

SERVICE MANUAL

SERVICE MANUAL SECTION

RADIATOR, REMOVE AND REPLACE

Model: 3200

Model: 4200

Model: 4300

Model: 4400

Model: 8500

S12008

02/11/2003

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DESCRIPTION

The new International Medium duty truck line has initiated a new high life cycle, low maintenance cooling system, with vehicle down time anticipation at an industry low. The design eliminates long periods of down time waiting for radiator cooling component repair.

CAUTION – Protect all open ports in the charge air system during removal and installation. Dirt or foreign particles in charge air cooling piping or cooling system components could cause internal damage to engine parts.

NOTE – The hood, grille and bumper assemblies must be removed prior to radiator removal. Refer to S09003, HOOD, FENDER AND GRILLE for removal.

1. RADIATOR AND COMPONENT REMOVAL

1.1. CROSS-MEMBER

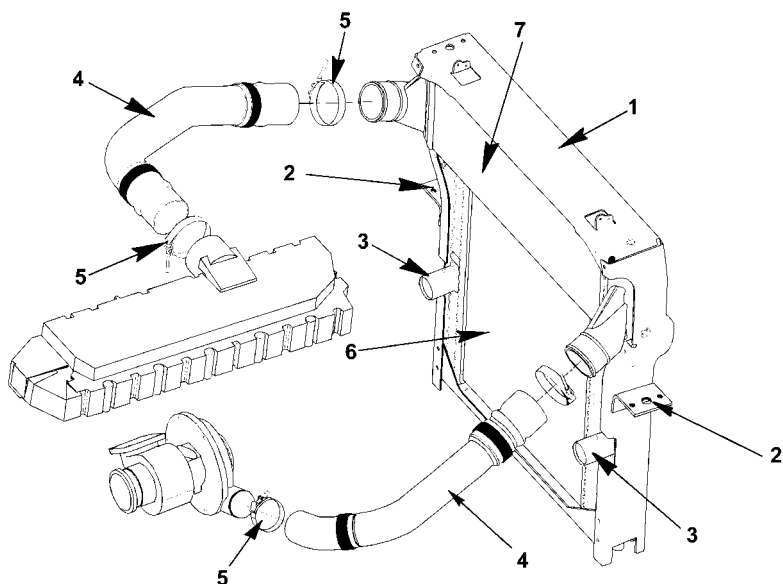


Figure 1 Radiator Assembly And Connections

1. RADIATOR TOP FRAME
2. RADIATOR MOUNTING BRACKETS
3. COOLING SYSTEM HOSE CONNECTIONS
4. CHARGE AIR COOLER PIPES
5. CHARGE AIR COOLER PIPE CLAMPS
6. RADIATOR CORE
7. CHARGE AIR COOLER

Prior to removal of cooling system components, the cooling system should be drained. Place a tray below radiator drain plug (petcock) and drain coolant. Save coolant for refilling system after replacing all components.

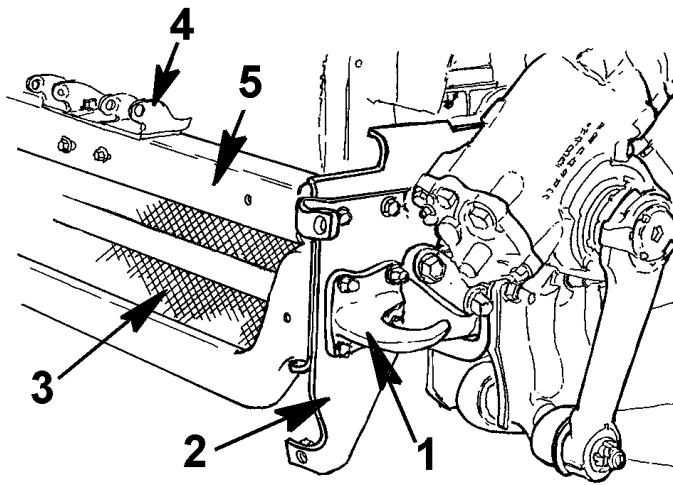


Figure 2 Front Cross-Member

1. TOW HOOK
2. BUMPER MOUNTING BRACKET
3. RADIATOR SCREEN PROTECTOR
4. HINGE MOUNTING ASSEMBLY
5. CROSS-MEMBER ASSEMBLY

The front cross-member must be removed to access radiator removal.

1. Beginning at the front cross-member lower flange, loosen and remove the bolts (Item 1, Figure 3) securing the mesh screen protecting the lower section of the radiator core (when applicable).

