CATERPILLAR®

SENR6588-03
June 2001

Service Manual

Programmable Relay Control Module (PRCM)

BMB1-Up (Generator Set)
CBB1-Up (Engine)
CNB1-Up (Generator Set)
CMC1-Up (Generator Set)
2RD1-Up (Engine)
2TD1-Up (Engine)
CMD1-Up (Generator Set)
CDE1-Up (Engine)
BLF1-Up (Generator Set)
CNF1-Up (Generator Set)
BAG1-Up (Engine)
BPJ1-Up (Generator Set)
CMJ1-Up (Generator Set)
BCK1-Up (Engine)
BRK1-Up (Generator Set)
CAL1-Up (Generator Set)
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)
CBN1-Up (Engine)
FDN1-Up (Generator Set)
FDR1-Up (Generator Set)
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)
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)
CAW1-Up (Generator Set)
BGX1-Up (Generator Set)
2EZ1-Up (Engine)
6HZ1-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.

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Specifications Section

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Environmental

SMCS Code: 1927

- The proper storage temperature for the PRCM is –40 °C (–40.0000 °F) to 85 °C (185.0000 °F).
- Ambient operating temperature range for the PRCM is –40 °C (–40.0000 °F) to 70 °C (158.0000 °F).
- Acceptable humidity for the PRCM is 0 to 100 percent relative humidity.
- The PRCM is resistant to the following elements: salt, fuel, oil, oil additives, coolant, steam, spray cleaning, trisodium phosphate(ten percent solution), chlorinated solvents, hydrogen sulfide, methane gas, and dust.

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Electrical

SMCS Code: 1927

The maximum length of the CAT data link cable that connects the PRCM to the engine ECM is 30.5 m (100 ft). If the length of the cable exceeds 30.5 m (100 ft), a Customer Communication Module (CCM) is required. The customer communication module is used in order to increase the signal of the CAT data link. Connect the + battery on the customer communication module to the + battery post on the rear of the PRCM. Connect the negative battery on the customer communication module to the negative battery post on the rear of the PRCM. Connect the CAT data link to the PRCM. Connect the CAT data link + to contact 19 and connect the CAT data link – to contact 20.

Note: Shielded twisted pair cable is required for the CAT data link. Use **123-2376** Electrical Cable.

- The operating voltage range is from 15 to 45 DCV. The relay driver module (RDM) is powered from a battery system of 24 DCV or a battery system of 32 DCV.
- The case of the PRCM is electrically isolated from the internal circuitry.
- The PRCM is protected against reverse battery polarity.
- The input/output circuitry is protected. The circuitry is protected from a short to the positive battery source and ground. Terminals 2, 13, and 14 on the RDM are NOT fused. These terminals are NOT protected from a short circuit to the positive battery source or ground.
- The PRCM is capable of operating with an earth ground and the PRCM is capable of operating without an earth ground.
- The PRCM must share a common ground with the optional Relay Driver Module (RDM) and the relay boards.

Systems Operation Section

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General Information

SMCS Code: 1927

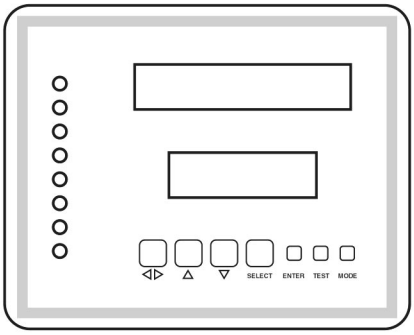

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Illustration 1

Programmable Relay Control Module (Front View)

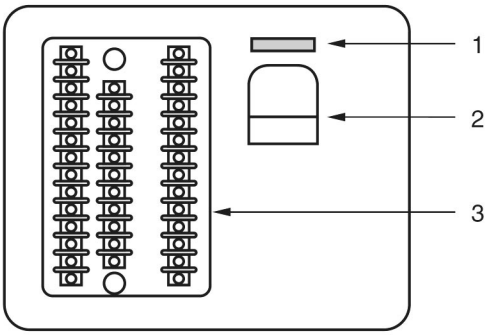

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Illustration 2

Programmable Relay Control Module (Rear View)

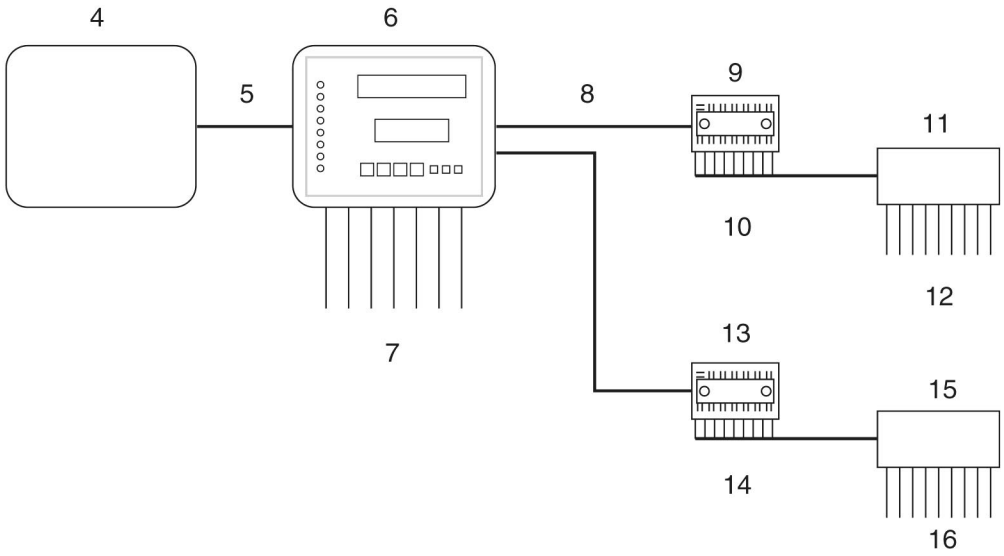

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Illustration 3

Typical installation of the Programmable Relay Control Module, Relay Driver Module and Relay Board

(4) ECM
(5) CAT data link
(6) PRCM
(7) Seven relays with outputs
(8) Serial data link
(9) RDM
(10) Nine driver relays
(11) Relay board
(12) Nine relays with outputs
(13) RDM
(14) Nine driver relays
(15) Relay board
(16) Nine relays with outputs

Related Literature

This manual contains safety, installation, operation, and troubleshooting information. Refer to the Service Manual, SENR1003, “EPG Engine Troubleshooting”, Service Manual, SENR1008, “Marine Engine Troubleshooting”, and Special Instruction, SEHS9951 for additional information. Refer to the wiring schematic for the engine in the Service Manual. Continuing improvement and advancement of product design may cause changes to the Programmable Relay Control Module (PRCM) which are not included in this manual. Consult your Caterpillar dealer for the latest available information.

Safety

The safety section in this manual lists basic safety precautions. Read the basic safety precautions before installing the PRCM or operating the PRCM.

Description of the PRCM

The Programmable Relay Control Module (PRCM) provides the control of seven relays, six alarms, and two LED displays. In addition, the PRCM can be programmed to control up to two Relay Driver Modules (RDM). Each RDM provides an additional nine relay outputs for a total of twenty-five relays. The PRCM receives information via the CAT data link from the Engine Control Module (ECM). The PRCM utilizes information from eight switched inputs on the PRCM to control the outputs. Control of each relay is programmable through the keypad and displayed on the PRCM.

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Programmable Relay Control Module

SMCS Code: 1927

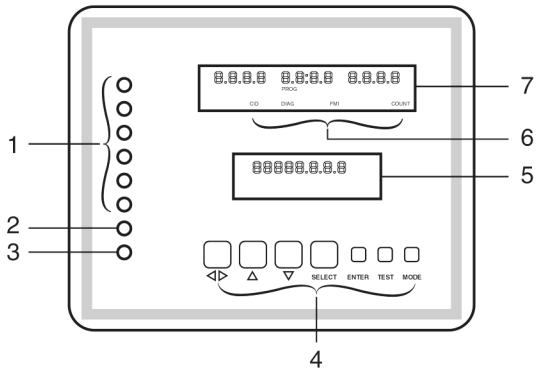

Illustration 4 g00709859

Display Area of the Programmable Relay Control Module

(1) Red LED Display of the Programmable Alarm
(2) Red LED Display of the Internal Fault Alarm
(3) Yellow LED Display of the Fault Alarm
(4) Keypad
(5) Lower LCD Display
(6) “CID”, “DIAG”, “FMI”, “PROG”, and “COUNT”
(7) Upper LCD Display

LED Indicators for Faults and Alarms

There are eight LED indicators. Indicators (1), indicator(2), and indicator (3) are used in order to diagnose an alarm or a fault. The LCD display also aids the operator in correctly diagnosing an alarm or a fault. The indicators are divided into three groups. programmable alarm indicators (1), the internal fault indicator (2), and the fault alarm indicator (3) are the three groups. The programmable alarm indicators (1) will turn ON when selected conditions are active. The internal fault indicator (2) will turn ON when an internal PRCM fault exists. The fault alarm indicator (3) will turn ON when a fault that is external to the PRCM exists. These faults consist of components that are within the PRCM system and the faults are NOT customer programmable.

PRCM Display

The lower display and upper display (5) and (7) of the PRCM are used for monitoring. The display monitors faults, programming, and setpoint information. The display area is LCD (liquid crystal display).

PRCM Keypad

The keypad is used for controlling the information on the PRCM display. The buttons have specific functions that are explained under the appropriate topic. Refer to System Operation, “Input/Output Monitoring and Programming”, System Operation, “Fault Viewing and Clearing”, and System Operation, “Setpoint Viewing and Programming” sections in this manual.

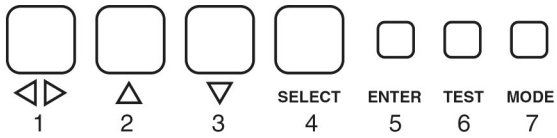

Illustration 5 g00709863

Enlarged View of the PRCM Keypad

(1) “LEFT” and “RIGHT” button
(2) “UP” button
(3) “DOWN” button
(4) “SELECT” button
(5) “ENTER” button
(6) “TEST” button
(7) “MODE” button

PRCM Internal Relays

The relays are located inside the relay module on the rear of the PRCM. The relays are permanently attached within the relay module and the relays are NOT removable. The entire relay module must be replaced if a relay is faulty. Additional relays are available when one or more optional Relay Driver Modules (RDM) are used. Refer to the System Operation, “Relay Driver Module” section in this manual. The relay contacts are internally connected to the terminals of the relay module of the PRCM. The terminals are available for the customer to use. The voltage and current specifications for each terminal (relay) are shown in the illustration and listed in the chart.

Table 1

Load Specifications For the Internal Relays of the PRCM		
Relay Module and Number	**Ratings For Resistive Loads**	**Ratings For Inductive Loads**
"K1"	7 milliamperes to 1 Amperes (24 DCV)	None(1)(2)(3)
"K2", "K3", "K4", "K5" (terminal 24), "K6" and "K7"	0.5 to 10 amperes (24 DCV)	0.5 to 10 Amperes (24 DCV)(3)
"K5" (terminals 23 and 36)	0.5 to 10 Amperes (24 DCV) and 0.5 to 10 Amperes (24 ACV)	0.5 to 5 Amperes (24 DCV) and 0.5 to 7.5 Amperes (110 ACV)

(1) Do NOT connect inductive loads to these terminals.

(2) The contacts of the relay that is connected to terminals 13 and 14 are gold flashed. The gold socket contact provides a source of low impedance for a low current resistive load. Loads that draw higher currents, currents that are of similar levels as terminals 23 and 36 in table 1 can be applied. However, if heavier loads are applied, the gold flashing will be permanently burned. This will eliminate the gold flashing from the contacts. This does not result in damage to the relay contacts, but the contacts can no longer be used for low current loads.

(3) "K1" (terminals 13 and 14) is not fused.

NOTICE

Do not apply AC voltages to any relay module terminal other than terminals 23 and 36 of K5 and terminals 13 and 14 of K1 or permanent damage to the relay module will result. All other terminals have flyback diodes connected to them that increase relay life when driving inductive loads; however, this limits their use to DC voltages.

Note: All 3K-8782 Fuses ("AGC-10") in the relay module are rated at 10 Amperes DCV.

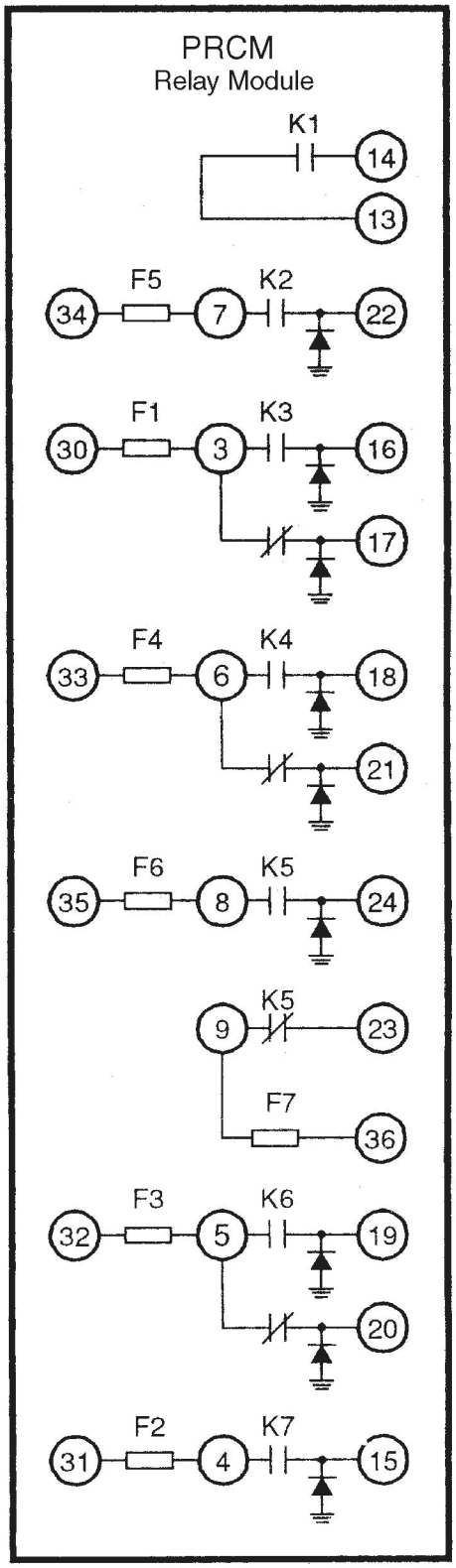

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Illustration 6

PRCM Connections to the Relay Module

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Menus

SMCS Code: 1927

There are three main display menus for the PRCM. The main menus of the PRCM are listed below.

- The display menu for monitoring and programming the inputs and the outputs
- The display menu for viewing faults and for clearing faults
- The display menu for Setpoint Viewing and for Setpoint programming

Access to the menu for monitoring and programming the inputs and the outputs are always available to the operator. The functions of Setpoint Viewing and Setpoint programming are always available to the operator. The menu for viewing faults and for clearing faults is only available when a logged PRCM fault exists or an active PRCM fault exists. The “MODE” button allows the operator to scroll between the main menus.

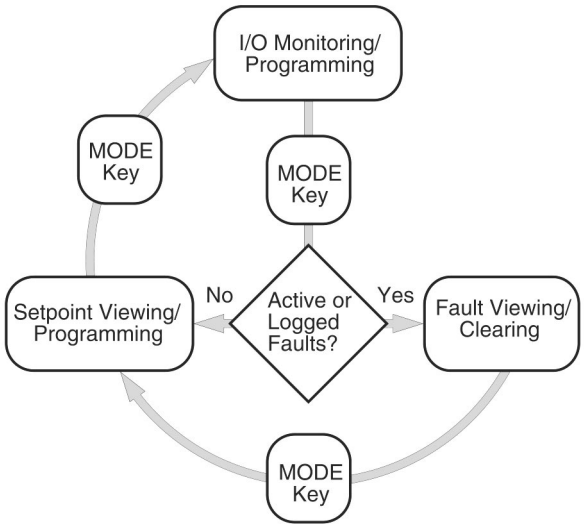

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Illustration 7

PRCM Display Modes

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Setpoint Viewing and Programming

SMCS Code: 1927

The Setpoint Viewing/Programming menu is entered by pressing the “MODE” button from the Fault Viewing/Clearing menu or the I/O Monitoring/Programming menu. The Setpoint Viewing/Programming menu allows the operator to view program PRCM setpoints. The Setpoint Viewing/Programming menu also allows the operator to program the PRCM setpoints.

Table 2

PRCM SETPOINTS		
Setpoint Number	**Setpoint Value**	**Description**
P01	01	Genset or center marine engine.
	02	Port marine engine.
	03	Starboard marine engine.
P02	01	All outputs controlled by the ECM remain in the state required by the last valid input, if communications from the ECM are lost (CAT data link failure).
	02	All outputs controlled from the ECM are reset to OFF.
P03	01	PRCM displays CID 590 FMI 09 and CID 248 FMI 11 diagnostic codes when the diagnostic codes are active, but does NOT place the diagnostic codes in the PRCM fault log.
	02	PRCM displays CID 590 FMI 09 and CID 248 FMI 11 diagnostic codes when the codes are active and places the diagnostic codes in the fault log.

The upper display will be blank and the lower display will show “P01 0X”. The “X” represents 1, 2, or 3. The 1, 2, and 3 represents the different types of engines.

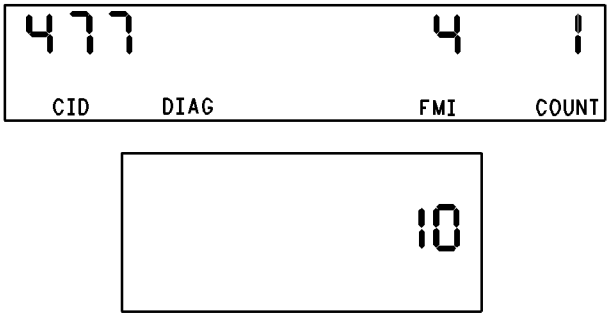

Illustration 8 g00713203

In the following example, the setpoint “P01” is programmed to “02”. A “02” is for the marine engine that is located on the port side.

1. The “UP” and “DOWN” buttons are used in order to scroll through the list of setpoints.
2. To program a setpoint, press the “ENTER” button. The password must be entered before the operator is allowed to enter the programming function. Refer to Systems Operation, “Input/Output Monitoring and Programming” for detailed instructions on entering the password. After you enter the password, the setpoint number should be flashing.
3. Use the “UP” and “DOWN” buttons to obtain the desired setpoint.

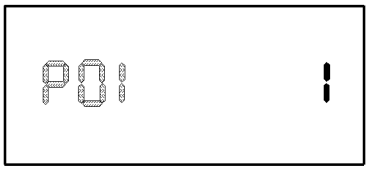

Illustration 9 g00713210

4. Press the “LEFT” and “RIGHT” button. The setpoint value is flashing.

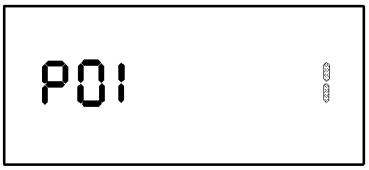

Illustration 10 g00713215

5. Use the “UP” and “DOWN” buttons in order to change the value of the setpoints.

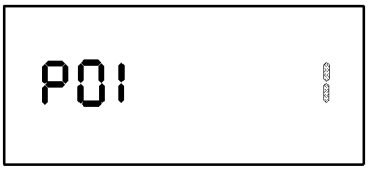

Illustration 11 g00713215

6. Press the “LEFT” and “RIGHT” button. All the characters flash.
7. Press the “LEFT” and “RIGHT” button in order to reject the changes. Press the “SELECT” button in order to accept the changes. The display will stop flashing for two seconds. When the display of the setpoint number begins to flash the operator is allowed to start programming the next setpoint.
8. After programming is complete, press “ENTER”in order to leave the programming mode and return to viewing the setpoints.

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Input/Output Monitoring and Programming

SMCS Code: 1927

There are three sub-menus for monitoring and programming the inputs and outputs:

Manual input and output in the scrolling mode:

You can manually scroll through the inputs and outputs. In this mode, you can step through each output and you can display the information for each output.

AUTO input and output in the scrolling mode:

You can automatically scroll through preselected inputs and outputs. The inputs and outputs are preselected by the operator. The preselections are made in the manual input and output scrolling mode.

Programming input and outputs in the scrolling mode:

You can program a logical relation between the input and output, and an associated input for a specified output.

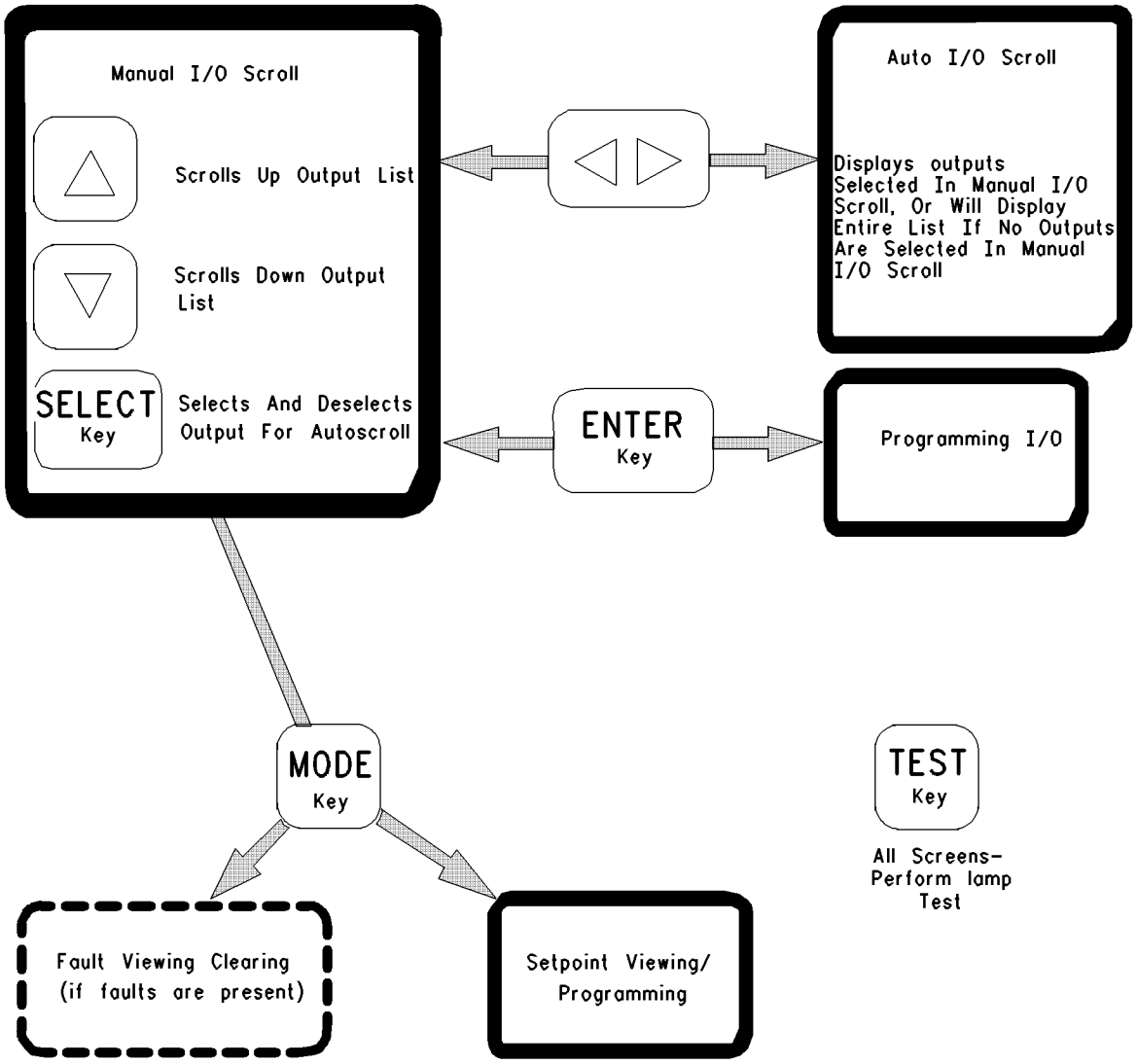

Illustration 12 g00710986

Manual Input And Output Scroll

The input screen and the output screen will be displayed when the “MODE” key is pressed. These screens can be accessed from the following menus: setpoint viewing, setpoint programming, fault viewing, and clearing.

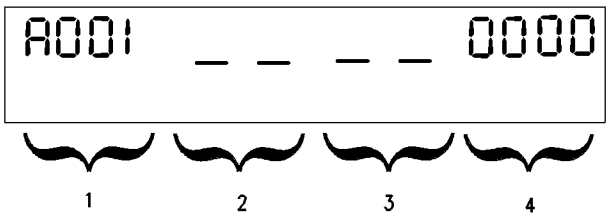

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Illustration 13

The Upper Display of the Manual Input and Output

(1) Characters “1” through “4” (output code)
(2) Characters “5” through “6” (output state)
(3) Characters “7” through “8” (input state)
(4) Characters “9” through “12” (input code)

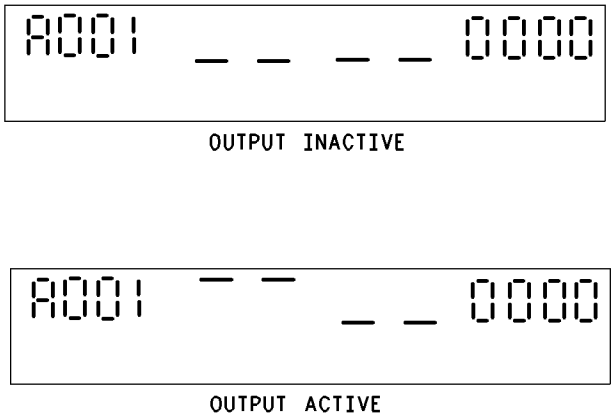

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Illustration 14

Characters“ 5” and “6” (Output State)

Characters “1” through “4” (1) on the upper display are the Output Code. A001 is the default display when power is first applied. The top red LED on the PRCM corresponds to the first four characters. Refer toTesting And Adjusting, “Display Codes” tables 4, 5, 6 and 7 for output codes.

Characters “5” and “6” (2) are the Output State.

Characters “7” and “8” (3) are the Input State.

Characters “9” through “12” (4) are for the Input Code. 0000 is the default display when power is first applied. The display corresponds to an input that is always inactive. Refer to Testing And Adjusting, “Display Codes” tables 1, 2, and 3 for input codes.

The lower display shows the engine hours. The lower display shows the relays on the PRCM that are active “K1” through “K7”. The engine hours default to zero until communication with the ECM is active. The engine hours will remain at zero until the PRCM has been programmed to request an input from the ECM. Refer to Testing And Adjusting, “Display Codes” table 3 for display codes for inputs from the ECM.

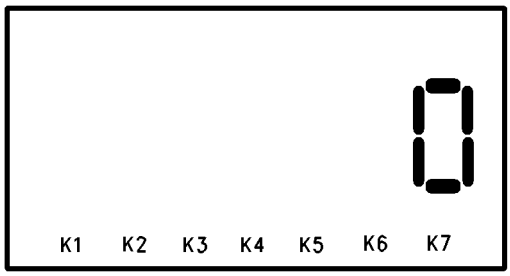

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Illustration 15

Lower Display of the Manual Input and Output

All buttons are active in the Manual input and output scrolling mode. The buttons will perform the following functions:

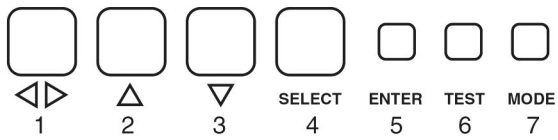

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Illustration 16

(1) “LEFT” and “RIGHT” button
(2) “UP” button
(3) “DOWN” button
(4) “SELECT” button
(5) “ENTER” button
(6) “TEST” button
(7) “MODE” button

1. The “LEFT” and “RIGHT” button toggles between the manual input and output scrolling mode to the AUTO input and output scrolling mode.

2. The “UP” button allows the operator to scroll through the list of outputs.

3. The “DOWN” button allows the operator to scroll through the list of outputs.

4. The “SELECT” button selects the output for AUTOSCROLL and the “SELECT” button unselects the output for AUTOSCROLL. An “A” will be displayed in the upper display in the lower right corner.

5. The“ENTER” button toggles between manual input and output scrolling mode to the programming mode of the inputs and outputs.

6. The “TEST” button performs a lamp test on the PRCM for the LED display and the LCD display.

7. The “MODE” button switches the PRCM into the mode for the fault log viewing mode or into the fault log clearing mode if there is a fault that is active or if there is a logged fault. Otherwise, the “MODE” button transfers the program into the setpoint viewing and/or the setpoint Programming mode.

Programming Input And Outputs

The “PROG” symbol on the upper display indicates that the PRCM is in the programming mode. The “DIAG” symbol on the upper display indicates that the PRCM has an active fault. The lower display shows “PE _ _ _ _ _”. The “PE _ _ _ _ _” prompts the user to enter the password into the PRCM. The scroll keys must be actuated in the correct sequence in order to enter the password correctly.

