SERVICE MANUAL SECTION

RADIATOR, REMOVE AND REPLACE - MXT

Model: MXT

S12019

07/28/2006

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DESCRIPTION

The International® medium duty truck line uses a 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. Figures 1 and 2 show various Cooling Module components.

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.

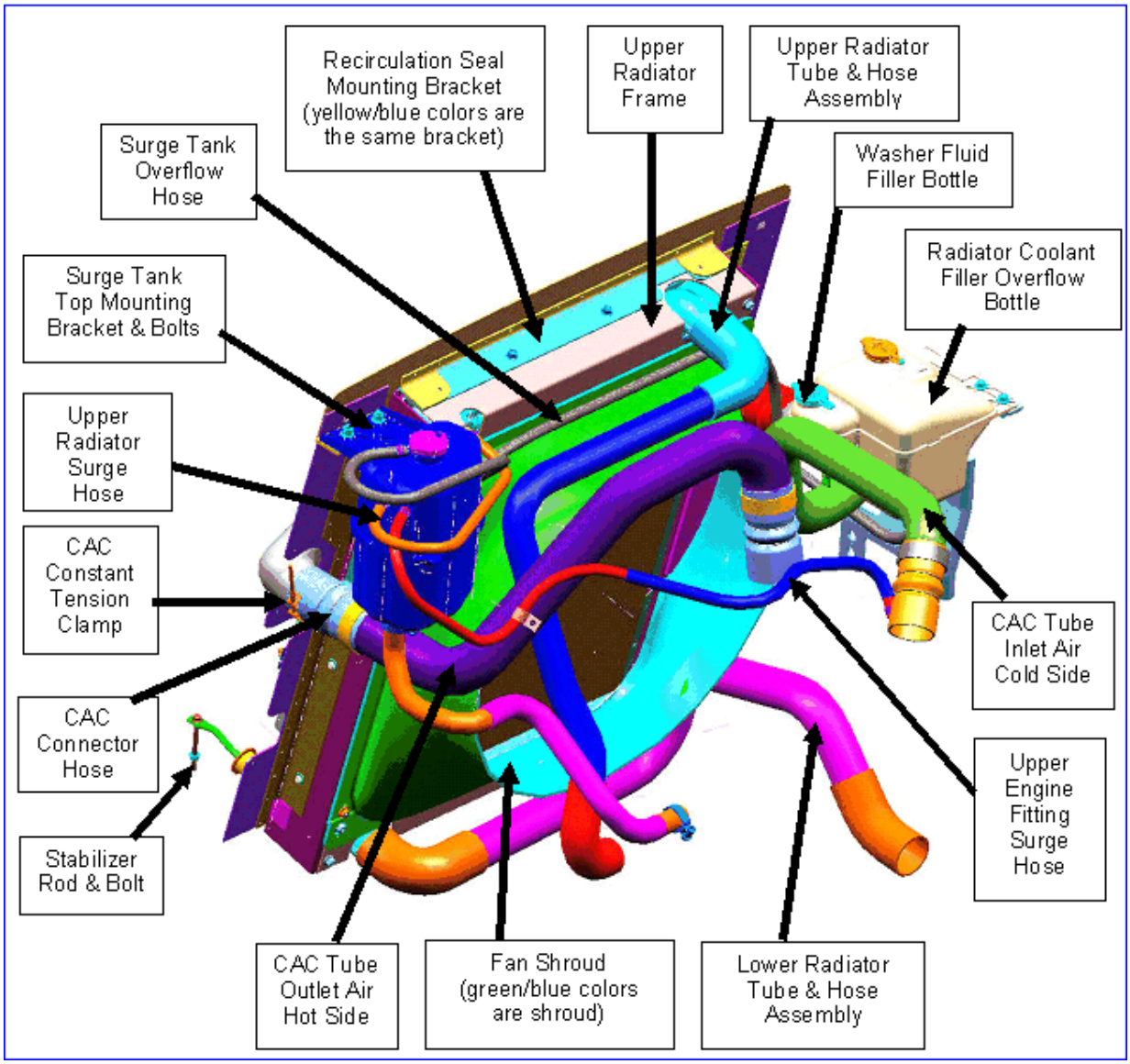

Figure 1 Radiator View from Top Driver Side

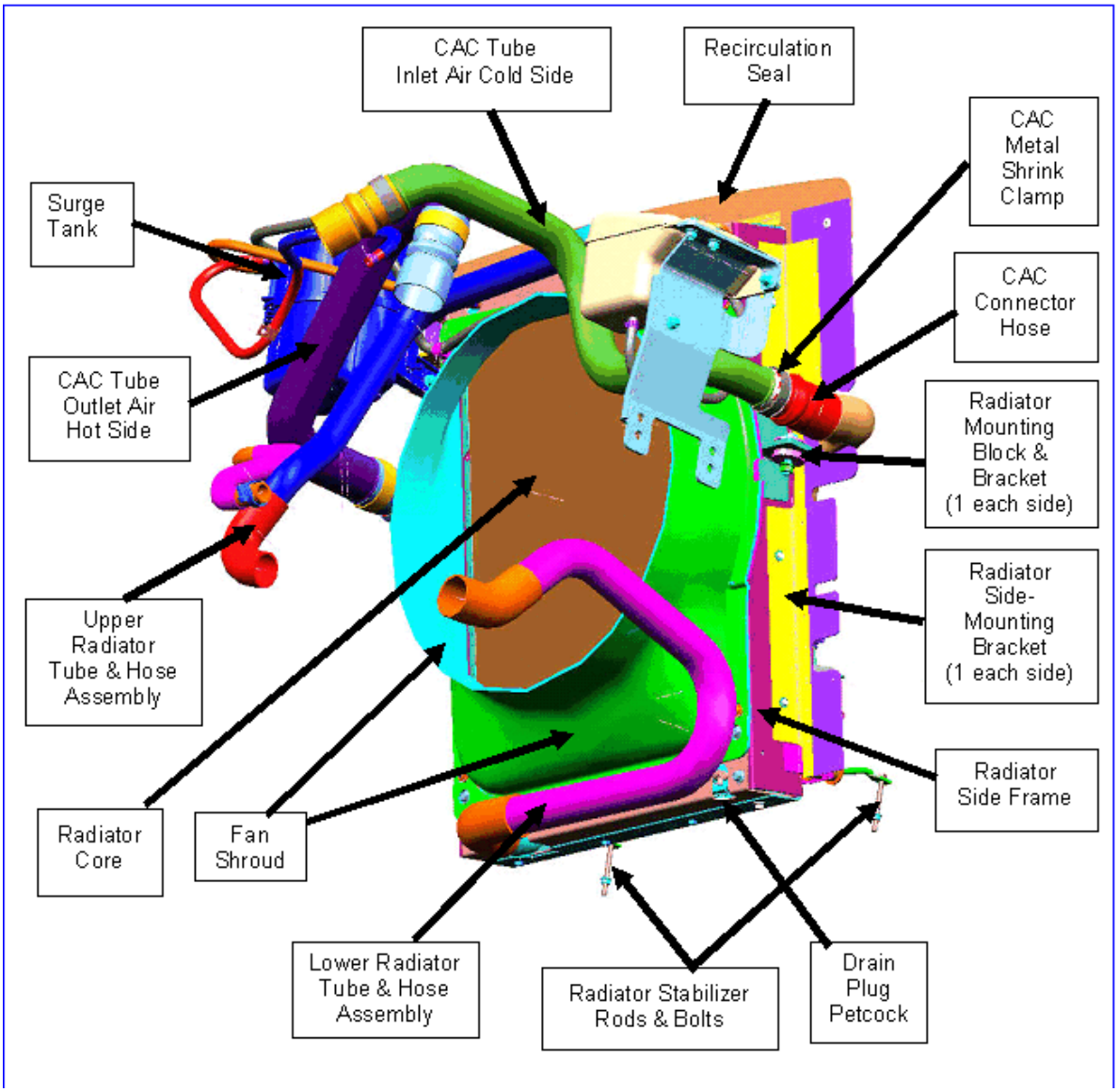

Figure 2 Radiator View from Lower Passenger Side

NOTE – The Radiator Assembly (from Modine) consists of the Radiator Core, AC Condenser, Charge Air Cooler, Radiator Frame and Recirculation Seal, Fan Shroud, Radiator Side-Mounting Brackets, and Radiator Mounting Blocks and Brackets.

NOTE – Please refer to the Torque Tables in this manual for specific torque requirements.

1. COMPONENT AND RADIATOR REMOVAL

Prior to removal of cooling system components, the cooling system should be drained. Place a tray below radiator Drain Plug Petcock (Figure 2) and drain coolant (approximately 8.5 gallons). Save coolant for refilling system after replacing all components.

