

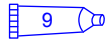
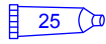

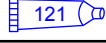
Fuel System

Section 5G - ECS Repair

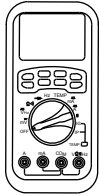
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Lubricants, Sealants, Adhesives

Tube Ref No.	Description	Where Used	Part No.
 9	Loctite 567 PST Pipe Sealant	ECT sensor threads	92-809822
		EFT sensor threads	
		Switch threads	
 25	Liquid Neoprene	Electrical connections	92- 25711 3
 87	High Performance Gear Lubricant	Gear lube monitor	92-858064K01
 121	15W40 4-cycle Diesel Engine Oil	Fuel pump actuator O-ring	92-858042K01

Special Tools

DMT 2004 Digital Multimeter	91-892647A01
 4516	Measures RPM on spark ignition (SI) engines, ohms, amperes, AC and DC voltages; records maximums and minimums simultaneously, and accurately reads in high RFI environments.

Special Service Procedures

High Pressure Fuel Pump Repair

The Robert Bosch Corporation has a network of authorized Bosch Service Dealers throughout the world to service their products. Sent pump and injectors to an authorized Bosch Service Center. When shipping a high pressure fuel pump to a service center for adjustments or repairs, the fuel return line hollow bolt must accompany the unit. The hollow bolt incorporates a sized orifice (is calibrated) and is matched to the pump. The pump cannot be properly adjusted without this matched orifice. Contact the Bosch distributor nearest you for the location of an authorized Bosch Service Center.

Wiring Harness Service

General Information

Marine engine control circuits contain many special design features not found in standard land vehicle wiring. Environmental protection is used extensively to protect electrical contacts. Proper splicing methods must be used when making repairs. The proper operation of low amperage input/output circuits depends upon good continuity between circuit connectors. It is important before component replacement and/or during normal troubleshooting procedures that a visual inspection of any questionable mating connector is performed. Mating surfaces should be properly formed, clean and likely to make proper contact. Some typical causes of connector problems include:

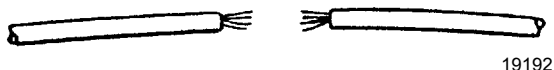
- Improperly formed contacts and/or connector housing
- Damaged contacts or housing due to improper engagement
- Corrosion, sealer or other contaminants on the contact mating surfaces
- Incomplete mating of the connector halves during assembly or during subsequent troubleshooting procedures
- Connectors have come apart due to vibration and/or temperature cycling
- Terminals not fully seated in the connector body

- Inadequate terminal crimps to the wire

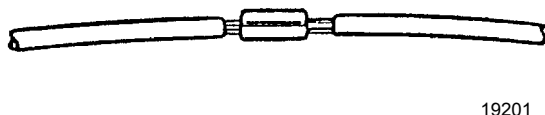
Replace wire harnesses with proper part number harnesses. When signal wires are spliced into a harness, use the same gauge wire with high temperature insulation only. With the low current and voltage levels found in the system, it is important that the best possible bond be made at all wire splices by soldering the splices, as shown in Wire Repair. Use care when probing a connector or replacing connector terminals. It is possible to short between opposite terminals. If this happens, certain components can be damaged. Always use jumper wires with the corresponding mating terminals between connectors for circuit checking. Never probe through connector seals, wire insulation, boots, nipples or covers. Microscopic damage or holes may result in eventual water intrusion, corrosion and/or component or circuit failure.

Wire Repair

1. Locate damaged wire.
2. Remove the insulation as required.



3. Splice two wires together using a splice clip. Solder with rosin core solder.



4. Cover the splice with a heat-shrink sleeve to insulate from other wires.

Connector Service

Most connectors in the engine compartment are protected against moisture and dirt that could create oxidation and deposits on the terminals. This protection is important because of the very low voltage and current levels found in the electronic system. The connectors have a lock which secures the male and female terminals together. A secondary lock holds the seal and terminal into the connector. When diagnosing connectors open circuits are often difficult to locate by sight because oxidation or terminal misalignments are hidden by the connectors. Merely wiggling a connector on a sensor or in the wiring harness may locate the open circuit condition. This should always be considered when an open circuit or failed sensor is indicated. Intermittent problems may also be caused by oxidized or loose connections. Before making a connector repair, be certain of the type of connector. Some connectors look similar but are serviced differently. Replacement connectors and terminals are listed in the Parts Catalog.

NOTE: Replacement connectors for Cummins MerCruiser ECS engines may come with the wires already attached to the connector.

Main and Starter Relays

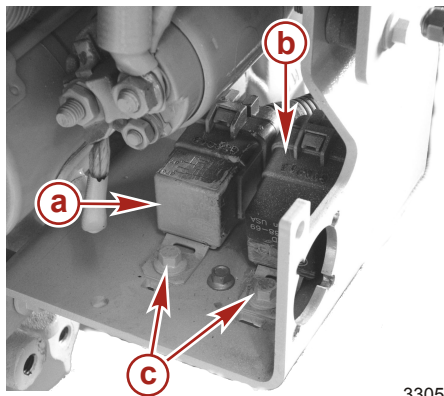
Relay, Module, and Sensor Servicing (On Board Service)

⚠ WARNING

Performing service or maintenance without first disconnecting the battery can cause product damage, personal injury, or death due to fire, explosion, electrical shock, or unexpected engine starting. Always disconnect the battery cables from the battery before maintaining, servicing, installing, or removing engine or drive components.

Removal

1. Remove the relay bolt and nut.



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Diagnostic port and harness removed for clarity

- a** - Main relay
- b** - Starter relay
- c** - Bolts

2. Disconnect the relay electrical connector.
3. Remove the relay from the TPS bracket.

Cleaning

IMPORTANT: The main relay is an electrical component. Do not soak in any liquid cleaner or solvent: damage may result.

