



User Manual for
HE800JCM200

SmartStack SAE J1939 Communication Module

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PREFACE

This manual explains how to use SmartStack SAE J1939 Communication Modules.

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Note: The programming examples shown in this manual are for illustrative purposes only. Proper machine operation is the sole responsibility of the system integrator.

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CHAPTER 1: INTRODUCTION

1.1 Overview

The HE800JCM200 is a SmartStack SAE J1939 Communication Module. SAE J1939 (J1939) is a CAN-based protocol used in truck and bus control communications networks. There are various layers to the J1939 protocol that are described in SAE J1939 documents. J1939 uses a 29-bit identifier requiring hardware that can support CAN 2.0B. The address for the JCM200 is fixed at 251. The baud rate is fixed at 250Kbps. SAE J1939 specifies a table of Parameter Group Numbers (PGNs). A PGN is unique numeric identifier that is associated with a specific parameter name. A PGN is used to define the parameter value a device is requesting or the parameter value that a device is sending.

Note: SAE is an acronym for *Society of Automotive Engineers*.

1.2 Product Description

There are 2 operational bi-colored LEDs on the side of the module. One LED is green indicating the module is OK. The other LED flashes orange, indicating network traffic.

1.3 Functional Description

The JCM200 can request/monitor data from and transmit data to devices on the J1939 network. There are two communication methods used for handling data: *Scanning* and *Transmit Channel*. For detailed information, refer to Chapter 2: Operation.

1.4 Technical Support

For assistance, contact Technical Support at the following locations:

North America:

(317) 916-4274 or visit our web site at www.heapg.com.

Europe:

(+) 353-21-4321-266

CHAPTER 2: OPERATION

2.1 General

Chapter Two covers operational information for the JCM200.

2.2 Two Communication Methods for Handling Data

The JCM200 can request and monitor data from and transmit data to devices on the J1939 network. There are two communication methods used for handling data. The first method is *Scanning* in which Parameter Group Numbers (PGNs) are pre-configured, and the module continuously gathers data for the configured PGNs. The second method is a *Transmit Channel* in which a message is built in PLC registers and is transmitted onto the network. The following sections cover each communication method in detail.

2.3 Scanning

The Scanning method uses a scan table that contains a series of PGNs and associated information. Data for the configured PGNs is continuously gathered and sent to the PLC. There are two modes for gathering data from devices on the J1939 network, monitor and request. Each PGN in the scan table is configured to use one of the two modes for gathering data. The JCM200 does not know which PGNs require monitoring and which PGNs require requesting; it is the responsibility of the individual configuring the module to enter the information. Otherwise, the data may not be updated.

a. Monitor Mode

An engine control module (ECM) sends some PGN data onto the network at regular intervals. The specific PGNs that are sent vary between ECMs. If the ECM broadcasts a desired PGN's data on a regular basis, then the mode for that PGN is configured for monitor.

Monitoring does not require interaction between the JCM200 and a device on the network. The JCM200 monitors the network for the PGNs that are configured as monitor mode in the scan table. If it finds a match, then the data is sent to the PLC.

b. Request Mode

If the desired PGN is not sent on a regular basis, then a request must be made from the JCM200 to the device *before* the data is sent. The mode for these PGNs are configured for request.

Requesting requires interaction between the JCM200 and a device on the network. The JCM200 must send a request message to a device onto the network and receive a reply *before* that data can be sent to the PLC.

2.4 Transmit Channel

The Transmit Channel can be used one of two ways. It can be used to send data to a device on the network or it can be used as low priority request to retrieve data from a device on the network.

The complete Transmit Channel uses 11 %AQs, 2 %Qs and 2 %Is. The %AQs and %AIs vary depending on whether a send data or request data type of communication is used.

2.4.1 Transmit Channel Register Definitions

The following are the registers used by the Transmit Channel and the corresponding descriptions. Not all registers are used for both types of communications.

