SERVICE MANUAL SECTION

CF 500, CF 600 Fuel Tanks

Truck Model: CF 500

Truck Model: CF 600

Unit Code: 15DPB

Unit Code: 15SGY

Unit Code: 15SGZ

S15002

11/02/2005

Table of Contents

Safety Information

NOTE: Read the following before starting the service procedure.

The information contained in this International Service Manual Section was current at the time of printing and is subject to change without notice or liability.

You must follow your company safety procedures when you service or repair equipment. Be sure to understand all of the procedures and instructions before you begin work on the unit.

International uses the following types of notations to give warning of possible safety problems and to give information that will prevent damage to the equipment being serviced or repaired.

WARNING: A warning indicates procedures that must be followed exactly. Personal injury or possible death can occur if the procedure is not followed.

CAUTION: A caution indicates procedures that must be followed exactly. If the procedure is not followed, damage to equipment or components can occur.

NOTE: A note indicates an operation, procedure or instruction that is important for correct service.

Some procedures require the use of special tools for safe and correct service. Failure to use these special tools when required can cause injury to service personnel or damage to vehicle components.

This service manual section is intended for use by professional technicians, NOT a "**do-it-yourselfer**." It is written to inform these technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, DO NOT assume that the service section applies to your vehicle. See your International Truck Dealer for information on whether this service section applies to your vehicle.

Fuel System — General Information

Specifications

Table 1 General Specifications

Item	Specification
Fuel Tank Capacity — Diesel Engines	
Aft-of-axle tank	151 liters (40 gallons)
Frame-mounted tank	132 liters (35 gallons)
Fuel Pressure	
Diesel operating fuel line primary pump pressure	310-379 kPa (45-55 psi)
Key on, engine running	310-379 kPa (45-55 psi)
Key on, engine off	0-379 kPa (0-55 psi)

Table 2 Torque Specifications

Description	Nm	lbf-ft
1/8 in National Pipe Thread (NPT)	11	8
1/4 in NPT	14	10
3/8 in NPT	20	15
1/2 in NPT	34	25
3/4 in NPT	41	30

Description and Operation

Fuel System

The fuel system for the diesel engine:

- is controlled by the engine control module (ECM).
- utilizes a frame-mounted fuel conditioning module which contains an electric fuel pump, a fuel filter and a water separator.

The electric fuel pump:

- draws fuel from the fuel tank.
- circulates fuel under pressure through the fuel filter, water separator and the pressure regulator to the cylinder head fuel galleries and the fuel injectors.

Excess fuel is returned to the fuel conditioning module through the fuel return hose.

The fuel filter:

- filters fuel from the fuel tank before it is sent to the engine.

The water separator:

- removes water from the fuel prior to sending the fuel to the engine.

Drain the water from the water separator at the recommended maintenance intervals. Refer to the Service Guide for the maintenance intervals.

A water-in-fuel indicator on the instrument panel will alert the operator when water builds up in the separator. When the indicator glows continuously while the engine is running, drain the water from the water separator as soon as possible to prevent damage to the fuel injection system.

Fuel System Diagnosis and Testing

Refer to the engine manual EGES-305.

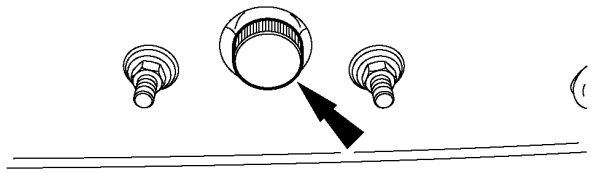
General Procedures

Fuel System Pressure Release

WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel-related component. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in personal injury.

WARNING: Fuel in the fuel system remains under high pressure even when the engine is not running. Before servicing or disconnecting any of the fuel lines or fuel system components, the fuel system pressure must be relieved to prevent accidental spraying of fuel, causing personal injury or a fire hazard.

1. Disconnect both battery ground cables. For additional information, refer to Battery, Mounting and Cables in S08307.
2. Open the fuel/water separator drain valve to release the fuel pressure.



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Quick Connect Coupling

Disconnect — Type I

WARNING: Do not smoke, or carry lighted tobacco or open flame of any type when working on or near any fuel-related components. Highly flammable mixtures are always present and can be ignited. Failure to follow these instructions may result in personal injury.

WARNING: Do not carry personal electronic devices such as cell phones, pagers or audio equipment of any type when working on or near any fuel-related components. Highly flammable mixtures are always present and can be ignited. Failure to follow these instructions may result in personal injury.

WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.

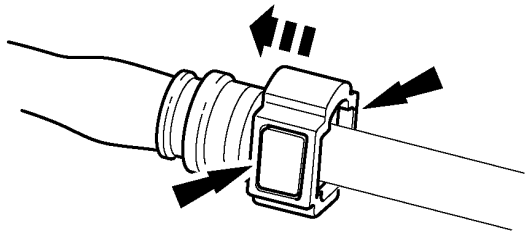
CAUTION: If the liquid or vapor tube is damaged (torn, holes or delaminated), a new tube assembly must be installed. Do not use aftermarket sleeving. Do not re-adhere loose sleeving material.