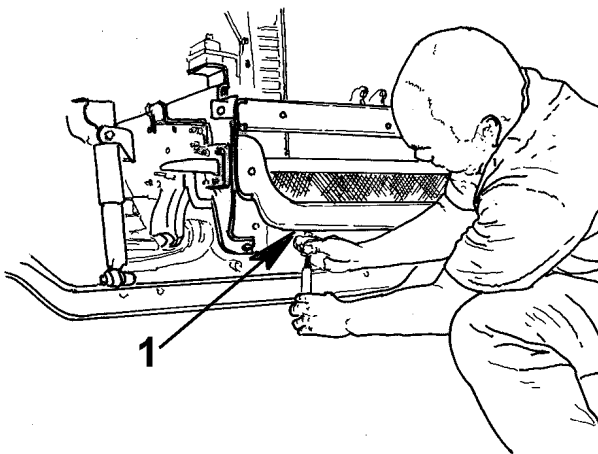


Figure 3 Lower Screen Removal (When Applicable)

1. LOWER SCREEN MOUNTING BOLTS
2. After removing screen assembly, locate the cross-member mounting bolts for the front tow hooks (Item 1, Figure 2). Loosen and remove bolts and tow hook (Item 2, Figure 4).
3. Remove bumper mounting bracket bolts located above the tow hook bolt holes. Remove the bumper mounting bracket (Item 2, Figure 2). Follow the same procedure to remove opposite side mounting bolts.

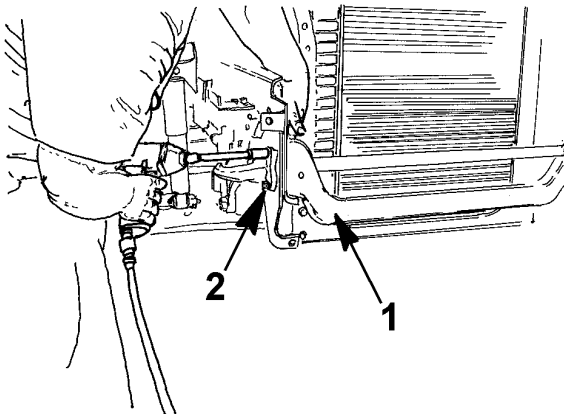


Figure 4 Front Cross-member Removal

1. FRONT CROSS-MEMBER
2. TOW HOOK MOUNTING BOLTS

4. Using a pry bar (Figure 5), loosen and remove the cross-member assembly.

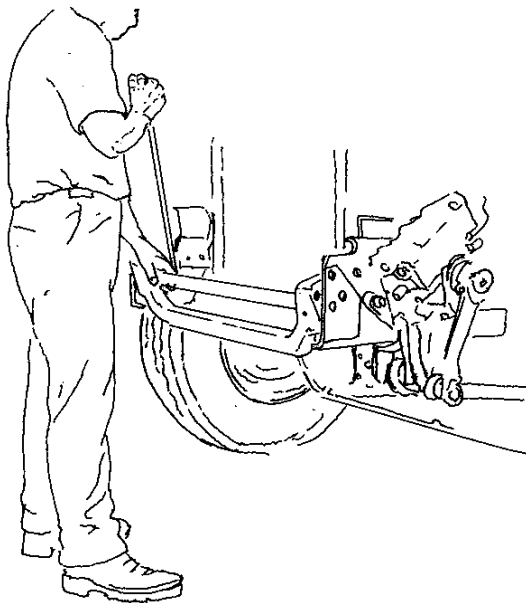


Figure 5 Remove Front Cross-member

1.2. SURGE TANK

The surge tank on the 3200 model, 4000 series, and 8500 model vehicle is located on the radiator frame driver side.

1. Check tank for coolant; drain if necessary.
2. Disconnect harness connection to sensor and remove hose clamp securing overflow tube from surge tank. Disconnect overflow tube (Item 1, Figure 6).

