

Using the Diagnostic Indicator to Determine Diagnostic Codes

Table 1

Activation Of Diagnostic Indicator Operations Quick Reference			
Operation	Contact 1 ⁽¹⁾	Contact 3 ⁽¹⁾	Contact 5 ⁽¹⁾
Scroll ACTIVE Diagnostic Codes	Ground ⁽²⁾	Open	Open
Scroll INACTIVE Diagnostic Codes	Open	Open	Ground ⁽²⁾
Clear ⁽³⁾ Diagnostic Codes	Open	Ground	Open

⁽¹⁾ These contacts are located in the harness code connector. Remove the harness code plug.

⁽²⁾ Remove the connection to ground in order to place the desired information that is shown during scrolling on hold.

⁽³⁾ A diagnostic code is cleared only while the code is on hold. A diagnostic code that is active cannot be cleared.

Use the following procedure when a diagnostic code is detected. When a diagnostic code is detected, the diagnostic indicator is ON. After you determine the diagnostic code, use the Troubleshooting, "Diagnostic Code List" in order to find the numbers (CID and FMI). The numbers correspond to the diagnostic code that is flashed on the diagnostic indicator of the ECM. In order to troubleshoot the service codes, see the following procedures.

1. Remove the machine identification plug in order to place the ECM in service mode.
2. A single diagnostic code is shown. A single diagnostic code is on hold at this time. The diagnostic code is shown on the diagnostic indicator by flashing the indicator ON and OFF. The

flashing represents a code number that is two digits. A series of flashes represent the first digit. A one second pause follows. A series of flashes then represents the second digit. Count the number of flashes in order to determine each digit. A pause of about three seconds separates each two digit code. Use the Troubleshooting, "Diagnostic Code List" in order to find the numbers (CID and FMI).

3. Scroll through the diagnostic codes in order to show the ACTIVE diagnostic codes. Ground contact 1 of the harness code connector in order to scroll through the codes. Scroll through the diagnostic codes in order to show the INACTIVE diagnostic codes. Ground contact 5 of the harness code connector in order to scroll through the codes.
4. In order to place the desired diagnostic code on hold, remove ground from contact 1 or contact 5 of the harness code connector when the desired diagnostic code is shown.
5. In order to troubleshoot the diagnostic code, see the procedures that follow. Perform the procedure that corresponds to the service codes (CID and FMI).
6. After a diagnostic code is corrected, the diagnostic code should be cleared. In order to clear the code, scroll through the INACTIVE diagnostic codes. Ground contact 5 of the harness code connector in order to scroll through the codes.
7. Place the desired diagnostic code on hold. Remove ground from contact 5 of the harness code connector when the desired diagnostic code is shown.
8. While the diagnostic code is on hold, momentarily ground contact 3 of the harness code connector. After the diagnostic code is cleared, the diagnostic indicator is turned OFF. The diagnostic code indicator remains in the OFF position until contact 1 is grounded again or until contact 5 is grounded again.
9. Repeat the Steps above for any remaining diagnostic code. A diagnostic code of "11" indicates that no diagnostic codes are ACTIVE. A diagnostic code of "12" indicates that diagnostic codes are INACTIVE. When the procedure is finished, return to the normal mode by replacing the machine identification plug.

Diagnostic Operation

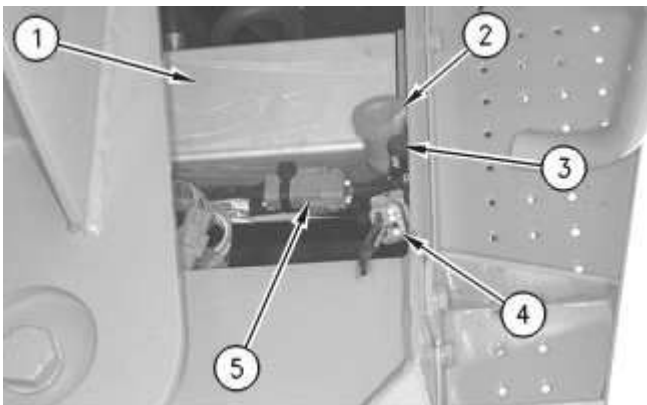


Illustration 1

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Component location

- (1) Control
- (2) Service tool connector
- (3) Diagnostic indicator
- (4) Harness code connector
- (5) Option code input

Information is shown on diagnostic indicator (3) by flashing the indicator ON and OFF. The information that is flashed represents a two digit number. There is a series of flashes that represent the

first digit. This is followed by a one second pause. The final step is a series of flashes that represents the digit in the second position. Count the number of flashes in order to determine each digit. A pause of about three seconds separates each two digit number.

