CATERPILLAR®

SEBU6874-04
March 2000

Operation and Maintenance Manual

Customer Communication Module (CCM) for Diesel Engines

2WB1-Up (Engine)
2RD1-Up (Engine)
2TD1-Up (Engine)
1ZF1-Up (Engine)
3YF1-Up (Engine)
4XF1-Up (Engine)
4RG1-Up (Engine)
5SJ1-Up (Engine)
2BM1-Up (Engine)
3DM1-Up (Engine)
4GM1-Up (Engine)
5XM1-Up (Engine)
6PM1-Up (Engine)
7HM1-Up (Engine)
7KM1-Up (Engine)
7SM1-Up (Engine)
8EM1-Up (Engine)
8RM1-Up (Engine)
4TN1-Up (Engine)
6HN1-Up (Engine)
6PN1-Up (Engine)
6WN1-Up (Engine)
7RN1-Up (Engine)
8CN1-Up (Engine)
8KN1-Up (Engine)
9AN1-Up (Engine)
9NN1-Up (Engine)
4ZR1-Up (Engine)
1LS1-Up (Engine)
3LS1-Up (Engine)
3MS1-Up (Engine)
3NS1-Up (Engine)
3PS1-Up (Engine)
3RS1-Up (Engine)
3SS1-Up (Engine)
3TS1-Up (Engine)
3WS1-Up (Engine)
3XS1-Up (Engine)
5PS1-Up (Engine)
8FS1-Up (Engine)
1NW1-Up (Engine)
1PW1-Up (Engine)
1TW1-Up (Engine)
2FW1-Up (Engine)
2GW1-Up (Engine)
2HW1-Up (Engine)
2JW1-Up (Engine)
3CW1-Up (Engine)
3DW1-Up (Engine)
3ZW1-Up (Engine)
4AW1-Up (Engine)
4BW1-Up (Engine)
5AW1-Up (Engine)
23Z1-Up (Engine)
24Z1-Up (Engine)
25Z1-Up (Engine)
2EZ1-Up (Engine)
67Z1-Up (Engine)
6HZ1-Up (Engine)
70Z1-Up (Engine)
73Z1-Up (Engine)
78Z1-Up (Engine)
81Z1-Up (Engine)
9BZ1-Up (Engine)

Important Safety Information

Most accidents that involve product operation, maintenance and repair are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs. A person must be alert to potential hazards. This person should also have the necessary training, skills and tools to perform these functions properly.

Improper operation, lubrication, maintenance or repair of this product can be dangerous and could result in injury or death.

Do not operate or perform any lubrication, maintenance or repair on this product, until you have read and understood the operation, lubrication, maintenance and repair information.

Safety precautions and warnings are provided in this manual and on the product. If these hazard warnings are not heeded, bodily injury or death could occur to you or to other persons.

The hazards are identified by the “Safety Alert Symbol” and followed by a “Signal Word” such as “DANGER”, “WARNING” or “CAUTION”. The Safety Alert “WARNING” label is shown below.

⚠ WARNING

The meaning of this safety alert symbol is as follows:

Attention! Become Alert! Your Safety is Involved.

The message that appears under the warning explains the hazard and can be either written or pictorially presented.

Operations that may cause product damage are identified by “NOTICE” labels on the product and in this publication.

Caterpillar cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this publication and on the product are, therefore, not all inclusive. If a tool, procedure, work method or operating technique that is not specifically recommended by Caterpillar is used, you must satisfy yourself that it is safe for you and for others. You should also ensure that the product will not be damaged or be made unsafe by the operation, lubrication, maintenance or repair procedures that you choose.

The information, specifications, and illustrations in this publication are on the basis of information that was available at the time that the publication was written. The specifications, torques, pressures, measurements, adjustments, illustrations, and other items can change at any time. These changes can affect the service that is given to the product. Obtain the complete and most current information before you start any job. Caterpillar dealers have the most current information available. For a list of the most current publication form numbers available, see the Service Manual Contents Microfiche, REG1139F.

⚠ WARNING

When replacement parts are required for this product Caterpillar recommends using Caterpillar replacement parts or parts with equivalent specifications including, but not limited to, physical dimensions, type, strength and material.

Failure to heed this warning can lead to premature failures, product damage, personal injury or death.

Table of Contents

Foreword

Literature Information

This manual should be stored in the operator's compartment in the literature holder or seat back literature storage area.

This manual contains safety information, operation instructions, and maintenance recommendations.

Some photographs or illustrations in this publication show details or attachments that can be different from your machine.

Continuing improvement and advancement of product design might have caused changes to your machine which are not included in this publication. Read, study and keep this manual with the machine.

Whenever a question arises regarding your machine, or this publication, please consult your Caterpillar dealer for the latest available information.

Safety

The safety section lists basic safety precautions. In addition, this section identifies the text and locations of warning signs and labels used on the machine.

Operation

The operation section is a reference for the new operator and a refresher for the experienced operator. This section includes a discussion of gauges, switches, machine controls, attachment controls, and programming information.

Photographs and illustrations guide the operator through correct procedures of checking, starting, operating and stopping the machine.

Operating techniques outlined in this publication are basic. Skill and techniques develop as the operator gains knowledge of the machine and its capabilities.

Maintenance

The maintenance section is a guide to equipment care.

California Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

Battery posts, terminals and related accessories contain lead and lead compounds.**Wash hands after handling**

Certified Engine Maintenance

Proper maintenance and repair is essential to keep the engine and machine systems operating correctly. As the heavy duty off-road diesel engine owner, you are responsible for the performance of the required maintenance listed in the Owner's Manual, Operation and Maintenance Manual, and Service Manual.

It is prohibited for any person engaged in the business of repairing, servicing, selling, leasing, or trading engines or machines to remove, alter, or render inoperative any emission related device or element of design installed on or in an engine or machine that is in compliance with the regulations (40 CFR Part 89). Certain elements of the machine and engine such as the exhaust system, fuel system, electrical system, intake air system and cooling system may be emission related and should not be altered unless approved byCaterpillar

Caterpillar Product Identification Number

Effective First Quarter 2001 the Caterpillar Product Identification Number (PIN) will change from 8 to 17 characters. In an effort to provide uniform equipment identification, Caterpillar and other construction equipment manufacturers are moving to comply with the latest version of the product identification numbering standard. Non-road machine PINs are defined by ISO 10261. The new PIN format will apply to all Caterpillar machines and generator sets. The PIN plates and frame marking will display the 17 character PIN. The new format will look like the following:

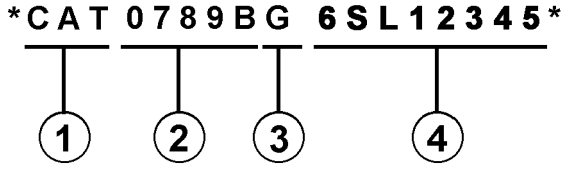

Illustration 1 g00751314

Where:

1. Caterpillar's World Manufacturing Code (characters 1-3)

2. Machine Descriptor (characters 4-8)

3. Check Character (character 9)

4. Machine Indicator Section (MIS) or Product Sequence Number (characters 10-17). These were previously referred to as the Serial Number.

Machines and generator sets produced before First Quarter 2001 will maintain their 8 character PIN format.

Components such as engines, transmissions, axles, etc. and work tools will continue to use an 8 character Serial Number (S/N).

Product Information Section

Model Views

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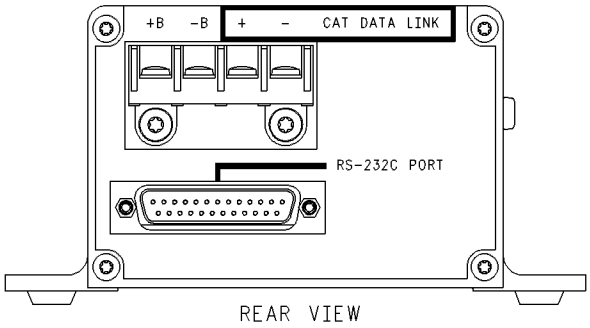
Model View Illustrations

SMCS Code: 1926



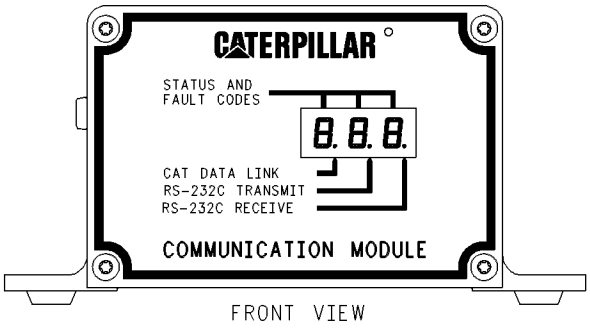
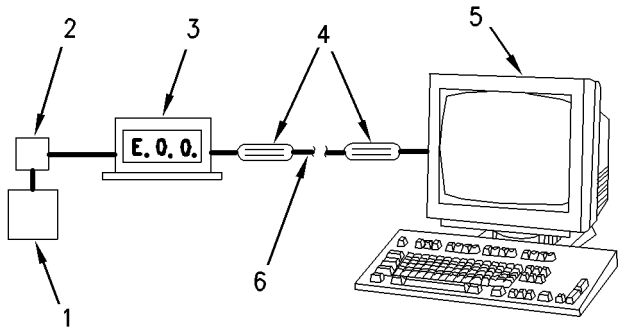


Illustration 2 g00329183

Customer Communication Module (front and rear view)



g00654437

Illustration 3

CCM System Setup

(1) Electronic Engine Controller
(2) Junction boxes
(3) CCM
(4) Optional modems
(5) Host computer
(6) Phone line

Product Identification Information

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Serial Number Location

SMCS Code: 1926

Each CCM has a 5 digit serial number. The serial number will be on the bottom of a mounting flange. The serial number will begin with the letters “SN”. The part number is located on the same flange. The part number will be a 7 digit number (XXX-XXXX).

Reference Materials

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Reference Material

SMCS Code: 1926

Users' Manual, JERD2162, "CCM PC Software Manual"

Note: All references to EMCP II in this manual include EMCP II, EMCP II+, and EMCP II+P except as noted. All references to EMCP II+ also apply to EMCP II+P unless otherwise stated. The same rules similarly apply to GSC, GSC+, and GSC+P.

Note: All references in this manual to 3500B EUI Engines also apply to 3500 with EUI option engines.

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Acronyms

SMCS Code: 1926

ADEM – Advanced Diesel Engine Management

CCM – Customer Communication Module

CID – Component Identifier

<cr> – carriage return

cs – checksum

CTS – Clear To Send

DCD – Data Carrier Detect

DCE – Data Communication Equipment

DTE – Data Terminal Equipment

DTR – Data Terminal Ready

ECM – Engine Control Module

ECS – Engine Control Switch

EIP – Electronic Instrument Panel

EIS – Electronic Ignition System

EMCP – Electronic Modular Control Panel

EMI – Electromagnetic Interference

EPG – Electric Power Generation

ET – Electronic Technician

EUI – Electronic Unit Injector

F – Fuse

FID – Fault Identifier

FMI – Failure Mode Identifier

GSC – Generator Set Control

IID – Instruction Identifier

LSB – Least Significant Byte

MID – Module Identifier

MSB – Most Significant Byte

MUI – Mechanical Unit Injector

PC – Personal Computer

PID – Parameter Identifier

PLC – Programmable Logic Controller

RFI – Radio Frequency Interference

RTS – Request To Send

RX – Data Receive

TX – Data Transmit

Operation Section

Operation

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General Operation

SMCS Code: 1926

The Customer Communication Module (CCM) provides a communication link between the electronic control system and a host device. An operator has the capability to control the engine remotely with the host device. The operator can monitor the engine remotely. The operator can program the engine remotely. 3500B Marine applications cannot be controlled remotely.

The host device can be one of the following items:

- personal computer (PC)
- Programmable Logic Controller (PLC)
- any other device with an RS-232C port

The host device can be connected directly to the CCM. The communication link is established with the CAT Data Link and the industry standard RS-232C cable. The host device can also be used with a modem.

If the host device is a PC, software that is compatible with the CCM is available from Caterpillar. Refer to “Caterpillar CCM PC For Windows: Getting Started Manual” for more information on the PC software.

The CCM can be used with customized software. A serial data format is used to aid in programming a PLC to communicate with the CCM. Refer to the Operation and Maintenance Manual, “Communication Protocol for Customized Systems”.

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Display Description

SMCS Code: 1926

The CCM display indicates the status of the CAT Data Link and the RS-232C during normal operation. The CCM will also display some of the current parameters for communication.

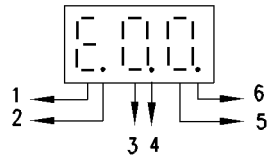

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Illustration 4

(1) Error code
(2) Activity on CAT Data Link
(3) First digit of error code
(4) The CCM is transmitting on RS 232C.
(5) Second digit of error code
(6) The CCM is receiving data on the RS 232C.

The values E, 0, and 0 indicate an error code of 00. The code E00 means that no faults are present, and the CCM is in normal operating mode. The complete list of error codes are in the Operation and Maintenance Manual, “Troubleshooting” section. The periods on the display will flash when information is transmitted on the CAT Data Link. The periods on the display will flash when information is transmitted on the RS-232C port. No period indicates that no activity is taking place.

Note: Units with the part number 117-6170 Customer Communication Module will display the faults that have been logged. Each fault will be displayed for 2 seconds in 60 second intervals. This flashing fault log will not appear for any other version of CCM. The fault log can be cleared by using the PC software for the CCM.

CCM Power Up Display

The CCM display will perform a lamp test (8.8.8.). The parameters for communication protocol (n81 9600 E00) will be displayed next. An example of the power up sequence is given below:

Table 1

8.8.8. n81 9600 E00	
8.8.8.	All of the segments are turned on for a two second lamp test.
n81 n 8 1	 No parity (default value) Eight data bits (default value) One stop bit (default value)
9600	Rate of Communication (default value)
E00	Error Code No faults are present.

The values for communication can be changed by using a host device or by using the PC software for the CCM. Refer to “Caterpillar CCM PC For Windows: Getting Started Manual”. The values for communication must match the values for the modems (if used) and the values for the host device.

Installation

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General Installation Requirements

SMCS Code: 1926

When a CCM is installed, the following specifications must be met:

- environmental
- mounting
- wire and cable

The connection diagrams must be followed. Improper wiring may cause erratic operation of the CCM. If modems are used, the user must set up the modems properly.

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Specifications

SMCS Code: 1926

Environmental

- The ambient operating temperature range is from –40° to 70°C (–40° to 158°F).
- The storage temperature is from –40° to 85°C (–40° to 185°F).
- The unit must be protected from direct contact with liquids. If sealing of the unit is required, the CCM must be in a water tight enclosure.
- The CCM weighs 0.75 kg (1.65 lb).

Mounting

The CCM can be located on a desk or on a shelf. The rubber feet on the bottom of the CCM can be removed for mounting to a panel.

Note: Do not mount the CCM on the engine or within the engine mounted instrument panel. The CCM is not designed for direct engine mounting.

Internal Battery

The CCM contains a battery that supplies power for internal memory whenever the CCM is turned off. Refer to the Operation and Maintenance Manual, “Battery - Replace”.

Power Supply

- The requirements for battery voltage are 15 to 45 volts DC (24 or 32 volts DC nominal power).
- The +/–B power dissipation is approximately 3.0 watts at 24 volts.
- The current drawn by the CCM is 0.11 amps at 12 volts and 0.13 amps at 36 volts.
- Multiple engines must share a common ground (–B).
- Multiple engines must use diodes to prevent power sharing between units.

Dimensions

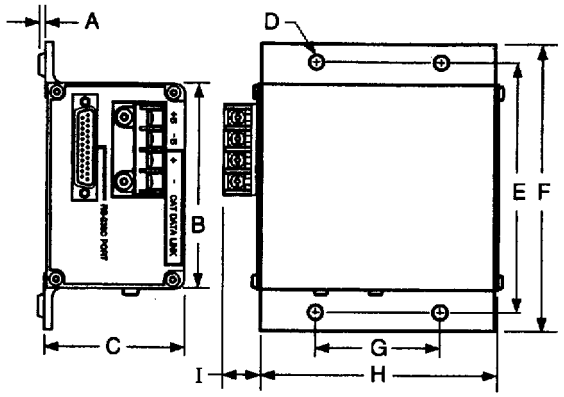

Illustration 5 g00647099

Table 2

CCM MOUNTING DIMENSIONS	
Item	**Dimension**
A	3.5 mm (0.14 in)
B	106.5 mm (4.19 in)
C	73.0 mm (2.87 in)
D	7.5 mm (0.29 in) diameter holes (4)
E	130 mm (5.12 in)
F	149.0 mm (5.87 in)
G	66.2 mm (2.61 in)
H	125.5 mm (4.94 in)
I	17.8 mm (.70 in)

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General Specifications for Wire and Cable

SMCS Code: 1926

The following specifications for wire and for cable are given to lower drops in voltage over long runs of wire. The specifications will also help minimize EMI/RFI interference.

- Do not run the data link wiring in the same raceway with high power cables. This restriction includes generator leads and AC cables.
- The wires that are connected to +B and –B on the CCM must be at least 16 AWG.
- The maximum length of the RS-232C cable is 15 m (50 ft).
- The maximum length for the Cat Data Link and the +/–B wire is 455 m (1500 ft) when a CCM is present. This length includes runs of wire between any multiple engine configuration. The maximum length of wire is 30.5 m (100 ft) when a CCM is NOT present.

Note: In order to conform to the European Economic Community (EEC) 336 Directive, the RS-232 cable must be shielded.

No terminations or splices are allowed on the above wires except as shown in the connection diagrams. The cable that is connected to the (+/–) CAT Data Link must be a 16 AWG shielded twisted pair cable. Use **123-2376** Electrical Cable.

Refer to Special Instruction, SEHS9951, “Customer Communication Module and Programmable Relay Control Module Installed on 3500B Engines with Electronic Instrument Panel” for additional information on 3500B wiring.

Table 3

CAT DATA LINK CABLE SPECIFICATIONS, RESISTANCE AND CAPACITANCE			
	Measured Parameter		
	C to C(1)	C to S(2)	SCSR(3)
Nominal Capacitance per meter (foot)	75 pF (23 pF)	144 pF (44 pF)	-
Total Nominal Capacitance 455 m (1500 ft)	0.035 µF	0.066 µF	-
Nominal Resistance per meter (foot) at 20 °C (68 °F)	-	-	14.0 mΩ (4.27 mΩ)
Total Nominal Resistance 455 m (1500 ft) at 20 °C (68 °F)	-	-	6.41 mΩ

(1) Conductor to Conductor
(2) Conductor to Shield
(3) Single Conductor Series Resistance (16 AWG, 19/29 stranding)

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General Wiring Diagram

SMCS Code: 1926

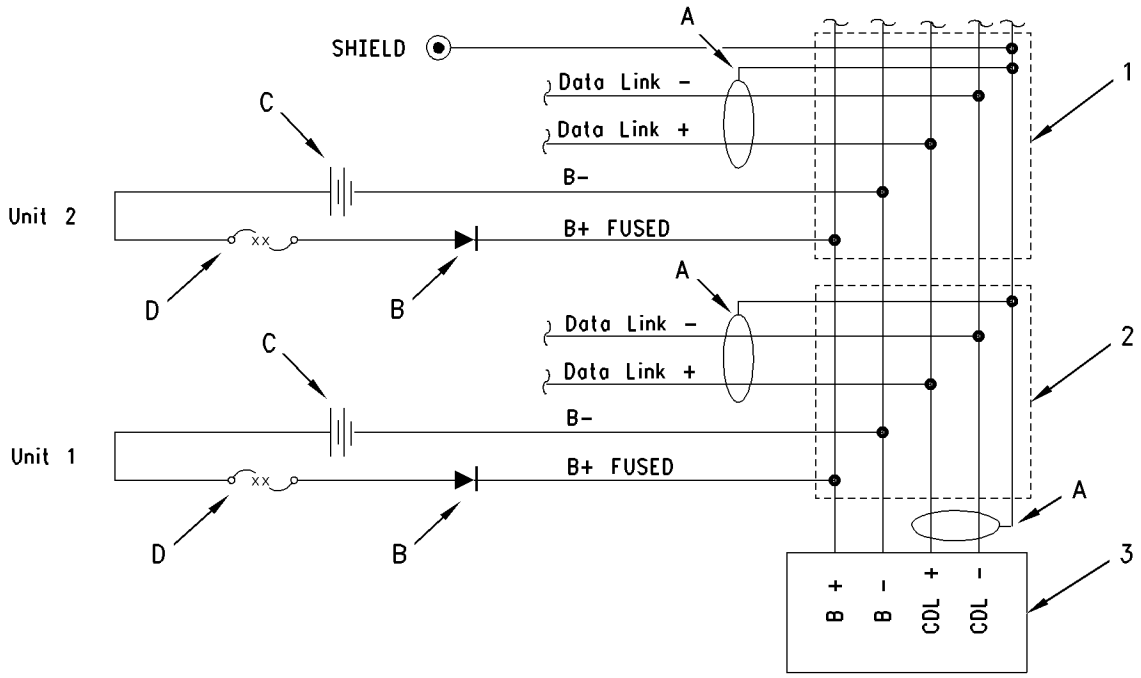

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Illustration 6

CCM Wiring Connections for Multiple Generator Sets

Shield (A) should be grounded in one location only. The shield should be grounded as near to the negative battery terminal as possible.

5N-4988 Diode (B) is necessary only when multiple gensets are connected.

Connections to the battery (C) should be made at the EMCP II (if equipped). Connections to the battery can be made at the 24 pin customer connector. The 24 pin customer connector is located on the bottom of the Electronic Instrument Panel (EIP).

The 8D-8724 Fuse (2 amp) (D) should be placed in a fuse block.

You will have electrical noise if the +B and –B lines are in the 4 wire shielded cable with the Cat data link cables. Use twisted pair wiring for the CDL+ and CDL- instead.

(1) Junction box for Unit 2
(2) Junction box for Unit 1
(3) CCM

When multiple units are connected to the CCM, junction boxes must be installed. The junction boxes will allow any engine to be disconnected for service or maintenance without power interruption to the CCM and the other engines.

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RS-232C Cable Requirements

SMCS Code: 1926

The CCM is classified as Data Terminal Equipment (DTE) for RS-232C communication.

- The CCM RS-232C connector is a standard 25 pin D shell connector with pins.
- The RS-232C cable must be shielded.
- When the CCM is connected to other DTE devices a Null Modem cable or an adapter is required. A personal computer is an example of a DTE device.
- When the CCM is connected to Data Communication Equipment (DCE) a Null Modem cable or an adapter is not required. Modems, printers, and terminals are examples of DCE devices.

- The DCD pin on the CCM must be asserted in order to allow the CCM to communicate. If the DCD pin is deasserted, the CCM will shut down all outgoing information.

A 25 to 25 pin cable and a null modem adapter are needed if the CCM is directly connected to a PC with a 25 pin RS-232C connector. Refer to Illustration 7.

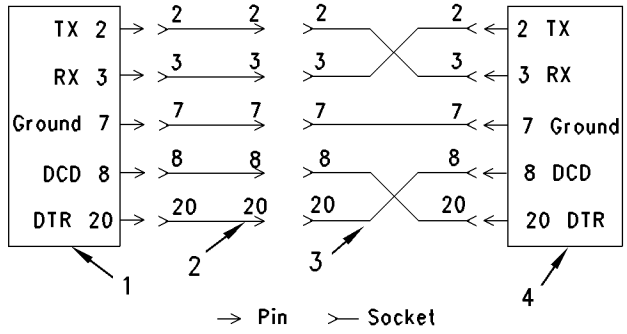

Illustration 7 g00670863

CCM Cable requirements for Direct Connection to PC with 25 Pin Connector

(1) PC with 25 pin RS-232C connector
(2) 25 to 25 pin female to male cable
(3) Null modem adapter
(4) CCM with 25 pin RS-232C connector

If the PC has a 9 pin RS-232C connector a 9 to 25 pin cable with a null modem adapter is required. Refer to Illustration 8.

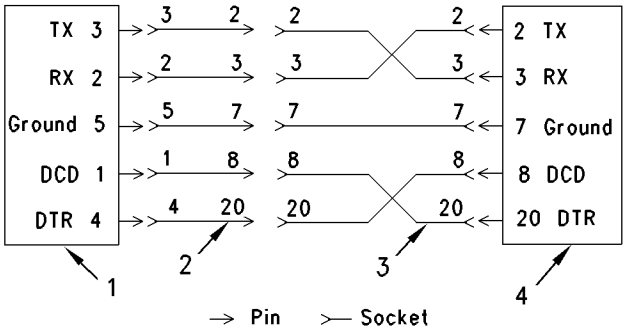

Illustration 8 g00670882

CCM Cable Requirements for Direct Connection to PC with 9-Pin Connector

(1) PC with 9 pin RS-232C connector
(2) 9 to 25 pin cable
(3) Null modem adapter
(4) CCM with 25 pin RS-232C connector

The null modem adapter connects the Data Transmit of one device to the Data Receive of the other device. The Null Modem adapter connects the Data Carrier Detect and the Data Terminal Ready pins in a similar manner. Cables are available from most personal computer suppliers.

Note: Verify that the cables and null modem adapters are compatible with the specifications in Tables 4 and 5.

Table 4

25 PIN RS-232C PIN DEFINITIONS	
Pin Number	**Description**
2	Data Transmit (TX)
3	Data Receive (RX)
7	Ground
8	Data Carrier Detect (DCD)
20	Data Terminal Ready (DTR)

Table 5

9 PIN RS-232C PIN DEFINITIONS	
Pin Number	**Description**
1	Data Carrier Detect (DCD)
2	Data Receive (RX
3	Data Transmit (TX)
4	Data Terminal Ready (DTR)
5	Ground

A 25 to 25 pin cable or a 9 to 25 pin cable is needed when the CCM is used with a modem. Refer to Illustrations 9 and 10. The type of cable will depend on the number of pins on the RS-232C connector of the PC.

Note: Do not use a null modem adapter to connect a modem to the PC or the CCM.

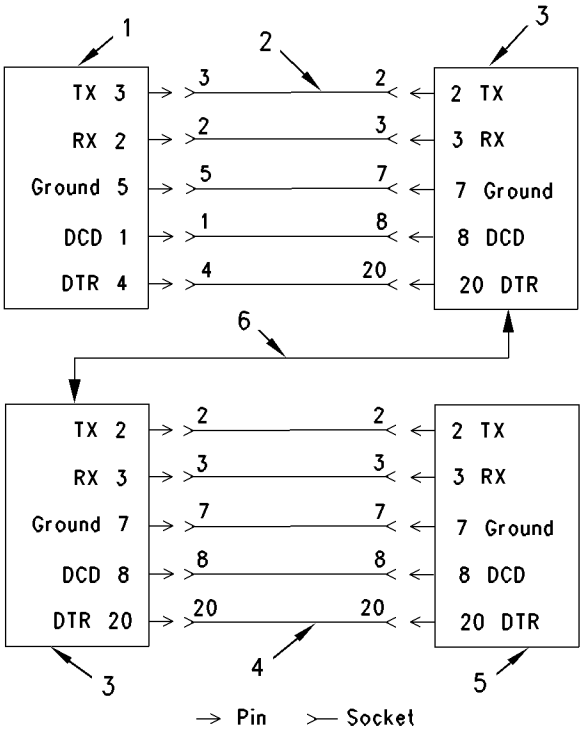

Illustration 9 g00645279

CCM Cable Requirements for Modem Connection to PC with 9-Pin Connector

(1) PC with 9 pin RS-232C connector
(2) 9 to 25 pin cable
(3) Modems that are connected by telephone lines
(4) 25 to 25 pin cable
(5) CCM with 25 pin RS-232C connector
(6) Telephone line

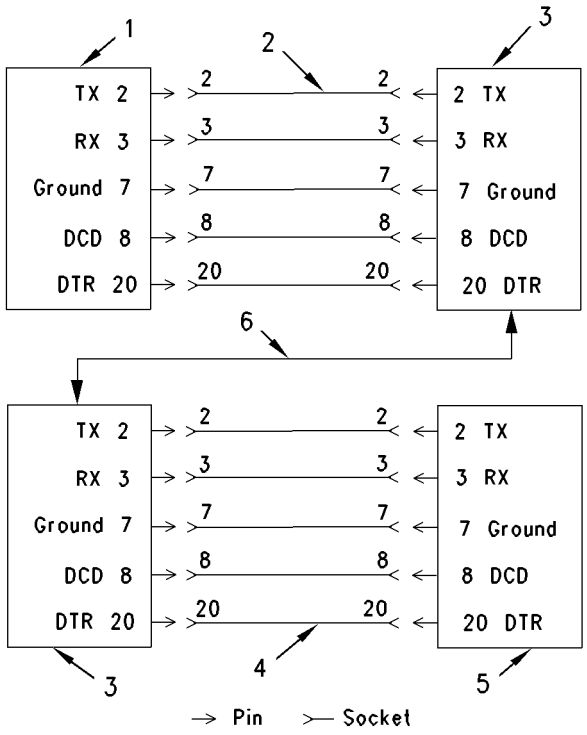

Illustration 10 g00645341

CCM Cable Requirements for Modem Connection to PC with 25-Pin Connector

(1) PC with 25 pin RS-232C connector
(2) 25 to 25 pin cable
(3) Modems that are connected by telephone lines
(4) 25 to 25 pin cable
(5) CCM with 25 pin RS-232C connector
(6) Telephone line

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Data Link Guidelines

SMCS Code: 1926

The CCM has the ability to communicate with a maximum of eight other controllers. The number of available connections will depend on the type of device that is being connected. Generator set applications are limited to eight controllers that can be connected to the CCM. Marine applications are limited to a maximum of three connections.