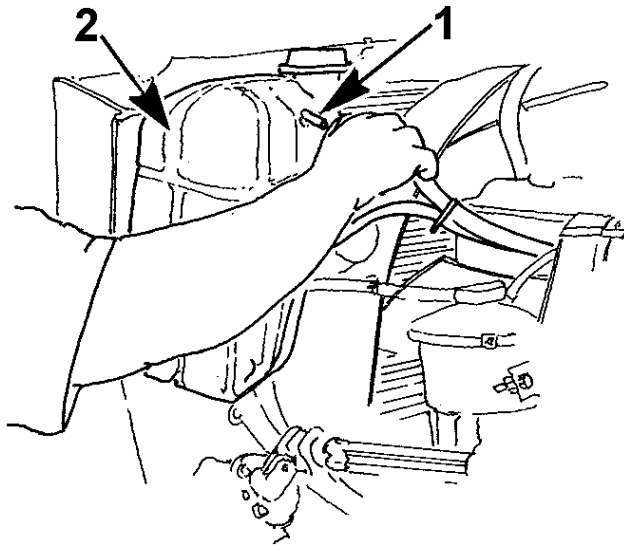


Figure 6 Overflow Tube Remove

1. OVERFLOW OUTLET
2. SURGE TANK

3. Loosen and remove lower surge tank mounting bolts from driver side radiator frame (Item 2, Figure 7).

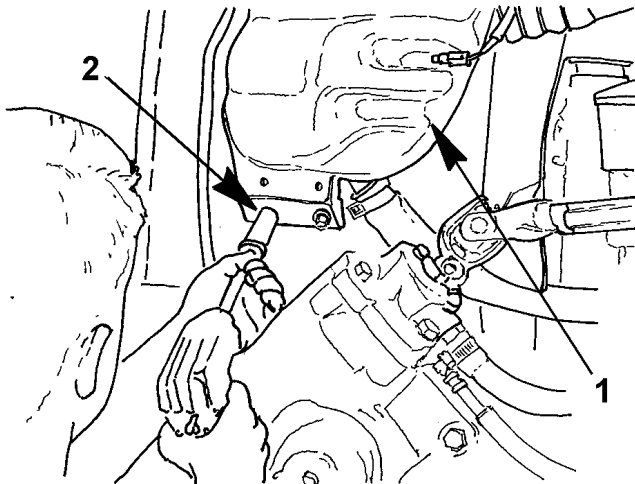


Figure 7 Surge Tank Lower Mounting Bolts

1. SURGE TANK
2. SURGE TANK LOWER MOUNTING BOLTS

4. Loosen and remove the upper surge tank mounting bolts from the radiator top frame (Item 1, Figure 8).

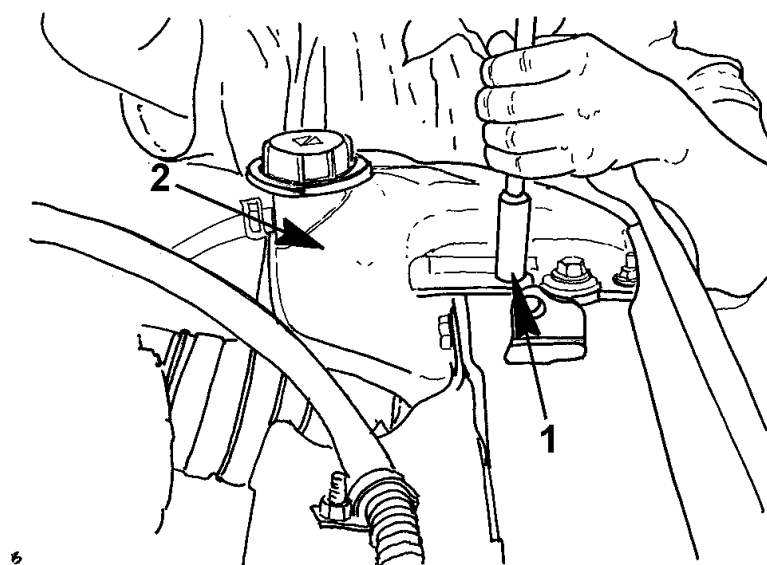


Figure 8 Surge Tank Upper Mounting Bolts

1. SURGE TANK TOP MOUNTING BOLTS
2. SURGE TANK

5. Remove surge tank.

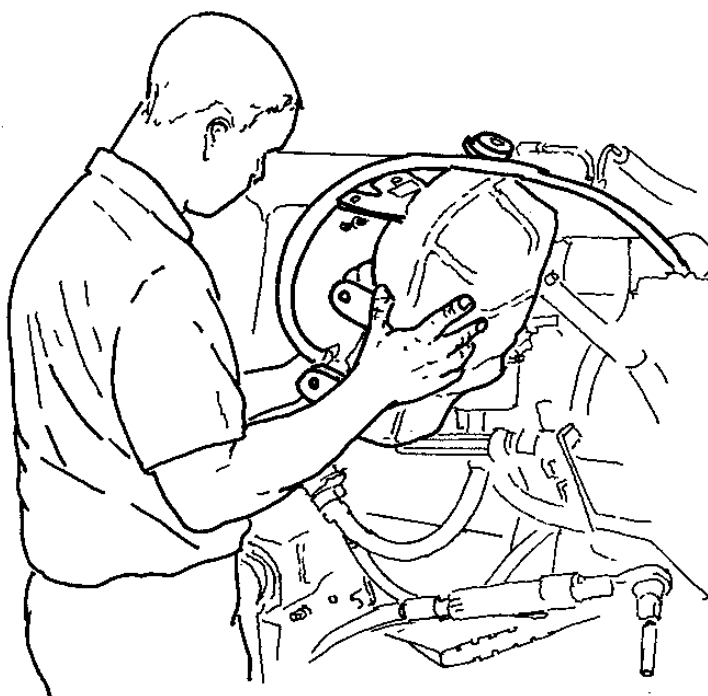


Figure 9 Surge Tank Removal

1.3. CHARGE AIR COOLER PIPES

Charge air cooler pipes and clamps (Items 4 and 5, Figure 1) are located on the upper radiator section.