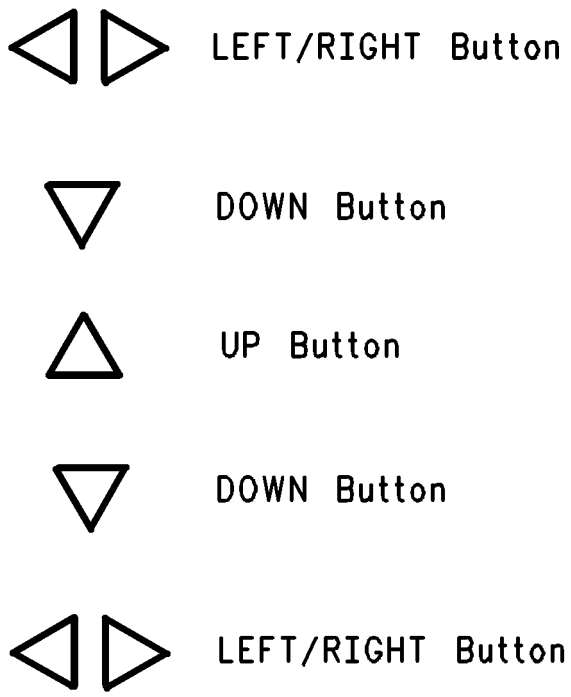

Illustration 17 g00711233

The lower display shows the previous scroll key entries. The display should appear as “PE 1 3 2 3 1”. The password prevents the possibility of mistakenly altering information that was previously programmed.

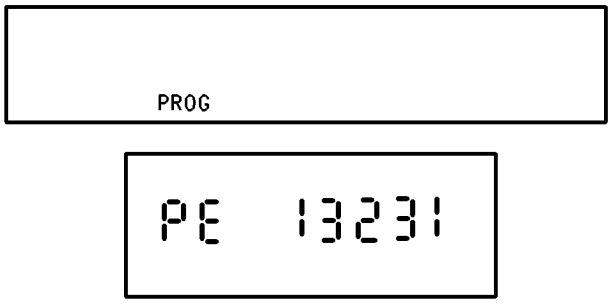

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Illustration 18

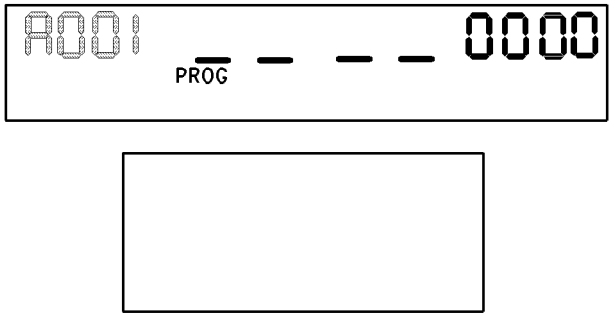
PRCM Display Of The Password Entry

The password remains activated until the Programming mode is exited. The upper display of the programming mode and upper display of the manual input and output are similar. The display is similar with the following exceptions:

- The display is empty.
- The item that is selected is flashing.
- The “PROG” symbol is continuously on.

In the following example, the PRCM is programmed to activate “K1” whenever a low engine oil pressure condition is received from the ECM. Immediately after you have entered the password, the PRCM displays change. Illustration 19 shows the changed display. Characters “1” through “4” will be flashing.

Note: Any gray characters in the following illustrations should be flashing on the display.



g00711453

Illustration 19

PRCM Displays After Password Entry

1. Output Selection.

Characters “1” through “4” represent the output selection. The output selections are flashing.

The “UP” and “DOWN” buttons allow the operator to scroll through the outputs. The outputs can be PRCM LED displays or relay outputs. The outputs could also be for the relay driver module. “P001” is the display for the PRCM relay and “K1” is the relay that is active. Refer to Testing And Adjusting, “Display Codes” tables 4, 5, 6, and 7. Refer to these tables for a listing of terms of the output codes.

After choosing the output, press the “LEFT” and “RIGHT” button in order to go to the logical relation state.

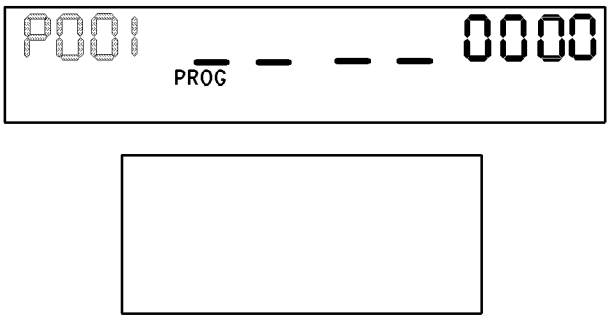


Illustration 20 g00711774

Display of the PRCM After the Output Selection

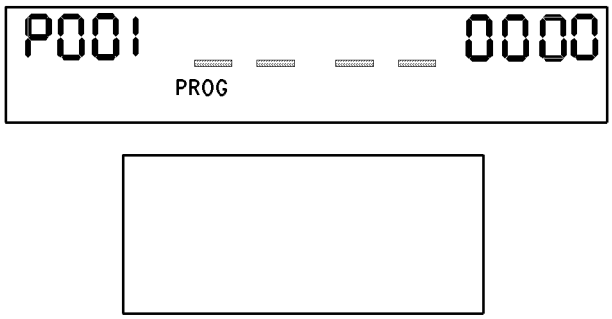


Illustration 21 g00711777

PRCM Displays After Logical Relationship State Selection

2. Logical Relation State

Characters “5” through “8” represent the logical relation between the input and the corresponding output and these characters will be flashing. The display will be all underscores for the input and the output state. For example, an active input will have an active output. The output state that is inverted from the input state will display inverted dashes “(--:_ _)”. For example, an active input will have an inactive output.

The “UP” and “DOWN” buttons toggle between the two logical states. The display will be all underscores for the input and the output state.

After choosing the logical relation state, press the “LEFT” and “RIGHT” button in order to go to the input selection.

3. Input Selection

Characters “9” and “10” represents a subset of inputs. These inputs can be programmed and these inputs are flashing. The input will activate the output that is chosen in step **1**. The subset of inputs are “00” for special functions. The Subset of inputs are “10” for PRCM. The subset of inputs are “20” for ECM faults on the communication link.

To program an input selection, press the “UP” and “DOWN” buttons. This will allow the operator to gain access to the subset menu. In this case, “20” is chosen for ECM faults. Refer to Testing And Adjusting, “Display Codes” tables 1, 2, and 3. Refer to these tables for a listing of terms of the input codes. The subset menu provides a way of saving time for the operator in selecting inputs. After selecting an input from the subset menu, press the “LEFT” and “RIGHT” button. This allows the operator to select the entire field of inputs.

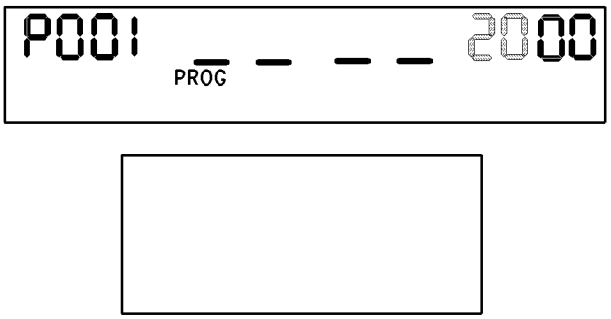


Illustration 22 g00711843

PRCM Displays After Input Subset Selection

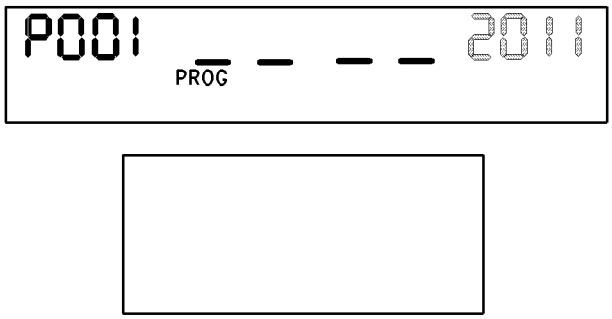


Illustration 23 g00711852

PRCM Displays After The Entire Input Selection

4. Complete Input Selection

Characters “9” through “12” represent the entire input selection. Characters “9” and “10” remains identical to step **3**. Characters “9” through “12” for the input selection are flashing. The flashing indicates that the operator is able to select an input code within the subset. The subset was chosen in step **3**.

The “UP” and “DOWN” buttons scroll through the table of inputs. An input code of “2011” is selected for the engine oil pressure warning. The inputs can be special functions. The inputs can be PRCM discrete inputs. The inputs can be data from the ECM. Refer to Testing And Adjusting, “Display Codes” tables 1, 2, and 3. Refer to these tables for a listing of terms of the input codes.

After selecting an input, press the “LEFT” and “RIGHT” button. This will allow the operator to proceed to step **5**.

5. Select All State.

Characters “1” through “12” should now be flashing. This state allows the operator to select all the changes that will be programmed. This state also allows the operator to disregard the previous changes.

The upper display will flash until the “SELECT” button is pushed in order to accept previous selections. The upper display will flash until the “LEFT” and “RIGHT” button is pushed in order to reject the previous selections. If the “SELECT” button is pushed, the display stops flashing for two seconds in order to show that the selections have been programmed successfully into the PRCM. The program returns to Step **1** in order to allow the user to continue programming the remaining outputs and inputs.

If the “LEFT” and “RIGHT” button is pushed, the program returns immediately to Step **1**, but the previous selections are NOT programmed into the PRCM.

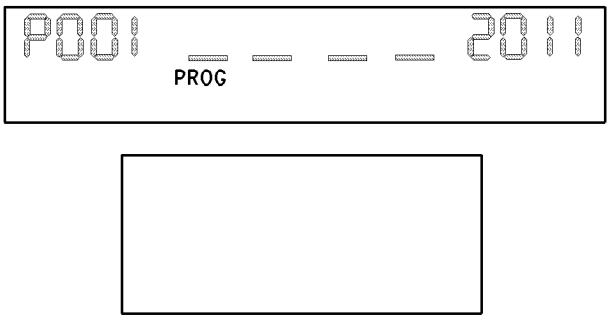


Illustration 24 g00711864

PRCM Displays After Programming

6. Press the “ENTER” button in order to exit the programming mode.

The following illustration represents an inactive input and output. When the ECM detects a low engine oil pressure condition that is within a specific alarm range the data for this condition is sent to the PRCM via the CAT data link. The PRCM will display characters “5” through “8” as being active. The “K1” symbol will be shown on the lower display to show that this relay is activated. The normally open contacts will close. The device that is connected to the output will activate.

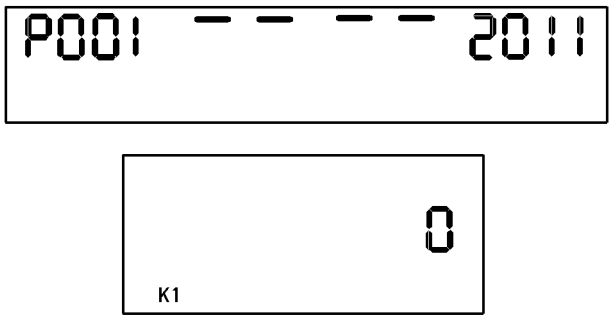


Illustration 25 g00711875

PRCM Display With Active Input (Low Oil Pressure Warning From ECM)

In another example, the PRCM input and output has been programmed to activate alarm “1” whenever switch input 1 is inactive. The top LED display will be activated. Characters “5” and “6” show that the output is active. Characters “7” and “8” show that the input is inactive. The colon between characters “6” and “7” indicates that the output state is inverted from the input state.

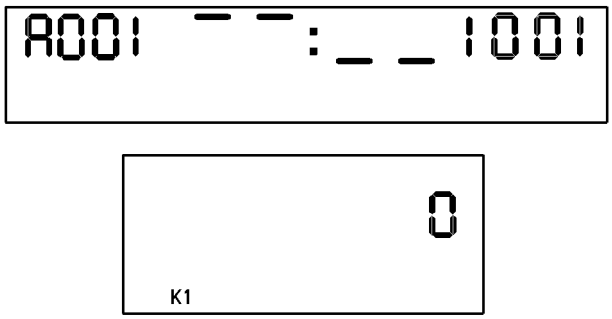


Illustration 26 g00711922

PRCM Displays With Inactive Input (Switch Input 1)

Note: All outputs can be programmed, even if no RDM is present. The operator should record the programming of the inputs and outputs for future reference. This will aid the operator if the activation of one of these outputs requires troubleshooting.

AUTO Input And Output Scroll

The AUTO input and output Scrolling mode screen will be displayed when the “LEFT” and “RIGHT” button is pressed. In this mode, the display will scroll through each of the selected AUTOSCROLL outputs. There is a two second delay for each selected input and output. All of the outputs will be displayed if none of the outputs are selected for AUTOSCROLL.

The “UP”, “DOWN” and “SELECT” buttons are inactive. Refer to the manual input and output scrolling mode section for the operation of the remaining buttons.

The “LEFT” and “RIGHT” button toggles the program back to manual input and output scrolling mode. If none of the outputs have been selected on the manual input and output scroll mode, all of the outputs will scroll on the upper display when the “LEFT” and “RIGHT” button is pushed.

The following illustration 27 shows the activation of the previous examples.

1. The manual input and the manual output screen uses the “UP” and “DOWN” buttons in order to view the input and output selection “A001 1001”. Press the “SELECT” button in order to activate this selection for viewing on the AUTOSCROLL screen. The letter “A” will appear in the lower right corner of the upper display.

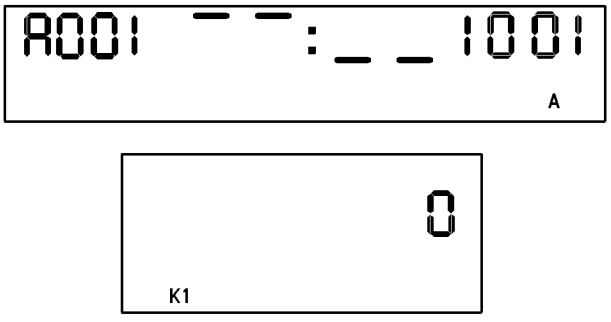


Illustration 27 g00711949

AUTOSCROLL Viewing Of “A001 1001” Selection

2. Press the “UP” or “DOWN” button in order to show the input and output selection “P001 2011”. Press the “SELECT” button. The letter “A” appears in the lower right corner of the upper display.

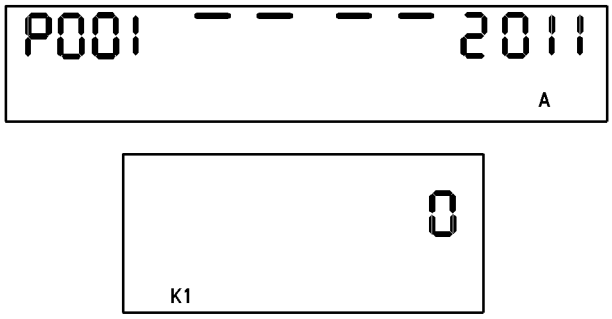


Illustration 28 g00711951

AUTOSCROLL Viewing Of “P001 2011” Selection

3. Press the “LEFT” and “RIGHT” button in order to go to the AUTOSCROLL screen. The input and output selections will scroll on the displays. The letter “A” will not be shown in the lower “RIGHT” corner. In this example, the associated input is active. The symbol “K1” will be visible when the input and output selections scroll. The upper LED display will be ON when the input and output selections scroll. The alarm for the LED display will be activated when the associated input is inactive and the output is active from the input state.

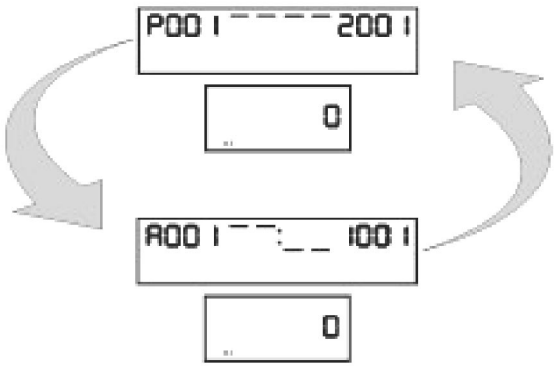


Illustration 29 g00711952

AUTOSCROLL Screen With “P001 2001” And “A001 1001” Input And Output Selections Activated. These Two Screens Will Continue To Be Repeated.

i01351256

Diagnostic Code Viewing and Clearing

SMCS Code: 1927

You can only view diagnostic codes and clear diagnostic codes by going through the I/O Monitoring/Programming Menu. The menu can only be accessed when an active diagnostic code or a logged diagnostic code exists. Press the “MODE” button from the initial screen of the I/O Monitoring/Programming Menu in order to reach the menu for the fault log. Pressing the “MODE” button again will toggle the display to the Setpoint Viewing/Programming Menu. The upper display shows the “CID” (Component Identifier), “FMI” (Failure Mode Identifier), and the occurrence “COUNT”. The example that is shown in illustration 30 indicates that an internal relay has failed.

- “CID 477” indicates that Relay 1 of the PRCM is the failed component.
- The “FMI 4” indicates that the diagnostic code is a shorted relay coil.
- “COUNT 1” indicates that the diagnostic code has happened one time.

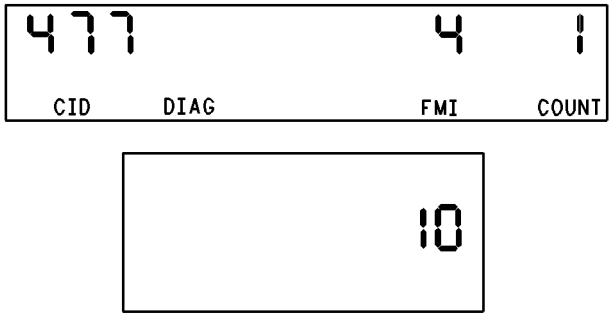


Illustration 30 g00713050

Displays of menu for viewing diagnostic codes

Refer to the Troubleshooting, “Troubleshooting Diagnostic Codes” for all definitions for diagnostic codes . When the “DIAG” symbol is FLASHING, the diagnostic code is active. The diagnostic code is present now. When the “DIAG” symbol is ON continuously, the diagnostic code is inactive. The diagnostic code is recorded in the fault log. The lower display shows the engine hours at the first occurrence of the diagnostic code and the last occurrence of the diagnostic code. The display will toggle between the two readings at an interval of two seconds . The illustration shows that the diagnostic code occurred at 10 engine hours.

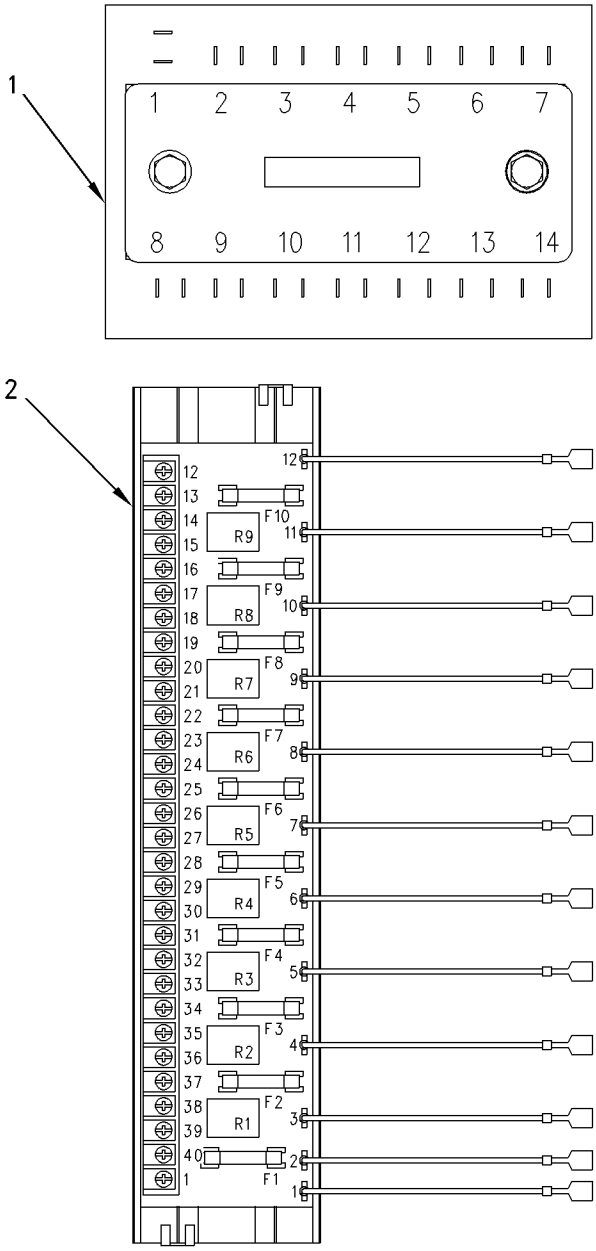
The following buttons are active in the mode for clearing diagnostic codes and viewing diagnostic codes:

- The “UP” button scrolls up the list of diagnostic codes.
- The“DOWN” button scrolls down the list of diagnostic codes.
- The “SELECT” button will clear an inactive diagnostic code when the button is held for two seconds. If the diagnostic code is active, the “SELECT” button will reset the “COUNTS” back to zero. The hours for the engine can be reset to the current reading when the diagnostic code is inactive.
- The “MODE” button Jumps to the setpoint viewing/programming menu.

i01344642

Relay Driver Module

SMCS Code: 1927



g00710264

Illustration 31

Optional Relay Driver Module And Relay Board

The Relay Driver Module (RDM) is an optional module. The RDM will increase the number of available outputs on the PRCM. Each RDM provides nine additional outputs. The outputs of the RDM are individually controlled by a serial data link from the PRCM. The outputs may drive the optional relay board. The outputs can be directly connected to horns, lamps, or other devices. The relay board contains nine relays. Each relay has a set of normally open contacts and each relay has a set of normally closed contacts. These relays are distinct from the seven relays that are contained within the PRCM Relay Module. These relays are in addition to the seven relays that are contained within the PRCM Relay Module. These relays are located on the rear of the PRCM. Once the output of the RDM is activated, the RDM will remain energized. The output will remain energized until the condition is cleared. The PRCM has two separate serial data links that enable the PRCM to be connected to two RDM'S.

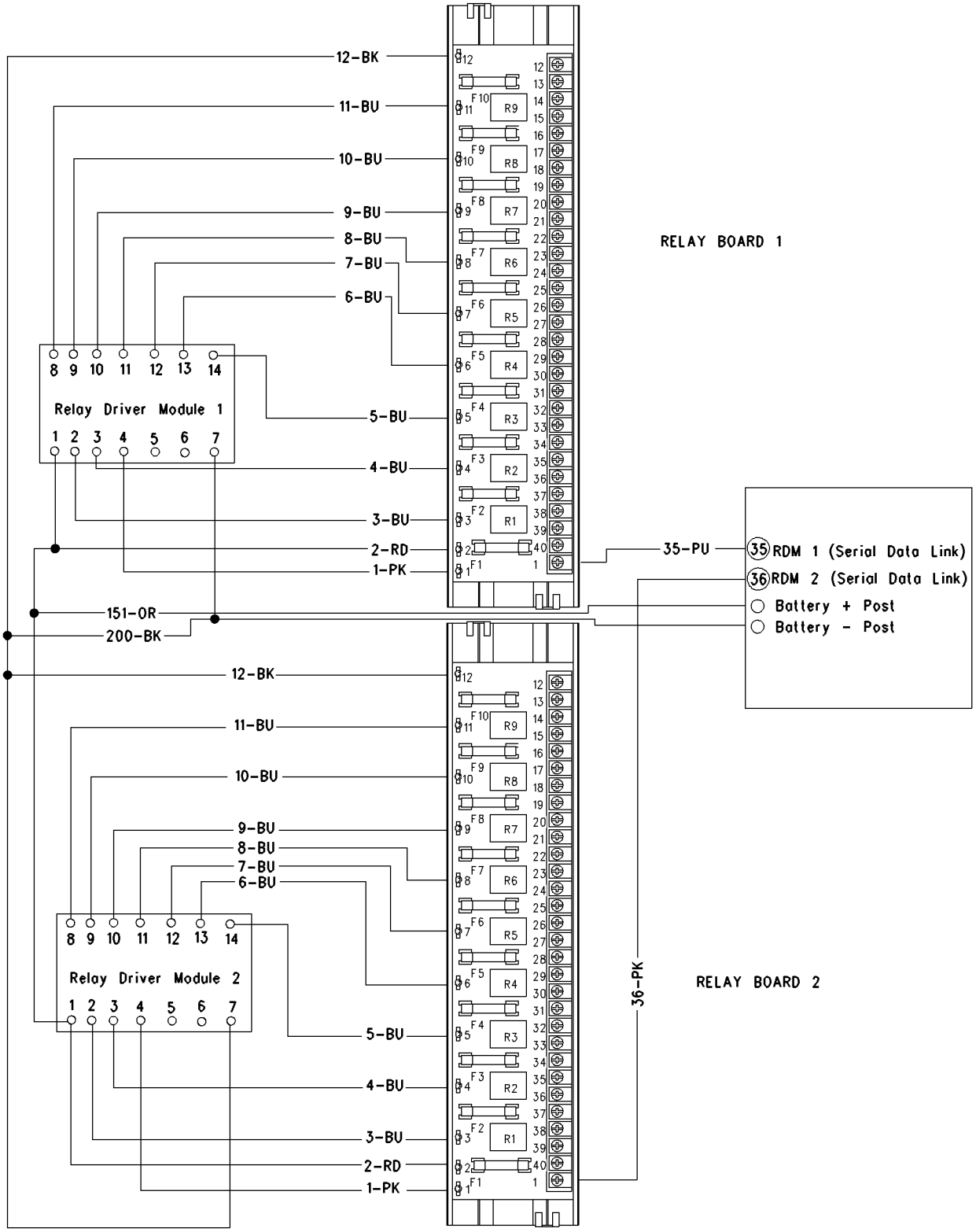


Illustration 32

g00710266

Output Test

The RDM will activate all outputs for ten seconds after the RDM receives an output signal. The RDM will activate for ten seconds unless the signal is deactivated. The test of the output signal is activated by connecting terminal 5 of the RDM to terminal 7 of the RDM.

Data Link

When the data link malfunctions, R1 output (terminal 2 of RDM) will be activated on and off at a rate of 0.5 Hz. Relays R2 through R9 will maintain the current status. Relays R2 through R9 could default to the OFF position. This is controlled by a jumper between terminal 6 and terminal 7 of the RDM. If the serial data link has a fault and a jumper is NOT present, the relay outputs (R2 through R9) will maintain the current status. If the jumper is present, R2 through R9 will default to the OFF position.

Specifications

- The maximum length of wire between the RDM and the PRCM is 305 m (1000 ft).
- The operating voltage range is from 15 to 45 DCV. The RDM is designed to operate when the RDM is powered by 24 DCV or when the RDM is powered by 32 DCV.
- The RDM is capable of operating with an earth ground or without an earth ground.
- The RDM must share a common ground with the PRCM and the relay board.
- The terminals that are on the RDM are push on blade connectors. The connectors are 6.4 mm (0.25 inch).
- The screw terminals on the relay board are a 6-32 thread.
- The driver outputs of the RDM are intended to drive incandescent lamps. Also, the driver outputs of the RDM are intended to power relay loads. The driver outputs sink up to 600 mA at 15 DCV to 45 DCV. The driver outputs of the RDM are protected against short circuits to “+B”. Also, the driver outputs of the RDM are protected against short circuits to “-B”.
- The relay outputs of the relay board are protected by 1 amp fuses. The contacts are flashed with silver. The contacts are rated at 1 amp at 28 DCV. The relay coils draw 20 mA at 24 DCV.

Troubleshooting Section

Introduction

i01351657

General Information

SMCS Code: 1927

⚠ WARNING

Personal injury or death can result from high voltage.

When power generation equipment must be in operation to make tests and/or adjustments, high voltage and current are present.

Improper test equipment can fail and present a high voltage shock hazard to its user.

Make sure the testing equipment is designed for and correctly operated for high voltage and current tests being made.

When servicing or repairing electric power generation equipment:

- **Make sure the unit is off-line (disconnected from utility and/or other generators power service) , and either locked out or tagged DO NOT OPERATE.**
- **Remove all fuses.**
- **Make sure the generator engine is stopped.**
- **Make sure all batteries are disconnected.**
- **Make sure all capacitors are discharged.**

Failure to do so could result in personal injury or death. Make sure residual voltage in the rotor, stator and the generator is discharged.

⚠ WARNING

When the engine-generator, or any source to which the engine-generator is synchronized to, is operating, voltages up to 600V are present in the control panel.

Do not short these terminal with line voltage to ground with any part of the body or any conductive material. Loss of life or injury could result from electrical shock or injury from molten metal.

⚠ WARNING

Do not connect generator to a utility electrical distribution system unless it is isolated from the system. Electrical feedback into the distribution system can occur and could cause personal injury or death.

Open and secure main distribution system switch, or if the connection is permanent, install a double throw transfer switch to prevent electrical feedback. Some generators are specifically approved by a utility to run in parallel with the distribution system and isolation may not be required. Always check with your utility as to the applicable circumstances.

i01351653

Service Tools

SMCS Code: 0785

The following service tools should be used to aid in troubleshooting the electrical system.