The ECM uses the diagnostic indicator in two different modes. The two modes are given below:

- Normal Mode
- Service Mode

When power is applied, the ECM enters normal mode. Removing the machine identification plug from harness code connector 4 places the ECM in the service mode. Once in service mode, grounding different connector contacts of the harness code connector causes the ECM to flash diagnostic codes on the indicator. This diagnostic code is a two-digit number that corresponds to the normal Caterpillar service codes.

Harness code connector 4 is located under the platform on the right side of the machine. The connector provides access to the service inputs. Connector contact 1 is grounded to flash diagnostic codes for active faults. Contact 5 is grounded to flash diagnostic codes for inactive faults. Contact 3 is used in order to clear the diagnostic codes for all inactive faults from the ECM. Connector contact 2 is ground.

Normal Mode

When voltage is applied to the ECM and the machine identification plug is installed, the ECM flashes the machine code on the diagnostic code indicator. After flashing the machine code, the ECM enters normal mode and the diagnostic indicator is turned OFF. If a diagnostic code is detected, the diagnostic code indicator remains in the ON position.

Normal Mode is used during normal machine operation. In normal mode, the ECM continuously checks for faults in the electronic control system. When a diagnostic code is detected, the diagnostic indicator is turned ON. See Service Mode.

Service Mode

The ECM detects diagnostic codes that occur in switches, sensors, solenoids and the related harness circuits. A diagnostic code is detected when the signal at the control connector is outside a valid range. The ECM records the diagnostic code.

If the diagnostic code indicator is ON and the diagnostic code indicator is in normal mode, diagnostic information is available in service mode. The service mode allows service personnel to see diagnostic codes that are detected by the ECM. The service mode allows service personnel to clear the diagnostic codes that are detected by the ECM.

To enter service mode, disconnect the machine identification plug from the harness code connector. When in service mode, the diagnostics of the ECM are available to assist with the troubleshooting of diagnostic codes that are detected. The detected diagnostic codes are shown by flashing a diagnostic code on the diagnostic code indicator. This code is a two-digit representation of normal Caterpillar service codes. The codes consist of two three digit codes (CID and FMI) that are used to specify each

detected fault. Each code that is flashed corresponds to specific identifiers. The identifiers are listed below:

Component Identifier (CID) - The CID indicates the component that is faulty. The engine speed sensor or the transmission speed sensor are examples. The CID is a three digit code.

Failure Mode Identifier (FMI) - The FMI tells the type of failure that has occurred. Examples that are seen are listed: voltage above normal, current below normal and abnormal frequency. The FMI is a two-digit code.

Note: The diagnostic code that is flashed on the diagnostic indicator must be converted to a CID and to an FMI. In order to make the conversion, use the Troubleshooting, "Diagnostic Code List".

The diagnostic code for the first available active fault is shown upon entering the service mode. The diagnostic code that is shown is on hold. When a diagnostic code is on hold, the code is shown continuously. The diagnostic indicator continuously flashes the diagnostic code for this active diagnostic code. This is maintained as long as connector contacts 1 and 5 remain open.

Scrolling through the diagnostic codes shows all of the codes that are active one at a time. The connector contact for grounding 1 causes the diagnostic codes to scroll while in service mode. In order to stop the scrolling, remove ground from contact 1 when the desired diagnostic code is shown. The diagnostic code that is shown is now on hold. A diagnostic code of "11" indicates that there are no active faults.

In order to cause the diagnostic codes to scroll, ground connector contact 5. In order to stop the scrolling, remove the ground from contact 5 when the desired diagnostic code is shown. The diagnostic code that is shown is now on hold. A diagnostic code of "12" indicates that there are no diagnostic codes that are inactive.

Clearing a diagnostic code removes the diagnostic code from the memory of the ECM. When a diagnostic code is corrected, it is necessary to remove the diagnostic code from the memory of the ECM. Connector contact 3 must be grounded in order to remove a diagnostic code from the memory of the ECM when the diagnostic code for an inactive diagnostic code is on hold. After the diagnostic code is cleared, the diagnostic indicator is turned OFF. This indicates that the diagnostic code is erased. Scroll through the diagnostic codes that are active in order to remove the diagnostic code indicator from the OFF position. Scroll through the diagnostic codes that are inactive in order to remove the diagnostic code indicator from the OFF position. The ECM does not allow active diagnostic codes to be cleared.

The ECM leaves service mode when the machine identification plug is connected to the harness code connector.

Diagnostic Example

The diagnostic indicator is ON.

Diagnostic code "31" is flashed - Use Troubleshooting, "Diagnostic Code List" in order to determine the numbers of the CID and of the FMI that correspond to a code of "31".