1. Begin by opening the Hood and locating the two Hood Tension Rods along the top of the Hood Mounting Bracket. (See example in Figure 3.)

2. Remove the Tension Rods by removing the pin from each bracket (Figure 4) located on both the Left and Right Chassis Frame.

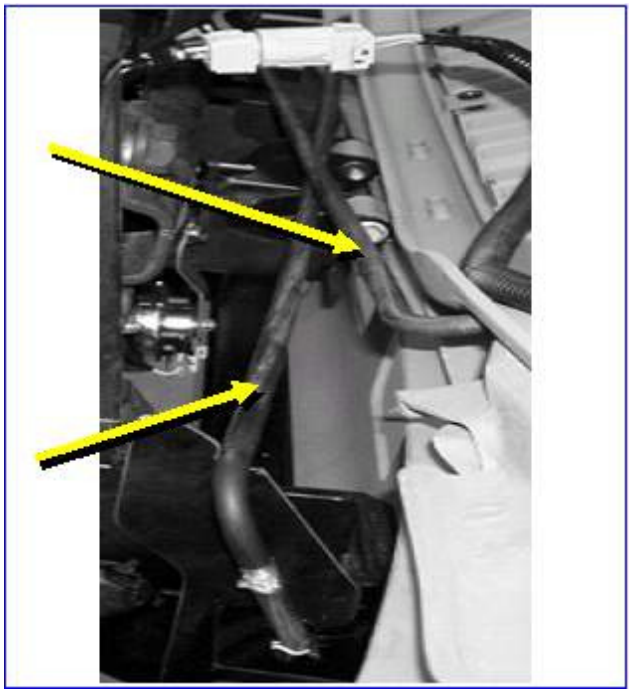

Figure 3 Example of Hood Tension Rods

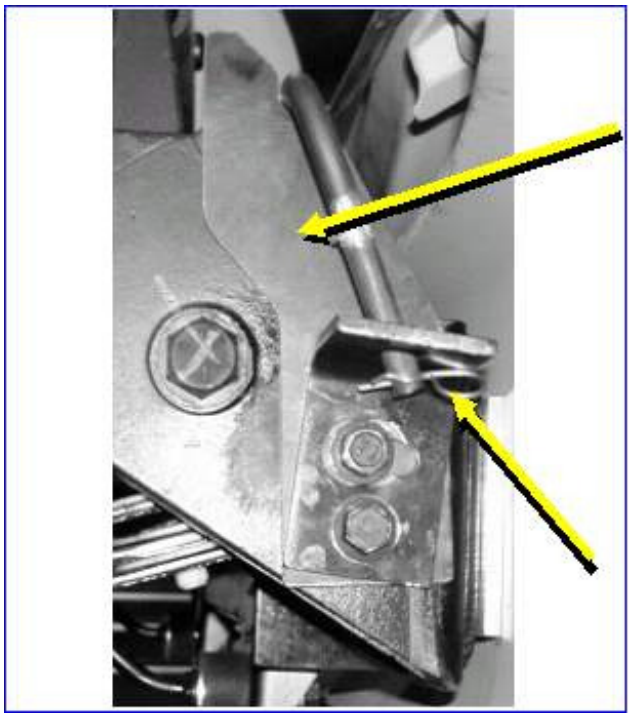

Figure 4 Example of Tension Rod Bracket and Pin

3. Locate the Hood Stabilizer Wires at the Top Front Radiator Frame (Figure 5). Disconnect the stabilizer wires and remove the Hood per instructions in the Hood, Grille, Bumpers and Fender Extensions Service Manual, S09013.

NOTE – Fender extensions and front bumper do NOT need to be removed. However, the hood must be removed once the stabilizer wires are disconnected, or the hood will fall forward with no support.

4. Disconnect the wiring to the two horns mounted on the front crossmember (Figure 6).

5. Disconnect wire harness at the “snap” connection attached to driver side front crossmember (Figure 6). Disconnect wire harness attached to passenger side front crossmember if applicable.