Table 3

REQUIRED SERVICE TOOLS		
Part Number	**Qty**	**Description**
-	1	Hex Wrench (4 mm)(1).
4C-3406	1	Connector Repair Kit (Deutsch)
6V-7070	1	Digital Multimeter
9U-7330	1	Digital Multimeter

(1) The wrench is required in order to fasten the connector on the PRCM.

i01351676

Fault Identification

SMCS Code: 1927-035

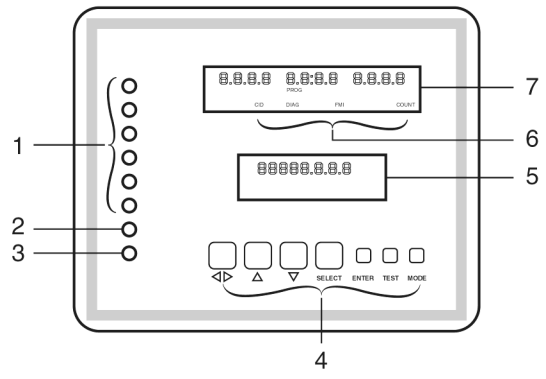
Table 4

FAULT IDENTIFICATION			
LED	**Diagnostic Code**	**DIAG Indicator**	**Alarm/ Fault Type**
Internal Fault	CID FMI	Flashing	Active Internal Diagnostic Code
Alarm Fault	CID FMI	Flashing	Active System Fault
None	CID FMI	Continuous	Inactive (Logged) Diagnostic Code

Note: Refer to Troubleshooting, “Troubleshooting Diagnostic Codes” of the PRCM for additional information.

Fault Identification Procedure

Diagnostic codes or alarms that are detected by the PRCM are shown in the display area of the PRCM. The PRCM uses the LED displays and diagnostic codes on the upper display in order to inform service personnel about a specific problem. Perform the following procedure in order to identify the diagnostic code that was detected by the PRCM.



g00713266

Illustration 33

Display area of the Programmable Relay Control Module

(1) Red LED display of the programmable alarm
(2) Red LED display of the internal alarm fault
(3) Yellow LED display of the alarm fault
(4) Keypad
(5) Lower LCD display
(6) “CID”, “DIAG”, “FMI”, “PROG”, and “COUNT”
(7) Upper LCD display

1. Determine the LED display that is active on the left side of the PRCM (1), (2), or (3).
2. View the diagnostic code on upper display (7) of the PRCM. If necessary, press the “MODE” button in order to obtain the Diagnostic Code Viewing/Clearing screen.
3. The status of the “DIAG” display area (6):
   - BLANK
   - FLASHING
   - CONTINUOUSLY ON
4. Use the first column of table 4 and identify a condition from step 3. Then, locate the alarm fault indicator that is activated.
5. Use the second column of table 4 and find the diagnostic code that is shown on the upper display.
6. Use the third column of table 4 which describes the status of the “DIAG” indicator.
7. Read the last column in order to find the type of diagnostic code. Refer to Troubleshooting, “Troubleshooting Diagnostic Codes” of the PRCM for additional information.

Note: See Testing and Adjusting, “Electrical Connector Inspect” in order to troubleshoot connectors. This procedure is useful for problems that are intermittent.

Diagnostic Code Procedures

i01352362

Troubleshooting Diagnostic Codes

SMCS Code: 1927-035; 7569

Diagnostic codes are associated with failed electrical components or circuits that provide information to the PRCM. Diagnostic codes are also associated with failed electrical components or circuits, that receive information from the PRCM. The diagnostic code closely identifies the cause of the failure.

Each diagnostic code consists of the following items: a component identifier (CID), a failure mode identifier (FMI), and a fault indicator (“DIAG”). These items are shown on the upper display. A fault indicator can be active or inactive. The CID identifies the component that has failed in the system. The FMI describes the nature of the problem. When the “DIAG” indicator is FLASHING, the diagnostic code is active. This means that the diagnostic code is present. When the “DIAG” indicator is ON CONTINUOUSLY, the diagnostic code is inactive and the CID FMI is recorded in the fault log. See Systems Operation, “Diagnostic Code Viewing and Clearing” in order to view the fault log. When the “DIAG” indicator is not showing, there are NO diagnostic codes that are detected or recorded. Service personnel interpret the identifiers in order to assist with troubleshooting.

The PRCM has a fault log to help with troubleshooting of diagnostic codes. Inactive diagnostic codes (CID FMI) are recorded in the fault log for viewing at a later time. Also, the number of occurrences are totalled and the number of occurrences are shown on the upper display with the CID and the FMI.

During troubleshooting, it is sometimes necessary to disconnect the harness connector from the PRCM and a diagnostic code of CID 0590 FMI 09 is created. An FMI 09 describes the voltage that is above normal. This fact is also used as an aid in the troubleshooting process. Clear these created diagnostic codes after the particular problem is corrected and the diagnostic code is cleared.

Note: The CID 590 FMI 09 will NOT be logged if the setpoint “P03” is set to “01”. Refer to Systems Operation, “Setpoint Viewing and Programming”.

Table 5

DIAGNOSTIC CODES for the PRCM	
For troubleshooting, see the procedure with the same CID and FMI.	
CID / FMI	**Description**
CID 0248 CAT data link:	
FMI 11	Short to + Battery or a short to – B of either CAT data link wire.
CID 0268 PRCM Internal Memory:	
FMI 02	Signal out of range.
CID 0333 Relay Driver Module (A):	
FMI 03	Voltage above normal.
FMI 04	Voltage below normal.
CID 0334 Relay Driver Module (B):	
FMI 03	Voltage above normal.
FMI 04	Voltage below normal.
CID 0477 PRCM Output Relay (1):	
FMI 03	Relay coil open circuit.
FMI 04	Relay coil short circuit.
CID 0478 PRCM Output Relay (2):	
FMI 03	Relay coil open circuit.
FMI 04	Relay coil short circuit.
CID 0479 PRCM Output Relay (3):	
FMI 03	Relay coil open circuit.
FMI 04	Relay coil short circuit.
CID 0480 PRCM Output Relay (4):	
FMI 03	Relay coil open circuit.
FMI 04	Relay coil short circuit.
CID 0481 PRCM Output Relay (5):	
FMI 03	Relay coil open circuit.
FMI 04	Relay coil short circuit.
CID 0482 PRCM Output Relay (6):	
FMI 03	Relay coil open circuit.
FMI 04	Relay coil short circuit.
CID 0483 PRCM Output Relay (7):	
FMI 03	Relay coil open circuit.
FMI 04	Relay coil short circuit.
CID 0590 ECM:	
FMI 09	ECM is not communicating to the PRCM.

i01353172

PRCM CID 0248 - FMI 11

SMCS Code: 1927-035

Conditions Which Generate This Code:

This diagnostic code is recorded when the engine ECM cannot send information or the ECM does not receive the expected information from the CAT data link.

The PRCM uses the CAT data link in order to communicate with the engine ECM. The CAT data link consists of two wires. The wires connect the PRCM to the ECM. If the CAT data link fails, the relays will remain in the state required by the last valid input state, unless the relays are programmed to reset to the OFF position. Refer to Systems Operation, “Setpoint Viewing And Programming”.

Note: The PRCM will not communicate properly with the engine ECM if the data link cable exceeds 30.5 m (100 ft). See Specifications, “Electrical” for additional information.

Note: The PRCM is capable of being programmed in order to treat diagnostic codes for the ECM in one of two ways.

- Setpoint P03 is 1. The PRCM will display CID 0590 FMI 09 and the PRCM will display CID 0248 FMI 11. The diagnostic codes are displayed as being active. When the diagnostic codes are inactive, the diagnostic codes will NOT be logged.

- Setpoint P03 is 2. The PRCM will display CID 0590 FMI 09 and the PRCM will display CID 0248 FMI 11. The diagnostic codes are displayed as being active. When the diagnostic codes are inactive, the diagnostic codes will be logged.

Test Step 1. INSPECT HARNESS CONNECTORS

A. Inspect the harness connections that are related to the data link.

B. Make sure that connectors are free of dirt, moisture and debris. Ensure that the connections are tight.

C. If necessary, repair the harness or replace the harness.

D. Check the status of the diagnostic code indicator.

Expected Result:

The diagnostic code indicator is ON.

Results:

- YES – The diagnostic code indicator is ON. The diagnostic code remains present. Proceed to test step 2.

- NO – The diagnostic code indicator is OFF and a harness connection has failed. The diagnostic code is not active. An intermittent connection exists in the data link circuits of the harness. Watch for a recurrence of this diagnostic code. STOP.

Test Step 2. CHECK FOR A SHORTED HARNESS

A. If equipped, turn the disconnect switch to the OFF position. If the system is NOT equipped with a disconnect switch, disconnect the battery negative cable.

B. Disconnect the wiring harness connector from the engine ECM and disconnect the wiring harness connector from the PRCM.

C. At the harness connector for the PRCM, measure the resistance from contact 19 to RM1 and RM28. Then, measure the resistance from contact 20 to RM1 and RM28.

Expected Result:

The resistance is greater than 5000 Ohms for each measurement.

Results:

- YES – The resistance is greater than 5000 Ohms for each measurement. The resistance is correct. Proceed to test step 3.

- NO – Resistance is less than 5000 Ohms for one or more of the measurements. The short is in the circuit with the low resistance measurement.

  Repair: Repair the wiring harness or replace the wiring harness.

  STOP.

Test Step 3. CHECK THE ENGINE ECM

A. Disconnect the harness from the engine ECM.

B. If equipped, turn the disconnect switch and the ECS to the ON position or reconnect the battery negative cable.

C. Use the “DIAG” indicator in order to check the status of the diagnostic code.

Expected Result:

The “DIAG” indicator is ON.

Results:

- YES – The “DIAG” indicator is ON. The diagnostic code remains present. Proceed to test step 4.
- NO – There is a problem with the engine ECM. It is unlikely that the engine ECM has failed. Exit this procedure and perform this diagnostic code procedure again.

  Repair: See Troubleshooting, SENR1003, “3500B EPG Engines” or Troubleshooting, SENR1008, “Marine Engines” prior to replacing the ECM.

  Clear the diagnostic code from the fault log after troubleshooting is complete.

  STOP.

Test Step 4. CHECK THE PRCM

A. Disconnect the wiring harness from the back of the PRCM.

Note: Diagnostic codes are created when the harness connector is disconnected from the PRCM during the troubleshooting procedures. Clear these created diagnostic codes after the particular problem is corrected.

B. Verify that the diagnostic code is active.

Expected Result:

The “DIAG” indicator is OFF. The diagnostic code is NOT active.

Results:

- YES – The “DIAG” indicator is OFF. The diagnostic code is NOT active. The PRCM has failed.

  Repair: Replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

  STOP.

- NO – The “DIAG” indicator is ON. The diagnostic code remains present. The problem is intermittent. Clear the diagnostic code from the fault log and watch for a recurrence. STOP.

i01354040

PRCM CID 0268 - FMI 02

SMCS Code: 1927-035

Conditions Which Generate This Code:

A portion of memory within the PRCM will store the important setpoint information.

CID 0268 FMI 02 is present when the setpoint data is invalid, or the setpoint data is out of range. When a diagnostic code is detected, the PRCM will set the affected setpoints to the default value. For additional information regarding the setpoints and the default values, see the topics that are listed below.

- Systems Operation, “Setpoint Viewing and Programming”
- Systems Operation, “Input/Output Monitoring and Programming”

The possible causes of this diagnostic code are listed:

- Electrical interference
- A sudden power loss during a programming session

Clear the diagnostic code from the fault log after the troubleshooting procedure is completed.

Test Step 1. CHECK THE SETPOINTS

View the setpoints that are stored in the memory of the PRCM. Compare the existing setpoints with the setpoints that are selected by the operator. See Systems Operation, “Setpoint Viewing and Programming” and Systems Operation, “Input/Output Monitoring and Programming”.

Expected Result:

The stored setpoints and the specified setpoints match.

Results:

- OK – The stored setpoints and the specified setpoints match. Proceed to test step 2.
- NOT OK – One or more of the setpoints do not match.

Repair: Reprogram the setpoints to the proper value or reprogram the setpoints to a value that is selected by the operator.

Proceed to test step 2.

Test Step 2.

Disconnect the + battery lead and the negative battery lead to the PRCM. Check for an active diagnostic code.

Expected Result:

The diagnostic code is NOT active.

Results:

- OK – The diagnostic code is NOT active. STOP.
- NOT OK – The diagnostic code is active.

  Repair: If the diagnostic code remains active, replace the PRCM. See Testing and Adjusting, “PRCM- Replace”.

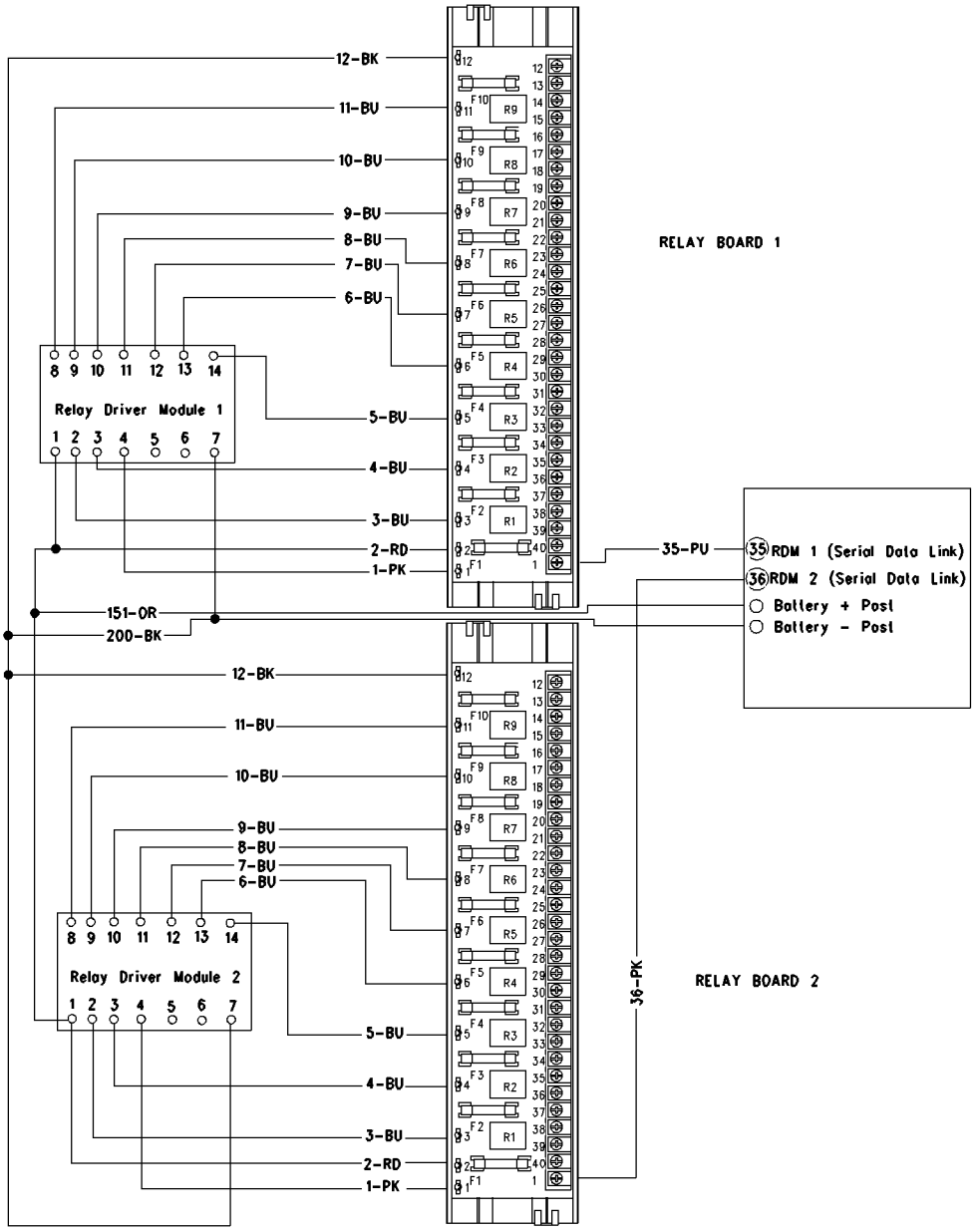
  STOP.

i01354350

PRCM CID 0333 - FMI 03

SMCS Code: 1927-035

Conditions Which Generate This Code:



g00715369

Illustration 34

System schematic of the PRCM, relay driver module and relay boards

The RDM communicates with the PRCM by a serial data link. When the data link malfunctions, the “R1” output (terminal 2 of the RDM) will flash at a rate of .5 Hz. Relays “R2” through “R9” will maintain the present state or relays “R2” through “R9” will default to the OFF position. This is controlled by a jumper between terminal 6 and terminal 7 of the RDM. If the jumper is NOT present and the serial data link has a failure, relays “R2” through “R9” will remain in the present state. If the jumper is present, relays “R2” through “R9” will default to the OFF position.

Note: The maximum number of the RDM or the Customer Interface Module (CIM) that may be connected to the serial data link is equal to two. The maximum distance between a module and the PRCM is 305 m (1000 ft). The LED indicators for the RDM may start flashing if the specifications for the maximum distances are not met. The PRCM may display a CID 0333 FMI 03. If the setup is not in compliance with the specifications, reduce the number of modules and/or shorten the distance to the modules.

Note: The following procedure can create numerous related diagnostic codes. When all harnesses are reconnected, the related diagnostic codes will be shown as being not active. Clear all related diagnostic codes after this procedure is completed.

The possible cause of a CID 0333 FMI 03 is a short to “B+” and the wire connected to contact 35 of the PRCM.

The PRCM treats a CID 0333 FMI 03 as an alarm. Clear the diagnostic code from the fault log after the troubleshooting procedure is completed.

Note: Check the terminal strips on the subpanel for a short when a CID 0333 FMI 03 is active on the upper display and no alarm module is installed. Perform the check from the signal wire to “B+”. Also, check the customer connection box for a short from the alarm data signal wire to “B+”.

Test Step 1. CHECK IF THE DIAGNOSTIC CODE IS ACTIVE.

A. Turn the engine control switch (ECS) to the OFF/RESET position and then turn the ECS to the STOPposition.

B. Press the “MODE” button.

Note: The “MODE” button is accessed from the diagnostic code viewing/clearing menu.

C. Observe the upper display for a CID 0333 FMI 03. The diagnostic code is active if the upper display shows a CID 0333 FMI 03.

D. If the diagnostic code is not showing, enter the service mode and view the fault log. Check the upper display in order to verify if the diagnostic code is active.

Note: The PRCM must be set up properly in order to view the fault log. See Systems Operation, “Setpoint Viewing and Programming”.

Expected Result:

A CID 0333 FMI 03 is active.

Results:

- OK – A CID 0333 FMI 03 is active. Proceed to test step 3.
- NOT OK – A CID 0333 FMI 03 has not occurred. The diagnostic code is NOT active. The PRCM must not have been setup in order to view logged diagnostics during the initial setup.

  Repair: The initial diagnostic code was probably caused by a poor electrical connection or a short at one of the harness connectors. See Testing and Adjusting, “Electrical Connector - Inspect”.

  Proceed to test step 2.

Test Step 2. CHECK FOR A SHORTED DATA LINK WIRE.

A. Disconnect the cable for the negative terminal for the battery or open the optional battery disconnect switch.

B. Disconnect both ends of the data link wire. Disconnect contact 35 of the PRCM and terminal 4 of the RDM.

C. Measure the resistance from the data link wire to the battery positive terminal of the PRCM.

Expected Result:

The resistance that is measured is greater than 5000 ohms.

Results:

- OK – The resistance that is measured is greater than 5000 ohms. Proceed to test step 3.
- NOT OK – The resistance that is measured is LESS than 5000 ohms. The data link wire has failed. The harness wiring has failed between the RDM and the PRCM.

  Repair: Repair the harness wiring or replace the harness wiring.

  STOP.

Test Step 3. CHECK THE RDM.

A. The cable for the negative terminal of the battery remains disconnected or the optional battery disconnect switch remains open.

B. At the RDM, measure the resistance from terminal 4 (positive meter lead) to the + battery.

Expected Result:

The resistance that is measured is greater than 5000 ohms.

Results:

- OK – The resistance that is measured is greater than 5000 ohms. Proceed to test step 4.
- NOT OK – The resistance that is measured is LESS than 5000 ohms.

  Repair: Replace the RDM.

  STOP.

Test Step 4. CHECK THE PRCM.

A. The data link wires remain disconnected.

B. Connect the cable on the negative terminal of the battery or close the optional disconnect switch.

C. Check the status of CID 0333 FMI 03.

Expected Result:

The diagnostic code is NOT active.

Results:

- OK – The diagnostic code is NOT active. The diagnostic code does NOT exist at this time.

  Repair: The initial diagnostic code was probably caused by a poor electrical connection or a short at one of the harness connectors that was disconnected and reconnected. Check the wiring for problems and resume normal operation. Watch for a recurrence of the problem.

  STOP.

- NOT OK – The diagnostic code has NOT been corrected. The PRCM may have failed.

  Repair: It is unlikely that the PRCM has failed. Exit this procedure and perform this procedure again. If the cause of the diagnostic code is not found, replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

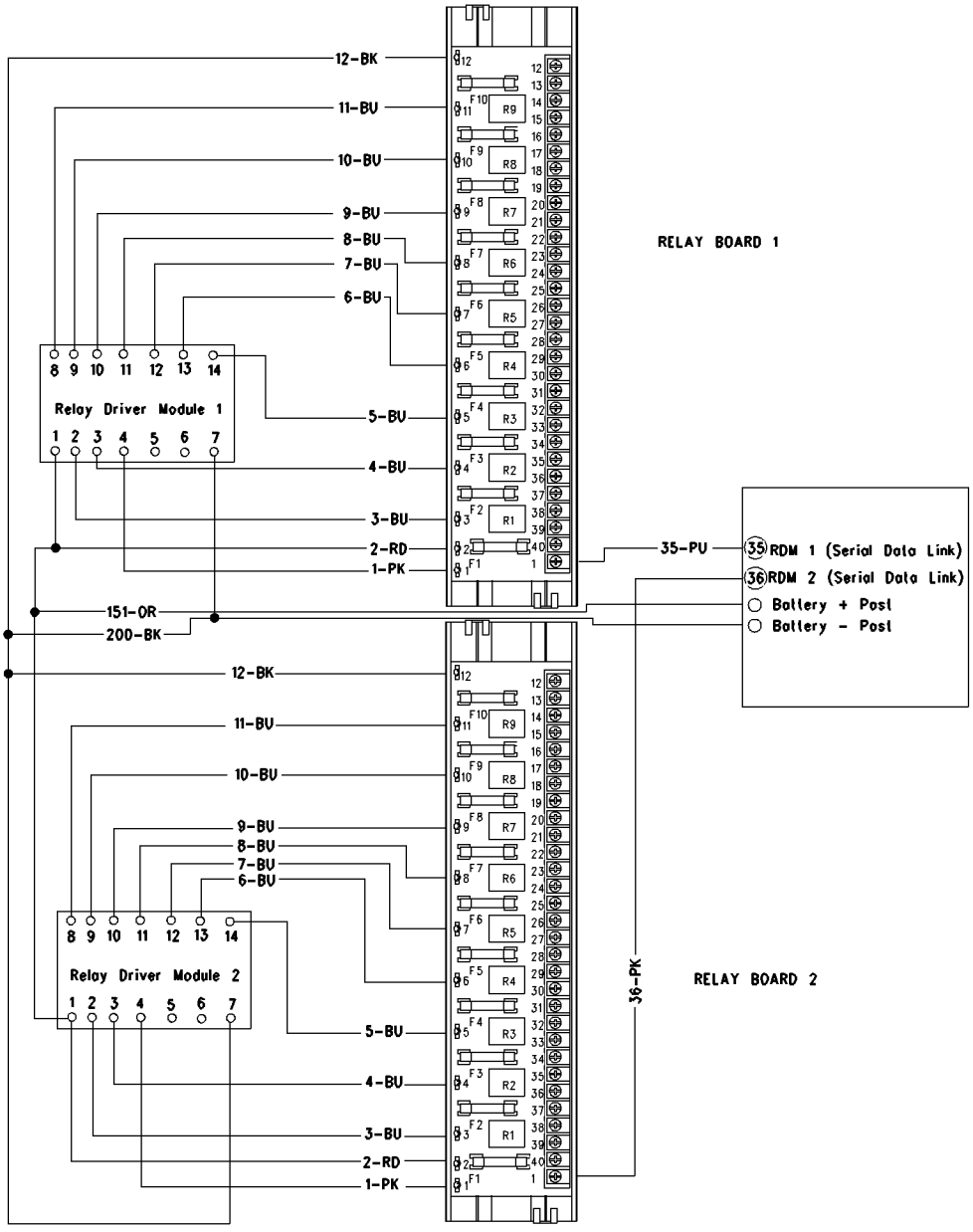
  STOP.

i01356595

PRCM CID 0333 - FMI 04

SMCS Code: 1927-035

Conditions Which Generate This Code:



g00715369

Illustration 35

System schematic of the PRCM, relay driver module and relay boards

The RDM communicates with the PRCM by a serial data link. When the data link malfunctions, the “R1” output (terminal 2 of the RDM) will flash at a rate of .5 Hz. Relays “R2” through “R9” will maintain the present state or relays “R2” through “R9” will default to the OFF position. This is controlled by a jumper between terminal 6 and terminal 7 of the RDM. If the jumper is NOT present and the serial data link has a failure, relays “R2” through “R9” will remain in the present state. If the jumper is present, relays “R2” through “R9” will default to the OFF position.

Note: The maximum number of the RDM or the Customer Interface Module (CIM) that may be connected to the serial data link is equal to two. The maximum distance between a module and the PRCM is 305 m (1000 ft). The LED indicators for the RDM may start flashing if the specifications for the maximum distances are not met. The PRCM may display a CID 0333 diagnostic code. If the setup is not in compliance with the specifications, reduce the number of modules and/or shorten the distance to the modules.

Note: The following procedure can create numerous related diagnostic codes. When all harnesses are reconnected, the related diagnostic codes will be shown as being not active. Clear all related diagnostic codes after this procedure is completed.

The possible cause of a CID 0333 FMI 04 is a short to “B-” and the wire connected to contact 35 of the PRCM.

The PRCM treats a CID 0333 FMI 04 as an alarm. Clear the diagnostic code from the fault log after the troubleshooting procedure is completed.

Note: Check the terminal strips on the subpanel for a short when a CID 0333 FMI 04 is active on the upper display and no alarm module is installed. Perform the check from the signal wire to “B+”. Also, check the customer connection box for a short from the alarm data signal wire to “B+”.

Test Step 1. CHECK IF THE DIAGNOSTIC CODE IS ACTIVE

A. Turn the engine control switch (ECS) to the OFF/RESET position and then turn the ECS to the STOP position.

B. Press the “MODE” button.

Note: The “MODE” button is accessed from the diagnostic code viewing/clearing menu.

C. Observe the upper display for a CID 0333 FMI 04. The diagnostic code is active if the upper display shows a CID 0333 FMI 04.

D. If the diagnostic code is not showing, enter the service mode and view the fault log. Check the upper display if the diagnostic code is active.

Note: The PRCM must be set up properly in order to view the fault log. See Systems Operation, “Setpoint Viewing and Programming”.

Expected Result:

A CID 0333 FMI 04 is active.

Results:

- OK – A CID 0333 FMI 04 is active. Proceed to test step 2.
- CODE NOT ACTIVE - NOT LOGGED – A CID 0333 FMI 04 has NOT occurred. The diagnostic code is NOT active. The PRCM must not have been setup in order to view logged diagnostics during the initial setup.

  Repair: The initial diagnostic code was probably caused by a poor electrical connection or a short at one of the harness connectors. See Testing and Adjusting, “Electrical Connector - Inspect”.

  STOP.
- CODE NOT ACTIVE BUT LOGGED – The diagnostic code is NOT active. The diagnostic code is logged in the fault log. The initial diagnostic was probably caused by a poor electrical connection or a short at one of the harness connectors that was disconnected and reconnected. Resume normal operation. STOP.

Test Step 2. CHECK THE PRCM.

A. Disconnect the cable on the negative terminal of the battery or open the optional battery disconnect switch.

B. Disconnect the data link wire from contact 35 of the PRCM.

C. Reconnect the cable on the negative terminal of the battery or close the optional battery disconnect switch.

D. Turn the engine control switch (ECS) to the STOP position.

Expected Result:

A CID 0333 FMI 04 is NOT active.

Results:

- OK – A CID 0333 FMI 04 is NOT active. Proceed to test step 3.
- NOT OK – A CID 0333 FMI 04 is active. The PRCM may have failed.

  Repair: It is unlikely that the PRCM has failed. Exit this procedure and perform this procedure again. Recheck the status of the diagnostic code. Replace the PRCM if the cause of the diagnostic code is not found. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

  STOP.

Test Step 3. CHECK THE RDM AND DATA LINK WIRE.

A. The data link wire remains disconnected from the PRCM.

B. Disconnect the cable on the negative terminal of the battery or open the optional battery disconnect switch.

C. Disconnect the data link wire from terminal 4 of the relay driver module.

D. Measure the resistance from the data link wire to the Battery negative on the PRCM.

Expected Result:

The resistance should be greater than 5000 ohms.

Results:

- OK – The resistance is greater than 5000 ohms. Proceed to test step 4.
- NOT OK – The resistance is greater than 5000 ohms. The data link wiring has failed.

  Repair: Repair the harness or replace the harness.

  STOP.

Test Step 4. CHECK THE RDM.

A. The cable on the negative terminal of the battery remains disconnected or the optional battery disconnect switch is open.

B. The data link wire remains disconnected.

C. Measure the resistance from terminal 4 of the relay driver module to the battery negative.

Expected Result:

The resistance should be greater than 5000 ohms.

Results:

- OK – The resistance that is measured is greater than 5000 ohms. The problem may be intermittent.

  Repair: Examine the wiring between the PRCM and the RDM for nicks, abrasions, or other damage.

  STOP.

- NOT OK – The resistance is NOT greater than 5000 ohms. The RDM has failed.

  Repair: Replace the RDM.