CAUTION: When reusing liquid or vapor tube connectors, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube. Apply clean engine oil to the end of the tube before inserting the tube into the connector.

CAUTION: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install blanking plugs to any open orifices or tubes.

1. Release the fuel system pressure. For additional information, refer to Fuel System Pressure Release in this section.
2. Disconnect the battery ground cable. For additional information, refer to Battery, Mounting and Cables in S08307.
3. Disconnect the fuel tube quick connect coupling.

   • Press the 2 fuel tube quick connect coupling buttons and pull the fuel tube to disconnect.



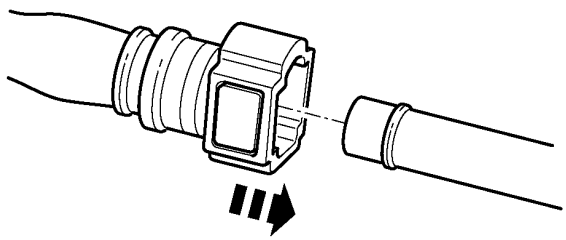
N0025119

Connect — Type I

CAUTION: Make sure the fuel tube clicks into place when installing the tube. To make sure that the fuel tube is fully seated, pull on the tube.

NOTE: Apply clean engine oil to O-ring seals.

1. Install the quick connect coupling onto the tube until it is fully seated.



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Disconnect — Type II

WARNING: Do not smoke, or carry lighted tobacco or open flame of any type when working on or near any fuel-related components. Highly flammable mixtures are always present and can be ignited. Failure to follow these instructions may result in personal injury.

WARNING: Do not carry personal electronic devices such as cell phones, pagers or audio equipment of any type when working on or near any fuel-related components. Highly flammable mixtures are always present and can be ignited. Failure to follow these instructions may result in personal injury.

WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.

CAUTION: If the liquid or vapor tube is damaged (torn, holes or delaminated), a new tube assembly must be installed. Do not use aftermarket sleeving. Do not re-adhere loose sleeving material.

CAUTION: When reusing liquid or vapor tube connectors, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube. Apply clean engine oil to the end of the tube before inserting the tube into the connector.

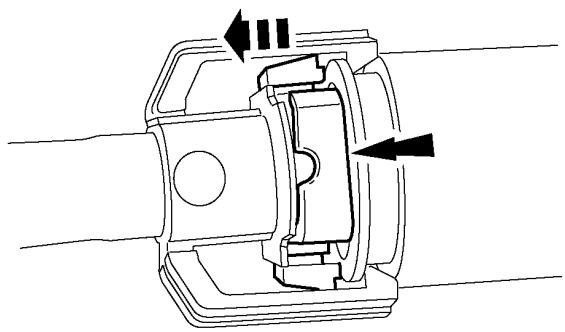
CAUTION: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install blanking plugs to any open orifices or tubes.

1. Release the fuel system pressure. For additional information, refer to Fuel System Pressure Release in this section.

2. Disconnect the battery ground cable. For additional information, refer to Battery, Mounting and Cables in S08307.

3. Disconnect the fuel tube quick connect coupling.

• Press the fuel tube quick connect coupling button and pull the fuel tube to disconnect.



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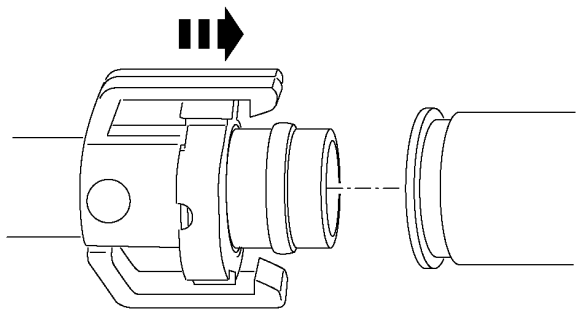
Connect — Type II

CAUTION: Make sure the fuel tube clicks into place when installing the tube. To make sure the fuel tube is fully seated pull on the tube.

NOTE: Apply clean engine oil to the O-ring seals.