6. Disconnect the 2 radiator stabilizer rod bolts at the front crossmember side and at the radiator side.

Figure 5 Hood Stabilizers Connected to the Radiator Frame

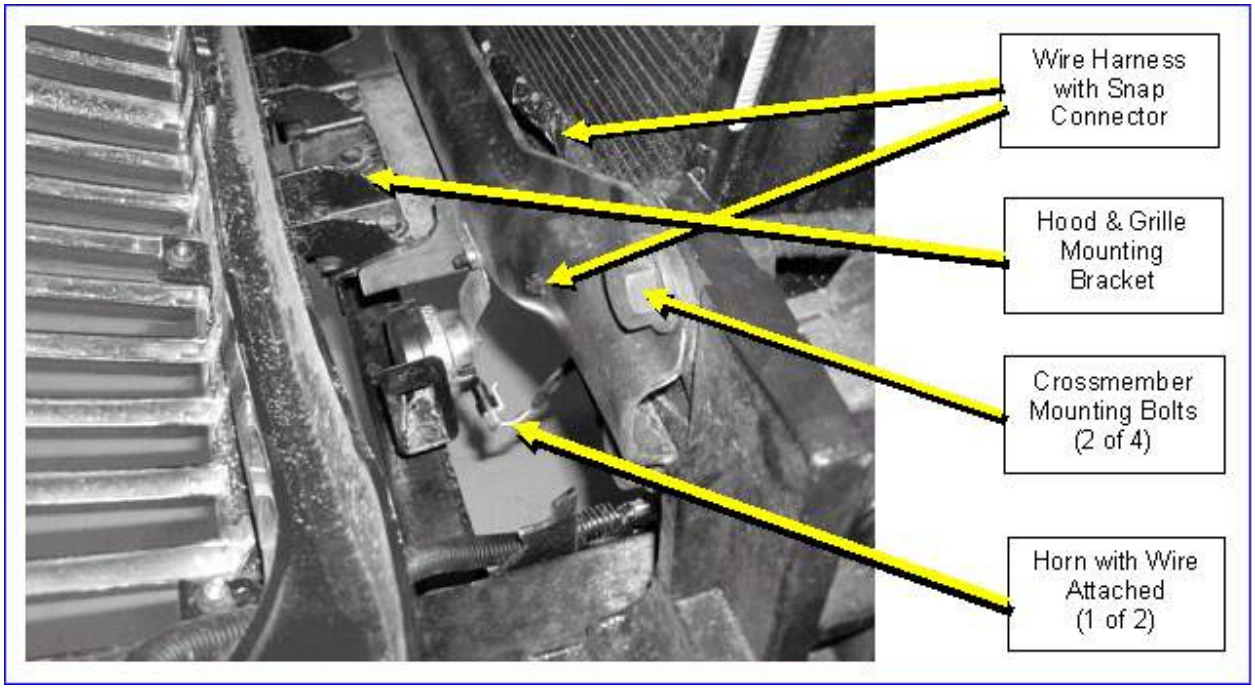

Figure 6 View of Driver Side Front Crossmember with Horn, Wire Harness and Connecting "Snap", and Hood and Grille Assembly Bracket. NOTE: Hood is in "Open" position in this photo (not removed yet)

7. Locate and remove the front crossmember by loosening and removing the 4 bolts holding it to the chassis frame. The front crossmember with its four mounting bolts is shown in Figure 7. (Notice the hood stabilizer wires and hood and grille assembly are removed, as are the horns and wire harness from Figure 6.)

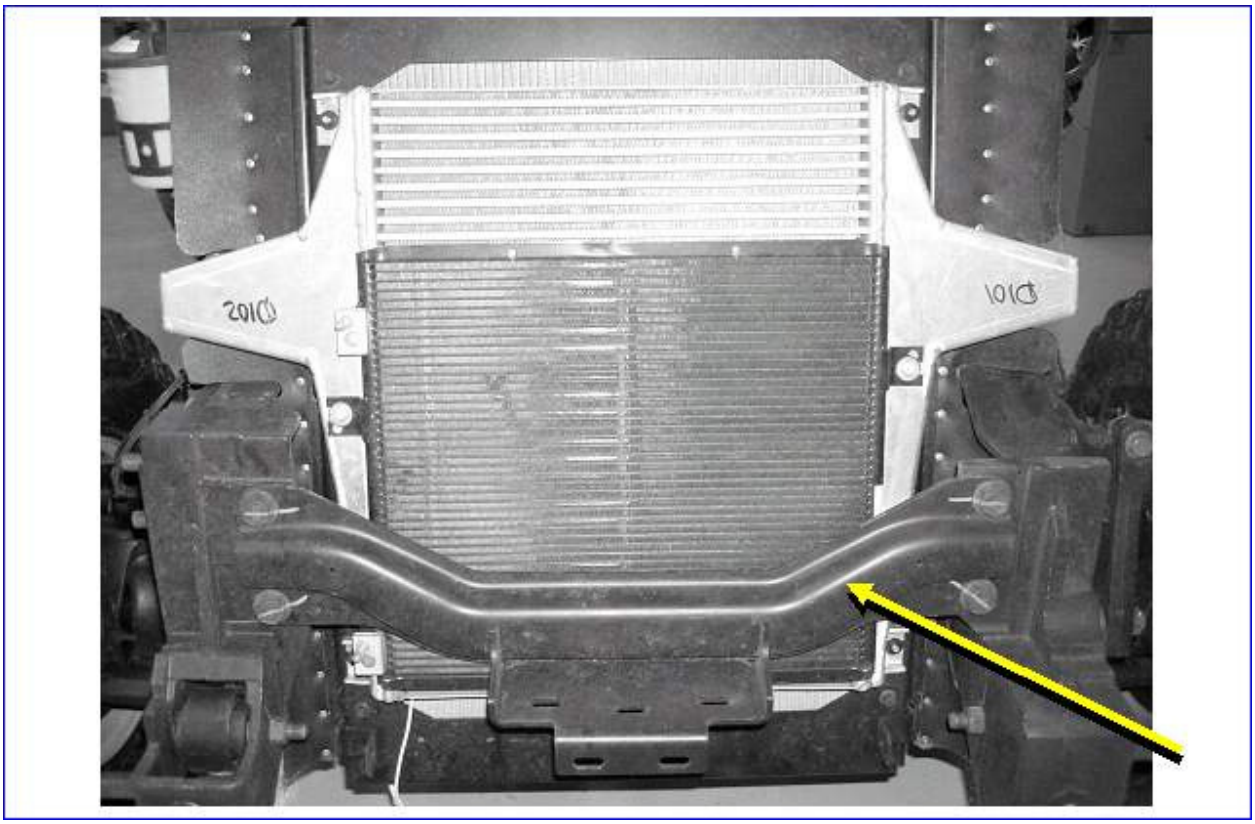

Figure 7 Front Crossmember

1.1. SURGE TANK

The surge tank on the MXT model vehicles is located on the driver's side radiator frame.

1. Check tank for coolant; drain if necessary by disconnecting the bottom hose to the thermostat housing (Figure 8).

Figure 8 Surge Tank Mounted to Bracket with All Hoses Attached

2. Loosen the compression clamp securing the upper radiator surge hose at the radiator and disconnect the hose (Figure 9).

3. Loosen the compression clamp securing the overflow surge hose at the overflow bottle and disconnect the hose (Figure 9).

4. Loosen the compression clamp securing the surge hose to the upper engine fitting and disconnect, if necessary.

NOTE – The upper engine fitting surge hose does not need to be disconnected. The hoses do not need to be disconnected at the surge tank because, once drained with the bolts removed, the tank can be "moved over", NOT "removed." The surge tank can rest, out of the way, on top of the engine.