Table 2.1 - %AQ Definitions for Transmit Channel	
%AQ Register	Description
AQx	PGN
AQx+1	Destination Address (255 – Global)
AQx+2	Number of bytes (Up to 8)
AQx+3	Starting %R register/ Byte value 1
AQx+4	Byte value 2
AQx+5	Byte value 3
AQx+6	Byte value 4
AQx+7	Byte value 5
AQx+8	Byte value 6
AQx+9	Byte value 7
AQx+10	Byte value 8

Table 2.2 - %R Definitions for Transmit Channel	
%R Register	Description (High/Low byte)
Rx	Requested PGN
Rx+1	Request data value byte 1
Rx+2	Request data value byte 2
Rx+3	Request data value byte 3
Rx+4	Request data value byte 4
Rx+5	Request data value byte 5
Rx+6	Request data value byte 6
Rx+7	Request data value byte 7
Rx+8	Request data value byte 8

%Q Register	Description
Qx	Transmit Command
Qx+1	Type of Transmit (0 for send data)

%I Register	Description
Ix	Transmit Complete
Ix+1	Transmit Error
Ix+2	Bus Off Error
Ix+3	Power Fail Error

2.4.2 Transmit Channel Operation Overview

The %AQs contain the information to be transmitted, the %Rs contain data from the device, the %Qs are used to control when and what to transmit, and the %Is report the status. Toggling %Qx from 0 to 1 triggers the JCM200 to send the data. The value of %Qx+1 determines the type of transmit, where 0 equals send data and 1 equals low priority request. The %AQ usage changes depending on the value of %Qx+1.

%Ix goes to 1 when the transmit operation completes, thus notifying the PLC that another transmit can occur. %Ix+1 indicates whether or not a transmit error occurred, where 0 equals OK and 1 equals an error.

Toggling %Qx from 1 to 0 clears the %Ix and %Ix+1 in order to setup for another transmit.

The following sections describe the how the %AQ and %AI registers are used.

2.4.3 Send Data

When the transmit channel is used to send data to a device on the network then the 11 %AQs, 2 %Qs and 2 %Is are used.

Send Data Register Use:

The %AQs contain the information to be transmitted. The %AQs need to be loaded with the appropriate data before %Qx is toggled from a 0 to 1 to initiate the transmit.

The following is a detailed description of the %AQ data:

%AQx contains the PGN where the associated data will be written

%AQx+1 contains the destination address of the device that the data is being sent to

%AQx+2 contains the number of bytes of data to be sent, up to 8 bytes.

%AQx+3 - %AQx+10 contains the data to be sent. Note that %AQs are word values but the data should only be a byte value. The upper byte of the word should be 0. Received values are packed into word values (low byte and high byte are separate returned values). The bytes for the transmit channel are separated for ease of configuration and use.

2.4.4 Low Priority Request

When the transmit channel is used to a low priority request to a device on the network then the first 4 %AQs, 2 %Qs, 2 %Is, and a defined number of %Rs are used.

Low Priority Request Register Use:

The %AQs contain the information to be transmitted. The %AQs need to be loaded with the appropriate data before %Qx is toggled from a 0 to 1 to initiate the transmit. The %Rs will contain the request data if %Ix+1 is not set (No transmit error).

The following is a detailed description of the %AQ and %AI data:

%AQx contains the PGN that is being requested.

%AQx+1 contains the destination address of the device that contains the requested data.

%AQx+2 contains 2 bytes for the requested PGN and the number of bytes of requested data to store in the %R registers [CURRENTLY FIXED AT A MAX OF 10 BYTES (2 for PGN + 8 for data)].

%AQx+3 contains the starting %R register where the requested data will be stored.

The remaining %AQs are not used.

%Rx contains the requested PGN that is associated with the following data

%Rx+1 contains data byte 1

%Rx+2 contains data byte 2

%Rx+3 contains data byte 3

%Rx+4 contains data byte 4

%Rx+5 contains data byte 5

%Rx+6 contains data byte 6

%Rx+7 contains data byte 7

%Rx+8 contains data byte 8

CHAPTER 3: CONFIGURATION

3.1 General

Chapter Three covers the configuration of the JCM200. The purpose of the configuration is to allow communication between an OCS/RCS and an Engine Control Module.

Note: To perform this configuration, it is necessary to consult the engine manufacturer's user documentation to determine parameter numbers and the corresponding number of words for each parameter.

3.2 Configuration

- a. First, invoke Cscape. From the Cscape Main Menu, select **Controller | I/O Configure...**

Ensure the correct controller is selected. To change controllers, press **CPU Slots** and select the desired module.

You can add an I/O module to any slot, but Slot 1 must not be empty.