1. Install the quick connect coupling onto the tube until it fully seated.



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Fuel Tank and Lines

Specifications

Table 3 Torque Specifications

Description	Nm	lbf-ft	lb-in
Fuel level sensor—aft-of-axle tank	10	—	89
Fuel level sensor—side mount tanks	2	—	18
Fuel tank filler pipe bolts	3	—	27
Fuel tank strap nuts—aft-of-axle tank	90	66	—
Fuel tank cover bolts—aft-of-axle tank	98	72	—
Fuel tank strap nuts—side mount tanks	32	24	—
Fuel conditioning module nuts	15	11	—
Fuel filter cover	25	18	—
Fuel manifold cover bolts	5	—	44
Fuel pump bolts	5	—	44
Fuel transfer pump mounting bolt	52	38	—
1/8 inch national pipe thread (NPT)	11	8	—
1/4 inch NPT	14	10	—
3/8 inch NPT	20	15	—
1/2 inch NPT	34	25	—
3/4 inch NPT	41	30	—

Fuel Tank and Lines Description and Operation

Diesel Engines

The fuel system consists of:

- Fuel tank
  - — There are 3 fuel tank configurations, aft-of-axle, LH, and LH and RH (saddle tanks).
  - — The LH fuel tank is mounted to the LH frame side rail.
  - — The auxiliary fuel tank is mounted to the RH frame side rail.
  - — The aft-of-axle fuel tank is mounted at the rear of the frame between the side rails and includes a fuel tank filler pipe without a restrictor plate.
- Fuel line
- Threaded fuel tank filler cap
- Fuel conditioning module which contains:
  - — a fuel filter and water separator to protect the fuel injectors.
  - — fuel heater and recirculation for improved cold starting.
  - — pressure regulator.
  - — frame-mounted in-line fuel pump, which provides pressurized fuel to the engine and contains a pressure relief valve for overpressure protection in the event of restricted flow.

The fuel pump is controlled by the fuel pump engine control module (ECM) relay.

Fuel Tank and Lines Diagnosis and Testing

Refer to the engine manual EGES-305.

Removal and Installation

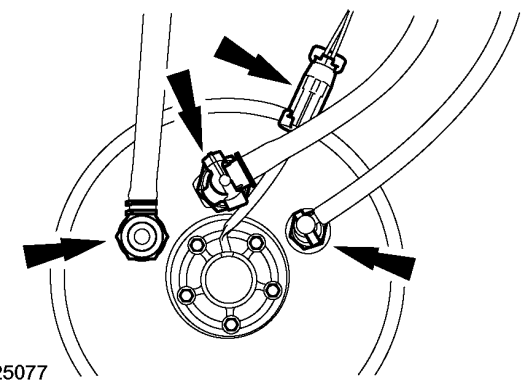
Fuel Tank — LH

WARNING: Do not drain fuel near an open flame or intense heat. To do so is a dangerous practice, which would create a hazardous work area. Failure to follow these instructions can result in personal injury.

All vehicles

1. Raise and support the vehicle with the transmission in NEUTRAL. For additional information, refer to Jacking and Lifting in S10019.
2. Release the fuel system pressure. For additional information, refer to Fuel System above.
3. Disconnect the battery ground cable. For additional information, refer to Battery, Mounting and Cables in S08307.
4. Drain the fuel from the fuel tank. For additional information, refer to Fuel System above.
5. Disconnect the fuel level sending unit electrical connector, fuel lines and, if necessary, the roll over valve hose. For additional information, refer to Fuel System above.

   • Plug or cap all fuel lines and ports to prevent contamination of the fuel system.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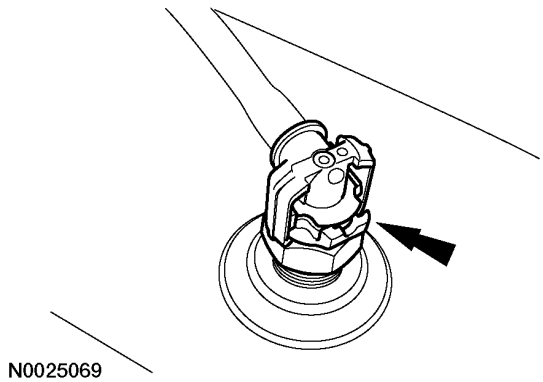
Vehicles equipped with dual tanks

6. Disconnect the fuel transfer pump fuel line. For additional information, refer to Fuel System above.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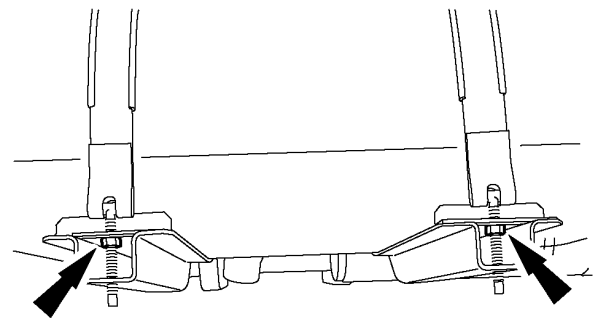
All Vehicles

7. Remove and discard the 2 fuel tank strap nuts. Position the fuel tank straps aside.

   • To install, tighten to 32 Nm (24 lb-ft).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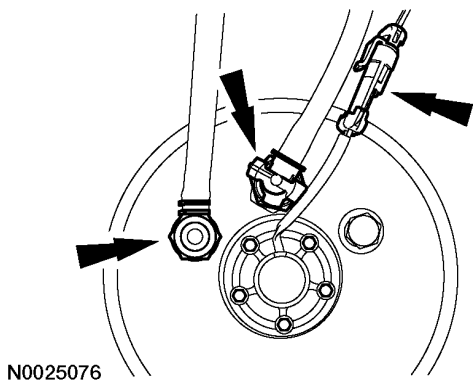
8. Support and remove the fuel tank.
9. To install, reverse the removal procedure.
   - On a dual tank vehicle, fill both tanks to the same level.