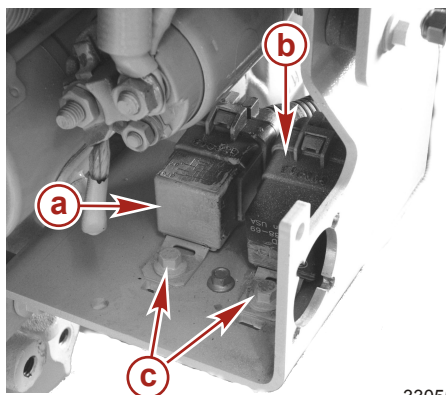
1. Clean the exterior with a dry cloth.
2. Clean the terminals with a suitable cleaner.

Inspection

1. Look for any evidence of physical damage to the base or connector surfaces of the relay.
2. Inspect the electrical pins of the relay for straightness and corrosion.
3. Inspect the connectors on the wiring harness for corrosion and for terminals that may have backed out of the harness.

Installation

1. Insert the relay into the TPS bracket.



Diagnostic port and harness removed for clarity

- a** - Main relay
- b** - Starter relay
- c** - Bolts

2. Install the relay bolt and nut.
3. Torque the relay bolt nut.

Description	Nm	lb-in.	lb-ft
Relay bolt nut	10.8	96	—

4. Connect the relay electrical connector.

Testing

IMPORTANT: The main and starter relays are identical and can be interchanged for diagnostic purposes.

Relay terminal designations:

NOTE: Relay terminal numbers are cast into the relay terminal cover.

- Both relays:
 - Terminal 30 is battery voltage.
 - Terminal 85 is grounded by the ECM.
- Main relay only:
 - Terminal 87 is connected (a circuit is formed) to terminal 30 in the energized (on) position. Terminal 87 then supplies battery voltage to two ECM pins.
 - Terminal 86 is connected to terminal 30.
- Starter relay only:
 - Terminal 87 is connected (a circuit is formed) to terminal 30 in the energized (on) position. Terminal 87 then supplies battery voltage to enable the starter motor.
 - Terminal 86 is powered by the ECM to energize the relay.

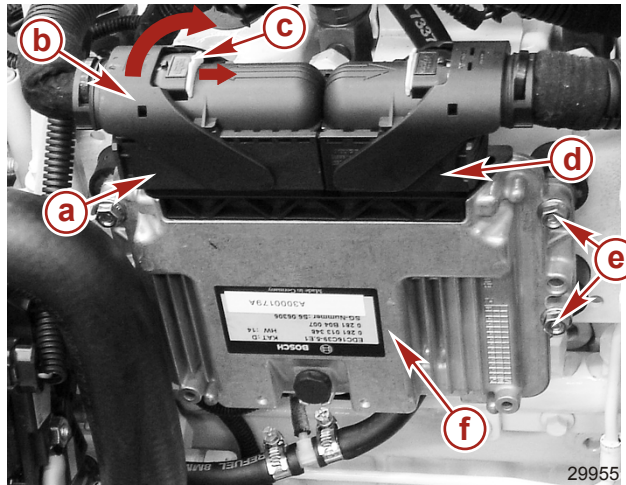
Electronic Control Module (ECM)

IMPORTANT: See Service Precautions at the beginning of this section before proceeding.

IMPORTANT: The ECM is a sensitive electrical device, subject to electrostatic damage. Take care not to touch connector pins when removing, cleaning, or installing the ECM.

Removal

1. Slide the lock in the direction shown.
2. Rotate the connector handle in the direction shown and lift to disconnect the 94-pin electrical connector K from the ECM.
3. Repeat steps 1 and 2 and disconnect the 60-pin electrical connector A from the ECM.
4. Remove the ECM mounting nuts. Retain the hardware.
5. Remove the ECM from the electrical bracket.



a - 94-pin ECM connector K
b - Connector Handle
c - Sliding lock

d - 60-pin ECM connector A
e - Mounting nuts (two not shown)
f - ECM

Cleaning

1. Clean the exterior of the ECM with a dry cloth. Be careful to avoid contact with the connector pins.
2. Clean the ECM mounting bracket to assure a good ground (–) contact.

Inspection

NOTE: The ECM is a sealed electrical component. If a scan check has shown it to be defective, replace the unit with another ECM having the same part number and service number as the original.

1. Inspect outer surfaces for any obvious damage.
2. Inspect the electrical pins of the ECM for straightness and corrosion.
3. Inspect the connectors on the wiring harness for corrosion and terminals that may have backed out of the harness.

Installation

1. Mount the new ECM to the electrical bracket using the retained hardware.
2. Torque mounting nuts.

Description	Nm	lb. in.	lb. ft.
ECM mounting nut	10.8	95	–

3. Connect and lock the 60-pin electrical connector to the ECM.
4. Connect and lock the 94-pin electrical connector to the ECM.

Testing

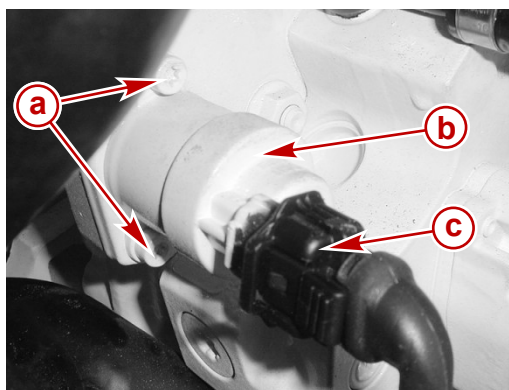
See Diagnostic Circuit Checks for information and procedures.