5. Loosen and remove all four surge tank mounting bolts from surge tank mounting bracket (Figure 10).

6. Move or remove the surge tank (Figure 11). (See NOTE above with Step 4.)

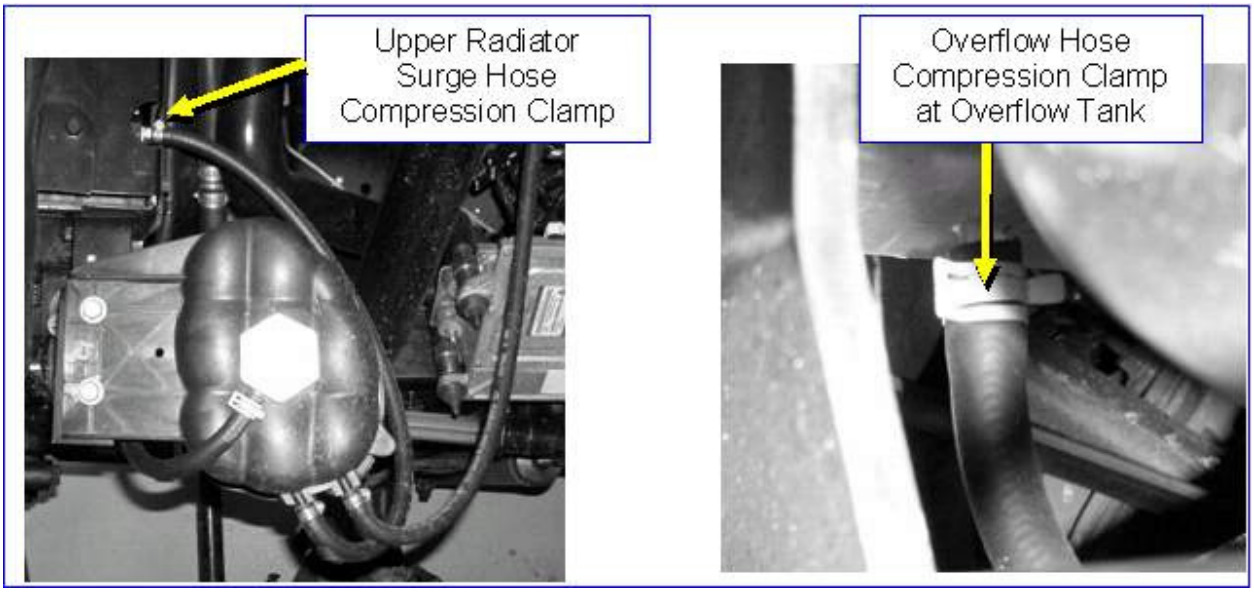

Figure 9 “Far-End” Surge Hose Connections

Figure 10 Surge Tank Mounting Bracket and Four Bolts

Figure 11 Surge Tank Move/Removal

1.2. CHARGE AIR COOLER PIPES

Charge Air Cooler (CAC) pipes, tubes, hoses and clamps (Figures 12 and 13) are located on the upper radiator section.

Figure 12 Up-Close View of Driver Side CAC Constant Tension Spring Clamps

Figure 13 Up-Close View of Passenger Side CAC Constant Tension Spring Clamps

NOTE – The clamps on the "tube end" of the connecting hose will be Heat Shrink Clamps from production (Figure 14), but will look like those in Figures 12 and 13, with Constant Tension Spring Clamps, after service replacement.

Figure 14 CAC Production Pipe Showing the "Tube End" Heat Shrink Clamps at the Connecting Hoses

Production International® cooling systems are fitted with Gates PowerGrip SB Heat Shrink Clamps on the tube end connections. A special type tool is required (Figure 15) for the removal of the Gates PowerGrip SB Heat Shrink Clamp. The recommended tool for this application is a heavy duty clamp cutting tool; model number ZTSE4479, available through International Truck and Engine Corporation.

Constant Tension Spring Clamps will replace the Heat Shrink Clamps on the CAC Tube Ends once a CAC Tube is serviced (Figures 12 and 13).

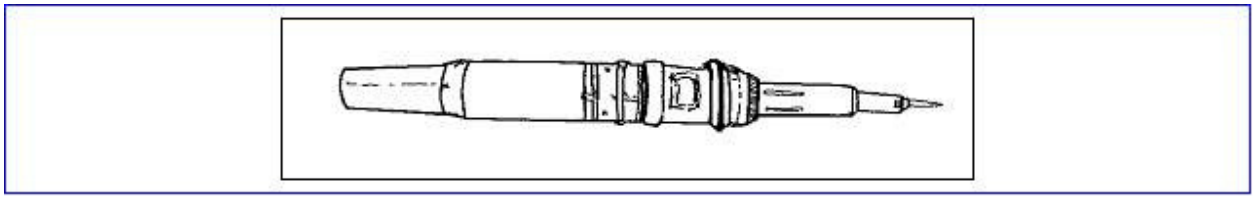

Figure 15 SB Clamp Cutting Tool (ZTSE4479)

1. Prior to disconnecting or removing the CAC connecting hoses or tubes, locate the air conditioning condenser and AC condenser line mounting brackets on the front side of the radiator assembly (upper and lower).

2. Loosen and remove the upper and lower AC condenser line mounting nuts.

3. Remove and secure the AC condenser in a location where it will not be damaged or the AC condenser lines kinked.

4. Locate, loosen, then remove the Constant Tension Spring Clamp from the CAC pipe fitting connection side (Item 1, Figure 16).

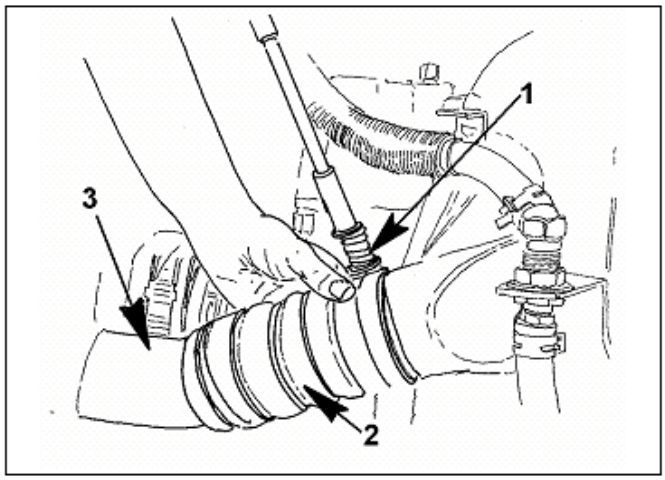

Figure 16 Charge Air Cooler Connection

1. CONSTANT TENSION CLAMP
2. CHARGE AIR COOLER CONNECTOR HOSE
3. CHARGE AIR COOLER (CAC) TUBE

5. Remove CAC connection hose from CAC pipe fitting connection.

6. Follow the same procedure for driver side CAC (see Figure 12) connection.

1.3. COOLING SYSTEM RADIATOR HOSE

Worm-Style Clamps are used at both the radiator lower and upper connections, and can be removed with a flat-head screwdriver (Figures 17 and 18).

Figure 17 Lower Radiator Hose with Both Worm-Style Clamps Showing

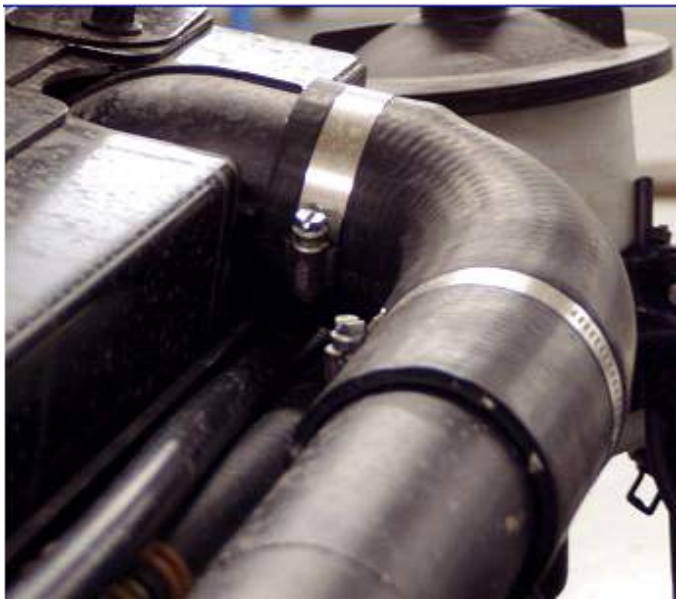

Figure 18 Upper Radiator Hose with Both Worm-Style Clamps Showing

1. Beginning with the lower radiator hose, locate the worm-style clamp (Figure 17).

2. Utilizing a standard flat-head screwdriver, remove the cooling system hose clamp, closest to the radiator.

3. At the upper radiator hose, locate the worm-style clamp closest to the radiator (Figure 18) and remove this hose clamp as in Step 2.

