QUALITIES THAT MAKE THE DIFFERENCE

Service Bulletin No. 1015

MODEL	:	**T2140 & T2145**
TYPE	:	**Product improvement**
MANUAL & SECTION	:	**Maintenance Manual: Chapter 2- Cooling System**
DATE	:	**February 9 th, 1998**
SUBJECT	:	**Intercooler and radiator removal and reinstallation**
CONDITIONS	:	**Parts may be obtained from International Coach Parts Inc., 17469 West Colonial Drive, Building A, Wintergarden, FL 34787**

DESCRIPTION : The removal and reinstallation of the T-2100 Series intercooler and radiator are fairly straightforward. On some vehicles however, difficulties may arise when trying to take the intercooler out of the radiator compartment. This is partly due to the lack of elasticity of the intercooler outlet closing rubber fitted to the engine flitch panel. Therefore this Service Bulletin describes two methods of removal. The "Standard Procedure" details the removal of intercooler and radiator on coaches that already have the modified softer closing rubber fitted. The "Alternative Procedure" offers a solution for intercooler removal on vehicles equipped with the harder intercooler closing rubber. Finally a separate procedure explains how the engine flitch panel can be modified to accept the softer closing rubber.

NOTE: Van Hool will cover the intercooler outlet closing rubber modification (parts according to list below and an additional labor cost of one and a half hours to the flat rate of a radiator removal/installation) if the radiator or intercooler must be changed due to a warrantable failure.

PARTS

Always use genuine maintenance products and parts. Do not accept imitations!

Part No.	Description	Qty.
VH 10632040	Intercooler closing rubber, complete	1
VH 10632044	Mounting bracket, short	1
VH 10632046	Mounting bracket, long	1

Service Bulletins are issued to supplement or supersede information in the Van Hool manuals. Note Service Bulletin number, date and subject on the register at the end of the relevant chapter(s). File Service Bulletin separately for future reference.

SERVICE PROCEDURE:

!!! CAUTION !!!
USE SAFE SHOP PRACTICES AT ALL TIMES READ ENTIRE PROCEDURE BEFORE BEGINNING WORK

1. Preparations

1. Put coach on level ground.

2. Apply parking brake.

3. Turn ignition off.

4. Place battery master switch in the "off" position.

5. Put "DO NOT OPERATE" tag on instrument panel to prevent inadvertent starting.

6. Close gate valves (heating system shut-off valves).

   - T2140: the gate valve in the heating system supply line is located behind the right hand engine compartment door; the one in the heating return line is accessible via the interior access trap above the transmission.

   - T2145: both gate valves are located in the combustion heater compartment on the left hand side of the coach (see figure 1).

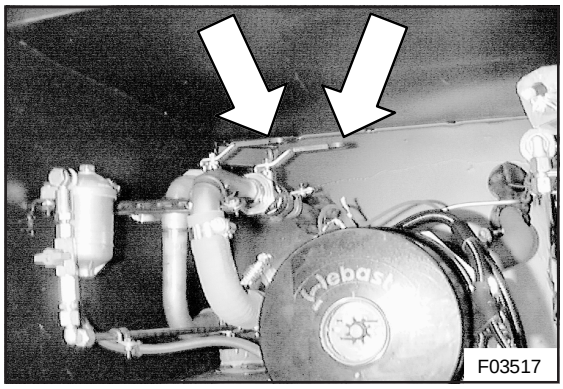

Figure 1: Location of gate valves in T2145 combustion heater compartment

7. Chock up wheels.

2. Intercooler and radiator removal: standard procedure

1. Open radiator compartment door.

2. Open engine compartment door.

3. Allow engine to cool down.

4. Place a suitable container beneath the radiator compartment to collect coolant while draining the system.

5. Remove radiator filler cap (see Figure 2) by slowly turning anti-clockwise.

!!! CAUTION !!!
WAIT UNTIL THE TEMPERATURE IS BELOW 50°C (120°F) BEFORE REMOVING THE COOLING SYSTEM PRESSURE CAP. FAILURE TO DO SO CAN CAUSE PERSONAL INJURY FROM HEATED COOLANT SPRAY.

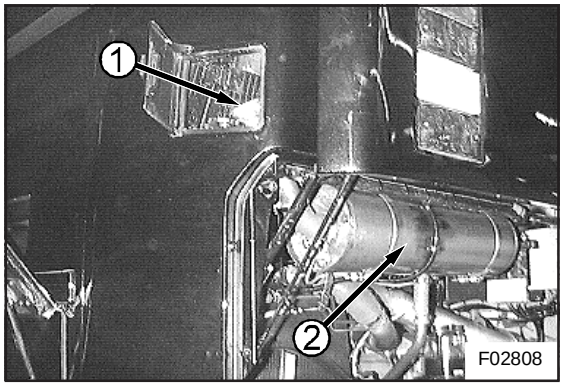

Figure 2: Radiator filler cap (1) and surge tank (2)

6. Open radiator draincock (see Figure 3).

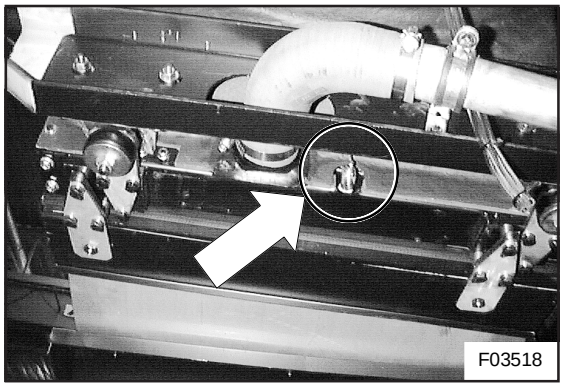

Figure 3: Location of radiator draincock

7. Working beneath the radiator compartment, loosen the hose clamps of the transmission oil cooler feedline indicated in Figure 4. Detach the hose to drain the coolant.

!!! CAUTION !!!
COOLANT CONTAINS TOXIC SUBSTANCES. THEY MAY IRRITATE THE EYES. DO NOT SWALLOW OR INHALE. AVOID PROLONGED OR REPEATED CONTACT WITH THE SKIN.