The CCM identifies different controllers on the data link by the Module Identifier (MID) of the controller. The MID is programmable in some cases. Refer to the Operations and Maintenance Manual, “Engine Number - Program” for more detailed information on programming the Module Identifiers. Each controller that is connected to the CCM must have a unique MID.

There are two versions of Electronic Control Modules (ECM) for 3500B EUI Engines. The connection to the CCM will depend on the version of the ECM. The version of the ECM is based on the serial number of the engine. The serial number is listed on the engine nameplate. Use the following chart to determine the correct version of controller for each engine.

Table 6

Serial Numbers	
Version C	**Version D**
N/A	1NW00001 & Up
N/A	1PW00001 & Up
N/A	1TW00001& Up
2BM00001 to 2BM00122	2BM00123 & Up
N/A	2FW00001 & Up
N/A	2GW00001 & Up
N/A	2HW00001 & Up
N/A	3CW00001 & Up
3DM00001 to 3DM00092	3DM00093 & Up
N/A	3DW00001 & Up
N/A	4AW00001 & Up
4GM00001 to 4GM00211	4GM00212 & Up
4TN00001 to 4TN00095	4TN00096 & Up
6HN00001 to 6HN00155	6HN00156 & Up
6PN00001 to 6PN00284	6PN00285 & Up
6WN00001 to 6WN00134	6WN00135 & Up
7HM00001 to 7HM00173	7HM00174 & Up
7RN00001 to 7RN00462	7RN00463 & Up
7SM00001 to 7SM00076	7SM00077 & Up
8CN00001 to 8CN00143	8CN00144 & Up
8EM00001 to 8EM00257	8EM00258 & Up
8KN00001 to 8KN00142	8KN00143 & Up
8RM00001 to 8RM00199	8RM00200 & Up
9AN00001 to 9AN00120	9AN00121 & Up

- Version C of the ADEM II controller (ECM) has a primary data link for use with the CCM. This data link is called the CAT Data Link. The Module Identifier (MID) of this controller is a fixed value. Each controller on the CAT Data Link must have a unique MID. The CCM can only be connected to one Version C ECM on the CAT Data Link.

- Version D of the ADEM II controller (ECM) also has a primary data link for use with the CCM. The value of the MID for the primary data link is fixed. Version D also has a secondary data link for use with the CCM. The Secondary CAT Data Link has a programmable MID. A maximum of eight different values is available for generator set applications. A maximum of three different values is available for marine applications.

- EMCP II (basic model) has a primary data link for use with the CCM. This data link is called the CAT Data Link. The CAT Data Link has a programmable MID. A maximum of eight different values may be used for the MID.

- EMCP II+ has the same primary data link as EMCP II (CAT Data Link) with a programmable value for the MID. The EMCP II+ also has a secondary data link for use with the CCM. The CCM Data Link has a programmable value for the MID. The CAT Data Link and the CCM Data Link have eight MID values.

- The Secondary CAT Data Link and the CCM Data Link can be treated in the same manner on the 3500B Version D and the EMCP II+ applications.

- There is a maximum of one CCM per data link.

- There is a maximum of one CCM per engine.

The previous descriptions govern the connections between the devices and the CCM. When an ADEM II controller and an EMCP II or EMCP II+ controller are connected, the CAT Data Link is always used for the connections. All subsequent connections to the CCM (ADEM II Version D or EMCP II+) are made by using the secondary data link. The following examples will illustrate some valid CCM connections with multiple electronic controllers. These examples are only a representation of most possible valid connections or combinations.

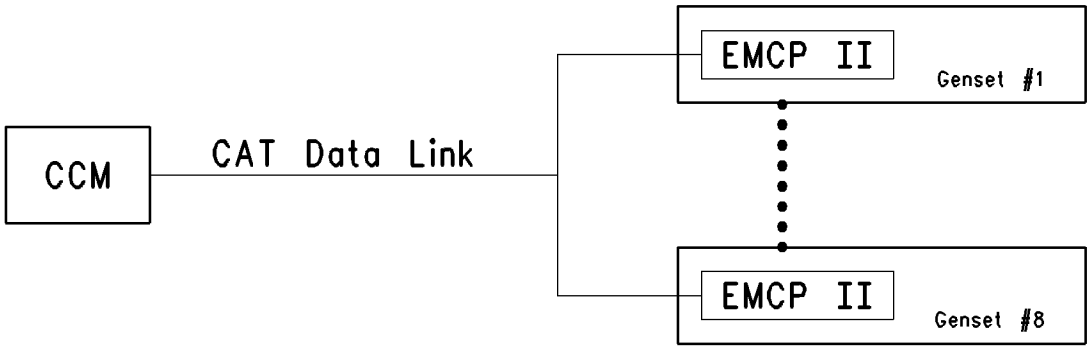


Illustration 11 g00649118

MUI Generator sets with EMCP II (Basic Model)

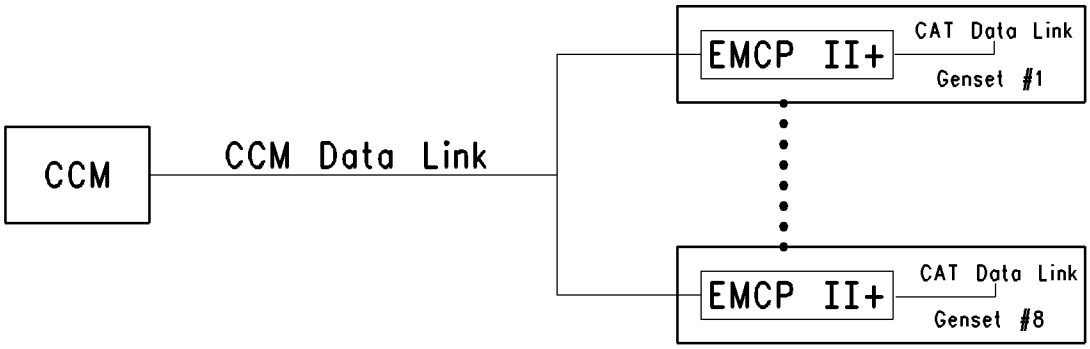


Illustration 12 g00649133

MUI Generator sets with EMCP II+

Illustration 13 g00649182

3500B EUI Generator set (Version C ECM)

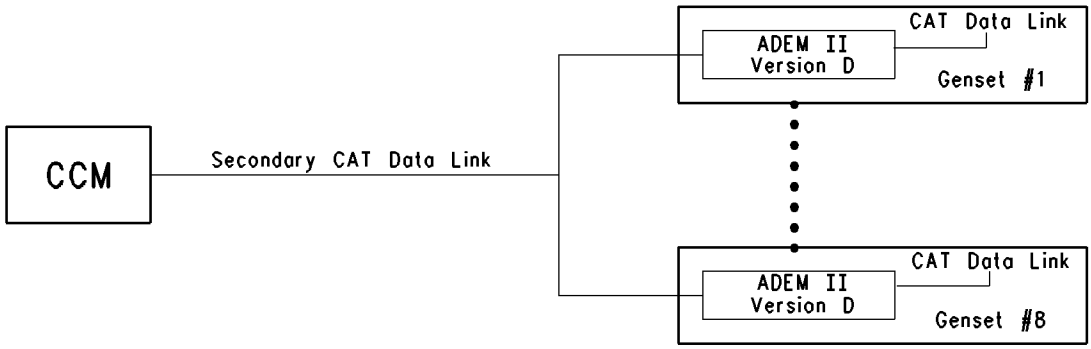
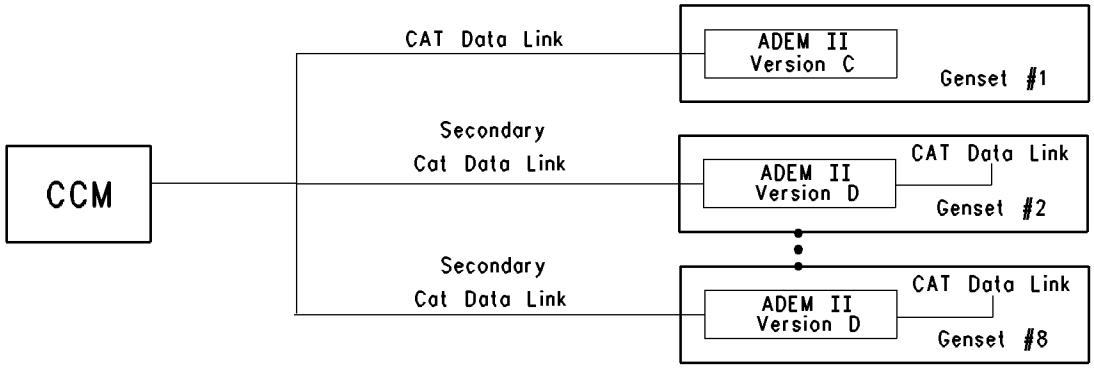


Illustration 14 g00649184

3500 B EUI Generator sets (Version D ECM)

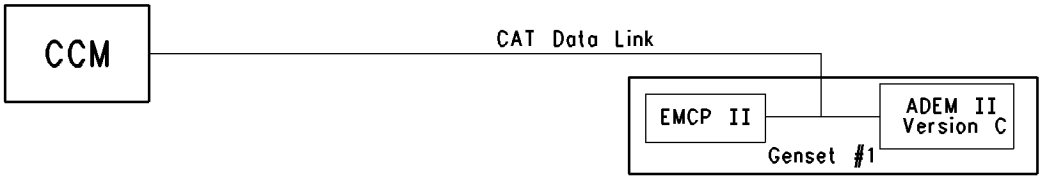


g00649192

Illustration 15

3500B EUI Generator sets (Version C and D ECM's)

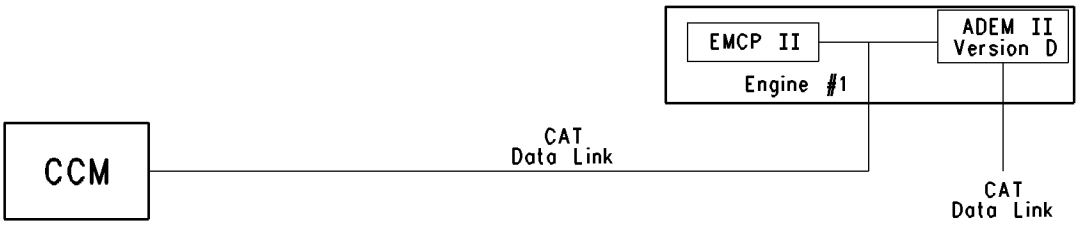
For the application that is shown in Illustration 15, only one Version C ECM is allowed.



g00649200

Illustration 16

3500B EUI Generator set (Version C ECM) with EMCP II (Basic Model)



g00649317

Illustration 17

EMCP II Basic and 3500B EUI Generator set (Version D ECM)

One CCM is required for each engine with Version D ECM.

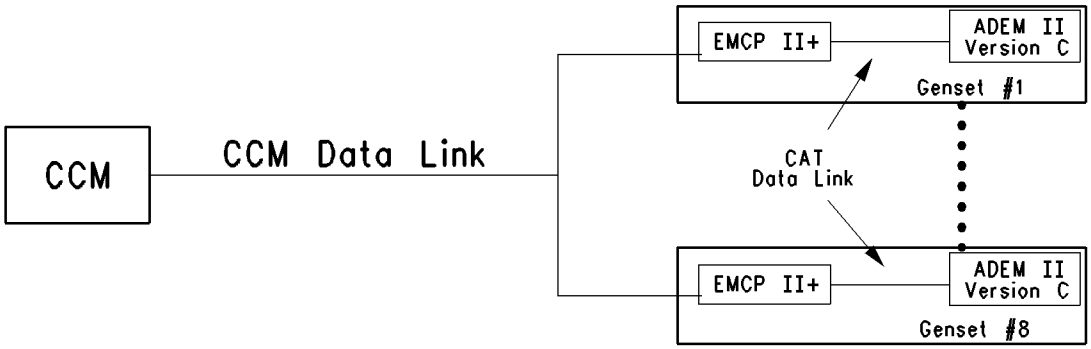


Illustration 18 g00649214

3500B EUI Generator sets (Version C ECM) with EMCP II+

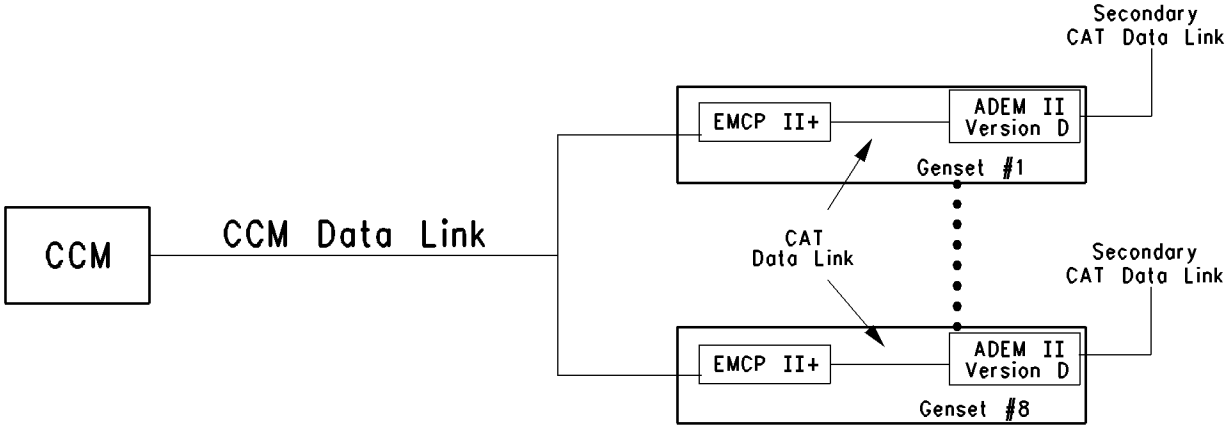


Illustration 19 g00649236

3500B EUI Generator sets (Version D ECM) with EMCP II+

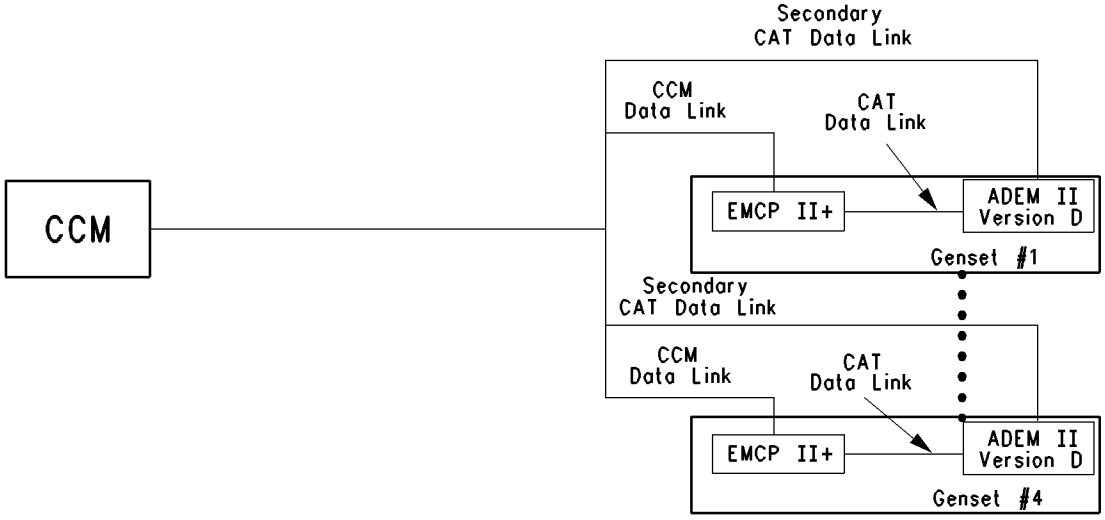


Illustration 20 g00649243

3500B EUI Generator sets (Version D ECM) with EMCP II+

A maximum of four generator sets can be connected in the application that is shown in Illustration 20. The CCM is limited to eight connections. In Illustration 19, eight generator sets can be connected. More detailed information can be obtained from the ADEM II controller in Illustration 20, but only four generator sets can be connected.

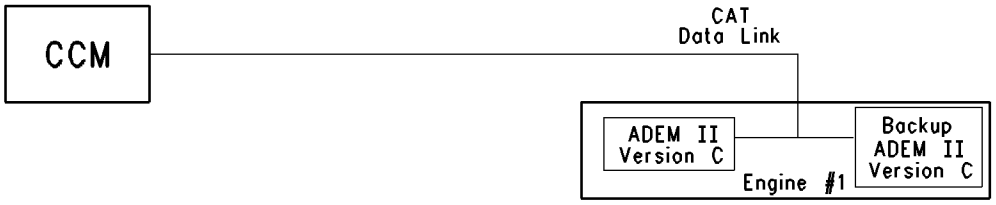


Illustration 21 g00649268

3500B EUI Marine Engine (Version C ECM)

One CCM is required for each engine with a Version C ECM.

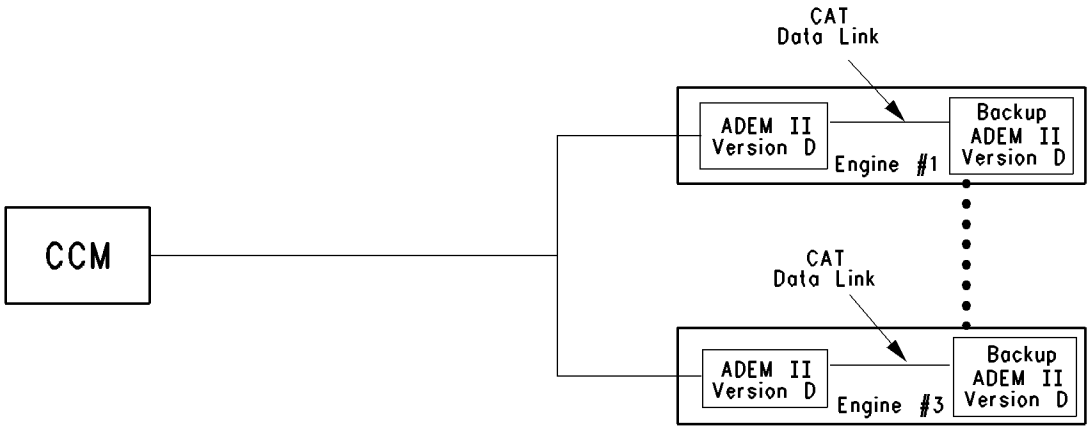


Illustration 22 g00649284

3500B EUI Marine Engine (Version D ECM)

i01200873

Communication Initialization

SMCS Code: 1926

The CCM may be connected directly to the host equipment. The CCM may also be connected to the equipment by using modems. The initialization procedure depends on the type of connection. The correct initialization procedure is necessary for proper communication between the CCM and the equipment.

When modems are installed between the CCM and the host equipment, the complexity of the communication network is increased. The RS-232C ports must be set to the proper parameters for communication on the following equipment: host equipment, modems, and CCM. The phone line ports of the modems must be compatible. To connect the modems, consult the manufacturer's instructions.

i01226763

Initialization for Direct Connection

SMCS Code: 1926

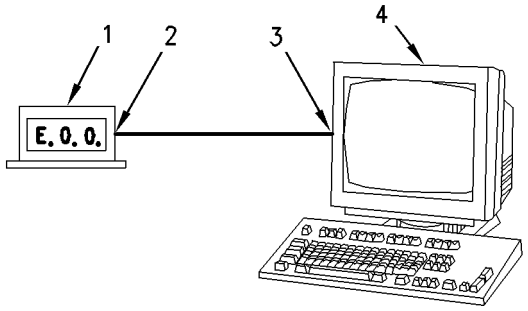


Illustration 23 g00669441

CCM to Host Equipment Direct Connection

(1) CCM
(2) CCM RS-232C port
(3) Computer RS-232C port
(4) Host equipment

Make sure that the following equipment is available:

- A personal computer. Refer to "Caterpillar CCM PC For Windows: Getting Started Manual" for specifications on the PC.

- The proper RS-232C cables are required for the particular installation. Refer to the Operation and Maintenance Manual, “RS-232C Cable Requirements”.

- The CCM PC Software for Windows. This software is available from Caterpillar.

Procedure

Perform the following procedure to initialize communication with the host equipment that is connected directly to the CCM.

Note: The host equipment and the CCM should be turned OFF before you change the cables to the serial ports.

1. The CCM should be installed with all of the wiring. Refer to Operations and Maintenance Manual, “General Wiring Diagram” and "RS-232C Cable Requirements".

2. Determine the parameters for communication for the installation. The default rate of communication (bits per second or bps) is 9600. The remaining default settings from the factory are no parity, 8 data bits, and 1 stop bit. These parameters will work well in most installations. Use the Operations and Maintenance Manual, “Communication Parameters - Identify” to determine the parameters of communication that are stored in the CCM.

3. Load the CCM PC For Windows software into the PC. Refer to the “Caterpillar CCM PC For Windows: Getting Started Manual”. Start the CCM PC program and connect to the CCM.

4. Go to the Data Link pull-down menu. Select ECM, CCM. Go to the CCM configuration screen in the Utilities menu. Set the parameters for communication to match the values that were chosen in step 2.

5. Use the CCM configuration screen to set the Connection Type to Direct Connection. The CCM is now set at the determined communication configuration.

Note: If the PC is required to communicate with the CCM, go to the Phone Book pull-down menu and select Add or Edit. Set the communication parameters of the PC to the values that were chosen in Step 2.

Note: The electronic controller of each engine must be programmed with the correct engine number for identification on the CCM. The electronic controller is programmed to Engine Number 1 at the factory. Refer to Operation and Maintenance Manual, SEBU6874, “Engine Number - Program”.

Note: After the CCM has been connected to the PC, refer to the “CCM PC Software Users Manual”. This manual contains instructions on monitoring and on controlling the engine remotely.

Note: Two conditions must be met before the electronic engine controller will allow control by the CCM. The Engine Control Switch must be in the AUTO position, and the remote initiate contacts must be open. The engine may be monitored with the ECS in any position.

Note: For an EMCP II application, the CCM cannot control the generator set if the GSC is in Service Mode. The generator set can only be monitored.

i01226832

Initialization for Remote Connection with Modem

SMCS Code: 1926

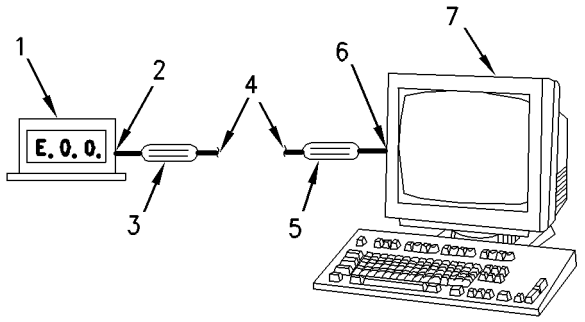


Illustration 24 g00669454

CCM/Host equipment Remote Connection with Modems

(1) CCM
(2) CCM RS-232C port
(3) Answering modem
(4) Telephone line
(5) Originating modem
(6) Computer’s RS-232C port
(7) Host equipment

You should follow the instructions in Operations and Maintenance Manual, “Initialization for Direct Connection” before you connect by a modem. The user can verify proper operation of the CCM at the location. The user can also become familiar with the CCM.

Make sure that the following equipment is available:

- A personal computer with a terminal emulator software program. Examples of terminal emulators include Procomm, PC-VT, or Terminal under the Accessories window in Microsoft Windows. Refer to “Caterpillar CCM PC For Windows: Getting Started Manual” for specifications on the PC. The user is responsible for understanding the operation of the PC.

- The proper RS-232C cables are required for the particular installation. An RS-232C cable must be temporarily connected from the PC to the Answering Modem. Refer to Operation and Maintenance Manual, “RS-232C Cable Requirements”.

- The two modems must support the Hayes AT command set. This is necessary for both the Answering Modem and the Originating Modem.

- The CCM PC For Windows software is required. This software is available from Caterpillar.

Note: Some personal computers will have an internal modem. The internal modem may be used as the Originating Modem. The internal modem must be compatible with the Answering Modem. Consult the instructions for the two modems.

Procedure

Perform the following procedure in order to initialize communication with the CCM and the Answering Modem. The Originating Modem is set up later by the PC software.

Note: In the following steps, the PC and the modems should be turned OFF before you change the cables on the serial ports. When power is reapplied, the modem must be powered up first.

1. The CCM should be installed with all of the wiring. Refer to the Operations and Maintenance Manual, “General Wiring Diagram” and "RS-232C Cable Requirements".

2. Determine the parameters for communication for the installation. The RS-232C default rate of communication (bits per second or bps) is 9600. The remaining default settings from the factory are no parity, 8 data bits, and 1 stop bit. These parameters will work well in most installations. Use the Operation and Maintenance Manual, “Communication Parameters - Identify” to determine the parameters of communication that are stored in the CCM.

Note: The RS-232C serial port communication baud rate is often referred to as the DTE speed. The phone port communication rate is often referred to as the DCE speed.

3. Connect the RS-232C port of the Answering Modem directly to the RS-232C port of the PC. This connection is temporary. This connection is required to set up the Answering Modem.

4. Use the terminal emulator on the PC to set the parameters for communication for the RS-232C port. Use the same values that were chosen in step 2.

5. Several commands must be sent to the Answering Modem that set the parameters for communication to the proper values. The examples in Table 7 are Hayes AT commands. Actual command sets vary widely between modem manufacturers. Consult the manual for the modem. Save these parameters to the modem memory.

Table 7

Typical Answering Modem Setup Commands			
Item	**Explanation**	**Command Example**	**Command for User's Modem**
a	Set the modem to the factory defaults. This is important if the setup of the modem is unknown.	AT&F	
b	Set to communicate in error control and in asynchronous mode. NOTE: If the modem does not support this command, enter the AT command for error control. Set to communicate in asynchronous mode with a separate command (Item c). Otherwise go to Step d.	AT&Q5	
c	Set to communicate in asynchronous mode. Note: If the &Q5 command is supported, the modem is already in asynchronous mode, and this command should not be sent.	AT&Q0	
d	Set Auto answer to ON. This tells the modem to answer the phone line after the first ring. If left at 0, the modem will never answer an incoming call. The value of this register can be seen with the ATS0? command.	ATS0=1	
e	Set Flow Control to XON/XOFF. This turns off RTS/CTS hardware handshaking between the modem and CCM since the CCM does not have RTS or CTS lines. It turns on the XON/XOFF software handshaking.	AT&K4	
f	Set DCD to track status of carrier detect signal. This causes the DCD line from the modem to follow the state of the phone line carrier. When the call to the CCM's modem has been made and the modem to modem handshaking is done, the DCD line will change and allow the CCM to receive data. Note: This is very important. If the DCD line is not at the right state, the CCM cannot receive data.	AT&C1	
g	Set DTR to monitor DTR signal and hang up and reset modem on an on-to-off DTR transition. This causes the modem to hang up and reset if the CCM drops the DTR line.	AT&D3	
h	Result codes do not have to be returned. Or, if the result codes are returned, the codes must be in originate mode, but not in answer mode.	ATQ2	
i	Set DTR transition response delay to maximum value less than 10 seconds. This example would cause the modem to hang up the line 2.5 seconds after the DTR line from the CCM changes. Note: Refer to your particular manual. Some modems specify the time in 1/100th of a second, and some in 1/10th of a second.	ATS25=250	
j	Set delay before forced hang-up to maximum value less than 3 seconds.	ATS38=2	
k	Write the setup parameters into memory 0. When the setup parameters are written, any that were not changed are stored into the memory.	AT&W0	
l	Set to recall memory 0 on reset.	AT&Y0	
m	View the modem active profile. This is an optional command that allows the user to view the above parameters stored in the modem. The profile should be written down and saved for future reference.	AT&V	

6. The setup for the Answering Modem is now complete. Disconnect the PC from the Answering Modem. Connect the PC directly to the CCM. Refer to the Operation and Maintenance Manual, "RS-232C Cable Requirements".

7. Load the CCM PC for Windows software into the PC. Refer to"Caterpillar CCM PC For Windows: Getting Started Manual". Start the CCM PC software and connect to the CCM.

8. Go to the Data Link pull-down menu. Go to the Utilities menu and select CCM configuration. Set the communication parameters to match the values that were chosen in Step **2**.

9. Go to the Phone Book pull-down menu and select Add or Edit. Set the communication parameters of the PC to match the values that were chosen in Step **2**.

10. The electronic engine controller of each engine must be programmed with the correct engine number to identify each ECM to the CCM. The electronic engine controller is programmed to Engine Number 1 at the factory. Refer to Operation and Maintenance Manual, “Engine Number - Program”.

11. Remove power from the CCM by removing the wire that is connected to the +B terminal. Turn off the power to the Modem. Disconnect the PC from the CCM.

12. Connect the PC, the modems, and the CCM as desired for the final site installation. Refer to Operation and Maintenance Manual, “RS-232C Cable Requirements”.

13. Ensure that the CCM and the Answering Modem are connected before power is applied to the CCM or the modem. **Apply power to the modem first.** Once the modem has powered up, apply power to the CCM. Ensure that the CCM remains on for a minimum of 30 seconds. The CCM will set the speed of the Answering Modem to match the CCM.

Note: Refer to the CCM PC Software Users Manual for instructions on monitoring and controlling the engine remotely.

Note: Two conditions must be met before the electronic engine controller will allow control by the CCM. The Engine Control Switch must be in AUTO position, and the remote initiate contacts must be open. The engine may be monitored with the ECS in any position.

Note: For EMCP II applications, the CCM cannot control the generator set if the GSC is in Service Mode. The generator set can still be monitored.

Service Information Section

Troubleshooting

i01253908

System - Troubleshoot

SMCS Code: 1926

This section will aid in solving problems that are NOT accompanied by an error code on the CCM.

