Foreword

This manual provides instructions for troubleshooting and repairing this engine in the chassis. Component and assembly rebuild procedures are provided in the engine shop manual. Refer to Section i - Introduction for instructions on how to use this manual.

Read and follow all safety instructions. Refer to the WARNING in the General Safety Instructions in Section i - Introduction.

The manual is organized to guide a service technician through the logical steps of identifying and correcting problems related to the engine. This manual does not cover vehicle or equipment problems. Consult the vehicle or equipment manufacturer for repair procedures.

A series of specific service manuals (for example: Shop, Specifications, and Alternative Repair) are available and can be ordered by Contacting your local area Cummins Regional office. A Cummins Regional office listing is located in Service Literature (Section L).

The repair procedures used in this manual are recommended by Cummins Inc. Some service procedures require the use of special service tools. Use the correct tools as described.

Cummins Inc. encourages the user of this manual to report errors, omissions, and recommendations for improvement. Please use the postage paid, pre-addressed Literature Survey Form in the back of this manual for communicating your comments.

The specifications and rebuild information in this manual are based on the information in effect at the time of printing. Cummins Inc. reserves the right to make any changes at any time without obligation. If differences are found between your engine and the information in this manual, contact a Cummins Authorized Repair Location or call 1-800-DIESELS (1-800-343-7357) toll free in the U.S. and Canada.

The latest technology and the highest quality components are used to manufacture Cummins engines. When replacement parts are needed, we recommend using only genuine Cummins or ReCon® exchange parts.

PREVIEW - YOUFIXTHIS.COM

To buy Cummins Parts and Service Manuals, Training Guides, or Tools go to our website at https://store.cummins.com

Download full manual at youfixthis.com

This Page Left Intentionally Blank

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Electronic Controlled Fuel System (101-007)

General Information

The ISC, ISL and ISLe3, with CM850 engine control module (ECM) is an electronically operated fuel control system that also provides many operator and vehicle features.

The base functions of the control system include fueling and timing control, limiting the engine speed operating range between the low and the high idle set points and reducing exhaust emissions while optimizing engine performance. The system also controls the engine brakes.

The control system uses inputs from the operator and its sensors to determine the fueling and timing required to operate at the desired engine speed at the required emissions level.

Engine Control Module Inputs

The engine control module (ECM) is the control center of the system. It processes all of the inputs and sends commands to the fuel system, vehicle and engine control devices.

The ECM performs diagnostic tests on most of its circuits and will activate a fault code if a problem is detected in one of these circuits. Along with the fault code identifying the problem, a snapshot of engine operating parameters at the time of fault activation is also stored in memory.

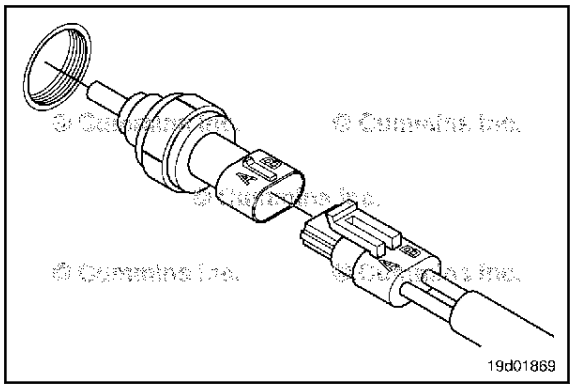
Active fault codes will cause a diagnostic lamp to activate to signal the driver.

The ECM can communicate with service tools and some other vehicle controllers (such as transmissions, ABS, ASR, electronic dash displays and so on) through the SAE J1939 data link or the SAE J1708 data link.

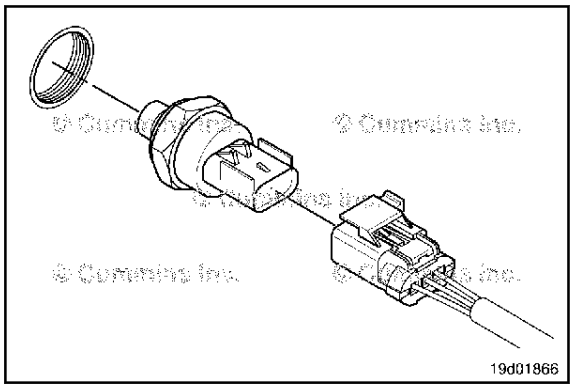
Some vehicles and equipment will have SAE J1939 networks on them that link many of the “smart” controllers together. Vehicle control devices can temporarily command engine speed or torque to perform one of its functions (that is, transmission shifting, anti-lock braking and so on).

The control system utilizes a number of sensors to provide information on engine operating parameters. These sensors include:

- Engine coolant temperature sensor
- Intake manifold air temperature sensor



- Intake manifold pressure sensor



PREVIEW - YOUFIXTHIS.COM

To buy Cummins Parts and Service Manuals, Training Guides, or Tools go to our website at https://store.cummins.com

Download full manual at youfixthis.com

Remote Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage Below Normal, or Shorted to Low Source
Fault Code TF-120

Fault Code 135auto TF-132
Oil Pressure Sensor Circuit - Voltage Above Normal, or Shorted to High Source
Fault Code TF-133

Fault Code 135mar TF-143
Oil Pressure Sensor Circuit - Voltage Above Normal, or Shorted to High Source
Fault Code TF-144

Fault Code 141auto TF-153
Oil Pressure Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
Fault Code TF-154

Fault Code 141mar TF-165
Oil Pressure Sensor Circuit - Voltage Below Normal or Shorted to Low Source
Fault Code TF-166

Fault Code 143b TF-176
Engine Oil Rifle Pressure - Data Valid but Below Normal Operational Range - Moderately Severe Level
Fault Code TF-177

Fault Code 143bm TF-178
Engine Oil Rifle Pressure - Data Valid but Below Normal Operational Range - Moderately Severe Level
Fault Code TF-179

Fault Code 144b TF-180
Engine Coolant Temperature 1 Sensor Circuit - Voltage Above Normal or Shorted to High Source
Fault Code TF-182

Fault Code 144bm TF-192
Engine Coolant Temperature 1 Sensor Circuit - Voltage Above Normal or Shorted to High Source
Fault Code TF-194

Fault Code 145b TF-204
Engine Coolant Temperature 1 Sensor Circuit - Voltage Below Normal or Shorted to Low Source
Fault Code TF-206

Fault Code 145bm TF-214
Engine Coolant Temperature 1 Sensor Circuit - Voltage Below Normal or Shorted to Low Source
Fault Code TF-216

Fault Code 146b TF-224
Engine Coolant Temperature - Data Valid but Above Normal Operational Range - Moderately Severe Level
Fault Code TF-225

Fault Code 146bm TF-226
Engine Coolant Temperature - Data Valid but Above Normal Operational Range - Moderately Severe Level
Fault Code TF-227

Fault Code 147 ....TF-228
Accelerator Pedal or Lever Position 1 Sensor Circuit Frequency - Data Valid but Below Normal Operational Range - Most Severe Level
Fault Code TF-229

Fault Code 148 ....TF-236
Accelerator Pedal or Lever Position Sensor 1 - Data Valid but Above Normal Operational Range - Most Severe Level
Fault Code TF-237

Fault Code 151b TF-242
Engine Coolant Temperature - Data Valid but Above Normal Operational Range - Most Severe Level
Fault Code TF-243

To buy Cummins Parts and Service Manuals, Training Guides, or Tools go to our website at https://store.cummins.com

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Troubleshooting Procedures and Techniques

General Information

A thorough analysis of the customer's complaint is the key to successful troubleshooting. The more information known about a complaint, the faster and easier the problem can be solved.