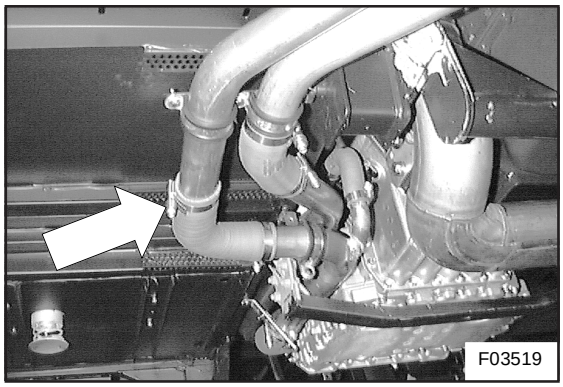

Figure 4: Transmission oil cooler feed line (B500-transmission)

NOTE
If the coolant is not going to be reused, dispose of used coolant and antifreeze in accordance with federal, state and local regulations.

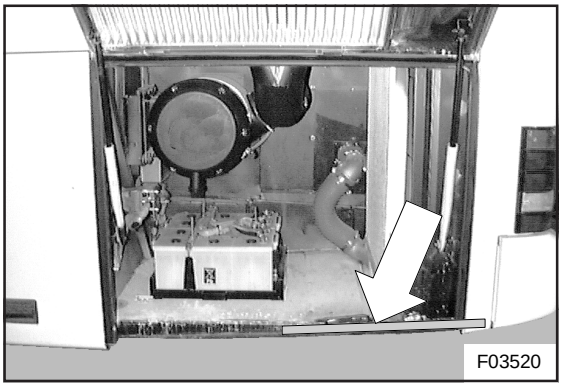

Figure 5: Location of angle gusset

8. Undo and remove the two M6 angle gusset retaining bolts clamping the bottom door seal of the radiator compartment (see Figures 5 and 6). Remove angle gusset and fold back the seal.

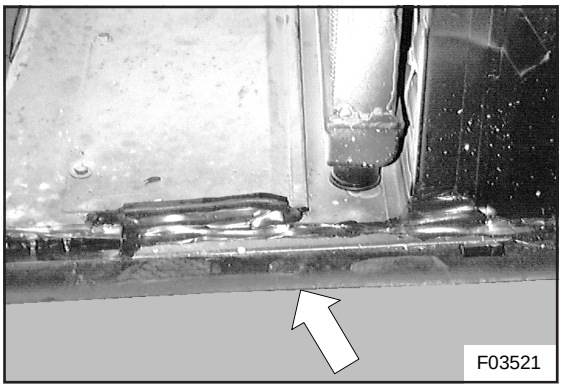

Figure 6: Radiator compartment bottom door seal

9. Undo and remove the three cap-screws securing the radiator compartment bottom closing plate (see Figure 7). Remove closing plate.

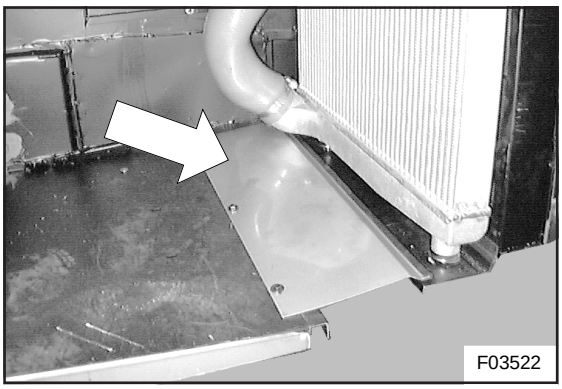

Figure 7: Radiator compartment bottom closing plate

10. In the engine compartment, slacken the fan drive belts by loosening the idler pulley hub nut (2, Figure 8) first, then by turning the hexagon head (1, Figure 8) of the threaded adjusting rod counter-clockwise to reduce tension. Remove the fan belts.

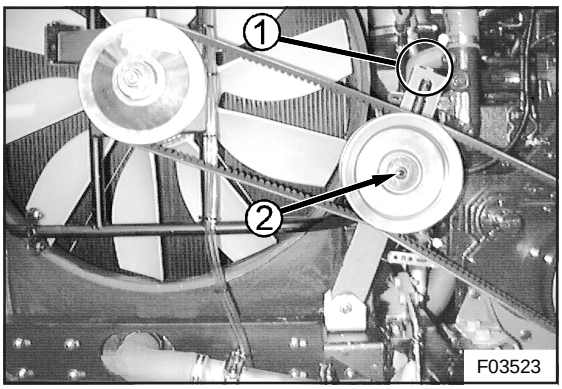

Figure 8: Engine to fan drive belt tensioner

11. With diagonal cutter pliers, cut loose the surge tank and filler neck overflow tubes (see Figure 9). Stow away tubes.

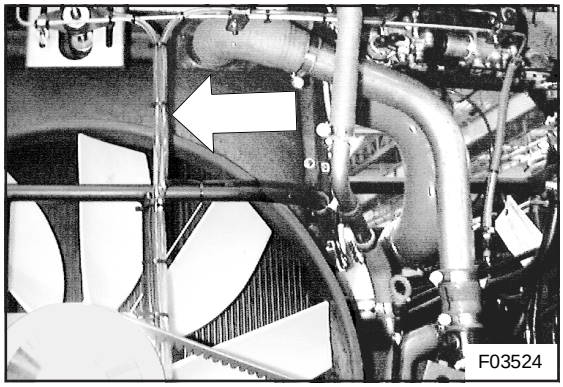

Figure 9: Surge tank and filler neck overflow tubes

12. Remove the wire straps securing fan clutch electric lead to engine flitch panel. Disconnect connector near upper right hand fan support bracket (see Figure 10).

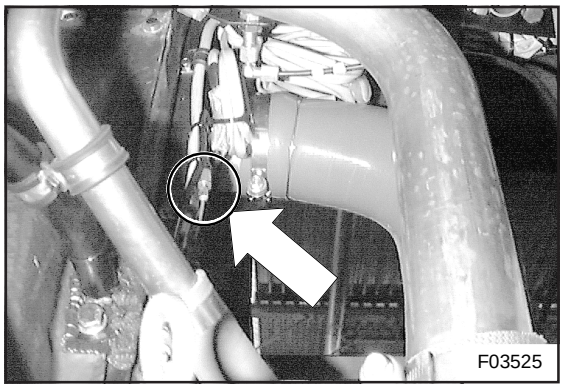

Figure 10: Fan clutch electric connector

13. On coaches equipped with Cummins engine, undo and remove capscrew and nut securing surge tank filler tube to fan clutch support bracket (see Figure 11).