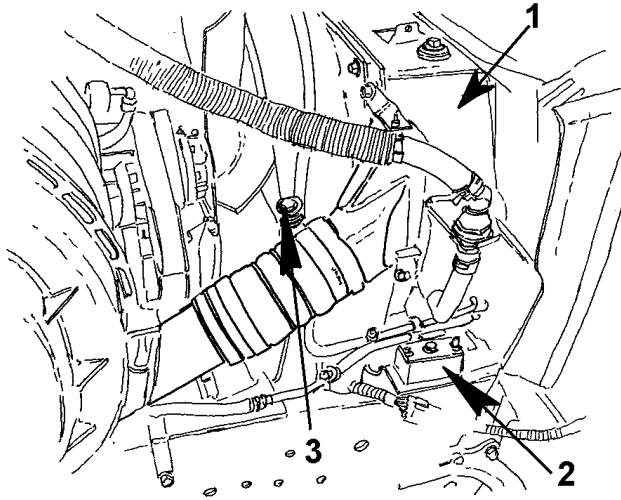


Figure 10 Charge Air Cooler Connections (Passenger Side Shown)

1. UPPER RADIATOR FRAME
2. RADIATOR MOUNTING BLOCK AND BRACKET
3. TENSION SPRING CLAMP

1. Prior to removing or disconnecting the charge air cooler pipes, locate the air conditioning condenser and condenser mounting brackets on the front side of the radiator assembly.
2. Loosen and remove the upper and lower condenser mounting bolts.
3. Remove and secure the condenser in a location where it will not be damaged or the condenser lines kinked.
4. Locate the tension spring clamp (Item 3, Figure 10), loosen, and remove clamp (Item 1, Figure 11).

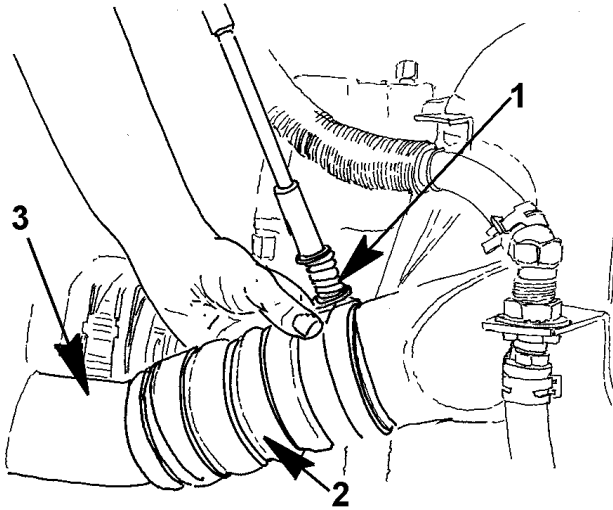


Figure 11 Charge Air Cooler Connection

1. TENSION SPRING CLAMP
2. CHARGE AIR COOLER CONNECTOR HOSE
3. CHARGE AIR COOLER PIPE

5. Remove charge air cooler connection hose from charge air cooler fitting connection.
6. Follow the same procedure for driver side charge air cooler (Figure 12) connection.

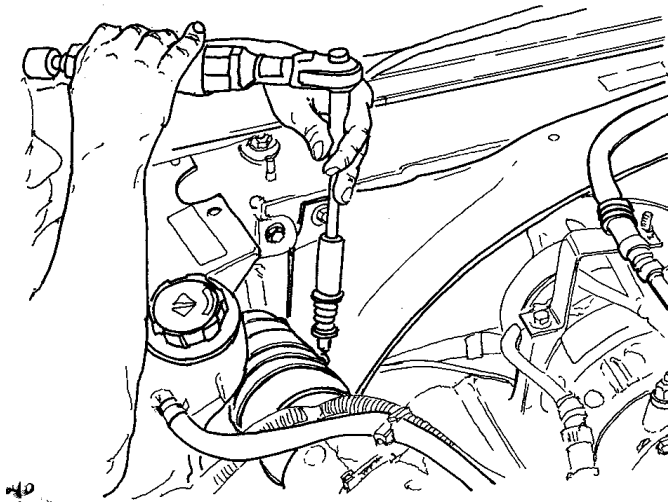


Figure 12 Driver Side Tension Spring Clamp Removal

1.4. COOLING SYSTEM RADIATOR HOSE

The International cooling system is fitted with heat shrink clamps on the radiator connections. A special type tool is required (Figure 13) for the removal of the Gates PowerGrip Shrink Band (SB) clamp. The recommended tool for this application is a heavy duty SB Clamp Removal Tool.



Figure 13 Heavy Duty SB Clamp Removal Tool

1. Beginning on the driver side of the radiator, locate the radiator hose and Gates SB clamp (Items 1 and 2, Figure 14).

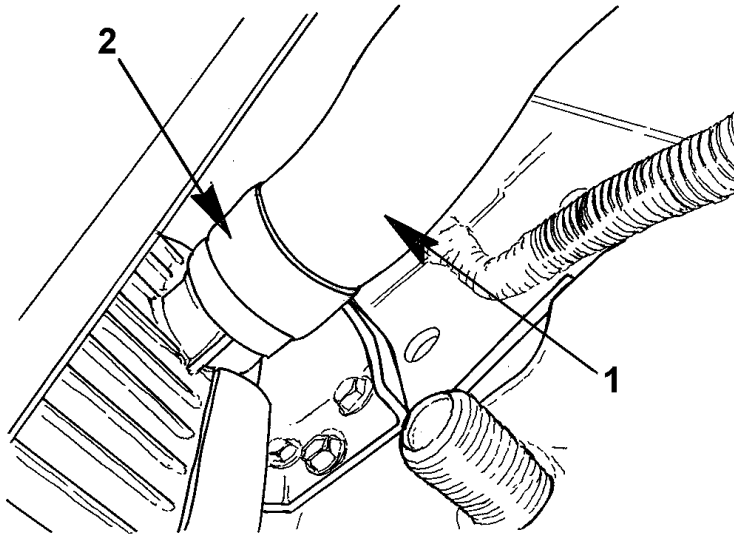


Figure 14 Lower Radiator Hose

1. RADIATOR HOSE
2. GATES SB CLAMP

2. Utilizing the SB clamp cutting tool, melt away clamp on the cooling system hose, driver side, closest to the radiator.
3. The entire hose connection does not have to be removed to remove radiator. If the existing hose is to be replaced, the SB tool must be used on the opposite end of hose with SB clamp (Item 1, Figure 15)