Fuel Tank — RH

WARNING: Do not drain fuel near an open flame or intense heat. To do so is a dangerous practice, which would create a hazardous work area. Failure to follow these instructions can result in personal injury.

1. Raise and support the vehicle with the transmission in NEUTRAL. For additional information, refer to Jacking and Lifting in S10019.
2. Release the fuel system pressure. For additional information, refer to Fuel System above.
3. Disconnect the battery ground cable. For additional information, refer to Battery, Mounting and Cables in S08307.
4. Drain the fuel from the fuel tank. For additional information, refer to Fuel System above.
5. Disconnect the fuel level sending unit electrical connector, fuel transfer pump fuel line and, if necessary, the roll over valve hose. For additional information, refer to Fuel System above.

   • Plug or cap all fuel lines and ports to prevent contamination of the fuel system.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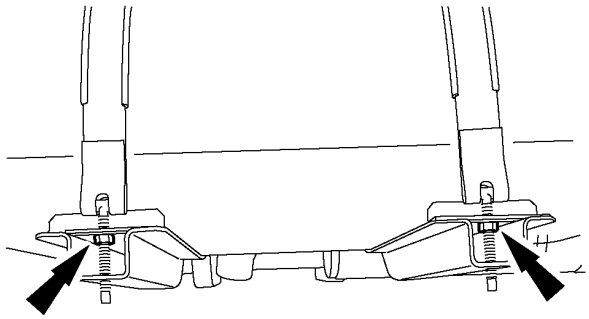
6. Remove and discard the 2 fuel tank strap nuts. Position the fuel tank straps aside.

   • To install, tighten to 32 Nm (24 lb-ft).



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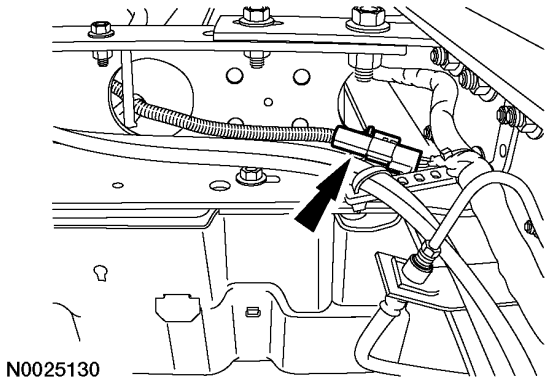
7. Support and remove the fuel tank.
8. To install, reverse the removal procedure.
   - On a dual tank vehicle, fill both tanks to the same level.

Fuel Tank — Aft of Axle

WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel-related component. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions can result in personal injury.

WARNING: Fuel in the fuel system remains under high pressure even when the engine is not running. Before repairing or disconnecting any of the fuel system components, the fuel system pressure must be relieved to prevent accidental spraying of fuel, causing personal injury or a fire hazard.

1. Raise and support the vehicle with the transmission in NEUTRAL. For additional information, refer to Jacking and Lifting in S10019.
2. Release the fuel system pressure. For additional information, refer to Fuel System above.
3. Disconnect the battery ground cable. For additional information, refer to Battery, Mounting and Cables in S08307.
4. Drain the fuel from the fuel tank. For additional information, refer to Fuel System above.
5. Remove the fuel tank filler pipe and fuel tank filler pipe vent hose. For additional information, refer to Fuel Tank Filler Pipe — Aft of Axle in this section.
6. Disconnect the fuel level sensor electrical connector.



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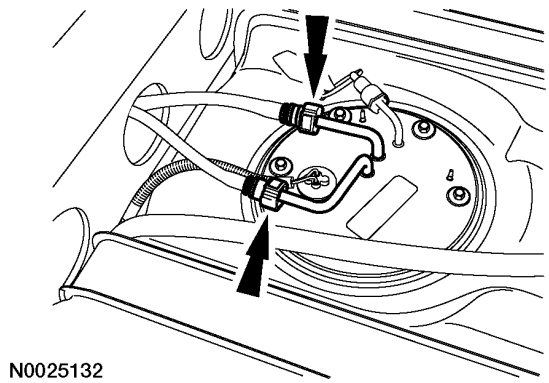
7. Disconnect the fuel supply tube quick connect fittings from the fuel level sensor. For additional information, refer to Fuel System in the section above.