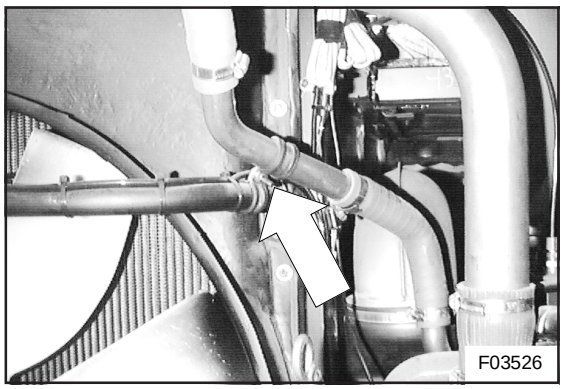

Figure 11: Surge tank filler tube bracket

14. Loosen hose clamps securing the radiator outlet tube (see Figure 12) and disconnect the tube.

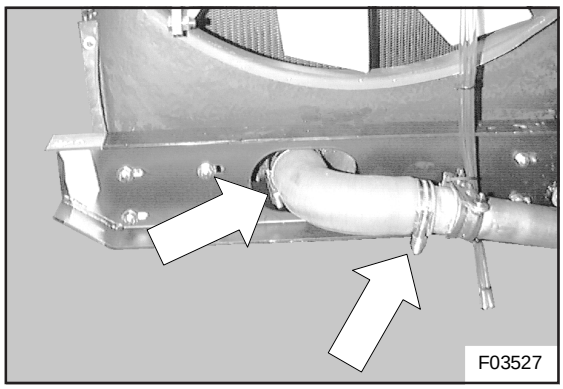

Figure 12: Radiator outlet tube

Figure 13: Fan assembly steady bar

15. Disconnect and remove fan assembly steady bar on the left hand side of the engine compartment (see Figure 13).

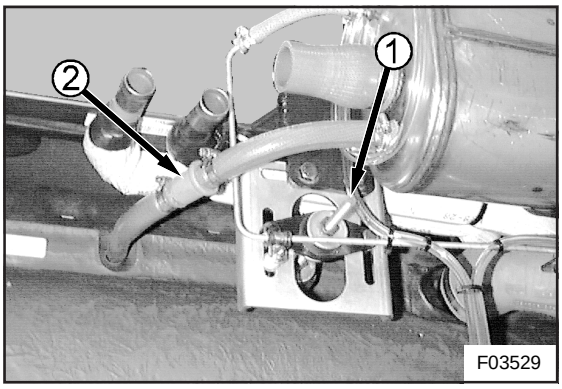

Figure 14: Radiator steady bar and surge tank breather hose

16. Disconnect and remove radiator to chassis steady bar (1, Figure 14). Slacken hose clamp and detach surge tank breather hose from radiator (2, Figure 14).

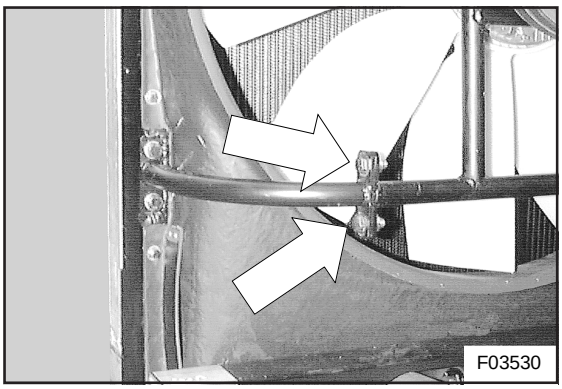

Figure 15: Lower left hand fan and clutch carrier retaining screws

17. Starting at the bottom, undo and remove three of the four capscrews and locknuts securing the fan and clutch carrier to the left hand radiator support brackets (see Figures 15 and 16). Slacken the top locknut so that it can be undone by hand but leave the capscrew in place.

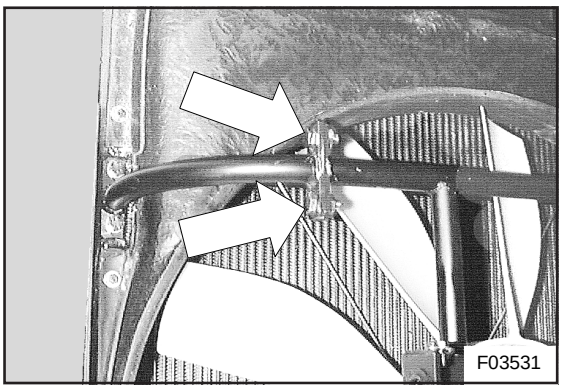

Figure 16: Upper left hand fan and clutch carrier retaining screws

18. Withdraw three of the four bolts securing the fan and clutch carrier to the right hand side of the radiator (see Figure 17). Loosen the top bolt so that it can be removed by hand.

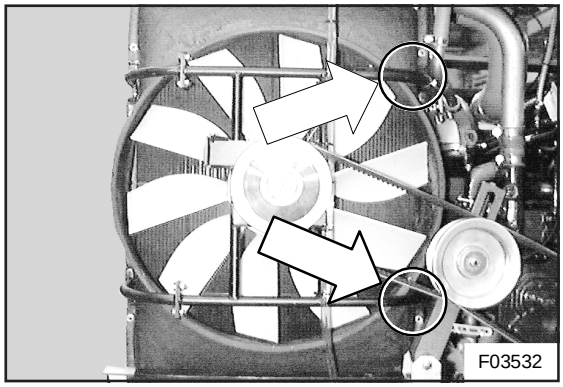

Figure 17: Fan and clutch carrier retaining bolts (right hand)

19. With the aid of an assistant, withdraw the upper carrier retaining screws and lift out the engine cooling fan assembly from the radiator cowling (see Figure 18).

!!! CAUTION !!!

THIS COMPONENT WEIGHS 23 KG (50 LB) OR MORE. TO AVOID PERSONAL INJURY AND/OR DAMAGE TO THE VEHICLE, GET ASSISTANCE TO HANDLE THE COMPONENT.