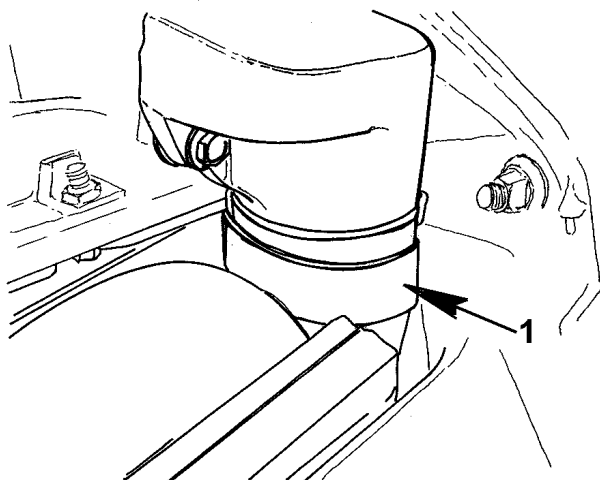


Figure 15 Driver Side Engine Hose Connection

1. GATES SB CLAMP

4. Locate lower passenger side radiator hose and heat shrink clamp, and melt away heat shrink clamp (Item 2, Figure 16).

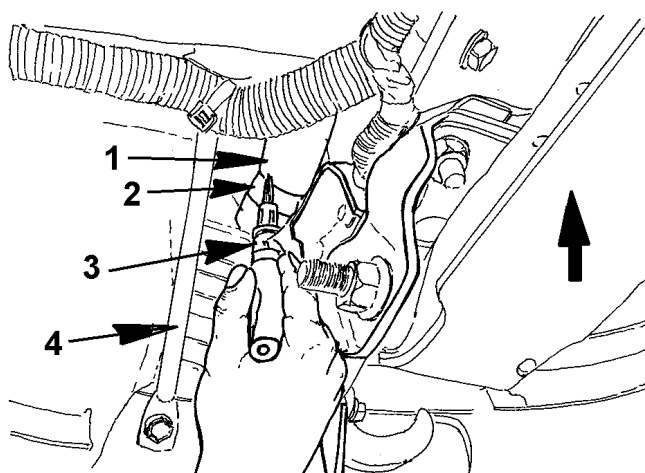


Figure 16 Passenger Side Lower Cooling System Hose And Clamp

1. RADIATOR HOSE
2. GATES SB CLAMP
3. SB CLAMP MELTING TOOL
4. RADIATOR STAY ROD

5. Find and remove rear radiator hose clamp with SB tool.

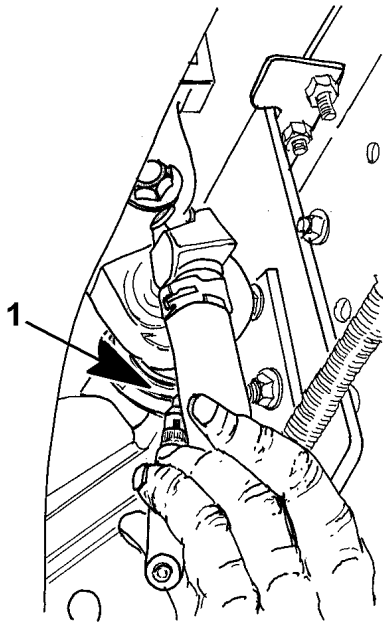


Figure 17 Passenger Side Rear Radiator Hose And Clamp Connection

1. GATES SB CLAMP

6. Locate and disconnect water heater hose from the mounting bracket on the passenger side of the radiator (if applicable). Heater hose return is routed to the engine after 07/22/2002 (refer to AFC G-02906).
7. Secure water heater radiator hose out of the way for access.

1.5. RADIATOR

Prior to removing the radiator, the assembly should be secured with lifting belts to prevent possible injury from radiator when loosening mounting bolts.

1. Locate the two radiator stay rods, and loosen the assembly from the radiator frame.
2. Locate the radiator mounting bracket and mounting bushing on the side frame of the radiator shell on the passenger side (Item 2, Figure 1).
3. Loosen and remove mounting bolts (Figure 18) from mounting bracket and bushing. Follow same procedure on driver side.