4. For both the lower and the upper radiator hoses: the entire hose/tube assembly connection does not have to be removed to remove the radiator. If the existing hose is to be replaced, remove worm-style clamps and replace hose.

5. Locate lower radiator tube at the engine end with worm-style clamp (Figure 19). Remove clamps if necessary to remove entire radiator hose and tube assembly.

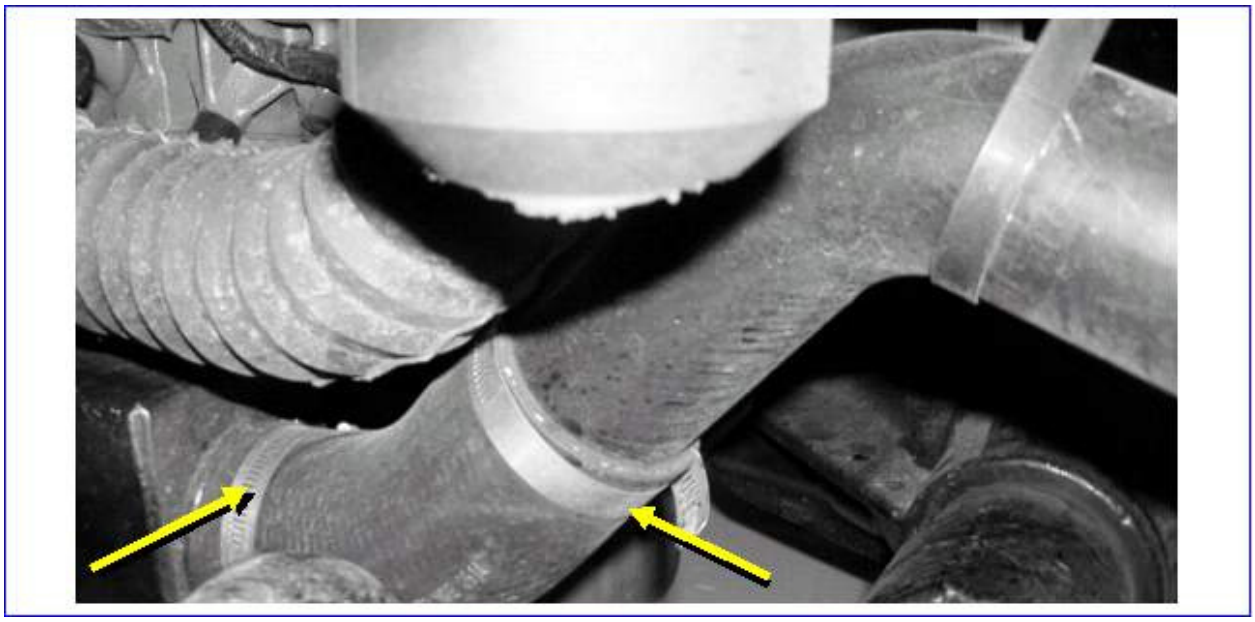

Figure 19 Lower Radiator Tube at Opposite Side of Radiator End with Both Worm Style Clamps and Tube Support Showing

1.4. RADIATOR

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

These lifting belts will be used to help guide and lift the radiator assembly from the vehicle.

1. Locate the two radiator stabilizer rods (Figure 2), and remove stay rods from the bumper structure assembly.

2. Locate the radiator mounting bracket and mounting bushing on each side frame of the radiator shell, directly below and behind the CAC connecting pipe (Figure 20, Driver's side view).

NOTE – The CAC connecting hose and clamp will have already been removed as shown in Figure 21.

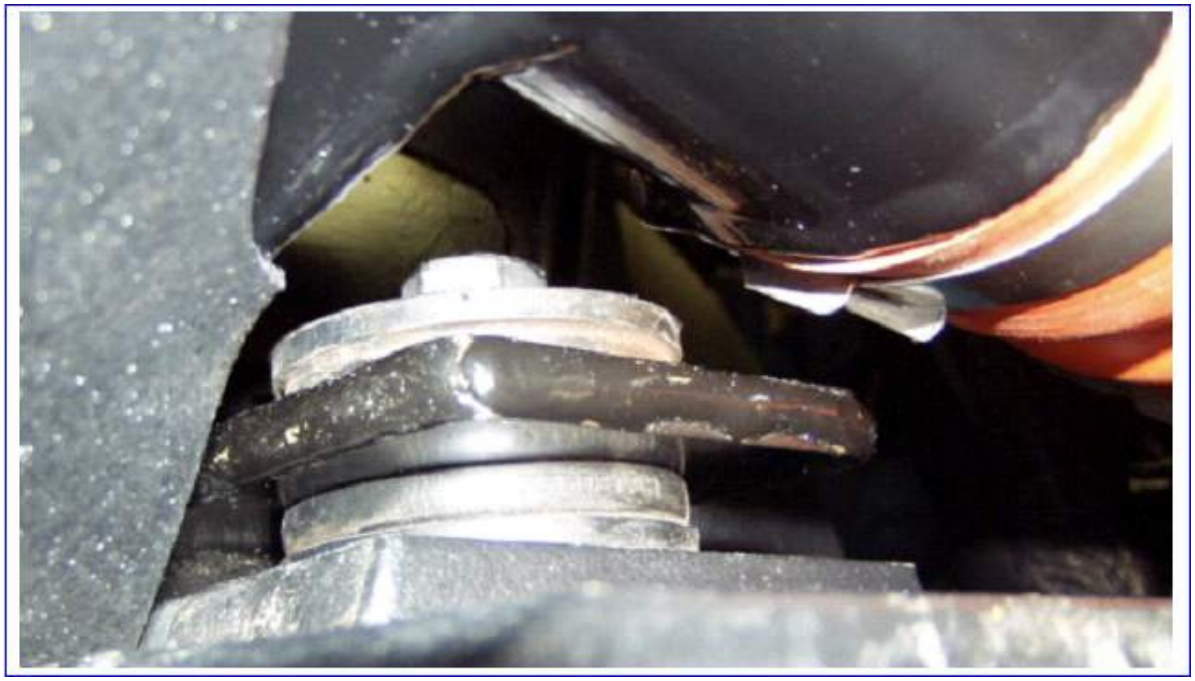

Figure 20 Radiator Mounting Bracket and Bushing (Driver's Side Shown)

3. Loosen and remove mounting bolts (Figure 21) from mounting bracket and bushing. Follow same procedure on passenger side.