Table 8

Additional Troubleshooting		
Problem	**Possible Explanation**	**Required Action**
Direct Connections		
PC unable to connect to CCM	PC is configured improperly, or a cable error is present.	Determine if the proper serial port on the PC has been selected. Make sure the correct RS-232C cable is being used. Null modem cable is required. Match the PC configuration with the CCM configuration.
Modem Connections		
PC unable to connect to CCM	PC configured improperly, modem not set up properly, or cable error is present. PC modem and CCM modem are not compatible. Password was not entered within 60 seconds	Determine if proper serial port on the PC is selected. Make sure that the Communication Specifications are being met and consult the modem manual. Make sure the correct RS-232C cable is being used. No null modem is required. Match the CCM, PC, and modem configurations.
Modem does not answer	Improper modem configuration.	Verify that the modem is configured per the instructions given in the Communication Initialization section in this manual.
Modem disconnects during remote start.	System battery voltage is low.	Make sure that the (+/-) Battery Power Specifications are being met. It may be necessary to disconnect the phone line on the local modem temporarily to force it to hang up.
Direct or Modem Connections		
PC can connect to only one electronic controller in a multiple unit installation.	Electronic controller MID has not been programmed. Electronic controllers are not connected on the correct data link.	Refer to Programming the Engine Number section and Data Link Guidelines section in this manual.
PC will not connect to 3500B marine propulsion engine through the CCM PC software.	CCM has been installed on the wrong data link.	CCM PC software version 1.2 and earlier will not communicate with the CCM if the CCM is connected via the primary Data Link on 3500B Marine Engines built after 4/97. The CCM should be connected to the Secondary CAT Data Link on these engines when used as a communications interface. Refer to the Data Link Guidelines section in this manual.

i01253899

Diagnostic Code - Troubleshoot

SMCS Code: 1926

The CCM has internal troubleshooting to aid in solving various system problems.

Note: For the 117-6170 System Communication Modules, the logged faults will appear on the display of the CCM in 60 second intervals. The error codes will be displayed for 2 seconds. The flashing fault log will not appear for any other version of CCM. The fault log can be cleared by using the PC software for the CCM.

Table 9

CCM Error Codes		
CCM Error Code	**Explanation**	**Action Required**
E00	No fault, normal operating mode	None
E01	Setpoint (EEPROM) fault	CCM passwords, unit addresses, or communication setups are corrupted. Reprogram from Phone-Book and Utilities pull-down menus.
E02	M5X message error	Check customer generated M5X code
E03	Memory backup battery is weak	Change battery. Refer to Operation and Maintenance Manual, “Battery - Replace”
E04	RS-232C link short circuit fault	Check RS-232C cable, PC port, and CCM port
E05	Internal buffer overflow on RS-232C or Data Link fault	Possibly caused by a slower than acceptable communication rate from the RS-232C port or an open CAT Data Link connection during RS-232C transmission. Increase communication rate and check CAT Data Link wires.
E06	Invalid CAT Data Link Message fault	Caused by: 1. Too much traffic on CAT Data Link. 2. CAT Data Link wires too long. Remove ECAP or other Caterpillar electronic service tool devices overloading CAT Data Link and check CAT Data Link wires.
E07	Miscellaneous CAT Data Link Fault	Caused by: 1. (+/-) CAT Data Link shorted to (+/-) battery. 2. Internal hardware fault in CCM. Check CAT Data Link wiring and then replace CCM if wiring is good.
E08	RS-232C link message fault (parity, data size)	Check RS-232C protocol (communication rate, data bits, stop bits, parity) of CCM and PC.
888	Internal CCM fault	Replace the CCM.

i01253906

M5X Protocol - Troubleshoot

SMCS Code: 1926

The purpose of this section is to aid the operator in solving common problems with the M5X communication protocol. This section should only be used for the M5X programming troubleshooting.

Table 10

M5X COMMUNICATION TROUBLESHOOTING		
Problem	**Possible Explanation**	**Action Required**
CCM shows error codes E02 and E08 when receiving data from the PC and will not communicate.	1. There is a protocol error. 2. The data is not in ASCII format. 3. An incorrect checksum was sent. 4. Baud rate of the CCM and PC not matched.	Correct the message being sent to the CCM
RS-232 receive lights are not lighted, and the CCM will not communicate with the PC even though no error codes are appearing.	Hardware connection between the PC and CCM is corrupted or disconnected.	Using the CCM PC software, connect to the CCM and determine if the connection to the PC is valid.
Cannot log into the CCM	Connection problem exists or using the wrong M5X protocol for logging in.	Use a read request (PID $F0 $12) to verify that the PC is available to communicate with the CCM. If a valid response is returned, proceed to log in as described in the Logging in section of this manual. If the password has been forgotten, call the CCM Help Desk.
Cannot get data from the electronic controller.	1. The electronic controller specified is not available. 2. The logged in security level is not high enough to support the request. 3. The electronic controller does not support the PID.	1. Verify that the electronic controller and the CCM are connected on the same data link. 2. Verify that the logged in security level is high enough to support the request. 3. Verify that the electronic controller supports the PID being requested.
Multiple responses are being generated from a single electronic controller	Multiple electronic controllers have the same MID.	Program the engine number of the electronic controller. Refer to the CCM/Data Link Guidelines section and Programming the Engine Number section in this manual.
An entire broadcast list is not returned.	1. The electronic controller specified is not available. 2. The electronic controller does not support any one of the PID's. 3. The PID contains greater than two bytes of data.	Refer to the CCM Customized System section, IID 10 and IID 13 in this manual
A broadcast list update rate is too slow or inconsistent.	1. Too many parameters are being requested. 2. RS-232 baud rate is slow.	1. Verify that the RS-232 and modem baud rates are at least 9600 baud. CCM can not broadcast more than 40 parameters per second. Use IID 13, Byte 7 to slow the update rate for stable parameters such as hour meter, atmospheric pressure, temperature, diagnostics, etc. Use a faster rate for more dynamic parameters such as engine speed, oil pressure, etc. Refer to the RS-232 Communication Protocol for Customized Systems section in this manual for further information. 2. Increase the RS-232 baud rate.

Service Information

i01224433

Communication Parameters - Identify

SMCS Code: 1926

The parameters for communication (rate of communication, parity, number of data bits, and number of stop bits) are stored in non-volatile memory within the CCM. To read the parameters for communication, follow these steps:

1. Power down the CCM by removing the wire that is connected to the +B terminal.

2. Power up the CCM by reconnecting the wire to the +B terminal. The display on the CCM will perform a lamp test (8.8.8.). The CCM will then display the communication protocol parameters (n81 9600 E00) that have been previously programmed.

Table 11

8.8.8. n81 9600 E00	
8.8.8.	All segments are turned on for a two second lamp test.
n81 n 8 1	 No parity (default value) Eight data bits (default value) One stop bit (default value)
9600	Rate of Communication (default value)
E00	Error code for no fault codes in memory

These parameters can be programmed to different values. Refer to “Setup Screen in the Caterpillar CCM PC For Windows: Getting Started Manual”.

i01225214

Engine Number - Program

SMCS Code: 1926

The electronic controller of each engine must be programmed with the correct engine number. The CCM will identify components by the engine number. The electronic controller is programmed to Engine Number 1 at the factory. Installations with one generator set per CCM will not need to change the engine number. Refer to the Operation and Maintenance Manual, “Data Link Guidelines” for more information on programmable engine modules. To change the engine number of the electronic controller, follow these steps:

EMCP II Applications

1. Refer to the Systems Operation, “Engine Setpoints - OP5” of the appropriate EMCP II or EMCP II+ Service Manual. Follow the procedure for adjusting setpoints. The setpoint number is P22 - GSC Engine Number. The default value is 1, which corresponds to Engine Number 1.

2. Follow the procedure in the EMCP II manual to change the value of P22 - GSC to the desired value. The range of possible values are 1 through 8, which correspond to the engine number. Each unit that is connected on the same data link must have a unique number (MID).

3. Disconnect the battery power from the GSC, and then reconnect the battery power to the GSC.

3500B Applications

1. Go to the Service menu on the Electronic Technician screen. Select Configuration.

2. Change the configuration parameter for the Secondary CAT Data Link Identifier (Cat Data Link 2) to the desired value.

Note: The Windows version of PC software for the CCM will detect all electronic engine controllers automatically.

i01290304

Battery - Replace

SMCS Code: 1926

The CCM contains a 101-1785 Battery that supplies power for internal memory whenever the CCM is powered down. The battery has an expected life of five years.

The battery is mounted to the front plate of the CCM behind the display. To replace the battery, follow these steps:

1. Disconnect power to the CCM.

2. Remove the four screws that secure the front plate to the housing.

3. The battery is held in place by two small tabs. A tie wrap provides additional support.

   a. Remove the tie wrap.

   b. Use a small screwdriver to carefully pry one tab and lift that side of the battery slightly.

c. Repeat for the other tab and remove the battery.

4. The battery has one corner that is angled. This corner will ensure that the battery is oriented correctly for installation.

a. Carefully install the new battery into the holder.

b. Verify that the battery pins are entering the sockets of the holder properly. Insert the battery until the tabs are holding the battery.

c. Install a new tie wrap.

5. Install the front plate of the CCM.

Programming Section

Protocol

i01219678

Communication Protocol for Customized Systems

SMCS Code: 1926

The Customer Communication Module (CCM) comes with CCM PC software that operates on Windows. The software utilizes the M5X protocol to allow the CCM to communicate with a remote personal computer (PC). In some installations, the user will require customized software. Customized software is required when enhancements to the PC software are needed. Customized software is also required when the host is NOT a personal computer.

The CCM communicates with the host equipment via a standard RS-232C serial data link. The serial data link uses the M5X protocol to transfer data. The M5X commands allow the user to periodically request a broadcast of multiple engine parameters and generator parameters. The parameters can be used by host equipment for monitoring. Single parameter read commands and write commands allow the user to control the engine from the host device.

The CCM provides the communication link between the host device and the engine or the generator set. The engine parameters and the generator parameters are given a unique Parameter Identifier (PID). Refer to the Operation and Maintenance Manual, “Parameter Identifiers” section. The host equipment can create a maximum of eight lists. The lists are stored in non-volatile memory in the CCM. Each list can have a maximum of eight PID’s. These lists contain multiple engine parameters that are broadcast to the host device from the CCM.

Most Caterpillar electronic systems that use the CCM can provide a maximum of 50 parameters per second. These parameters are sent to a remote computer system through the RS-232C connection. Other factors will decrease the number of parameters per second. When you connect with a modem at less than 4800 baud, the throughput will be reduced. A 2400 baud connection through a cellular phone will reduce the throughput to 29 parameters per second. CAT Data Link loading can also cause reduced throughput. In some complex systems, other modules on the CAT Data Link utilize system resources. The system throughput may be reduced to 40 parameters per second.

Stable parameters should be requested less frequently in order to optimize data transfer. This will minimize communication loading. Some examples of stable parameters include the following items: hourmeters, atmospheric pressure, temperatures, and diagnostics. Parameters that are more dynamic such as engine speed and oil pressure can be requested more frequently. Use good judgment to determine the update rate of individual parameters.

The M5X protocol command messages that are transmitted to the CCM must be in ASCII format. The response to the command messages will always be returned in ASCII format. The broadcast may be configured to be either ASCII or Binary.

Standard Preamble

The first four bytes of every IID contain a standard preamble.

50xxyyzz (IID specific data)

The **50** indicates M5X protocol.

xx is the module identifier of the sending module.

Table 12

XX	Module
00	Host Device
01	CCM

yy is the Instruction Identifier.

Table 13

yy	IID
00	Special Parameter Command
10	Broadcast Response
11	Activate a Broadcast List.
12	Deactivate a Broadcast List.
13	Program a Broadcast List.
15	Status Response to IID 11, 12, and 13
24	Single Parameter Read Request
25	Single Parameter Read Response
34	Single Parameter Write Request
35	Single Parameter Write Response

zz is the number of bytes in the message after this byte. zz does not include the checksum. This value will change depending on the data that is associated with the IID.

Checksum Calculation

The checksum is an important part of the M5X message. By using the checksum, the integrity of the message is determined. The second to last byte of every IID is the checksum, which is followed by an ASCII carriage return ($0D). The checksum is a 2's complement value of the summation of all the data bytes in the message. The message is a good message if all the bytes and the checksum add to zero (0).

The following message is an example.

5000240400580082AE<cr>

The checksum for this message is AE. Although the message is sent in ASCII, the checksum must be calculated by using the hexadecimal value.

Table 14

Byte	ASCII Value	Hexadecimal Value
50	$35 $30	$50
00	$30 $30	$00
24	$32 $34	$24
04	$30 $34	$04
00	$30 $30	$00
58	$35 $38	$58
00	$30 $30	$00
82	$38 $32	$82
Total		$152
Truncated to LSB		$52
2's Compement	$41 $45	$AE
Total		$100
Truncated to LSB		$00

CCM Heartbeat

You should check the connection to the CCM before you log in to the CCM. You should also check the connection (heartbeat) to the CCM during normal operation from time to time. The recommended PID is $F0 $12. Use PID $F0 $12 to read the current Security Level at a regular interval as a heartbeat. If the CCM does not answer to the read request, then there is a problem with the connection. This PID will also monitor the Security Level, which may have been changed.

Security Levels

Every PID has an associated security level (0, 1, 2, or 3) within the CCM. A user within a particular security level may use PID's in that level or lower levels. PID's cannot be accessed by the user in levels higher than the password allows. For example, a user at security level 2 can access level 2, 1, and 0, but not level 3.

The answering modem will be hung up if the password is not entered (sets the security level) within one minute. Specifically, if DCD is held low by the PC, and the security level is at 0 for more than one minute, DTR will be toggled by the CCM (answering modem hung up). Also, if the RS-232C cable is disconnected for more than five seconds, DTR will be toggled, and the security level will be set to 0.

When power is removed from the CCM, the security level will be changed to 2, if the CCM was operating at security level 3.

The following chart defines the PID's within each security level for CCM parameters.

Table 15

PID Security Levels	
Level No.	**PID**
0	$00 $80 (R), $AA $8A (W), $F0 $12 (RW)(1), $F8 $14 (R)
1	$00 $0D (R), $00 $82 (R), $F0 $12 (W)(1), $F6 $01 (R)
2	$00 $0D (W), $F0 $12 (W)(1)
3	$AA $12 (RW), $AA $87 (RW), $AA $88 (RW), $AA $89 (RW), $F0 $12 (W)(1), $F6 $01 (W), $F8 $14 (W)

(1) User can write this parameter only at a level equal to or less than the logged in security level.

R = Read, W = Write

Logging In to the CCM

Before any parameters can be read or written to the CCM or to the electronic engine controller, the appropriate security level must be established. This process is called Logging In. The default password for the password is blank for all security levels. To log in with the factory default blank password, use IID 34 for PID $AA $8A: **$500034040061AA8AE3**

Table 16

IID 34 - Single Parameter Write Request		
Byte(s)	**Byte Contents**	**Detailed Description**
1	$50	Indicates M5X protocol
2	$00	User's PC is the sending module.
3	$34	IID 34
4	$04	Number of bytes
5	$00	Response in ASCII
6	$61	MID for CCM
7, 8	$AA $84	PID $AA $8A Login Password
9	$E3	Checksum

To login using a password 11112222, use IID 34 for PID $AA $8A:
$5000340C0061AA8A31313131323232324F

Table 17

IID 34 - Single Parameter Write Request	
Bytes(s)	**Description**
1	$50 indicates M5X protocol
2	$00 = User's PC is the sending module
3	$34 = IID 34
4	$0C = Number of bytes
5	$00 = Reply in ASCII format
6	$61 = CCM
7, 8	$AA $8A = PID $AA $8A Login Password
9-16	3131313132323232 = Password (ASCII text)
17	$4F = Checksum

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Password - Enable and Disable

SMCS Code: 1926

The password protection for the CCM is initially enabled. Password protection may be necessary for some applications. Use the following procedure to enable password protection. Changing the password protection can be done with the PC software for the CCM . The password protection can also be changed by using a host device to write the IIDs.

Disabling Passwords

To disable the passwords, the AA12 and AA8A PIDs must be used.

Note: Refer to the Operation and Maintenance Manual, "Parameter Identifiers for General Usage".

1. Use IID 34 with a unit number of 61. Write to PID AA8A with the level 3 password. This will set the security level in the CCM to level 3. The message will be **5000340C0061AA8Ab1b2b3b4b5b6b7b8cs**. The example above shows that b1 through b8 are the ASCII characters of the password. If the password is all spaces, simply end the message after PID AA8A. Do not include any of the data bytes. The CCM will automatically add spaces when a character is not present.

2. Use IID 34 with a unit number of 61. Write PID AA 12 with bit 3 set. This will disable the password protection. The message will be **500034050061AA1204cs**. This message will disable the passwords. Baud rate changes will be enabled. The CCM will be set for a direct connection. Bits 1 and 2 should be set to 1 if the last two items need to be set the other way.

Note: When the passwords are disabled, all three passwords are set to all blanks (spaces).

Enabling Passwords

The AA12 and the F012 PIDs must be used in order to enable the password protection.

Note: Refer to the Operation and Maintenance Manual, "Parameter Identifiers for General Usage".

1. Use IID 34 with a unit number of 61. Write to PID AA12 to clear bit 3. The message format will be **500034050061AA1200cs**. This message will enable the following items: passwords, change of baud rate, and set the CCM for direct connect. Bits 1 and 2 should be set to 1 if the last two items need to be set the other way.

2. In order to enable the changes, the power to the CCM must be cycled or the security level must be written to zero. The security level is written to zero by using IID 34. The message will be **500034050061F01200cs**.

Note: When the passwords were disabled, each character was set to a blank or space. Set the level 3 password on the CCM to something other than spaces.

Identifiers

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Instruction Identifiers

SMCS Code: 1926

IID 00 - Special Parameter Command

IID 00 is used to read or write special parameters. IID 00 is used when IID 24 or IID 25 cannot be used. The response to an IID 00 will be an IID 25 Single Parameter Read Response. An example of the IID 00 message is: **$500000zz00580083ddddddcs**. This example contains three bytes of data.

Table 18

IID 00 - Special Parameter Command	
Bytes(s)	**Description**
1 - 4	Standard Preamble
5	Reply Format $00 = ASCII
6	Unit Number Data is being written to 3500B Marine Engine Unit Number $21 = Electronic engine controller (Port) $22 = Electronic engine controller (Starboard) $24 = Electronic engine controller (Single of Center) 3500B Generator Set Unit Number $21 - $26 = Electronic engine controller $28, $29 (number 1-8) EMCP II Generator Set Unit Number $58 - $5F = GSC (number 1-8) Customer Communication Module Unit No. $61 = CCM
7, 8	PID
9 - 11(1)	Data value of parameter.
12	Checksum of message followed by an ASCII carriage return ($0D)

(1) The number of bytes will depend on the PID.

IID 10 - Broadcast Response

This IID is used to broadcast data from the CCM to the host device. The CCM will send this message if the time to broadcast data has elapsed. In order to send an IID 10 message, ALL of the parameters must be present on the CAT data link. When IID 10 is used, the data will be two bytes in length. If a parameter only has one data byte, zeros will be added in front of the data. An example of the IID 10 message is: **$500110zz0124ddd120ddd220ddd320ddd420ddd520ddd620ddd720ddd8cs**.

Table 19

IID 10 - Broadcast Response	
Byte(s)	**Description**
1-4	Standard preamble (50 xxyyzz)
5	Parameter List Number $01 - $08 show which list 1 through 8 is being sent.
6	Unit Number Data is being written to 3500B Marine Engine Unit Number $21 = Electronic engine controller (Port) $22 = Electronic engine controller (Starboard) $24 = Electronic engine controller (Single of Center) 3500B Generator Set Unit Number $21 - $26 = Electronic engine controller $28, $29 (number 1-8) EMCP II Generator Set Unit Number $58 - $5F = GSC (number 1-8) Customer Communication Module Unit No. $61 = CCM
7	Separator(1)
8,9	Data for 1st PID
10	Separator(1)
11, 12	Data for 2nd PID
13	Separator(1)
14, 15	Data for 3rd PID
16	Separator(1)
17, 18	Data for 4th PID
19	Separator(1)
20, 21	Data for 5th PID
22	Separator(1)
23, 24	Data for 6th PID
25	Separator(1)
26, 27	Data for 7th PID
28	Separator(1)
29, 30	Data for 8th PID
31	Checksum of message

(1) A separator may or may not be present depending on bytes 8 and 9 of IID 13.

IID 10 can will be either binary or ASCII. The message format is determined by bytes 8 and 9 of IID 13. The entire broadcast list will not be returned if any of the following conditions are met:

- The GSC number or the ECM number is not available.
- The GSC or the ECM does not support any of the PID in IID 13.
- The PID contains more than 2 bytes of data.

Refer to PID $00 $80 for information on the device ID. Refer to IID 13 for information on creating broadcast lists. Refer to Operation and Maintenance Manual, SEBU6874, “Programming Examples for M5X Protocol”.

IID 11 - Activate a Broadcast List

This IID is used in order to activate a broadcast list that has been programmed. When a list is programmed into the CCM, the list is set to deactivated. The list will stay deactivated until a valid IID 11 message is received. After receiving an IID 11 message, the CCM responds with an IID 15 message. The IID 15 message is for verification of the IID 11 message. If the IID 11 message is valid and the list is programmed, broadcasting of the data will start. Lists can be activated and deactivated at any time without being reprogrammed. A typical IID 11 example is: **$5000110101cs**

Table 20

IID 11- Activate a Broadcast List	
Byte(s)	**Description**
1-4	Standard preamble (50 xxyyzz)
5	Parameter List Number $01 - $08 show which list 1 through 8 is being sent.
6	Checksum of message

IID 12 - Deactivate a Broadcast List

This IID is used in order to deactivate a broadcast list that has been programmed. A list will stay activated until a valid IID 12 message is received. Upon receiving an IID 12 message, the CCM responds with an IID 15 message. This is used to indicate the validity of the message. If the IID 12 message is valid, the broadcasting of the data will stop. Lists can be activated and deactivated at any time without being reprogrammed. A typical IID 12 example is: **$5000120101cs**.

Table 21

IID 12 - Deactivate a Broadcast List	
Byte(s)	**Description**
1-4	Standard preamble (50 xxyyzz)
5	Parameter List Number $01 - $08 show which list 1 through 8 is being sent.
6	Checksum of message

IID 13 - Create a Broadcast List

This IID is used in order to program a broadcast list. After receiving an IID 13 command, the CCM responds with an IID 15 message. If the command message is valid, the list will be programmed in the CCM. This IID has several parameters that need to be programmed with the IID.

The message must contain eight parameters. If the number of desired parameters is only four, the remaining four parameters must be filled with zeros (0). The broadcast response (IID 10) will only contain data for the nonzero parameters. A typical IID 13 example is: **$500013150124010000ddd1ddd2ddd3ddd5ddd6ddd7ddd8cs**

Table 22

IID 13 - Deactivate a Broadcast List	
Byte(s)	Description
1-4	Standard preamble (50 xxyyzz)
5	Parameter List Number $01 - $08 show which list 1 through 8 is being sent.
6	Unit Number Data is being written to 3500B Marine Engine Unit Number $21 = Electronic engine controller (Port) $22 = Electronic engine controller (Starboard) $24 = Electronic engine controller (Single of Center) 3500B Generator Set Unit Number $21 - $26 = Electronic engine controller $28, $29 (number 1-8) EMCP II Generator Set Unit Number $58 - $5F = GSC (number 1-8) Customer Communication Module Unit No. $61 = CCM
7	Update Rate (between list or parameters) Resolution: 0.5 second per bit Data range: 0 to 127.5 ($00 to $FF)
8, 9	Programming Options Bit 1 — 0 = ASCII, 1 = Binary Bit 3, 2 — 00 = Message terminated by carriage return; 01 = Message terminated by carriage return and line feed Bit 4 — 0 = Always Bit 6, 5 — 00 = Comma separator; 01 = Space separator; 10 = No separator Bit 7-16 — Reserved for future use
10, 11	Data for 1st PID(1)
12, 13	Data for 2nd PID(1)
14, 15	Data for 3rd PID(1)
16, 17	Data for 4th PID(1)
18, 19	Data for 5th PID(1)
20, 21	Data for 6th PID(1)
22, 23	Data for 7th PID(1)
24, 25	Data for 8th PID(1)
26	Checksum of message

(1) If a PID is not used, 0000 must be entered for that PID. The CCM will ignore any PID's after the first PID entered as 0000. Therefore all unused PID's must be at the end of the broadcast list.

Note: Each CCM will support up to a total of eight lists for all GSC's and ECM's. Each list may contain up to eight PID's. The CCM will support up to 64 parameters. However, the total number of PID's able to be broadcast is limited to 48 per controller. Refer to Operation and Maintenance Manual, SEBU6874, "Programming Examples for M5X Protocol".

Note: For the older version of CCM, 117-6170 System Communication Module, the total number of PID's able to be broadcast is limited to 31 per module.

IID 15 - Status Reply to IID 11, IID 12, and IID 13

This IID is used in order to indicate the validity of a command message that was just sent to the CCM. A typical IID 15 example is: **$5001150100cs**.

Table 23

IID 15 - Status Reply to IID 11, IID 12, and IID 13	
Byte(s)	**Description**
1-4	Standard preamble (50 xxyyzz)
5	IID sent in response to (11, 12, or 82)
6	Status Reply $00 = IID data is OK $10 = Invalid list number (greater than 8 or less than 1) $20 = List is not programmed $30 = Faulty checksum or command format
7	Checksum of message followed by an ASCII carriage return ($0D)

IID 24 - Single Parameter Read Request

This IID is used to request data for an individual parameter. The parameter can be sent one time per second. Another IID 24 request cannot be sent until one second has elapsed and/or an IID 25 message has been received for the previous request. A typical IID 24 example is: **$500024040024F515cs**

Table 24

IID 24 - Single Parameter Read Request	
Byte(s)	**Description**
1-4	Standard preamble (50 xxyyzz)
5	Reply format $00 = ASCII
6	Unit Number Data is being written to 3500B Marine Engine Unit Number $21 = Electronic engine controller (Port) $22 = Electronic engine controller (Starboard) $24 = Electronic engine controller (Single of Center) 3500B Generator Set Unit Number $21 - $26 = Electronic engine controller $28, $29 (number 1-8) EMCP II Generator Set Unit Number $58 - $5F = GSC (number 1-8) Customer Communication Module Unit No. $61 = CCM
7, 8	PID
9	Checksum of message followed by an ASCII carriage return ($0D)

IID 25 - Single Parameter Read Response

This IID is used to indicate a response to a single parameter read request (IID 24). The number of bytes for this IID will vary. The number of bytes is dependent on the parameter that was requested. A typical IID 25 example is: **$500125zz24F515ddddcs**

Note: In this example, parameter F515 has two data bytes.

Table 25

IID 25 - Single Parameter Read Response	
Byte(s)	**Description**
1-4	Standard preamble (50 xxyyzz)
5	Unit Number Data is being written to 3500B Marine Engine Unit Number $21 = Electronic engine controller (Port) $22 = Electronic engine controller (Starboard) $24 = Electronic engine controller (Single of Center) 3500B Generator Set Unit Number $21 - $26 = Electronic engine controller $28, $29 (number 1-8) EMCP II Generator Set Unit Number $58 - $5F = GSC (number 1-8) Customer Communication Module Unit No. $61 = CCM
6, 7	PID
8	Data value of requested parameter. Data value may be from 1 through 27 bytes. This example shows two bytes.
9	Checksum of message followed by an ASCII carriage return ($0D)

IID 34 - Single Parameter Write Request

This IID is used to write data for an individual parameter. The data can be sent one time per second. Another IID 34 request cannot be sent until one second has elapsed and/or an IID 35 message has been received for the previous request. A typical IID 34 example is: **$500034zz0024F515ddddcs**

Table 26

IID 34 - Single Parameter Write Request	
Byte(s)	**Description**
1-4	Standard preamble (50 xxyyzz)
5	Reply format $00 = ASCII
6	Unit Number Data is being written to 3500B Marine Engine Unit Number $21 = Electronic engine controller (Port) $22 = Electronic engine controller (Starboard) $24 = Electronic engine controller (Single of Center) 3500B Generator Set Unit Number $21 - $26 = Electronic engine controller $28, $29 (number 1-8) EMCP II Generator Set Unit Number $58 - $5F = GSC (number 1-8) Customer Communication Module Unit No. $61 = CCM
7, 8	PID
9, 10	Data value of requested parameter. Data value may be from 1 through 27 bytes. This example shows two bytes.
11	Checksum of message followed by an ASCII carriage return ($0D)

IID 35 - Single Parameter Write Response

This IID is used to indicate a response to a single parameter write request (IID 34). The number of bytes for this IID will vary depending on the parameter that was written. A typical IID 35 example is: **$500135zz24F515ddddcs**.

Table 27

IID 35 - Single Parameter Write Response	
Byte(s)	**Description**
1-4	Standard preamble (50 xxyyzz)
6	Unit Number Data is being written to 3500B Marine Engine Unit Number $21 = Electronic engine controller (Port) $22 = Electronic engine controller (Starboard) $24 = Electronic engine controller (Single of Center) 3500B Generator Set Unit Number $21 - $26 = Electronic engine controller $28, $29 (number 1-8) EMCP II Generator Set Unit Number $58 - $5F = GSC (number 1-8) Customer Communication Module Unit No. $61 = CCM
6, 7	PID
8, 9	Data value of requested parameter. Data value may be from 1 through 27 bytes. This example shows two bytes.
10	Checksum of message followed by an ASCII carriage return ($0D)

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Fault Identifiers

SMCS Code: 1926

The following chart contains the Fault Identifiers for PID's.