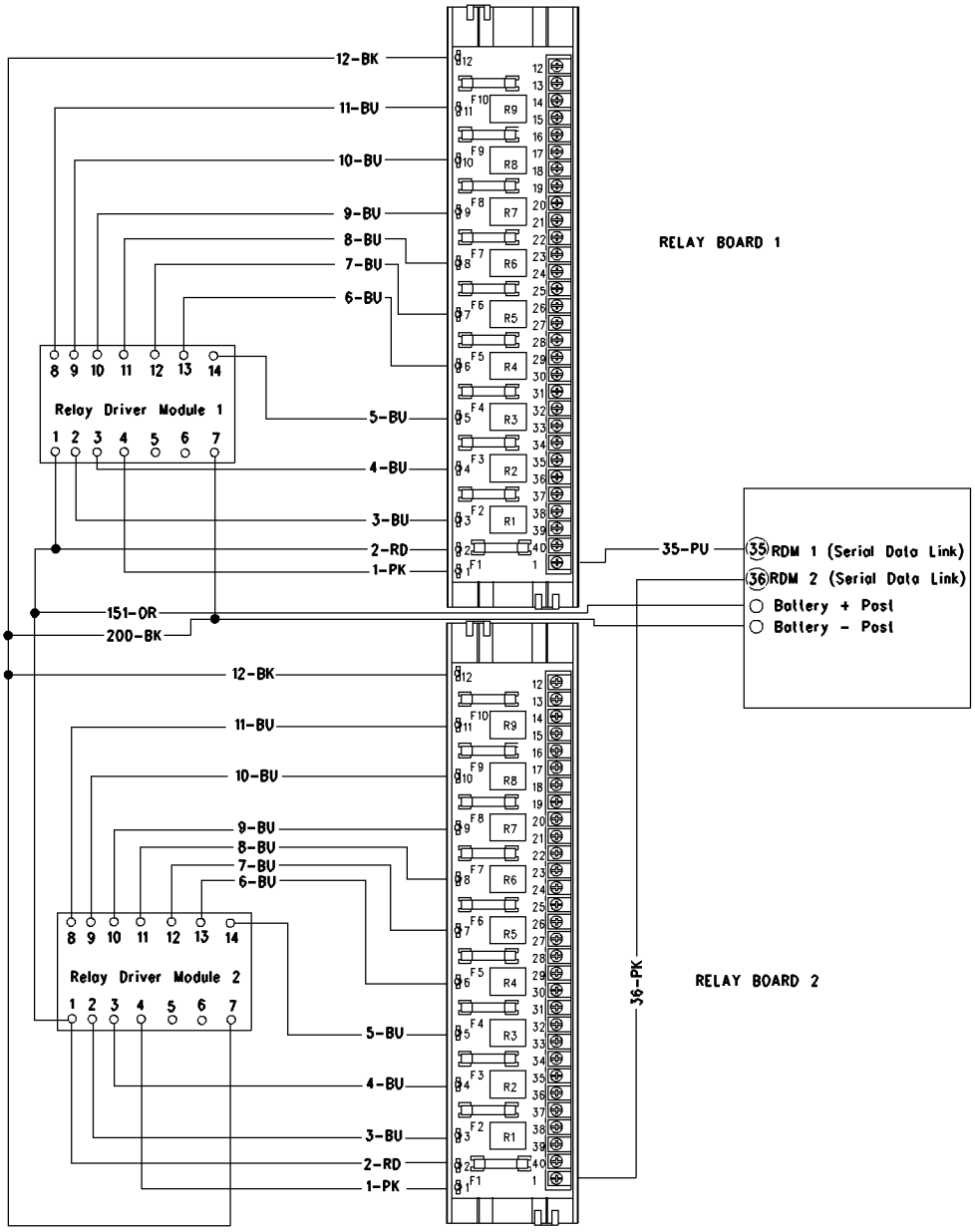
  STOP.

i01356649

PRCM CID 0334 - FMI 03

SMCS Code: 1927-035

Conditions Which Generate This Code:



g00715369

Illustration 36

System Schematic of the PRCM, Relay Driver Module and Relay Boards

The RDM communicates with the PRCM by a serial data link. When the data link malfunctions, the “R1” output (terminal 2 of the RDM) will flash at a rate of .5 Hz. Relays “R2” through “R9” will maintain the present state or relays “R2” through “R9” will default to the OFF position. This is controlled by a jumper between terminal 6 and terminal 7 of the RDM. If the jumper is NOT present and the serial data link has a failure, relays “R2” through “R9” will remain in the present state. If the jumper is present, relays “R2” through “R9” will default to the OFF position.

Note: The maximum number of the RDM or the Customer Interface Module (CIM) that may be connected to the serial data link is equal to two. The maximum distance between a module and the PRCM is 305 m (1000 ft). The LED indicators for the RDM may start flashing if the specifications for the maximum distances are not met. The PRCM may display a CID 0334 diagnostic code. If the setup is not in compliance with the specifications, reduce the number of modules and/or shorten the distance to the modules.

Note: The following procedure can create numerous related diagnostic codes. When all harnesses are reconnected, the related diagnostic codes will be shown as being not active. Clear all related diagnostic codes after this procedure is completed.

The possible cause of a CID 0334 FMI 03 is a short to “B+” and the wire connected to contact 35 of the PRCM.

The PRCM treats a CID 0334 FMI 03 diagnostic code as an alarm. Clear the diagnostic code from the fault log after the troubleshooting procedure is completed.

Note: Check the terminal strips on the subpanel for a short when a CID 0334 FMI 03 diagnostic code is active on the upper display and no alarm module is installed. Perform the check from the signal wire to “B+”. Also, check the customer connection box for a short from the alarm data signal wire to “B+”.

Test Step 1. CHECK IF THE DIAGNOSTIC CODE IS ACTIVE.

A. Turn the engine control switch (ECS) to the OFF/RESET position and then turn the ECS to the STOPposition.

B. Press the “MODE” button.

Note: The “MODE” button is accessed from the diagnostic code viewing/clearing menu.

C. Observe the upper display for a CID 0334 FMI 03. The diagnostic code is active if the upper display shows a CID 0334 FMI 03.

D. If the diagnostic code is not showing, enter the service mode and view the fault log. Check the upper display in order to verify if the diagnostic code is active.

Note: The PRCM must be set up properly in order to view the fault log. See Systems Operation, “Setpoint Viewing and Programming”.

Expected Result:

A CID 0334 FMI 03 is active.

Results:

- OK – A CID 0334 FMI 03 is active. Proceed to test step 3.

- NOT OK – A CID 0334 FMI 03 has not occurred. The diagnostic code is NOT active. The PRCM must not have been setup in order to view logged diagnostics during the initial setup.

  Repair: The initial diagnostic code was probably caused by a poor electrical connection or a short at one of the harness connectors. See Testing and Adjusting, “Electrical Connector - Inspect”.

  Proceed to test step 2.

Test Step 2. CHECK FOR A SHORTED DATA LINK WIRE.

A. Disconnect the cable for the negative terminal for the battery or open the optional battery disconnect switch.

B. Disconnect both ends of the data link wire. Disconnect contact 35 of the PRCM and terminal 4 of the RDM.

C. Measure the resistance from the data link wire to the battery positive terminal of the PRCM.

Expected Result:

The resistance that is measured is greater than 5000 ohms.

Results:

- OK – The resistance that is measured is greater than 5000 ohms. Proceed to test step 3.

- NOT OK – The resistance that is measured is LESS than 5000 ohms. The data link wire has failed. The harness wiring has failed between the RDM and the PRCM.

  Repair: Repair the harness wiring or replace the harness wiring.

  STOP.

Test Step 3. CHECK THE RDM.

A. The cable for the negative terminal of the battery remains disconnected or the optional battery disconnect switch remains open.

B. At the RDM, measure the resistance from terminal 4 (positive meter lead) to the + battery.

Expected Result:

The resistance that is measured is greater than 5000 ohms.

Results:

- OK – The resistance that is measured is greater than 5000 ohms. Proceed to test step 4.
- NOT OK – The resistance that is measured is LESS than 5000 ohms.

  Repair: Replace the RDM.

  STOP.

Test Step 4. CHECK THE PRCM.

A. The data link wires remain disconnected.

B. Connect the cable on the negative terminal of the battery or close the optional disconnect switch.

C. Check the status of CID 0334 FMI 03.

Expected Result:

The diagnostic code is NOT active.

Results:

- OK – The diagnostic code is NOT active. The diagnostic code does NOT exist at this time.

  Repair: The initial diagnostic code was probably caused by a poor electrical connection or a short at one of the harness connectors that was disconnected and reconnected. Check the wiring for problems and resume normal operation. Watch for a recurrence of the problem.

  STOP.

- NOT OK – The diagnostic code has NOT been corrected. The PRCM may have failed.

  Repair: It is unlikely that the PRCM has failed. Exit this procedure and perform this procedure again. If the cause of the diagnostic code is not found, replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

  STOP.

i01356695

PRCM CID 0334 - FMI 04

SMCS Code: 1927-035

Conditions Which Generate This Code:

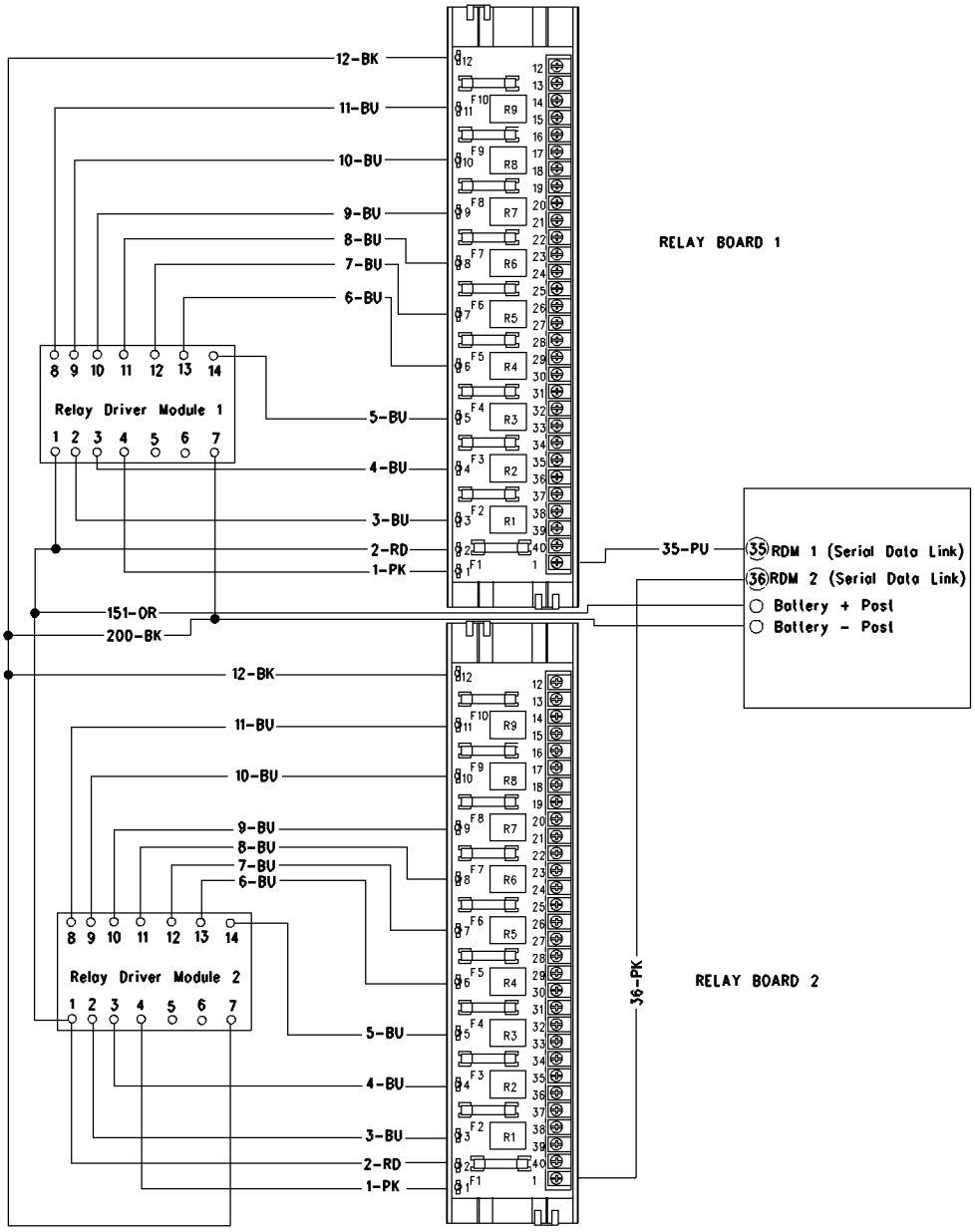


Illustration 37

g00715369

System schematic of the PRCM, relay driver module and relay boards

The RDM communicates with the PRCM by a serial data link. When the data link malfunctions, the “R1” output (terminal 2 of the RDM) will flash at a rate of .5 Hz. Relays “R2” through “R9” will maintain the present state or relays “R2” through “R9” will default to the OFF position. This is controlled by a jumper between terminal 6 and terminal 7 of the RDM. If the jumper is NOT present and the serial data link has a failure, relays “R2” through “R9” will remain in the present state. If the jumper is present, relays “R2” through “R9” will default to the OFF position.

Note: The maximum number of the RDM or the Customer Interface Module (CIM) that may be connected to the serial data link is equal to two. The maximum distance between a module and the PRCM is 305 m (1000 ft). The LED indicators for the RDM may start flashing if the specifications for the maximum distances are not met. The PRCM may display a CID 0334 FMI 04. If the setup is not in compliance with the specifications, reduce the number of modules and/or shorten the distance to the modules.

Note: The following procedure can create numerous related diagnostic codes. When all harnesses are reconnected, the related diagnostic codes will be shown as being not active. Clear all related diagnostic codes after this procedure is completed.

The possible cause of a CID 0334 FMI 04 is a short to “B-” and the wire connected to contact 35 of the PRCM.

The PRCM treats a CID 0334 FMI 04 as an alarm. Clear the diagnostic code from the fault log after the troubleshooting procedure is completed.

Note: Check the terminal strips on the subpanel for a short when a CID 0334 FMI 04 diagnostic code is active on the upper display and no alarm module is installed. Perform the check from the signal wire to “B+”. Also, check the customer connection box for a short from the alarm data signal wire to “B+”.

Test Step 1. CHECK IF THE DIAGNOSTIC CODE IS ACTIVE

A. Turn the engine control switch (ECS) to the OFF/RESET position and then turn the ECS to the STOP position.

B. Press the “MODE” button.

Note: The “MODE” button is accessed from the diagnostic code viewing/clearing menu.

C. Observe the upper display for a CID 0334 FMI 04. The diagnostic code is active if the upper display shows a CID 0334 FMI 04.

D. If the diagnostic code is not showing, enter the service mode and view the fault log. Check the upper display if the diagnostic code is active.

Note: The PRCM must be set up properly in order to view the fault log. See Systems Operation, “Setpoint Viewing and Programming”.

Expected Result:

A CID 0334 FMI 04 is inactive.

Results:

- OK – A CID 0334 FMI 04 is NOT active. Proceed to test step 2.
- CODE NOT ACTIVE - NOT LOGGED – A CID 0334 FMI 04 has NOT occurred. The diagnostic code is NOT active. The PRCM must not have been setup in order to view logged diagnostics during the initial setup.

  Repair: The initial diagnostic code was probably caused by a poor electrical connection or a short at one of the harness connectors. See Testing and Adjusting, “Electrical Connector - Inspect”.

  STOP.
- CODE NOT ACTIVE BUT LOGGED – The diagnostic code is NOT active. The diagnostic code is logged in the fault log. The initial diagnostic was probably caused by a poor electrical connection or a short at one of the harness connectors that was disconnected and reconnected. Resume normal operation. STOP.

Test Step 2. CHECK THE PRCM.

A. Disconnect the cable on the negative terminal of the battery or open the optional battery disconnect switch.

B. Disconnect the data link wire from contact 35 of the PRCM.

C. Reconnect the cable on the negative terminal of the battery or close the optional battery disconnect switch.

D. Turn the engine control switch (ECS) to the STOP position.

Expected Result:

A CID 0334 FMI 04 is NOT active.

Results:

- OK – A CID 0334 FMI 04 is NOT active. Proceed to test step 3.

- NOT OK – A CID 0334 FMI 04 is active. The PRCM may have failed.

  Repair: It is unlikely that the PRCM has failed. Exit this procedure and perform this procedure again. Recheck the status of the diagnostic code. Replace the PRCM if the cause of the diagnostic code is not found. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

  STOP.

Test Step 3. CHECK THE RDM AND DATA LINK WIRE.

A. The data link wire remains disconnected from the PRCM.

B. Disconnect the cable on the negative terminal of the battery or open the optional battery disconnect switch.

C. Disconnect the data link wire from terminal 4 of the relay driver module.

D. Measure the resistance from the data link wire to the Battery negative on the PRCM.

Expected Result:

The resistance should be greater than 5000 ohms.

Results:

- OK – The resistance is greater than 5000 ohms. Proceed to test step 4.

- NOT OK – The resistance is greater than 5000 ohms. The data link wiring has failed.

  Repair: Repair the harness or replace the harness.

  STOP.

Test Step 4. CHECK THE RDM.

A. The cable on the negative terminal of the battery remains disconnected or the optional battery disconnect switch is open.

B. The data link wire remains disconnected.

C. Measure the resistance from terminal 4 of the relay driver module to the battery negative.

Expected Result:

The resistance should be greater than 5000 ohms.

Results:

- OK – The resistance that is measured is greater than 5000 ohms. The problem may be intermittent.

  Repair: Examine the wiring between the PRCM and the RDM for nicks, abrasions, or other damage.

  STOP.

- NOT OK – The resistance is NOT greater than 5000 ohms. The RDM has failed.

  Repair: Replace the RDM.

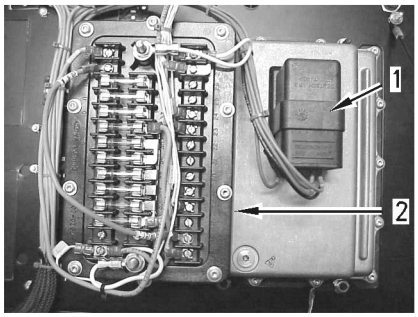
  STOP.

i01369914

PRCM CID 0477 - FMI 03

SMCS Code: 1927-035

Conditions Which Generate This Code:



g00722721

Illustration 38

Rear view of the PRCM

(1) 40-pin connector
(2) Relay module

Table 6

Load Specifications For the Internal Relays of the PRCM		
Relay Module and Number	**Ratings For Resistive Loads**	**Ratings For Inductive Loads**
K1	7 milliamperes to 1 Amperes (24 DCV)	None(1)(2)(3)
“K2”, “K3”, “K4”, “K5” (terminal 24), “K6” and “K7”	0.5 to 10 amperes (24 DCV)	0.5 to 10 Amperes (24 DCV)(3)
“K5” (terminals 23 and 36)	0.5 to 10 Amperes (24 DCV) and 0.5 to 10 Amperes (24 ACV)	0.5 to 5 Amperes (24 DCV) and 0.5 to 7.5 Amperes (110 ACV)

(1) Do NOT connect inductive loads to these terminals.

(2) The contacts of the relay that is connected to terminals 13 and 14 are gold flashed. The gold socket contact provides a source of low impedance for a low current resistive load. Loads that draw higher currents, currents that are of similar levels as terminals 23 and 36 in table 6can be applied. However, if heavier loads are applied, the gold flashing will be permanently burned. This will eliminate the gold flashing from the contacts. This does not result in damage to the relay contacts, but the contacts can no longer be used for low current loads.

(3) “K1” (terminals 13 and 14) is not fused.

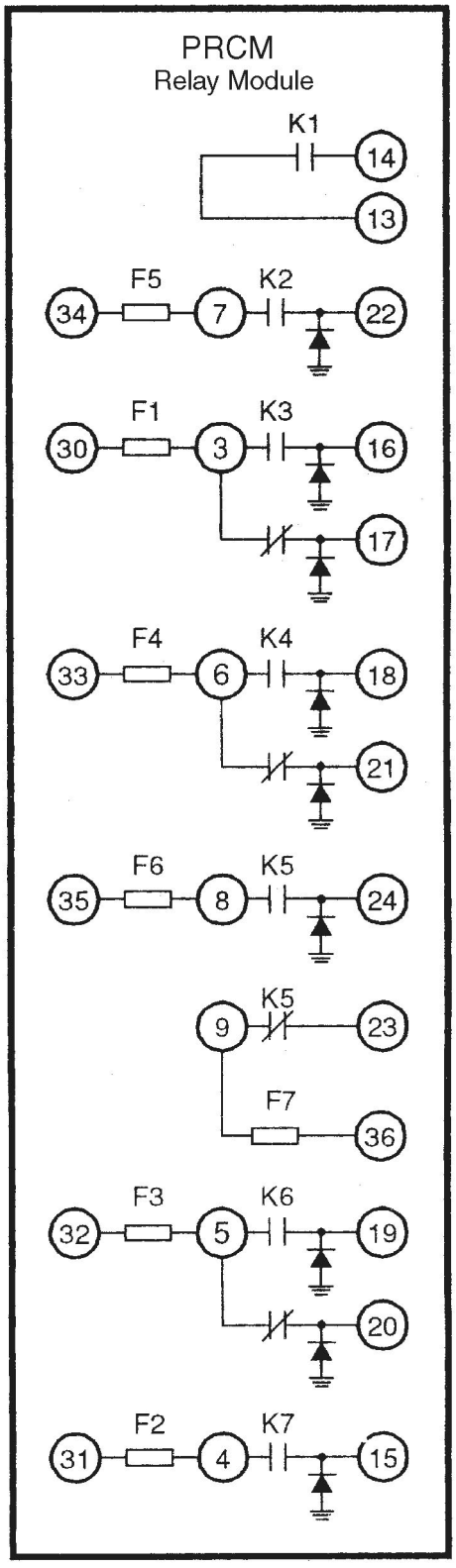


Illustration 39 g00709866

The Connections for the PRCM to the Relay Module

The PRCM provides the internal relay outputs for customer's use. All relays are located in the relay module on the rear of the PRCM. If the CAT data link fails, the relay remains in the state required by the last valid input state. The relay may also be programmed to reset to the OFF position. Refer to Systems Operation, "Setpoint Viewing and Programming".

The Possible cause of a CID 0477 FMI 03 is an open circuit of the "K1" relay coil. Clear the diagnostic code from the fault log when the troubleshooting procedure is completed.

NOTICE

Do not apply AC voltages to any relay module terminal other than terminals 23 and 36 of K5 and terminals 13 and 14 of K1 or permanent damage to the relay module will result. All other terminals have flyback diodes connected to them that increase relay life when driving inductive loads; however, this limits their use to DC voltages.

Note: All 3K-8782 Fuses ("AGC-10") in the relay module are rated at 10 Amperes DCV.

Test Step 1. CHECK THE STATUS OF THE DIAGNOSTIC CODE.

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Press the "MODE" key until the diagnostic code viewing/clearing menu appears.

C. Observe the upper display. Check that the CID 0477 FMI 03 is active.

Note: The "DIAG" indicator will be flashing and the CID 0477 FMI 03 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0477 FMI 03 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The CID 0477 FMI 03 is active. Proceed to test step 2.
- NOT OK – The CID 0477 FMI 03 has not occurred. STOP.

Test Step 2. CHECK THE INTERNAL CABLE OF THE RELAY MODULE.

Note: Only open the relay module in a dry environment. If the inspection and the repair takes more than twenty minutes replace the desiccant bag. The bag is located in the housing of the PRCM. See Testing and Adjusting, "Relay Module - Replace".

A. Turn the ECS to the OFF/RESET position.

B. Disconnect the battery negative cable.

C. Temporarily, remove the relay module from the PRCM. See Testing and Adjusting, "Relay Module - Replace".

D. Check the cable that attaches the relay module to the PRCM.

Expected Result:

The cable should be firmly seated in the connector. The clamp should be in place. The cable should not be damaged.

Results:

- OK – The cable is firmly seated in the connector. The clamp is in place. The cable is not damaged. Reassemble the relay module to the PRCM. Proceed to test step 3.
- NOT OK – One or more of the components are damaged or the components are missing.

  Repair: Replace the clamp if the clamp is missing. If the cable is damaged, replace the PRCM. See Testing and Adjusting, "Programmable Relay Control Module - Replace".

  STOP.

Test Step 3. RECHECK THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Reconnect the battery negative cable.

C. Press the "MODE" key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0477 FMI 03. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0477 FMI 03 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0477 FMI 03 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.
- NOT OK – The diagnostic is still active.

  Repair: Replace the relay module. See Testing and Adjusting, “Relay Module - Replace”.

  STOP.

Test Step 4. VERIFY THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. The battery negative cable remains connected.

C. Press the “MODE” key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0477 FMI 03. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0477 FMI 03 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0477 FMI 03 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.
- NOT OK – The diagnostic is still active.

  Repair: Replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

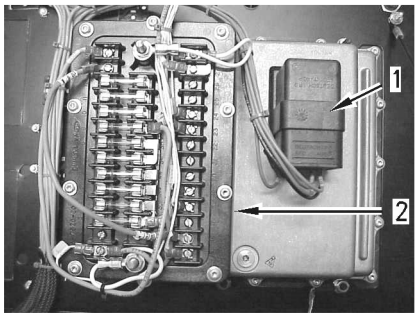
  STOP.

i01371027

PRCM CID 0477 - FMI 04

SMCS Code: 1927-035

Conditions Which Generate This Code:



g00722721

Illustration 40

Rear view of the PRCM

(1) 40-pin connector
(2) Relay module

Table 7

Load Specifications For the Internal Relays of the PRCM		
Relay Module and Number	**Ratings For Resistive Loads**	**Ratings For Inductive Loads**
“K1”	7 milliamperes to 1 Amperes (24 DCV)	None(1)(2)(3)
“K2”, “K3”, “K4”, “K5” (terminal 24), “K6” and “K7”	0.5 to 10 amperes (24 DCV)	0.5 to 10 Amperes (24 DCV)(3)
“K5” (terminals 23 and 36)	0.5 to 10 Amperes (24 DCV) and 0.5 to 10 Amperes (24 ACV)	0.5 to 5 Amperes (24 DCV) and 0.5 to 7.5 Amperes (110 ACV)

(1) Do NOT connect inductive loads to these terminals.
(2) The contacts of the relay that is connected to terminals 13 and 14 are gold flashed. The gold socket contact provides a source of low impedance for a low current resistive load. Loads that draw higher currents, currents that are of similar levels as terminals 23 and 36 in table 7 can be applied. However, if heavier loads are applied, the gold flashing will be permanently burned. This will eliminate the gold flashing from the contacts. This does not result in damage to the relay contacts, but the contacts can no longer be used for low current loads.
(3) “K1” (terminals 13 and 14) is not fused.

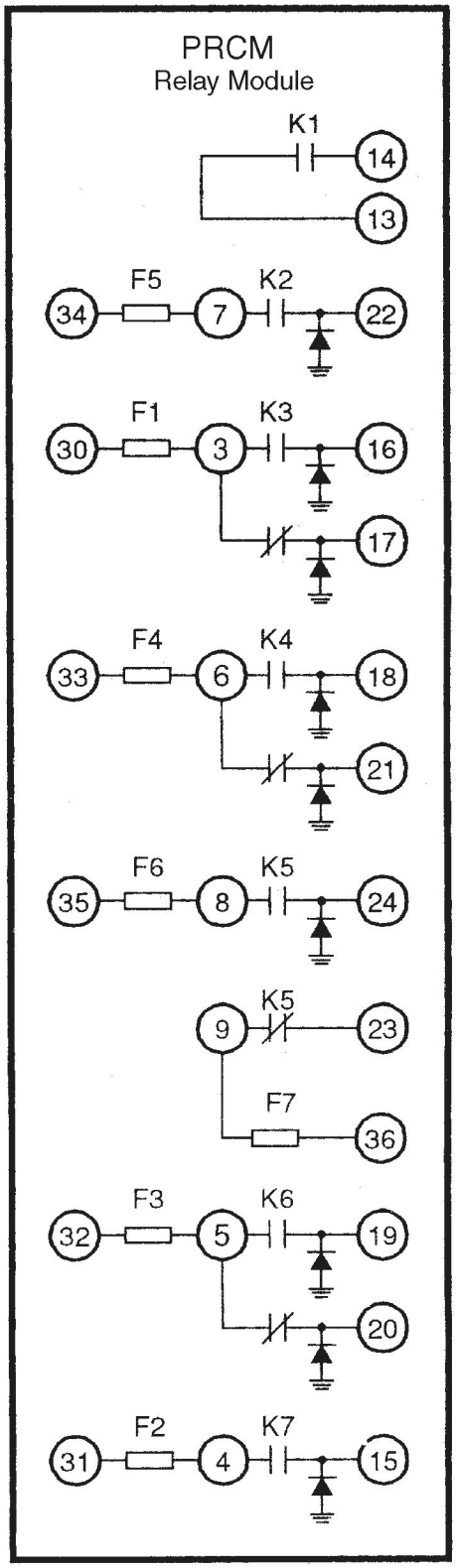


Illustration 41 g00709866

The Connections for the PRCM to the Relay Module

The PRCM provides the internal relay outputs for customer's use. All relays are located in the relay module on the rear of the PRCM. If the CAT data link fails, the relay remains in the state required by the last valid input state. The relay may also be programmed to reset to the OFF position. Refer to Systems Operation, "Setpoint Viewing and Programming".