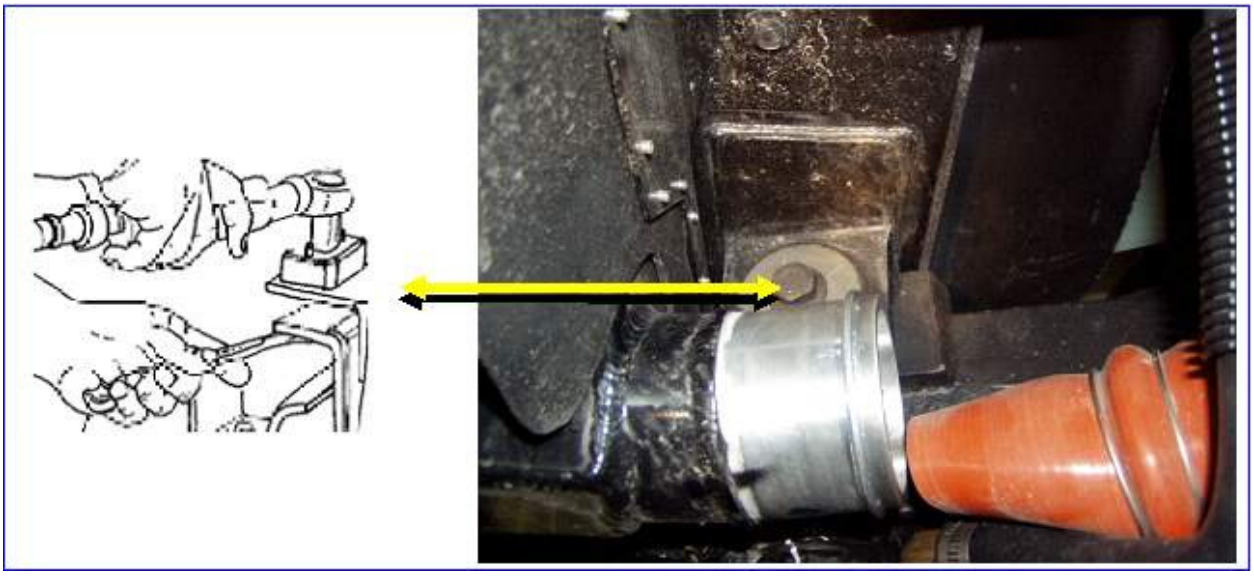

Figure 21 Radiator Mounting Bracket and Bushing Removal Top View (Driver's Side Shown)

4. Using a hoist (Figure 22) and the lifting belts and sling already attached to the radiator assembly, lift the radiator from the chassis frame rail - by coming forward toward the front bumper to clear the fan, and then up, to clear the front bumper.

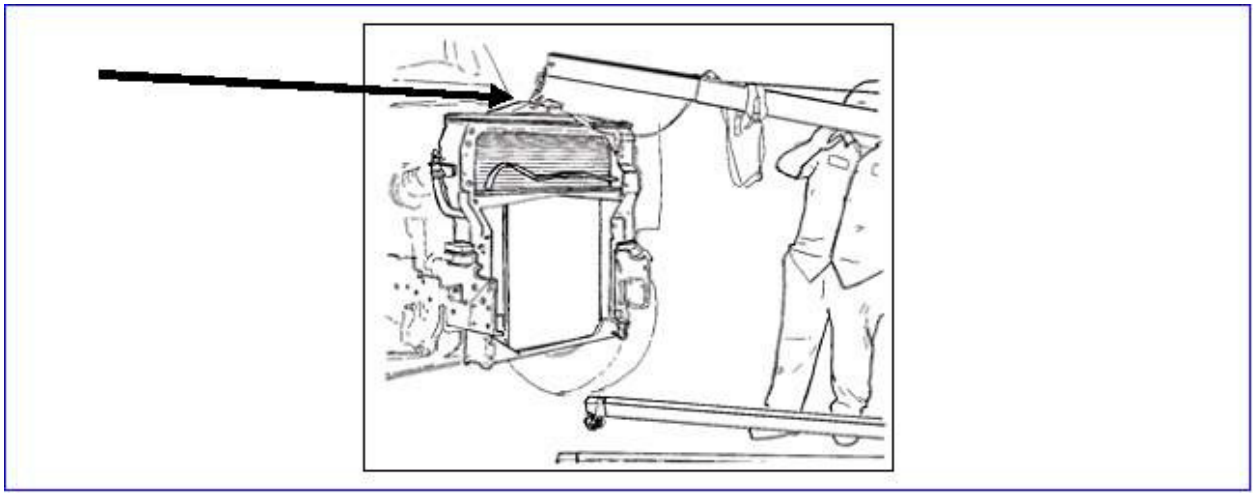

Figure 22 Sling Attached to Hoist to Lift Radiator from Chassis Rail

1.5. RADIATOR SHROUD AND FRAME

After locating and securing the radiator assembly in a safely supported position on the floor or work bench area, remove frame and fan shroud (Figures 23 through 26).

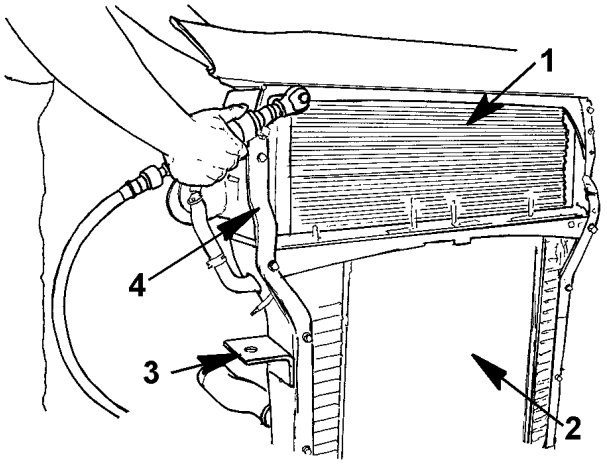

Figure 23 Example Radiator Frame Disassemble

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

1. Loosen and remove upper frame bolts.

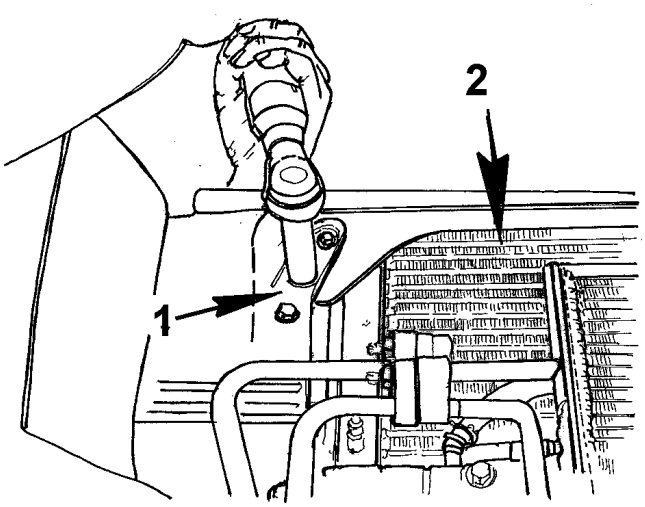

Figure 24 Example Radiator Upper Frame Removal (View Lying Flat)

1. UPPER RADIATOR FRAME BOLTS
2. CHARGE AIR COOLER

2. Locate, loosen and remove the charge air cooler mounting bolts from under the surface of the radiator cross frame (Figure 25).