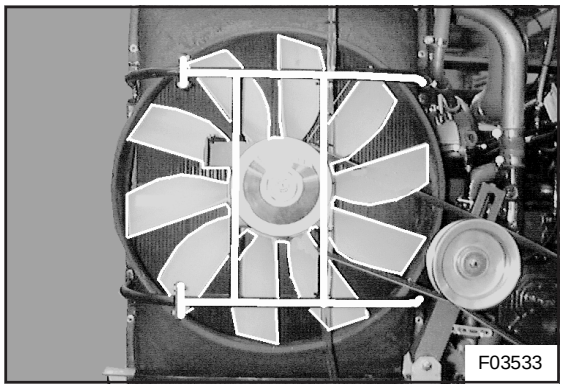

Figure 18: Engine cooling fan assembly

20. On coaches equipped with Cummins engine, sloosen lower hose clamps of surge tank filler tube (1, Figure 19) and radiator inlet tube (2, Figure 19).

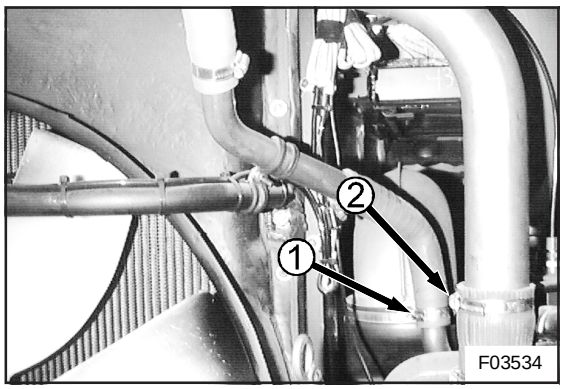

Figure 19: Lower hose clamps of surge tank filler tube (1) and radiator inlet tube (2)

21. On coaches equipped with Cummins engine, loosen upper hose clamps of surge tank filler tube (1, figure 20) and radiator inlet tube (2, Figure 20). Detach and remove both tubes.

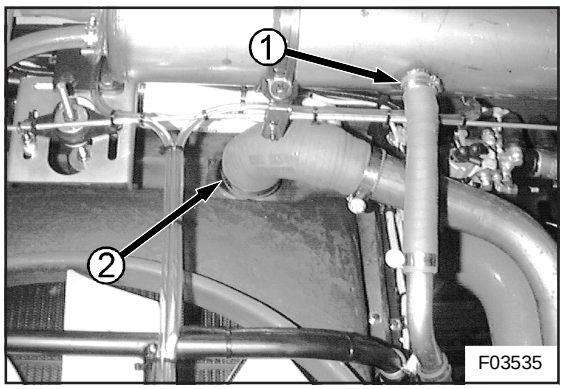

Figure 20: Upper hose clamps of surge tank filler tube (1) and radiator inlet tube (2)

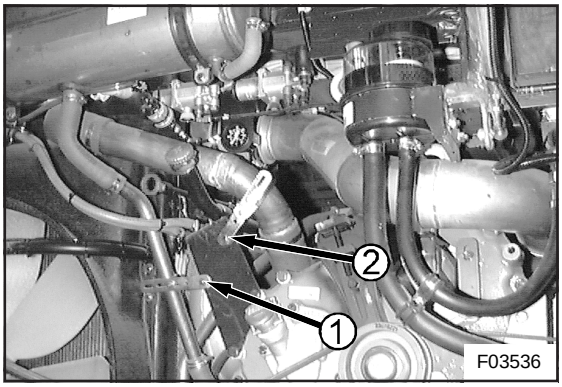

Figure 21: Support bracket retaining screws of the surge tank filler tube (1) and radiator inlet tube (2)

22. On coaches equipped with Detroit Diesel engine, undo and remove the support bracket retaining screws of the surge tank filler tube (1, Figure 21) and radiator inlet tube (2, Figure 21).

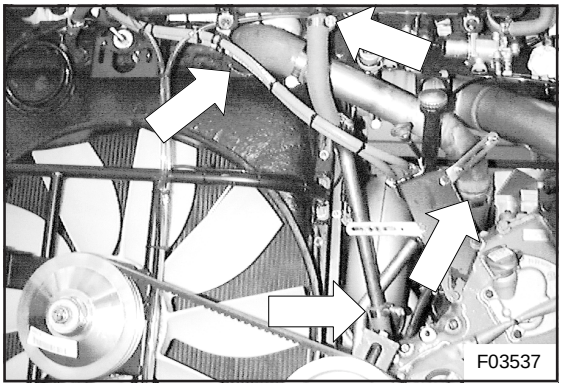

Figure 22: Upper and lower hose clamps of surge tank filler tube and radiator inlet tube

23. On coaches equipped with Detroit Diesel engine, loosen upper and lower hose clamps of surge tank filler tube and radiator inlet tube. Detach and remove both tubes.

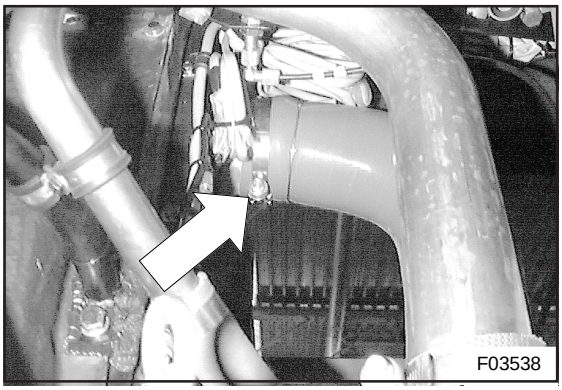

Figure 23: Cummins intercooler outlet hose

24. On coaches equipped with Cummins engine, loosen upper constant-torque hose clamp of intercooler outlet hose (see Figure 23). Detach hose.

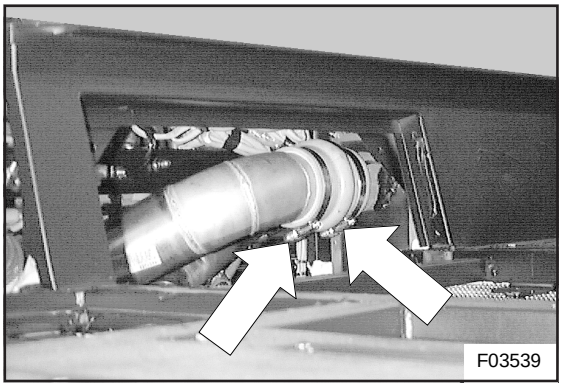

Figure 24: DD intercooler outlet bellows (view from passenger compartment)

25. On coaches equipped with Detroit Diesel engine, loosen both constant-torque hose clamps retaining intercooler outlet bellows (see Figure 24). Slide bellows over air intake duct.