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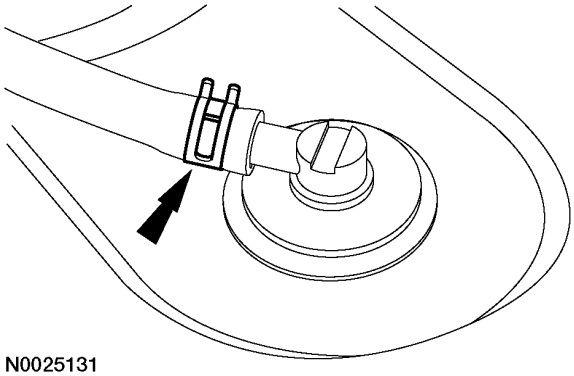
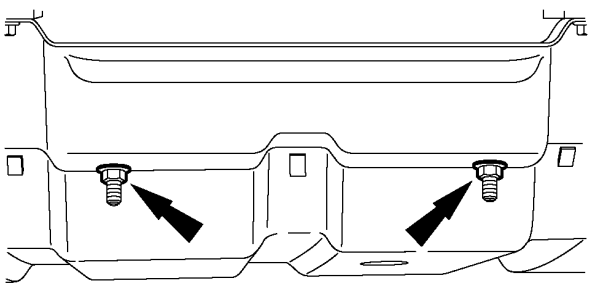
8. If necessary, disconnect the fuel vapor tube from the fuel tank grade vent valve.



N0025131

9. Place a suitable lifting device under the fuel tank.
10. Remove the 2 nuts from the fuel tank straps.
    - To install, tighten to 90 (66 lb-ft).



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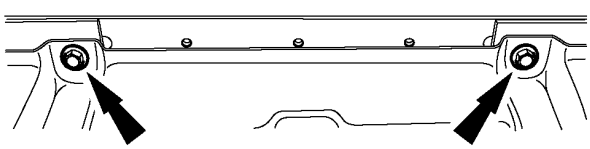
NOTE: Rear bolts are shown, front are similar.

11. Remove the 4 bolts and the fuel tank cover.
    - To install, tighten to 98 (72 lb-ft).



N0025157

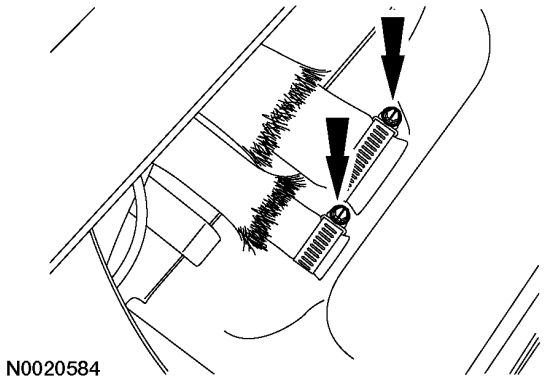
12. Lower the fuel tank.
13. To install, reverse the removal procedure.

Fuel Tank Filler Pipe — Aft of Axle

WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel-related component. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions can result in personal injury.

WARNING: Fuel in the fuel system remains under high pressure even when the engine is not running. Before repairing or disconnecting any of the fuel system components, the fuel system pressure must be relieved to prevent accidental spraying of fuel, causing personal injury or a fire hazard.

1. Raise and support the vehicle with the transmission in NEUTRAL. For additional information, refer to Jacking and Lifting in S10019.
2. Disconnect the battery ground cable. For additional information, refer to Battery, Mounting and Cables in S08307.
3. Drain the fuel tank until the fuel level is at or below half. For additional information, refer to Fuel System above.
4. Release the clamps and disconnect the fuel tank filler pipe and fuel tank filler pipe vent hose.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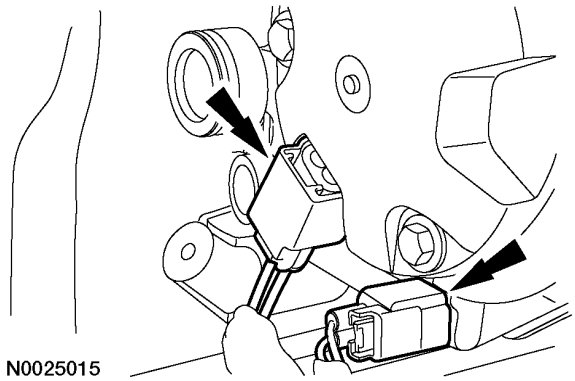
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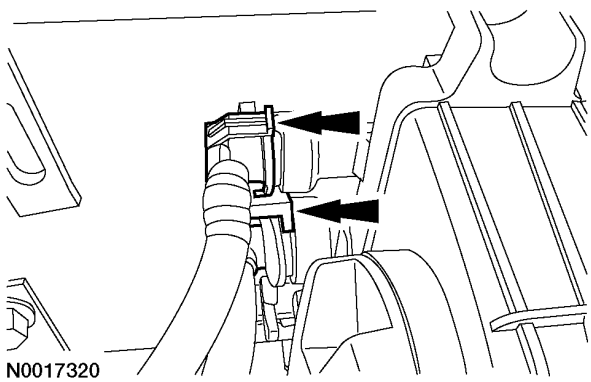
5. Remove the fuel tank filler cap.
6. Remove the 3 fuel tank filler pipe upper retaining screws.
   - To install, tighten to 3 (27 lb-in).
7. Remove the fuel tank filler pipe and fuel tank filler pipe vent hose assembly.
8. To install, reverse the removal procedure.