3. Loosen and remove the remainder of radiator frame bolts on each side of radiator.

4. Loosen and remove the bolts for the fan shroud assembly (Figure 26).

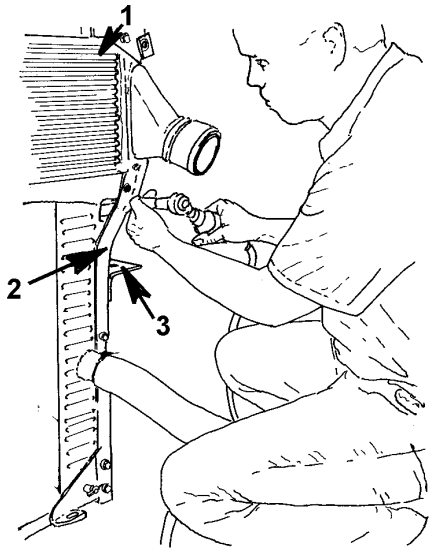

Figure 25 Example Radiator Frame Removal (Passenger Side Shown)

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

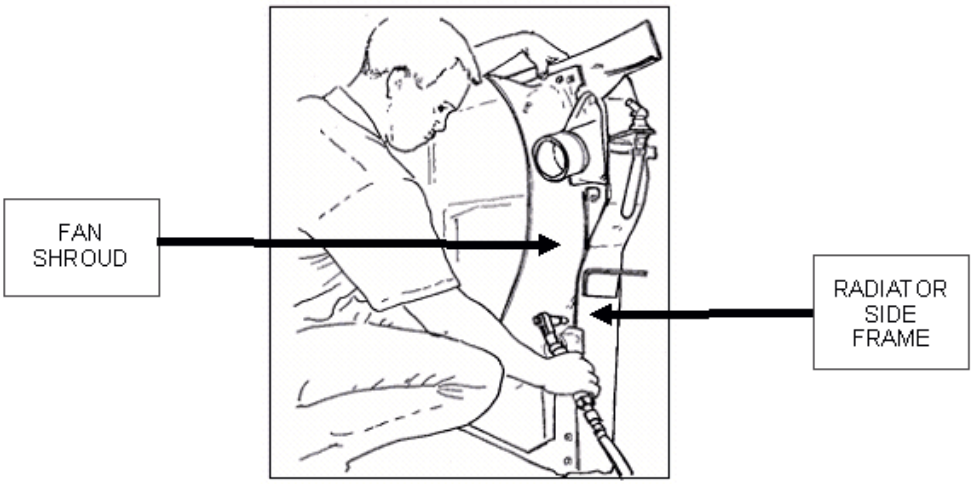

Figure 26 Example Radiator Fan Shroud Removal

1.6. 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.

1.7. 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

NOTE – Please refer to the Torque Tables in this manual for specific torque requirements.

NOTE – The entire Radiator Assembly/Cooling Module consists of: Radiator Core, Radiator Frame, Charge Air Cooler (CAC), AC Condenser and Fan Shroud.

1. Place radiator lower frame assembly 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. Locate and install charge air cooler in frame assembly (Figure 27).

6. Install mounting bolts in charge air cooler.

7. Install opposite side frame, align and install fan shroud to side frames, and install and tighten bolts in side frame and radiator.

8. Install radiator top frame and fasten top frame to side frame sections.

9. With radiator supported, attach lifting sling to top or radiator lifting points.

10. Locate radiator on chassis frame radiator mounting blocks.

11. Insert bolts in radiator mounting blocks and bracket, and tighten bolts.

12. Check the alignment of the radiator on frame rails.

13. Loosen and remove lifting sling and hoist.

14. Locate and attach stabilizer rods to support radiator on bumper structure assembly.

Figure 27 Some Re-Installed Radiator Components

2.2. RADIATOR HOSE

Check radiator hoses prior to installation. Instructions are for both upper and lower radiator tube and hose assemblies.

1. Place worm-style hose clamps over each end of new hose (see Figures 17 and 18) (if hose is replaced on tube).

2. Position hose over tube end and secure clamp to specifications to form a tight seal.

3. 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.

2.3. CHARGE AIR COOLER PIPES

With the radiator assembly (cooling module) already installed, connect the CAC Pipes (Figure 28).

1. Locate charge air cooler tubes and hoses. Inspect for dirt or particles and remove any dirt or particles.

2. Replace hose cuffs if deteriorated. Place constant tension spring clamps on pipe connections if hose cuffs are replaced.

3. Tighten the constant tension spring clamps on each end of the charge air cooler piping to the appropriate port on the turbo charger and engine manifold.

4. Position and secure the AC condenser lines with appropriate fasteners as required (refer to Table 1, Installation Torque Values).

5. Re-install AC lines:

    - Coat end of AC fitting with compressor oil (Texaco Capella WF68 or equivalent)
    - Secure nuts

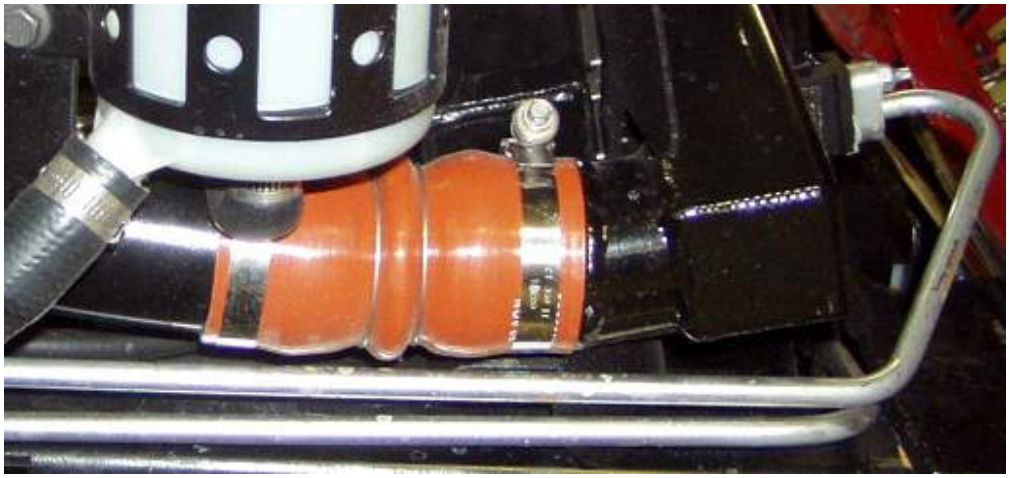

Figure 28 Properly Installed Passenger Side CAC Connecting Hose and Constant Tension Spring Clamps – Showing the AC Lines