The Possible cause of a CID 0477 FMI 04 is an short circuit of the "K1" relay coil. Clear the diagnostic code from the fault log when the troubleshooting procedure is completed.

NOTICE

Do not apply AC voltages to any relay module terminal other than terminals 23 and 36 of K5 and terminals 13 and 14 of K1 or permanent damage to the relay module will result. All other terminals have flyback diodes connected to them that increase relay life when driving inductive loads; however, this limits their use to DC voltages.

Note: All 3K-8782 Fuses ("AGC-10") in the relay module are rated at 10 Amperes DCV.

Test Step 1. CHECK THE STATUS OF THE DIAGNOSTIC CODE.

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Press the "MODE" key until the diagnostic code viewing/clearing menu appears.

C. Observe the upper display. Check that the CID 0477 FMI 04 is active.

Note: The "DIAG" indicator will be flashing and the CID 0477 FMI 04 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0477 FMI 04 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The CID 0477 FMI 04 is active. Proceed to test step 2.
- NOT OK – The CID 0477 FMI 04 has not occurred. STOP.

Test Step 2. CHECK THE INTERNAL CABLE OF THE RELAY MODULE.

Note: Only open the relay module in a dry environment. If the inspection and the repair takes more than twenty minutes replace the desiccant bag. The bag is located in the housing of the PRCM. See Testing and Adjusting, “Relay Module - Replace”.

A. Turn the ECS to the OFF/RESET position.

B. Disconnect the battery negative cable.

C. Temporarily, remove the relay module from the PRCM. See Testing and Adjusting, “Relay Module - Replace”.

D. Check the cable that attaches the relay module to the PRCM.

Expected Result:

The cable should be firmly seated in the connector. The clamp should be in place. The cable should not be damaged.

Results:

- OK – The cable is firmly seated in the connector. The clamp is in place. The cable is not damaged. Reassemble the relay module to the PRCM. Proceed to test step 3.

- NOT OK – One or more of the components are damaged or the components are missing.

  Repair: Replace the clamp if the clamp is missing. If the cable is damaged, replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

  STOP.

Test Step 3. RECHECK THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Reconnect the battery negative cable.

C. Press the “MODE” key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0477 FMI 04. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0477 FMI 04 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0477 FMI 04 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.

- NOT OK – The diagnostic is still active.

  Repair: Replace the relay module. See Testing and Adjusting, “Relay Module - Replace”.

  STOP.

Test Step 4. VERIFY THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. The battery negative cable remains connected.

C. Press the “MODE” key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0477 FMI 04. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0477 FMI 04 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0477 FMI 04 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.

- NOT OK – The diagnostic is still active.

  Repair: Replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

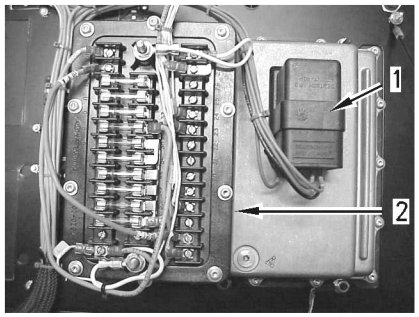
  STOP.

i01371080

PRCM CID 0478 - FMI 03

SMCS Code: 1927-035

Conditions Which Generate This Code:



g00722721

Illustration 42

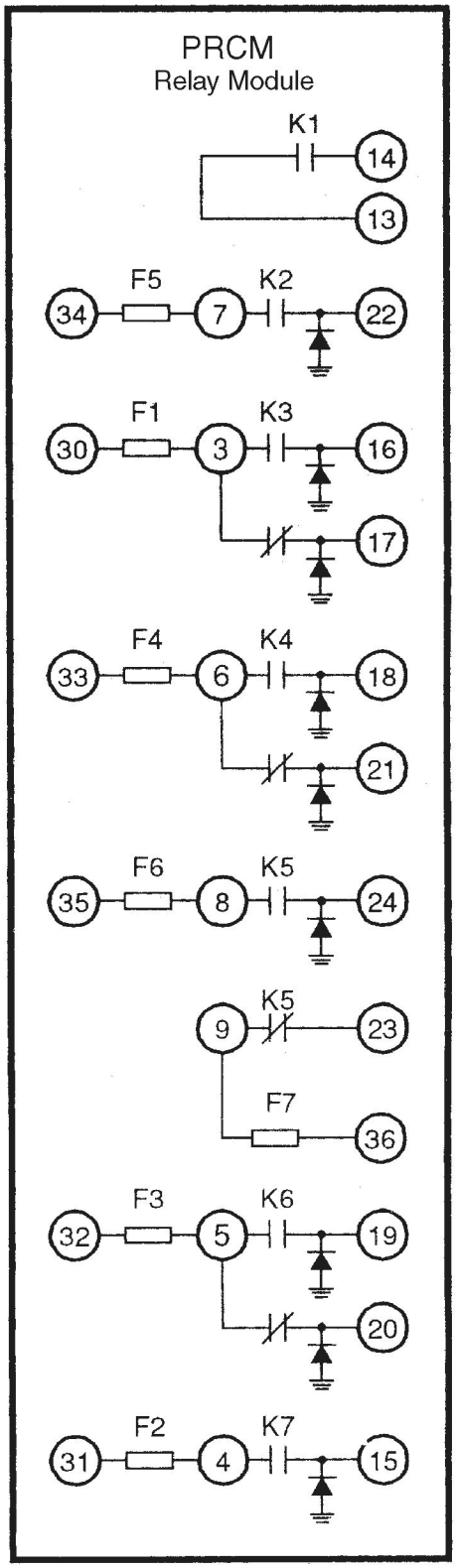
Rear view of the PRCM

(1) 40-pin connector
(2) Relay module

Table 8

Load Specifications For the Internal Relays of the PRCM		
Relay Module and Number	**Ratings For Resistive Loads**	**Ratings For Inductive Loads**
K1	7 milliamperes to 1 Amperes (24 DCV)	None(1)(2)(3)
“K2”, “K3”, “K4”, “K5” (terminal 24), “K6” and “K7”	0.5 to 10 amperes (24 DCV)	0.5 to 10 Amperes (24 DCV)(3)
“K5” (terminals 23 and 36)	0.5 to 10 Amperes (24 DCV) and 0.5 to 10 Amperes (24 ACV)	0.5 to 5 Amperes (24 DCV) and 0.5 to 7.5 Amperes (110 ACV)

(1) Do NOT connect inductive loads to these terminals.
(2) The contacts of the relay that is connected to terminals 13 and 14 are gold flashed. The gold socket contact provides a source of low impedance for a low current resistive load. Loads that draw higher currents, currents that are of similar levels as terminals 23 and 36 in table 8can be applied. However, if heavier loads are applied, the gold flashing will be permanently burned. This will eliminate the gold flashing from the contacts. This does not result in damage to the relay contacts, but the contacts can no longer be used for low current loads.
(3) “K1” (terminals 13 and 14) is not fused.



g00709866

Illustration 43

The Connections for the PRCM to the Relay Module

The PRCM provides the internal relay outputs for customer's use. All relays are located in the relay module on the rear of the PRCM. If the CAT data link fails, the relay remains in the state required by the last valid input state. The relay may also be programmed to reset to the OFF position. Refer to Systems Operation, "Setpoint Viewing and Programming".

The Possible cause of a CID 0478 FMI 03 is an open circuit of the "K2" relay coil. Clear the diagnostic code from the fault log when the troubleshooting procedure is completed.

NOTICE

Do not apply AC voltages to any relay module terminal other than terminals 23 and 36 of K5 and terminals 13 and 14 of K1 or permanent damage to the relay module will result. All other terminals have flyback diodes connected to them that increase relay life when driving inductive loads; however, this limits their use to DC voltages.

Note: All 3K-8782 Fuses ("AGC-10") in the relay module are rated at 10 Amperes DCV.

Test Step 1. CHECK THE STATUS OF THE DIAGNOSTIC CODE.

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Press the "MODE" key until the diagnostic code viewing/clearing menu appears.

C. Observe the upper display. Check that the CID 0478 FMI 03 is active.

Note: The "DIAG" indicator will be flashing and the CID 0478 FMI 03 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0478 FMI 03 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The CID 0478 FMI 03 is active. Proceed to test step 2.
- NOT OK – The CID 0478 FMI 03 has not occurred. STOP.

Test Step 2. CHECK THE INTERNAL CABLE OF THE RELAY MODULE.

Note: Only open the relay module in a dry environment. If the inspection and the repair takes more than twenty minutes replace the desiccant bag. The bag is located in the housing of the PRCM. See Testing and Adjusting, “Relay Module - Replace”.

A. Turn the ECS to the OFF/RESET position.

B. Disconnect the battery negative cable.

C. Temporarily, remove the relay module from the PRCM. See Testing and Adjusting, “Relay Module - Replace”.

D. Check the cable that attaches the relay module to the PRCM.

Expected Result:

The cable should be firmly seated in the connector. The clamp should be in place. The cable should not be damaged.

Results:

- OK – The cable is firmly seated in the connector. The clamp is in place. The cable is not damaged. Reassemble the relay module to the PRCM. Proceed to test step 3.
- NOT OK – One or more of the components are damaged or the components are missing.

  Repair: Replace the clamp if the clamp is missing. If the cable is damaged, replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

  STOP.

Test Step 3. RECHECK THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Reconnect the battery negative cable.

C. Press the “MODE” key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0478 FMI 03. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0478 FMI 03 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0478 FMI 03 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.
- NOT OK – The diagnostic is still active.

  Repair: Replace the relay module. See Testing and Adjusting, “Relay Module - Replace”.

  STOP.

Test Step 4. VERIFY THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. The battery negative cable remains connected.

C. Press the “MODE” key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0478 FMI 03. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0478 FMI 03 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0478 FMI 03 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.
- NOT OK – The diagnostic is still active.

  Repair: Replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

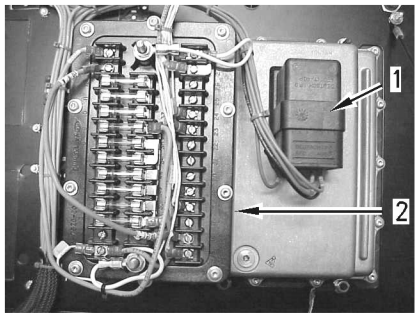
  STOP.

i01371095

PRCM CID 0478 - FMI 04

SMCS Code: 1927-035

Conditions Which Generate This Code:



g00722721

Illustration 44

Rear view of the PRCM

(1) 40-pin connector
(2) Relay module

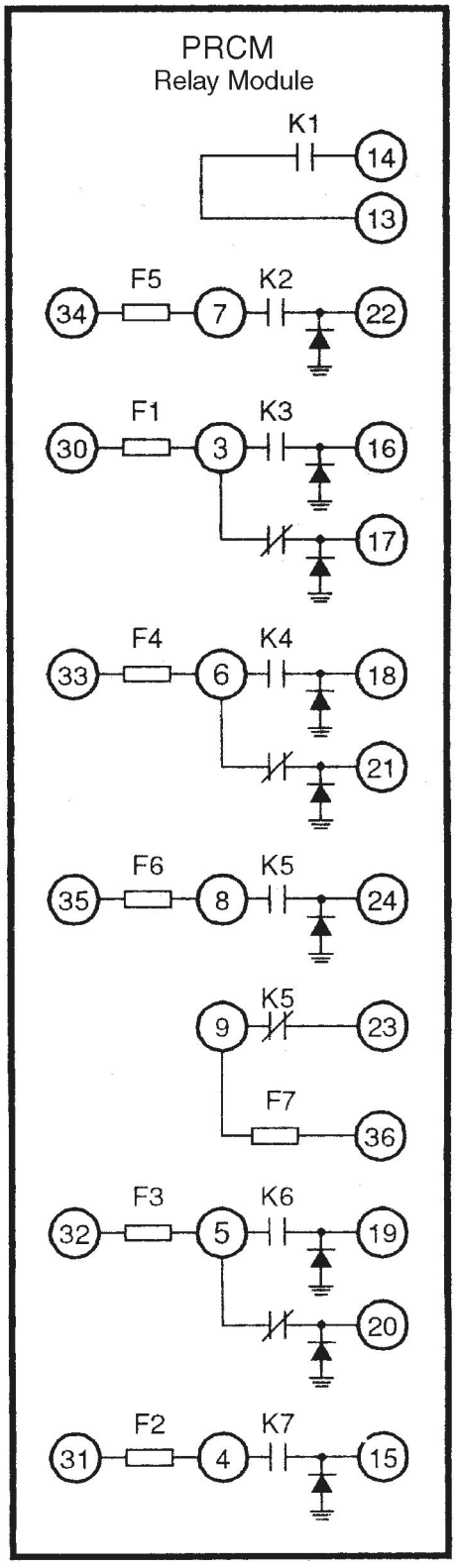
Table 9

Load Specifications For the Internal Relays of the PRCM		
Relay Module and Number	**Ratings For Resistive Loads**	**Ratings For Inductive Loads**
“K1”	7 milliamperes to 1 Amperes (24 DCV)	None(1)(2)(3)
“K2”, “K3”, “K4”, “K5” (terminal 24), “K6” and “K7”	0.5 to 10 amperes (24 DCV)	0.5 to 10 Amperes (24 DCV)(3)
“K5” (terminals 23 and 36)	0.5 to 10 Amperes (24 DCV) and 0.5 to 10 Amperes (24 ACV)	0.5 to 5 Amperes (24 DCV) and 0.5 to 7.5 Amperes (110 ACV)

(1) Do NOT connect inductive loads to these terminals.

(2) The contacts of the relay that is connected to terminals 13 and 14 are gold flashed. The gold socket contact provides a source of low impedance for a low current resistive load. Loads that draw higher currents, currents that are of similar levels as terminals 23 and 36 in table 9 can be applied. However, if heavier loads are applied, the gold flashing will be permanently burned. This will eliminate the gold flashing from the contacts. This does not result in damage to the relay contacts, but the contacts can no longer be used for low current loads.

(3) “K1” (terminals 13 and 14) is not fused.



g00709866

Illustration 45

The Connections for the PRCM to the Relay Module

The PRCM provides the internal relay outputs for customer's use. All relays are located in the relay module on the rear of the PRCM. If the CAT data link fails, the relay remains in the state required by the last valid input state. The relay may also be programmed to reset to the OFF position. Refer to Systems Operation, "Setpoint Viewing and Programming".

The Possible cause of a CID 0478 FMI 04 is a short circuit of the "K2" relay coil. Clear the diagnostic code from the fault log when the troubleshooting procedure is completed.

NOTICE

Do not apply AC voltages to any relay module terminal other than terminals 23 and 36 of K5 and terminals 13 and 14 of K1 or permanent damage to the relay module will result. All other terminals have flyback diodes connected to them that increase relay life when driving inductive loads; however, this limits their use to DC voltages.

Note: All 3K-8782 Fuses ("AGC-10") in the relay module are rated at 10 Amperes DCV.

Test Step 1. CHECK THE STATUS OF THE DIAGNOSTIC CODE.

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Press the "MODE" key until the diagnostic code viewing/clearing menu appears.

C. Observe the upper display. Check that the CID 0478 FMI 04 is active.

Note: The "DIAG" indicator will be flashing and the CID 0478 FMI 04 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0478 FMI 04 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The CID 0478 FMI 04 is active. Proceed to test step 2.
- NOT OK – The CID 0478 FMI 04 has not occurred. STOP.

Test Step 2. CHECK THE INTERNAL CABLE OF THE RELAY MODULE.

Note: Only open the relay module in a dry environment. If the inspection and the repair takes more than twenty minutes replace the desiccant bag. The bag is located in the housing of the PRCM. See Testing and Adjusting, "Relay Module - Replace".

A. Turn the ECS to the OFF/RESET position.

B. Disconnect the battery negative cable.

C. Temporarily, remove the relay module from the PRCM. See Testing and Adjusting, "Relay Module - Replace".

D. Check the cable that attaches the relay module to the PRCM.

Expected Result:

The cable should be firmly seated in the connector. The clamp should be in place. The cable should not be damaged.

Results:

- OK – The cable is firmly seated in the connector. The clamp is in place. The cable is not damaged. Reassemble the relay module to the PRCM. Proceed to test step 3.
- NOT OK – One or more of the components are damaged or the components are missing.

  Repair: Replace the clamp if the clamp is missing. If the cable is damaged, replace the PRCM. See Testing and Adjusting, "Programmable Relay Control Module - Replace".

  STOP.

Test Step 3. RECHECK THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Reconnect the battery negative cable.

C. Press the "MODE" key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0478 FMI 04. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0478 FMI 04 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0478 FMI 04 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.
- NOT OK – The diagnostic is still active.

  Repair: Replace the relay module. See Testing and Adjusting, “Relay Module - Replace”.

  STOP.

Test Step 4. VERIFY THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. The battery negative cable remains connected.

C. Press the “MODE” key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0478 FMI 04. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0478 FMI 04 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0478 FMI 04 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.
- NOT OK – The diagnostic is still active.

  Repair: Replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

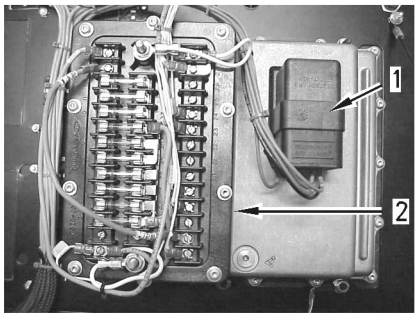
  STOP.

i01371131

PRCM CID 0479 - FMI 03

SMCS Code: 1927-035

Conditions Which Generate This Code:



g00722721

Illustration 46

Rear view of the PRCM

(1) 40-pin connector
(2) Relay module

Table 10

Load Specifications For the Internal Relays of the PRCM		
Relay Module and Number	**Ratings For Resistive Loads**	**Ratings For Inductive Loads**
K1	7 milliamperes to 1 Amperes (24 DCV)	None(1)(2)(3)
“K2”, “K3”, “K4”, “K5” (terminal 24), “K6” and “K7”	0.5 to 10 amperes (24 DCV)	0.5 to 10 Amperes (24 DCV)(3)
“K5” (terminals 23 and 36)	0.5 to 10 Amperes (24 DCV) and 0.5 to 10 Amperes (24 ACV)	0.5 to 5 Amperes (24 DCV) and 0.5 to 7.5 Amperes (110 ACV)

(1) Do NOT connect inductive loads to these terminals.
(2) The contacts of the relay that is connected to terminals 13 and 14 are gold flashed. The gold socket contact provides a source of low impedance for a low current resistive load. Loads that draw higher currents, currents that are of similar levels as terminals 23 and 36 in table 10can be applied. However, if heavier loads are applied, the gold flashing will be permanently burned. This will eliminate the gold flashing from the contacts. This does not result in damage to the relay contacts, but the contacts can no longer be used for low current loads.
(3) “K1” (terminals 13 and 14) is not fused.

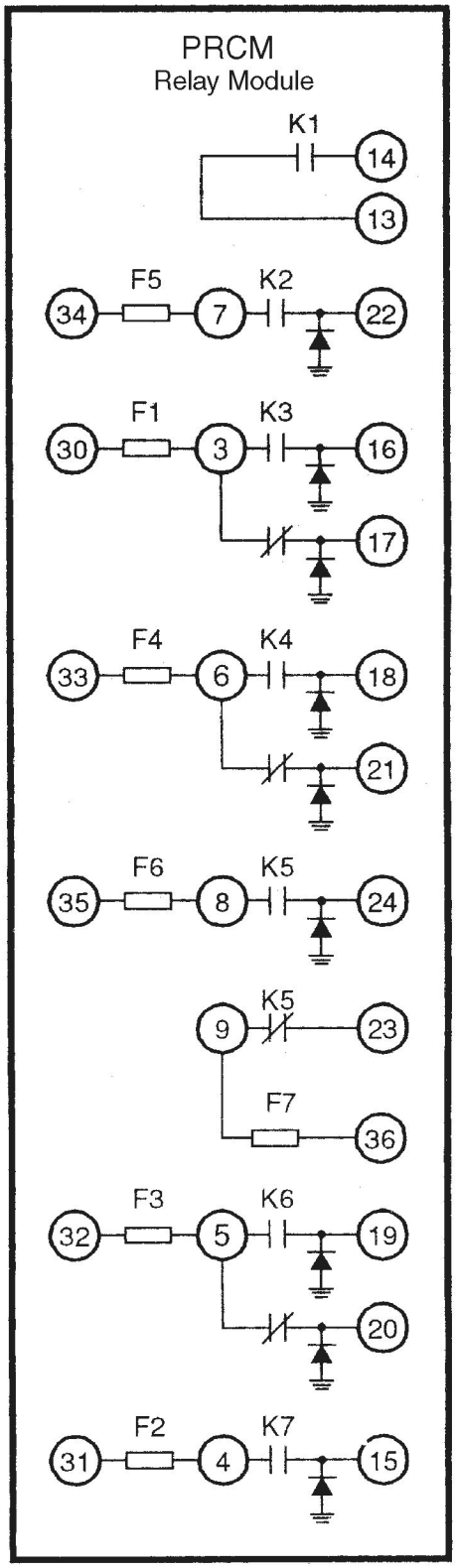


Illustration 47 g00709866

The Connections for the PRCM to the Relay Module

The PRCM provides the internal relay outputs for customer's use. All relays are located in the relay module on the rear of the PRCM. If the CAT data link fails, the relay remains in the state required by the last valid input state. The relay may also be programmed to reset to the OFF position. Refer to Systems Operation, "Setpoint Viewing and Programming".

The Possible cause of a CID 0479 FMI 03 is an open circuit of the "K3" relay coil. Clear the diagnostic code from the fault log when the troubleshooting procedure is completed.

NOTICE

Do not apply AC voltages to any relay module terminal other than terminals 23 and 36 of K5 and terminals 13 and 14 of K1 or permanent damage to the relay module will result. All other terminals have flyback diodes connected to them that increase relay life when driving inductive loads; however, this limits their use to DC voltages.

Note: All 3K-8782 Fuses ("AGC-10") in the relay module are rated at 10 Amperes DCV.

Test Step 1. CHECK THE STATUS OF THE DIAGNOSTIC CODE.

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Press the "MODE" key until the diagnostic code viewing/clearing menu appears.

C. Observe the upper display. Check that the CID 0479 FMI 03 is active.

Note: The "DIAG" indicator will be flashing and the CID 0479 FMI 03 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0479 FMI 03 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The CID 0479 FMI 03 is active. Proceed to test step 2.
- NOT OK – The CID 0479 FMI 03 has not occurred. STOP.

Test Step 2. CHECK THE INTERNAL CABLE OF THE RELAY MODULE.

Note: Only open the relay module in a dry environment. If the inspection and the repair takes more than twenty minutes replace the desiccant bag. The bag is located in the housing of the PRCM. See Testing and Adjusting, “Relay Module - Replace”.

A. Turn the ECS to the OFF/RESET position.

B. Disconnect the battery negative cable.

C. Temporarily, remove the relay module from the PRCM. See Testing and Adjusting, “Relay Module - Replace”.

D. Check the cable that attaches the relay module to the PRCM.

Expected Result:

The cable should be firmly seated in the connector. The clamp should be in place. The cable should not be damaged.

Results:

- OK – The cable is firmly seated in the connector. The clamp is in place. The cable is not damaged. Reassemble the relay module to the PRCM. Proceed to test step 3.

- NOT OK – One or more of the components are damaged or the components are missing.

  Repair: Replace the clamp if the clamp is missing. If the cable is damaged, replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

  STOP.

Test Step 3. RECHECK THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Reconnect the battery negative cable.

C. Press the “MODE” key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0479 FMI 03. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0479 FMI 03 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0479 FMI 03 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.

- NOT OK – The diagnostic is still active.

  Repair: Replace the relay module. See Testing and Adjusting, “Relay Module - Replace”.

  STOP.

Test Step 4. VERIFY THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. The battery negative cable remains connected.

C. Press the “MODE” key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0479 FMI 03. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0479 FMI 03 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0479 FMI 03 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.

- NOT OK – The diagnostic is still active.

  Repair: Replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

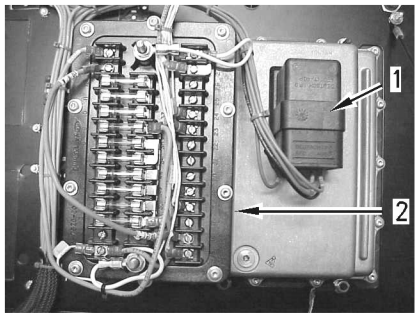
  STOP.

i01371242

PRCM CID 0479 - FMI 04

SMCS Code: 1927-035

Conditions Which Generate This Code:



g00722721

Illustration 48

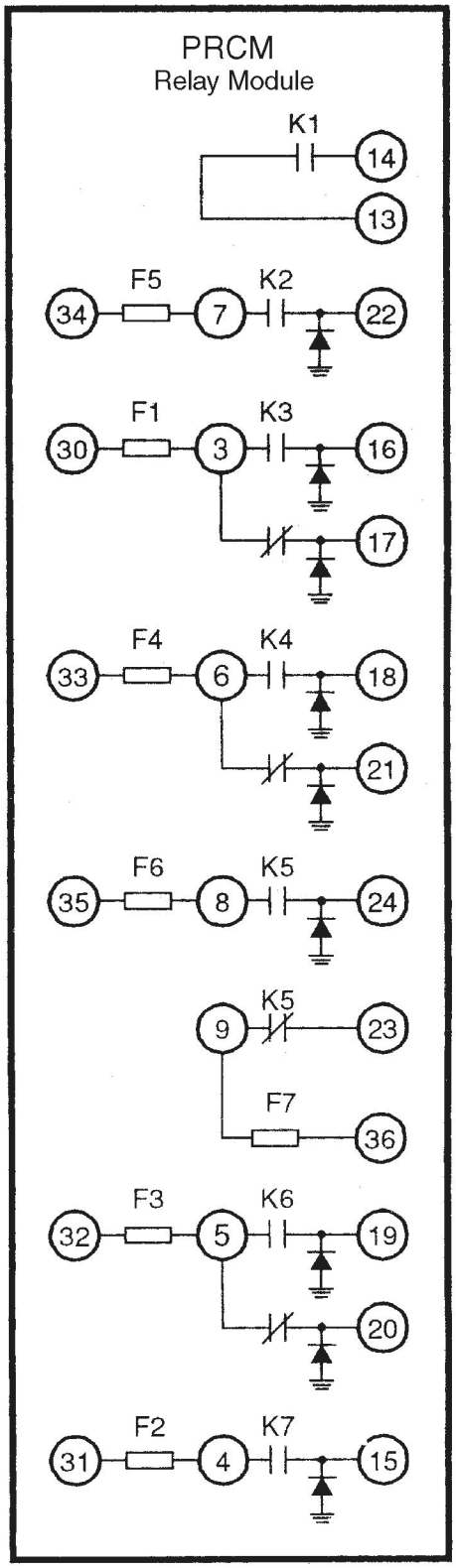
Rear view of the PRCM

(1) 40-pin connector
(2) Relay module

Table 11

Load Specifications For the Internal Relays of the PRCM		
Relay Module and Number	**Ratings For Resistive Loads**	**Ratings For Inductive Loads**
“K1”	7 milliamperes to 1 Amperes (24 DCV)	None(1)(2)(3)
“K2”, “K3”, “K4”, “K5” (terminal 24), “K6” and “K7”	0.5 to 10 amperes (24 DCV)	0.5 to 10 Amperes (24 DCV)(3)
“K5” (terminals 23 and 36)	0.5 to 10 Amperes (24 DCV) and 0.5 to 10 Amperes (24 ACV)	0.5 to 5 Amperes (24 DCV) and 0.5 to 7.5 Amperes (110 ACV)

(1) Do NOT connect inductive loads to these terminals.
(2) The contacts of the relay that is connected to terminals 13 and 14 are gold flashed. The gold socket contact provides a source of low impedance for a low current resistive load. Loads that draw higher currents, currents that are of similar levels as terminals 23 and 36 in table 11 can be applied. However, if heavier loads are applied, the gold flashing will be permanently burned. This will eliminate the gold flashing from the contacts. This does not result in damage to the relay contacts, but the contacts can no longer be used for low current loads.
(3) “K1” (terminals 13 and 14) is not fused.



g00709866

Illustration 49

The Connections for the PRCM to the Relay Module

The PRCM provides the internal relay outputs for customer's use. All relays are located in the relay module on the rear of the PRCM. If the CAT data link fails, the relay remains in the state required by the last valid input state. The relay may also be programmed to reset to the OFF position. Refer to Systems Operation, "Setpoint Viewing and Programming".

The Possible cause of a CID 0479 FMI 04 is a short circuit of the "K3" relay coil. Clear the diagnostic code from the fault log when the troubleshooting procedure is completed.

NOTICE

Do not apply AC voltages to any relay module terminal other than terminals 23 and 36 of K5 and terminals 13 and 14 of K1 or permanent damage to the relay module will result. All other terminals have flyback diodes connected to them that increase relay life when driving inductive loads; however, this limits their use to DC voltages.

Note: All 3K-8782 Fuses ("AGC-10") in the relay module are rated at 10 Amperes DCV.

Test Step 1. CHECK THE STATUS OF THE DIAGNOSTIC CODE.

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Press the "MODE" key until the diagnostic code viewing/clearing menu appears.

C. Observe the upper display. Check that the CID 0479 FMI 04 is active.

Note: The "DIAG" indicator will be flashing and the CID 0479 FMI 04 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0479 FMI 04 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The CID 0479 FMI 04 is active. Proceed to test step 2.
- NOT OK – The CID 0479 FMI 04 has not occurred. STOP.