Fuel Pump Actuator

IMPORTANT: See Service Precautions at the beginning of this section before proceeding.

Removal

1. Disconnect the fuel pump actuator harness connector.
2. Remove the fuel pump actuator screws.
3. Remove the fuel pump actuator.



- a** - Screws
b - Fuel pump actuator
c - Harness connector

Cleaning


1. Clean the fuel pump actuator with a dry cloth.
2. Remove the sealing washer and discard.
3. Clean the sealing washer seat.
4. Clean the harness connector.

Inspection

1. Look for evidence of any physical damage to the base or the connector surfaces.
2. Visually inspect the sensor electrical pins for straightness and corrosion.
3. Visually inspect the wiring harness connectors for corrosion or terminals that may have backed out of the harness.

Installation

1. Install a new O-ring on the fuel pump actuator.
2. Lubricate the O-ring with clean oil.

Tube Ref No.	Description	Where Used	Part No.
 121	15W40 4-cycle Diesel Engine Oil	Fuel pump actuator O-ring	92-858042K01

3. Turn the fuel pump actuator clockwise while pressing it into the bore. Verify the fuel pump actuator flange is flush with the mounting surface.
4. Tighten the fuel pump actuator screws to specification.

Description	Nm	lb. in.	lb. ft.
Fuel pump actuator screw	6	50	—

5. Connect and lock the fuel pump actuator harness connector.

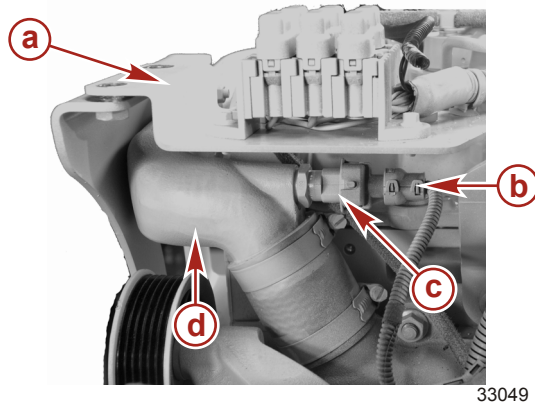
Engine Coolant Temperature Sensor

Removal

IMPORTANT: See Service Precautions at the beginning of this section before proceeding.

NOTE: Handle the engine coolant temperature (ECT) sensor carefully as any damage to it will affect operation of the ECS (Electronic Control System).

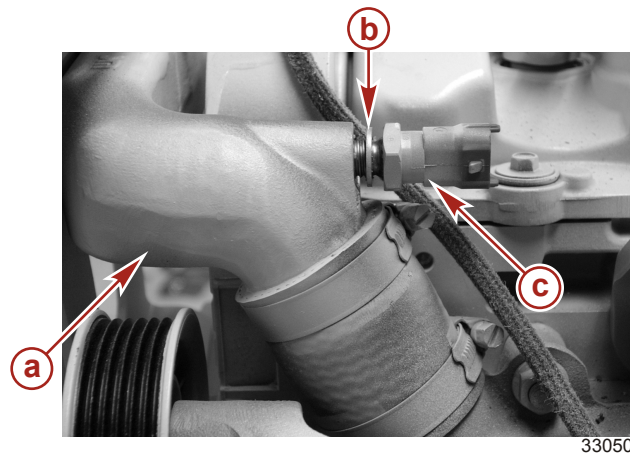
1. Drain the closed cooling system. See **Section 6A—Draining the closed cooling system**.
2. Remove the bolts attaching the engine fuse panel.



Alternator removed for clarity

- a** - Engine fuse panel
- b** - ECT sensor connector
- c** - ECT sensor
- d** - Coolant manifold

3. Disconnect the engine coolant temperature (ECT) sensor harness connector.
4. Remove the ECT sensor. Retain the sealing washer.



- a** - Coolant manifold
- b** - Sealing washer
- c** - ECT sensor

Cleaning

1. Clean the sensor with a dry cloth.
2. Remove the sealing washer and clean the seating area.


- Clean the harness connector.

Inspection

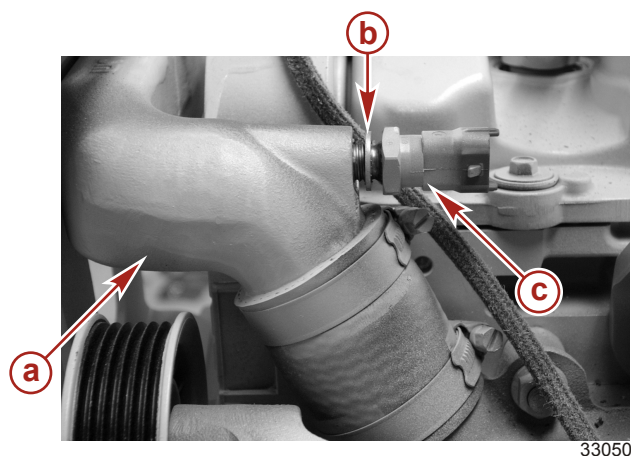
- Look for evidence of any physical damage to the base or the connector surfaces.
- Visually inspect the sensor electrical pins for straightness and corrosion.
- Visually inspect the wiring harness connectors for corrosion or terminals that may have backed out of the harness.

Installation

- Apply sealant to the ECT sensor threads.

Tube Ref No.	Description	Where Used	Part No.
 9	Loctite 567 PST Pipe Sealant	ECT sensor threads	92-809822

- Install the ECT sensor and sealing washer.



- a** - Coolant manifold
b - Sealing washer
c - ECT sensor

- Torque the ECT sensor.