The Troubleshooting Symptom Charts are organized so that a problem can be located and corrected by doing the easiest and most logical things first. Complete all steps in the sequence shown from top to bottom.

It is **not** possible to include all the solutions to problems that can occur; however, these charts are designed to stimulate a thought process that will lead to the cause and correction of the problem.

Follow these basic troubleshooting steps:

- Get all the facts concerning the complaint
- Analyze the problem thoroughly
- Relate the symptoms to the basic engine systems and components
- Consider any recent maintenance or repair action that can relate to the complaint
- Double-check before beginning any disassembly
- Solve the problem by using the symptom charts and doing the easiest things first
- Determine the cause of the problem and make a thorough repair
- After repairs have been made, operate the engine to make sure the cause of the complaint has been corrected

PREVIEW - YOUFIXTHIS.COM

To buy Cummins Parts and Service Manuals, Training Guides, or Tools go to our website at https://store.cummins.com

Download full manual at youfixthis.com

ECM - No Communication Troubleshooting Tree

This troubleshooting procedure should be followed for the following symptoms:

- No communication and engine will **not** start
- No communication and engine will start
- No communication related INSITE™ electronic service tool errors
- Communication with some ECMs but **not** all ECMs on a multi-module engine.

How to Use This Troubleshooting Procedure:

This troubleshooting procedure can be used to troubleshoot J1939 and J1587 data link communication issues between the electronic service tool and the ECM. There are four procedures that can be used to support this troubleshooting tree:

- Procedure 022-999 (Service Tools and Hardware - Overview) in Section F, in the appropriate electronic control system troubleshooting and repair manual.
- Procedure 019-165 (Data Link Circuit, SAE J1939) in Section 19 in the appropriate electronic control system troubleshooting and repair manual.
- Procedure 019-166 (Data Link Circuit, SAE J1587) in Section 19 in the appropriate electronic control system troubleshooting and repair manual.

The troubleshooting steps in this procedure build upon information obtained in previous steps. The troubleshooting steps **must** be performed in the sequence specified in the troubleshooting procedure.

This troubleshooting procedure supports several engine families, therefore some instructions are stated in a general manner. Apply the requested procedures and actions to the specific engine family with the support of engine specific documentation that can be found in the Troubleshooting and Repair manuals for the specific engine family.

Shop Talk:

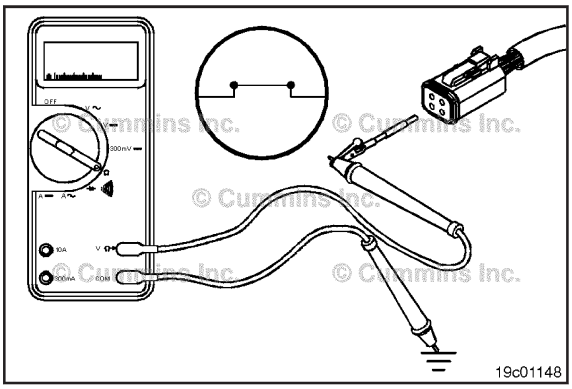
Three basic principles were used to define and sequence the troubleshooting steps that are listed in this tree.

- Verify high level system operation prior to troubleshooting individual components of the system. The purpose for this is to learn from the behavior of the system in order to direct the next steps for troubleshooting.
- Use the Bench Top Harness to separate the ECM from the vehicle so the ECM can be isolated from vehicle issues that could be causing no communication.
- Use a second vehicle or a second ECM to isolate high level system issues before troubleshooting individual components of the system.

PREVIEW - YOUFIXTHIS.COM

To buy Cummins Parts and Service Manuals, Training Guides, or Tools go to our website at https://store.cummins.com

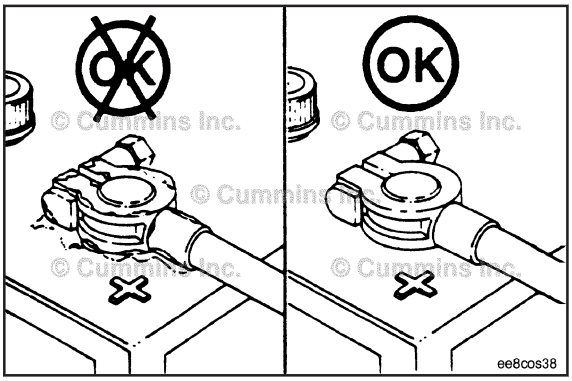
Download full manual at youfixthis.com



CAUTION

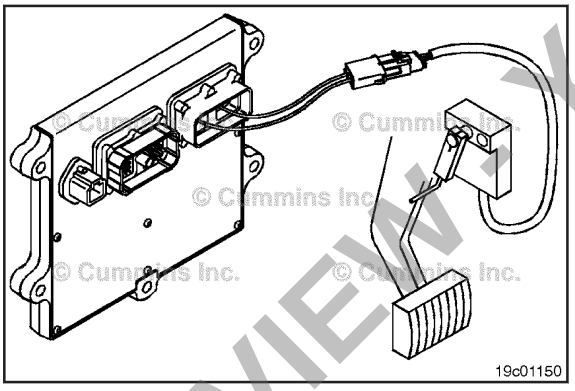
The leads must fit tightly in the connector without expanding the pins in the connector otherwise the connector will be damaged.

Measure the resistance between the battery supply negative (-) pin of the Original Equipment Manufacturer harness control module connector(s) and engine block ground or chassis ground for each control module. Reference the wiring diagram for connector pin identification. The resistance **must** be 10 ohms or less.



If the resistance value is **not** correct, check the batteries, cables, and cable connections.

Repair or replace the parts as required.

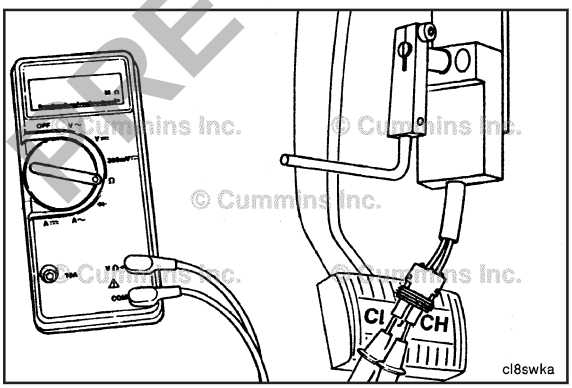


Clutch Pedal Position Switch (019-009)

General Information

The clutch pedal position switch circuit is used to disable the PTO and cruise control features.

The circuit consists of an open control switch, a clutch pedal position switch signal wire, and a switch return. When the clutch pedal position switch is installed and adjusted, the contact points are held closed. When the clutch pedal is depressed, the clutch pedal position switch is in its normally open position. This will disable the PTO or cruise control operation.



Resistance Check

If INSITE™ is available, monitor the clutch switch for proper operation. If **not**, follow the troubleshooting procedures in this section.

Find the clutch pedal position switch. The location will depend on the OEM installation procedures.

Disconnect the wiring harness attached to the switch terminals.

Adjust the multimeter to measure resistance.

Touch the probes of a multimeter to the two terminals in the connector of the clutch pedal position switch.

PREVIEW - YOUFIXTHIS.COM

To buy Cummins Parts and Service Manuals, Training Guides, or Tools go to our website at https://store.cummins.com

Download full manual at youfixthis.com

Additional Service Literature

General Information

The following publications can be purchased.

Bulletin Number	Title of Publication
4021271	Service Manual, ISB, ISBe, ISBe4, QSB4.5, QSB5.9 and QSB6.7 (Common Rail Fuel System) Series Engines
4021418	Troubleshooting and Repair Manual, ISC, ISCe, QSC8.3, ISL, ISLe3, and QSL9 Engines
4021355	Owner's ISB ^{e} and ISB (Common Rail Fuel System) Series Engines
4021427	Owner's Manual, ISC and ISL Engines
4021481	Owner's Manual, QSC8.3 and QSL9 Marine Engines
4021482	Owner's Manual, QSB5.9 Marine Engines
4915536	Owner's Manual, QSC8.3 and QSL9
4021347	Wiring Diagram, ISB CM850 Electronic Control Module
4021421	Wiring Diagram, ISC and ISL CM850 Electronic Control Module
4021524	Wiring Diagram, QSB4.5, QSB6.7, QSC8.3 and QSL9 CM850 Electronic Control Module
4021532	Wiring Diagram, ISBe4 CM850 Electronic Control Module
4021586	Wiring Diagram, QSB4.5, QSB6.7 and QSL9 CM850 Power Generation
4021598	Wiring Diagram, ISLe4 CM850
4021670	Wiring Diagram, ISBe2/ISBe3 CM850
4081885	Wiring Diagram, QSL9 and QSC8.3 Marine CM850 Electronic Control Module
4081886	Wiring Diagram, QSB5.9 Marine CM850 Electronic Control Module
3379000	Air for Your Engines
3379001	Fuel for Cummins Engines
3387622	Cold Weather Operation
3666132	Coolant Requirements and Maintenance
3810340	Cummins Engine Oil Recommendations

PREVIEW - YOUFIXTHIS.COM

To buy Cummins Parts and Service Manuals, Training Guides, or Tools go to our website at https://store.cummins.com

Download full manual at youfixthis.com

Specifications

General Information

⚠ WARNING ⚠

This diagram is provided as a diagnostic tool for trained, experienced technicians only. Improper troubleshooting or repair can result in severe personal injury or death or property damage. See important instructions in Service Manual.

Electrical Specifications

DATA LINK
- Positive wire to chassis ground (J1587 **only**)
  - 3.5 to 5.0 VDC
- Negative wire to chassis ground (J1587 **only**)
  - 0.0 to 2.5 VDC

J1939 BACKBONE RESISTANCE
- Positive wire to return wire
  - 50 to 70 Ohms
- J1939 Termination Resistance
  - 110 to 130 Ohms

ALL CONTINUITY CHECKS
- OK (no open circuit) if less than 10 Ohms

ALL SHORTS TO GROUND
- OK (no short circuit) if more than 100k Ohms

SHORT CIRCUIT TO EXTERNAL VOLTAGE
- OK if less than 1.5 VDC

SENSOR SUPPLY VOLTAGE
- @ ECM = 4.75 to 5.25 VDC

SOLENOIDS
- EFC Actuator = 2.0 to 4.5 Ohms

ECM CONNECTOR
- Retaining Cap Screw Torque = 2.8 N•m [25 in-lb]

Sensor Specifications

NOTE: To convert to gauge pressure on all psi pressure sensors subtract the barometric pressure from the absolute pressure.

BAROMETRIC (AMBIENT) AIR PRESSURE SENSOR

Altitude [m]	Altitude [ft]	Pressure [psi]	Pressure [in Hg]	Voltage (VDC)
0 (sea level)	0	14.7	29.9	3.65 to 4.28
915	3000	13.2	28.9	3.06 to 3.50
1830	6000	11.8	24.0	2.52 to 2.96
2744	9000	10.5	21.4	2.01 to 2.36
3659	12000	9.35	19.0	1.57 to 1.84

INTAKE MANIFOLD PRESSURE SENSOR

Torque = 23 N•m [204 in-lb]

Pressure (mm Hg)	Pressure [in Hg]	Pressure [psi]	Voltage (VDC)
0	0	0	0.90 to 1.06
381	15	22	1.30 to 1.53
635	25	27	1.57 to 1.84
1549	61	45	2.53 to 2.96
2057	81	55	3.07 to 3.60
2590	102	65	3.61 to 4.23

TURBOCHARGER COMPRESSOR INLET AIR TEMPERATURE AND INTAKE MANIFOLD TEMPERATURE SENSORS

Torque = 23 N•m [204 in-lb]

Temperature (C°)	Temperature [F°]	Resistance (Ohms)
-10	14	49k to 62k
0	32	29k to 36k
20	68	11k to 14k
40	104	4.9k to 5.8k
70	158	1.6k to 1.9k

EXHAUST GAS PRESSURE SENSOR

Torque = 23 N•m [204 in-lb]

Pressure (mmHg)	Pressure [inHg]	Pressure [psi]	Voltage (VDC)
0	0	0	0.5 to 0.54
381	15	7	0.57 to 0.68
635	25	12	0.7 to 0.98
1549	61	30	1.48 to 1.8
2057	81	40	1.85 to 2.42
3886	153	75	3.53 to 4.21

EGR TEMPERATURE SENSOR

Torque = 57 N•m [42 ft-lb]

Temperature (C°)	Temperature [F°]	Resistance (Ohms)
0	32	256k to 423k

PREVIEW - YOUFIXTHIS.COM

To buy Cummins Parts and Service Manuals, Training Guides, or Tools go to our website at https://store.cummins.com

Download full manual at youfixthis.com

Table of Contents

	Section
Introduction	i
Engine and System Identification	E
Familiarization	F
Troubleshooting Fault Codes (FC0001 - FC)	TF
Back	back

PREVIEW - YOUFIXTHIS.COM

To buy Cummins Parts and Service Manuals, Training Guides, or Tools go to our website at https://store.cummins.com

Download full manual at youfixthis.com

STEP 2D: Check the fault codes and verify remote accelerator pedal or lever condition.

Condition:
- Turn keyswitch OFF.
- Connect the remote accelerator pedal or lever to the OEM harness.
- Turn keyswitch ON.
- Connect INSITE™ electronic service tool.

Action	Specification/Repair	Next Step
Check for the appropriate circuit response after 30 seconds. Use INSITE™ electronic service tool to read the fault codes.	Fault Code 134 is active? **YES** **Repair:** A damaged remote accelerator pedal or lever has been detected. Contact the appropriate OEM or dealership for repair instructions. Replace the remote accelerator pedal or lever. Refer to the OEM service manual.	4A
	Fault Code 134 is active? **NO** **Repair:** None. The removal and installation of the connector corrected the fault.	4A

STEP 3: Check the ECM and OEM harness.

STEP 3A: Inspect the ECM and OEM harness connector pins.

Condition:
- Turn keyswitch OFF.
- Disconnect the OEM harness from the ECM.

Action	Specification/Repair	Next Step
Inspect the OEM harness and ECM connector pins for the following: • Loose connector • Corroded pins • Bent or broken pins • Pushed back or expanded pins • Moisture in or on the connector • Missing or damaged connector seals • Dirt or debris in or on the connector pins • Wire insulation damage • Connector shell broken. • Damaged locking tab connector Use the following procedure for general inspection techniques. Refer to Procedure 019-361 in Section 19.	Dirty or damaged pins? **YES** **Repair:** A damaged connection has been detected in the harness connector. Clean the connector and pins. Repair the damaged harness, connector, or pins if possible. Refer to Procedure 019-071 in Section 19.	4A
	Dirty or damaged pins? **NO**	3A-1

PREVIEW - YOUFIXTHIS.COM

To buy Cummins Parts and Service Manuals, Training Guides, or Tools go to our website at https://store.cummins.com

Download full manual at youfixthis.com

STEP 3D: Check for an inactive fault code.

Condition:
- Connect all components.
- Turn keyswitch ON.
- Connect INSITE™ electronic service tool.

Action	Specification/Repair	Next Step
Check for the appropriate ECM response after one minute. • Use INSITE™ electronic service tool to read the fault codes.	Fault Code 196 inactive? **YES** **Repair:** None. The removal and installation of the connector corrected the fault.	4A
	Fault Code 196 inactive? **NO** **Repair:** Replace the ECM. Refer to Procedure 019-031 in Section 19.	4A

STEP 4: Clear the fault codes

STEP 4A: Disable the fault code.

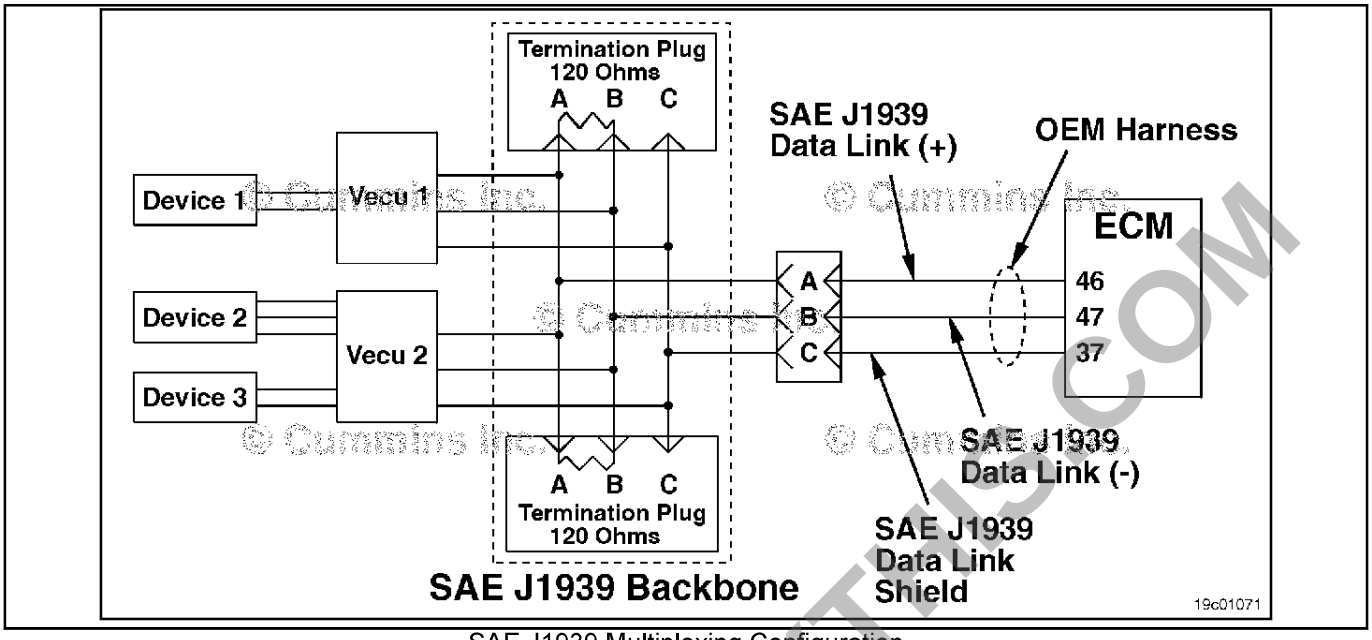
Condition:
- Connect all components.
- Connect INSITE™ electronic service tool.

Action	Specification/Repair	Next Step
Disable the fault code. • Start the engine and let it idle for one minute. • Use INSITE™ electronic service tool, verify that the fault code is inactive.	Fault Code 196 inactive? **YES**	4B
	Fault Code 196 inactive? **NO** **Repair:** Return to the troubleshooting steps or contact a local Cummins® Authorized Repair Location if all steps have been completed and checked again.	1A

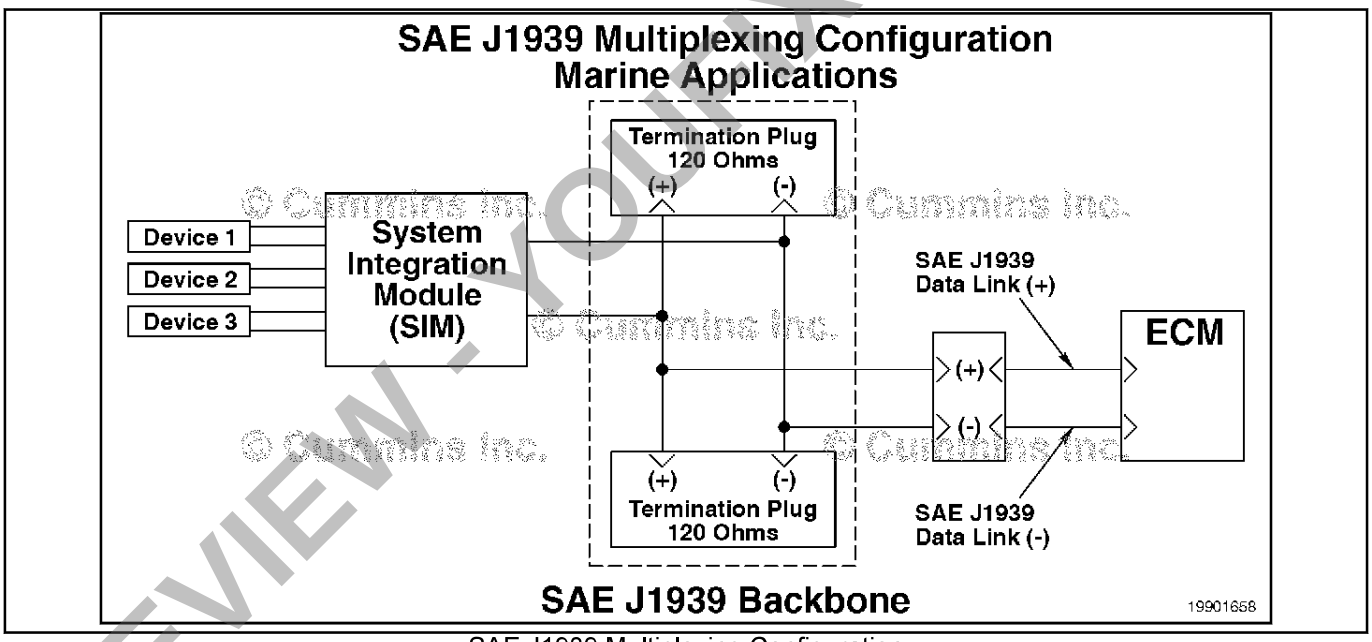
PREVIEW - YOUFIXTHIS.COM

To buy Cummins Parts and Service Manuals, Training Guides, or Tools go to our website at https://store.cummins.com

Download full manual at youfixthis.com



SAE J1939 Multiplexing Configuration



SAE J1939 Multiplexing Configuration

Refer to Troubleshooting Fault Code t05-286

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

STEP 5: Clear the fault codes.

STEP 5A: Disable the fault code.

Condition:
- Connect all components.
- Turn keyswitch ON.
- Connect INSITE™ electronic service tool.

Action	Specification/Repair	Next Step
Disable the fault code. • Turn keyswitch OFF and wait 30 seconds. • Turn keyswitch ON. • Use INSITE™ electronic service tool to verify Fault Code 341 is inactive.	Fault Code 341 inactive? **YES**	5B
	Fault Code 341 inactive? **NO** **Repair:** Return to the troubleshooting steps or contact your local Cummins Authorized Repair Location if all the steps have been completed and checked again.	1A

STEP 5B: Clear the inactive fault codes.

Condition:
- Connect all components.
- Turn keyswitch ON.
- Connect INSITE™ electronic service tool.

Action	Specification/Repair	Next Step
Clear the inactive fault codes. • Use INSITE™ electronic service tool to erase the inactive fault codes.	All fault codes cleared? **YES**	Repair complete
	All fault codes cleared? **NO** **Repair:** Troubleshoot any remaining active fault codes	Appropriate troubleshooting steps

PREVIEW - YOUFIXTHIS.COM

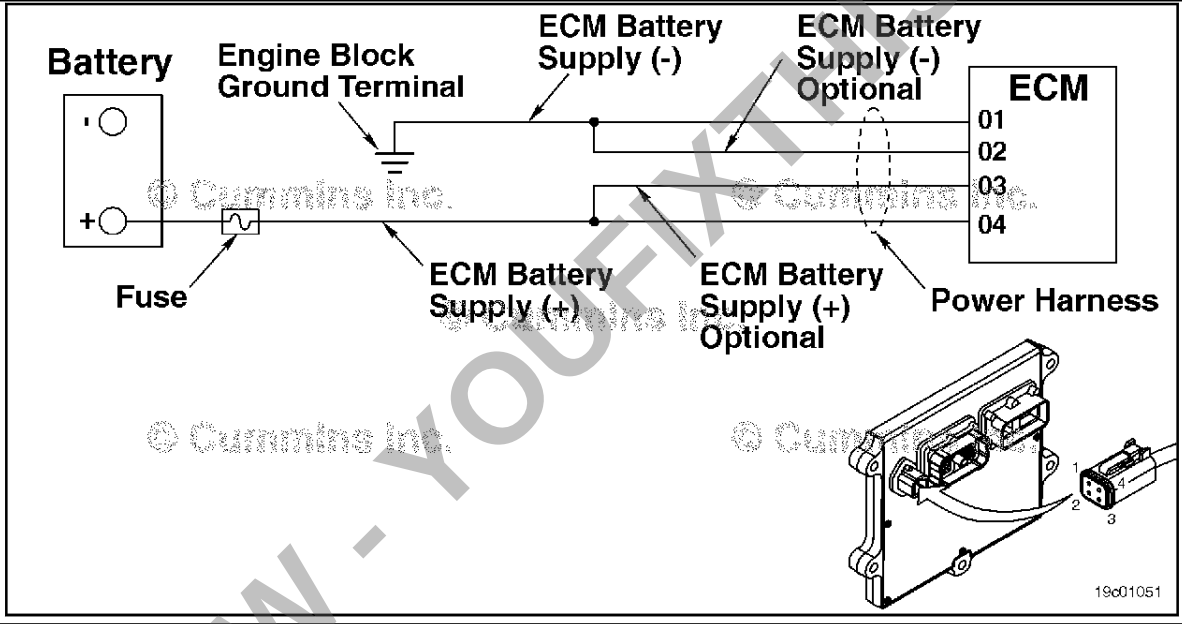
To buy Cummins Parts and Service Manuals, Training Guides, or Tools go to our website at https://store.cummins.com

Download full manual at youfixthis.com

Fault Code 434 Automotive Application

Power Supply Lost With Ignition On - Data Erratic, Intermittent or Incorrect

CODES	REASON	EFFECT
Fault Code: 434 PID(P), SID(S): S251 SPN: 627 FMI: 2/2 Lamp: Amber SRT:	Power Supply Lost With Ignition On - Data Erratic, Intermittent or Incorrect. Supply voltage to the ECM fell below 6.2 VDC momentarily, or the ECM was **not** allowed to power down correctly (retain battery voltage for 30 seconds after key OFF).	Possible no noticeable performance effects or engine dying or hard starting. Fault information, trip information, and maintenance monitor data can be inaccurate.



ECM Power Supply Circuit

Circuit Description:

The electronic control module (ECM) receives constant voltage from the batteries through the unswitched battery wires that are connected directly to the positive (+) battery post. The ECM receives switched battery input through the vehicle keyswitch wire when the vehicle keyswitch is turned ON.

This fault code will be logged if a battery disconnect switch is used in the battery circuit to stop the engine. This fault code will also log if a battery disconnect switch is opened within 10 seconds of turning the keyswitch OFF.

Component Location:

The ECM is connected to the battery by the OEM power harness through the ECM battery supply stub. This provides a constant power supply for the ECM. The location of the battery will vary with the OEM. Refer to the OEM troubleshooting and repair manual.

Conditions for Running the Diagnostics:

This diagnostic runs continuously when the keyswitch is in the ON position.

PREVIEW - YOUFIXTHIS.COM

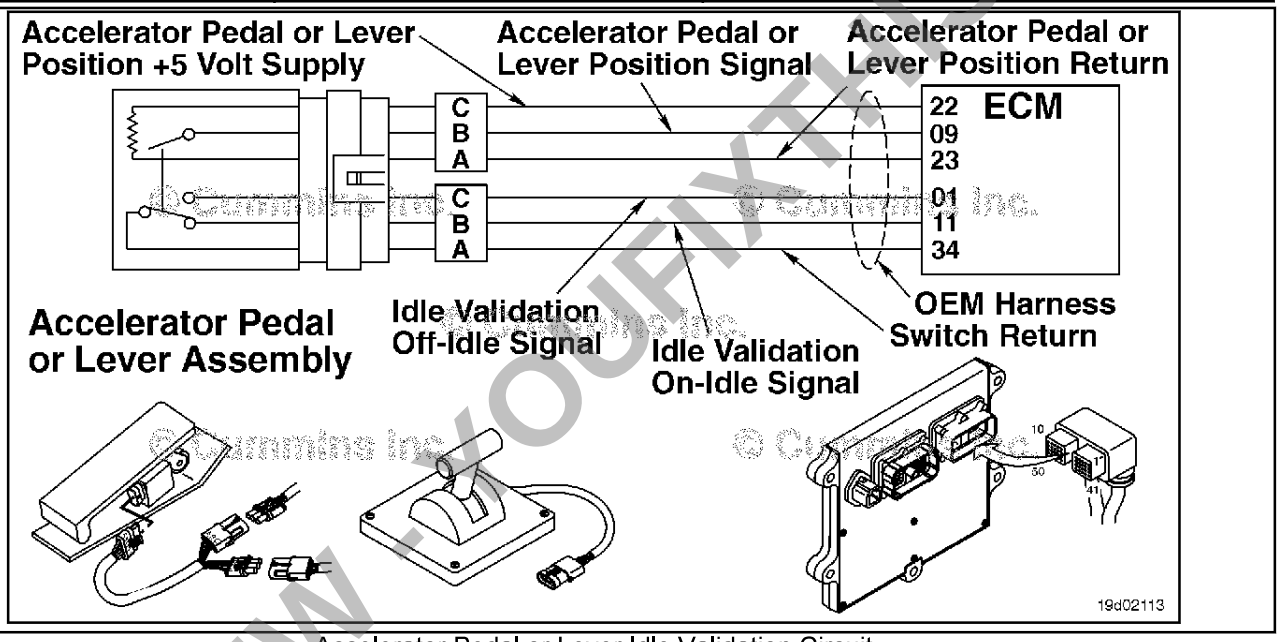
To buy Cummins Parts and Service Manuals, Training Guides, or Tools go to our website at https://store.cummins.com

Download full manual at youfixthis.com

Fault Code 551 (SSS)

Accelerator Pedal or Lever Idle Validation Circuit - Voltage Below Normal or Shorted to Low Source

CODES	REASON	EFFECT
Fault Code: 551 PID(P), SID(S): S230 SPN: 558 FMI: 4/4 Lamp: Amber SRT:	Accelerator Pedal or Lever Idle Validation Circuit - Voltage Below Normal or Shorted to Low Source. No voltage detected simultaneously on both the idle validation off-idle and on-idle circuits.	Automotive: Engine will **only** idle. Marine: Severe derate in engine speed. Limp home capability **only**.



Accelerator Pedal or Lever Idle Validation Circuit

Circuit Description:

The idle validation switch is used by the electronic control module (ECM) to indicate when the accelerator pedal or lever is released (on-idle) or depressed (off-idle). The switch is adjusted by the accelerator pedal or lever manufacturers to switch from on-idle to off-idle at the correct accelerator pedal or lever position. The switch return is a shared return with other OEM cab switches.

Component Location:

The solid state sensor switch (SSS) is located on the accelerator pedal or lever assembly.

Shop Talk:

- This fault code is usually caused by a short circuit to ground in the harness, an uncalibrated accelerator pedal or lever assembly, or a miswired idle validation switch.
- When installing a new accelerator pedal or lever assembly, it **must** be calibrated before operating the engine. To calibrate, turn the keyswitch to the ON position, and fully depress and release the pedal or lever three times.

Refer to Troubleshooting Fault Code t05-551

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

STEP 2D: Inspect the ECM and engine harness connector pins.

Condition:
- Turn keyswitch OFF.
- Disconnect the engine harness from the ECM.

Action	Specification/Repair	Next Step
Inspect the engine harness and ECM connector pins for the following: • Loose connector • Corroded pins • Bent or broken pins • Pushed back or expanded pins • Moisture in or on the connector • Missing or damaged connector seals • Dirt or debris on or in the connector pins • Connector shell broken • Wire insulation damage • Damaged connector locking tab. Use the following procedure for general inspection techniques. Refer to Procedure 019-361 in Section 19.	Dirty or damaged pins? **YES** **Repair:** Clean the connector and pins. Repair the damaged harness, connector, or pins if possible. Refer to Procedure 019-043 in Section 19.	4A
	Dirty or damaged pins? **NO**	2E

STEP 2E: Check the ECM response.

Condition:
- Turn keyswitch OFF.
- Disconnect the engine harness from the ECM.
- Turn keyswitch ON.
- Connect INSITE™ electronic service tool.

Action	Specification/Repair	Next Step
Check for the appropriate ECM response. • Read the camshaft engine position sensor state. Use INSITE™ electronic service tool monitor mode.	Monitor camshaft engine position sensor state equals low? **YES**	2E-1
	Monitor camshaft engine position sensor state equals low? **NO** **Repair:** Replace the ECM. Refer to Procedure 019-031 in Section 19.	4A

PREVIEW - YOUFIXTHIS.COM

To buy Cummins Parts and Service Manuals, Training Guides, or Tools go to our website at https://store.cummins.com

Download full manual at youfixthis.com

Notes

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

On-Board Diagnostics (OBD) Information:

- The ECM illuminates the malfunction indicator lamp (MIL) when the diagnostic runs and fails
- The ECM turns off the malfunction indicator lamp (MIL) when the diagnostic runs and passes. The diagnostic requires a quantity of diesel exhaust fluid (DEF) to be dosed. Depending on the application and system configuration, this may be up to 3 liters (3.17 qt). The MIL and fault code can also be cleared using INSITE™ electronic service tool.
- The fault code will be cleared from memory after 40 consecutive drive cycles where the diagnostic runs and passes.

Refer to Troubleshooting Fault Code t05-1699.

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

STEP 3B: Clear the inactive fault codes.

Condition:
- Connect all components.
- Connect INSITE™ electronic service tool.
- Turn keyswitch ON.

Action	Specification/Repair	Next Step
Clear the inactive fault codes. • Use INSITE™ to clear the inactive fault codes.	All fault codes cleared? **YES**	Repair complete
	All fault codes cleared? **NO** **Repair:** Troubleshoot any remaining active fault codes.	Appropriate troubleshooting steps

PREVIEW - YOUFIXTHIS.COM

To buy Cummins Parts and Service Manuals, Training Guides, or Tools go to our website at https://store.cummins.com

Download full manual at youfixthis.com

STEP 6B: **Clear the inactive fault codes.** **All fault codes cleared?**

TROUBLESHOOTING STEP

STEP 1: Check for additional fault codes.

STEP 1A: Check for active or inactive fault codes.

Condition:
- Connect INSITE™ electronic service tool.
- Turn keyswitch ON.

Action	Specification/Repair	Next Step
Check for active or high counts of inactive fault codes. • Use INSITE™ electronic service tool to read the fault codes.	Fault Codes 1228, 1229, 2271, 2272, 2273, 2274, 2346, 2347, 2348, 2349, 2351, 2352, 2353, 2357, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 9121, or 9122 active or inactive with high counts? **YES** **Repair:** Troubleshoot fault codes starting with the fault code for which there is the highest number of counts.	Appropriate troubleshooting step
	Fault Codes 1228, 1229, 2271, 2272, 2273, 2274, 2346, 2347, 2348, 2349, 2351, 2352, 2353, 2357, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 9121, or 9122 active or inactive with high counts? **NO**	2A

STEP 2: Check the EGR differential pressure.

STEP 2A: Verify the EGR differential pressure at key ON.

Condition:
- Connect INSITE™ electronic service tool.
- Turn keyswitch ON.
- Engine **not** operating.
- Exhaust fans disconnected or turned OFF.

Action	Specification/Repair	Next Step
Verify the engine coolant temperature is greater than 67°C [154°F] and intake manifold air temperature is greater than 16°C [60°F]. • Turn keyswitch OFF for 30 seconds. NOTE: The engine **must not** be operating before the keyswitch is turned OFF. If the engine is operating, turn the keyswitch OFF for 30 seconds, key ON for 30 seconds then back OFF again. • Turn keyswitch ON and wait 30 seconds. • Use INSITE™ electronic service tool to check the fault codes.	Fault Code 2359 active? **YES**	2A-1
	Fault Code 2359 active? **NO**	3A

PREVIEW - YOUFIXTHIS.COM

To buy Cummins Parts and Service Manuals, Training Guides, or Tools go to our website at https://store.cummins.com

Download full manual at youfixthis.com

FAULT CODE 2556 - Intake Air Heater #1 Circuit - Voltage Below Normal or Shorted to Low Source

TROUBLESHOOTING SUMMARY

⚠CAUTION⚠

To reduce the possibility of damaging a new ECM, all other active fault codes must be investigated prior to replacing the ECM.

⚠CAUTION⚠

To reduce the possibility of pin and harness damage, use the following test leads when taking a measurement: Part Number 3822758 - male Deutsch™/AMP™/Metri-Pack™ test lead and Part Number 3822917 - female Deutsch™/AMP™/Metri-Pack™ test lead.

STEPS		SPECIFICATIONS	SRT CODE
STEP 1:	**Check the fault codes.**		
STEP 1A:	Check for an inactive fault code.	Fault Code 2556 is inactive?	
STEP 2:	**Check the intake air heater relay and circuit.**		
STEP 2A:	Inspect the intake air heater relay and electrical connections.	Dirty or damaged pins?	
STEP 2B:	Check the circuit response.	Fault Code 2555 is active and Fault Code 2556 is inactive?	
STEP 2C:	Check the fault codes and verify the sensor condition.	Fault Code 2556 is active?	
STEP 3:	**Check the ECM and OEM harness.**		
STEP 3A:	Inspect the ECM and OEM harness connector pins.	Dirty or damaged pins?	
STEP 3B:	Check for a pin short circuit to ground.	Greater than 100k ohms?	
STEP 3C:	Check for a pin-to-pin short circuit in the OEM harness.	Greater than 100k ohms?	
STEP 3D:	Check for an inactive fault code.	Fault Code 2556 inactive?	
STEP 4:	**Clear the fault code.**		
STEP 4A:	Disable the fault code.	Fault Code 2556 inactive?	
STEP 4B:	Clear the inactive fault codes.	All fault codes cleared?	

PREVIEW - YOUFIXTHIS.COM

To buy Cummins Parts and Service Manuals, Training Guides, or Tools go to our website at https://store.cummins.com

Download full manual at youfixthis.com

TROUBLESHOOTING SUMMARY

STEPS	SPECIFICATIONS	SRT CODE

STEP 1: Perform basic troubleshooting procedures.

- **STEP 1A:** Check for active fault codes or high counts of inactive fault codes.
- **STEP 1B:** Perform basic troubleshooting checks.

STEP 2: Determination of engine symptom.

- **STEP 2A:** Low power, poor acceleration, or poor response.
- **STEP 2B:** Engine misfire, engine speed surge, or engine speed unstable.
- **STEP 2C:** Excessive white or black smoke.
- **STEP 2D:** Low intake manifold pressure.
- **STEP 2E:** Engine will not start or difficult to start, engine shuts off unexpectedly.

STEP 3: No-start troubleshooting procedures.

- **STEP 3A:** Verify the operation of cold weather starting aids.
- **STEP 3B:** Verify the low-pressure fuel lines are routed correctly.
- **STEP 3C:** Check the ECM keyswitch voltage.
- **STEP 3D:** Check the ECM battery supply voltage.
- **STEP 3E:** Check engine speed during cranking.
- **STEP 3F:** Verify rail fuel pressure sensor accuracy.
- **STEP 3G:** Check for fuel rail pressure while cranking the engine.
  - **STEP 3G-1:** Check fuel gear pump pressure.
  - **STEP 3G-2:** Check fuel lift pump pressure.
- **STEP 3H:** Check for other fault codes that explain a no-start condition.

STEP 4: Fuel system troubleshooting procedures.

- **STEP 4A:** Check for fault codes.
- **STEP 4B:** Check for air in the high-pressure pump fuel supply.
- **STEP 4C:** Measure fuel gear pump pressure.

PREVIEW - YOUFIXTHIS.COM

To buy Cummins Parts and Service Manuals, Training Guides, or Tools go to our website at https://store.cummins.com

Download full manual at youfixthis.com

STEP 9F-2: Check if the engine is equipped with an air compressor.

Condition:
- Turn keyswitch OFF.

Action	Specification/Repair	Next Step
Check if the engine is equipped with an engine gear driven air compressor. N/A	Is the engine is equipped with an engine gear driven air compressor? **YES**	9F-3
	Is the engine is equipped with an engine gear driven air compressor? **NO**	9G

STEP 9F-3: Unload the Air Compressor and Operate.

Condition:
- Turn keyswitch OFF.
- Unload the air compressor.

Action	Specification/Repair	Next Step
With the air compressor unloaded, operate the engine in the condition in which the vibration complaint occurs. The air compressor can be unloaded by: Disconnecting the air governor signal line and connecting regulated shop air, with a pressure gauge, to the air compressor governor air signal port. Typically 621 kPa (90 psi) of air pressure is the set point for unloading the air compressor. Refer to the OEM service manual. Disconnect the air compressor discharge line and air intake hose from the air compressor. On turbocharged air compressors, make sure to plug the air intake hose attached to the intake manifold.	Did unloading the air compressor significantly reduce or eliminate the vibration? **YES**	9F-4
	Did unloading the air compressor significantly reduce or eliminate the vibration? **NO**	Repair Complete.

PREVIEW - YOUFIXTHIS.COM

To buy Cummins Parts and Service Manuals, Training Guides, or Tools go to our website at https://store.cummins.com

Download full manual at youfixthis.com

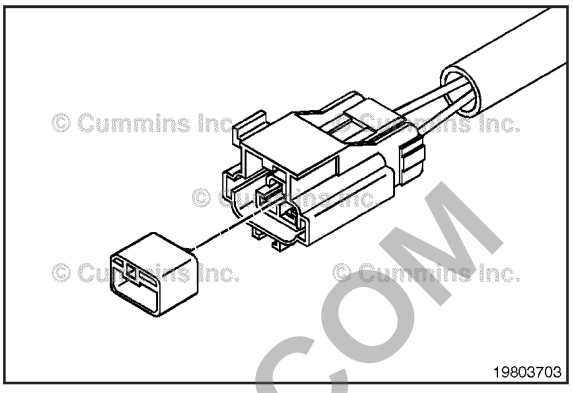
Connector Replacement

The connector can have multiple pin configurations. All types of connectors are repaired in the same manner.

Before installing the new connector perform a test fit to make sure the connector is keyed correctly.

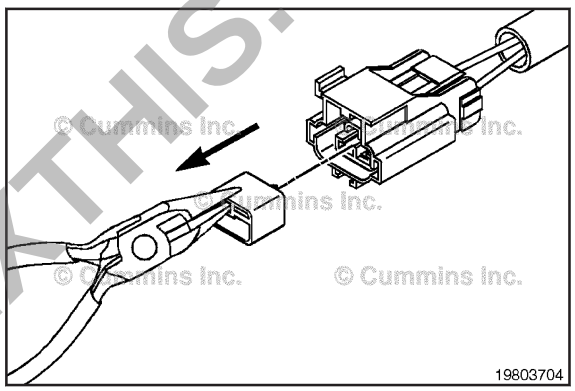
Refer to the appropriate wiring repair kit in the service tools table in the front of this section for the correct repair connector.

Refer to the wiring diagram in Section E for pin locations.



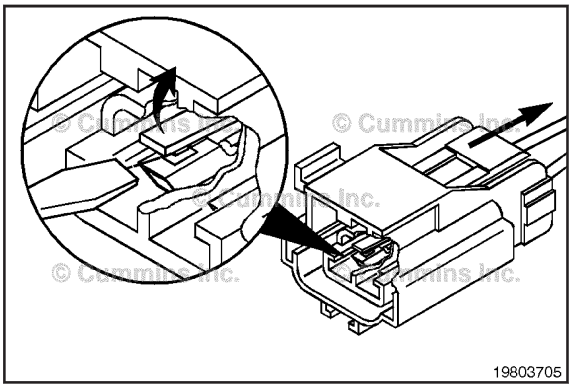
CAUTION
If more than one wire is repaired or if the connector body is replaced, be sure to insert the wires into the same location as they were in the original connector. If the wires are not in the original location, electrical damage can occur.

To replace the connector, grasp the blue inter connector and pull it straight out.

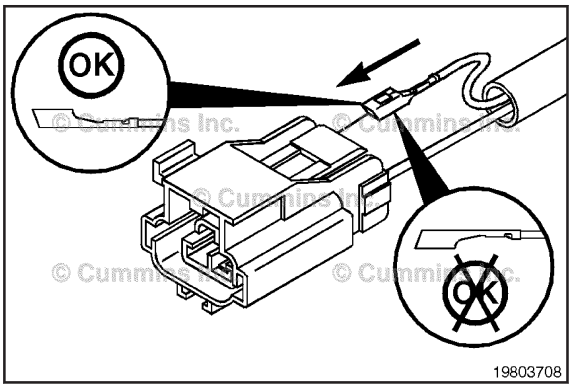


CAUTION
The locking finger can be easily broken. Care must be taken when using this tool. Do not force the tool into place.

To remove the contact out of the connector body, gently pull wire backward, while at the same time releasing the locking finger by moving it away from the contact with a screwdriver.



Replace the connector and install the wires and terminals into the seal at the back of the connector. Push the wires straight in until a click is felt. A slight tug will confirm that it is properly locked in place.



PREVIEW - YOUFIXTHIS.COM

To buy Cummins Parts and Service Manuals, Training Guides, or Tools go to our website at https://store.cummins.com

Download full manual at youfixthis.com

PREVIEW ONLY

You're viewing 25 of 3274 pages

The full manual includes:

- All 3274 pages, complete
- Searchable PDF (find any keyword)
- No watermarks
- Instant download
- Print-ready quality

GET FULL MANUAL NOW

Cummins ISB, ISBe2, ISBe3, ISBe4, QSB4.5, QSB5.9, QSB6.7, ISC, QSC8.3, ISL, ISLe3, ISLe4, QSL9 Troubleshooting and Repair Manual

Scan or click anywhere
youfixthis.com

Click anywhere on this page to get the full manual