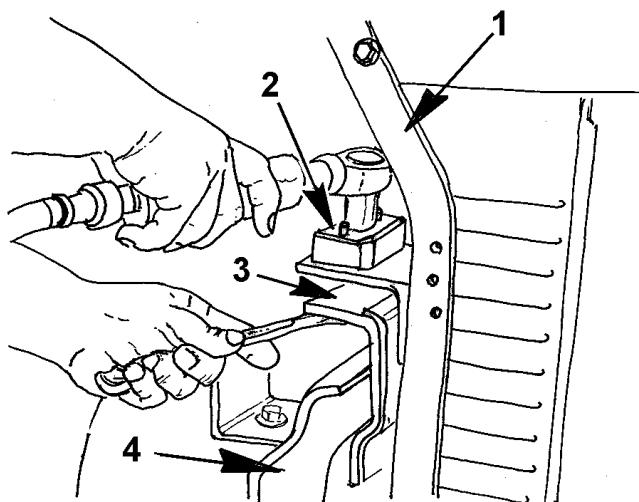


Figure 18 Radiator Mounting Bracket And Bushing (Passenger Side Shown)

1. RADIATOR FRAME
2. RADIATOR MOUNTING BUSHING
3. FRAME RAIL BRACKET
4. FRAME RAIL

4. Before lifting the radiator assembly, disconnect the stay rods, one from the radiator on the driver side, the other at the frame from the driver side.
5. Using a hoist (Item 1, Figure 19) and the sling already attached to the radiator assembly, lift the radiator from the chassis frame rail.

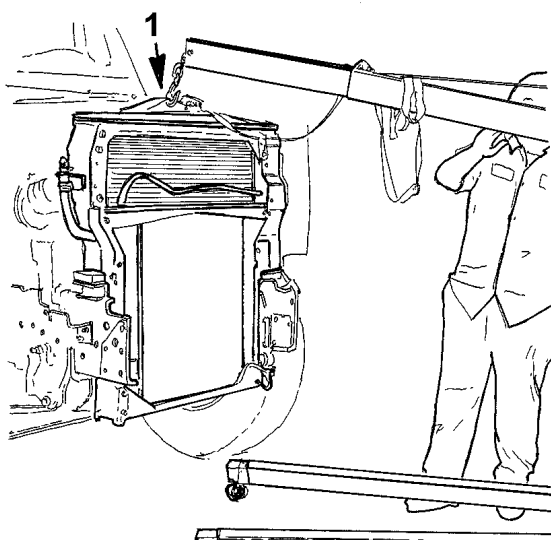


Figure 19 Lift Radiator From Chassis Rail

1. SLING ATTACHED TO HOIST FOR RADIATOR LIFTING

1.6. RADIATOR SHROUD AND FRAME

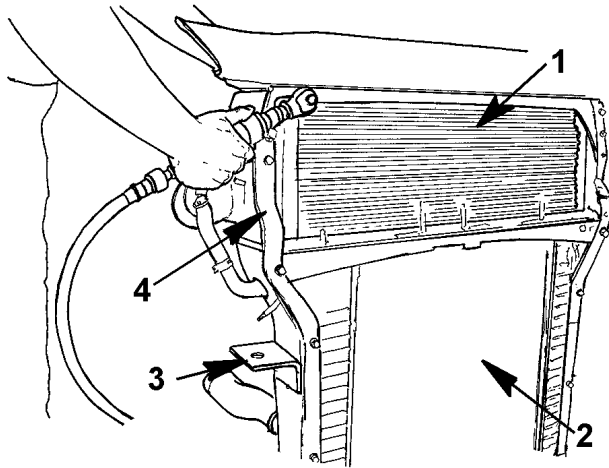


Figure 20 Radiator Frame Disassemble

1. CHARGE AIR COOLER
2. RADIATOR CORE
3. RADIATOR MOUNTING BRACKET
4. RADIATOR FRAME

After locating and securing the radiator assembly in a safely supported position on the floor or work bench area, remove fan shroud and frame (Figure 20).

1. Loosen and remove upper frame bolts.

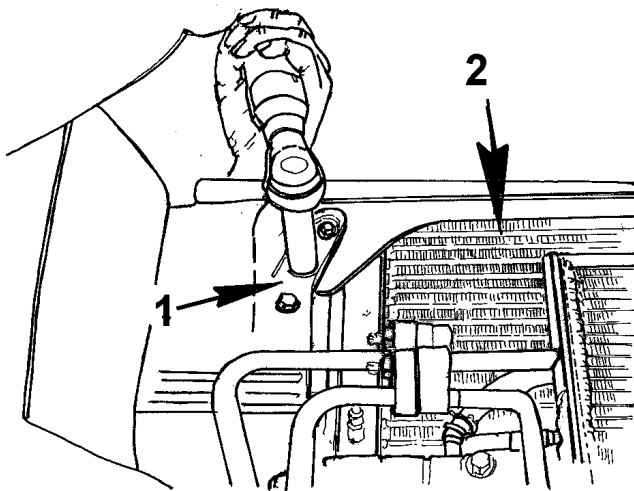


Figure 21 Radiator Upper Frame Remove

1. UPPER RADIATOR FRAME BOLTS
2. CHARGE AIR COOLER

2. Locate, loosen and remove the charge air cooler mounting bolts from under surface of radiator cross frame.

3. Loosen and remove the remainder of radiator frame bolts on each side of radiator. These bolts will also loosen the fan shroud assembly.