26. Remove coolant receptacle from under coach.

27. Undo and remove the rubber buffer retaining nut (1, Figure 25) and the three capscrews securing the left intercooler support bracket to the radiator (2, Figure 25). Remove support bracket.

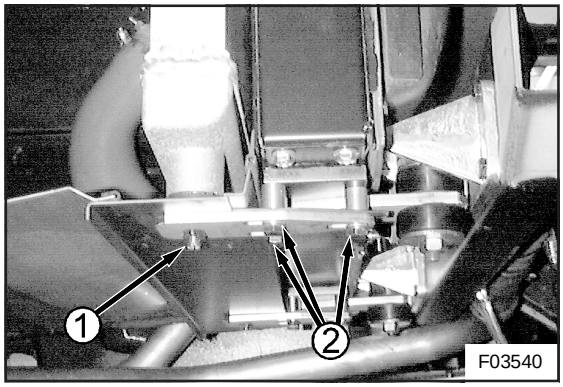

Figure 25: Left intercooler support bracket and mounting hardware

28. Undo and remove the rubber buffer retaining nut and the three cap-screws securing the right intercooler support bracket to the radiator (see Figure 26). Remove support bracket.

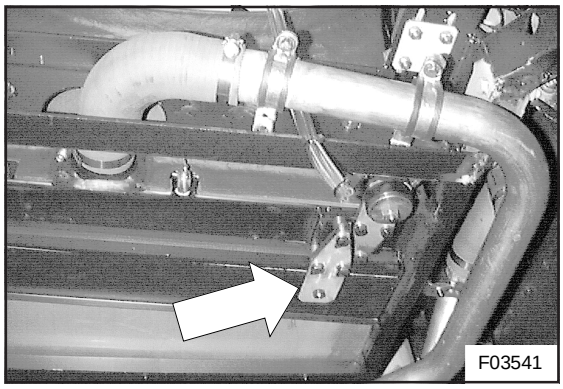

Figure 26: Right intercooler support bracket

29. Remove intercooler bottom plate (see Figure 27).

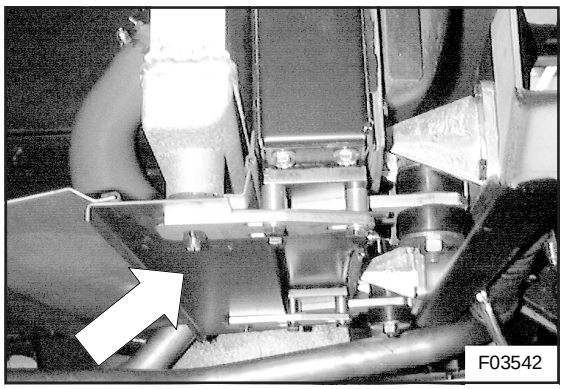

Figure 27: Intercooler bottom plate

30. Using a hydraulic transmission jack and a wooden block, support the intercooler at the base and raise it slightly. Loosen the two constant torque hose clamps securing the intercooler inlet hose and remove the hose (see Figure 28).

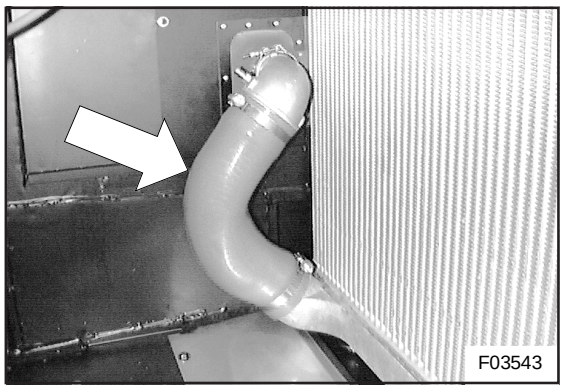

Figure 28: Intercooler inlet hose

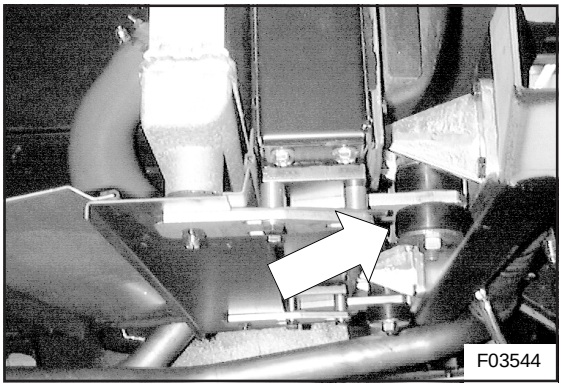

Figure 29: Radiator buffer: left

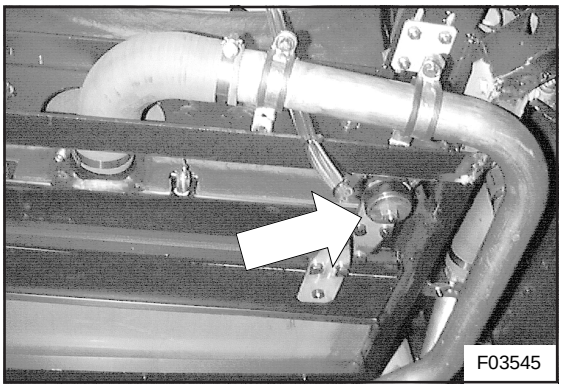

Figure 30: Radiator buffer: right

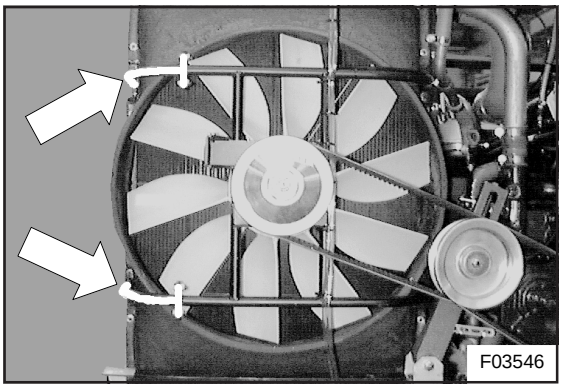

Figure 31: Fan and clutch carrier support brackets

31. **With the aid of an assistant, lower the intercooler, tilt it and carefully ease it out of the radiator compartment.**

!!! CAUTION !!!
THIS COMPONENT WEIGHS 30 KG (66 LB). TO AVOID PERSONAL INJURY AND/OR DAMAGE TO THE VEHICLE OR COMPONENT, GET ASSISTANCE TO HANDLE IT.