Fuel Conditioning Module

1. Release the fuel system pressure. For additional information, refer to Fuel System above.
2. Disconnect the rear fuel tubes. For additional information, refer to Fuel System above.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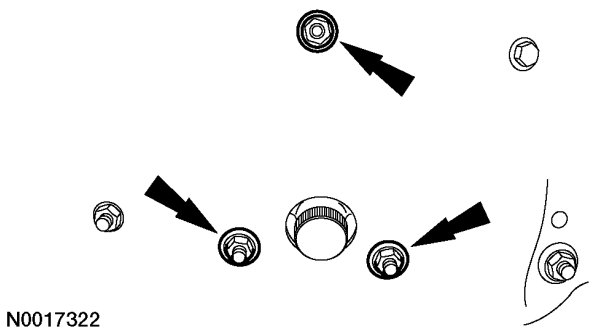
3. Disconnect the fuel conditioning fuel pump and fuel heater electrical connectors.
4. Remove the retaining nuts and position out the fuel conditioning module away from the frame rail to gain access to the fuel tubes and electrical connector.
   - To install, tighten to 15 Nm (11 lb-ft).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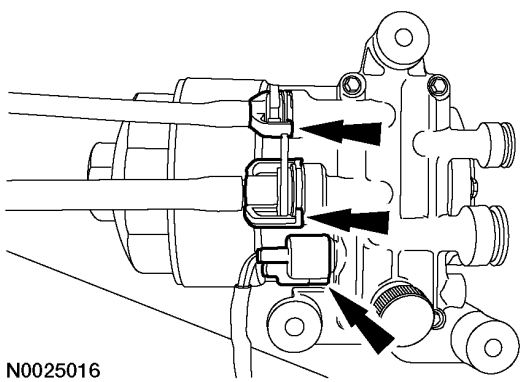
5. Disconnect the fuel tubes and water sensor electrical connector. For additional information, refer to Fuel System in the section above.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6. To install, reverse the removal procedure.

Fuel Level Sensor

All vehicles

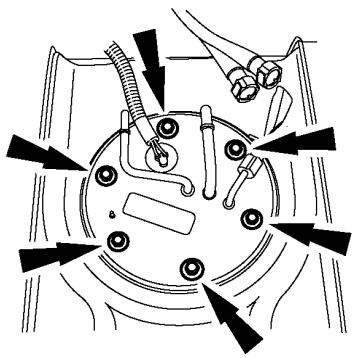
1. Remove the fuel tank. For additional information, refer to Fuel Tank — LH, Fuel Tank — RH, or Fuel Tank — Aft of Axle in this section.

Aft-of-Axle

2. Remove the screws and the fuel level sensor.

   • Remove and discard the fuel level sensor gasket.

   • To install, tighten to 10 Nm (89 lb-in).



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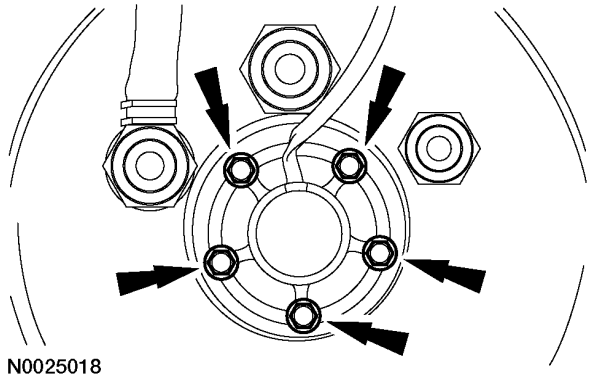
Frame mounted tank (LH and RH)

NOTE: LH shown, RH similar.

3. Remove the screws and the fuel level sensor.

   • Remove and discard the fuel level sensor gasket.

   • To install, tighten to 2 Nm (18 lb-in).



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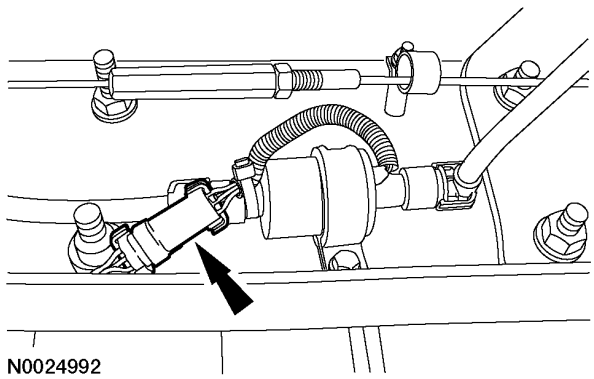
All Vehicles