Description	Nm	lb-in.	lb-ft
ECT sensor screw	20.5	181	—

- Connect the ECT sensor harness connector.
- Attach the engine fuse panel.
- Fill the engine with the specified coolant. See **Section 6A—Filling the closed cooling system**.

Testing

See **Diagnostic Circuit Checks** for information and procedures.

Engine Fuel Temperature Sensor

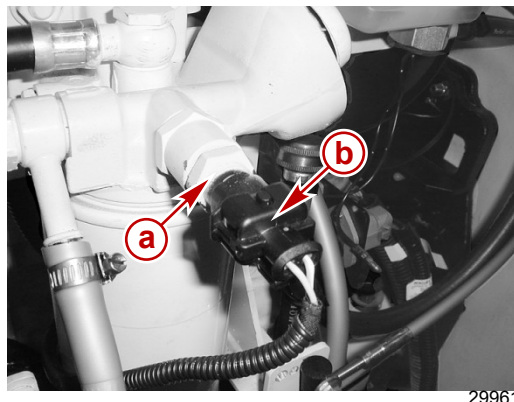
Important Information

IMPORTANT: See **Service Precautions** at the beginning of this section before proceeding.

Removal

- Disconnect the electrical connectors from the engine fuel temperature sensor (EFT) sensor.

2. Counterhold the reducer fitting, if equipped, with a separate tool.
3. Gradually loosen the EFT sensor to relieve the fuel pressure. Properly contain any fuel that drains from the fuel system.
4. Remove the EFT sensor.



- a** - EFT sensor
b - Harness connector

Cleaning

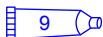
1. Clean the sensor with a dry cloth.
2. Remove the sealing washer and clean the seating area.
3. Clean the harness connector.

Inspection

1. Look for evidence of any physical damage to the base or the connector surfaces.
2. Visually inspect the sensor electrical pins for straightness and corrosion.
3. Visually inspect the wiring harness connectors for corrosion or terminals that may have backed out of the harness.

Installation

1. Apply sealant to the EFT sensor threads.

Tube Ref No.	Description	Where Used	Part No.
 9	Loctite 567 PST Pipe Sealant	EFT sensor threads	92-809822

2. Install the EFT sensor.
3. Tighten the EFT sensor to specification.

Description	Nm	lb. in.	lb. ft.
Engine fuel temperature sensor screw	18	159	—

4. Connect and lock the EFT sensor electrical connector.

Testing

See **Diagnostic Circuit Checks** for information and procedures.

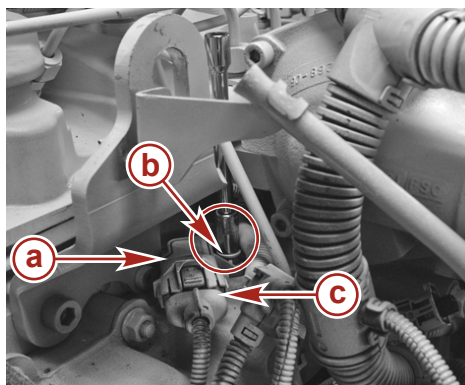
Manifold Absolute Pressure and Intake Air Temperature Sensor

Removal

NOTE: See *Service Precautions in Repair Procedures* before continuing.

NOTE: The manifold absolute pressure (MAP) and intake air temperature (IAT) sensors are included in one assembly.

1. Disconnect the manifold absolute pressure and intake air temperature (MAP-IAT) sensor harness connector.



- a** - MAP-IAT sensor
- b** - Sensor screw
- c** - Harness connector

2. Remove the MAP-IAT sensor screw.
3. Remove the sensor from the aftercooler housing.

Cleaning

1. Clean the sensor with a dry cloth.
2. Clean the harness connector.

Inspection

1. Look for evidence of any physical damage to the sensor base or connector surfaces.
2. Visually inspect the sensor electrical pins for straightness and corrosion.
3. Visually inspect the wiring harness connectors for corrosion and terminals backed out of the harness.
4. Inspect the O-ring for damage.

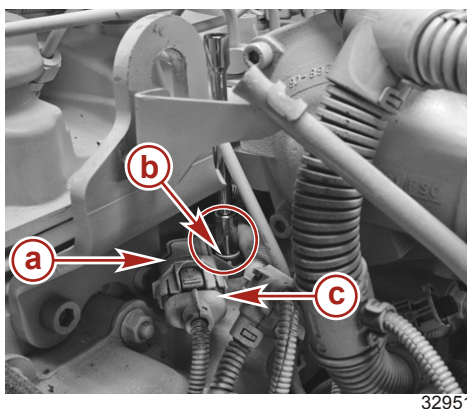
Installation

1. Install a new MAP-IAT sensor O-ring.



Sensor O-ring

2. Install the MAP-IAT sensor to the aftercooler housing using the screw and washer.



- a** - MAP and IAT sensor
- b** - Sensor screw
- c** - Harness connector

3. Torque the MAP and IAT sensor screws.

Description	Nm	lb-in.	lb-ft
MAP-IAT sensor screw	11	97	–

4. Connect and lock the MAP-IAT sensor harness connector.

Testing

See **Diagnostic Circuit Checks** for information and procedures.

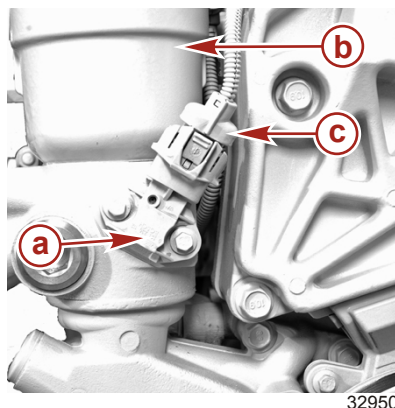
Engine Oil Pressure and Engine Oil Temperature Sensor

Removal

NOTE: See *Service Precautions in Repair Procedures* before continuing.