Test Step 2. CHECK THE INTERNAL CABLE OF THE RELAY MODULE.

Note: Only open the relay module in a dry environment. If the inspection and the repair takes more than twenty minutes replace the desiccant bag. The bag is located in the housing of the PRCM. See Testing and Adjusting, “Relay Module - Replace”.

A. Turn the ECS to the OFF/RESET position.

B. Disconnect the battery negative cable.

C. Temporarily, remove the relay module from the PRCM. See Testing and Adjusting, “Relay Module - Replace”.

D. Check the cable that attaches the relay module to the PRCM.

Expected Result:

The cable should be firmly seated in the connector. The clamp should be in place. The cable should not be damaged.

Results:

- OK – The cable is firmly seated in the connector. The clamp is in place. The cable is not damaged. Reassemble the relay module to the PRCM. Proceed to test step 3.
- NOT OK – One or more of the components are damaged or the components are missing.

  Repair: Replace the clamp if the clamp is missing. If the cable is damaged, replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

  STOP.

Test Step 3. RECHECK THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Reconnect the battery negative cable.

C. Press the “MODE” key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0479 FMI 04. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0479 FMI 04 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0479 FMI 04 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.
- NOT OK – The diagnostic is still active.

  Repair: Replace the relay module. See Testing and Adjusting, “Relay Module - Replace”.

  STOP.

Test Step 4. VERIFY THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. The battery negative cable remains connected.

C. Press the “MODE” key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0479 FMI 04. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0479 FMI 04 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0479 FMI 04 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.
- NOT OK – The diagnostic is still active.

  Repair: Replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

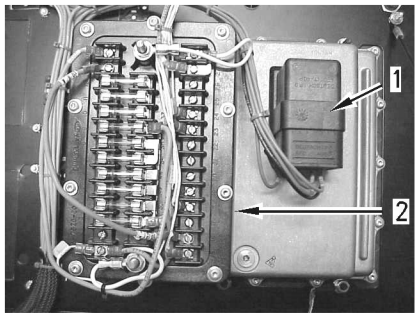
  STOP.

i01371273

PRCM CID 0480 - FMI 03

SMCS Code: 1927-035

Conditions Which Generate This Code:



g00722721

Illustration 50

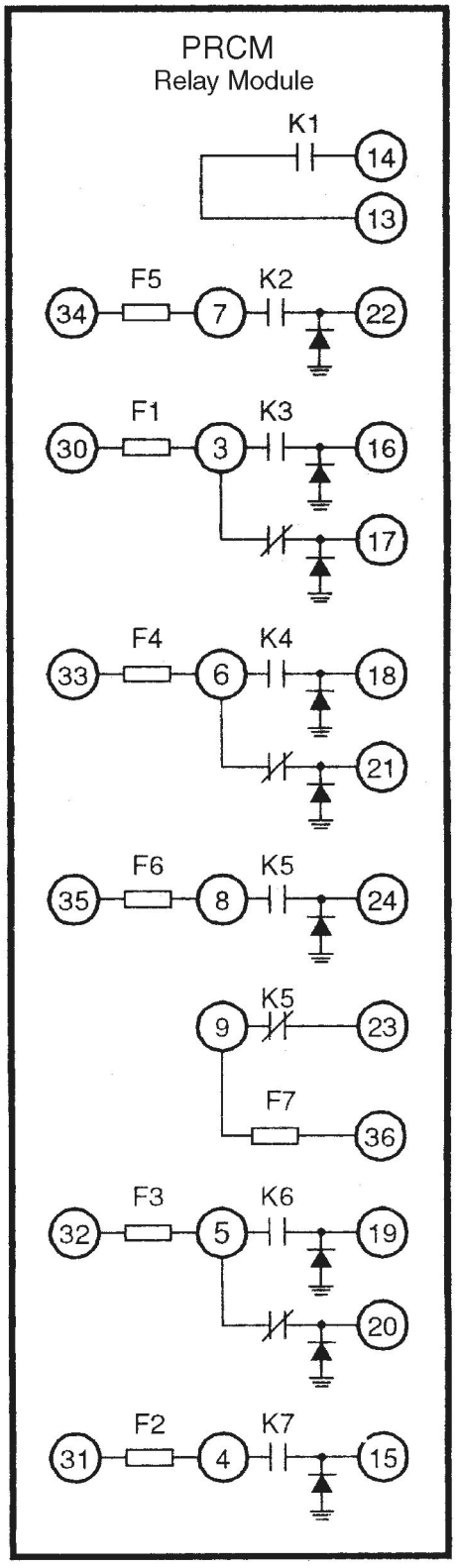
Rear view of the PRCM

(1) 40-pin connector
(2) Relay module

Table 12

Load Specifications For the Internal Relays of the PRCM		
Relay Module and Number	**Ratings For Resistive Loads**	**Ratings For Inductive Loads**
K1	7 milliamperes to 1 Amperes (24 DCV)	None(1)(2)(3)
“K2”, “K3”, “K4”, “K5” (terminal 24), “K6” and “K7”	0.5 to 10 amperes (24 DCV)	0.5 to 10 Amperes (24 DCV)(3)
“K5” (terminals 23 and 36)	0.5 to 10 Amperes (24 DCV) and 0.5 to 10 Amperes (24 ACV)	0.5 to 5 Amperes (24 DCV) and 0.5 to 7.5 Amperes (110 ACV)

(1) Do NOT connect inductive loads to these terminals.
(2) The contacts of the relay that is connected to terminals 13 and 14 are gold flashed. The gold socket contact provides a source of low impedance for a low current resistive load. Loads that draw higher currents, currents that are of similar levels as terminals 23 and 36 in table 12can be applied. However, if heavier loads are applied, the gold flashing will be permanently burned. This will eliminate the gold flashing from the contacts. This does not result in damage to the relay contacts, but the contacts can no longer be used for low current loads.
(3) “K1” (terminals 13 and 14) is not fused.



g00709866

Illustration 51

The Connections for the PRCM to the Relay Module

The PRCM provides the internal relay outputs for customer's use. All relays are located in the relay module on the rear of the PRCM. If the CAT data link fails, the relay remains in the state required by the last valid input state. The relay may also be programmed to reset to the OFF position. Refer to Systems Operation, "Setpoint Viewing and Programming".

The Possible cause of a CID 0480 FMI 03 is an open circuit of the "K4" relay coil. Clear the diagnostic code from the fault log when the troubleshooting procedure is completed.

NOTICE

Do not apply AC voltages to any relay module terminal other than terminals 23 and 36 of K5 and terminals 13 and 14 of K1 or permanent damage to the relay module will result. All other terminals have flyback diodes connected to them that increase relay life when driving inductive loads; however, this limits their use to DC voltages.

Note: All 3K-8782 Fuses ("AGC-10") in the relay module are rated at 10 Amperes DCV.

Test Step 1. CHECK THE STATUS OF THE DIAGNOSTIC CODE.

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Press the "MODE" key until the diagnostic code viewing/clearing menu appears.

C. Observe the upper display. Check that the CID 0480 FMI 03 is active.

Note: The "DIAG" indicator will be flashing and the CID 0480 FMI 03 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0480 FMI 03 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The CID 0480 FMI 03 is active. Proceed to test step 2.
- NOT OK – The CID 0480 FMI 03 has not occurred. STOP.

Test Step 2. CHECK THE INTERNAL CABLE OF THE RELAY MODULE.

Note: Only open the relay module in a dry environment. If the inspection and the repair takes more than twenty minutes replace the desiccant bag. The bag is located in the housing of the PRCM. See Testing and Adjusting, "Relay Module - Replace".

A. Turn the ECS to the OFF/RESET position.

B. Disconnect the battery negative cable.

C. Temporarily, remove the relay module from the PRCM. See Testing and Adjusting, "Relay Module - Replace".

D. Check the cable that attaches the relay module to the PRCM.

Expected Result:

The cable should be firmly seated in the connector. The clamp should be in place. The cable should not be damaged.

Results:

- OK – The cable is firmly seated in the connector. The clamp is in place. The cable is not damaged. Reassemble the relay module to the PRCM. Proceed to test step 3.
- NOT OK – One or more of the components are damaged or the components are missing.

  Repair: Replace the clamp if the clamp is missing. If the cable is damaged, replace the PRCM. See Testing and Adjusting, "Programmable Relay Control Module - Replace".

  STOP.

Test Step 3. RECHECK THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Reconnect the battery negative cable.

C. Press the "MODE" key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0480 FMI 03. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0480 FMI 03 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0480 FMI 03 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.
- NOT OK – The diagnostic is still active.

  Repair: Replace the relay module. See Testing and Adjusting, “Relay Module - Replace”.

  STOP.

Test Step 4. VERIFY THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. The battery negative cable remains connected.

C. Press the “MODE” key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0480 FMI 03. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0480 FMI 03 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0480 FMI 03 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.
- NOT OK – The diagnostic is still active.

  Repair: Replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

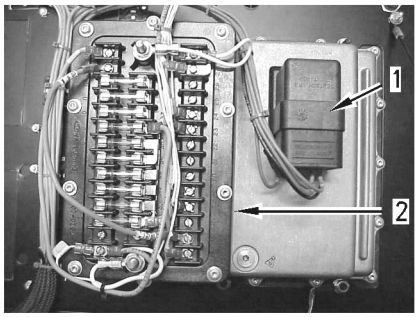
  STOP.

i01371285

PRCM CID 0480 - FMI 04

SMCS Code: 1927-035

Conditions Which Generate This Code:



g00722721

Illustration 52

Rear view of the PRCM

(1) 40-pin connector
(2) Relay module

Table 13

Load Specifications For the Internal Relays of the PRCM		
Relay Module and Number	**Ratings For Resistive Loads**	**Ratings For Inductive Loads**
“K1”	7 milliamperes to 1 Amperes (24 DCV)	None(1)(2)(3)
“K2”, “K3”, “K4”, “K5” (terminal 24), “K6” and “K7”	0.5 to 10 amperes (24 DCV)	0.5 to 10 Amperes (24 DCV)(3)
“K5” (terminals 23 and 36)	0.5 to 10 Amperes (24 DCV) and 0.5 to 10 Amperes (24 ACV)	0.5 to 5 Amperes (24 DCV) and 0.5 to 7.5 Amperes (110 ACV)

(1) Do NOT connect inductive loads to these terminals.
(2) The contacts of the relay that is connected to terminals 13 and 14 are gold flashed. The gold socket contact provides a source of low impedance for a low current resistive load. Loads that draw higher currents, currents that are of similar levels as terminals 23 and 36 in table 13 can be applied. However, if heavier loads are applied, the gold flashing will be permanently burned. This will eliminate the gold flashing from the contacts. This does not result in damage to the relay contacts, but the contacts can no longer be used for low current loads.
(3) “K1” (terminals 13 and 14) is not fused.

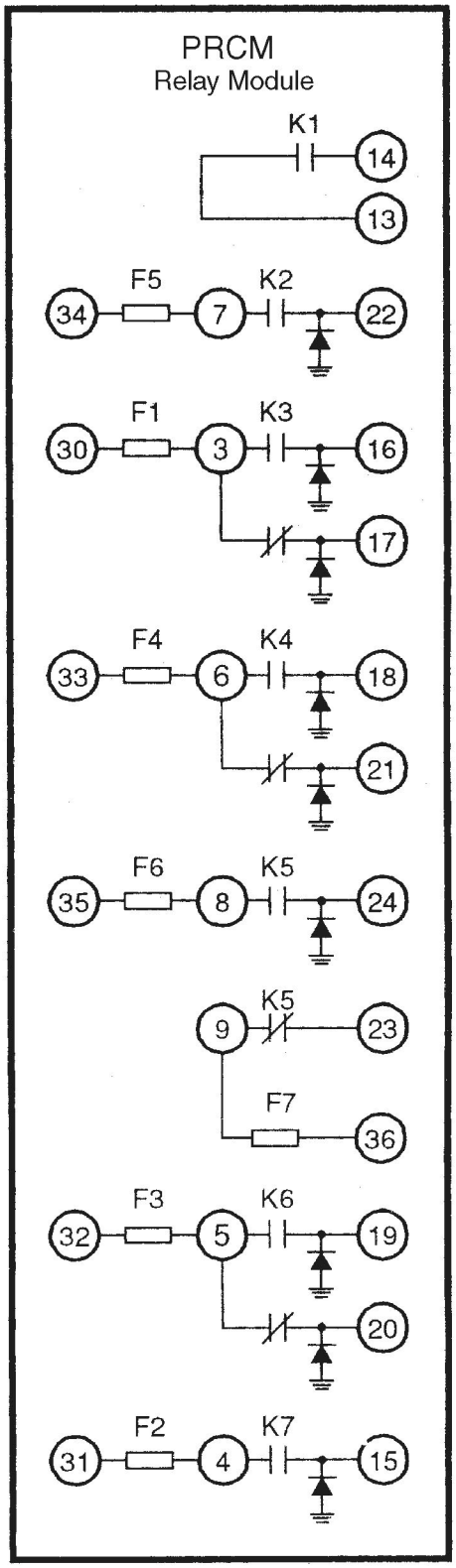


Illustration 53 g00709866

The Connections for the PRCM to the Relay Module

The PRCM provides the internal relay outputs for customer's use. All relays are located in the relay module on the rear of the PRCM. If the CAT data link fails, the relay remains in the state required by the last valid input state. The relay may also be programmed to reset to the OFF position. Refer to Systems Operation, "Setpoint Viewing and Programming".

The Possible cause of a CID 0480 FMI 04 is a short circuit of the "K4" relay coil. Clear the diagnostic code from the fault log when the troubleshooting procedure is completed.

NOTICE

Do not apply AC voltages to any relay module terminal other than terminals 23 and 36 of K5 and terminals 13 and 14 of K1 or permanent damage to the relay module will result. All other terminals have flyback diodes connected to them that increase relay life when driving inductive loads; however, this limits their use to DC voltages.

Note: All 3K-8782 Fuses ("AGC-10") in the relay module are rated at 10 Amperes DCV.

Test Step 1. CHECK THE STATUS OF THE DIAGNOSTIC CODE.

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Press the "MODE" key until the diagnostic code viewing/clearing menu appears.

C. Observe the upper display. Check that the CID 0480 FMI 04 is active.

Note: The "DIAG" indicator will be flashing and the CID 0480 FMI 04 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0480 FMI 04 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The CID 0480 FMI 04 is active. Proceed to test step 2.
- NOT OK – The CID 0480 FMI 04 has not occurred. STOP.

Test Step 2. CHECK THE INTERNAL CABLE OF THE RELAY MODULE.

Note: Only open the relay module in a dry environment. If the inspection and the repair takes more than twenty minutes replace the desiccant bag. The bag is located in the housing of the PRCM. See Testing and Adjusting, “Relay Module - Replace”.

A. Turn the ECS to the OFF/RESET position.

B. Disconnect the battery negative cable.

C. Temporarily, remove the relay module from the PRCM. See Testing and Adjusting, “Relay Module - Replace”.

D. Check the cable that attaches the relay module to the PRCM.

Expected Result:

The cable should be firmly seated in the connector. The clamp should be in place. The cable should not be damaged.

Results:

- OK – The cable is firmly seated in the connector. The clamp is in place. The cable is not damaged. Reassemble the relay module to the PRCM. Proceed to test step 3.
- NOT OK – One or more of the components are damaged or the components are missing.

  Repair: Replace the clamp if the clamp is missing. If the cable is damaged, replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

  STOP.

Test Step 3. RECHECK THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Reconnect the battery negative cable.

C. Press the “MODE” key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0480 FMI 04. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0480 FMI 04 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0480 FMI 04 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.
- NOT OK – The diagnostic is still active.

  Repair: Replace the relay module. See Testing and Adjusting, “Relay Module - Replace”.

  STOP.

Test Step 4. VERIFY THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. The battery negative cable remains connected.

C. Press the “MODE” key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0480 FMI 04. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0480 FMI 04 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0480 FMI 04 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.
- NOT OK – The diagnostic is still active.

  Repair: Replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

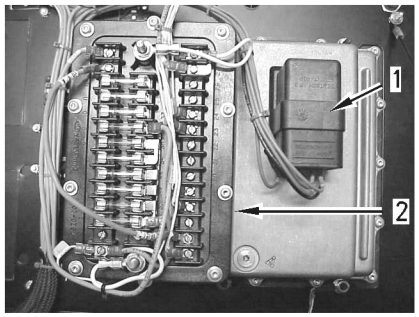
  STOP.

i01371330

PRCM CID 0481 - FMI 03

SMCS Code: 1927-035

Conditions Which Generate This Code:



g00722721

Illustration 54

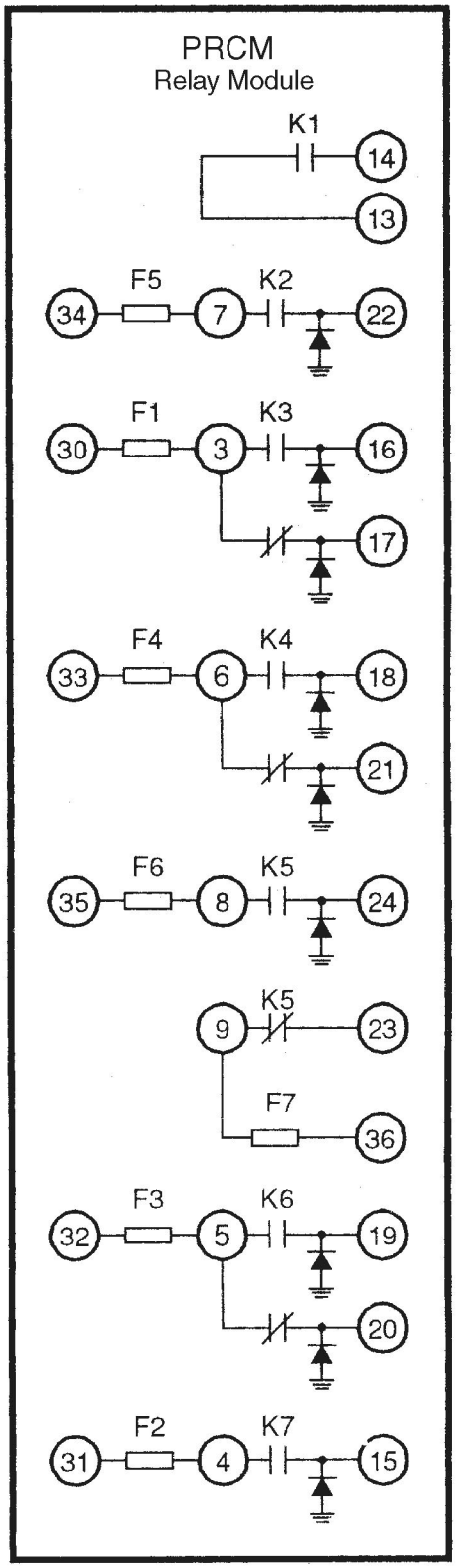
Rear view of the PRCM

(1) 40-pin connector
(2) Relay module

Table 14

Load Specifications For the Internal Relays of the PRCM		
Relay Module and Number	**Ratings For Resistive Loads**	**Ratings For Inductive Loads**
K1	7 milliamperes to 1 Amperes (24 DCV)	None(1)(2)(3)
“K2”, “K3”, “K4”, “K5” (terminal 24), “K6” and “K7”	0.5 to 10 amperes (24 DCV)	0.5 to 10 Amperes (24 DCV)(3)
“K5” (terminals 23 and 36)	0.5 to 10 Amperes (24 DCV) and 0.5 to 10 Amperes (24 ACV)	0.5 to 5 Amperes (24 DCV) and 0.5 to 7.5 Amperes (110 ACV)

(1) Do NOT connect inductive loads to these terminals.
(2) The contacts of the relay that is connected to terminals 13 and 14 are gold flashed. The gold socket contact provides a source of low impedance for a low current resistive load. Loads that draw higher currents, currents that are of similar levels as terminals 23 and 36 in table 14can be applied. However, if heavier loads are applied, the gold flashing will be permanently burned. This will eliminate the gold flashing from the contacts. This does not result in damage to the relay contacts, but the contacts can no longer be used for low current loads.
(3) “K1” (terminals 13 and 14) is not fused.



g00709866

Illustration 55

The Connections for the PRCM to the Relay Module

The PRCM provides the internal relay outputs for customer's use. All relays are located in the relay module on the rear of the PRCM. If the CAT data link fails, the relay remains in the state required by the last valid input state. The relay may also be programmed to reset to the OFF position. Refer to Systems Operation, "Setpoint Viewing and Programming".

The Possible cause of a CID 0481 FMI 03 is an open circuit of the "K5" relay coil. Clear the diagnostic code from the fault log when the troubleshooting procedure is completed.

NOTICE

Do not apply AC voltages to any relay module terminal other than terminals 23 and 36 of K5 and terminals 13 and 14 of K1 or permanent damage to the relay module will result. All other terminals have flyback diodes connected to them that increase relay life when driving inductive loads; however, this limits their use to DC voltages.

Note: All 3K-8782 Fuses ("AGC-10") in the relay module are rated at 10 Amperes DCV.

Test Step 1. CHECK THE STATUS OF THE DIAGNOSTIC CODE.

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Press the "MODE" key until the diagnostic code viewing/clearing menu appears.

C. Observe the upper display. Check that the CID 0481 FMI 03 is active.

Note: The "DIAG" indicator will be flashing and the CID 0481 FMI 03 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0481 FMI 03 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The CID 0481 FMI 03 is active. Proceed to test step 2.
- NOT OK – The CID 0481 FMI 03 has not occurred. STOP.

Test Step 2. CHECK THE INTERNAL CABLE OF THE RELAY MODULE.

Note: Only open the relay module in a dry environment. If the inspection and the repair takes more than twenty minutes replace the desiccant bag. The bag is located in the housing of the PRCM. See Testing and Adjusting, “Relay Module - Replace”.

A. Turn the ECS to the OFF/RESET position.

B. Disconnect the battery negative cable.

C. Temporarily, remove the relay module from the PRCM. See Testing and Adjusting, “Relay Module - Replace”.

D. Check the cable that attaches the relay module to the PRCM.

Expected Result:

The cable should be firmly seated in the connector. The clamp should be in place. The cable should not be damaged.

Results:

- OK – The cable is firmly seated in the connector. The clamp is in place. The cable is not damaged. Reassemble the relay module to the PRCM. Proceed to test step 3.
- NOT OK – One or more of the components are damaged or the components are missing.

  Repair: Replace the clamp if the clamp is missing. If the cable is damaged, replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

  STOP.

Test Step 3. RECHECK THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Reconnect the battery negative cable.

C. Press the “MODE” key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0481 FMI 03. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0481 FMI 03 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0481 FMI 03 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.
- NOT OK – The diagnostic is still active.

  Repair: Replace the relay module. See Testing and Adjusting, “Relay Module - Replace”.

  STOP.

Test Step 4. VERIFY THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. The battery negative cable remains connected.

C. Press the “MODE” key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0481 FMI 03. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0481 FMI 03 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0481 FMI 03 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.
- NOT OK – The diagnostic is still active.

  Repair: Replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

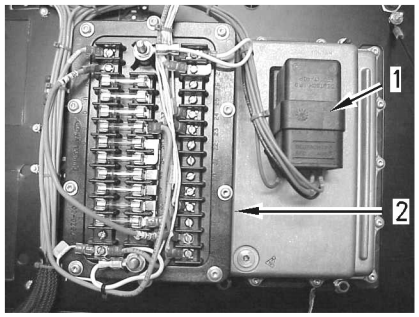
  STOP.

i01371369

PRCM CID 0481 - FMI 04

SMCS Code: 1927-035

Conditions Which Generate This Code:



g00722721

Illustration 56

Rear view of the PRCM

(1) 40-pin connector
(2) Relay module

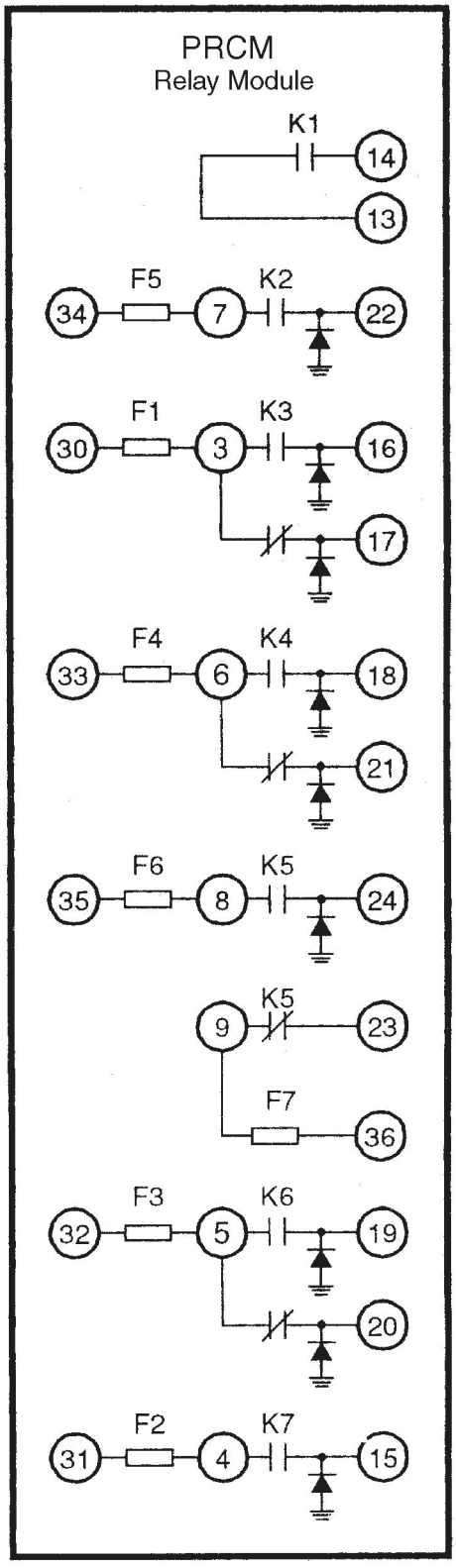
Table 15

Load Specifications For the Internal Relays of the PRCM		
Relay Module and Number	**Ratings For Resistive Loads**	**Ratings For Inductive Loads**
“K1”	7 milliamperes to 1 Amperes (24 DCV)	None(1)(2)(3)
“K2”, “K3”, “K4”, “K5” (terminal 24), “K6” and “K7”	0.5 to 10 amperes (24 DCV)	0.5 to 10 Amperes (24 DCV)(3)
“K5” (terminals 23 and 36)	0.5 to 10 Amperes (24 DCV) and 0.5 to 10 Amperes (24 ACV)	0.5 to 5 Amperes (24 DCV) and 0.5 to 7.5 Amperes (110 ACV)

(1) Do NOT connect inductive loads to these terminals.

(2) The contacts of the relay that is connected to terminals 13 and 14 are gold flashed. The gold socket contact provides a source of low impedance for a low current resistive load. Loads that draw higher currents, currents that are of similar levels as terminals 23 and 36 in table 15 can be applied. However, if heavier loads are applied, the gold flashing will be permanently burned. This will eliminate the gold flashing from the contacts. This does not result in damage to the relay contacts, but the contacts can no longer be used for low current loads.

(3) “K1” (terminals 13 and 14) is not fused.



g00709866

Illustration 57

The Connections for the PRCM to the Relay Module

The PRCM provides the internal relay outputs for customer's use. All relays are located in the relay module on the rear of the PRCM. If the CAT data link fails, the relay remains in the state required by the last valid input state. The relay may also be programmed to reset to the OFF position. Refer to Systems Operation, "Setpoint Viewing and Programming".

The Possible cause of a CID 0481 FMI 04 is a short circuit of the "K5" relay coil. Clear the diagnostic code from the fault log when the troubleshooting procedure is completed.

NOTICE

Do not apply AC voltages to any relay module terminal other than terminals 23 and 36 of K5 and terminals 13 and 14 of K1 or permanent damage to the relay module will result. All other terminals have flyback diodes connected to them that increase relay life when driving inductive loads; however, this limits their use to DC voltages.

Note: All 3K-8782 Fuses ("AGC-10") in the relay module are rated at 10 Amperes DCV.

Test Step 1. CHECK THE STATUS OF THE DIAGNOSTIC CODE.

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Press the "MODE" key until the diagnostic code viewing/clearing menu appears.

C. Observe the upper display. Check that the CID 0481 FMI 04 is active.

Note: The "DIAG" indicator will be flashing and the CID 0481 FMI 04 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0481 FMI 04 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The CID 0481 FMI 04 is active. Proceed to test step 2.
- NOT OK – The CID 0481 FMI 04 has not occurred. STOP.

Test Step 2. CHECK THE INTERNAL CABLE OF THE RELAY MODULE.

Note: Only open the relay module in a dry environment. If the inspection and the repair takes more than twenty minutes replace the desiccant bag. The bag is located in the housing of the PRCM. See Testing and Adjusting, "Relay Module - Replace".

A. Turn the ECS to the OFF/RESET position.

B. Disconnect the battery negative cable.

C. Temporarily, remove the relay module from the PRCM. See Testing and Adjusting, "Relay Module - Replace".

D. Check the cable that attaches the relay module to the PRCM.

Expected Result:

The cable should be firmly seated in the connector. The clamp should be in place. The cable should not be damaged.

Results:

- OK – The cable is firmly seated in the connector. The clamp is in place. The cable is not damaged. Reassemble the relay module to the PRCM. Proceed to test step 3.
- NOT OK – One or more of the components are damaged or the components are missing.