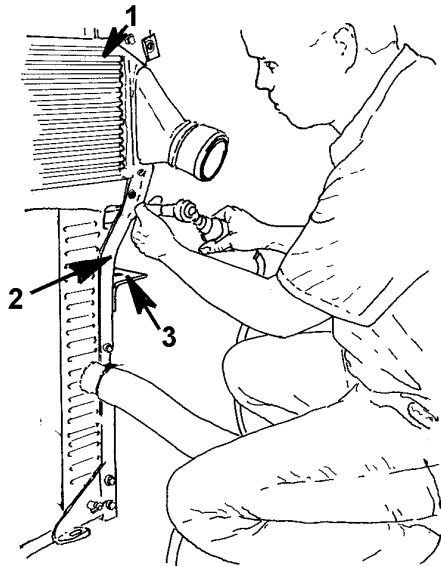


Figure 22 Frame Removal (Passenger Side Shown)

1. CHARGE AIR COOLER
2. RADIATOR FRAME
3. RADIATOR MOUNTING BRACKET

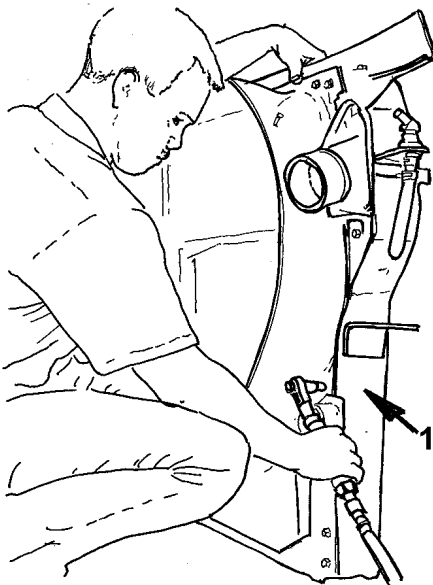


Figure 23 Radiator Fan Shroud Removal

1. RADIATOR SIDE FRAME

1.7. CHARGE AIR COOLER

1. After loosening and removing frame assembly bolts, support the charge air cooler core and spread the radiator frame apart, away from core.
2. Carefully lift and remove charge air cooler from radiator frame assembly.

1.8. RADIATOR CORE

1. Loosen and remove radiator lower frame assembly bolts.
2. Lift and remove radiator core.

Radiator core is a replaceable component only. If replacing the radiator core, use only authorized International parts and assemblies.

2. RADIATOR AND COMPONENT INSTALLATION

2.1. RADIATOR CORE

1. Place radiator lower in position to install radiator core.
2. Place one side of radiator frame assembly on lower frame and install lower bolts.
3. Install core assembly, position and align bolt holes for side frame and radiator core.
4. Install bolts and hand tighten.
5. Install intermediate cross frame over radiator core.
6. Locate and install charge air cooler in frame assembly.
7. Install mounting bolts in charge air cooler from under side of intermediate cross frame member.
8. Install opposite side frame, align and install fan shroud to side frames, and install and tighten bolts in side frame and radiator.
9. Install radiator top frame and fasten top frame to side frame sections.
10. With radiator supported, attach lifting sling to top or radiator lifting points.
11. Locate radiator on chassis frame radiator mounting blocks, locate and attach stay rods to support radiator on chassis rail.
12. Insert bolts in radiator mounting blocks and bracket, and tighten bolts.
13. Check the alignment of the radiator on frame rails. Loosen and remove lifting sling and hoist.

2.2. RADIATOR HOSE

Check radiator hoses prior to installation.

Place Gates SB clamps on each end of radiator hose to be reconnected. Use the following procedure to install Gates SB clamps.