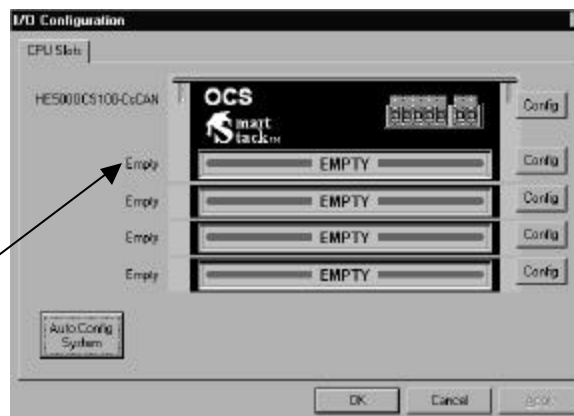


Figure 3.1 – Select the Module Slot

Ensure that the desired controller is selected. The OCS300-CsCAN is shown as the selected controller (Fig. 3.1) in this example. If satisfied with the controller selection, press a **Base #** tab, and go to Step 3. If a different controller is desired (as it is in this configuration example), continue Step 2.

Note: The **Auto Config System** button can be pressed *prior* to selecting the desired controller *and* I/O. By pressing the button, the settings are deleted from any controller *and* I/O that is physically connected to the PC. A dialog box appears and indicates that settings will be deleted from currently configured models. If OK, press **Yes**. Then press **OK**.

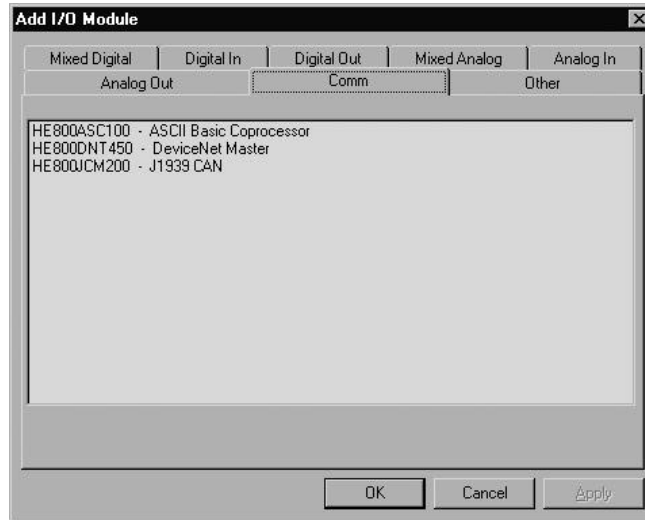


Figure 3.2 – Select the Comm tab

b. Next, double-click on the empty slot in which the JCM200 module will reside, or click on the **Config** button to the right of the slot position. This invokes the Add I/O Module screen. Click on the **Comm** tab.

From that dialog, select the **JCM200** module, and click **OK**.



Figure 3.3 – JCM200 Module is Added

c. The screen returns to the Configure I/O dialog box - with the selected slot showing that the **JCM200** module has been added.

Double-click on the JCM200 module in the I/O configuration screen (Figure 3.3) or click on the **Config** button next to the JCM200 module.

d. The following screen appears: Two tabs are available for selection:



Figure 3.4 – Module Configuration

I/O Map Tab

NOTE: Ignore this screen at this point. %AI registers can be varied during configuration; they are not fixed. As a result, a more complete I/O Map is provided later on in the configuration process after adding and deleting %AI as required.

Module Setup Tab

The **Module Setup** screen has two important functions.

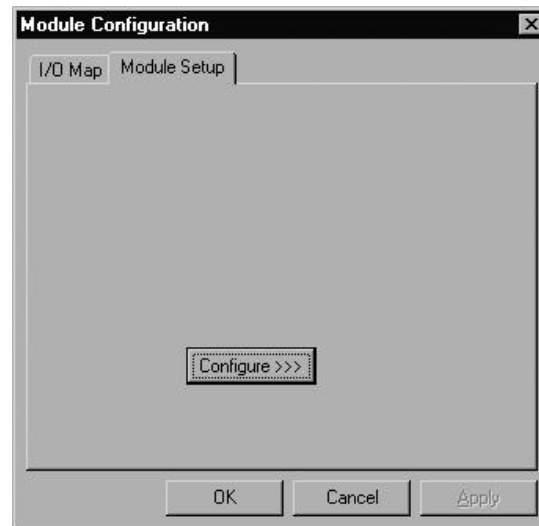


Figure 3.5 – Module Setup Tab

Function 1: Pressing the **Module Setup** tab displays a screen with a **Configure** button. Pressing the **Configure** button opens the following **Configurator** screen.