Table 28

FAULT IDENTIFIERS (FID)							
FID	**Signed Byte**	**Unsigned Byte**	**Signed Word**	**Unsigned Word**	**Signed Long Word**	**Unsigned Long Word**	**Fault Description**
0 - 1	$80 - $81	$E0 - $E1	$8000 - $8001	$FFE0 - $FFE1	$8000000 - $8000001	$FFFFFFE0 $FFFFFFE1	Not Used
2	$82	$E2	$8002	$FFE2	$8000002	$FFFFFFE2	Data erratic, intermittent or incorrect
3	$83	$E3	$8003	$FFE3	$8000003	$FFFFFFE3	Shorted high or open circuit
4	$84	$E4	$8004	$FFE4	$8000004	$FFFFFFE4	Shorted low
5	$85	$E5	$8005	$FFE5	$8000005	$FFFFFFE5	Open circuit or current below normal
6	$86	$E6	$8006	$FFE6	$8000006	$FFFFFFE6	Current above normal or grounded circuit
7	$87	$E7	$8007	$FFE7	$8000007	$FFFFFFE7	Not Used
8	$88	$E8	$8008	$FFE8	$8000008	$FFFFFFE8	Abnormal frequency, pulse width, or period
9	$89	$E9	$8009	$FFE9	$8000009	$FFFFFFE9	Abnormal update
10	$8A	$EA	$800A	$FFEA	$800000A	$FFFFFFEA	Not used
11	$8B	$EB	$800B	$FFEB	$800000B	$FFFFFFEB	Failure mode not identified
12	$8C	$EC	$800C	$FFEC	$800000C	$FFFFFFEC	Bad device or component
13 - 15	$8D - $8F	$ED - $EF	$800D- $800F	$FFED - $FFEF	$800000D - $800000F	$FFFFFFED - $FFFFFFEF	Not used
16	$90	$F0	$8010	$FFF0	$8000010	$FFFFFFF0	Parameter not available
17	$91	$F1	$8011	$FFF1	$8000011	$FFFFFFF1	Module not responding
18	$92	$F2	$8012	$FFF2	$800012	$FFFFFFF2	Sensor supply fault
19 - 31	$93 - $9F	$F3 - $FF	$8013 - $801F	$FFF3 - $FFFF	$8000013 $800001F	$FFFFFFF3 - $FFFFFFFF	Not used

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Parameter Identifiers for General Usage

SMCS Code: 1926

Each Parameter Identifier (PID) is two bytes in length. The Parameter Identifier is hexadecimal. The PID is followed by data bytes. The data bytes are represented as aa for one data byte or aabb for two data bytes, or mb for multiple bytes. For example, the CCM Error Code PID is $00 $82. The error code is followed by two bytes of data (ab) that contain the CCM fault information. Data bits are given in binary form unless the number is preceded by $. All data is sent with the most significant byte (MSB) first.

The following chart is a quick reference list of the Parameter Identifiers (PID). The chart also contains a brief description of the Parameter Identifiers.

Table 29

QUICK REFERENCE CHART WITH DESCRIPTION OF GENERAL PARAMETER IDENTIFIERS	
PID	**Description**
$00 $0D a	Remote Fault Reset Used to reset faults on the CCM.
$00 $80 aabbcc	Device ID Code Used to read the device ID code from the CCM as well as from other components on the data link. Each pair of bytes (aa, bb, cc) is sent LSB first.
$00 $82 ab	CCM Error Codes Used to read the CCM error codes.
$AA $12 a	CCM Communication Rate Change Enable Used to determine if the CCM is connected to the host computer directly or remotely using a modem. Also used to enable or disable the host computers ability to change the communication rate of the RS-232C serial port.
$AA $87 aaaaaaaa	Access Level 1 Password Used to read or program the Level 1 Password
$AA $88 aaaaaaaa	Access Level 2 Password Used to read or program the Level 2 Password
$AA $89 aaaaaaaa	Access Level 3 Password Used to read or program the Level 3 Password
$AA $8A aaaaaaaa	Login Password Password used to login when host device is connecting to the CCM
$F0 $12 aa	Security Access Level Used to read or program the password level.
$F6 $01 aabb	CCM RS-232C Serial Port Configuration Used to program the RS-232C port configuration on the CCM
$F8 $14 aaaaa aaaaa	Application Software Part Number Used to read and write the application software part number for the CCM.

Remote Fault Reset $00 $0D a

Used to reset faults on the CCM.

Table 30

(a)	$00 - $7F = Retain current CCM inactive fault status. $80 - $FF = Reset CCM inactive fault.

Device ID Code $00 $80 aabbcc

Used to read the device ID code from the CCM as well as other components on the data link. Each pair of bytes (aa, bb, cc) is sent LSB first.

Table 31

(aa)	Module ID: will always equal $61, data will be sent as $61 $00
(bb)	Service Tool Support Change Level: $01, data will be sent as $01 $00
(cc)	Application type:$FF $E0, data will be sent as $E0 $FF

CCM Error Codes $00 $82 ab

Used to read the CCM Error Codes.

Table 32

(a)	bit 1 = Reserved	
(b)(1)	Fault Code Status	
	bit 8	1 = RS-232C link message fault exists
	bit 7	1 = Miscellaneous Cat Data Link fault
	bit 6	1 = Invalid Cat Data message fault
	bit 5	1 = Internal buffer overflow on RS-232C or Data Data Link fault
	bit 4	1 = RS-232C short circuit fault
	bit 3	1 = Memory battery is weak
	bit 2	1 = M5X message error (checksum or byte count error)
	bit 1	1 = EEPROM fault

(1) A value of 0 (zero) in bits 1 through 8 indicates that particular fault does not exist.

CCM Communication Rate Change Enable $AA $12 a

Used to determine if the CCM is connected to the host computer directly or remotely using a modem. Also used to enable or disable the host computers ability to change the communication rate of the RS-232C serial port.

Table 33

(a)	Bit 4	Reserved for Caterpillar.
	Bit 3	0 = Enable password protection 1 = Disable password protection
	Bit 2	0 = Enable baud rate change 1 = Disable baud rate change
	Bit 1	0 = Direct connection 1 = Modem connection

Access Level 1 Password $AA $87 aaaaaaaa

Used to read or program the Level 1 Password

Table 34

(aaaaaaaa)	Level 1 password in printable ASCII form. Must be at least 6, but no more than 8 characters long. Do not pad with spaces if the password is less than 8 characters long. Use only letters and numbers for the password characters.

Access Level 2 Password
$AA $88 aaaaaaaa

Used to read or program the Level 2 Password.

Table 35

(aaaaaaaa)	Level 2 password in printable ASCII form. Must be at least 6, but no more than 8 characters long. Do not pad with spaces if the password is less than 8 characters long. Use only letters and numbers for the password characters

Access Level 3 Password
$AA $89 aaaaaaaa

Used to read or program the Level 3 Password.

Table 36

(aaaaaaaa)	Level 3 password in printable ASCII form. Must be at least 6, but no more than 8 characters long. Do not pad with spaces if the password is less than 8 characters long. Use only letters and numbers for the password characters

Login Password
$AA $8A aaaaaaaa

Password used to login when host device is connecting to the CCM.

Table 37

(aaaaaaaa)	Login password in printable ASCII form. Must be at least 6, but no more than 8 characters long. Do not pad with spaces if the password is less than 8 characters long. Use only letters and numbers for the password characters

Note: If the password is all spaces, do not enter any data after the PID. The CCM will automatically add the necessary spaces. When used to login, using IID 34, the CCM responds with PID F012 to indicate which security level password was matched.

Security Access Level
$F0 $12 aa

Used to read the password level.

Table 38

(aa)	$00 = Security level 00 $01 = Security level 01 $02 = Security level 02 $03 = Security level 03

CCM RS-232C Serial Port Configuration
$F6 $01 aabb

Table 39

(aa)	Bits 16-15	Not used
	Bit 14	0 = 1 stop bit 2 = 2 stop bits
	Bit 13	0 = No echo 1 = Echo enabled
	Bit 12-9	0100 = 300 baud 0101 = 600 baud 0110 = 1200 baud 1000 = 2400 baud 1010 = 4800 baud 1100 = 9600 baud 1101 = 19200 baud
(bb)	Bit 8	Not used
	Bit 7-6	10 = 7 data bits 11 = 8 data bits
	Bit 5-3	000 = No parity 001 = Odd parity 011 = Even parity
	Bit 2-1	Not used

Application Software Part Number
$F8 $14 aaaaaaaaaa

Used to read the application software part number of the CCM.

Table 40

(aaaaa aaaaa)	Application software part number in printable ASCII (part number less than 10 characters are padded with an ASCII space $20 at the beginning of the part number).

Note: The application software part number cannot be read from the older version of CCM, 117-6170 System Communication Module.

i01215456

Parameter Identifiers for EMCP II

SMCS Code: 1926

S/N: 2WB1-Up

S/N: 2RD1-Up

S/N: 2TD1-Up

S/N: 4XF1-Up

S/N: 4RG1-Up

S/N: 5SJ1-Up

S/N: 2BM1-Up

S/N: 3DM1-Up

S/N: 4GM1-Up

S/N: 5XM1-Up

S/N: 6PM1-Up

S/N: 7HM1-Up

S/N: 7KM1-Up

S/N: 7SM1-Up

S/N: 8EM1-Up

S/N: 8RM1-Up

S/N: 4TN1-Up

S/N: 6HN1-Up

S/N: 6PN1-Up

S/N: 6WN1-Up

S/N: 7RN1-Up

S/N: 8CN1-Up

S/N: 8KN1-Up

S/N: 9AN1-Up

S/N: 4ZR1-Up

S/N: 1LS1-Up

S/N: 3LS1-Up

S/N: 3MS1-Up

S/N: 3NS1-Up

S/N: 3PS1-Up

S/N: 3RS1-Up

S/N: 3SS1-Up

S/N: 3TS1-Up

S/N: 3WS1-Up

S/N: 3XS1-Up

S/N: 8FS1-Up

S/N: 1NW1-Up

S/N: 1PW1-Up

S/N: 1TW1-Up

S/N: 2FW1-Up

S/N: 2GW1-Up

S/N: 2HW1-Up

S/N: 2JW1-Up

S/N: 3CW1-Up

S/N: 3DW1-Up

S/N: 4AW1-Up

S/N: 5AW1-Up

S/N: 23Z1-Up

S/N: 24Z1-Up

S/N: 25Z1-Up

S/N: 2EZ1-Up

S/N: 67Z1-Up

S/N: 6HZ1-Up

S/N: 70Z1-Up

S/N: 73Z1-Up

S/N: 78Z1-Up

S/N: 81Z1-Up

PID Security Levels

The following chart defines the PID within each security level for EMCP II applications.

Table 41

PID Security Levels for EMCP II	
LEVEL NO.	**PID**
0	
1	$00 $0D (R), $00 $40 (R), $00 $42 (R), $00 $44 (R), $00 $54 (R), $00 $5E (R), $00 $80 (R), $00 $82 (R), $00 $83 (R), $00 $84 (R), $F0 $13 (R), $F0 $14 (R), $F0 $2A (R), $F0 $8F (R), $F0 $B0 (RW), $F0 $B1 (R), $F0 $B2 (R), $F0 $B3 (R), $F0 $B4 (R), $F1 $D3 (R), $F1 $D4 (R), $F1 $D5 (R), $F1 $D6 (R), $F2 $13 (R), $F2 $CB (R), $F2 $CC (R), $F2 $D6 (R), $F2 $D7 (R), $F4 $40 (R), $F4 $41 (R), $F4 $42 (R), $F4 $43 (R), $F4 $44 (R), $F4 $46 (R), $F4 $47 (R), $F4 $48 (R), $F4 $49 (R), $F4 $FA (R), $F4 $4B (R), $F4 $4C (R), $F4 $4D (R), $F4 $60 (R), $F4 $61 (R), $F4 $62 (R), $F4 $63 (R), $F4 $64 (R), $F4 $65 (R), $F4 $66 (R), $F4 $67 (R), $F4 $68 (R), $F4 $69 (R), $F4 $6A (R), $F4 $6B (R), $F4 $6C (R), $F4 $6D (R), $F4 $C3 (R), $F4 $C4 (R), $F4 $C7 (R), $F4 $C8 (R), $F4 $C9 (R), $F4 $CA (R), $F4 $CB (R), $F4 $CF (R), $F4 $D0 (R), $F4 $D1 (R), $F4 $D2 (R), $F5 $0B (R), $F4 $0C (R), $F5 $0D (R), $F5 $3E (R), $F5 $57 (R), $F8 $14 (R), $FC $0D (R), $FC $0F (R), $FC $10 (R), $FC $11 (R), $FC $12 (R), $FC $13 (R), $FC $14 (R), $FC $14 (R), $FC $15 (R), $FC $17 (R), $FC $18 (R), $FC $19 (R), $FC $1A (R), $FC $1B (R), $FC $1C (R), $FC $1D (R), $FC $1E (R), $FC $1F (R)
2	$00 $0D (W), $00 $83 (W), $F0 $B1 (W), $F0 $B2 (W), $F2 $13 (W), $F2 $CC (W), $F4 $4D (W), $FC $0D (W), $FC $10 (W)
3	

Each Parameter Identifier (PID) has an identifier that is one or two bytes in length. The identifier is hexadecimal. The PID is followed by one or more data bytes. For example, the Relay Control PID is $F4 $4C. This PID is followed by two bytes of data (aa) that contain the status of the Generator Set Status Control relays. Data bits are given as binary digits unless the number is preceded by $. All data is sent with the most significant byte first.

The following chart is a quick reference list of the Parameter Identifiers (PID).

Table 42

Parameter Identifier Reference Chart for EMCP II Applications	
PID	**Description**
$00 $0D a	Remote Fault Reset Used to read the status of or reset inactive shutdown and alarm faults on the GSC.

(continued)

(Table 42, contd)

Parameter Identifier Reference Chart for EMCP II Applications	
PID	**Description**
$00 $40 aa	Generator Set Engine RPM Used to read the generator set engine rpm.
$00 $42 aa	Generator Set Ring Gear Teeth Setpoint Used to read the number of ring gear teeth the GSC uses to calculate engine speed.
$00 $44 aa	Engine Coolant Temperature (°C) Used to read the temperature of the engine coolant.
$00 $54 aa	Engine Oil Pressure kPa Used to read the oil pressure of the engine in kPa.
$00 $5E aa	Generator Set Hourmeter Used to read number of hours the generator set has run.
$00 $80 aabbcc	Device ID Code Used to read the device ID code from components on the data link. Each pair of bytes (aa, bb, cc) is sent LSB first.
$00 $82 aab [c]	GSC Fault Log Codes, Status, and Number of Occurrences Used to read component identifier (CID), status (active or inactive) of diagnostic codes stored in the GSC fault log, and number of occurrences.
$00 $83 aabb	GSC Fault Log Request for Additional Data Used to request additional information about a given logged diagnostic code or to clear a particular diagnostic code.
$00 $84 aab [cddee]	GSC Fault Log Response for Additional Information Used to acknowledge the diagnostic codes being cleared in the GSC fault log or to supply additional information about a given diagnostic code requested by PID $00 $83.
$F0 $13 a	System Battery Voltage Used to read the system battery voltage of a generator set.
$F0 $14 a	GSC Cooldown Timer Setpoint Used to read the amount of time the GSC allows the engine to run after a normal shutdown is initiated.
$F0 $2A a	Remote Start Status Used to read the status of the remote start input of the GSC
$F0 $8F a	Engine Control Switch Position Used to read the status of the Engine Control Switch (ECS).
$F0 $B0 a	Generator Phase Select Used to read or select the generator phase being monitored.

(continued)

(Table 42, contd)

Parameter Identifier Reference Chart for EMCP II Applications	
PID	**Description**
$F0 $B1 a	Remote Emergency Stop Used to read the status of or request a remote emergency stop.
$F0 $B2 a	Cooldown Override Control Used to read the status of or select a shutdown that aborts the cooldown timer.
$F1 $B3 a	Generator AC Voltage Full Scale and External Potential Transformer Setpoint Used to read the AC full scale voltage and the ratio of the external potential transformer.
$F1 $B4 a	Generator AC Current Full Scale Setpoint Used to read the AC full scale current.
$F1 $D3 a	Generator Phase A Power Factor Lead/Lag Status Used to read the lead or lag status of the phase current versus the phase voltage for phase A.
$F1 $D4 a	Generator Phase B Power Factor Lead/Lag Status Used to read the lead or lag status of the phase current versus the phase voltage for phase B.
$F2 $D5 a	Generator Phase C Power Factor Lead/Lag Status Used to read the lead or lag status of the phase current versus the phase voltage for phase C.
$F2 $D6 a	Generator Average Power Factor Lead/Lag Status Used to read the lead or lag status of the average power factor lead or lag status of the average power factor of the generator.
$F2 $13 a	Remote Start Initiate Used to read the status of or start or stop the engine remotely.
$F2 $CB a	EPG Circuit Breaker Status (GSC+P only) Used to read the status of the breaker.
$F2 $CC a	Remote Generator Synchronizer Control (GSC+P only) Used to read and program the synchronization function to be performed.
$F2 $D6 a	Remote synchronization Control Readiness (GSC+P only) Used to read if the remote synchronization is available.
$F2 $D7 a	Generator Synchronizer Control Status (GSC+P only) Used to read the status of the synchronizer control system.
$F4 $40 aa	Right Exhaust Temperature (GSC+) Used to read the temperature of the exhaust air on the right side of the engine.

(continued)

(Table 42, contd)

Parameter Identifier Reference Chart for EMCP II Applications	
PID	**Description**
$F4 $41 aa	Left Exhaust Temperature (GSC+) Used to read the temperature of the exhaust air on the left side of the engine.
$F4 $42 aa	Generator RMS Voltage Phase A to B (GSC+) Used to read the RMS voltage from phase A to phase B.
$F4 $43 aa	Generator RMS Voltage Phase B to C (GSC+) Used to read the RMS voltage from phase B to phase C.
$F4 $44 aa	Generator RMS Voltage Phase C to A (GSC+) Used to read the RMS voltage from phase C to phase A.
$F4 $45 aa	Generator RMS Voltage Phase A to Neutral (GSC+) Used to read the RMS voltage from phase A to neutral.
$F4 $46 aa	Generator RMS Voltage Phase B to Neutral (GSC+) Used to read the RMS voltage from phase B to neutral.
$F4 $47 aa	Generator RMS Voltage Phase C to Neutral (GSC+) Used to read the RMS voltage from phase C to neutral.
$F4 $48 aa	Generator Phase A RMS Current (GSC+) Used to read the phase A RMS current.
$F4 $49 aa	Generator Phase B RMS Current (GSC+) Used to read the phase B RMS current.
$F4 $4A aa	Generator Phase C RMS Current (GSC+) Used to read the phase C RMS current.
$F4 $4B aa	Generator Frequency Used to read the generator output frequency.
$F4 $4C aa	GSC Relay Status Used to read the status of GSC relays.
$F4 $4D aa	GSC Relay Control Used to read the status of or control the GSC relays.
$F4 $60 aa	GSC Alarm Status Used to read the status of GSC Alarm faults.
$F4 $61 aa	GSC Shutdown Status Used to read the status of GSC shutdown faults.
$F4 $62 aa	GSC Spare Fault Alarm Status Used to read the status of spare fault alarms.

(continued)

(Table 42, contd)

Parameter Identifier Reference Chart for EMCP II Applications	
PID	**Description**
$F4 $63 aa	GSC Spare Fault Shutdown Status Used to read the status of spare fault shutdowns.
$F4 $64 aa	Generator Line-Line Voltage Used to read AC generator voltage of a preselected phase. PID $F0 $B0 is used to select generator phase.
$F4 $65 aa	Generator Line Current Used to read AC generator current of a selected phase. PID $F0 $B0 selects generator phase.
$F4 $66 aa	Engine Overspeed Setpoint Used to read the setpoint that the GSC uses to declare an overspeed fault to exist.
$F4 $67 aa	Engine Oil Step Speed Setpoint Used to read the speed the GSC uses to distinguish between rated speed and idle speed when a low engine oil pressure fault occurs.
$F4 $68 aa	Low Engine Oil Pressure at Rated Speed Setpoint Used to read the setpoint that the GSC uses to declare a low oil pressure fault to exist at rated speed.
$F4 $69 aa	Low Engine Oil Pressure at Idle Speed Setpoint Used to read the setpoint that the GSC uses to declare a low oil pressure fault to exist at idle speed.
$F4 $6A aa	High Engine Coolant Temperature Setpoint Used to read the setpoint that the GSC uses to declare a high coolant temperature fault exists.
$F4 $6B aa	Low Engine Coolant Temperature Setpoint Used to read the setpoint that the GSC uses to declare a low coolant temperature fault exists.
$F4 $6C aa	GSC Configuration Used to read the GSC setpoints.
$F4 $6D aa	Remaining Cooldown Time Used to read the amount of time left in the GSC cooldown period before the engine is shut down.
$F4 $C3 aa	Generator Average RMS Voltage (GSC+) Used to read the average RMS voltage being delivered by the generator.
$F4 $C4 aa	Generator Total RMS Current (GSC+) Used to read the total RMS current being delivered by the generator.

(continued)

(Table 42, contd)

Parameter Identifier Reference Chart for EMCP II Applications	
PID	**Description**
$F4 $C7 aa	Generator Power (Percent Of Rated, GSC+) Used to read the real power delivered by the generator as a percentage of the rated power.
$F4 $C8 aa	Generator Phase A Power Factor (GSC+) Used to read the generator phase A power factor.
$F4 $C9 aa	Generator Phase B Power Factor (GSC+) Used to read the generator phase B power factor.
$F4 $CA aa	Generator Phase C Power Factor (GSC+) Used to read the generator phase C power factor.
$F4 $CB aa	Generator Average Power Factor (GSC+) Used to read the generator average power factor.
$F4 $CF aa	Generator Bus Frequency (GSC+P only) Used to read the frequency of the generator bus.
$F4 $D0 aa	Generator Bus RMS Voltage (GSC+P only) Used to read the RMS voltage of the generator bus.
$F4 $D1 aa	Generator Set Control Output Status (GSC+) Used to read the status of the outputs on the generator set control.
$F4 $D2 aa	Generator Set Shutdown Status, Extension #1 (GSC+) Used to read the status of the generator set shutdowns. This is an extension to the list of shutdowns in PID $F4 $61.
$F5 $0B aa	Cycle Crank Time Setpoint used to read the amount of time the GSC allows the engine to crank and then to rest the starting motor during a single crank cycle.
$F5 $0C a	GSC Total Crank Time Setpoint Used to read the elapsed time when the GSC declares an overcrank fault to exist.
$F5 $0D aa	GSC Crank Terminate Speed Setpoint Used to read engine speed when the GSC will disengage starter motor during engine cranking.
$F5 $3E aa	Engine Oil Temperature (GSC+) Used to read the oil temperature in the engine.
$F5 $57 aa	Bus to Generator Phase Difference (GSC+P only) Used to read the phase difference between the bus and the generator.
$F8 $14 aaaaa aaaaa	Application Software Part Number Used to read the application software part number of the GSC. (Personality Module)

(continued)

(Table 42, contd)

Parameter Identifier Reference Chart for EMCP II Applications	
PID	**Description**
$FC $0D abcd	Spare Outputs (GSC+) Used to read or change the state of the spare output of the GSC+.
$FC $0F aaaa	Generator Total Real Power (GSC+) Used to read the total real power being delivered by the generator.
$FC $10 abcd	Relay Driver Module Relay State Used to read or change the state of outputs or relays on the Relay Driver Module.
$FC $11 aaaa	Generator Phase A Real Power (GSC+) Used to read the real power delivered by phase A of the generator.
$FC $12 aaaa	Generator Phase B Real Power (GSC+) Used to read the real power delivered by phase B of the generator.
$FC $13 aaaa	Generator Phase C Real Power (GSC+) Used to read the real power delivered by phase C of the generator.
$FC $14 aaaa	Generator Phase A Reactive Power (GSC+) Used to read the reactive power delivered by phase A of the generator.
$FC $15 aaaa	Generator Phase B Reactive Power (GSC+) Used to read the reactive power delivered by phase B of the generator.
$FC $16 aaaa	Generator Phase C Reactive Power (GSC+) Used to read the reactive power delivered by phase C of the generator.
$FC $17 aaaa	Generator Total Reactive Power (GSC+) Used to read the total reactive power delivered by the generator.
$FC $18 aaaa	Generator Phase A Apparent Power (GSC+) Used to read the apparent power delivered by phase A of the generator.
$FC $19 aaaa	Generator Phase B Apparent Power (GSC+) Used to read the apparent power delivered by phase B of the generator.
$FC $1A aaaa	Generator Phase C Apparent Power (GSC+) Used to read the apparent power delivered by phase C of the generator.
$FC $1B aaaa	Generator Total Apparent Power (GSC+) Used to read the total apparent power delivered by the generator.
$FC $1C aaaa	Generator Total kW-hours (GSC+) Used to read the kilowatt hours which have been accumulated by the generator.
$FC $1D aaaa	Generator Total kVAR-hours (GSC+) Used to read the kiloVAR-hours which have been accumulated by the generator.

(continued)

(Table 42, contd)

Parameter Identifier Reference Chart for EMCP II Applications	
PID	**Description**
$FC $1E abcd	Generator Shutdown Status (GSC+) Used to read the reason(s) for the GSC+ fault shutdown being ON.
$FC $1F abcd	Generator Alarm Status (GSC+) Used to read the reason(s) for the GSC+ fault alarm being ON.

Table 43

PID's for EMCP II Applications	
Remote Fault Reset **$00 $0D a** This PID is used to read the status of inactive shutdown faults and of alarm faults. This PID is also used to reset inactive faults.	
(a)	$00 - $7F = Retain current GSC inactive fault status
	$80 - $FF = Reset GSC inactive fault
Generator Set Engine RPM **$00 $40 aa** This PID is used to read the generator set engine rpm.	
(aa)	Resolution: 0.5 rpm per bit Data range: 0 through 16383.5 rpm $0000-$7FFFF is valid data range $8000 - $801F are Fault Identifiers (FID)(1)
Generator Set Ring Gear Teeth Setpoint **$00 $42 aa** This PID is used to read the number of ring gear teeth the GSC uses to calculate engine speed.	
(aa)	Resolution: 1 tooth per bit Data range: 0 through 655535 $0000-$FFFF is valid data range.
Engine Coolant Temperature **$00 $44 aa** This PID is used to read the temperature of the engine coolant.	
(aa)	Resolution: 1°C per bit Data range –32736 through –1°C or 0 through 32767 °C. $8020 - $FFFF is valid negative data range $0000 - $7FFF is valid positive data range. $8000 - $801F are Fault Identifiers(1)
Engine Oil Pressure kPa **$00 $54 aa** This PID is used to read the oil pressure of the engine in kPa.	

(continued)

(Table 43, contd)

PID's for EMCP II Applications	
(aa)	Resolution: 0.5 kPa per bit Data range: 0 through 16385.5 kPa $0000 - $7FFF is valid data range $8000 - $801F are Fault Identifiers(1)
Generator Set Hourmeter **$00 $5E aa** This PID is used to read the number of hours that the generator set has run.	
(aa)	Resolution: 1 hour per bit Data range: 0 through 655535 hours(2) $0000 - $FFFF is valid data range
Device ID Code **$00 $80 aabbcc** This PID is used to read the device ID code from the components on the data link. Each pair of bytes (aa, bb, cc) is sent LSB first. Device ID Code can not be read from the older version of the CCM, 117-6170 System Communication Module.	
(aa)	Module ID: will always equal $58 - $5F (for example: when MID = $58, data will be sent as $58 $00)
(bb)	Module Change Level: $00 = basic version of GSC $01 = supports RDM $10 = GSC+ $20 = GSC+P (for example: when change level = $10, data will be sent as $10 $00)
(cc)	Application type: For EMCP II will always be $60 for generator sets (for example: application type = $60, data will be sent as $60 $00)
GSC Fault Log Codes, Status, and Number of Occurrences **$00 $82 aab [c]...aab [c]** This PID is used to read up to 9 Component Identifiers (CID), the status of the diagnostic codes stored in the GSC fault log, and number of occurrences.	
(a)	Upper byte of CID
(a)	Lower byte of CID
(b)	Fault Code Status Bit 8 — 0 = count not included; 1 = count is included bit 7 — 0 = fault is active; 1 = fault is inactive bit 6 — 0 = Fault is logged; 1 = Fault is not logged bit 5 — 0 = Standard FMI; 1 = Extended FMI bits 4-1 — Failure Mode Identifier (FMI) of a fault code

(continued)

(Table 43, contd)

PID's for EMCP II Applications	
(c)	Occurrence count for fault code, optional as defined by bit 8
GSC Fault Log Request for Additional Data **$00 $83 aab** This PID should be used only for requesting additional information about a given logged diagnostic code. This PID can also be used to clear a particular diagnostic code. Use IID 00 Special Parameter Command to request this PID. Use the $00 $82 PID to request preliminary information such as existence of active or inactive diagnostic codes. Refer to Operation and Maintenance Manual, SENR 6874, "M5X Communication Protocol Programming Examples".	
(a)	Upper byte of CID Component identifier when more information is being requested, or is being cleared
(a)	Lower byte of CID Component identifier when more information is being requested, or is being cleared
(b)	Information Requested Bit 7, 8 — 00 = Request ASCII descriptive message for given diagnostic code; 01 = Request to clear given diagnostic code in the GSC fault log; 10 = Request to clear all diagnostic codes in GSC fault log; 11 = Request additional diagnostic information about given diagnostic code. bit 6, 5 — Not used bits 4-1 — Failure Mode Identifier (FMI) of a fault code
(c)	Occurrence count for fault code, optional as defined by bit 8
GSC Fault Log Response for Additional information **$00 $84 aab [cddee]** This PID is used to acknowledge the diagnostic does being cleared in the GSC fault log or to supply additional information about a given diagnostic code requested by PID $00 $83.	
(a)	Upper byte of CID Component identifier when more information is being requested, or is being cleared
(a)	Lower byte of CID Component identifier when more information is being requested, or is being cleared

(continued)

(Table 43, contd)

PID's for EMCP II Applications	
(b)	Information Requested Bit 8, 7 Response Identifier 01 = Count has been cleared for given CID 10 = All counts have been cleared 11 = Message contains additional information for given diagnostic code Bit 6 0 = Request to clear logged fault granted 1 = Request to clear logged fault denied Bit 5-1 Failure Mode identifier (FMI) of a fault code
(c)(3)	Number of occurrences (MSB first)
(dd)(3)	Time of first occurrence (MSB first)
(ee)(3)	Time of last occurrence (MSB first)
System Battery Voltage **$F0 $13 a** This PID is used to read system battery voltage for a generator set.	
(a)	Resolution: 0.5 volts per bit Data Range: 0.0 volts through 127.5 volts $00 - $FF is the valid data range
GSC Cooldown Timer Setpoint **$F0 $14 a** This PID is used to read the amount of time the GSC allows the engine to run after a normal shutdown is initiated.	
(a)	Resolution: 1 minute per bit Data range: 0 through 223 minutes $00 - $DF is the valid range
Remote Start Status **$F0 $2A a** This PID is used to read the status of the remote start input of the GSC. Only a remote initiate contact closer to the GSC will activate this PID (not a remote start signal from the CCM).	
(a)	$00 = Remote start is OFF $01 - $7F = Remote start is ON $80 - $9F are Fault Identifiers(1)
Engine Control Switch Position **$F0 $8F a** This PID is used to read the status of Engine Control Switch (ECS).	