Figure 24 Gates SB Clamp

1. Remove clamp from brace by squeezing band to collapse, then fold in half and remove it from cardboard.

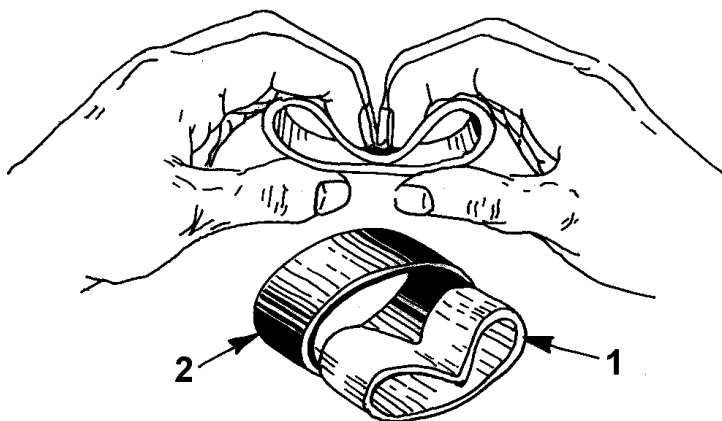


Figure 25 PowerGrip Shrink Clamp Preparation

1. CARDBOARD REINFORCEMENT
2. GATES SB CLAMP

2. Place clamps over each end of new hose.

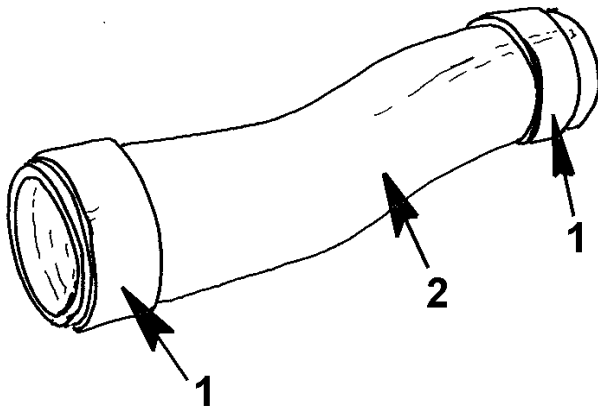


Figure 26 Radiator Hose And Shrink Clamps

- 1. GATES SB CLAMPS
- 2. RADIATOR HOSE

- 3. Position hose over fittings.
- 4. Slide clamp over top of fitting bead. (Gates SB clamps have a wider sealing surface than conventional clamps and can be positioned over a wide area including the bead without causing leaks.)

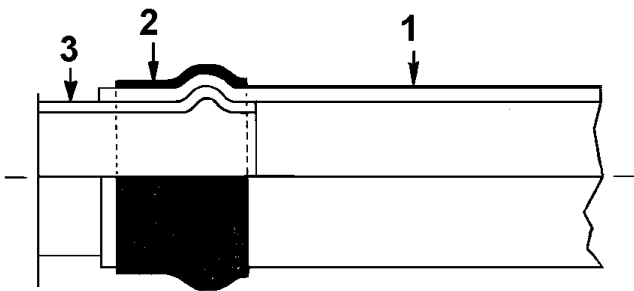


Figure 27 Cross Section Clamp And Hose

- 1. HOSE
- 2. CLAMP
- 3. STEM

IMPORTANT – Be sure to position so the print on the clamp is facing up (Figure 24) and in full view.

- 5. Apply heat as follows:
 - a. Use standard heat gun with setting on high.
 - b. Do not use open flame to apply heat.
 - c. Follow heat gun manufacturer's safety procedures.
 - d. Do not apply heat to one spot too long. Move gun continuously.

- e. Move heat gun continuously around as much of the clamps surface as possible- 1/3 of the surface minimum.

CAUTION – Although Gates SB clamps are very durable, too much heat can melt them.

- f. Continue until shrinking is complete (printed information on the clamp will turn gray when enough heat has been applied).
 - g. Remove the heat source.
6. Check connections to be sure a good seal was made by trying to turn the hose. Hose and clamp should not turn when using **reasonable** torque.
 7. Replace coolant after all other installations have been completed.
 8. When all other installations, surge tank and related components, including charge air cooler are installed, start engine and check for leaks. If leaks appear, apply more heat to the Gates SB clamps.

2.3. CHARGE AIR COOLER PIPES

Prior to installation of charge air cooler pipes, relocate the a/c condenser assembly from the secured position.

1. Place the condenser on the mounting bracket and align with the mounting hole.
2. Insert the upper and lower mounting bolts and tighten.
3. Secure the condenser lines with "P" clips as may be required.
4. Locate charge air cooler pipes, inspect pipes for dirt or particles. Remove any dirt or particles. Place charge air cooler clamps on pipe connections.
5. Tighten the spring tension clamps on each end of the charge air cooler piping to the appropriate port on the turbo charger and components.

2.4. SURGE TANK

Check the condition of surge tank for leaks or damage before installing.

1. Locate surge tank on radiator top frame and install upper mounting bolts.
2. Align lower mounting holes in surge tank with holes in radiator side frame.
3. Install bolts and tighten.
4. Re-attach the surge tank sensor plug in the surge tank receptacle.
5. Attach the surge over flow hose and clamp.
6. Tighten clamp.
7. Close the pet cock in lower radiator.

8. Replace coolant after all other installations have been completed.
9. When all other installations, surge tank and related components, including charge air cooler pipes and clamps are installed, start engine and check for leaks. If leaks appear, apply more heat to the clamps.

2.5. FRONT CROSS-MEMBER

Locate the front cross-member assembly, bumper mounting assembly, and tow hooks for installation prior to re-installing the front hood and grille assembly.

1. Place the front cross-member assembly between the frame rail at the front of the chassis.
2. Align the front bumper mounting bracket with the frame rail holes and front cross-member mounting holes. Install the top two bolts and hand tighten.
3. Align the tow hook assembly holes with the bumper mounting bracket, frame and cross-member assembly holes.
4. Install the tow hook bolts and tighten.
5. Tighten the bumper mounting bracket bolts.
6. Locate and install the lower radiator screen protector on the lower cross-member frame assembly.
7. Insert the mounting bolts and tighten.
8. Refer to S09003 — Hood, Fender and Grille Service manual for installation of the hood, fender and grille assemblies.