NOTE
If the intercooler cannot be removed from the radiator compartment, refer to the alternative service procedure further in this bulletin.

32. **Using a hydraulic transmission jack and a wooden block, support the radiator at the base and raise it slightly.**

33. **Unscrew and remove the radiator buffer retaining nuts (see Figures 29 and 30). Withdraw the large plain washers and rubber buffer halves.**

34. **With the aid of an assistant, turn the radiator around its vertical axis until the fan and clutch carrier support brackets (see Figure 31) show up in the radiator compartment. Taking care to keep the brackets in the right order and the correct way round, unscrew the retaining bolts and withdraw the brackets.**

35. **With the aid of an assistant, lower the radiator, tilt it and carefully ease it out of the radiator compartment.**

!!! CAUTION !!!
THIS COMPONENT WEIGHS 60 KG (132 LB). TO AVOID PERSONAL INJURY AND/OR DAMAGE TO THE VEHICLE OR COMPONENT, GET ASSISTANCE TO HANDLE IT.

3. Intercooler removal: alternative service procedure

If the intercooler cannot be removed from the radiator compartment, some modifications of the engine/radiator flitch panel are necessary. Proceed as follows:

1. On coaches equipped with Cummins engine, loosen lower constant-torque hose clamp of intercooler outlet hose (see Figure 32) inside engine compartment. Detach and remove hose.

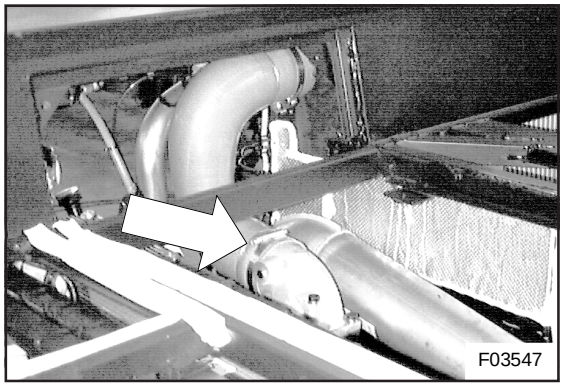

Figure 32: Cummins intercooler outlet hose, lower clamp (view from passenger compartment)

2. On coaches equipped with Detroit Diesel engine:

   a. Inside engine compartment, undo and remove the bolts, nuts and springwashers securing the power steering oil tank to the chassis (see Figure 33). Lift away the unit and tie it temporarily to the HVAC compressor with wire straps.

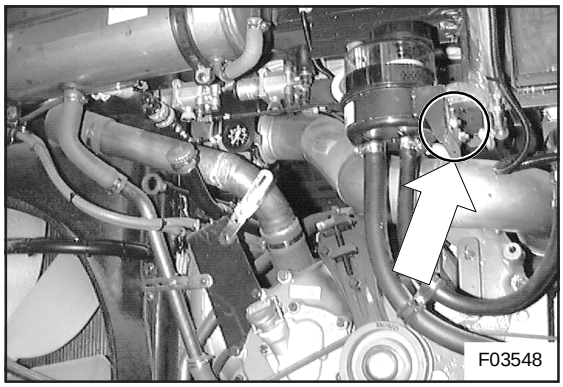

Figure 33: Power steering oil tank retaining screws

   b. Unscrew the air duct clamp assembly retaining nuts (see Figure 34). Remove clamp assembly.

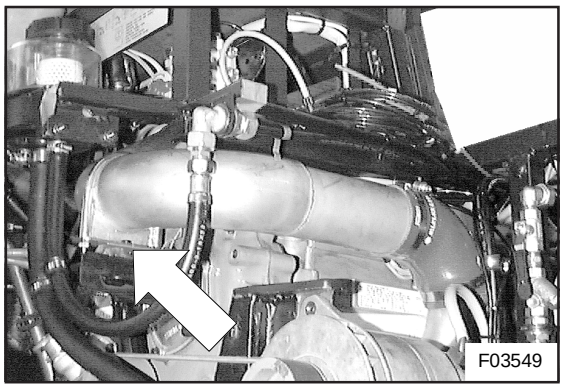

Figure 34: Air duct clamp assembly

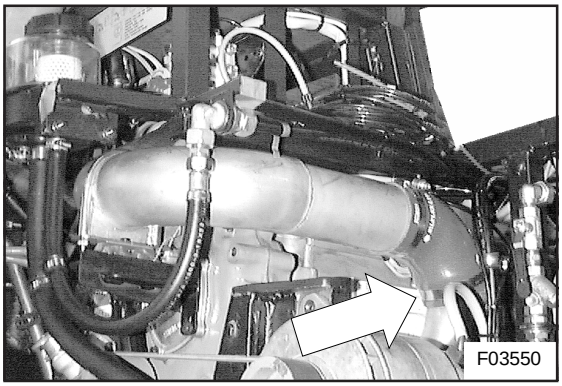

Figure 35: Intake manifold hose clamp

c Loosen intake manifold constant-torque hose clamp indicated in Figure 35. Remove air duct with intercooler bellows and intake hose.

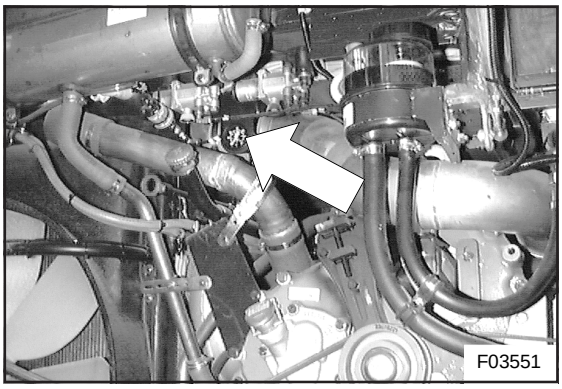

Figure 36: Optional coolant temperature gauge

3. Below the surge tank, an optional coolant temperature gauge may be installed (see Figure 36). Use diogonal cutter pliers to remove the wire straps securing the temperature gauge lead.