  Repair: Replace the clamp if the clamp is missing. If the cable is damaged, replace the PRCM. See Testing and Adjusting, "Programmable Relay Control Module - Replace".

  STOP.

Test Step 3. RECHECK THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Reconnect the battery negative cable.

C. Press the "MODE" key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0481 FMI 04. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0481 FMI 04 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0481 FMI 04 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.
- NOT OK – The diagnostic is still active.

  Repair: Replace the relay module. See Testing and Adjusting, “Relay Module - Replace”.

  STOP.

Test Step 4. VERIFY THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. The battery negative cable remains connected.

C. Press the “MODE” key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0481 FMI 04. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0481 FMI 04 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0481 FMI 04 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.
- NOT OK – The diagnostic is still active.

  Repair: Replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

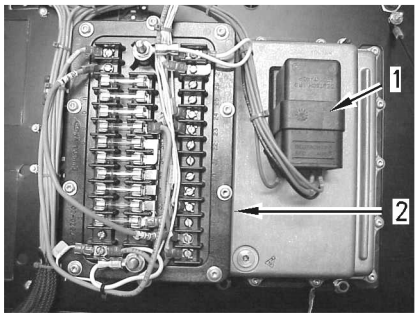
  STOP.

i01371376

PRCM CID 0482 - FMI 03

SMCS Code: 1927-035

Conditions Which Generate This Code:



g00722721

Illustration 58

Rear view of the PRCM

(1) 40-pin connector
(2) Relay module

Table 16

Load Specifications For the Internal Relays of the PRCM		
Relay Module and Number	**Ratings For Resistive Loads**	**Ratings For Inductive Loads**
K1	7 milliamperes to 1 Amperes (24 DCV)	None(1)(2)(3)
“K2”, “K3”, “K4”, “K5” (terminal 24), “K6” and “K7”	0.5 to 10 amperes (24 DCV)	0.5 to 10 Amperes (24 DCV)(3)
“K5” (terminals 23 and 36)	0.5 to 10 Amperes (24 DCV) and 0.5 to 10 Amperes (24 ACV)	0.5 to 5 Amperes (24 DCV) and 0.5 to 7.5 Amperes (110 ACV)

(1) Do NOT connect inductive loads to these terminals.
(2) The contacts of the relay that is connected to terminals 13 and 14 are gold flashed. The gold socket contact provides a source of low impedance for a low current resistive load. Loads that draw higher currents, currents that are of similar levels as terminals 23 and 36 in table 16can be applied. However, if heavier loads are applied, the gold flashing will be permanently burned. This will eliminate the gold flashing from the contacts. This does not result in damage to the relay contacts, but the contacts can no longer be used for low current loads.
(3) “K1” (terminals 13 and 14) is not fused.

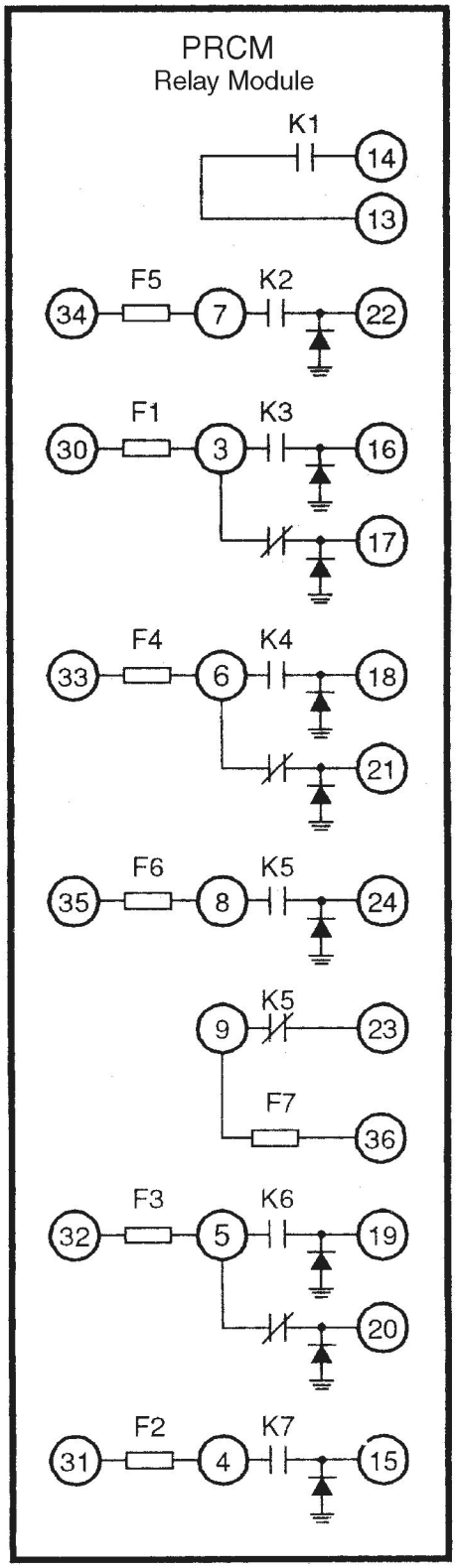


Illustration 59 g00709866

The Connections for the PRCM to the Relay Module

The PRCM provides the internal relay outputs for customer's use. All relays are located in the relay module on the rear of the PRCM. If the CAT data link fails, the relay remains in the state required by the last valid input state. The relay may also be programmed to reset to the OFF position. Refer to Systems Operation, "Setpoint Viewing and Programming".

The Possible cause of a CID 0482 FMI 03 is an open circuit of the "K6" relay coil. Clear the diagnostic code from the fault log when the troubleshooting procedure is completed.

NOTICE

Do not apply AC voltages to any relay module terminal other than terminals 23 and 36 of K5 and terminals 13 and 14 of K1 or permanent damage to the relay module will result. All other terminals have flyback diodes connected to them that increase relay life when driving inductive loads; however, this limits their use to DC voltages.

Note: All 3K-8782 Fuses ("AGC-10") in the relay module are rated at 10 Amperes DCV.

Test Step 1. CHECK THE STATUS OF THE DIAGNOSTIC CODE.

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Press the "MODE" key until the diagnostic code viewing/clearing menu appears.

C. Observe the upper display. Check that the CID 0482 FMI 03 is active.

Note: The "DIAG" indicator will be flashing and the CID 0482 FMI 03 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0482 FMI 03 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The CID 0482 FMI 03 is active. Proceed to test step 2.
- NOT OK – The CID 0482 FMI 03 has not occurred. STOP.

Test Step 2. CHECK THE INTERNAL CABLE OF THE RELAY MODULE.

Note: Only open the relay module in a dry environment. If the inspection and the repair takes more than twenty minutes replace the desiccant bag. The bag is located in the housing of the PRCM. See Testing and Adjusting, “Relay Module - Replace”.

A. Turn the ECS to the OFF/RESET position.

B. Disconnect the battery negative cable.

C. Temporarily, remove the relay module from the PRCM. See Testing and Adjusting, “Relay Module - Replace”.

D. Check the cable that attaches the relay module to the PRCM.

Expected Result:

The cable should be firmly seated in the connector. The clamp should be in place. The cable should not be damaged.

Results:

- OK – The cable is firmly seated in the connector. The clamp is in place. The cable is not damaged. Reassemble the relay module to the PRCM. Proceed to test step 3.
- NOT OK – One or more of the components are damaged or the components are missing.

  Repair: Replace the clamp if the clamp is missing. If the cable is damaged, replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

  STOP.

Test Step 3. RECHECK THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Reconnect the battery negative cable.

C. Press the “MODE” key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0482 FMI 03. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0482 FMI 03 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0482 FMI 03 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.
- NOT OK – The diagnostic is still active.

  Repair: Replace the relay module. See Testing and Adjusting, “Relay Module - Replace”.

  STOP.

Test Step 4. VERIFY THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. The battery negative cable remains connected.

C. Press the “MODE” key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0482 FMI 03. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0482 FMI 03 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0482 FMI 03 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.
- NOT OK – The diagnostic is still active.

  Repair: Replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

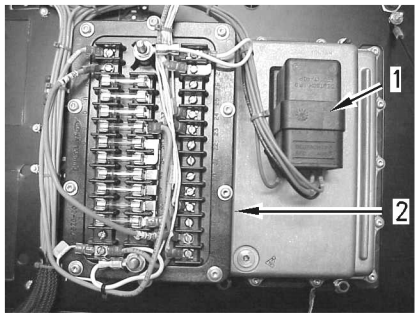
  STOP.

i01371384

PRCM CID 0482 - FMI 04

SMCS Code: 1927-035

Conditions Which Generate This Code:



g00722721

Illustration 60

Rear view of the PRCM

(1) 40-pin connector
(2) Relay module

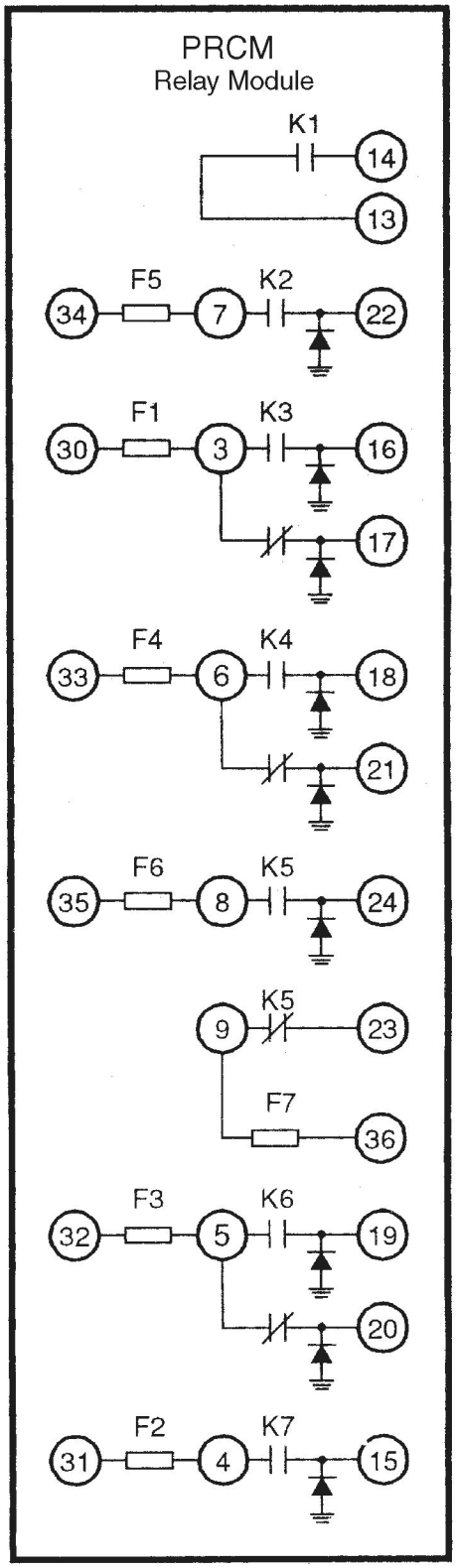
Table 17

Load Specifications For the Internal Relays of the PRCM		
Relay Module and Number	**Ratings For Resistive Loads**	**Ratings For Inductive Loads**
“K1”	7 milliamperes to 1 Amperes (24 DCV)	None(1)(2)(3)
“K2”, “K3”, “K4”, “K5” (terminal 24), “K6” and “K7”	0.5 to 10 amperes (24 DCV)	0.5 to 10 Amperes (24 DCV)(3)
“K5” (terminals 23 and 36)	0.5 to 10 Amperes (24 DCV) and 0.5 to 10 Amperes (24 ACV)	0.5 to 5 Amperes (24 DCV) and 0.5 to 7.5 Amperes (110 ACV)

(1) Do NOT connect inductive loads to these terminals.

(2) The contacts of the relay that is connected to terminals 13 and 14 are gold flashed. The gold socket contact provides a source of low impedance for a low current resistive load. Loads that draw higher currents, currents that are of similar levels as terminals 23 and 36 in table 17 can be applied. However, if heavier loads are applied, the gold flashing will be permanently burned. This will eliminate the gold flashing from the contacts. This does not result in damage to the relay contacts, but the contacts can no longer be used for low current loads.

(3) “K1” (terminals 13 and 14) is not fused.



g00709866

Illustration 61

The Connections for the PRCM to the Relay Module

The PRCM provides the internal relay outputs for customer's use. All relays are located in the relay module on the rear of the PRCM. If the CAT data link fails, the relay remains in the state required by the last valid input state. The relay may also be programmed to reset to the OFF position. Refer to Systems Operation, "Setpoint Viewing and Programming".

The Possible cause of a CID 0482 FMI 04 is a short circuit of the "K6" relay coil. Clear the diagnostic code from the fault log when the troubleshooting procedure is completed.

NOTICE

Do not apply AC voltages to any relay module terminal other than terminals 23 and 36 of K5 and terminals 13 and 14 of K1 or permanent damage to the relay module will result. All other terminals have flyback diodes connected to them that increase relay life when driving inductive loads; however, this limits their use to DC voltages.

Note: All 3K-8782 Fuses ("AGC-10") in the relay module are rated at 10 Amperes DCV.

Test Step 1. CHECK THE STATUS OF THE DIAGNOSTIC CODE.

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Press the "MODE" key until the diagnostic code viewing/clearing menu appears.

C. Observe the upper display. Check that the CID 0482 FMI 04 is active.

Note: The "DIAG" indicator will be flashing and the CID 0482 FMI 04 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0482 FMI 04 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The CID 0482 FMI 04 is active. Proceed to test step 2.
- NOT OK – The CID 0482 FMI 04 has not occurred. STOP.

Test Step 2. CHECK THE INTERNAL CABLE OF THE RELAY MODULE.

Note: Only open the relay module in a dry environment. If the inspection and the repair takes more than twenty minutes replace the desiccant bag. The bag is located in the housing of the PRCM. See Testing and Adjusting, “Relay Module - Replace”.

A. Turn the ECS to the OFF/RESET position.

B. Disconnect the battery negative cable.

C. Temporarily, remove the relay module from the PRCM. See Testing and Adjusting, “Relay Module - Replace”.

D. Check the cable that attaches the relay module to the PRCM.

Expected Result:

The cable should be firmly seated in the connector. The clamp should be in place. The cable should not be damaged.

Results:

- OK – The cable is firmly seated in the connector. The clamp is in place. The cable is not damaged. Reassemble the relay module to the PRCM. Proceed to test step 3.
- NOT OK – One or more of the components are damaged or the components are missing.

  Repair: Replace the clamp if the clamp is missing. If the cable is damaged, replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

  STOP.

Test Step 3. RECHECK THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Reconnect the battery negative cable.

C. Press the “MODE” key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0482 FMI 04. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0482 FMI 04 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0482 FMI 04 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.
- NOT OK – The diagnostic is still active.

  Repair: Replace the relay module. See Testing and Adjusting, “Relay Module - Replace”.

  STOP.

Test Step 4. VERIFY THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. The battery negative cable remains connected.

C. Press the “MODE” key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0482 FMI 04. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0482 FMI 04 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0482 FMI 04 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.
- NOT OK – The diagnostic is still active.

  Repair: Replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

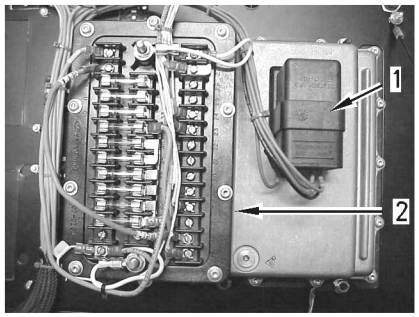
  STOP.

i01371393

PRCM CID 0483 - FMI 03

SMCS Code: 1927-035

Conditions Which Generate This Code:



g00722721

Illustration 62

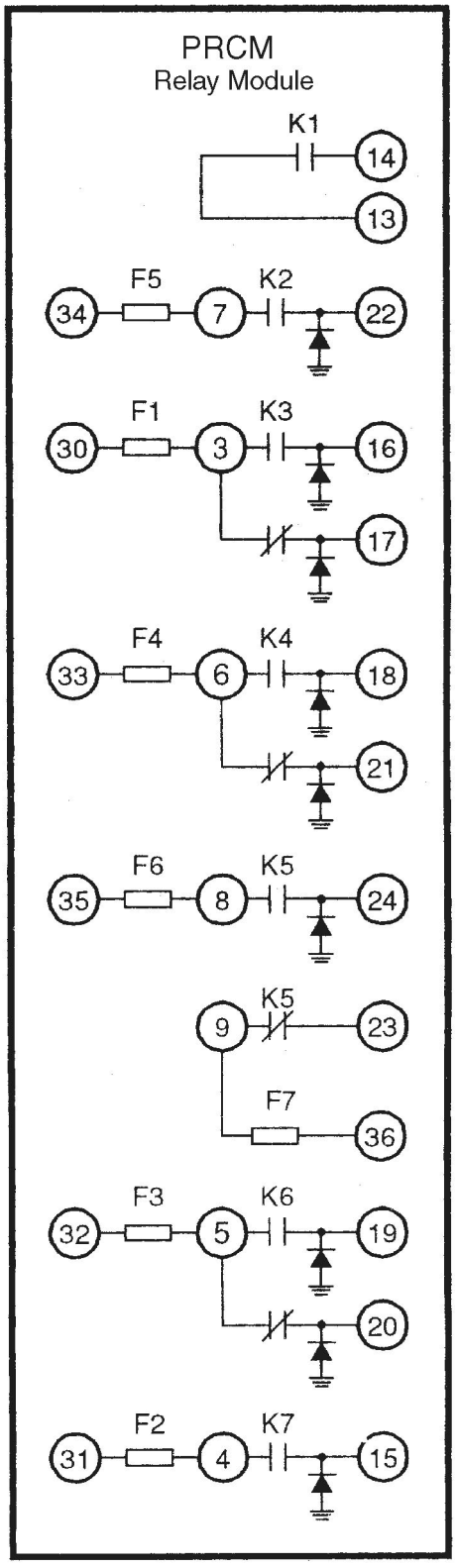
Rear view of the PRCM

(1) 40-pin connector
(2) Relay module

Table 18

Load Specifications For the Internal Relays of the PRCM		
Relay Module and Number	**Ratings For Resistive Loads**	**Ratings For Inductive Loads**
K1	7 milliamperes to 1 Amperes (24 DCV)	None(1)(2)(3)
“K2”, “K3”, “K4”, “K5” (terminal 24), “K6” and “K7”	0.5 to 10 amperes (24 DCV)	0.5 to 10 Amperes (24 DCV)(3)
“K5” (terminals 23 and 36)	0.5 to 10 Amperes (24 DCV) and 0.5 to 10 Amperes (24 ACV)	0.5 to 5 Amperes (24 DCV) and 0.5 to 7.5 Amperes (110 ACV)

(1) Do NOT connect inductive loads to these terminals.
(2) The contacts of the relay that is connected to terminals 13 and 14 are gold flashed. The gold socket contact provides a source of low impedance for a low current resistive load. Loads that draw higher currents, currents that are of similar levels as terminals 23 and 36 in table 18can be applied. However, if heavier loads are applied, the gold flashing will be permanently burned. This will eliminate the gold flashing from the contacts. This does not result in damage to the relay contacts, but the contacts can no longer be used for low current loads.
(3) “K1” (terminals 13 and 14) is not fused.



g00709866

Illustration 63

The Connections for the PRCM to the Relay Module

The PRCM provides the internal relay outputs for customer's use. All relays are located in the relay module on the rear of the PRCM. If the CAT data link fails, the "K7" relay remains in the state required by the last valid input state. The relay may also be programmed to reset to the OFF position. Refer to Systems Operation, "Setpoint Viewing and Programming".

The Possible cause of a CID 0483 FMI 03 is an open circuit of the relay coil. Clear the diagnostic code from the fault log when the troubleshooting procedure is completed.

NOTICE

Do not apply AC voltages to any relay module terminal other than terminals 23 and 36 of K5 and terminals 13 and 14 of K1 or permanent damage to the relay module will result. All other terminals have flyback diodes connected to them that increase relay life when driving inductive loads; however, this limits their use to DC voltages.

Note: All 3K-8782 Fuses ("AGC-10") in the relay module are rated at 10 Amperes DCV.

Test Step 1. CHECK THE STATUS OF THE DIAGNOSTIC CODE.

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Press the "MODE" key until the diagnostic code viewing/clearing menu appears.

C. Observe the upper display. Check that the CID 0483 FMI 03 is active.

Note: The "DIAG" indicator will be flashing and the CID 0483 FMI 03 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0483 FMI 03 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The CID 0483 FMI 03 is active. Proceed to test step 2.
- NOT OK – The CID 0483 FMI 03 has not occurred. STOP.

Test Step 2. CHECK THE INTERNAL CABLE OF THE RELAY MODULE.

Note: Only open the relay module in a dry environment. If the inspection and the repair takes more than twenty minutes replace the desiccant bag. The bag is located in the housing of the PRCM. See Testing and Adjusting, "Relay Module - Replace".

A. Turn the ECS to the OFF/RESET position.

B. Disconnect the battery negative cable.

C. Temporarily, remove the relay module from the PRCM. See Testing and Adjusting, "Relay Module - Replace".

D. Check the cable that attaches the relay module to the PRCM.

Expected Result:

The cable should be firmly seated in the connector. The clamp should be in place. The cable should not be damaged.

Results:

- OK – The cable is firmly seated in the connector. The clamp is in place. The cable is not damaged. Reassemble the relay module to the PRCM. Proceed to test step 3.
- NOT OK – One or more of the components are damaged or the components are missing.

  Repair: Replace the clamp if the clamp is missing. If the cable is damaged, replace the PRCM. See Testing and Adjusting, "Programmable Relay Control Module - Replace".

  STOP.

Test Step 3. RECHECK THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Reconnect the battery negative cable.

C. Press the "MODE" key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0483 FMI 03. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0483 FMI 03 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0483 FMI 03 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.
- NOT OK – The diagnostic is still active.

  Repair: Replace the relay module. See Testing and Adjusting, “Relay Module - Replace”.

  STOP.

Test Step 4. VERIFY THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. The battery negative cable remains connected.

C. Press the “MODE” key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0483 FMI 03. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0483 FMI 03 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0483 FMI 03 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.
- NOT OK – The diagnostic is still active.

  Repair: Replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

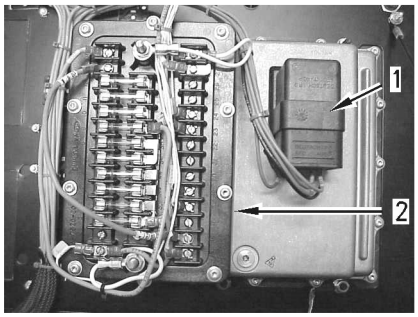
  STOP.

i01371421

PRCM CID 0483 - FMI 04

SMCS Code: 1927-035

Conditions Which Generate This Code:



g00722721

Illustration 64

Rear view of the PRCM

(1) 40-pin connector
(2) Relay module

Table 19

Load Specifications For the Internal Relays of the PRCM		
Relay Module and Number	**Ratings For Resistive Loads**	**Ratings For Inductive Loads**
“K1”	7 milliamperes to 1 Amperes (24 DCV)	None(1)(2)(3)
“K2”, “K3”, “K4”, “K5” (terminal 24), “K6” and “K7”	0.5 to 10 amperes (24 DCV)	0.5 to 10 Amperes (24 DCV)(3)
“K5” (terminals 23 and 36)	0.5 to 10 Amperes (24 DCV) and 0.5 to 10 Amperes (24 ACV)	0.5 to 5 Amperes (24 DCV) and 0.5 to 7.5 Amperes (110 ACV)

(1) Do NOT connect inductive loads to these terminals.
(2) The contacts of the relay that is connected to terminals 13 and 14 are gold flashed. The gold socket contact provides a source of low impedance for a low current resistive load. Loads that draw higher currents, currents that are of similar levels as terminals 23 and 36 in table 19 can be applied. However, if heavier loads are applied, the gold flashing will be permanently burned. This will eliminate the gold flashing from the contacts. This does not result in damage to the relay contacts, but the contacts can no longer be used for low current loads.
(3) “K1” (terminals 13 and 14) is not fused.

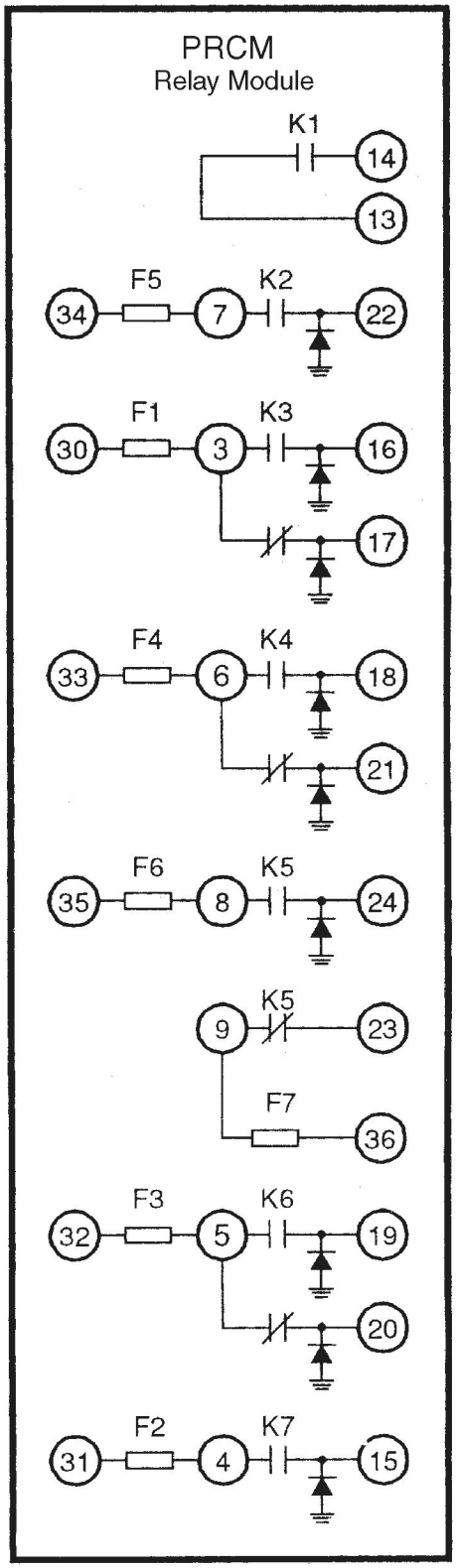


Illustration 65 g00709866

The Connections for the PRCM to the Relay Module

The PRCM provides the internal relay outputs for customer's use. All relays are located in the relay module on the rear of the PRCM. If the CAT data link fails, the relay remains in the state required by the last valid input state. The relay may also be programmed to reset to the OFF position. Refer to Systems Operation, "Setpoint Viewing and Programming".

The Possible cause of a CID 0483 FMI 04 is a short circuit of the "K7" relay coil. Clear the diagnostic code from the fault log when the troubleshooting procedure is completed.

NOTICE

Do not apply AC voltages to any relay module terminal other than terminals 23 and 36 of K5 and terminals 13 and 14 of K1 or permanent damage to the relay module will result. All other terminals have flyback diodes connected to them that increase relay life when driving inductive loads; however, this limits their use to DC voltages.

Note: All 3K-8782 Fuses ("AGC-10") in the relay module are rated at 10 Amperes DCV.

Test Step 1. CHECK THE STATUS OF THE DIAGNOSTIC CODE.

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Press the "MODE" key until the diagnostic code viewing/clearing menu appears.

C. Observe the upper display. Check that the CID 0483 FMI 04 is active.

Note: The "DIAG" indicator will be flashing and the CID 0483 FMI 04 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0483 FMI 04 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The CID 0483 FMI 04 is active. Proceed to test step 2.
- NOT OK – The CID 0483 FMI 04 has not occurred. STOP.

Test Step 2. CHECK THE INTERNAL CABLE OF THE RELAY MODULE.

Note: Only open the relay module in a dry environment. If the inspection and the repair takes more than twenty minutes replace the desiccant bag. The bag is located in the housing of the PRCM. See Testing and Adjusting, “Relay Module - Replace”.

A. Turn the ECS to the OFF/RESET position.

B. Disconnect the battery negative cable.

C. Temporarily, remove the relay module from the PRCM. See Testing and Adjusting, “Relay Module - Replace”.

D. Check the cable that attaches the relay module to the PRCM.

Expected Result:

The cable should be firmly seated in the connector. The clamp should be in place. The cable should not be damaged.

Results:

- OK – The cable is firmly seated in the connector. The clamp is in place. The cable is not damaged. Reassemble the relay module to the PRCM. Proceed to test step 3.
- NOT OK – One or more of the components are damaged or the components are missing.

  Repair: Replace the clamp if the clamp is missing. If the cable is damaged, replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

  STOP.

Test Step 3. RECHECK THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. Reconnect the battery negative cable.

C. Press the “MODE” key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0483 FMI 04. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0483 FMI 04 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0483 FMI 04 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.
- NOT OK – The diagnostic is still active.

  Repair: Replace the relay module. See Testing and Adjusting, “Relay Module - Replace”.

  STOP.

Test Step 4. VERIFY THE STATUS OF THE DIAGNOSTIC CODE

A. Turn the ECS to the OFF/RESET position and then turn the ECS to the STOP position.

B. The battery negative cable remains connected.

C. Press the “MODE” key until the diagnostic code viewing/clearing menu appears.

D. Observe the upper display. Check the status of the CID 0483 FMI 04. The diagnostic code is active or the diagnostic code is inactive.

Note: The “DIAG” indicator will be flashing and the CID 0483 FMI 04 will be present on the display if the diagnostic code is active.