2.4. SURGE TANK

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

1. Locate surge tank on radiator surge tank mounting bracket and install upper mounting bolts (Figure 29).

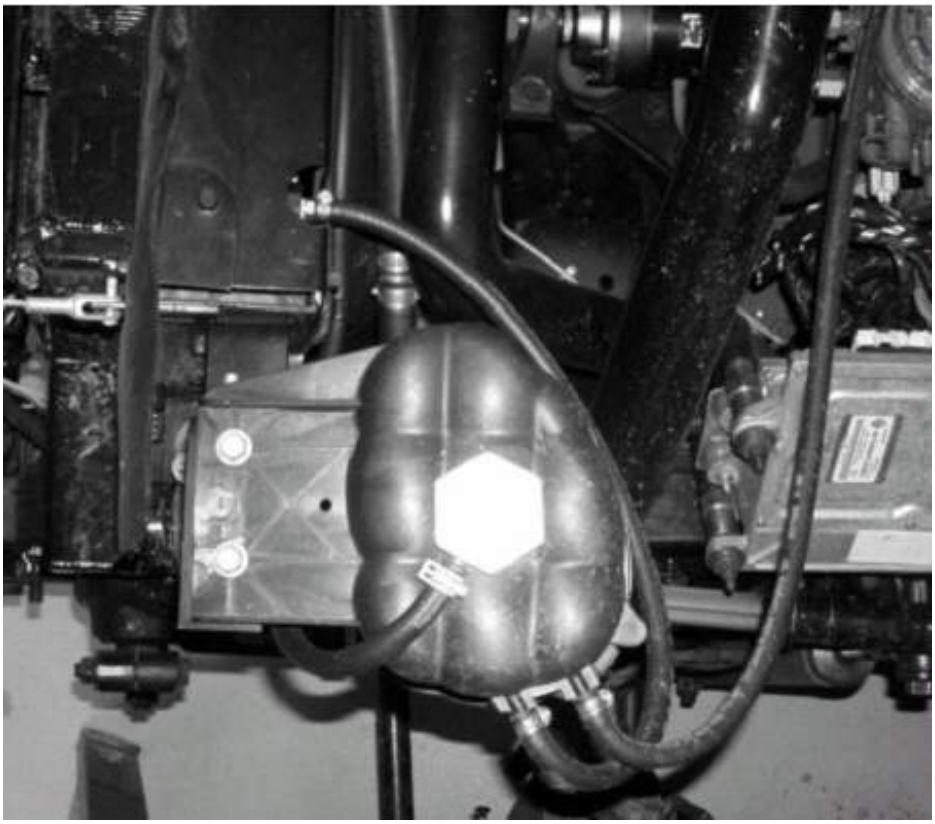

Figure 29 Surge Tank Showing Top of Mounting Bracket with All Hoses Attached

2. Align side-mounting holes in surge tank with holes in surge tank mounting bracket and install bolts (Figure 30).
3. Tighten all four bolts.
4. Re-attach the bottom hose to the engine thermostat housing using a worm-style clamp (if previously removed).
5. Re-attach the upper radiator surge hose to the radiator using a compression clamp.
6. Re-attach the overflow surge hose to the overflow tank using a compression clamp.
7. Re-attach the upper engine fitting surge hose (if it was removed) using a worm-style clamp.
8. Close the petcock in lower radiator.
9. Replace coolant after all other installations have been completed.
10. Place the front crossmember assembly between the frame rails at the front of the chassis.

11. Insert the four mounting bolts and tighten.

When all installations, surge tank and related components, including charge air cooler pipes and clamps and front crossmember are installed, start engine and check for leaks. If leaks appear, recheck connecting tubes and all clamps for proper installation.

Figure 30 Properly Installed Surge Tank (Located on Driver Side)

2.5. FRONT CROSSMEMBER

Locate the front crossmember assembly for installation prior to re-installing the hood and grille assembly. Figure 31 shows some components after re-installation.

1. Re-connect the 2 horns.

2. Re-connect the wire harness(es).

3. Re-attach the hood, hood stabilizing wires and hood tension rods. Refer to Service Manual S09013, Hood, Grille, Bumpers and Fender Extensions, for installation of the hood and grille assembly.

Figure 31 Under-Hood View of Some Properly Installed Components on the MXT Vehicle

TORQUE

Table 1 Installation Torque Values Unless Otherwise Noted

Fastener	Specified Torque Range
M10 Screw	70 – 80 Nm
M10 Nut	35 – 40 Nm
M8 Screw / Nut	17 – 20 Nm
M6 Screw / Nut	10 – 14 Nm

AC CONDENSER LINE FASTENERS

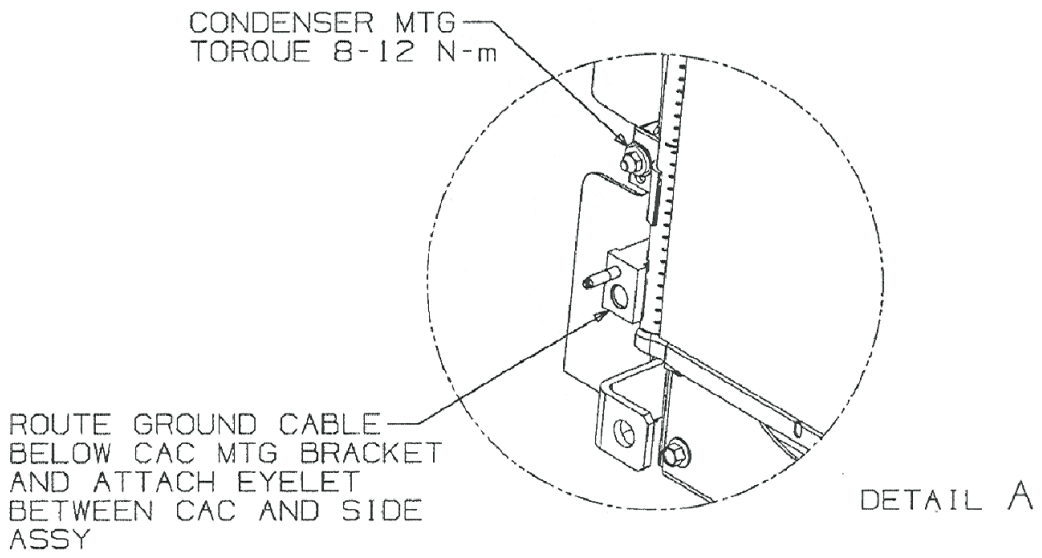

Table 2 Specific Component Fastener Torque Values

Component	Fastener	Specified Torque Range
Surge Bottle	M10 Bolts (15MM Head)	48 - 54 Nm
Coolant Overflow Bottle		48 - 54 Nm
Power Steering Reservoir Bottle		48 - 54 Nm
Cooling Module Mounts	M12 Bolt, Hex Head (18MM Socket Size)	90 Nm
Fan Shroud	M8 Bolts	17 – 20 Nm
Radiator Stabilizer Rods	@ Crossmember Side @ Radiator Side	26 Nm 48 Nm
Radiator Hose Clamps		8 Nm
Surge Tank Hose Clamps		8 Nm
Charge Air Cooler Hose Clamps		12 – 30 Nm