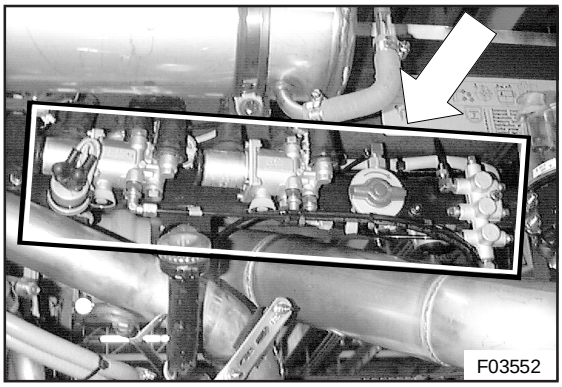

Figure 37: Air valve mounting plate

4. Next to the surge tank is a mounting plate with two solenoid air valves, a control valve, a pressure regulator and a distributor block (see Figure 37). Undo and remove the two M8 retaining screws left and right of the mounting plate and lift the complete assembly out of the way. The intercooler closing rubber can now be reached (see Figures 38 and 39).

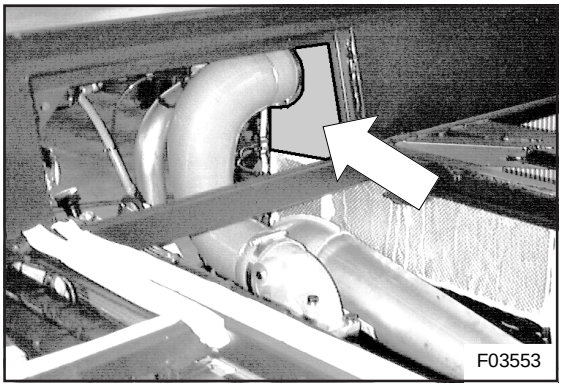

Figure 38: Intercooler closing rubber, Cummins (view fom passenger compartment)

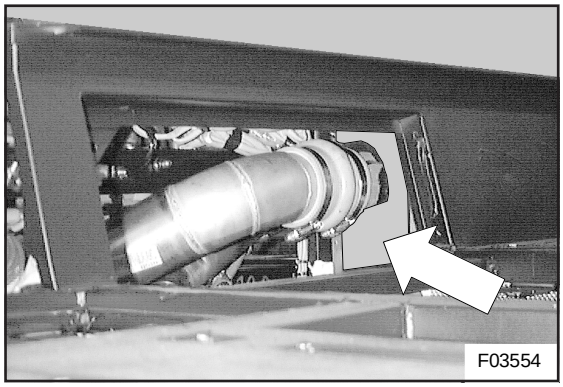

Figure 39: Intercooler closing rubber, Detroit Diesel (view from passenger compartment)

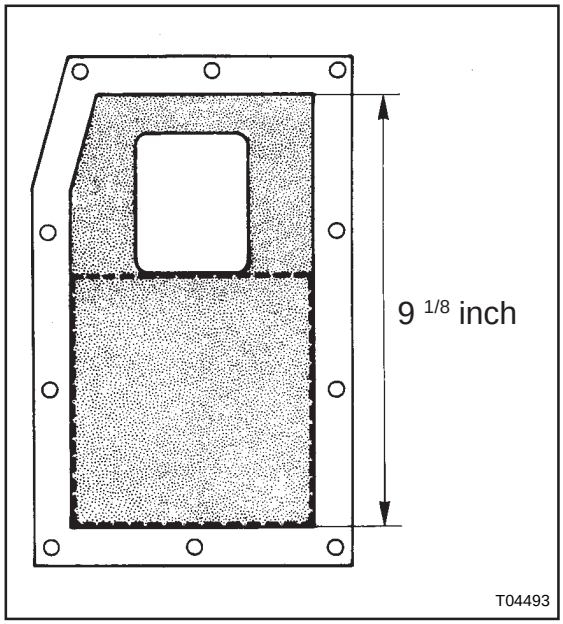

Figure 40: Intercooler closing rubber, height and cutting line

5. a. With a steel ruler, measure the height of the flitch panel mounted rubber. It should be 232 mm (9 1/8 inch) high (see Figure 40). Remove the lower part of the rubber by cutting along the edges of the mounting frame with a utility-knife as indicated by dotted line.

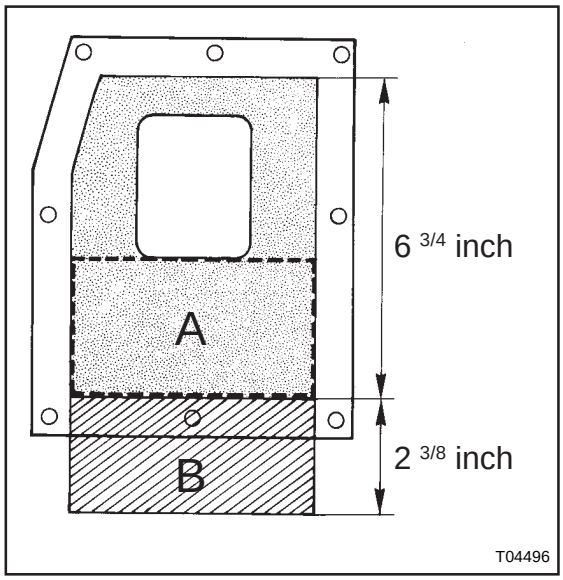

Figure 41: Intercooler closing rubber, removal and flitch panel modification

b. If the height of the rubber measures 172 mm (6 3/4 inch), first remove the rubber as explained in item 5a (see also A - Figure 41).
Next, cut through the lower part of the mounting frame and through the flitch panel steel with a reciprocating saw to modify the flitch panel opening as shown by B - Figure 41.

!!! CAUTION !!!

WHEN MODIFYING THE FLITCH PANEL OPENING, TAKE GREAT CARE NOT TO DAMAGE THE INTERCOOLER WEB. MAKE THE TWO VERTICAL CUTS FIRST AND FOLD THE LIP BACK 90° TOWARDS THE ENGINE. FINISH THE MODIFICATION BY MAKING THE HORIZONTAL CUT WITH THE INTERCOOLER REMOVED.