Function 2: After you finish with the **Configurator**, be sure to return to this screen and press **OK** (or **CANCEL**) to save (or cancel) all changes..

e. The following screen appears.

Standard Configuration focuses on 3 register types: %Q, %AQ, %I. These types have a fixed number of registers.

Scan Setup focuses on %AI register configuration. The ending register location and number of registers for %AIs varies depending on the register map.

If you want to add a %AI register, enter a Starting %AI Register number. Then, press **Add**.

To **Delete** a %AI register, double-click the item, and a screen appears allowing you to delete the register.

This screen is used to map the OCS %AI registers that contain parameter values from Engine Control Modules.

This portion of the screen is used to create a %AI register map to depict %AI registers that have been added.

%AIs listed here can be double-clicked to delete / edit them.

Figure 3.6 - JCM200 Configuration Program

Standard Configuration

The JCM200 has a fixed number of 8 %Qs, 8 %Is, and 11 %AQs.

Type: Displays the register types assigned to the module.

Starting Register: Denotes the starting location of the register type. **These are user-editable fields.**

Ending Register: Denotes the ending location of the register type. These fields are **automatically updated** by the Configurator.

Number: Indicates the quantity of a particular register type. These fields are **automatically updated** by the Configurator.

Scan Setup Configuration

Scan Setup Configuration Overview:

A single PGN can contain multiple bytes of parameter information. That information needs to be defined for each PGN in order for the JCM to understand what PGN data is to be stored into the corresponding %AIs. The PGN Configuration screen allows for entering the required information to create a data map between PGN data value and %AI registers.

The **Scan Setup** Configuration depicts the **Type**, **Starting Register**, **Ending Register**, and **Number of Registers** for the %AI registers. (See **Standard** Configuration for an explanation of these parameters.)

The Scan Setup Configuration is used to configure %AI registers. (The number of %AIs vary depending on your Scan Table configuration.)

To add a %AI, enter a Starting Register number. Press the **Add** button.

The following screen appears.

Figure 3.7 - PGN Configuration

%AI: Denotes the %AI register being configured (or deleted). This box is automatically updated by the Configurator.

PGN : In order for the OCS/RCS to communicate with an Engine Control Module, it is necessary to consult the engine manufacturer's user documentation to determine Parameter Group Numbers (**PGN**) and the definition for the **words** for each parameter.

SAE J1939 specifies a table of PGNs. A PGN is unique numeric identifier that is associated with a specific parameter name. A PGN is used to define the parameter value(s) a device is requesting or the parameter value(s) that a device is sending. (Requires a number to be entered between 0 through 65,536.)

Number of Words: This value represents the number of words from the PGN data to store into %AIs. A PGN could contain 8 words of data. If only the first 4 words are needed then this value would be set to 4. (Requires a number to be entered between 1 - 50.)

Starting Word: This value represents an index into the PGN data. Currently, this value is fixed a 1 so the PGN data starting at word 1 through the Number of Words will stored to %AIs. If the desired PGN data word is at word 6 then Number of Words would set at 6 (PGN data word 1 – data word 6 would be stored to %AIs).

In the future, this value may be adjustable, which would allow for starting at PGN data word 2 or higher.

f. **Scan Method:** The Scanning method uses a scan table that contains a series of PGNs and associated information. Data for the configured PGNs is continuously gathered and sent to the PLC. There are two modes for gathering data from devices on the J1939 network, monitor and request. Each PGN in the scan table is configured to use one of the two modes for gathering data. It denotes the method used to scan and obtain PGN values.

Monitor Mode

If the Engine Control Module broadcasts a desired PGN's data on a regular basis, then the mode for that PGN is configured for monitor.

Monitoring does not require interaction between the JCM200 and a device on the network. The JCM200 monitors the network for the PGNs that are configured as monitor mode in the scan table. If it finds a match, then the data is sent to the PLC.