NOTE: The engine oil pressure (EOP) and engine oil temperature (EOT) sensors are in a single assembly.

1. Disconnect the EOP and EOT sensor harness connector.



- a** - EOP and EOT sensor
- b** - Engine oil filter housing
- c** - Electrical connector

2. Remove the EOP and EOT sensor screws.
3. Remove the sensor from its mounting location.

Cleaning

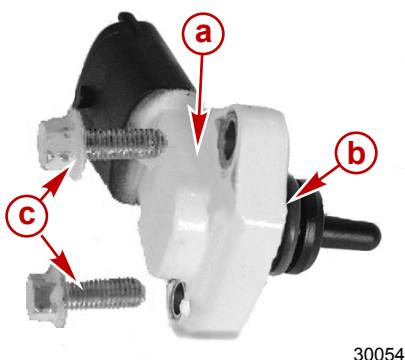
1. Clean the sensor with a dry cloth.
2. Clean the harness connector.

Inspection

1. Look for evidence of any physical damage to the sensor base or connector surfaces.
2. Visually inspect the sensor electrical pins for straightness and corrosion.
3. Visually inspect the wiring harness connectors for corrosion and terminals backed out of the harness.
4. Inspect the O-ring for damage.

Installation

1. Install a new O-ring on the EOP and EOT sensor.



- a** - EOP and EOT sensor
- b** - O-ring
- c** - Screws

2. Install the EOP and EOT sensor to the engine oil filter housing using the flange screws.
3. Torque the flange screws to specification.

Description	Nm	lb-in.	lb-ft
EOP and EOT sensor screw	11	97	–

4. Connect and lock the EOP and EOT sensor harness connector.

Testing

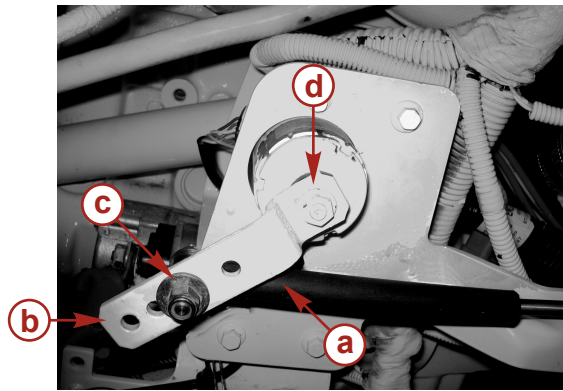
See **Diagnostic Circuit Checks** for information and procedures.

Throttle Position Sensor

Removal

1. Place the engine throttle lever in the idle position.

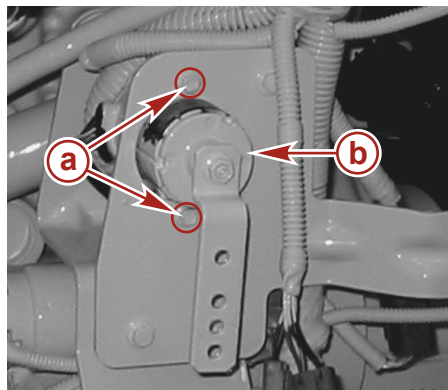
2. Disconnect the throttle cable.



27184

- a** - Throttle cable
- b** - Lever
- c** - Throttle cable bolt
- d** - Throttle position sensor

3. Disconnect the throttle position (TP) sensor harness connector.
4. Remove the TP sensor bolts.



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- a** - TP sensor bolts
- b** - TP sensor

5. Remove the sensor from the bracket.

Cleaning

1. Clean the sensor with a dry cloth.
2. Clean the harness connector.

Inspection

1. Look for evidence of any physical damage to the base or the connector surfaces.
2. Visually inspect the sensor electrical pins for straightness and corrosion.
3. Visually inspect the wiring harness connectors for corrosion or terminals that may have backed out of the harness.

Installation

1. Attach the TP sensor to the bracket with bolts and flange nuts.
2. Torque the flange nuts.

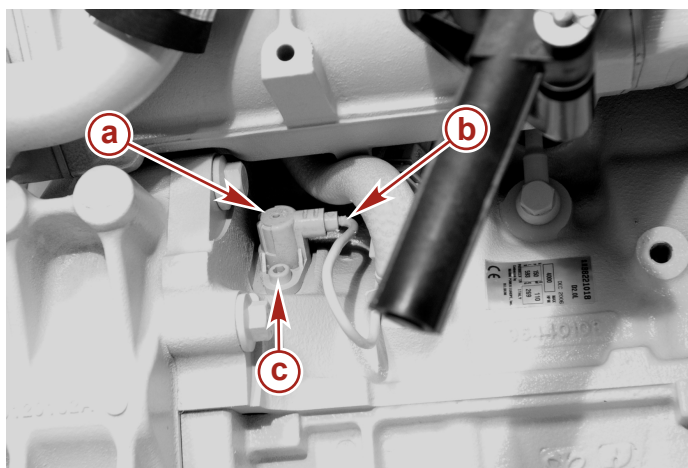
Description	Nm	lb-in.	lb-ft
TP sensor flange nut	10.8	95	—

3. Connect the TP sensor harness connector.
4. Install the throttle cable. Refer to **Section 2A—Throttle and Shift Cable Installation and Adjustment**.
5. Check the TP sensor output voltage and verify the full throttle range. See **Section 5F—ECS Diagnostics**.