6. The intercooler can now be removed from the radiator compartment as explained in "Intercooler and Radiator Removal: Standard Procedure" item 31.

4. Flitch panel modification

With the intercooler and radiator removed from the radiator compartment, the flitch panel opening can easily be modified to accept a detachable intercooler closing rubber. Proceed as follows:

1. From inside the radiator compartment, using a pneumatic hand drill and a 5/32 inch drill bit, remove the rivets securing the closing rubber mounting frame to the flitch panel. Remove the remains of frame and rubber.

2. Cut flitch panel opening to size as shown in Figure 42. Deburr cutting edges with multi-cut file.

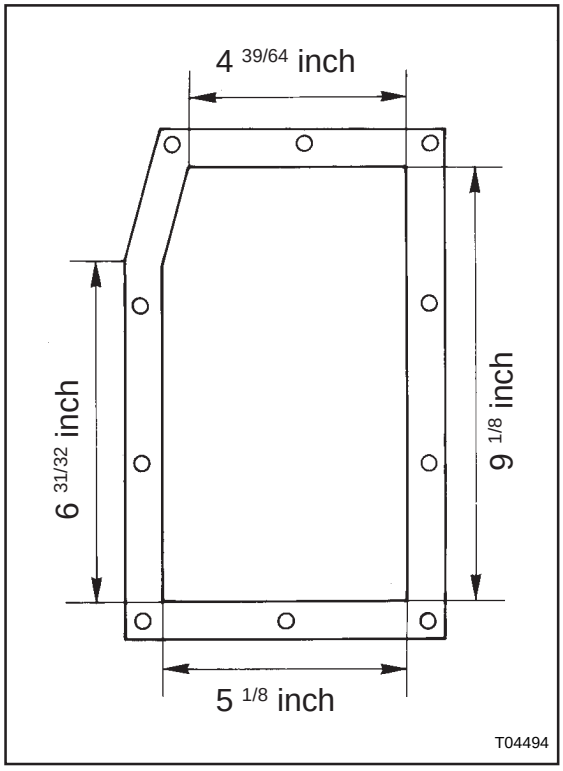

Figure 42: Flitch panel opening dimensions

3. Using intercooler outlet closing assembly (VH 10632040) as a template, drill mounting frame corner holes in flitch panel out to 9/32 inch diameter (see Figure 43).

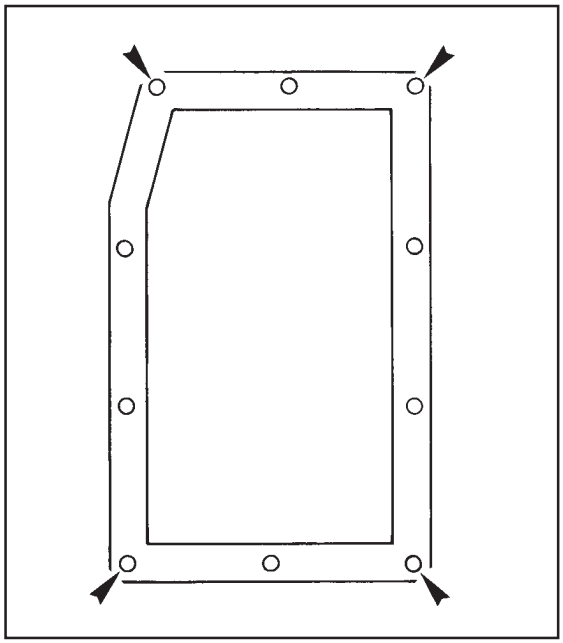

Figure 43: Mounting frame, 9/32 inch corner holes

4. From inside the radiator compartment, have an assistant push the mounting bracket studs of the long bracket (VH 10632046) through the bottom corner holes, and the studs of the short mounting bracket (VH 10632044) through the upper corner holes.

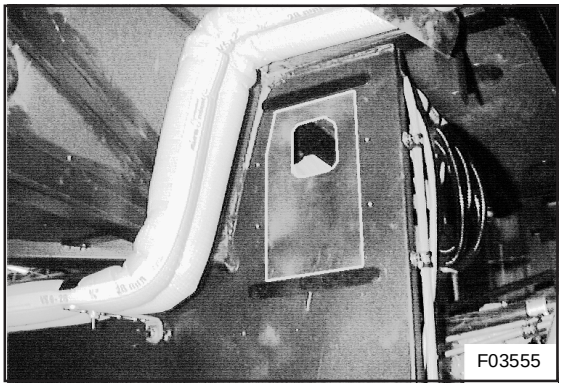

Figure 44: Intercooler outlet closing assembly, completed installation

5. Slide the intercooler outlet closing assembly over the studs protruding into the engine compartment and secure with M6 self-locking nuts . See figure 44 for completed installation.

5. Radiator and intercooler installation.

1. Reinstallation of radiator and intercooler is the reverse sequence to removal.

2. Once the installation completed, seal off the bottom closing plate in the radiator compartment with black neutral silicone sealer.

3. To tighten fan belts, refer to Chapter 3 of the Maintenance Manual.

4. To fill the cooling system, refer to Chapter 2 of the Maintenance Manual.

5. Open the gate valves.

6. Start engine and allow to run for 20 minutes. Check cooling system plumbing for leaks. Check induction system hose clamps for tightness. Rectify if necessary.

7. Check "all systems go" on multifunction display (indicated by an asterisk on the bottom middle of multifunction display).

8. Remove wheel chocks and warning label on instrument panel.

9. Shut down engine.

Procedure complete.

SERVICE INFORMATION:

1. Parts

Parts will be made available for service purposes only.

2. Tools

Following tools and products will be needed to execute the procedure described in this Bulletin.

- 3/8" drive metric socket & ratchet set
- 1/2' drive ratchet
- 17, 19 and 22 mm 1/2' drive sockets
- 1/2' drive breaker bar
- 10, 13, 17, 19 and 22 mm box wrenches
- 1/4' drive 9/32 inch socket
- 1/4' flexible driver
- utility knife
- reciprocating saw
- multi-cut flat file
- pneumatic hand drill
- 4 and 7 mm drill bits
- diagonal cutter pliers