4. To install, reverse the removal procedure.

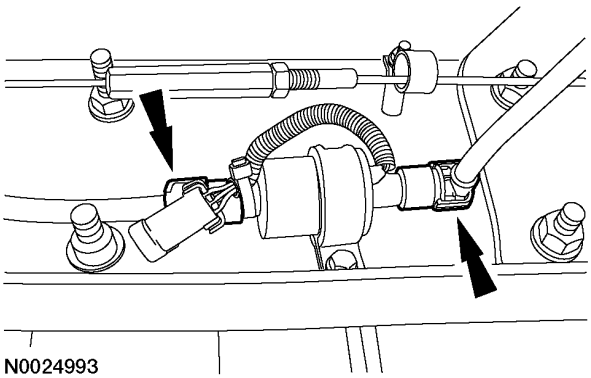
Fuel Transfer Pump

1. Disconnect the fuel transfer pump electrical connector.

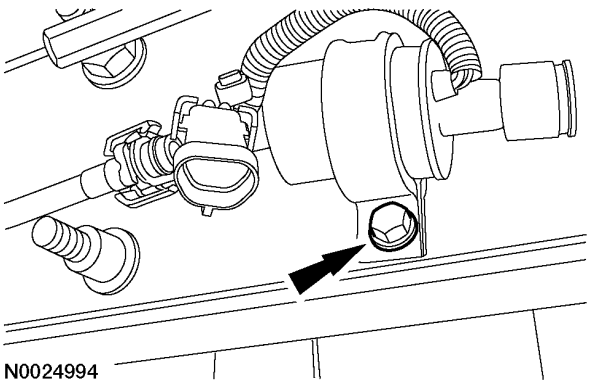


N0024992

2. Disconnect the fuel lines. For additional information, refer to Fuel System in the section above.


N0024993

3. Remove the bolt and the fuel transfer pump.
   - To install, tighten to 52 Nm (38 lb-ft).

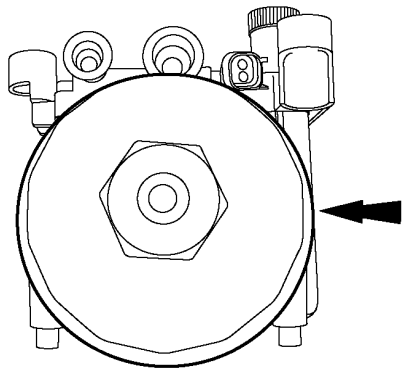

N0024994

4. To install, reverse the removal procedure.

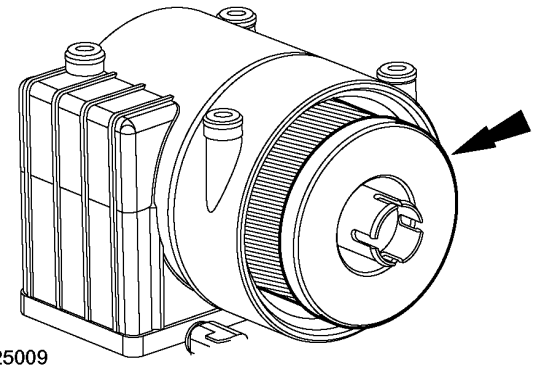
Disassembly and Assembly

Fuel Conditioning Module — Disassembly

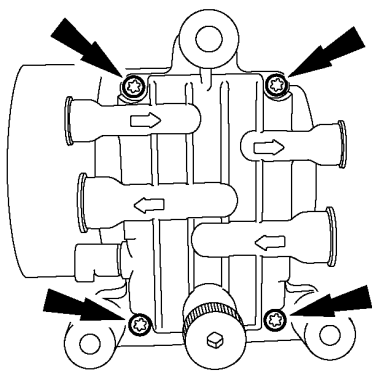
1. Remove the fuel filter cover and drain the fuel from the housing.
   - Remove and discard the O-ring seal.


N0025008

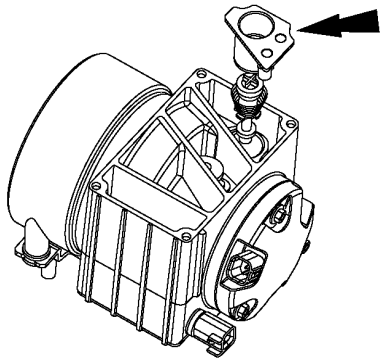
2. Remove the fuel filter and discard.