Crankshaft Speed Sensor

Removal

1. Disconnect the crankshaft speed sensor from the engine harness.



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- a** - Crankshaft speed sensor
- b** - Harness connection
- c** - Allen-head screw

2. Remove the sensor Allen-head screw.
3. Withdraw the crankshaft speed sensor from the starboard side of the engine.

Cleaning

1. Clean the sensor and connector with a dry cloth.
2. Clean the harness connector.

Inspection

1. Look for evidence of any physical damage to the sensor surfaces and the tip of the sensor.
2. Visually inspect the connectors for corrosion and terminals that may have backed out of the harness.
3. Inspect the O-ring seal for damage.

Installation

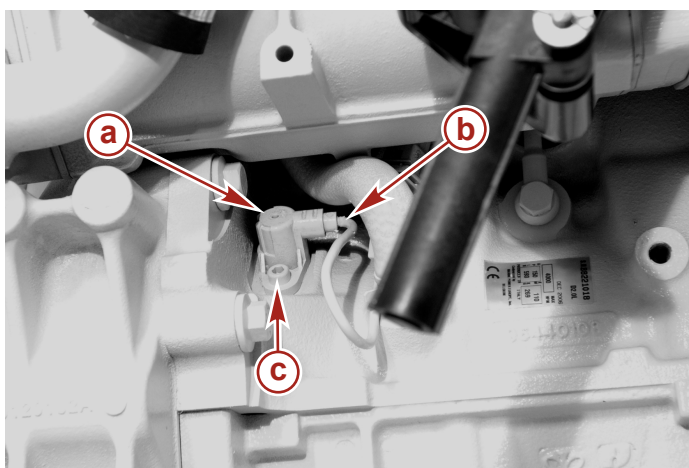
1. Install a new crankshaft speed sensor O-ring.



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Crankshaft speed sensor O-ring

2. Insert the crankshaft speed sensor into the flywheel housing.



32947

- a** - Crankshaft speed sensor
- b** - Harness connection
- c** - Allen-head screw

3. Install the crankshaft speed sensor Allen-head screw with washer.
4. Torque the Allen-head screw.

Description	Nm	lb-in.	lb-ft
Crankshaft speed sensor Allen-head screw	8	71	—

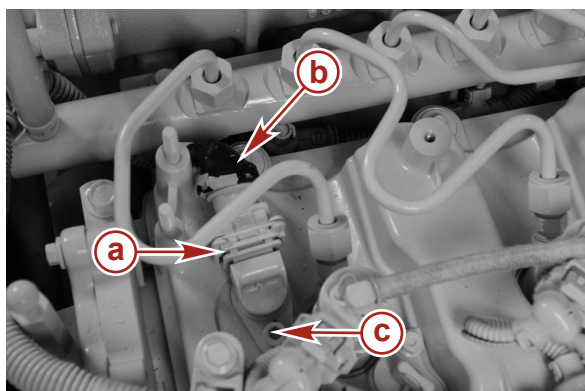
5. Connect the engine harness connector to the crankshaft speed sensor.

Camshaft Position Sensor

Removal

1. Disconnect the camshaft position sensor from the injection harness.
2. Remove the screw.

3. Withdraw the camshaft position sensor.



- a** - Camshaft position sensor
b - Harness connector
c - Screw

Cleaning

1. Clean the sensor and connector with a dry cloth.
2. Clean the harness connector.
3. Remove and discard the O-ring seal.

Inspection

1. Look for evidence of any physical damage to the sensor surfaces and the tip of the sensor.
2. Visually inspect the connectors for corrosion and terminals that may have backed out of the harness.

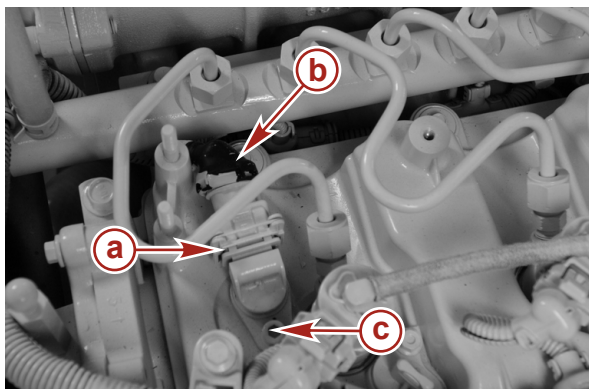
Installation

1. Install a new camshaft position sensor O-ring.



O-ring seal

2. Insert the camshaft position sensor and screw.



32945

- a** - Camshaft position sensor
- b** - Harness connector
- c** - Screw

3. Torque the screw.

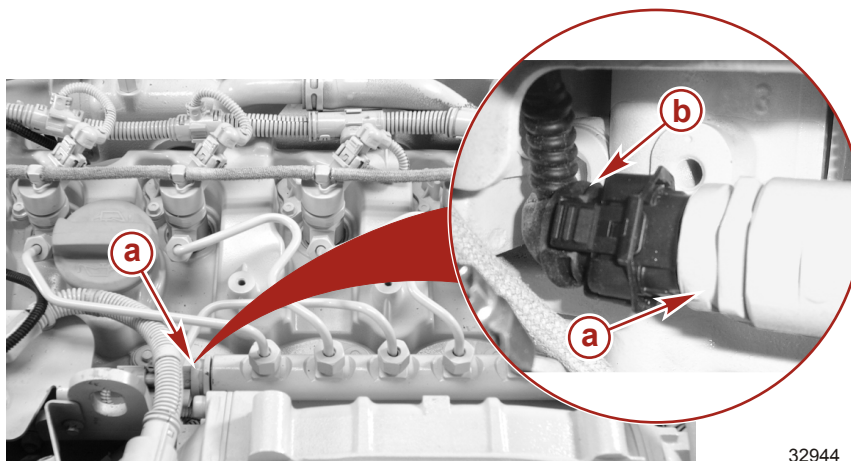
Description	Nm	lb-in.	lb-ft
Camshaft position sensor screw	8	71	–

4. Connect and lock the camshaft position sensor harness connector.

Rail Fuel Pressure Sensor

Removal

1. Disconnect the rail fuel pressure sensor harness connector.
2. Remove the rail fuel pressure sensor from the common rail.