(continued)

(Table 43, contd)

PID's for EMCP II Applications	
(a)	$00 = Off/reset $02 = Start $03 = Stop $04 = Auto $80 - $9F are Fault Identifiers(1)
Generator Phase Select **$F0 $B0 a** This PID is used to read or select what generator phase is being monitored.	
(a)	$00 = Phase A-B voltage, phase A current $01 = Phase B-C voltage, phase B current $02 = Phase C-A voltage, phase C current $03 - $FF = Undefined
Remote Emergency Stop **$F0 $B1 a** This PID is used to read the status of or request a remote emergency stop. Engine Control Switch must be in AUTO.	
(a)	$00 = Remote emergency stop is OFF $01 - $7F = Remote emergency stop is ON $80 - $9F are Fault Identifiers(1)
Cooldown Override Control **$F0 $B2 a** This PID is used to read the status of or select a shutdown that aborts the cooldown timer.	
(a)	$00 = Continue cooldown $01 - $7F = Abort cooldown $80 - $9F are Fault Identifiers(1)
Generator AC Voltage Full Scale and External Potential Transformer Setpoint **$F0 $B3 a** This PID is used to read the AC full scale voltage and the ratio of the external potential transformer.	

(continued)

(Table 43, contd)

PID's for EMCP II Applications	
(a)	$00 = 700 volts full scale, jumper installed, no external PT
	$01 = 150 volts full scale, no jumper, no external PT
	$02 = 300 volts full scale, no jumper, no external PT
	$03 = 500 volts full scale, no jumper, 3.33:1 PT
	$04 = 600 volts full scale, no jumper, 4:1 PT
	$05 = 750 volts full scale, no jumper, 5:1 PT
	$06 = 3.0k volts full scale, no jumper, 20:1 external PT
	$07 = 4.5k volts full scale, no jumper, 30:1 external PT
	$08 = 5.25k volts full scale, no jumper, 35.1 external PT
	$09 = 9.0k volts full scale, no jumper, 60:1 external PT
	$0A = 15.0k volts full scale, no jumper, 100:1 external PT
	$0B = 18.0k volts full scale, no jumper, 120:1 external PT
	$0C = 30.0k volts full scale, no jumper, 200:1 external PT
	$0D = 4.125k volts full scale, no jumper, 27.5:1 external PT
	$0E = 5.2k volts full scale, no jumper, 34.67:1 external PT
	$0F = 4.95k volts full scale, no jumpers, 33:1 external PT
Generator AC Current Full Scale Setpoint **$F0 $B4 a** This PID is used to read the AC full scale current.	

(continued)

(Table 43, contd)

PID's for EMCP II Applications	
(a)	$00 = 75.5, 75 Amps full scale $01 = 100.5, 100 Amps full scale $02 = 150.5, 200 Amps full scale $03 = 200:5, 200 amps full scale $04 = 300:5, 300 Amps full scale $05 = 400:5, 400 Amps full scale $06 = 600:5, 500 Amps full scale $07 = 800:5, 800 Amps full scale $08 = 1000:5, 1000 Amps full scale $09 = 1200:5, 1200 Amps full scale $0A = 1500:5, 1500 Amps full scale $0B = 2000:5, 2000 Amps full scale $0C = 2500:5, 2500 Amps full scale $0D = 3000:5, 3000 Amps full scale $0E = 4000;5, 4000 Amps full scale $0F = 5000:5, 5000 Amps full scale $10 = 6000:5, 6000 Amps full scale $11 = 7000:5, 7000 Amps full scale $12 = 1600:5, 1600 Amps full scale
Generator Phase A Power Factor Lead/Lag Status (GSC+) **$F1 $D3 a** This PID is used to read the lead or lag status of the phase current versus the phase voltage for phase A.	
(a)	$00 = current lags voltage $01 = current leads voltage $02 - $DF = undefined $E0 - $FF = Fault Identifiers(1)
Generator Phase B Power Factor Lead/Lag Status (GSC+) **$F1 $D4 a** This PID is used to read the lead or lag status of the phase current versus the phase voltage for phase B.	
(a)	$00 = current lags voltage $01 = current leads voltage $02 - $DF = undefined $E0 - $FF = Fault Identifiers(1)
Generator Phase C Power Factor Lead/Lag Status (GSC+) **$F1 $D5 a** This PID is used to read the lead or lag status of the phase current versus the phase voltage for phase C.	
(a)	$00 = current lags voltage $01 = current leads voltage $02 - $DF = undefined $E0 - $FF = Fault Identifiers(1)

(continued)

(Table 43, contd)

PID's for EMCP II Applications	
Generator Average Power Factor Lead/Lag Status (GSC+) **$F1 $D6 a** This PID is used to read the lead or lag status of the average power factor lead or lag status of the average power factor of the generator.	
(a)	$00 = current lags voltage $01 = current leads voltage $02 - $DF = undefined $E0 - $FF = Fault Identifiers(1)
Remote Start Initiate **$F2 $13 a** This PID is used to read the status of or start or stop the engine remotely.	
(a)	$00 = Start engine $7F = Stop engine
EPG Circuit Breaker Status (GSC+P only) **$F2 $CB a** This PID is used to read the status of the breaker.	
(a)	$00 = Breaker open $01 = Breaker closed $E4 = Breaker sensor input shorted low
Remote Generator Synchronizer Control (GSC+P only) **$F2 $CC a** This PID is used to read and program the synchronization function to be performed.	
(a)	$00 = Off $01 = Remote synchronization test $02 = Automatic synchronization
Remote Synchronization Control Readiness (GSC+P only) **$F2 $D6 a** This PID is used to read if the remote synchronization is available. If it is not available, used to read the reason.	
(a)	$00 = Not installed $01 = Ready for remote command $02 = Synchronizing switch not in auto $03 = Engine control switch not in auto $04 = Engine was not started remotely $05 = Engine not running
Generator Synchronizer Control Status (GSC+P only) **$F2 $D7 a** This PID is used to read the status of the synchronizer control system.	

(continued)

(Table 43, contd)

PID's for EMCP II Applications	
(a)	$00 = Not installed $01 = Inactive $02 = Semiautomatic paralleling $03 = Permissive paralleling $04 = Remote synchronization testing $05 = Synchronizing $06 = Synchronization system alarm or diagnostic $07 = remote synchronization testing passed $08 = Dead bus time delay $09 = Closing to dead bus
Right Exhaust Temperature (GSC+) **$F4 $40 aa** This PID is used to read the temperature of the exhaust air on the right side of the engine.	
(aa)	Resolution: 1 degree C/bit Valid Data Range: -32736 to +32767 degree C $8020 - $7FFF is the valid data range $8000 - $801F are Fault Identifiers(1)
Left Exhaust Temperature (GSC+) **$F4 $41 aa** This PID is used to read the temperature of the exhaust air on the left side of the engine.	
(aa)	Resolution: 1 degree C/bit Valid Data Range: -32736 to +32767 degree C $8020 - $7FFF is the valid data range $8000 - $801F are Fault Identifiers(1)
Generator RMS Voltage Phase A-B (GSC+) **$F4 $42 aa** This PID is used to read the RMS voltage from phase A to B.	
(aa)	Resolution: 1 V(rms)/bit Valid Data Range: 0 - 65503 V(rms) $0000 - $FFDF is the valid data range $FFE0 - $FFFF are Fault Identifiers(1)
Generator RMS Voltage Phase B-C (GSC+) **$F4 $43 aa** This PID is used to read the RMS voltage from phase B to C.	
(aa)	Resolution: 1 V(rms)/bit Valid Data Range: 0 - 65503 V(rms) $0000 - $FFDF is the valid data range $FFE0 - $FFFF are Fault Identifiers(1)
Generator RMS Voltage Phase C-A (GSC+) **$F4 $44 aa** This PID is used to read the RMS voltage from phase C to A.	

(continued)

(Table 43, contd)

PID's for EMCP II Applications	
(aa)	Resolution: 1 V(rms)/bit Valid Data Range: 0 - 65503 V(rms) $0000 - $FFDF is the valid data range $FFE0 - $FFFF are Fault Identifiers(1)

Generator RMS Voltage Phase A to Neutral (GSC+)
$F4 $45 aa
This PID is used to read the RMS voltage from phase A to neutral.

(aa)	Resolution: 1 V(rms)/bit Valid Data Range: 0 - 65503 V(rms) $0000 - $FFDF is the valid data range $FFE0 - $FFFF are Fault Identifiers(1)

Generator RMS Voltage Phase B to Neutral (GSC+)
$F4 $46 aa
This PID is used to read the RMS voltage from phase B to neutral.

(aa)	Resolution: 1 V(rms)/bit Valid Data Range: 0 - 65503 V(rms) $0000 - $FFDF is the valid data range $FFE0 - $FFFF are Fault Identifiers(1)

Generator RMS Voltage Phase C to Neutral (GSC+)
$F4 $47 aa
This PID is used to read the RMS voltage from phase C to neutral.

(aa)	Resolution: 1 V(rms)/bit Valid Data Range: 0 - 65503 V(rms) $0000 - $FFDF is the valid data range $FFE0 - $FFFF are Fault Identifiers(1)

Generator Phase A RMS Current (GSC+)
$F4 $48 aa
This PID is used to read the phase A RMS current.

(aa)	Resolution: 1 A(rms)/bit Valid Data Range: 0 - 65503 A(rms) $0000 - $FFDF is the valid data range $FFE0 - $FFFF are Fault Identifiers(1)

Generator Phase B RMS Current (GSC+)
$F4 $49 aa
This PID is used to read the phase B RMS current.

(aa)	Resolution: 1 A(rms)/bit Valid Data Range: 0 - 65503 A(rms) $0000 - $FFDF is the valid data range $FFE0 - $FFFF are Fault Identifiers(1)

Generator Phase C RMS Current (GSC+)
$F4 $49 aa
This PID is used to read the phase C RMS current.

(continued)

(Table 43, contd)

PID's for EMCP II Applications	
(aa)	Resolution: 1 A(rms)/bit Valid Data Range: 0 - 65503 A(rms) $0000 - $FFDF is the valid data range $FFE0 - $FFFF are Fault Identifiers(1)

Generator Frequency
$F4 $4B aa
This PID is used to read the generator output frequency.

(aa)	Resolution: 0.1 Hz per bit Data range: 0 through 6550.3 Hz $0000 - $FFDF is the valid data range

GSC Relay Status
$F4 $4C aa
This PID is used to read the status of GSC relays.

Bit	Relay(4)
16, 15	Electronic Governor Relay
14, 13	Program Spare Relay
12, 11	Run Relay
10, 9	Generator set Fault Relay
8, 7	Starter Motor Relay
6, 5	Crank Terminate Relay
4, 3	Fuel Control Relay
2, 1	Air Shutoff Relay

GSC Relay Control
$F4 $4D aa
This PID is used to read the status of or control the GSC relays. Must read $F4 $4C to determine the true status. $F4 $4D echoes back the status requested by $F4 $4D. Some relays can not be controlled by $F4 $4D, and may not change state. The CCM can control the electronic governor relay if actual engine oil pressure is higher than the Low Oil Pressure Idle Speed setpoint, but cannot control the electronic governor relay if engine oil pressure is not higher than this setpoint. Refer to Service Manual Module, SENR5809 for more information on engine setpoints. The CCM can control the generator fault relay if no fault shutdown condition exists. If a fault condition exists, the generator fault will activate regardless of the CCM command.

Bit	Relay(4)
16, 15	Electronic Governor Relay
14, 13	Program Spare Relay
12, 11	Run Relay(5)
10, 9	Generator set Fault Relay(5)
8, 7	Starter Motor Relay(5)

(continued)

(Table 43, contd)

PID's for EMCP II Applications	
6, 5	Crank Terminate Relay(5)
4, 3	Fuel Control Relay(5)
2, 1	Air Shutoff Relay(5)

GSC Alarm Status
$F4 $60 aa
This PID is used to read the status of GSC alarm faults.

Bits	Alarm(4)
16 - 13	Undefined (future use)
12, 11	Engine Control Alarm
10, 9	High Oil Temperature (GSC+ only)
8, 7	Engine Control Switch not in auto or Manual
6, 5	Low Oil Pressure
4, 3	Low Coolant Temperature
2, 1	High Coolant Temperature

GSC Shutdown Status
$F4 $61 aa
This PID is used to read the status of GSC shutdown faults. Low oil pressure, high coolant temperature, and coolant loss faults can be overridden by correctly programming the GSC. Refer to Service Manual Module, SENR 5809. The GSC configuration byte $F4 $6C should be requested to determine whether these faults have been overridden.

Bits	Fault(4)
16, 15	Overspeed
14, 13	Overcrank
12, 11	Low Oil Pressure
10, 9	High Coolant Temperature
8, 7	Spare Fault
6, 5	Emergency Stop
4, 3	Coolant Loss
2, 1	Diagnostic Code

GSC Spare Fault Alarm Status
$F4 $62 aa
This PID is used to read the status of spare fault alarms.

Bit	Fault(4)
16 - 9	Undefined (future use)
8, 7	Spare Fault 4 (GSC+ only)
6, 5	Spare Fault 3
4, 3	Spare Fault 2

(continued)

(Table 43, contd)

PID's for EMCP II Applications	
2, 1	Spare Fault 1

GSC Spare Fault Shutdown Status
$F4 $63 aa
This PID is used to read the status of spare fault shutdowns.

Bit	Fault(4)
16 - 9	Undefined (future use)
8, 7	Spare Fault 4 (GSC+ only)
6, 5	Spare Fault 3
4, 3	Spare Fault 2
2, 1	Spare Fault 1

Generator Line-Line Voltage
$F4 $64 aa
This PID is used to read AC generator voltage of a preselected phase. PID $F0 $B0 is used to select generator phase.

(aa)	Resolution: 1 volt RMS per bit Data range: 0 through 65503 V RMS $0000 = $FFDF is the valid data range $FFE0 - $FFFF are Fault Identifiers(1)

Generator Line Current
$F4 $65 aa
This PID is used to read AC generator current of a selected phase. PID $F0 $B0 selects generator phase.

(aa)	Resolution: 1 Amp RMS per bit Data range: 0 through 65503 Amps RMS $0000 - $FFDF is the valid data range $FFE0 - $FFFF are Fault Identifiers(1)

Engine Overspeed Setpoint
$F4 $66 aa
This PID is used to read the setpoint where GSC declares an overspeed fault to exist.

(aa)	Resolution: 0.5 rpm per bit Data range 0 through 32751.5 rpm $0000 - $FFDF is the valid data range.

Engine Oil Step Speed Setpoint
$F4 $67 aa
This PID is used to read the speed GSC uses to distinguish between rated speed and idle speed when a low engine oil pressure fault occurs.

(aa)	Resolution 0.5 rpm per bit Data range: 0 through 32751.5 rpm $0000 - $FFDF is the valid data range.

(continued)

(Table 43, contd)

PID's for EMCP II Applications	
Low Engine Oil Pressure at Rated Speed Setpoint $F4 $68 aa This PID is used to read the setpoint where the GSC declares a low oil pressure fault to exist at rated speed.	
(aa)	Resolution 0.5 rpm per bit Data range: 0 through 32751.5 rpm $0000 - $FFDF is the valid data range.
Low Engine Oil Pressure at Idle Speed Setpoint $F4 $69 aa This PID is used to read the setpoint where the GSC declares a low oil pressure fault to exist at idle speed.	
(aa)	Resolution 1 kPa per bit Data range: 0 through 65503 kPa $0000 - $FFDF is the valid data range.
High Engine Coolant Temperature Setpoint $F4 $6A aa This PID is used to read the setpoint where the GSC declares a high coolant temperature fault exists.	
(aa)	Resolution 1 °C per bit Data range: 0 through 65503 °C $0000 - $FFDF is the valid data range.
Low Engine Coolant Temperature Setpoint $F4 $6B aa This PID is used to read the setpoint where the GSC declares a low coolant temperature alarm exists.	
(aa)	Resolution 1 °C per bit Data range: 0 through 65503 °C $0000 - $FFDF is the valid data range.
GSC Configuration $F4 $6C aa Used to read GSC setpoints.	
(a)	Undefined

(continued)

(Table 43, contd)

PID's for EMCP II Applications	
(a)	GSC Setpoints bit 8: AC metering 1 = AC metering disabled 0 = AC metering enabled bit 7: Battery System 1 = 32 volt battery system 0 = 24 volt battery system bit 6: Engine coolant loss action 1 = Shutdown override for engine coolant loss fault 0 = Shutdown enabled for engine coolant loss fault bit 5: Engine coolant loss sensor 1 = Engine coolant loss sensor installed 0 = Engine coolant loss sensor not installed bit 4: Sensor faults 1 = Shutdown enable for sensor faults 0 = Shutdown override for sensor faults bit 3: Engine coolant temperature and oil pressure faults 1 = Shutdown override for high engine coolant temperature and low engine oil pressure faults 0 = Shutdown enable for high engine coolant temperature and low engine oil pressure faults bit 2: Display units 1 = Metric units are displayed for engine oil pressure and coolant temperature 0 = English units displayed for engine oil pressure and coolant temperature bit 1: Fuel system 1 = Energize to run fuel system 0 = Energize to shutdown fuel system
Remaining Cooldown Time $F4 $6D aa This PID is used to read the amount of time left in the GSC cooldown period before the engine is shut down.	
(aa)	Resolution: 1 second per bit Data range: 0 through 65535 seconds $0000 - $FFFF is the valid data range
Generator Average RMS Voltage (GSC+) $F4 $C3 aa This PID is used to read the average RMS voltage being delivered by the generator.	

(continued)

(Table 43, contd)

PID's for EMCP II Applications	
(aa)	Resolution: 1 V(rms)/bit Valid Data Range: 0 - 65503 V(rms) $0000 - FFDF is the valid data range $FFE0 - $FFFF are Fault Identifiers(1)
Generator Total RMS Current (GSC+) **$F4 $C4 aa** This PID is used to read the total RMS current being delivered by the generator.	
(aa)	Resolution: 1 A(rms)/bit Valid Data Range: 0 - 65503 V(rms) $0000 - FFDF is the valid data range $FFE0 - $FFFF are Fault Identifiers(1)
Generator Power (Percent Of Rated, GSC+) **$F4 $C7 aa** This PID is used to read the real power delivered by the generator as a percentage of the rated power.	
(aa)	Resolution: 0.1% per bit Valid Data Range: -3273.6% to +3276.7% $8020 - $7FFF is the valid data range $8000 - $801F are Fault Identifiers(1)
Generator Phase A Power Factor (GSC+) **$F4 $C8 aa** This PID is used to read the generator phase A power factor.	
(aa)	Resolution: 0.0001/bit Valid Data Range: -1.0000 to 1.0000 $D8F0 - $FFFF and $0000 - $2710 is the valid data range $8000 - $801F are Fault Identifiers(1)
Generator Phase B Power Factor (GSC+) **$F4 $C9 aa** This PID is used to read the generator phase B power factor.	
(aa)	Resolution: 0.0001/bit Valid Data Range: -1.0000 to 1.0000 $D8F0 - $FFFF and $0000 - $2710 is the valid data range $8000 - $801F are Fault Identifiers(1)
Generator Phase C Power Factor (GSC+) **$F4 $CA aa** This PID is used to read the generator phase C power factor.	
(aa)	Resolution: 0.0001/bit Valid Data Range: -1.0000 to 1.0000 $D8F0 - $FFFF and $0000 - $2710 is the valid data range $8000 - $801F are Fault Identifiers(1)

(continued)

(Table 43, contd)

PID's for EMCP II Applications	
Generator Average Power Factor (GSC+) **$F4 $CB aa** This PID is used to read the generator average power factor.	
(aa)	Resolution: 0.0001/bit Valid Data Range: -1.0000 to 1.0000 $D8F0 - $FFFF and $0000 - $2710 is the valid data range $8000 - $801F are Fault Identifiers(1)
Generator Bus Frequency (GSC+P only) **$F4 $CF aa** This PID is used to read the frequency of the generator bus.	
(aa)	Resolution: 0.1 Hz per bit Data Range: 0 through 6550.3 Hz $000 - $FFDF is valid data range $FFE0 - $FFFF are Fault Identifiers(1)
Generator Bus RMS Voltage (GSC+P only) **$F4 $D0 aa** This PID is used to read the RMS voltage of the generator bus.	
(aa)	Resolution: 1 Volt per bit Data Range: 0 through 65503 V $0000 - $FFDF is valid data range $FFE0 - $FFFF are Fault Identifiers(1)
Generator Set Control Output Status (GSC+) **$F4 $D1 aa** This PID is used to read the status of the outputs on the generator set control.	
(aa)(4)	Bits 16-15 = Undefined, future use Bits 14-13 = Undefined, future use Bits 12-12 = Undefined, future use Bits 10 - 9 = Undefined, future use Bits 8 - 7 = Undefined, future use Bits 6 - 5 = Undefined, future use Bits 4 - 3 = Kilowatt Relay Control Output Bits 2 -1 = Close Breaker Output
Generator Set Shutdown Status - Extension #1 (GSC+) **$F4 $D2 aa** This PID is used to read the status of the generator set shutdowns. This is an extension to the list of shutdowns in PID $F4 61.	

(continued)

(Table 43, contd)

PID's for EMCP II Applications	
(aa)[4]	Bits 16-15: High Engine Oil Temperature Bits 14-13: Engine Control Shutdown Bits 12-11: Undefined, future use Bits 10-9: Undefined, future use Bits 8-7: Undefined, future use Bits 6-5: Undefined, future use Bits 4-3: Undefined, future use Bits 2-1: Undefined, future use
Cycle Crank Time Setpoint **$F5 $0B aa** This PID is used to read the amount of time the GSC allows the engine to crank and then to rest the starting motor during a single crank cycle.	
(aa)	Resolution: 1 second per bit Data range: 0 through 65503 seconds $0000 - $FFDF is the valid data range
GSC Total Crank Time Setpoint **$F4 $0C aa** This PID is used to read the elapsed time when the GSC declares an overcrank fault to exist	
(aa)	Resolution: 1 seconds per bit Data Range: 0 through 65503 seconds $0000 = $FFDF is the valid data range.
GSC Crank Terminate Speed Setpoint **$F5 $0D aa** Used to read engine speed when GSC will disengage starter motor during engine cranking	
(aa)	Resolution: 0.5 rpm per bit Data range: 0 through 32751.5 rpm $0000 = $FFDF is the valid data range
Engine Oil Temperature (GSC+) **$F5 $3E aa** This PID is used to read the oil temperature in the engine.	
(aa)	Resolution: 1 degree C/bit Valid Data Range: -32736 to +32767 °C $8020 = $7FFF is the valid data range $8000 - $801F are Fault Identifiers[1]
Bus to Generator Phase Difference (GSC+P only) **$F5 $57 aa** This PID is used to read the phase difference between the bus and generator.	
(aa)	Resolution: 0.1 degrees per bit Data range: -360.0 to +360.0 degrees $F1F0 - $FFFF and $0000 = $0E10 is valid data range $8000 = $801F are Fault Identifiers[1]

(continued)

(Table 43, contd)

PID's for EMCP II Applications	
Application Software Part Number **$F8 $14 aaaaaaaaaa** This PID is used to read the application software part number of the GSC (Personality Module).	
(aaaaa aaaaa)	Application software part number in printable ASCII (part number less than 10 characters are padded with an ASCII space $20 at the beginning of part number.
Spare Outputs (GSC+) **$FC $0D abcd** Used to read or change the state of the spare output of the GSC+. When performing a parameter write ($B2) to change an individual relay's state, set all other relay bits to 11 in order to not change their state. The CCM can only control the spare output in an active low type of configuration. See Systems Operations, SENR 5832, "Service Mode - Spare Input/Output Programming" for more information.	
(a[2])	Bits 32-31: Undefined, future use Bits 30-29: Undefined, future use Bits 28-27: Undefined, future use Bits 26-25: Undefined, future use
(b)	Bits 24-23: Undefined, future use Bits 22-21: Undefined, future use Bits 20-19: Undefined, future use Bits 18-17: Undefined, future use
(c)	Bits 16-15: Undefined, future use Bits 14-13: Undefined, future use Bits 12-11: Undefined, future use Bits 10-9: Undefined, future use
(d)	Bits 8-7: Undefined, future use Bits 6-5: Undefined, future use Bits 4-3: Undefined, future use Bits 2-1: Undefined, future use
Generator Total Real Power (GSC+) **$FC $0F aaaa** This PID is used to read the total real power being delivered by the generator.	
(aaaa)	Resolution: 1 Watt/bit Valid Data Range: -2147483615 to 214748647 Watts $80000020 - $7FFFFFF is the valid data range $80000000 - $8000001F are Fault Identifiers[1]
Relay Driver Module Relay State **$FC $10 abcd** This PID is used to read or change the state of the outputs or relays on the Relay Driver Module. When performing a parameter write ($B2) to change an individual relay's state, set all other relay bits to 11 in order to not change their state.	

(continued)

(Table 43, contd)

PID's for EMCP II Applications	
(a)	Bits 32-31: Output 4 Bits 30-29: Output 3 Bits 28-27: Output 2 Bits 26-25: Output 1
(b)	Bits 24-23: Output 8 Bits 22-21: Output 7 Bits 20-19: Output 6 Bits 18-17: Output 5
(c)	Bits 16-15: Undefined, future use Bits 14-13: Undefined, future use Bits 12-11: Undefined, future use Bits 10-9: Output 9
(d)	Bits 8-7: Undefined, future use Bits 6-5: Undefined, future use Bits 4-3: Undefined, future use Bits 2-1: Undefined, future use
Generator Phase A Real Power (GSC+) **$FC $11 aaaa** This PID is used to read the real power delivered by phase A of the generator.	
(aaaa)	Resolution: 1 Watt/bit Valid Data Range: -2147483615 to 214748647 Watts $80000020 - $7FFFFFF is the valid data range $80000000 - $8000001F are Fault Identifiers(1)
Generator Phase B Real Power (GSC+) **$FC $12 aaaa** This PID is used to read the real power delivered by phase B of the generator.	
(aaaa)	Resolution: 1 Watt/bit Valid Data Range: -2147483615 to 214748647 Watts $80000020 - $7FFFFFF is the valid data range $80000000 - $8000001F are Fault Identifiers(1)
Generator Phase C Real Power (GSC+) **$FC $13 aaaa** This PID is used to read the real power delivered by phase C of the generator.	
(aaaa)	Resolution: 1 Watt/bit Valid Data Range: -2147483615 to 214748647 Watts $80000020 - $7FFFFFF is the valid data range $80000000 - $8000001F are Fault Identifiers(1)
Generator Phase A Reactive Power (GSC+) **$FC $14 aaaa** This PID is used to read the reactive power delivered by phase A of the generator.	

(continued)

(Table 43, contd)

PID's for EMCP II Applications	
(aaaa)	Resolution: 1 Var/bit Valid Data Range: -2147483615 to 214748647 Var $80000020 - $7FFFFFF is the valid data range $80000000 - $8000001F are Fault Identifiers(1)
Generator Phase B Reactive Power (GSC+) **$FC $15 aaaa** This PID is used to read the reactive power delivered by phase B of the generator.	
(aaaa)	Resolution: 1 Var/bit Valid Data Range: -2147483615 to 214748647 Var $80000020 - $7FFFFFF is the valid data range $80000000 - $8000001F are Fault Identifiers(1)
Generator Phase C Reactive Power (GSC+) **$FC $16 aaaa** This PID is used to read the reactive power delivered by phase C of the generator.	
(aaaa)	Resolution: 1 Var/bit Valid Data Range: -2147483615 to 214748647 Var $80000020 - $7FFFFFF is the valid data range $80000000 - $8000001F are Fault Identifiers(1)
Generator Total Reactive Power (GSC+) **$FC $17 aaaa** This PID is used to read the total reactive power delivered by the generator.	
(aaaa)	Resolution: 1 Var/bit Valid Data Range: -2147483615 to 214748647 Var $80000020 - $7FFFFFF is the valid data range $80000000 - $8000001F are Fault Identifiers(1)
Generator Phase A Apparent Power (GSC+) **$FC $18 aaaa** This PID is used to read the apparent power delivered by phase A of the generator.	
(aaaa)	Resolution: 1 VA/bit Valid Data Range: -2147483615 to 214748647 Var $80000020 - $7FFFFFF is the valid data range $80000000 - $8000001F are Fault Identifiers(1)
Generator Phase B Apparent Power (GSC+) **$FC $19 aaaa** This PID is used to read the apparent power delivered by phase B of the generator.	