N0025009

3. Remove the screws and the fuel manifold cover.
   - Remove and discard the press-in-place gasket.

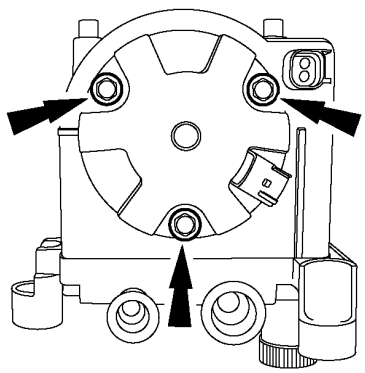

N0025010

4. Remove the return valve assembly.



A0090961

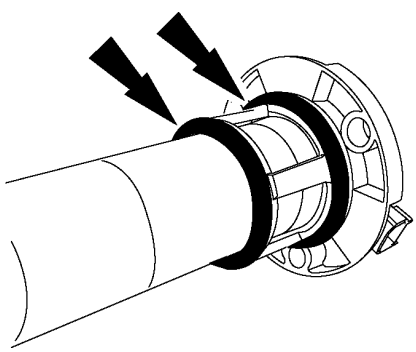
5. Remove the screws and the fuel pump.
   - Remove and discard the O-ring seals.



N0025011

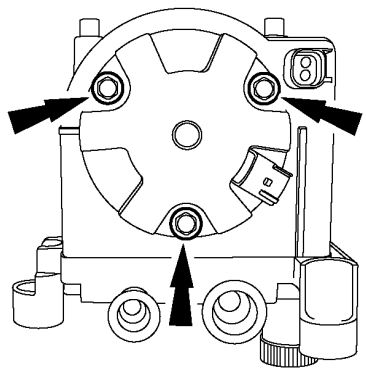
Fuel Conditioning Module — Assembly

1. Install new O-ring seals on the fuel pump and lubricate with clean engine oil.



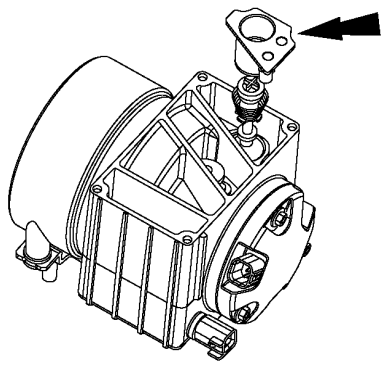
A0064994

2. Install the fuel pump and mounting bolts.
   - Tighten to 5 Nm (44 lb-in).



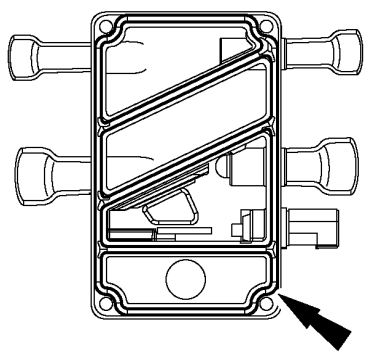
N0025011

3. Install the return valve assembly.



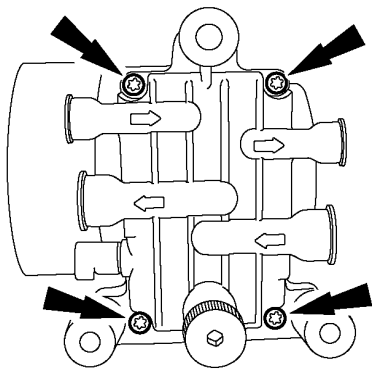
A0090961

4. Install a new press-in-place gasket in the fuel manifold cover.

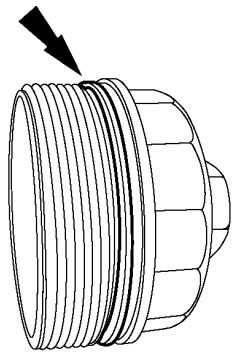


N0025012

5. Install the fuel manifold cover and bolts.
   - Tighten to 5 Nm (44 lb-in).

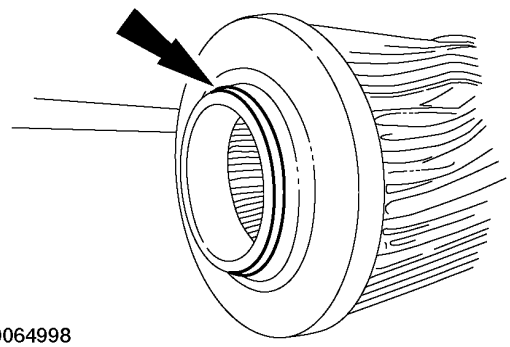


N0025010



N0025013

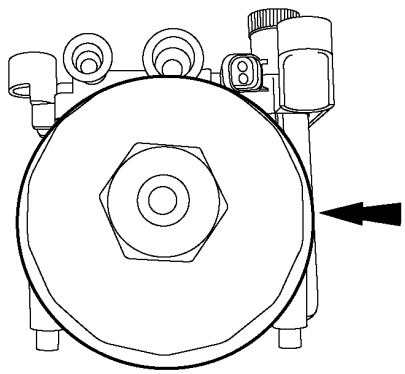
6. Lubricate the O-ring seal with clean engine oil and install the fuel filter.



A0064998

7. Install a new O-ring seal on the fuel filter cover and lubricate with clean engine oil.

8. Install the fuel filter cover.
   - Tighten to 25 Nm (18 lb-ft).



N0025008