Expected Result:

A CID 0483 FMI 04 is displayed as an active diagnostic code or the diagnostic code is inactive.

Results:

- OK – The diagnostic code is inactive. The problem has been fixed by this procedure. STOP.
- NOT OK – The diagnostic is still active.

  Repair: Replace the PRCM. See Testing and Adjusting, “Programmable Relay Control Module - Replace”.

  STOP.

i01371455

PRCM CID 0590 - FMI 09

SMCS Code: 1901-035

Conditions Which Generate This Code:

The CID 0590 FMI 09 failure means that the engine electronic control module has stopped responding to the periodic requests for information from the PRCM. The PRCM detects this condition when there is a loss of the data signal on the CAT data link.

Note: The PRCM will not communicate properly with the engine ECM if the data link cable exceeds 30.5 m (100 ft). See Specifications, “Electrical” for additional information.

Note: The PRCM is capable of being programmed in order to treat diagnostic codes for the ECM in one of two ways.

- Setpoint P03 is 1. The PRCM will display CID 0590 FMI 09 and the PRCM will display CID 0248 FMI 11. The diagnostic codes are displayed as being active. When the diagnostic codes are inactive, the diagnostic codes will NOT be logged.
- Setpoint P03 is 2. The PRCM will display CID 0590 FMI 09 and the PRCM will display CID 0248 FMI 11. The diagnostic codes are displayed as being active. When the diagnostic codes are inactive, the diagnostic codes will be logged.

CHECK THE CAT DATA LINK

A. Disconnect the contacts 19 and 20 of the CAT data link from the PRCM.

B. Disconnect the contacts 13 and 14 of the CAT data link from the ECM.

C. Measure the resistance between contact 19 of the PRCM and contact 14 of the ECM.

D. Measure the resistance between contact 20 of the PRCM and contact 13 of the ECM.

Expected Result:

The resistance for both measurements is less than 5 ohms.

Results:

- OK – The resistance for both measurements is less than 5 ohms. The circuit is correct. The ECM has failed.

  Repair: It is unlikely that the ECM has failed. See Troubleshooting, SENR1003, “3500B EPG Engines”prior to replacing the ECM.

  Clear the diagnostic code from the fault log after troubleshooting is complete. The PRCM is usually programmed to treat a CID 590 diagnostic code as an “alarm fault”.

  STOP.

- NOT OK – The resistance for both measurements is greater than 5 ohms. The circuit is not correct.

  Repair: Repair the wiring of the CAT data link or replace the wiring of the CAT data link.

  Clear the diagnostic code from the fault log after troubleshooting is complete. The PRCM is usually programmed to treat a CID 590 diagnostic code as an “alarm fault”.

  STOP.

Diagnostic System Procedures

i01373432

Customer Device Problem

SMCS Code: 1927-035

System Operation Description:

The spare output of the PRCM can be programmed as a high logic signal or a low logic signal for customer devices. Also, the spare output can be programmed as a serial data link for operating the relay driver module (RDM).

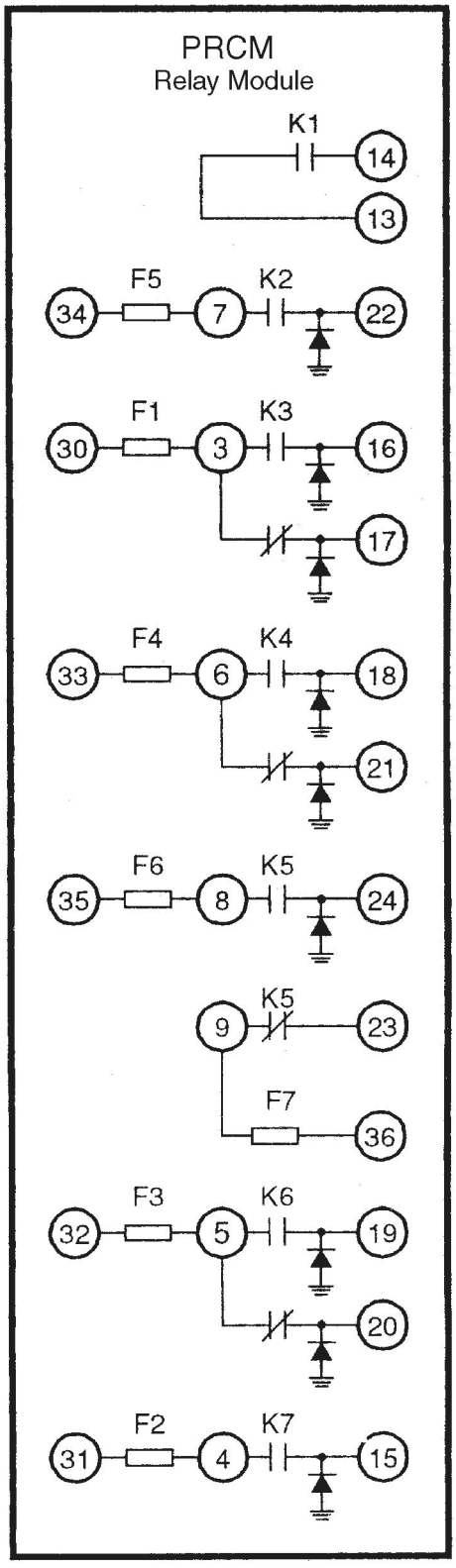


Illustration 66 g00709866

Table 20

NUMERIC DISPLAY CODES AND CONNECTION CHART FOR THE PRCM				
Relay Code	**Relay No.**	**Common**	**Normally Open Output**	**Normally Closed Output**
P001	K1	RM-13	RM-14	-
P002	K2	RM-34	RM-22	-
P003	K3	RM-30	RM-16	RM-17
P004	K4	RM-33	RM-18	RM-21
P005	K5	RM-35	RM-24	-
P006	K6	RM-32	RM-19	RM-20
P007	K7	RM-31	RM-15	-

Test Step 1. CHECK THE STATUS OF THE DEVICE

Perform the following procedure in order to verify the cause of an unknown device.

A. Check that the component is working properly.

Expected Result:

The component or the device is working properly.

Results:

- YES – The component or the device is working properly. STOP.
- NO – The component or the device is NOT working properly. Proceed to test step 2.

Test Step 2. VERIFY RELAY ACTIVATION.

Either the “K1” through “K7” symbol will be present on the lower display in order to show that the relay is activated. The contacts that are normally open will close. This will activate the device that is connected to the output contacts.

A. View the lower display in order to verify that either the “K1” through “K7” is present on the display.

Expected Result:

The relay is activated or the relay is NOT activated.

Results:

- YES – One of the “K1” through “K7” symbols is active on the lower display. Proceed to test step 3.
- NO – The relay is not programmed to be on at this time. Check the programming. See Systems Operation, Input/Output Monitoring and Programming. STOP.

Test Step 3. VERIFY THE STATUS OF THE RELAY

A. Use a multimeter in order to verify that the contacts are in the proper position.

Expected Result:

The relay contacts are in the proper position.

Results:

- YES – The relay contacts are in the proper position. The device or the component has failed. The wire from the relay to the component may have failed.

  Repair: Check the wire from the relay to the component. Repair the device/component or replace the device/component.

  STOP.

- NO – The relay has failed.

  Repair: Replace the relay board.

  STOP.

Testing and Adjusting Section

Testing and Adjusting

i01357881

Electrical Connector - Inspect

SMCS Code: 7553-040-WW

Many of the troubleshooting procedures require an inspection of the 40-pin connector for the PRCM. A complete inspection of various terminals that are crimped should also be performed. Do the following steps in order to test an electrical connector or test a terminal that is crimped. If a faulty connection is found, repair the connection. Return to the original troubleshooting procedures and recheck the connections. Continue with the troubleshooting procedure.

Note: Avoid unnecessary disconnecting and connecting of the connector halves in order to troubleshoot system diagnostic codes. This practice can cause the connector contacts within the connector to wear out prematurely.

1. Check the hex screw connector. Make sure that the 40-pin connector on the rear of the PRCM is aligned and seated properly. Make sure that the hex screw connector is tight. Any unused pin locations in the 40-pin connector should be plugged in order to keep out dirt, water and other contaminants.

2. Each wire should be given the 10 pound pull test . Each connector contact and wire should easily withstand ten pounds of pull and the wire will remain within the connector body. This test ensures that each wire and connector contact was crimped properly. The test also ensures that the connector contact was inserted into the connector body completely. Perform repair, as needed. Use the 1U-5804 Crimp Tool when you are replacing the contacts of the connector. The contact and the crimp tool needs to match the proper wire gauge in order to ensure that the contact is crimped properly. Connector contacts should always be crimped onto the wire, never soldered.

Note: Do the 10 pound pull test for the insulated terminals on any of the terminal strip connections. When you replace the terminals, use the proper crimping tool and use the proper techniques for the type and the brand of terminal. Use a properly sized terminal for the wire gauge. Spade terminals and ring terminals may be soldered to the wire for an improved electrical connection.

3. Visually inspect all wiring. Look for wires that are worn or wires that are scraped. Check for a pinched harness or a damaged harness.

4. Visually inspect connectors and crimp terminals. Verify that connector contacts within the connectors are not corroded or damaged. Verify proper alignment of connector contacts and location of connector contacts within the connector. Verify that the two connector halves are seated and locked together.

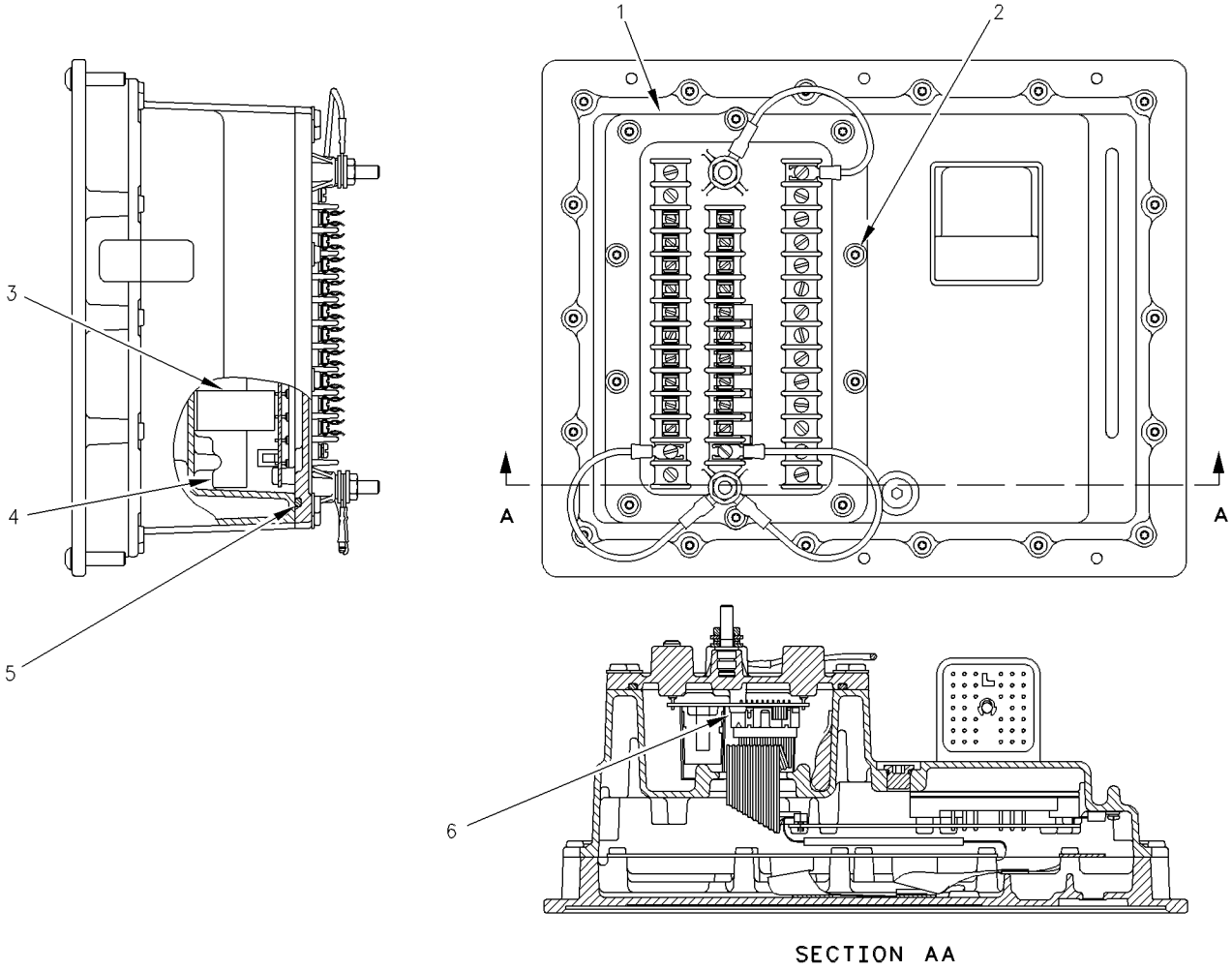
Note: Check all terminals for corrosion and inspect the terminals for damage. Wiggle each wire on a terminal. The bare wires that are located at the open end of the terminal barrel should be tight. Check the tightness of the screws on the terminal strips. Perform repair, as needed.

5. Check individual connector contacts. This is especially important for intermittent problems. When you are using a new connector contact, insert this contact into each of the mating connector contacts. Check for a snug fit between the mating connector contacts. Repeat this procedure for the other connector by using a new connector contact of the correct type.

i01356934

Relay Module - Replace

SMCS Code: 1927-510



g00583564

Illustration 67

Replacement Of The Relay Module

The Rear View of the PRCM

(1) Relay Module
(2) Screws
(3) Tape
(4) Desiccant Package
(5) O-Ring Seal
(6) Cable connector

Relay module (1) contains the relays, fuses and terminals that are used to operate external devices of the PRCM system. Relay module (1) is a component of the PRCM.

Reference: Special Instruction, SEHS9710, “Relay Module Replacement”.

Replacement Procedure

1. Remove the positive lead wire from the battery.

2. Make sure that all wires at the terminal strips of the relay module (1) are marked. During reassembly, the wires that are marked must be reattached to the correct terminals. Remove all wires from the terminals and posts of relay module (1).

3. Remove ten screws (2) that fasten relay module (1) to the PRCM.

4. Be aware that O-ring seal (5) exists. Partially separate relay module (1) from the PRCM. Carefully disconnect cable clamp and cable connector (6) from relay module (1).

5. Replace desiccant package (4) with the new desiccant package and tape that is included with the replacement relay module. The new desiccant package is attached in the same manner as the previous desiccant package.

Note: Remove the new desiccant package from the protective container just prior to installation into the PRCM. The replacement of the relay module is approximately a 20 minute procedure. The desiccant package will become saturated with moisture particularly if the relay module is disassembled for more than 20 minutes. In a humid environment, the desiccant package becomes saturated sooner.

6. Install new O-ring seal (5) in the groove of relay module (1). Make sure that O-ring seal (5) is seated properly. Align and reconnect cable connector (6) to the relay module (1). Install the cable clamp.

7. Place relay module (1) on the PRCM. Check that O-ring (5) remains seated. Align the screw holes of relay module (1) and the PRCM. Install the ten screws and tighten the ten screws (2) to 1.70 ± 0.25 N·m (15 ± 2 lb in).

8. Reconnect all the wires to the terminals of the relay module that were removed. Reconnect the positive lead wire to the battery.

i01357040

Programmable Relay Control Module - Replace

SMCS Code: 1927-510

Replacement Procedure

1. The new Programmable Relay Control Module (PRCM) must be reprogrammed after the new PRCM is installed. If the PRCM that is being replaced is functional, then make a note of the following items: value for the hour meter, all engine setpoints, any spare inputs that are programmed, and Any spare outputs that are programmed. See System Operation, “Setpoint Viewing and Programming” and System Operation, “Input/Output Monitoring and Programming”.

2. Shut down the engine. Remove the positive lead wire from the battery.

3. Remove the harness connector from the PRCM. A 4 mm hex wrench is required to turn the fastening screw.

4. Make sure that all wires at the terminal strips are marked. During reassembly, the wires that are marked must be reattached to the correct terminals. Remove all wires from the terminals and from the posts of the relay module.

5. Remove the six nuts that fasten the PRCM to the front panel. Remove the PRCM.

6. Place the new PRCM in the front panel. Install the six nuts. Tighten the nuts.

7. Reconnect the harness connector to the PRCM. Reconnect all the wires to the terminals of the relay module that were removed. Reconnect the positive lead wire to the battery.

8. Reprogram the setpoints, the spare inputs/outputs and the hour meter. See System Operation, “Setpoint Viewing and Programming”. Use the values from the original PRCM. Refer to Step 1.

i01357314

Block Diagram

SMCS Code: 1927

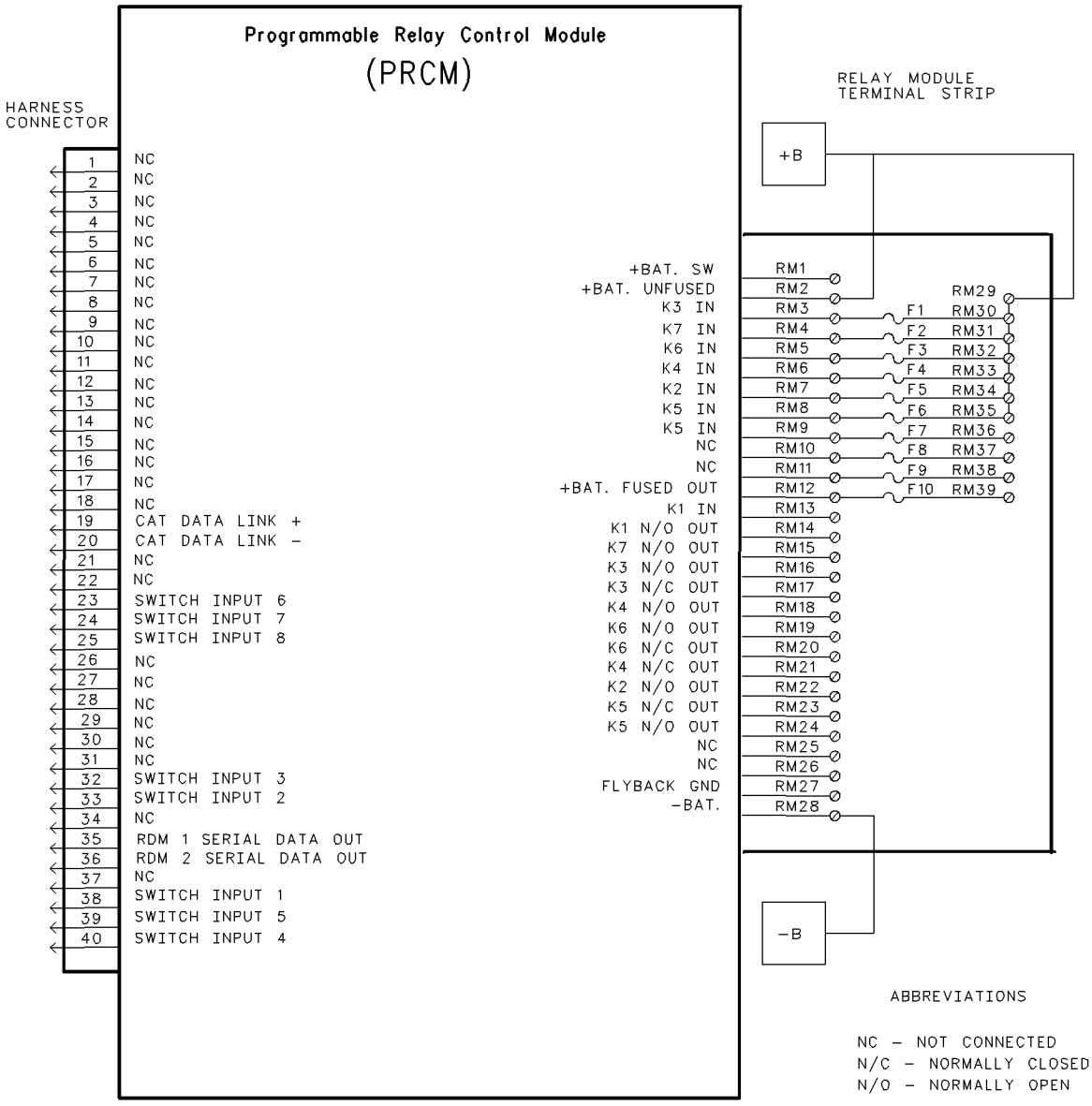


Illustration 68 g00716279

i01357559

Display Codes

SMCS Code: 1927

Table 21

NUMERIC DISPLAY CODE FOR SPECIAL FUNCTION INPUTS		
Function Code	**Identification**	**Description**
0000	Input Off	Input Always Reads OFF
0001	Input On	Input Always Reads ON
0002	PRCM Diagnostic Code	Input Is Normally OFF. Input Is ON When Any PRCM Diagnostic Code Is Detected. (Refer to Troubleshooting, “Troubleshootng Diagnostic Codes” List.)

Table 22

NUMERIC DISPLAY CODES AND CONNECTION CHART FOR PRCM DISCRETE INPUTS		
Input Code	**Identification**	**40-Pin Connector Contact**
1001	PRCM Switch Input 1	38
1002	PRCM Switch Input 2	33
1003	PRCM Switch Input 3	32
1004	PRCM Switch Input 4	40
1005	PRCM Switch Input 5	39
1006	PRCM Switch Input 6	23
1007	PRCM Switch Input 7	24
1008	PRCM Switch Input 8	25

Note: Each switch input must be connected to the ground of the switch input in order to activate. A ground point for the PRCM can be obtained at the negative battery post on the relay module . The relay module is located at the rear of the PRCM. Another ground point location is pin contact 31 of the 40 pin connector on the PRCM.

Note: Open circuit voltage (input inactive) is approximately 10.5 DCV on all of the switched inputs.

Table 23

DISPLAY CODES FOR INPUTS FROM THE ECM	
Input Code	**Parameter**
2000	ECM Active Diagnostic Present
2001	ECM Active Diagnostic and/or Event Present
2010	ECM Voltage Warning
2011	Engine Oil Pressure Warning
2012	Engine Jacket Water Temperature High Warning
2013	Engine Jacket Water Temperature Low Warning
2014	Overspeed Warning
2015	Air Inlet Restriction Warning
2016	Exhaust Temperature Warning
2017	Oil Filter Differential Pressure Warning
2018	Fuel Filter Differential Pressure Warning
2019	Crankcase Pressure Warning
2020	Aftercooler Temperature Warning
2023	Low Coolant Level Warning
2024	Low Fuel Level Warning
2026	Marine Gear Oil Temperature Warning
2027	Marine Gear Oil Pressure Warning
2040	Injection Disabled
2041	Engine At 100 Percent Load Factor
2042	Engine Speed Above 50 RPM
2043	Overcrank
2044	Start Motor Relay Active
2045	System Not In Auto
2050	Engine Derated
2051	Engine Derated, But Not For Altitude

(continued)

(Table 23, contd)

2070	Engine Monitoring System Shutdown
2071	Engine Oil Pressure Shutdown
2072	Engine Jacket Water Temperature Shutdown
2073	Overspeed Shutdown
2074	Crankcase Pressure Shutdown
2075	Aftercooler Temperature Shutdown

Table 24

NUMERIC DISPLAY CODES FOR THE PRCM LED DISPLAY	
LED CODE	**LED IDENTIFICATION**
A001	ALARM 1
A002	ALARM 2
A003	ALARM 3
A004	ALARM 4
A005	ALARM 5
A006	ALARM 6

Table 25

NUMERIC DISPLAY CODES AND CONNECTION CHART FOR THE PRCM				
Relay Code	**Relay No.**	**Common**	**Normally Open Output**	**Normally Closed Output**
P001	K1	RM-13	RM-14	-
P002	K2	RM-34	RM-22	-
P003	K3	RM-30	RM-16	RM-17
P004	K4	RM-33	RM-18	RM-21
P005	K5	RM-35	RM-24	-
P006	K6	RM-32	RM-19	RM-20
P007	K7	RM-31	RM-15	-

Note: Refer to Systems Operation, “Programmable Relay Control Module” for more information on the relay outputs.

Table 26

NUMERIC DISPLAY CODES AND CONNECTION FOR RDM #1 RELAY OUTPUTS					
Output Code	**ID(1)**	**Relay Board Common Output**	**Relay Board NO Output**	**Relay Board NC Output**	**RDM Output Terminal**
C101	R1	37	38	39	2A, 2B
C102	R2	34	35	36	3A, 3B
C103	R3	31	32	33	14A, 14B
C104	R4	28	29	30	13A, 13B
C105	R5	25	26	27	12A, 12B
C106	R6	22	23	24	11A, 11B
C107	R7	19	20	21	10A, 10B
C108	R8	16	17	18	9A, 9B
C109	R9	13	14	15	8A, 8B

(1) IDENTIFICATION

Note: Relay Driver Module (RDM) terminals may be connected in order to sink 600 milliampere loads without the addition of a RDM relay board assembly.

Table 27

NUMERIC DISPLAY CODES AND CONNECTION FOR RDM #1 RELAY OUTPUTS					
Output Code	**ID(1)**	**Relay Board Common Output**	**Relay Board NO Output**	**Relay Board NC Output**	**RDM Output Terminal**
C201	R1	37	38	39	2A, 2B
C202	R2	34	35	36	3A, 3B
C203	R3	31	32	33	14A, 14B
C204	R4	28	29	30	13A, 13B
C205	R5	25	26	27	12A, 12B
C206	R6	22	23	24	11A, 11B
C207	R7	19	20	21	10A, 10B
C208	R8	16	17	18	9A, 9B
C209	R9	13	14	15	8A, 8B

(1) IDENTIFICATION

Note: Relay Driver Module (RDM) terminals may be connected in order to sink 600 mA loads without the addition of a RDM relay board assembly.

Table 28

PRCM CONNECTIONS	
PRCM J1 Terminals	**Identification**
19	CAT data link +
20	CAT data link -
35	RDM 1 Serial Data Out
36	RDM 2 Serial Data Out
38	Switch Input 1
33	Switch Input 2
32	Switch Input 3
40	Switch Input 4
39	Switch Input 5
23	Switch Input 6
24	Switch Input 7
25	Switch Input 8
PRCM Relay Module Terminals	**Identification**
1	+ B
28	- B
2	+ B

i01358034

Connector Contact Identification

SMCS Code: 7553-546

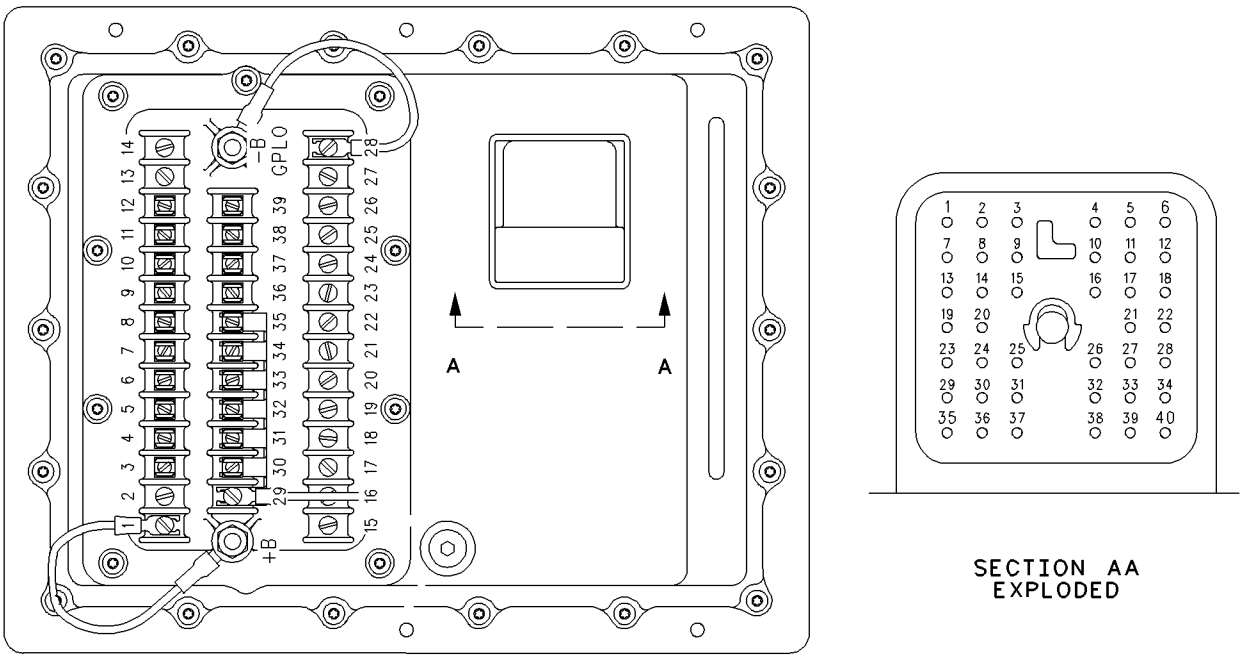


Illustration 69

g00716691

i01358396

Glossary of Terms

SMCS Code: 1927

PRCM – Programmable Relay Control Module

RDM – Relay Driver Module

ECM – Engine Control Module

NO – Normally Open

NC – Normally Closed

DIAG – Diagnostic

CID – Component Identifier

FMI – Failure Mode Identifier

LCD – Liquid Crystal Display

LED – Light Emitting Diode

EPG – Electrical Power Generation

GENSET – Generator Set

DCV – Direct Current Volts

PROG – Program

I/O – Input/Output

Index