: 0 and 1

Type: Measured

Suspect Parameter Number: 3329

Reference: 5.3.3

5.3.3.1.1 Identify All Configurable Messages

A ‘1’ in this parameter signifies that it is desired to identify the configuration for all of the configurable messages in use by the receiver. The PGN of Configurable Message Desired parameter (5.3.3.2) is meaningless for this case and shall be ignored by any receiver.

5.3.3.1.2 Identify Particular Configurable Message

A ‘0’ in this parameter signifies that it is desired to identify the configuration for a particular configurable message. That particular message will be identified by the PGN in the PGN of Configurable Message Desired parameter, 5.3.3.2.

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5.3.3.2 PGN of Configurable Message Desired

This is the PGN of the configurable message whose configuration is being requested by this Request for Complete Configurable Message Set. A 3 byte slot is used. The all 1's value shall be transmitted when the request is for all configurable messages (5.3.3.1.1), otherwise the PGN of one of the configurable messages should be used. Should an invalid PGN be received the complete set for all of the configurable messages in use should be sent.

Data Length: 24 bits (3 bytes)

Resolution: 1 message/count

Data Range: (17 Numeric values, one for each configurable message, to be selected by database after ballot approval from the range 0, 256, … 61184, 61440, 61441, … 65535, 65536, 65792, … 126720, 126976, 126977, … 131071 – i.e. Only 8672 values are available/valid even though 24 bits and FFFFFF16)

Type: Measured

Suspect Parameter Number: 3330

Reference: 5.3.3

5.4 The Set of Destination Specific Proprietarily Configurable Messages

This is the set of PDU type 1 messages that may be used in a proprietary fashion for sending only parameters defined within this SAE J1939 document (note: more parameters may be added at a later date). Configured messages from this set will be identified on the network using a Configuration Identification Message. Also note that since the use of these messages is destination specific the use of the global destination address (value 255) would not make sense and is hence not allowed. Should a receiving device detect one of these messages directed to the global address, it should consider the message meaningless and not to be processed (in other words just dispose of it).

5.4.1 DESTINATION SPECIFIC PROPRIETARILY CONFIGURABLE MESSAGE 1

The first message of the set assigned for use as a proprietarily configurable destination specific message.

Transmission Rate: As needed

Data Length: 8 to n (based on Configuration Identification Message, see 5.3.1.6)

Data Page: 0

PDU Format: 177

PDU Specific: DA

Default Priority: 6

Parameter Group Number: 45312

DESTINATION_SPECIFIC_PROPRIETARILY_CONFIGURABLE_MESSAGE_1

Byte: 1-n As defined within the appropriate Configuration Identification Message(s)

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5.4.1.1 Parameter Content of Destination Specific Proprietarily Configurable Messages

The parameters sent within any of the Proprietarily Configurable Messages are identified within a set of Configuration Identification Messages each of which contains the PGN of the particular Destination Specific Proprietarily Configurable Message. Each of the Configuration Identification Messages also contains the location information for a single SPN. Thus a CA sending a particular Destination Specific Proprietarily Configurable Message with 'n' parameters will need to send 'n' Configuration Identification Messages to any CA it wishes to decode said Destination Specific Proprietarily Configurable Message. Remember that only parameters from within this document are to be included within any Destination Specific Proprietarily Configurable Message (presently the committee has chosen to not allow configurable messaging with parameters from other SAE J1939 document(s)).

5.4.1.2 DLC for Destination Specific Proprietarily Configurable Messages

The minimum data length of each of the Destination Specific Proprietarily Configurable Messages is to be 8. Hence, the DLC will be 8. (Remember the DLC is the packet data length and not the message data length.) Any bits within the message which have not had parameters associated shall be sent as '1' (5.3.1.8.3). This is the most general form found for other SAE J1939 messages, although there are a few special cases where the DLC is other than 8. The packet DLC will be 8, even when transport protocol is used, because the total message data length exceeds 8 (see 5.3.1.6).

5.4.2 DESTINATION SPECIFIC PROPRIETARILY CONFIGURABLE MESSAGE 2

This is the second message in the set of messages assigned for use as a proprietarily configurable destination specific message.

Transmission Rate: As needed

Data Length: 8 to n (based on Configuration Identification Message, see 5.3.1.6)

Data Page: 0

PDU Format: 178

PDU Specific: DA

Default Priority: 6

Parameter Group Number: 45568

DESTINATION_SPECIFIC_PROPRIETARILY_CONFIGURABLE_MESSAGE_2

Byte: 1-8 As defined within the appropriate Configuration Identification Message(s)

5.4.2.1 Parameter Content of Destination Specific Proprietarily Configurable Messages

The parameters sent within any of the Proprietarily Configurable Messages are identified within a set of Configuration Identification Messages each of which contains the PGN of the particular Destination Specific Proprietarily Configurable Message. Each of the Configuration Identification Messages also contains the location information for a single SPN. Thus a CA sending a particular Destination Specific Proprietarily Configurable Message with 'n' parameters will need to send 'n' Configuration Identification Messages to any CA it wishes to decode said Destination Specific Proprietarily Configurable Message. Remember that only parameters from within this document are to be included within any Destination Specific Proprietarily Configurable Message (presently the committee has chosen to not allow configurable messaging with parameters from other SAE J1939 document(s)).

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