Request Mode

If the desired PGN is not sent on a regular basis, then a request must be made from the JCM200 to the device *before* the data is sent. The mode for these PGNs are configured for request.

Requesting requires interaction between the JCM200 and a device on the network. The JCM200 must send a request message to a device onto the network and receive a reply *before* that data can be sent to the PLC.

g. During the configuration, it is possible that the following screen appears. In the event that it does appear, press the HE800JCM200 Configurator button (located on the Menu bar at the very bottom of the screen) to return to the configuration screen. This screen simply prompts you to close the JCM200 editor to continue.

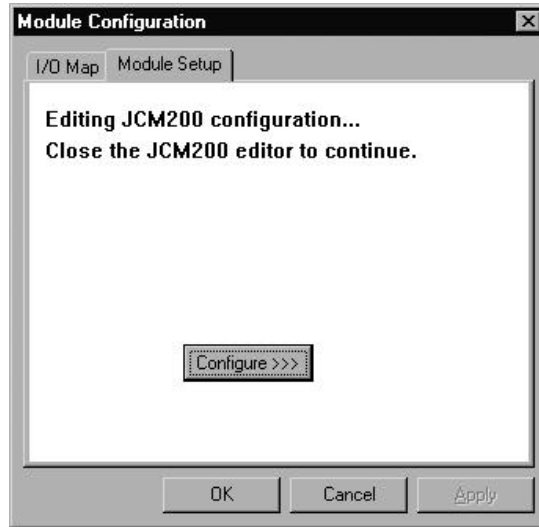
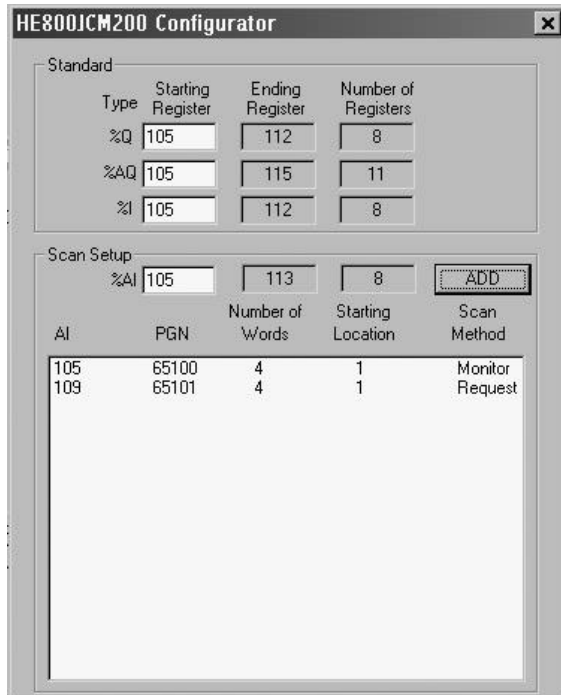


Figure 3.8 - PGN Configuration

h. Here is an example configuration screen.



← Press here after making the register map.

Then save your changes on the screen that follows.

Figure 3.9 – Example Configuration

i. After making the register map, you need to save the configuration changes by exiting the configuration screen and then returning to the **Module Setup** screen.

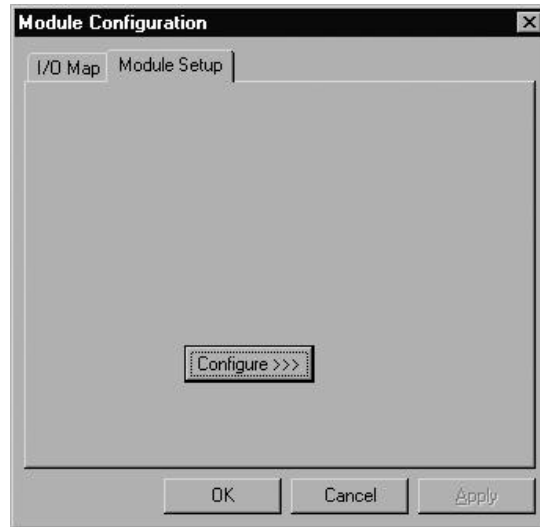


Figure 3.10 – Module Setup Tab

- j. To save or cancel your settings, be sure to return to this screen and press **OK** or **CANCEL**.