(continued)

(Table 43, contd)

PID's for EMCP II Applications	
(aaaa)	Resolution: 1 VA/bit Valid Data Range: -2147483615 to 214748647 Var $80000020 - $7FFFFFF is the valid data range $80000000 - $8000001F are Fault Identifiers(1)
Generator Phase C Apparent Power (GSC+) **$FC $1A aaaa** This PID is used to read the apparent power delivered by phase C of the generator.	
(aaaa)	Resolution: 1 VA/bit Valid Data Range: -2147483615 to 214748647 Var $80000020 - $7FFFFFF is the valid data range $80000000 - $8000001F are Fault Identifiers(1)
Generator Total Apparent Power (GSC+) **$FC $1B aaaa** This PID is used to read the total apparent power delivered by the generator.	
(aaaa)	Resolution: 1 VA/bit Valid Data Range: -2147483615 to 214748647 Var $80000020 - $7FFFFFF is the valid data range $80000000 - $8000001F are Fault Identifiers(1)
Generator Total kW-hours (GSC+) **$FC $1C aaaa** This PID is used to read the kilowatt-hours which have been accumulated by the generator.	
(aaaa)	Resolution: 1 kW-hr/bit Valid Data Range: 0 4,294,967,263 kW-hrs $00000000 - $FFFFFFDF is the valid data range $FFFFFE0 - $FFFFFFFF are Fault Identifiers(1)
Generator Total kVAR-hours (GSC+) **$FC $1D aaaa** This PID is used to read the kiloVAR-hours which have been accumulated by the generator.	
(aaaa)	Resolution: 1 kVAR-hr/bit Valid Data Range: 0 4,294,967,263 kW-hrs $00000000 - $FFFFFFDF is the valid data range $FFFFFE0 - $FFFFFFFF are Fault Identifiers(1)
Generator Shutdown Status (GSC+) **$FC $1E abcd** This PID is used to read the reason(s) for the GSC+ fault shutdown being ON.	

(continued)

(Table 43, contd)

PID's for EMCP II Applications	
(a)	Bits 32-31: Undefined, future use Bits 30-29: Undefined, future use Bits 28-27: Undefined, future use Bits 26-25: Undefined, future use
(b)	Bits 24-23: Generator Frequency Inconsistent with Engine Speed Bits 22-21: Phase Rotation Mismatch (GSC+P only) Bits 20-19: Synchronization Timeout (GSC+P only) Bits 18-17: Inappropriate Bus or Generator Voltage (GSC+P only)
(c)	Bits 16-15: Reverse Power Bits 14-13: Single Phase Overcurrent Bits 12-11: Generator Total Overcurrent Bits 10-9: Generator Frequency Sensing Fault
(d)	Bits 8-7: Overvoltage Bits 6-5: Undervoltage Bits 4-3: Overfrequency Bits 2-1: Underfrequency
Generator Alarm Status (GSC+) **$FC $1F abcd** This PID is used to read the reason(s) for the GSC+ fault alarm being ON.	
(a)	Bits 32-31: Undefined, future use Bits 30-29: Undefined, future use Bits 28-27: Undefined, future use Bits 26-25: Undefined, future use
(b)	Bits 24-23: Generator Frequency Inconsistent with Engine Speed Bits 22-21: Phase Rotation Mismatch (GSC+P only) Bits 20-19: Synchronization Timeout (GSC+P only) Bits 18-17: Inappropriate Bus or Generator Voltage (GSC+P only)
(c)	Bits 16-15: Reverse Power Bits 14-13: Single Phase Overcurrent Bits 12-11: Generator Total Overcurrent Bits 10-9: Generator Frequency Sensing Fault
(d)	Bits 8-7: Overvoltage Bits 6-5: Undervoltage Bits 4-3: Overfrequency Bits 2-1: Underfrequency

(1) For a complete list of the Fault Identifiers refer to the Operation and Maintenance Manual, SENR 6874, "Fault Identifiers".

(2) The number of hours the generator set has run is determined by the GSC. The PID is limited to 65535 hours, the value for PID $00 $5E will always be 0 hours.

(3) Bytes c, dd, and ee are omitted if the response identifier is 01 or 10. The format is $00 $84 in aab.

(4) For each group of bits: 00 = off/de-energized; 01 = On/energized; 11 = Relay not installed, keep same state.

(5) Can not control with the CCM.

i01229089

Parameter Identifiers for 3400 Engines

SMCS Code: 1926

S/N: 2WB1-Up

S/N: 4RG1-Up

S/N: 9NN1-Up

S/N: 4ZR1-Up

S/N: 1LS1-Up

S/N: 8FS1-Up

S/N: 78Z1-Up

S/N: 81Z1-Up

S/N: 9BZ1-Up

PID Security Levels

The following chart defines the PID within each security level for 3400 applications. For 3400 systems the CCM will not automatically respond to a Write Request with a Write Response. Therefore, a Write Request (IID 34) should always be followed with a Read Request (IID 24) for verification after 1 second. If the written value is greater than the maximum value of the parameter, the ECM will adjust the parameter to the maximum value that is allowed. If the written value is less than the minimum value of the parameter, the ECM will adjust the parameter to the minimum value that is allowed.

Table 44

PID Security Levels For 3400 Applications	
LEVEL NO.	**PID**
0	
1	$00 $08 (R), $00 $15 (R), $00 $40 (R), $00 $44 (R), $00 $46 (R), $00 $53 (R), $00 $54 (R), $00 $55 (R), $00 $5A (R), $00 $5B (R), $00 $5E (R), $00 $82 (R), $00 $83 (R), $00 $84 (R), $00 $C8 (R), $F0 $13 (R), $F0 $14 (R), $F0 $16 (R), $F0 $1B (R), $F0 $2A (R), $F0 $2C (R), $F0 $8F (R), $F0 $9C (R), $F0 $A6 (R), $F0 $A8 (R), $F0 $A9 (R), $F0 $AA (R), $F0 $AC (R), $F0 $B1 (R), $F0 $B2 (R), $F0 $B5 (R), $F0 $C1 (R), $F0 $C2 (R), $F1 $18 (R), $F1 $89 (R), $F1 $92 (R), $F2 $13 (R), $F2 $4D (R), $F2 $8A (R), $F4 $10 (R), $F4 $11 (R), $F4 $12 (R), $F4 $17 (R), $F4 $5B (R), $F4 $6D (R), $F4 $8F (R), $F4 $A0 (R), $F5 $0A (R), $F5 $0B (R), $F5 $0D (R), $F5 $0E (R), $F5 $0F (R), $F5 $10 (R), $F5 $11 (R), $F5 $15 (R), $F5 $1D (R), $F5 $25 (R), $F5 $3E (R), $F5 $E0 (R), $F8 $11 (R), $F8 $14 (R), $F8 $1A (R), $FC $07 (R), $FC $08 (R), $FC $09 (R)
2	$00 $0D (W), $00 $83 (W), $F0 $14 (W), $F0 $1B (W), $F0 $AC (W), $F0 $B1 (W), $F0 $B2 (W), $F0 $C1 (W), $F0 $C2 (W), $F2 $13 (W), $F4 $5B (W), $F5 $0A (W), $F5 $0B (W), $F5 $0D (W), $F5 $10 (W), $F8 $1A (W)
3	

Each Parameter Identifier (PID) has an identifier that is one or two bytes in length. The identifier is hexadecimal. The PID is followed by one or more data bytes. For example, the Engine RPM PID is $00 $40. This PID is followed by two bytes of data (aa) that contain the status of the Engine Speed. Data bits are given as binary digits unless the number is preceded by $. All data is sent with the most significant byte (MSB) first.

The following chart is a quick reference list of the Parameter Identifiers (PID).

Table 45

Parameter Identifier Reference Chart for 3400 Applications	
PID	**Description**
$00 $08 a	Engine Configuration Used to read the engine configuration.
$00 $0D a	Remote Fault Reset Used to read the status of or reset inactive shutdown and alarm faults on the ECM.

(continued)

(Table 45, contd)

Parameter Identifier Reference Chart for 3400 Applications	
PID	**Description**
$00 $15 a	Throttle Position Used to read the position of the throttle position sensor (speed adjust potentiometer).
$00 $40 aa	Generator Set Engine RPM Used to read the generator set engine rpm.
$00 $44 aa	Engine Coolant Temperature (°C) Used to read the temperature of the engine coolant in degrees C.
$00 $46 aa	Desired Engine Speed Used to read the desired engine speed of the engine controller.
$00 $53 aa	Atmospheric Pressure Used to read atmospheric pressure in kPa.
$00 $54 aa	Engine Oil Pressure (gauge) Used to read the oil pressure of the engine in kPa.
$00 $55 aa	Boost Pressure (gauge) Used to read engine boost pressure in kPa.
$00 $5A aa	Filtered Engine Oil Pressure (absolute) Used to read the absolute filtered engine oil pressure in kPa.
$00 $5B aa	Boost Pressure (absolute) Used to read the absolute boost pressure of the engine in kPa.
$00 $5E aa	ECM Hour Meter Used to read number of hours the engine has run.
$00 $82 aab [c]	ECM Fault Log Codes, Status, and Number of Occurrences Used to read component identifier (CID), status (active or inactive) of diagnostic codes stored in the ECM fault log, and number of occurrences.
$00 $83 abb	ECM Fault Log Request for Additional Data Used to request additional information about a given logged diagnostic code or to clear a particular diagnostic code.
$00 $84 aab [cddee]	ECM Fault Log Response for Additional Information Used to acknowledge the diagnostic codes being cleared in the ECM fault log or to supply additional information about a given diagnostic code requested by PID $00 $83.
$00 $C8 aaaa	Total Fuel Used to read total fuel the engine has burned.
$F0 $13 a	System Battery Voltage Used to read the system battery voltage of the engine control system.

(continued)

(Table 45, contd)

Parameter Identifier Reference Chart for 3400 Applications	
PID	**Description**
$F0 $14 a	Cooldown Timer Setpoint Used to read or program the amount of time the ECM allows the engine to run after a normal shutdown is initiated.
$F0 $16 a	Cold Mode Status Used to read the cold mode status of the engine.
$F0 $1B a	Engine Prelube Duration Used to read or program the amount of time in seconds the ECM will prelube the engine before the crank cycle is entered.
$F0 $2A a	Remote Start Status Used to read the status of the remote start/stop switch. This data is valid only when the Engine Control switch is in the AUTO position.
$F0 $2C a	Engine Coolant Level Status Used to read the status of the engine level coolant switch. This data is read from the SEMS module.
$F0 $8F a	Engine Control Switch Position Used to read the status of the Engine Control Switch (ECS).
$F0 $9C a	Shutdown Notify Relay Status (Generator Set Only) Used to read the status of the Shutdown Notify Relay.
$F0 $A6 a	Overspeed Verify Switch Position Used to read the status of the overspeed verify switch.
$F0 $A8 a	Remote Emergency Stop Switch Position Used to read the status of the remote emergency stop switch.
$F0 $A9 a	Start up Mode Status Used to read the status of the start up mode.
$F0 $AA a	Air Shutoff Status (Generator Set Only) Used to read the status of air shutoff system.
$F0 $AC a	Maximum Number of Crank Cycles Used to read or program the number of times the engine will try to start before an Overcrank condition is annunciated.
$F0 $B1 a	Remote Emergency Stop Used to read the status of or request a remote emergency stop.
$F0 $B2 a	Cooldown Override Control Used to read the status of or select a shutdown that aborts the cooldown timer.
$F0 $B5 a	Engine Prelube Status Used to read the status of the prelube system.

(continued)

(Table 45, contd)

Parameter Identifier Reference Chart for 3400 Applications	
PID	**Description**
$F0 $C1 a	Acceleration Delay Time (Generator Set Only) Used to read or program the time in seconds the engine will wait at low idle before accelerating to rated speed. The engine waits at low idle until oil pressure increases to 70 kPa or until Acceleration Delay Time is reached.
$F0 $C2 a	Remote Throttle Override Used by the remote communication module to read or override desired engine speed to low idle.
$F1 $18 a	Percent Engine Load Used to read the percentage of engine load.
$F1 $89 a	Engine Power Derate Percentage Used to read the current engine power derate percentage.
$F1 $92 a	Diagnostic Status Summary Used to read a summary of the diagnostics and events status for a control module. This summary indicates if any active or logged diagnostics or events are present. This summary also indicates the highest current warning level of the active event codes.
$F2 $13 a	Remote Start Initiate Used to read the status of or start or stop the engine remotely.
$F2 $4D a	Shutdown Emergency Override Switch Status (Battle Short) (3456 DPGDS only) Used to read the state of the Shutdown Emergency Override Switch. The switch is used to override the derates and shutdowns to continue operation during emergency conditions.
$F2 $8A a	Governor Global Gain Adjustment Used to read and program a factor of adjustment applied to the governor controller's constants.
$F4 $10 aa	Effective Rack Used to read the distance traveled by a nonexistent rack actuator. This value gives an indication of fuel flow.
$F4 $11 aa	Effective Smoke Rack Limit Used to read the maximum distance the nonexistent rack actuator may travel. This value gives an indication of maximum fuel flow.
$F4 $12 aa	Effective Smoke Rack Limit Used to read the distance the nonexistent rack actuator may travel, taking into account the current Turbocharger Outlet (Boost) pressure.

(continued)

(Table 45, contd)

Parameter Identifier Reference Chart for 3400 Applications	
PID	**Description**
$F4 $17 ab	Engine Status Used to read the engine status.
$F4 $5B aa	Acceleration Ramp Rate (Generator Set Only) Used to read or program the maximum rate at which the engine will accelerate from the crank terminate speed to the speed that is requested by the throttle.
$F4 $6D aa	Cooldown Time Remaining Used to read how much time is left in the cooldown period before the engine shuts down.
$F4 $8F aa	Ether Usage Used to read how much ether has been consumed.
$F4 $A0 aa	Exhaust Temperature Used to read the temperature of the exhaust air exiting the engine.
$F5 $08 aa	Crankcase Air Pressure (absolute) Used to read the absolute pressure of the air inside the crankcase in kPa.
$F5 $0A aa	Cooldown Engine Speed Used to read or program the speed at which the engine will idle when in the cooldown mode.
$F5 $0B aa	Cycle Crank Time Setpoint Used to read the amount of time the ECM allows the engine to crank and then to rest the starting motor during a single crank cycle.
$F5 $0D aa	Crank Terminate Speed Setpoint Used to read engine speed when the ECM will disengage starter motor during engine cranking.
$F5 $0E aa	Filtered Engine Fuel Pressure (absolute) Used to read the absolute filtered engine fuel pressure in kPa. This data comes from the fuel pressure sensor placed after the fuel filter(s).
$F5 $0F aa	Filtered Engine Fuel Pressure (gauge) Used to read the gauge filtered engine fuel pressure in kPa. This data comes from the fuel pressure sensor placed after the fuel filter(s).
$F5 $10 aa	Low Idle Speed Used to read or program the speed at which the engine will run when the throttle is overridden or the throttle is disconnected.

(continued)

(Table 45, contd)

Parameter Identifier Reference Chart for 3400 Applications	
PID	**Description**
$F5 $11 aa	Intake Manifold Air Temperature Used to read the temperature of the precombustion chamber air in the intake manifold of the engine air supply system in degrees C. This data is read from the SEMS module.
$F5 $15 aa	Percent Droop Used to read how much the engine speed drops when full load is applied.
$F5 $1D aa	Fuel Temperature Used to read the temperature of the fuel.
$F5 $25 a	Fuel Consumption Rate Used to read the rate at which fuel is being consumed.
$F5 $3E aa	Engine Oil Temperature Used to read the oil temperature in the engine in degrees C. This data is read from the SEMS module.
$F5 $E0 aa	User Defined Switch Status Used to read the user defined switch status if installed.
$F8 $11 aaabcccc dd	Electronic Control Module Serial Number Used to read the electronic control module serial number.
$F8 $14 aaaaa aaaaa	Application Software Part Number Used to read the application software part number of the ECM. (Personality Module)
$F8 $1A aaaaaaaa aaaaaaaa	Vehicle System ID Used to read or program the engine ID.
$FC $07 abcd	Warning Status Used to read various warning status conditions of the engine.
$FC $08 abcd	Shutdown Status Used to read the cause of an engine shutdown.
$FC $09 abcd	Engine Derate Status Used to read the cause of the engine being derated.

Table 46

PID's for 3400 Applications	
Engine Configuration **$00 $08 a** Used to read the engine configuration.	
(a)	High nibble = Liter size (Example: 4 = 3400)
	Low nibble = # cylinders -1 (Example: 5 = 3406)

(continued)

(Table 46, contd)

PID's for 3400 Applications	
Remote Fault Reset **$00 $0D a** This PID is used to read the status of inactive shutdown faults and of alarm faults. This PID is also used to reset inactive faults.	
(a)	$00 - $7F = Retain current inactive fault status
	$80 - $FF = Reset inactive fault
Throttle Position **$00 $15 a** Used to read the position of the throttle position sensor (speed adjust potentiometer).	
(a)	Resolution: 0.4 percent per bit Data range: 0 through 102 percent
Engine RPM **$00 $40 aa** This PID is used to read the engine rpm.	
(aa)	Resolution: 0.5 rpm per bit Data range: 0 through 16383.5 rpm $8000 - $801F are Fault Identifiers (FID)(2)
Engine Coolant Temperature **$00 $44 aa** This PID is used to read the temperature of the engine coolant in degrees C.	
(aa)	Resolution: 1°C per bit Data range –32736 through 32767 °C. $8000 - $801F are Fault Identifiers(3)
Desired Engine Speed **$00 $46 aa** Used to read the desired engine speed of the engine controller.	
(aa)	Resolution: 0.5 rpm per bit Data Range: 0 through 3200.0 rpm
Atmospheric Pressure **$00 $53 aa** Used to read atmospheric pressure in kPa.	
(aa)	Resolution: 0.5 kPa per bit Data range: 0 through 16383.5 kPa $8000 - $801F are Fault Identifiers(3)

(continued)

(Table 46, contd)

PID's for 3400 Applications	
Filtered Engine Oil Pressure (gauge) **$00 $54 aa** This PID is used to read the filtered oil pressure of the engine in kPa.	
(aa)	Resolution: 0.5 kPa per bit Data range: -16368 through 16383.5 kPa $8000 - $801F are Fault Identifiers(3)
Boost Pressure (gauge) **$00 $55 aa** Used to read the boost pressure of the engine in kPa.	
(aa)	Resolution: 0.5 kPa per bit Data range: -16368 through 16383.5 kPa $8000 - $801F are Fault Identifiers(3)
Filtered Engine Oil Pressure (absolute) **$00 $5A aa** Used to read the absolute filtered engine oil pressure in kPa.	
(aa)	Resolution: 0.5 kPa per bit Data range: -16368 through 16383.5 kPa $8000 - $801F are Fault Identifiers(3)
Boost Pressure (absolute) **$00 $5B aa** Used to read the absolute boost pressure of the engine in kPa.	
(aa)	Resolution: 0.5 kPa per bit Data range: -16368 through 16383.5 kPa $8000 - $801F are Fault Identifiers(3)
ECM Hourmeter **$00 $5E aa** This PID is used to read the number of hours that the engine has run.	
(aa)	Resolution: 1 hour per bit Data range: 0 through 655535 hours(1)
ECM Fault Log Codes and Status **$00 $82 aab [c]...aab [c]** This PID is used to read the component identifier (CID), status (active or inactive) of diagnostic codes stored in the ECM fault log.	
(a)	Upper byte of CID
(a)	Lower byte of CID

(continued)

(Table 46, contd)

PID's for 3400 Applications	
(b)	Fault Code Status Bit 8 — 0 = count not included, 1 = count is included bit 7 — 0 = fault is active, 1 = fault is inactive bit 6 — 0 = Fault is logged, 1 = Fault is not logged bit 5 — 0 = Standard FMI, 1 = Extended FMI bits 4-1 — Failure Mode Identifier (FMI)
(c)	Occurrence count for fault code, optional as defined by bit 8
ECM Fault Log Request for Additional Data **$00 $83 aab** This PID should be used only for requesting additional information about a given logged diagnostic code. This PID can also be used to clear a particular diagnostic code. Use IID 00 Special Parameter Command to request this PID. Use PID $00 $82 to request preliminary information such as existence of active or inactive diagnostic codes.	
(a)	Upper byte of CID Component identifier when more information is being requested, or is being cleared
(a)	Lower byte of CID Component identifier when more information is being requested, or is being cleared
(b)	Information Requested Bit 7, 8 — 00 = Request ASCII descriptive message for given diagnostic code; 01 = Request to clear given diagnostic code in the ECM fault log; 10 = Request to clear all diagnostic codes in ECM fault log; 11 = Request additional diagnostic information about given diagnostic code. bit 6, 5 — Not used bits 4-1 — Failure Mode Identifier (FMI)
(c)	Occurrence count for fault code, optional as defined by bit 8
ECM Fault Log Response for Additional Information **$00 $84 aab [cddee]** This PID is used to acknowledge the diagnostic does being cleared in the ECM fault log or to supply additional information about a given diagnostic code requested by PID $00 $83.	

(continued)

(Table 46, contd)

PID's for 3400 Applications	
(a)	Upper byte of CID Component identifier when more information is being requested, or is being cleared
(a)	Lower byte of CID Component identifier when more information is being requested, or is being cleared
(b)	Information Requested Bit 8, 7 Response Identifier 01 = Count has been cleared for given CID 10 All counts have been cleared 11 = Message contains additional information for given diagnostic code Bit 6 0 = Request to clear logged fault granted 1 = Request to clear logged fault denied Bit 5-1 Failure Mode Identifier (FMI)
(c)(2)	Number of occurrences (MSB first)
(dd)(2)	Time of first occurrence (MSB first)
(ee)(2)	Time of last occurrence (MSB first)
Total Fuel **$00 $C8 aaaa** Used to read total fuel the engine has burned.	
(aaaa)	Resolution: 0.125 gallon per bit Data range: 0 through 268,435,456
System Battery Voltage **$F0 $13 a** This PID is used to read system battery voltage of the engine control system.	
(a)	Resolution: 0.5 volts per bit Data Range: 0.0 volts through 127.5 volts
Cooldown Duration **$F0 $14 a** This PID is used to read or program the amount of time the ECM allows the engine to run after a normal shutdown is initiated.	
(a)	Resolution: 1 minute per bit Data range: 0 through 223 minutes $E0 - $FF are Fault Identifiers(3)
Cold Mode Status **$F0 $16 a** Used to read the cold mode status of the engine.	

(continued)

(Table 46, contd)

PID's for 3400 Applications	
(a)	$00 = Cold mode inactive $80 = Cold mode active
Engine Prelube Duration **$F0 $1B a** Used to read or program the amount of time in seconds the ECM will prelube the engine before the crank cycle is entered.	
(a)	Resolution: 1 second per bit Data range: 0 through 233 seconds $E0 - $FF are Fault Identifiers(3)
Remote Start Status **$F0 $2A a** This PID is used to read the status of the remote start/stop switch. This data is valid only when the Engine Control switch is in the AUTO position.	
(a)	$00 = Remote start is OFF $01 - $7F = Remote start is ON $80 - $9F are Fault Identifiers(3)
Engine Coolant Level Status (Not on 3456 DPGDS) **$F0 $2C a** Used to read the status of the engine coolant level switch. This data is read from the SEMS module.	
(a)	$00 = Coolant level is OK $7F = Coolant level is Low $01 - $7E = not used $80 - $DF = not used $E0 - $FF are Fault Identifiers(3)
Engine Control Switch Position **$F0 $8F a** This PID is used to read status of the Engine Control Switch (ECS).	
(a)	$00 = Off/reset $02 = Start $03 = Stop $04 = Auto $80 - $9F are Fault Identifiers(3)
Shutdown Notify Relay Status **$F0 $9C a** Used to read the status of the Shutdown Notify Relay.	
(a)	$00 = Relay is OFF $01 = Relay is ON $02 - $DF = Not used $E0 - $FF are Fault Identifiers (FID)(3)

(continued)

(Table 46, contd)

PID's for 3400 Applications	
Overspeed Verify Switch Position **$F0 $A6 a** Used to read the status of the overspeed verify switch.	
(a)	$00 = Switch is in the OFF position $01 - $7F = Switch is in the ON position $80 - $9F are Fault Identifiers(3)
Remote Emergency Stop Switch Position **$F0 $A8 a** Used to read the status of the remote E-stop switch.	
(a)	$00 = Switch is in the OFF position $01 - $7F = Switch is in the ON position $80 - $9F are Fault Identifiers (FID)(3)
Start-up Mode Status **$F0 $A9 a** Used to read the status of the start-up mode.	
(a)	$00 = Starter is OFF $01 = Starter is ON (cranking) $02 = Overcrank $03 = Start-up was successful $04 - $DF = Not used $E0 - $FF are Fault Identifiers (FID)(3)
Air Shutoff Status (Generator Set Only) **$F0 $AA a** Used to read status of air shutoff system.	
(a)	$00 = Air shutoff relay is OFF $01 - $7F air shutoff relay is ON $80 - $9F are Fault Identifiers (FID)(3)
Maximum Number of Crank Cycles **$F0 $AC a** Used to read or program the number of times the engine will try to start before an overcrank condition is annunciated.	
(a)	Data range: 0 through 223 counts $E0 - $FF are Fault Identifiers (FID)(3)
Remote Emergency Stop **$F0 $B1 a** This PID is used to read the status of or request an emergency stop via the data link. The Engine Control Switch must be in AUTO.	
(a)	$00 = Remote emergency stop is OFF $01 - $7F = Remote emergency stop pis ON $80 - $9F are Fault Identifiers(3)

(continued)

(Table 46, contd)

PID's for 3400 Applications	
Cooldown Override Control **$F0 $B2 a** This PID is used to read the status of or select a shutdown that aborts the cooldown timer.	
(a)	$00 = Continue cooldown $01 - $7F = Abort cooldown $80 - $9F are Fault Identifiers(3)
Engine Prelube Status **$F0 $B5 a** Used to read the status of the prelube system.	
(a)	$00 = Prelube is OFF $01 = Prelube is ON $02 = Prelube is DISABLED $03 = Prelube is COMPLETED $04 - $FF = Not Used
Acceleration Delay Time (Generator Set Only) **$F0 $C1 a** Used to read or program the time (seconds) the engine will wait at low idle before accelerating to rated speed. The engine waits at low idle until oil pressure increases to 70 kPa or until Acceleration Delay time is reached.	
(a)	Data range: 0 - 255 seconds
Remote Throttle Override **$F0 $C2 a** Used by a remote communication module to read or override desired engine speed to low idle.	
(a)	$00 = Normal throttle setting $01 = Low idle setting $02 - $DF = Not used $E0 - $FF are Fault Identifiers (FID)(3)
Percent Engine Load **$F1 $18 a** Used to read the percentage of engine load.	
(a)	Resolution: 1.0 percent per bit Data range: 0 through 255 percent
Engine Power Derate Percentage **$F1 $89 a** Used to read the current engine power derate percentage.	
(a)	Resolution: 0.5 percent per bit Data range: 0 through 100 percent $E0 - $FF are Fault Identifiers (FID)(3)

(continued)

(Table 46, contd)

PID's for 3400 Applications	
Diagnostic Status Summary **$F1 $92 a** Used to read a summary of the diagnostics and events status for control module. This summary indicates if any active or logged diagnostics or events are present. This summary also indicates the highest current warning level of the active event codes.	
(a)	Bits 2-1: Highest Active Warning Level $0 = No Warning $1 = Level 1 Warning $2 = Level 2 Warning $3 = Level 3 Warning Bit 3: Not Used Bit 4: Not Used Bit 5: Logged Events Status 0 = No Logged Events 1 = At least 1 logged event Bit 7: Logged Diagnostics Status 0 = No logged diagnostics 1 = At least 1 logged diagnostic Bit 8: Active Diagnostics Status 0 = No Active Diagnostics 1 = At least 1 active diagnostic
Remote Start Initiate **$F2 $13 a** This PID is used to read the status of or start or stop the engine via the datalink.	
(a)	$00 = Start engine $7F = Stop engine
Emergency Override Switch Status (Battle-short) (3456 DPGDS only) **$F2 $4D a** Used to read the state of the Emergency Override Switch. The switch is used to override the derates and shutdowns to continue operation during emergency conditions.	
(a)	Emergency Override Switch Status $00 = Emergency override off $01 = Emergency override on $02 - $DF = Not used $E0 - $FF are Fault Identifiers (FID)(3)
Effective Rack **$F4 $10 aa** Used to read the distance traveled by a nonexistent rack actuator. This value gives an indication of fuel flow.	