32944

- a** - Rail fuel pressure sensor
- b** - Harness connector

Cleaning

1. Clean the sensor and connector with a dry cloth.
2. Clean the harness connector.

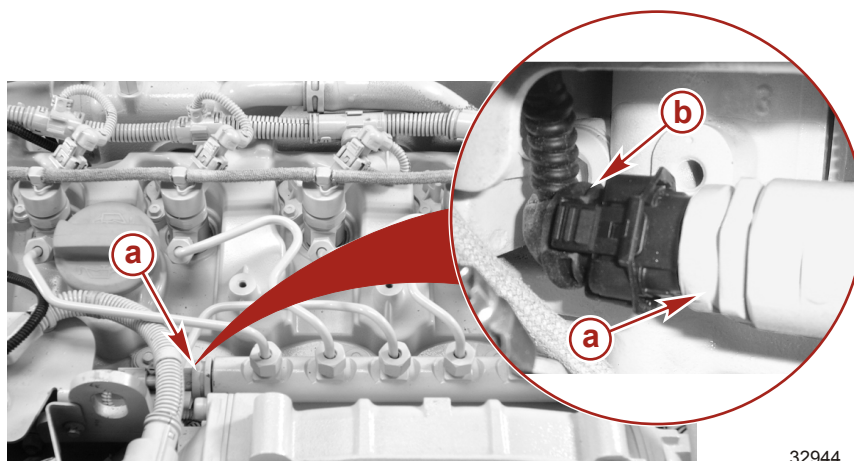
Inspection

1. Look for evidence of any physical damage to the sensor surfaces and the tip of the sensor.

2. Visually inspect the connectors for corrosion and terminals that may have backed out of the harness.
3. Inspect the O-ring seal and sensor threads for damage.

Installation

1. Install a new rail fuel pressure sensor O-ring.
2. Insert the rail fuel pressure sensor into the fuel rail.



32944

- a** - Rail fuel pressure sensor
b - Harness connector

3. Screw the rail fuel pressure sensor into the fuel rail.
4. Torque the sensor.

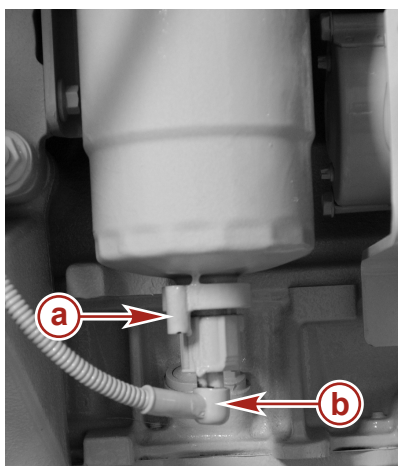
Description	Nm	lb-in.	lb-ft
Rail fuel pressure sensor	35	–	26

5. Connect and lock the rail fuel pressure sensor harness connector.

Water In Fuel Sensor

Removal

1. Disconnect the water in fuel (WIF) sensor harness connector.



32940

- a** - WIF sensor
b - Harness connector

2. Remove the WIF sensor from the fuel filter. Refer to **Section 1B**.

Cleaning

1. Clean the sensor and connector with a dry cloth.
2. Clean the harness connector.

Inspection

1. Look for evidence of any physical damage to the sensor surfaces and the tip of the sensor.
2. Visually inspect the connectors for corrosion and terminals that may have backed out of the harness.
3. Inspect the O-ring seal and sensor threads for damage.

Installation

1. Install a new WIF sensor O-ring.
2. Screw the WIF sensor into the fuel filter housing assembly.
3. Torque the WIF sensor.

Description	Nm	lb. in.	lb. ft.
WIF sensor	1.2	10.6	–

4. Connect and lock the electrical connector to the WIF sensor.

Gear Lube Monitor Switch

Removal

The gear lube monitor switch is serviced with the gear lube monitor assembly.

1. Disconnect the engine harness wiring from the gear lube monitor switch.
2. Remove the gear lube monitor from its bracket.
3. Empty the gear lube monitor into a suitable container.
4. Disconnect the gear lube monitor hose from its fitting.

Installation

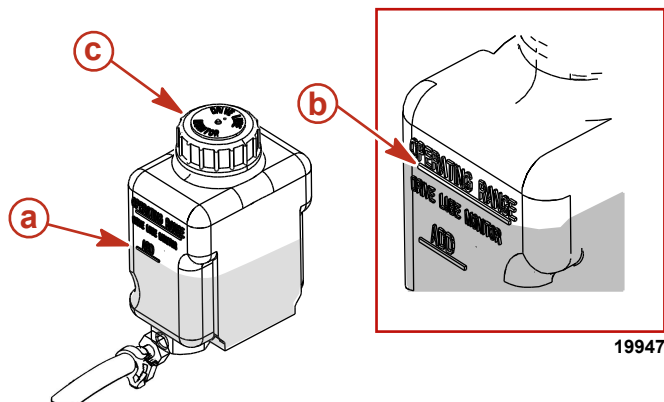
1. Connect and securely clamp the gear lube monitor hose to the fitting on the gear lube monitor.
2. Secure the gear lube monitor in its bracket.
3. Connect the orange engine harness wire to the tan/blue gear lube monitor sensor wire.
4. Connect the black engine harness wire to the black gear lube sensor wire.
5. Fill the gear lube monitor to the "operating range" (full) mark with lubricant.