(continued)

(Table 46, contd)

PID's for 3400 Applications	
(aa)	Resolution: 0.005 mm per bit Data range: 0 through 60.00 mm
Effective Rack Limit **$F4 $11 aa** Used to read the maximum distance the nonexistent rack actuator may travel. This value gives an indication of maximum fuel flow.	
(aa)	Resolution: 0.005 mm per bit Data range: 0 through 60.00 mm
Effective Smoke Rack Limit **$F4 $12 aa** Used to read the distance the nonexistent rack actuator may travel, taking into account the current Turbocharger Outlet (Boost) pressure.	
(aa)	Resolution: 0.005 mm per bit Data range: 0 through 60.00 mm
Engine Status **$F4 $17 ab** Used to read the engine status.	
(a)	Engine Status Set 1 Bit 8, 7 Reserved Bit 6 - 4 Not Used Bit 3, 2 Reserved Bit 1 Engine speed 1 = No engine speed 0 = Engine speed Engine Status Set 2 Bit 8 Not Used Bit 7, 6 Reserved Bit 5 E-Stop Shutdown 1 = E-stop shutdown 0 = No E-stop shutdown Bit 4 Fuel Injection 1 = Fuel Injection disabled 0 = No injection disabled Bit 3-1 Reserved
Acceleration Ramp Rate (Generator Set Only) **$F4 $5B aa** Used to read or program the maximum rate at which the engine will accelerate from the crank terminate speed to the speed that is requested by the throttle.	
(aa)	Resolution: 1 rpm per second per bit Data range: 0 through 65535 rpm/sec

(continued)

(Table 46, contd)

PID's for 3400 Applications	
Cooldown Time Remaining **$F4 $6D aa** Used to read the amount of time left in the cooldown period before the engine shuts down.	
(aa)	Resolution: 1 second per bit Data range: 0 through 65535 seconds
Ether Usage **$F4 $8F aa** Used to read how much ether has been consumed.	
(aa)	Resolution: 1 cc per bit Data range: 0 through 65535 cc
Exhaust Temperature **$F4 $A0 aa** Used to read the temperature of the exhaust air exiting the engine.	
(aa)	Resolution: 1 °C per bit Data range: -32736 through 32767 °C $8000 - $801F are Fault Identifiers(3)
Cooldown Engine Speed **$F5 $0A aa** Used to read or program the speed at which the engine will idle when in the cooldown mode.	
(aa)	Resolution: 0.5 rpm per bit Data range: 0 through 32751.5 rpm $FFE0 - $FFFF are Fault Identifiers(3)
Cycle Crank Time Setpoint **$F5 $0B aa** This PID is used to read the amount of time the ECM allows the engine to crank and then to rest the starting motor during a single crank cycle.	
(aa)	Resolution: 1 second per bit Data range: 0 through 65503 seconds $FFE0 - $FFFF is the valid data range
Crank Terminate Speed Setpoint **$F5 $0D aa** Used to read engine speed at which the ECM will disengage starter motor during engine cranking.	
(aa)	Resolution: 0.5 rpm per bit Data range: 0 through 32751.5 rpm $0000 = $FFDF is the valid data range $FFE0 - $FFFF are Fault Identifiers(3)

(continued)

(Table 46, contd)

PID's for 3400 Applications	
Filtered Engine Fuel Pressure (absolute) **$F5 $0E aa** Used to read the absolute filtered engine fuel pressure in kPa. This data comes from the fuel pressure sensor placed after the fuel filter(s).	
(aa)	Resolution: 0.5 kPa per bit Data range: 0 through 32751.5 kPa $FFE0 - $FFFF are Fault Identifiers(3)
Filtered Engine Fuel Pressure (gauge) **$F5 $0F aa** Used to read the gauge filtered engine fuel pressure in kPa. This data comes from the fuel pressure sensor placed after the fuel filter(s).	
(aa)	Resolution: 0.5 kPa per bit Data range: 0 through 32751.5 kPa $FFE0 - $FFFF are Fault Identifiers(3)
Low Idle Speed **$F5 $10 aa** Used to read or program the speed at which the engine will run when the throttle is overridden or the throttle is disconnected.	
(aa)	Resolution: 0.5 rpm per bit Data range: 0 through 32767.5 rpm
Intake Manifold Air Temperature **$F5 $11 aa** Used to read the temperature in degrees C of the precombustion air found in the intake manifold of the engine air supply system. This data is read from the SEMS module.	
(aa)	Resolution: 0.1 °C per bit Valid Data Range: -3273.6 to +3276.7 degree C $8000 - $801F are Fault Identifiers(3)
Percent Droop **$F5 $15 aa** Used to read how much the engine speed drops when a full load is applied.	
(aa)	Resolution: 0.1 percent per bit Data range: 0 through 6550.3 percent $FFE0 - $FFFF are Fault Identifiers(3)
Fuel Temperature **$F5 1D aa** Used to read the temperature of the fuel.	

(continued)

(Table 46, contd)

PID's for 3400 Applications	
(aa)	Resolution: 0.1 °C per bit Data range: -3273.6 to 3273.7 °C $8000 - $801F are Fault Identifiers(3)
Fuel Consumption Rate **$F5 $25 aa** Used to read the rate at which fuel is being consumed.	
(aa)	Resolution: 0.05 liter/hour per bit Data range: 0.00 to 3275.15 liter/hour $FFE0 - $FFFF are Fault Identifiers(3)
Engine Oil Temperature **$F5 $3E aa** This PID is used to read the oil temperature in degrees C in the engine. This data is read from the SEMS module.	
(aa)	Resolution: 1 °C per bit Valid Data Range: -32736 to +32767 °C $8000 - $801F are Fault Identifiers(3)
User Defined Switch Status **$F5 $E0 aa** This PID is used to read the user defined switch.	
(aa)	0000 = Inactive 0001 = Active $FFE0 - $FFFF are Fault Identifiers(3)
Electronic Control Module Software Part Number **$F8 $11 aaabcccdd** Used to read the electronic control module serial number.	
(aa)	Day of the year
(b)	Last digit of the year
(cccc)	Serialized number for that day (starts at 0001 each day)
(dd)	Control type
Application Software Part Number **$F8 $14 aaaaaaaaaa** This PID is used to read the application software part number of the ECM (Personality Module).	
(aaaaa aaaaa)	Application software part number in printable ASCII (part number less than 10 characters are padded with an ASCII space $20 at the beginning of part number. The application software part number can not be read from the older version of CCM (117-6170 System Communication Module).

(continued)

(Table 46, contd)

PID's for 3400 Applications	
Vehicle System ID **$F8 $1A aaaaaaaaaaaaaaaa** Used to read or program the engine ID.	
(aaaaa aaaaa aaaaa aa)	Engine ID (must be 17 ASCII characters)
Warning Status **$FC $07 abcd** Used to read various warning status conditions of the engine.	
(a)	Warning subset number 4 0 = Warning is NOT ACTIVE 1 = Warning is ACTIVE Bit 8-3 Not Used Bit 2 High Fuel Temperature Bit 1 Not Used
(b)	Warning subset number 3 0 = Warning is NOT ACTIVE 1 = Warning is ACTIVE Bit 8-2 Not Used Bit 1 User defined shutdown
(c)	Warning Subset number 2 0 = Warning is NOT ACTIVE 1 = Warning is ACTIVE Bit 8 - 3 Not Used Bit 2 High Engine Oil Temperature Bit 1 High Engine Inlet Air Temperature
(d)	Warning subset number 1 0 = Warning is NOT ACTIVE 1 = Warning is ACTIVE Bit 8 Low system voltage Bit 7 Low engine oil pressure Bit 6 High engine coolant temperature Bit 5 Low engine coolant temperature Bit 4 Engine overspeed Bit 2, 3 Not used Bit 1 High exhaust temperature

(continued)

(Table 46, contd)

PID's for 3400 Applications	
Shutdown Status **$FC $08 abcd** Used to read the cause of an engine shutdown.	
(a)	Warning subset number 4 0 = Warning is NOT ACTIVE 1 = Warning is ACTIVE Bit 8-1 Not Used
(b)	Warning subset number 3 0 = Warning is NOT ACTIVE 1 = Warning is ACTIVE Bit 8-2 Not Used Bit 1 User defined shutdown
(c)	Warning Subset number 2 0 = Warning is NOT ACTIVE 1 = Warning is ACTIVE Bit 8 - 3 Not Used Bit 2 Engine Oil Temperature Bit 1 Not Used
(d)	Warning subset number 1 0 = Warning is NOT ACTIVE 1 = Warning is ACTIVE Bit 8 Not Used Bit 7 Low engine oil pressure Bit 6 High engine coolant temperature Bit 5 Not Used Bit 4 Engine Overspeed Bit 3-1 Not Used
Engine Derate Status **$FC $09 abcd** Used to read the cause of the engine being derated.	
(a)	Derate subset number 4 0 = Warning is NOT ACTIVE 1 = Warning is ACTIVE Bit 8-1 Not Used

(continued)

(Table 46, contd)

PID's for 3400 Applications	
(b)	Derate subset number 3 0 = Warning is NOT ACTIVE 1 = Warning is ACTIVE Bit 8-1 Not Used
(c)	Derate Subset number 2 0 = Warning is NOT ACTIVE 1 = Warning is ACTIVE Bit 8-1 Not Used
(d)	Warning subset number 1 0 = Warning is NOT ACTIVE 1 = Warning is ACTIVE Bit 8, 7 Not Used Bit 6 High engine coolant temperature Bit 5-3 Not Used Bit 2 High altitude (atmospheric pressure) Bit 1 High exhaust temperature

(1) The number of hours the engine has run is determined by the ECM. The PID is limited to 65535 hours. When the engine has run more than 65535 hours, the value for PID $00 $5E will be reset to 0 hours.

(2) Bytes c, dd, and ee are omitted if the response identifier is 01 or 10. The format is $00 $84 in aab.

(3) For a complete list of the Fault Identifiers, refer to the Operation and Maintenance Manual, "Fault Identifiers"

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Parameter Identifiers for 3500B Engines

SMCS Code: 1926

S/N: 2RD1-Up

S/N: 2TD1-Up

S/N: 1ZF1-Up

S/N: 3YF1-Up

S/N: 2BM1-Up

S/N: 3DM1-Up

S/N: 4GM1-Up

S/N: 7HM1-Up

S/N: 7SM1-Up

S/N: 8EM1-Up

S/N: 8RM1-Up

S/N: 4TN1-Up

S/N: 6HN1-Up

S/N: 6PN1-Up

S/N: 6WN1-Up

S/N: 7RN1-Up

S/N: 9AN1-Up

S/N: 5PS1-Up

S/N: 1NW1-Up

S/N: 1PW1-Up

S/N: 1TW1-Up

S/N: 2FW1-Up

S/N: 2GW1-Up

S/N: 2HW1-Up

S/N: 2JW1-Up

S/N: 3CW1-Up

S/N: 3DW1-Up

S/N: 3ZW1-Up

S/N: 4AW1-Up

S/N: 5AW1-Up

S/N: 2EZ1-Up

S/N: 6HZ1-Up

PID Security Levels

The following chart defines the PID within each security level for 3500B applications. For 3500B systems the CCM will not automatically respond to a Write Request with a Write Response. Therefore, a Write Request (IID 34) should always be followed with a Read Request (IID 24) for verification after 1 second.

If the written value is greater than the maximum value of the parameter, the ECM will adjust the parameter to the maximum value allowed. If the written value is less than the minimum value of the parameter, the ECM will adjust the parameter to the minimum value allowed.

Table 47

PID Security Levels for 3500 Applications	
LEVEL NO.	**PID**
0	
1	$00 $08 (R), $00 $15 (R), $00 $40 (R), $00 $44 (R), $00 $46 (R), $00 $4D (R), $00 $4E (R), $00 $53 (R), $00 $54 (R), $00 $55 (R), $00 $58 (R), $00 $5A (R), $00 $5B (R), $00 $5C (R), $00 $5E (R), $00 $5F (R), $00 $82 (R), $00 $83 (R), $00 $84 (R), $00 $C8 (R), $F0 $13 (R), $F0 $14 (R), $F0 $16 (R), $F0 $1B (R), $F0 $2A (R), $F0 $2C (R), $F0 $8F (R), $F0 $9C (R), $F0 $A6 (R), $F0 $A8 (R), $F0 $A9 (R), $F0 $AA (R), $F0 $AC (R), $F0 $B1 (R), $F0 $B2 (R), $F0 $B5 (R), $F0 $B6 (R), $F0 $C1 (R), $F0 $C2 (R), $F0 $FD (R) $F1 $18 (R), $F1 $4F (R), $F1 $89 (R), $F2 $13 (R), $F2 $4D (R), $F2 $4F (R), $F4 $0E (R), $F4 $10 (R), $F4 $11 (R), $F4 $12 (R), $F4 $15 (R), $F4 $17 (R), $F4 $19 (R), $F4 $1C (R), $F4 $1F (R), $F4 $20 (R), $F4 $40 (R), $F4 $41 (R). $F4 $5B (R), $F4 $6D (R), $F5 $08 (R), $F5 $09 (R), $F5 $0A (R), $F5 $0B (R), $F5 $0D (R), $F5 $0E (R), $F5 $0F (R), $F5 $10 (R), $F5 $11 (R), $F5 $15 (R), $F5 $1F (R), $F5 $20 (R), $F5 $25 (R), $F5 $3E (R), $F8 $14 (R), $F8 $1A (R) $FC $07 (R), $FC $08 (R), $FC $09 (R)
2	$00 $0D (W), $00 $83 (W), $F0 $14 (W), $F0 $1B (W), $F0 $AC (W), $F0 $B1 (W), $F0 $B2 (W), $F0 $C1 (W), $F0 $C2 (W), $F2 $13 (W), $F2 $4F (W), $F4 $5B (W), $F5 $0A (W), $F5 $0B (W), $F5 $0D (W), $F5 $10 (W), $F8 $1A (W)
3	

Each Parameter Identifier (PID) has an identifier that is one or two bytes in length. The identifier is hexadecimal. The PID is followed by one or more data bytes. For example, the Engine RPM PID is $00 $40. This PID is followed by two bytes of data (aa) that contain the status of the Engine Speed. Data bits are given as binary digits unless the number is preceded by $. All data is sent with the most significant byte (MSB) first.

The following chart is a quick reference list of the Parameter Identifiers (PID).

Table 48

Parameter Identifier Reference Chart for 3500 Applications	
PID	**Description**
$00 $08 a	Engine Configuration Used to read the engine configuration.
$00 $0D a	Remote Fault Reset Used to read the status of or reset inactive shutdown and alarm faults on the ECM.
$00 $15 a	Throttle Position Used to read the position of the throttle position sensor (speed adjust potentiometer).
$00 $40 aa	Generator Set Engine RPM Used to read the generator set engine rpm.
$00 $44 aa	Engine Coolant Temperature (°C) Used to read the temperature of the engine coolant.
$00 $46 aa	Desired Engine Speed Used to read the desired engine speed of the engine controller.
$00 $4D aa	Transmission Oil Temperature (Marine Only) Used to read the transmission oil temperature in degrees C.
$00 $4E aa	Transmission Oil Pressure (absolute) (Marine Only) Used to read the absolute transmission oil pressure of the engine in kPa.
$00 $53 aa	Atmospheric Pressure Used to read atmospheric pressure in kPa.
$00 $54 aa	Engine Oil Pressure (kPa) Used to read the oil pressure of the engine in kPa.
$00 $55 aa	Boost Pressure (gauge) Used to read engine boost pressure in kPa.
$00 $58 aa	Air Filter Restriction Used to read the current filter restriction in kPa of the left and right air filter. The greater of the two restrictions is displayed.
$00 $5A aa	Filtered Engine Oil Pressure (absolute) Used to read the absolute filtered engine oil pressure in kPa.
$00 $5B aa	Boost Pressure (absolute) Used to read the absolute boost pressure of the engine in kPa.
$00 $5C aa	Left Turbocharger Inlet Pressure (absolute) Used to read left turbocharger pressure in kPa.
$00 $5E aa	ECM Hour Meter Used to read number of hours the engine has run.

(continued)

(Table 48, contd)

Parameter Identifier Reference Chart for 3500 Applications	
PID	**Description**
$00 $5F aa	Right Turbocharger Inlet Pressure (absolute) Used to read right turbocharger inlet pressure in kPa.
$00 $82 aab [c]	ECM Fault Log Codes, Status, and Number of Occurrences Used to read component identifier (CID), status (active or inactive) of diagnostic codes stored in the ECM fault log, and number of occurrences.
$00 $83 aabb	ECM Fault Log Request for Additional Data Used to request additional information about a given logged diagnostic code or to clear a particular diagnostic code.
$00 $84 aab [cddee]	ECM Fault Log Response for Additional Information Used to acknowledge the diagnostic codes being cleared in the ECM fault log or to supply additional information about a given diagnostic code requested by PID $00 $83.
$00 $C8 aaaa	Total Fuel Used to read total fuel the engine has burned.
$F0 $13 a	System Battery Voltage Used to read the system battery voltage of the engine control system.
$F0 $14 a	Cooldown Timer Setpoint Used to read or program the amount of time the ECM allows the engine to run after a normal shutdown is initiated.
$F0 $16 a	Cold Mode Status Used to read the cold mode status of the engine
$F0 $1B a	Engine Prelube Duration Used to read or program the amount of time in seconds the ECM will prelube the engine before the crank cycle is entered.
$F0 $2A a	Remote Start Status Used to read the status of the remote start/stop switch. This data is valid only when the Engine Control switch is in the AUTO position.
$F0 $2C a	Engine Coolant Level Status Used to read the status of the engine level coolant switch. This data is read from the SEMS module.
$F0 $8F a	Engine Control Switch Position Used to read the status of the Engine Control Switch (ECS).
$F0 $9C a	Shutdown Notify Relay Status (Generator Set Only) Used to read the status of the Shutdown Notify Relay.

(continued)

(Table 48, contd)

Parameter Identifier Reference Chart for 3500 Applications	
PID	**Description**
$F0 $A6 a	Overspeed Verify Switch Position Used to read the status of the overspeed verify switch.
$F0 $A8 a	Remote Emergency Stop Switch Position Used to read the status of the remote emergency stop switch.
$F0 $A9 a	Start-up Mode Status Used to read the status of the start-up mode.
$F0 $AA a	Air Shutoff Status (Generator Set Only) Used to read the status of air shutoff system.
$F0 $AC a	Maximum Number of Crank Cycles Used to read or program the number of times the engine will try to start before an Overcrank condition is annunciated.
$F0 $B1 a	Remote Emergency Stop Used to read the status of or request a remote emergency stop.
$F0 $B2 a	Cooldown Override Control Used to read the status of or select a shutdown that aborts the cooldown timer.
$F0 $B5 a	Engine Prelube Status Used to read the status of the prelube system.
$F0 $B6 a	Engine Fuel Level Status Used to read the status of the engine fuel level switch. This data is read from the SEMS module.
$F0 $C1 a	Acceleration Delay Time (Generator Set Only) Used to read or program the time in seconds the engine will wait at low idle before accelerating to rated speed. The engine waits at low idle until oil pressure increases to 70 kPa or until Acceleration Delay Time is reached.
$F0 $C2 a	Remote Throttle Override Used by the remote communication module to read or override desired engine speed to low idle.
$F0 $F2 a	ECM in Control (Marine Only) Used to determine whether the primary ECM or the backup ECM is currently controlling the engine.
$F0 $FD a	Low Idle Switch Position Used to read the low idle switch position.
$F1 $18 a	Percent Engine Load Used to read the percentage of engine load.

(continued)

(Table 48, contd)

Parameter Identifier Reference Chart for 3500 Applications	
PID	**Description**
$F1 $4F a	Backup ECM Status (Marine Only) Used to read whether the backup ECM is ready to take over control of the engine, should the primary ECM fail.
$F1 $89 a	Engine Power Derate Percentage Used to read the current engine power derate percentage.
$F2 $13 a	Remote Start Initiate Used to read the status of or start or stop the engine remotely.
$F2 $4D a	Shutdown Emergency Override Switch Status (Marine Only) Used to read the state of the Shutdown Emergency Override Switch. The switch is used to override the derates and shutdowns to continue operation during emergency conditions.
$F2 $4F a	General Alarm Output Status/Override (Marine Only) Used to read and override the state of the General Alarm Output.
$F4 $0E aa	Engine Oil Pressure Differential Used to read the pressure drop across the oil filter(s) in kPa.
$F4 $10 aa	Effective Rack Used to read the distance traveled by a nonexistent rack actuator. This value gives an indication of fuel flow.
$F4 $11 aa	Effective Smoke Rack Limit Used to read the maximum distance the nonexistent rack actuator may travel. This value gives an indication of maximum fuel flow.
$F4 $12 aa	Effective Smoke Rack Limit Used to read the distance the nonexistent rack actuator may travel, taking into account the current Turbocharger Outlet (Boost) pressure.
$F4 $15 aa	Peak Air Filter Restriction Used to read the peak air filter restriction that has occurred since power up in kPa. This value is latched and is reset only by power cycling the engine controller.
$F4 $17 ab	Engine Status Used to read the engine status.
$F4 $19 aa	Unfiltered Engine Oil Pressure (absolute) Used to read the absolute unfiltered engine oil pressure in kPa. This data comes from the oil pressure sensor placed before the oil filter(s).

(continued)

(Table 48, contd)

Parameter Identifier Reference Chart for 3500 Applications	
PID	**Description**
$F4 $1C aa	Engine Fuel Pressure Differential Used to read the pressure drop across the fuel filters in kPa.
$F4 $1F aa	Unfiltered Engine Fuel Pressure (absolute) Used to read the absolute unfiltered engine fuel pressure in kPa. This data comes from the fuel pressure sensor placed before the fuel filter(s).
$F4 $20 aa	Engine Aftercooler Temperature Used to read the temperature of the liquid in the engine aftercooler system in degrees C.
$F4 $40 a	Right Exhaust Temperature Used to read the temperature of the exhaust air on the right side of the engine.
$F4 $41 a	Left Exhaust Temperature Used to read the temperature of the exhaust air on the left side of the engine.
$F4 $5B aa	Acceleration Ramp Rate (Generator Set Only) Used to read or program the maximum rate at which the engine will accelerate from the crank terminate speed to the speed that is requested by the throttle.
$F4 $6D aa	Cooldown Time Remaining Used to read how much time is left in the cooldown period before the engine shuts down.
$F5 $08 aa	Crankcase Air Pressure (absolute) Used to read the absolute pressure of the air inside the crankcase in kPa.
$F5 $09 aa	Crankcase air Pressure (gauge) Used to read the gauge pressure of the air inside the crankcase in kPa.
$F5 $0A aa	Cooldown Engine Speed Used to read or program the speed at which the engine will idle when in the cooldown mode.
$F5 $0B aa	Cycle Crank Time Setpoint Used to read the amount of time the ECM allows the engine to crank and then to rest the starting motor during a single crank cycle.
$F5 $0D aa	Crank Terminate Speed Setpoint Used to read engine speed when the ECM will disengage starter motor during engine cranking.
$F5 $0E aa	Filtered Engine Fuel Pressure (absolute) Used to read the absolute filtered engine fuel pressure in kPa. This data comes from the fuel pressure sensor placed after the fuel filter(s).

(continued)

(Table 48, contd)

Parameter Identifier Reference Chart for 3500 Applications	
PID	**Description**
$F5 $0F aa	Filtered Engine Fuel Pressure (gauge) Used to read the gauge filtered engine fuel pressure in kPa. This data comes from the fuel pressure sensor placed after the fuel filter(s).
$F5 $10 aa	Low Idle Speed Used to read or program the speed at which the engine will run when the throttle is overridden or the throttle is disconnected.
$F5 $11 aa	Intake Manifold Air Temperature (Generator set Only) Used to read the temperature of the precombustion chamber air in the intake manifold of the engine air supply system in degrees C. This data is read from the SEMS module.
$F5 $15 aa	Percent Droop (Generator Set Only) Used to read how much the engine speed drops when full load is applied.
$F5 $1F aa	Right Air Filter Restriction Used to read the right air filter restriction in kPa.
$F5 $20	Left Air Filter Restriction Used to read the left air filter restriction in kPa.
$F5 $25 a	Fuel Consumption Rate Used to read the rate at which fuel is being consumed.
$F5 $3E aa	Engine Oil Temperature (Generator Set Only) Used to read the oil temperature in the engine in degrees C. This data is read from the SEMS module.
$F8 $14 aaaaa aaaaa	Application Software Part Number Used to read the application software part number of the ECM. (Personality Module)
$F8 $1A aaaaaaaa aaaaaaaa	Vehicle System ID Used to read or program the engine ID.
$FC $07 abcd	Warning Status Used to read various warning status conditions of the engine.
$FC $08 abcd	Shutdown Status Used to read the cause of an engine shutdown.
$FC $09 abcd	Engine Derate Status Used to read the cause of the engine being derated.

Table 49

PID's for 3500 Applications	
Engine Configuration **$00 $08 a** Used to read the engine configuration.	
(a)	High Nibble: Liter size (Example: 5 = 3500)
	Low Nibble: # cylinders -1 (Example: 11 = 3512)
Remote Fault Reset (Generator Set Only) **$00 $0D a** Used to reset the Emergency Stop shutdown. This parameter is write only.	
(a)	$00 - $7F Retain current inactive fault status
	$80 - $FF Reset inactive fault
Throttle Position **$00 $15 a** Used to read the position of the throttle position sensor (speed adjust potentiometer).	
(a)	Resolution: 0.4 percent per bit Data range: 0 through 102 percent
Engine RPM **$00 $40 aa** This PID is used to read the engine rpm.	
(aa)	Resolution: 0.5 rpm per bit Data range: 0 through 16383.5 rpm $8000 - $801F are Fault Identifiers(2)
Engine Coolant Temperature **$00 $44 aa** This PID is used to read the temperature of the engine coolant in degrees C.	
(aa)	Resolution: 1°C per bit Data range –32736 through 32767 °C. $8000 - $801F are Fault Identifiers(2)
Desired Engine Speed **$00 $46 aa** Used to read the desired engine speed of the engine controller.	
(aa)	Resolution: 0.5 rpm per bit Data Range: 0 through 3200.0 rpm $8000 - $801F are Fault Identifiers(2)

(continued)

(Table 49, contd)

PID's for 3500 Applications	
Transmission Oil Temperature (Marine Only) **$00 $4D aa** Used to read the transmission oil temperature in degrees C.	
(aa)	Resolution: 1°C per bit Data range: -32736 through 32767°C $8000 - $801F are Fault Identifiers(2)
Transmission Oil Pressure (absolute) (Marine Only) **$00 $4E aa** Used to read the absolute transmission oil pressure of the engine in kPa.	
(aa)	Resolution: 0.5 kPa per bit Data range: 0 through 32751.5 kPa $FFE0 - $FFFF are Fault Identifiers(2)
Atmospheric Pressure **$00 $53 aa** Used to read atmospheric pressure in kPa.	
(aa)	Resolution: 0.5 kPa per bit Data range: 0 through 16383.5 kPa $8000 - $801F are Fault Identifiers(2)
Filtered Engine Oil Pressure (gauge) **$00 $54 aa** This PID is used to read the filtered oil pressure of the engine in kPa.	
(aa)	Resolution: 0.5 kPa per bit Data range: 0 through 16383.5 kPa $8000 - $801F are Fault Identifiers(2)
Boost Pressure (gauge) **$00 $55 aa** Used to read the boost pressure of the engine in kPa.	
(aa)	Resolution: 0.5 kPa per bit Data range: 0 through 16383.5 kPa $8000 - $801F are Fault Identifiers(2)
Air Filter Restriction **$00 $58 aa** Used to read the current filter restriction in kPa of the left or right air filter. The greater of the two restrictions is displayed.	
(aa)	Resolution: 0.5 kPa per bit Data range: 0 through 16383.5 kPa $8000 - $801F are Fault Identifiers(2)

(continued)

(Table 49, contd)

PID's for 3500 Applications	
Filtered Engine Oil Pressure (absolute) **$00 $5A aa** Used to read the absolute filtered engine oil pressure in kPa.	
(aa)	Resolution: 0.5 kPa per bit Data range: 0 through 16383.5 kPa $8000 - $801F are Fault Identifiers(2)
Boost Pressure (absolute) **$00 $5B aa** Used to read the absolute boost pressure of the engine in kPa.	
(aa)	Resolution: 0.5 kPa per bit Data range: 0 through 16383.5 kPa $8000 - $801F are Fault Identifiers(2)
Left Turbocharger Inlet Pressure (absolute) **$00 $5C aa** Used to read the left turbocharger inlet pressure in kPa.	
(aa)	Resolution: 0.5 kPa per bit Data range: 0 through 16383.5 kPa $8000 - $801F are Fault Identifiers(2)
ECM Hourmeter **$00 $5E aa** This PID is used to read the number of hours that the engine has run.	
(aa)	Resolution: 1 hour per bit Data range: 0 through 655535 hours(1) $0000 - $FFFF is valid data range
Right Turbocharger Inlet Pressure (absolute) **$00 $5F aa** Used to read right turbocharger inlet pressure in kPa.	
(aa)	Resolution: 0.5 kPa per bit Data range: 0 through 16383.5 kPa $8000 - $801F are Fault Identifiers(2)
ECM Fault Log Codes and Status **$00 $82 aab [c]...aab [c]** This PID is used to read the component identifier (CID), status (active or inactive) of diagnostic codes stored in the ECM fault log.	
(a)	Upper byte of CID
(a)	Lower byte of CID

(continued)

(Table 49, contd)

PID's for 3500 Applications	
(b)	Fault Code Status Bit 8 0 = count not included 1 = count is included bit 7 0 = fault is active 1 = fault is inactive bit 6 0 = Fault is logged 1 = Fault is not logged bit 5 0 = Standard FMI 1 = Extended FMI bits 4-1 Failure Mode Identifier (FMI)
(c)	Occurrence count for fault code, optional as defined by bit 8
ECM Fault Log Request for Additional Data **$00 $83 aab** This PID should be used only for requesting additional information about a given logged diagnostic code. This PID can also be used to clear a particular diagnostic code. Use IID 00 Special Parameter Command to request this PID. Use the PID $00 $82 to request preliminary information such as existence of active or inactive diagnostic codes.	
(a)	Upper byte of CID Component identifier when more information is being requested, or is being cleared
(a)	Lower byte of CID Component identifier when more information is being requested, or is being cleared
(b)	Information Requested Bit 7, 8 00 = Request ASCII descriptive message for given diagnostic code 01 = Request to clear given diagnostic code in the ECM fault log 10 = Request to clear all diagnostic codes in ECM fault log 11 = Request additional diagnostic information about given diagnostic code. bit 6, 5 Not used bits 4-1 Failure Mode Identifier (FMI)
ECM Fault Log Response for Additional information **$00 $84 aab [cddee]** This PID is used to acknowledge the diagnostic does being cleared in the ECM fault log or to supply additional information about a given diagnostic code requested by PID $00 $83.	
(a)	Upper byte of CID Component identifier when more information is being requested, or is being cleared

(continued)

(Table 49, contd)

PID's for 3500 Applications	
(a)	Lower byte of CID Component identifier when more information is being requested, or is being cleared
(b)	Information Requested Bit 8, 7 Response Identifier 01 = Count has been cleared for given CID 10 = All counts have been cleared 11 = Message contains additional information for given diagnostic code
	Bit 6 0 = Request to clear logged fault granted 1 = Request to clear logged fault denied
	Bit 5-1 Failure Mode Identifier (FMI)
(c)(3)	Number of occurrences (MSB first)
(dd)(3)	Time of first occurrence (MSB first)
(ee)(3)	Time of last occurrence (MSB first)
Total Fuel **$00 $C8 aaaa** Used to read total fuel the engine has burned.	
(aaaa)	Resolution: 0.125 gallon per bit Data range: 0 through 268,435,456
System Battery Voltage **$F0 $13 a** This PID is used to read system battery voltage of the engine control system.	
(a)	Resolution: 0.5 volts per bit Data Range: 0.0 volts through 127.5 volts $00 - $FF is the valid data range
Cooldown Duration **$F0 $14 a** This PID is used to read or program the amount of time the ECM allows the engine to run after a normal shutdown is initiated.	
(a)	Resolution: 1 minute per bit Data range: 0 through 223 minutes $E0 - $FF are Fault Identifiers(2)
Cold Mode Status **$F0 $16 a** Used to read the cold mode status of the engine.	
(a)	$00 = Cold mode inactive $80 = Cold mode active

(continued)

(Table 49, contd)

PID's for 3500 Applications	
Engine Prelube Duration **$F0 $1B a** Used to read or program the amount of time in seconds the ECM will prelube the engine before the crank cycle is entered.	
(a)	Resolution: 1 second per bit Data range: 0 through 233 seconds $E0 - $FF are Fault Identifiers(2)
Remote Start Status **$F0 $2A a** This PID is used to read the status of the remote start/stop switch. This data is valid only when the Engine Control switch is in the AUTO position.	
(a)	$00 = Remote start is OFF $01 - $7F = Remote start is ON $80 - $9F are Fault Identifiers(2)
Engine Coolant Level Status **$F0 $2C a** Used to read the status of the engine coolant level switch. This data is read from the SEMS module.	
(a)	$00 = Coolant level is OK $7F = Coolant level is Low $01 - $7E = not used $80 = $DF = not used $E0 - $FF are Fault Identifiers
Engine Control Switch Position **$F0 $8F a** This PID is used to read status of the Engine Control Switch (ECS).	
(a)	$00 = Off/reset $02 = Start $03 = Stop $04 = Auto $80 - $9F are Fault Identifiers(2)
Shutdown Notify Relay Status (Generator Set Only) **$F0 $9C a** Used to read the status of the Shutdown Notify Relay.	
(a)	$00 = Relay is OFF $01 = Relay is ON $02 - $DF = Not used $E0 - $FF are Fault Identifiers(2)
Overspeed Verify Switch Position **$F0 $A6 a** Used to read the status of the overspeed verify switch.	

(continued)

(Table 49, contd)

PID's for 3500 Applications	
(a)	$00 = Switch is in the OFF position $01 - $7F = Switch is in the ON position $80 - $9F are Fault Identifiers(2)
Remote Emergency Stop Switch Position **$F0 $A8 a** Used to read the status of the remote emergency stop switch.	
(a)	$00 = Switch is in the OFF position $01 - $7F = Switch is in the ON position $80 - $9F are Fault Identifiers(2)
Start-up Mode Status **$F0 $A9 a** Used to read the status of the start-up mode.	
(a)	$00 = Starter is OFF $01 = Starter is ON (cranking) $02 = Overcrank $03 = Start-up was successful $04 - $DF = Not used $E0 - $FF are Fault Identifiers(2)
Air Shutoff Status (Generator Set Only) **$F0 $AA a** Used to read status of air shutoff system.	
(a)	$00 = Air shutoff relay is OFF $01 - $7F air shutoff relay is ON $80 - $9F are Fault Identifiers(2)
Maximum Number of Crank Cycles **$F0 $AC a** Used to read or program the number of times the engine will try to start before an overcrank condition is annunciated.	
(a)	Data range: 0 through 223 counts $E0 - $FF are Fault Identifiers(2)
Remote Emergency Stop **$F0 $B1 a** This PID is used to read the status of or request a remote emergency stop. Engine Control Switch must be in AUTO.	
(a)	$00 = Remote emergency stop is OFF $01 - $7F = Remote emergency stop is ON $80 - $9F are Fault Identifiers(2)
Cooldown Override Control **$F0 $B2 a** This PID is used to read the status of or select a shutdown that aborts the cooldown timer.	

(continued)

(Table 49, contd)

PID's for 3500 Applications	
(a)	$00 = Continue cooldown $01 - $7F = Abort cooldown $80 - $9F are Fault Identifiers(2)
Engine Prelube Status **$F0 $B5 a** Used to read the status of the prelube system.	
(a)	$00 = Prelube is OFF $01 = Prelube is ON $02 = Prelube is DISABLED $03 = Prelube is COMPLETED $04 - $FF = Not Used
Engine Fuel Level Status **$F0 $B6 a** Used to read the status of the engine fuel level switch. This data is read from the SEMS module.	
(a)	$00 = Fuel level is OK $01 = Fuel level is LOW $02 - $DF = Not used $E0 - $FF are Fault Identifiers(2)
Acceleration Delay Time (Generator Set Only) **$F0 $C1 a** Used to read or program the time (seconds) the engine will wait at low idle before accelerating to rated speed. The engine waits at low idle until oil pressure increases to 70 kPa or until Acceleration Delay time is reached.	
(a)	Data range: 0 - 255 seconds
Remote Throttle Override **$F0 $C2 a** Used by a remote communication module to read or override desired engine speed to low idle.	
(a)	$00 = Normal throttle setting $01 = Low idle setting $02 - $DF = Not used $E0 - $FF are Fault Identifiers(2)
ECM in Control (Marine Only) **$F0 $F2 a** Used to determine whether the primary ECM or the backup ECM is currently controlling the engine.	
(a)	$00 = Primary ECM is in control of engine $01 = BACKUP ECM is in control of engine $02 - $FF = Not used
Low Idle Switch (Generator Set Only) **$F0 $FD a** Used to read the position of a low idle switch.	

(continued)

(Table 49, contd)

PID's for 3500 Applications	
(a)	$00 = Low idle switch is off $01 = Low idle switch is on $02 - $DF = Not used $E0 - $FF are Fault Identifiers(2)
Percent Engine Load **$F1 $18 a** Used to read the percentage of engine load.	
(a)	Resolution: 1.0 percent per bit Data range: 0 through 255 percent
Backup ECM Status (Marine Only) **$F1 $4F a** Used to read whether the backup ECM is ready to take over control of the engine, should the primary ECM fail.	
(a)	$00 = Backup ECM is READY $01 = Backup ECM is NOT READY $02-$FF = Not used
Engine Power Derate Percentage **$F1 $89 a** Used to read the current engine power derate percentage.	
(a)	Resolution: 0.5 percent per bit Data range: 0 through 100 percent
Remote Start Initiate **$F2 $13 a** This PID is used to read the status of or start or stop the engine remotely.	
(a)	$00 = Start engine $7F = Stop engine
Emergency Override Switch Status (Marine Only) **$F2 $4D a** Used to read the state of the Emergency Override Switch. The switch is used to override the derates and shutdowns to continue operation during emergency conditions.	
(a)	Emergency Override Switch Status $00 = Emergency override off $01 = Emergency override on $02 - $DF = Not used
General Alarm Output Status/Override (Marine Only) **$F2 $4F a** Used to read and override the state of the General Alarm Output.	

(continued)

(Table 49, contd)

PID's for 3500 Applications		
(a)	General Alarm Output	
	bit 8	1 = override 0 = normal
	bit 7-1	$00 = Output is off $01 = Output is on $02 - $7F = Not Used
Engine Oil Pressure Differential **$F4 $0E aa** Used to read the pressure drop across the oil filter(s) in kPa.		
(aa)	Resolution: 0.5 kPa per bit Data range: 0 through 32751.5 kPa $FFE0 - $FFFF are Fault Identifiers(2)	
Effective Rack **$F4 $10 aa** Used to read the distance traveled by a nonexistent rack actuator. This value gives an indication of fuel flow.		
(aa)	Resolution: 0.005 mm per bit Data range: 0 through 60.00 mm	
Effective Rack Limit **$F4 $11 aa** Used to read the maximum distance the nonexistent rack actuator may travel. This value gives an indication of maximum fuel flow.		
(aa)	Resolution: 0.005 mm per bit Data range: 0 through 60.00 mm	
Effective Smoke Rack Limit **$F4 $12 aa** Used to read the distance the nonexistent rack actuator may travel, taking into account the current Turbocharger Outlet (Boost) pressure.		
(aa)	Resolution: 0.005 mm per bit Data range: 0 through 60.00 mm	
Peak Air Filter Restriction **$F4 $15 aa** Used to read the peak air filter restriction in kPa that has occurred since power up. This value is latched and is reset only by power cycling the engine controller.		
(aa)	Resolution: 0.5 kPa per bit Data range: 0 through 16383.5 kPa $8000 - $801F are Fault Identifiers(2)	

(continued)

(Table 49, contd)

PID's for 3500 Applications	
Engine Status **$F4 $17 ab** Used to read the engine status.	
(a)	Engine Status Set 1 Bit 8, 7 Reserved Bit 6 - 4 Not Used Bit 3, 2 Reserved Bit 1 Engine speed 1 = No engine speed 0 = Engine speed
(b)	Engine Status Set 2 Bit 8 Not Used Bit 7, 6 Reserved Bit 5 Emergency Stop Shutdown 1 = Emergency stop shutdown 0 = No emergency stop shutdown Bit 4 Fuel Injection 1 = Fuel Injection disabled 0 = No injection disabled Bit 3-1 Reserved
Unfiltered Engine Oil Pressure (absolute) **$F4 $19 aa** Used to read the absolute unfiltered engine oil pressure in kPa. This data comes from the oil pressure sensor placed before the oil filter(s).	
(aa)	Resolution: 0.5 kPa per bit Data range: 0 through 32751.5 kPa $FFE0 - $FFFF are Fault Identifiers(2)
Engine Fuel Pressure Differential **$F4 $1C aa** Used to read the pressure drop across the fuel filter(s) in kPa.	
(aa)	Resolution: 0.5 kPa per bit Data range: 0 through 32751.5 kPa $FFE0 - $FFFF are Fault Identifiers(2)
Unfiltered Engine Fuel Pressure (absolute) **$F4 $1F aa** Used to read the absolute Unfiltered engine fuel pressure in kPa. This data comes from the fuel pressure sensor placed before the fuel filter(s).	
(aa)	Resolution: 0.5 kPa per bit Data range: 0 through 32751.5 kPa $FFE0 - $FFFF are Fault Identifiers(2)

(continued)

(Table 49, contd)

PID's for 3500 Applications	
Engine Aftercooler Temperature **$F4 $20 aa** Used to read the temperature of the liquid in the engine aftercooler system in degrees C.	
(aa)	Resolution: 1.0 °C per bit Valid Data Range: -32736 to +32767 degree C $8000 - $801F are Fault Identifiers(2)
Right Exhaust Temperature **$F4 $40 aa** This PID is used to read the temperature of the exhaust air on the right side of the engine in degrees C.	
(aa)	Resolution: 1 °C/bit Valid Data Range: -32736 to +32767 degree C $8000 - $801F are Fault Identifiers(2)
Left Exhaust Temperature **$F4 $41 aa** This PID is used to read the temperature of the exhaust air on the left side of the engine in degrees C.	
(aa)	Resolution: 1 °C/bit Valid Data Range: -32736 to +32767 degree C $8000 - $801F are Fault Identifiers(2)
Acceleration Ramp Rate (Generator Set Only) **$F4 $5B aa** Used to read or program the maximum rate at which the engine will accelerate from the crank terminate speed to the speed that is requested by the throttle.	
(aa)	Resolution: 1 rpm per second per bit Data range: 0 through 65535 rpm/sec
Cooldown Time Remaining **$F4 $6D aa** Used to read the amount of time left in the cooldown period before the engine shuts down.	
(aa)	Resolution: 1 second per bit Data range: 0 through 65535 seconds
Crankcase Air Pressure (absolute) **$F5 $08 aa** Used to read the absolute pressure of the air inside the crankcase in kPa.	
(aa)	Resolution: 0.1 kPa per bit Data range: 0 through 6550.3 kPa $FFE0 - $FFFF are Fault Identifiers(2)

(continued)

(Table 49, contd)

PID's for 3500 Applications	
Crankcase Air Pressure (gauge) **$F5 $09 aa** Used to read the gauge pressure of the air inside the crankcase in kPa.	
(aa)	Resolution: 0.1 kPa per bit Data range: –3273.6 through 3276.7 kPa $8000 - $801F are Fault Identifiers(2)
Cooldown Engine Speed **$F5 $0A aa** Used to read or program the speed at which the engine will idle when in the cooldown mode.	
(aa)	Resolution: 0.5 rpm per bit Data range: 0 through 32751.5 rpm $FFE0 - $FFFF are Fault Identifiers(2)
Cycle Crank Time Setpoint **$F5 $0B aa** This PID is used to read the amount of time the ECM allows the engine to crank and then to rest the starting motor during a single crank cycle.	
(aa)	Resolution: 1 second per bit Data range: 0 through 65503 seconds $FFE0 - $FFFF are Fault Identifiers(2)
Crank Terminate Speed Setpoint **$F5 $0D aa** Used to read engine speed at which the ECM will disengage starter motor during engine cranking.	
(aa)	Resolution: 0.5 rpm per bit Data range: 0 through 32751.5 rpm $FFE0 - $FFFF are Fault Identifiers(2)
Filtered Engine Fuel Pressure (absolute) **$F5 $0E aa** Used to read the absolute filtered engine fuel pressure in kPa. This data comes from the fuel pressure sensor placed after the fuel filter(s).	
(aa)	Resolution: 0.5 kPa per bit Data range: 0 through 32751.5 kPa $FFE0 - $FFFF are Fault Identifiers(2)
Filtered Engine Fuel Pressure (gauge) **$F5 $0F aa** Used to read the gauge filtered engine fuel pressure in kPa. This data comes from the fuel pressure sensor placed after the fuel filter(s).	
(aa)	Resolution: 0.5 kPa per bit Data range: 0 through 32751.5 kPa $FFE0 - $FFFF are Fault Identifiers(2)

(continued)

(Table 49, contd)

PID's for 3500 Applications	
Low Idle Speed **$F5 $10 aa** Used to read or program the speed at which the engine will run when the throttle is overridden or the throttle is disconnected.	
(aa)	Resolution: 0.5 rpm per bit Data range: 0 through 32767.5 rpm
Intake Manifold air Temperature (Generator Set Only) **$F5 $11 aa** Used to read the temperature in degrees C of the precombustion air found in the intake manifold of the engine air supply system. This data is read from the SEMS module.	
(aa)	Resolution: 0.1 °C per bit Valid Data Range: -3273.6 to +3276.7 degree C $8000 - $801F are Fault Identifiers(2)
Percent Droop (Generator Set Only) **$F5 $15 aa** Used to read how much the engine speed drops when a full load is applied.	
(aa)	Resolution: 0.1 percent per bit Data range: 0 through 6550.3 percent $FFE0 through $FFFF are Fault Identifiers(2)
Right Air Filter Restriction **$F5 $1F aa** Used to read the right air filter restriction in kPa.	
(aa)	Resolution: 0.1 kPa per bit Data range: 0 through 6550.3 kPa $8000 through $801F are Fault Identifiers(2)
Left Air Filter Restriction **$F5 $20 aa** Used to read the left air filter restriction in kPa.	
(aa)	Resolution: 0.1 kPa per bit Data range: 0 through 6550.3 kPa $8000 - $801F are Fault Identifiers(2)
Fuel Consumption Rate **$F5 $25 aa** Used to read the rate at which fuel is being consumed.	
(aa)	Resolution: 0.05 liter/hour per bit Data range: 0.00 to 3275.15 liter/hour $FFE0 - $FFFF are Fault Identifiers(2)

(continued)

(Table 49, contd)

PID's for 3500 Applications	
Engine Oil Temperature **$F5 $3E aa** This PID is used to read the oil temperature in degrees C in the engine. This data is read from the SEMS module.	
(aa)	Resolution: 1 °C per bit Valid Data Range: -32736 to +32767 °C $8000 - $801F are Fault Identifiers(2)
Application Software Part Number **$F8 $14 aaaaaaaaaa** This PID is used to read the application software part number of the ECM (Personality Module). Application software part number can not be read from the older version of CCM (117-6170 System Communication Module).	
(aaaaa aaaaa)	Application software part number in printable ASCII (part number less than 10 characters are padded with an ASCII space $20 at the beginning of part number.
Vehicle System ID **$F8 $1A aaaaaaaaaaaaaaaa** Used to read or program the engine ID.	
(aaaa aaaa aaaa aaaaa)	Engine ID (must be 17 ASCII characters)
Warning Status **$FC $07 abcd** Used to read various warning status conditions of the engine.	
(a)	Warning subset number 4 0 = Warning is NOT ACTIVE 1 = Warning is ACTIVE Bit 8-1 Not Used
(b)	Warning subset number 3 0 = Warning is NOT ACTIVE 1 = Warning is ACTIVE Bit 8 High transmission oil temperature Bit 7 Low transmission oil pressure Bit 6-1 Not Used

(continued)

(Table 49, contd)

PID's for 3500 Applications	
(c)	Warning Subset number 2 0 = Warning is NOT ACTIVE 1 = Warning is ACTIVE Bit 8 Oil filter plugged Bit 7 Fuel filter plugged Bit 6 High crankcase pressure Bit 5 High aftercooler coolant temperature Bit 4-1 Not Used
(d)	Warning subset number 1 0 = Warning is NOT ACTIVE 1 = Warning is ACTIVE Bit 8 Low system voltage Bit 7 Low engine oil pressure Bit 6 High engine coolant temperature Bit 5 Low engine coolant temperature Bit 4 Engine overspeed Bit 3 Air filter plugged Bit 2 Not used Bit 1 High exhaust temperature
Shutdown Status **$FC $08 abcd** Used to read the cause of an engine shutdown.	
(a)	Warning subset number 4 0 = Warning is NOT ACTIVE 1 = Warning is ACTIVE Bit 8-1 Not Used
(b)	Warning subset number 3 0 = Warning is NOT ACTIVE 1 = Warning is ACTIVE Bit 8-1 Not Used
(c)	Warning Subset number 2 0 = Warning is NOT ACTIVE 1 = Warning is ACTIVE Bit 8, 7 Not Used Bit 6 High crankcase pressure Bit 5 High aftercooler coolant temperature Bit 4-1 Not Used

(continued)

(Table 49, contd)

PID's for 3500 Applications	
(d)	Warning subset number 1 0 = Warning is NOT ACTIVE 1 = Warning is ACTIVE Bit 8 Not Used Bit 7 Low engine oil pressure Bit 6 High engine coolant temperature Bit 5 Not Used Bit 4 Engine overspeed Bit 3-1 Not used
Engine Derate Status **$FC $09 abcd** Used to read the cause of the engine being derated.	
(a)	Warning subset number 4 0 = Warning is NOT ACTIVE 1 = Warning is ACTIVE Bit 8-1 Not Used
(b)	Warning subset number 3 0 = Warning is NOT ACTIVE 1 = Warning is ACTIVE Bit 8-1 Not Used
(c)	Warning Subset number 2 0 = Warning is NOT ACTIVE 1 = Warning is ACTIVE Bit 8, 7 Not Used Bit 6 High crankcase pressure Bit 5 High aftercooler coolant temperature Bit 4-1 Not Used

(continued)

(Table 49, contd)

PID's for 3500 Applications	
(d)	Warning subset number 1 0 = Warning is NOT ACTIVE 1 = Warning is ACTIVE Bit 8, 7 Not Used Bit 6 High engine coolant temperature Bit 5, 4 Not Used Bit 3 Air filter plugged Bit 2 High altitude (atmospheric pressure) Bit 1 High exhaust temperature

(1) The number of hours the engine has run is determined by the ECM. The PID is limited to 65535 hours. When the engine has run more than 65535 hours, the value for PID $00 $5E will always be 0 hours.

(2) For a complete list of the Fault Identifiers, refer to the Operation and Maintenance Manual, "Fault Identifiers"

(3) Bytes c, dd, and ee are omitted if the response identifier is 01 or 10. The format is $00 $84 in aab.

Examples

i01226592

Programming Examples for M5X Protocol

SMCS Code: 1926

The following examples reference EMCP II applications. However, the format will be similar for other applications.

The user must login to the CCM before any M5X programming can be started. Refer to Operation and Maintenance Manual, SEBU6874, “Communication Protocol for Customized Systems” for more specific information.

Create a Broadcast List

In the following example a broadcast list will be created. The list will also be activated. The list will contain PID $00 $40 (engine rpm) and PID $00 $54 (engine oil pressure). The information will be requested in 2 second intervals from the EMCP II GSC. The list will then be deactivated.

1. Create a Broadcast List - IID 13: **500013150258040020004000540000000000000000000000086**

IID 13 - Used to create a broadcast list. A total of eight lists is allowed by the CCM. This example assumes list number 2.

Table 50

Byte(s)	Byte Contents	Detailed Description
1	$50	Indicates M5X protocol
2	$00	User’s PC is the sending module
3	$13	IID 13
4	$15	Number of bytes
5	$02	List number
6	$58	GSC number 1
7	$04	Response will be sent every 2 seconds (increments of 0.5 seconds)
8	$00	These bits are unused (always = 0)
9	$20	Programming Options: no separator, message terminated by carriage return, in ASCII form.
10, 11	$00 $40	1st PID - Generator Set Engine RPM
12, 13	$00 $54	2nd PID - Engine Oil Pressure (kPa)
14, 15	$00 $00	Filter for unused PID
16, 17	$00 $00	Filter for unused PID
18, 19	$00 $00	Filter for unused PID
20, 21	$00 $00	Filter for unused PID
22, 23	$00 $00	Filter for unused PID
24, 25	$00 $00	Filter for unused PID
26	$86	Checksum

2. IID 15 is the response from the CCM that confirms that the list has been successfully created: **500115010099**

IID 15 - The CCM’s reply to IID 11, IID 12, or IID 13.

Table 51

Byte(s)	Byte Contents	Detailed Description
1	$50	Indicates M5X protocol
2	$01	CCM is the sending module
3	$15	IID 15
4	$01	Number of bytes
5	$00	IID data is OK
6	$99	Checksum

3. Activate the Broadcast List - IID 11: **50001101029C**

IID 11 - Used to activate a broadcast list.

Table 52

Byte(s)	Byte Contents	Detailed Description
1	$50	Indicates M5X protocol
2	$00	User's PC is the sending module
3	$11	IID 11
4	$01	Number of bytes
5	$02	List number
6	$9C	Checksum

4. IID 15 is the response from the CCM confirming that the list has been activated: **500115010099**

IID 15 - The CCM's reply to IID 11, IID 12, or IID 13.

Table 53

Byte(s)	Byte Contents	Detailed Description
1	$50	Indicates M5X protocol
2	$01	CCM is the sending module
3	$15	IID 15
4	$01	Number of bytes
5	$00	IID data is OK
6	$99	Checksum

5. IID 10 is the broadcast response from the CCM: **5001100602580BB800C8B4**

IID 10 - The data will now start flowing from the GSC to the CCM and then to the user's PC at the rate of once every two seconds. The entire broadcast list will not be returned if any of the following conditions are met:

- The GSC number is not available.
- The GSC does not support the PID.
- The PID contains more than 2 bytes of data.

Table 54

Byte(s)	Byte Contents	Detailed Description
1	$50	Indicates M5X protocol
2	$01	CCM is the sending module
3	$10	IID 10
4	$06	Number of bytes
5	$02	List number
6	$58	GSC number 1
7, 8	$0BB8	1500 rpm
9, 10	$00C8	100 kPa
11	$B4	Checksum

6. IID 12 will deactivate the list: **50001201029**

IID 12 - Used to deactive a list.

Table 55

Byte(s)	Byte Contents	Detailed Description
1	$50	Indicates M5X protocol
2	$01	CCM is the sending module
3	$12	IID 12
4	$06	Number of bytes
5	$02	List Number
6	$9B	Checksum

7. IID 15 is the response from the CCM confirming that the list has been successfully deactivated: **500115010099**

IID 15 - The CCM's reply to IID 11, IID 12, or IID 13.

Table 56

Byte(s)	Byte Contents	Detailed Description
1	$50	Indicates M5X protocol
2	$01	CCM is the sending module
3	$15	IID 15
4	$01	Number of bytes
5	$00	IID data is OK
6	$99	Checksum

Reading Faults from EMCP II GSC

The following example shows how to read faults from the EMCP II GSC.

1. Use IID 24 to send PID $0082 to the GSC: **5000240400580082AE**

IID 24- Single parameter Read Request

Table 57

Byte(s)	Byte Contents	Detailed Description
1	$50	Indicates M5X protocol
2	$01	CCM is the sending module
3	$24	IID 24
4	$04	Number of bytes
5	$00	IID data is OK
6	$58	GSC number 1
7, 8	$00 $82	PID $0082 GSC Fault Log Codes, Status, And Number of occurrences
9	$AE	Checksum

2. IID 25 is the response from the CCM: **5001250758008200BEC30424**

IID 25 - Single Parameter Read Response

Table 58

Byte(s)	Byte Contents	Detailed Description
1	$50	Indicates M5X protocol
2	$01	CCM is the sending module
3	$25	IID 25
4	$07	Number of bytes
5	$58	GSC number 1
6, 7	$00 $82	PID $0082 GSC Fault Log Codes, Status, And Number of occurrences
8, 9	$00 $BE	CID 190 (engine speed sensor fault)
10	$C3	Count included, inactive fault, logged fault, standard FMI (3)
11	$04	Occurrence count of 4
12	$24	Checksum

3. IID 00 is used to request additional information on a fault **500000070058008300BEC34D**

IID 00 - Special parameter Command

Table 59

Byte(s)	Byte Contents	Detailed Description
1	$50	Indicates M5X protocol
2	$01	CCM is the sending module
3	$00	IID 00
4	$07	Number of bytes
5	$00	Reply in ASCII format
6	$58	GSC number 1
7, 8	$00 $83	PID $0083 GSC Fault Log Request For Additional Data
9, 10, 11	$00 $BE $C3	More information requested on CID 190 FMI 3
12	$4D	Checksum

4. IID 25 will contain the reply as PID $0084 **5001250B58008400BEC303000C001102**

IID 25 - Single Parameter Read Response

Table 60

Byte(s)	Byte Contents	Detailed Description
1	$50	Indicates M5X protocol
2	$01	CCM is the sending module
3	$25	IID 25
4	$0B	Number of bytes
5	$58	GSC number 1
6, 7	$00 $84	PID $0084 GSC Fault Log Response For Additional Data
8, 9	$00 $BE	CID 190
10	$C3	More information on FMI 3
11	$03	Three occurrences of this fault
12, 13	$00 $0C	First occurrence at 12 hours
14, 15	$00 $11	Last occurrence at 17 hours
16	$02	Checksum

Monitoring Generator Phase

The following example shows how to select which generator phase the GSC monitors.

1. Use IID 34 to write the parameters of PID $F0B0: **500034050048F0B0007F**

IID 34 - Single Parameter Write Request

Table 61

Byte(s)	Byte Contents	Detailed Description
1	$50	Indicates M5X protocol
2	$00	User's PC is the sending module
3	$34	IID 34
4	$05	Number of bytes
5	$00	Reply in ASCII format
6	$58	GSC number 1
7, 8	$F0 $B0	PID $F0B0 Generator Phase Select
9	$00	Phase A-B Voltage, Phase A Current
10	$7F	Checksum

2. IID 35 is the response from the CCM:
5001350458F0B0007E

IID 35 - Single Parameter Write Response

Table 62

Byte(s)	Byte Contents	Detailed Description
1	$50	Indicates M5X protocol
2	$01	CCM is the sending module
3	$35	IID 35
4	$04	Number of bytes
5	$58	GSC number 1
6, 7	$F0 $B0	PID $F0B0 Generator Phase Select
8	$00	Phase A-B Voltage, Phase A Current
9	$7E	Checksum

Retrieving CCM Diagnostic Codes

The CCM allows the diagnostic codes to be read from the CCM and the Engine Controller. This is accomplished by using IID 24. Use IID 24 with PID 0082 to retrieve the codes for the CCM . The format for the message is given below.

5000240400610082cs

The CCM will respond with two data bytes.

Clearing CCM Diagnostic Codes

The diagnostic codes on the CCM can be cleared. The codes are cleared by using IID 34 with PID 000D. The codes on the CCM can be cleared at any time. By sending the following message to the CCM, all of the diagnostic codes will be cleared.

500034050061000DFFcs

The CCM will respond with IID 35, if the message is received properly.

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Product and Dealer Information

Note: For product identification plate locations, see the section “Product Identification Information” in the Operation and Maintenance Manual.

Delivery Date: _____

Product Information

Model: _____

Product Identification Number: _____

Engine Serial Number: _____

Transmission Serial Number: _____

Generator Serial Number: _____

Attachment Serial Numbers: _____

Attachment Information: _____

Customer Equipment Number: _____

Dealer Equipment Number: _____

Dealer Information

Name: _____ Branch: _____

Address: _____

_____

_____

	Dealer Contact	Phone Number	Hours
Sales:	_____	_____	_____
Parts:	_____	_____	_____
Service:	_____	_____	_____

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