Tube Ref No.	Description	Where Used	Part No.
 87	High Performance Gear Lubricant	Gear lube monitor	92-858064K01

Testing

The gear lube monitor switch is normally open when the fluid level is correct. If the gear lube is low the switch will close.

1. Ensure that the gear lube monitor bottle is filled to the "OPERATING RANGE" (full) mark.



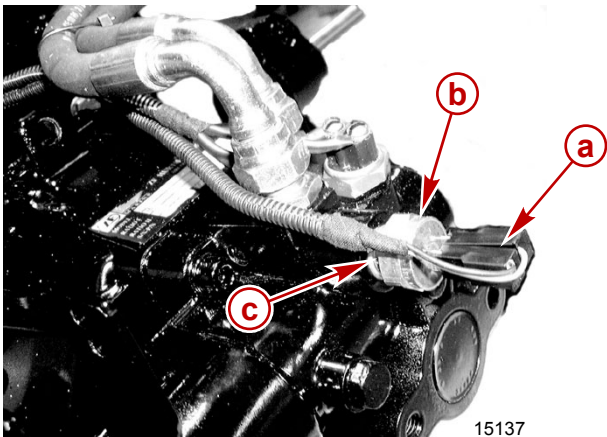
Gear lube monitor

- a** - Gear lube level at the "ADD" mark
 - b** - Gear lube level at the "OPERATING RANGE" mark
 - c** - Gear lube monitor cap
2. Disconnect the engine harness wiring from the two gear lube monitor switch wires.
 3. Connect a continuity meter between the two switch wires.
- | | |
|-----------------------------|--------------|
| DMT 2004 Digital Multimeter | 91-892647A01 |
|-----------------------------|--------------|
4. With the gear lube monitor bottle filled to the "OPERATING RANGE" (full) mark there should be no continuity in the switch
 5. If continuity exists, replace the gear lube monitor.
 6. An empty gear lube monitor bottle, or one with the float fully depressed for diagnostic purposes, will result in measured continuity.
 7. If no continuity exists, replace the gear lube monitor.
 8. If continuity testing indicates an operational gear lube monitor switch, inspect the connectors and engine wiring for corrosion and wiring shorts.

Transmission Fluid Temperature Switch

Removal

- 1. Remove the engine harness wiring from the transmission fluid temperature switch.



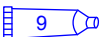
Typical

- a** - Harness wiring
- b** - Transmission fluid temperature switch
- c** - Sealing washer

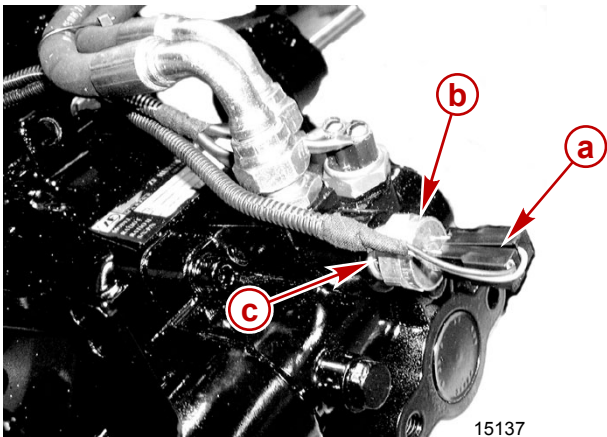
- 2. Prepare to contain spilled fluid.
- 3. Remove the transmission fluid temperature switch.
- 4. Inspect the transmission fluid temperature switch sealing washer. Replace if distorted or damaged.

Installation

- 1. Apply thread sealant to the threads of the transmission fluid temperature switch.

Tube Ref No.	Description	Where Used	Part No.
 9	Loctite 567 PST Pipe Sealant	Switch threads	92-809822


- 2. Install the switch and sealing washer into the transmission and tighten securely.



Typical

- a** - Harness wiring
- b** - Transmission fluid temperature switch
- c** - Sealing washer

- Reconnect the harness wires and coat connection with sealant.

Tube Ref No.	Description	Where Used	Part No.
 25	Liquid Neoprene	Electrical connections	92- 25711 3

- Check transmission fluid level.

Testing

The switch is located on the transmission of MIE engines. The switch is normally open and will close at a predetermined temperature that is dependant application and switch part number.

Description	Opens	Closes
Switch (PN 48952)	66° to 77° C (150° to 170° F)	88° to 93° C (190° to 200° F)
Switch (PN 87-86080)	79° to 91° C (175° to 195° F)	102° to 107° C (215° to 225° F)
Switch (PN 87-88031)	82° to 93° C (160° to 200° F)	104° to 116° C (220° to 240° F)

- Disconnect the wiring and remove the transmission fluid temperature switch from the transmission.
- Connect the leads of a DMT or ohmmeter to the switch's electrical terminals.
- At ambient temperature the switch should have no continuity. A defective switch must be replaced.
- Heat the switch with a suitable controlled heat source (such as a sand bath) and observe switch continuity (open or closed) at the specified temperature ranges. A defective switch must be replaced.

Description	Opens	Closes
Switch (PN 48952)	66° to 77° C (150° to 170° F)	88° to 93° C (190° to 200° F)
Switch (PN 87-86080)	79° to 91° C (175° to 195° F)	102° to 107° C (215° to 225° F)
Switch (PN 87-88031)	82° to 93° C (160° to 200° F)	104° to 116° C (220° to 240° F)

- Allow the switch to cool before handling and installation.

Notes: