Installation Manual

Volvo V70R Front Mount Intercooler System

Bell Intercoolers

C Contents

! Important Information

Congratulations on your purchase of the Bell Intercoolers Volvo V70R Front Mount Intercooler System. The installation instructions in this manual will assist you in the complete process of installing your new intercooler. Please read through these instructions entirely before you begin the installation process. This will familiarize you with the process and alert you to any unique tools or m
please do not hesitate to contact us at 210-412-0917.

however, it is important to honestly evaluate your mechanical skills and determine if you are capable of performing the installation or if you should have the system installed by a professional mechanic. To help you identify possible difficulties, we have marked steps of installation that are complex, require special tools or involve special procedures with this icon: (!)

A modern internal combustion engine is a precise piece of equipment and while durable they can be severely damaged or destroyed through careless installation techniques.

To
problems with the engine or vehicle corrected prior to installing the intercooler.

Parts List

Part Name	Packet	Qty	Part Number
Intercooler Assembly	Intercooler	1	A3001361806070(B)
Intercooler Inlet Tube	Components	1	PLV6070-01-B
Intercooler Outlet Tube	Components	1	PLV6070-02-B
Throttle Inlet Tube	Components	1	PLV6070-03-B
Silicone Hose			
Straight (2.5” ID x 3” L)	Hose	1	P00503-0300BLAC
Bellows/Hump (2.5” ID x 3” L)	Hose	2	P00553-0300BLAC
Straight (3.0” ID x 2.5” L)	Hose	1	P00505-0250BLAC
Reducer (2.0” or 2.25” dia. to 2.5” dia.)	Hose	1	P00562-250200B or P00561-250225B
Intercooler Mounting Spacer	Parts - Bag 1	2	PLV6070-07
M10-1.25 x 60mm Bolt - Hex Head	Parts - Bag 1	2	P00700-M10-60-Z
M10 Washer	Parts - Bag 1	4	P00740-M10-C
M10-1.25 Hex Locknut (Mechanical)	Parts - Bag 1	2	P00710-M10-125-Z
Horn Bracket - Left	Parts - Bag 2	1	PLV6070-05
Horn Bracket - Right	Parts - Bag 2	1	PLV6070-06
M6-1.0 x 20mm Bolt - Hex Head	Parts - Bag 2	2	P00700-M6-20-Z
M6-1.0 Hex Locknut (Mechanical)	Parts - Bag 2	2	P00710-M6-1.0-Z
M6 Washer	Parts - Bag 2	4	P00740-M6-C
M6-1.0 x 20mm Bolt - Hex Head (Sensor)	Parts - Bag 2	1	P00700-M6-20-Z
Radiator/AC Condenser Spacer	Parts - Bag 3	4	PLV6070-08
M6-1.0 x 40mm Bolt - Hex Head	Parts - Bag 3	4	P00700-M6-40-Z
M6 Washer	Parts - Bag 3	4	P00740-M6-C
Hose Clamps - T-Bolt Style			
2.0” or 2.25”	Hose Clamps	1	P00600-002 or P00607-002
2.5”	Hose Clamps	7	P00603-002
3.0”	Hose Clamps	2	P00609-002

Required Tools and Materials

To effici
supplied with your intercooler.

Tools

- 1/4” Drive Ratchet
- 1/4” Drive Extensions - 3” and 6” Length
- 3/8” Drive Ratchet
- 3/8” Drive Extension - 3” Length
- 8 mm Socket
- 10 mm Socket
- 11 mm Deep Socket
- 12 mm Socket
- 13 mm Socket
- 15 mm Socket
- 10 mm Wrench (Open/Boxed)
- 11 mm Wrench (Open/Boxed)
- 12 mm Wrench (Open/Boxed)
- 15 mm Wrench (Open/Boxed)
- T-25 Torx Bit
- Jack
- Jack Stands (x2)
- Flat-head Screwdriver
- Phillips Screwdriver
- Electric Handheld Drill (capable of holding .457” bit)
- .457” Drill Bit (or next larger size available)
- Vise-Grip style locking pliers (2 required)
- Small Trim/Molding Removal Tool (or Butter Knife)
- Hacksaw or Cutting Wheel
- Round and Flat File
- Ruler – 12” or longer

Materials

- Grease Pencil or China Marker (non-permanent)
- Black Ink Marker Pen (Sharpie™)
- Satin Black Touch Up Paint
- Masking Tape
- Sandpaper - 600 Grit

1.0 Vehicle Preparations

As with any vehicle modification project, the process will be easier, faster and safer for the engine, turbocharger and you if the engine compartment is thoroughly cleaned before you begin the project. Not only is a dirty engine compartment a mess to work in, but a dirty engine compartment also offers the possibility that dirt and/or debris could be introduced into the intake tract of the engine.

A small stone or piece of debris falling into an open turbo inlet can cause serious and expensive damage to the turbo when the engine is started. Even worse, the debris could cause a turbocharger compressor failure leading to pieces of compressor blades feeding into the cylinder, possibly damaging valves, cylinders and pistons. An easily avoidable, but expensive proposition.

Wh
all tubes, hoses and the intercooler for any foreign objects or debris before installing.

1.1 Disconnect Battery
Before beginning any work on this installation disconnect the negative terminal of the battery. During the installation you will have

ba
your Volvo service manual for details and procedures on disconnecting the trunk mounted battery.

1.2 Jack Stands or Lift
Installation of this intercooler system requires placing the vehicle on a lift or jack stands. Please consult Volvo service manual proper jack, jackstand and/or lift placement. Be sure vehicle is securely positioned before proceeding.

2.0 Removing Front Fascia (Nose Section)

Note: Before beginning any work on the vehicle the battery must be disconnected and the AC system must be evacuated. See page 1 for details.

The first step in the installation will involve removal of the front nose section or fascia of the vehicle (Fig. 2.1). Attached to the front fascia are the upper grill assembly, the front license plate and mounting bracket, the driving light assemblies and driving light grills. All of these pieces remain attached to the front fascia when it is removed and only require that you disconnect one wiring connector for each driving light assembly, one per side.

To reduce the chance of damaging the vehicle paint on the front fascia and the surrounding bodywork, we recommend you have someone available to help when you remove the fascia.

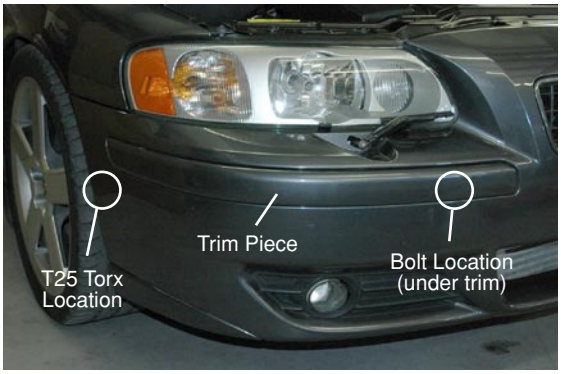


Figure 2.1

2.1 Remove Headlight Wipers

Before removing wipers make a note of the position of the wipers (direction of arms) so you will reinstall them properly. Next fold the wiper arm forward to access and remove the washer fluid tubing.

- Using small screwdriver, flip up cover at base of wiper arm (Fig. 2.2). Remove the 8 mm nut securing wiper arm. With the nut removed, carefully grip the base of the wiper arm with locking pliers as shown (Fig. 2.3). While gently rocking the wiper arm up and down, pull the wiper arm off of the shaft being careful to not damage the paint. You may want to wrap the locking pliers in a rag to prevent paint damage.
- Repeat for opposite side wiper assembly.

Figure 2.2

Figure 2.3

2.2 Remove Trim Pieces

Two trim pieces (shown in Fig. 2.1), one per side, are held in place by tabs along the top and bottom of each piece, which are inserted into the front fascia.

- Start at the front of the trim piece (end closest to upper grill opening). Along the lower edge of the trim piece, approximately 1.5” from front/inner end of piece, carefully insert the edge of the trim/molding removal tool (or butter knife) under the trim piece as shown (Fig. 2.4). Gently pry the trim piece away from the front fascia to release mounting tab. Once the first tabs has been released you will be able to easily release the rest of the tabs by hand.
- Repeat for opposite side trim piece.

Figure 2.4

2.3 Remove Mounting Bolts

- Locate the two bolts securing the front fascia assembly to the bumper subframe (one per side as indicated in Fig. 2.1). Remove these bolts, using care not to allow the bolts to drop into the space in the front fascia assembly.

2.4 Loosen Retainers

- Using the T25 Torx bit, loosen the two retainer fasteners, one on each side of the front fascia. They are located just inside the wheel opening on the fender liner (one per side as indicated in Fig. 2.1) and secure the fascia with a small clip. The fastener

  Fig. 2.5 for a detail of this clip.

2.5 Remove Bulkhead Rivets

- Loc
  bulkhead. Please note, these rivets are designed to be reused. Using a Phillips screwdriver press the center section of the ri
  Repeat for all rivets.

2.6 Remove Front Fascia

Note: This process can be accomplished by a single person if you know what to expect and proceed carefully. That said, it is much easier and safer for the paint work if you have an assistant.

- Grasping the rear edge of the front fascia (at the wheel opening), gently pull the fascia out, to the side, approximately .5", to clear side clips, and move fascia forward about two inches. Repeat for other side.
- With the front fascia pulled forward slightly you will need to disconnect the two wiring connectors for the driving lights (one per side). These are located on the inside of the front fascia, above the left and right side driving light assemblies. Disconnect both harnesses.
- You may now completely remove the front fascia.

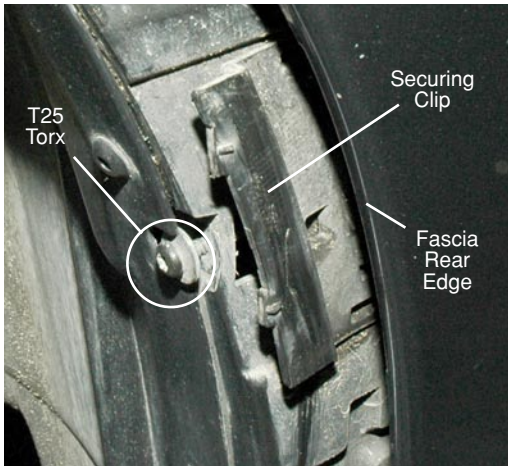


Figure 2.5

2.7 Remove Underbody Tray

Located underneath the radiator / AC condenser / intercooler assembly is the underbody tray. It is secured by two bolts (one per side) and two tabs (one per side). Locate the two tabs on the lower edge of the bumper cross member, release the tabs and slide them out of their slots. Locate and remove the two bolts, found at the outer rear corners of the underbody tray.

The underbody tray may now be removed.

3.0 Removing Air Filter Assembly

3.1 Remove Cold Air Snorkel

- Locate and remove the two bolts securing cold air snorkel to air filter box (Items A in Fig 3.1). Locate and remove the three bolts securing cold air snorkel to radiator bulkhead (Items B in Fig 3.1).
- Remove cold air snorkel from air filter box, you may need to release the two small raised tabs on the snorkel located next to the A bolts.
- Slide cold air snorkel out of radiator bulkhead.

3.2 Remove Air Filter Assembly

- Locate and loosen hose clamp securing air inlet tube to air filter box (Fig 3.2). Unclip and disconnect mass air sensor from air filter box (Fig 3.2).
- Locate and remove the three bolts securing the air filter box. Two bolts are located to the left side of the box and one to the right.
- The air filter box is now ready to be removed. Lift the front of the air filter box and remove air filter box from air inlet tube. Once clear of the air inlet tube, lift air filter box and disconnect vacuum line bundle, located on the driver's side of the air filter box. This bundle of vacuum lines is secured to air filter box with a tab and it can pulled off.
- Remove air filter box.

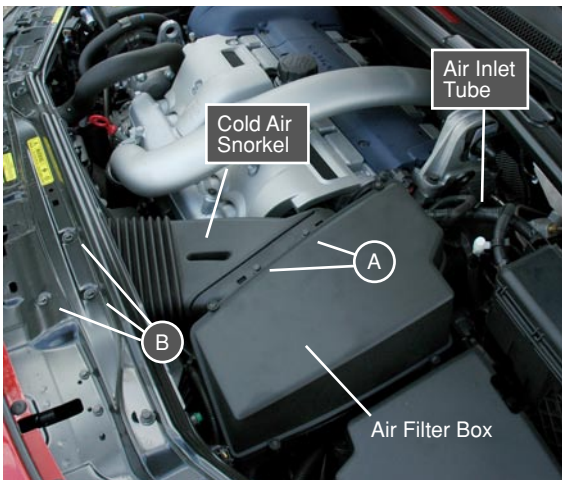


Figure 3.1

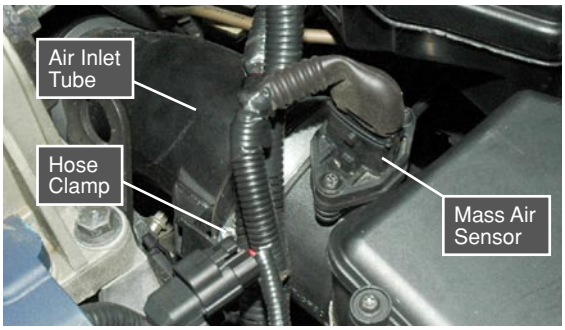
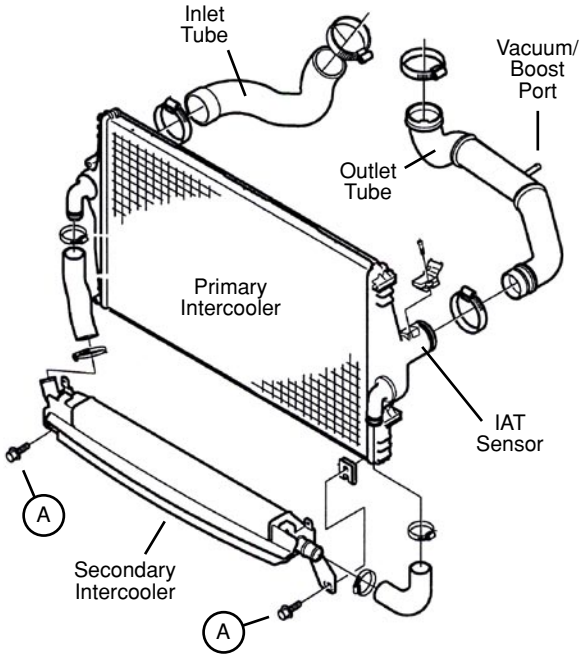


Figure 3.2

4.0 Removing Factory Intercoolers and Tubes

Note: For this step of the installation process it will be necessary to drain the engine coolant. At this point you may wish to replace your engine coolant, as well as radiator hoses. We recommend replacing hoses if they have been in use for more than two years or 20,000 miles, as they can become less flexible and prone to cracking and failure when handled.

The S60R utilizes two intercoolers, a large primary intercooler and a small secondary intercooler, in the factory intercooler system. The primary intercooler is secured between the AC condenser and radiator to form an assembly which is then attached to the radiator bulkhead. To remove the primary intercooler you must detach the AC condenser and primary intercooler from the radiator. The radiator and AC condenser will be lowered to extract the primary intercooler. The AC system does NOT need to be evacuated form this process, though care must be exercised when working with the various AC lines and components to prevent damage.



Factory Intercoolers and Tubes

Figure 4.1
Illustration / Volvo Cars North America

4.1 Remove Secondary Intercooler

- Locate the secondary intercooler connection hoses on each end of the secondary intercooler. Loosen all hose clamps (x4) for the left and right connection hoses.
- Locate and remove the two mounting bolts securing the secondary intercooler to the AC condenser (see Items A in Fig. 4.1).
- Remove secondary intercooler and intercooler connection hoses.

4.2 Remove Intercooler Inlet Hose and Outlet Tube

- Locate intercooler inlet hose (see Fig. 4.1).
- Loosen hose clamp securing intercooler inlet hose to intercooler.
- Loosen hose clamp securing intercooler inlet hose to the over-engine-pipe (OEP, the large tube running over top of engine from front to rear). Remove intercooler inlet hose.
- Locate vacuum/boost port on intercooler outlet tube (see Fig. 4.1). Remove hose from port.
- Locate and loosen hose clamp securing intercooler outlet tube to intercooler.
- Locate hose clamp securing intercooler outlet tube to underside of engine intake manifold. Loosen hose clamp and remove tube.

4.3 Remove IAT Sensor Harness

- Locate the intake air temperature (IAT) sensor, located on intercooler outlet (see Fig. 4.1). Disconnect wiring harness from IAT sensor. Locate and remove bolt securing IAT sensor to intercooler (T15 Torx bit). Carefully remove IAT sensor being sure not to damage O-ring seal.

4.4 Drain Engine Coolant

Note: You may wish to replace your engine coolant and radiator hoses as part of routine maintenance.

- Locate the plastic radiator drain plug/nozzle at the lower right (driver side) corner of the radiator (see Fig. 4.2).
- Remove cap from coolant reservoir in engine compartment.
- Position drain pan and loosen, but do not remove drain plug. Coolant will drain without the drain plug being completely removed.
- When coolant completely drained, retighten coolant drain plug.

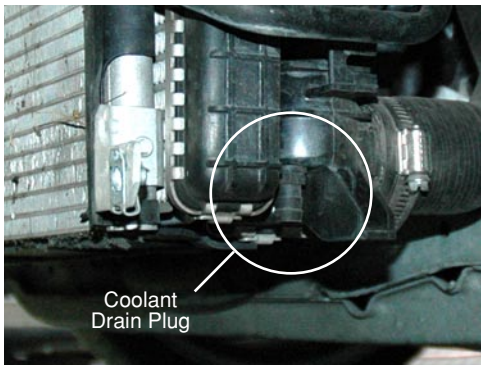


Figure 4.2

4.5 Disconnect Radiator Hoses

- Loosen hose clamps securing upper and lower radiator hoses to radiator.
- Disconnect upper and lower radiator hoses from radiator. Remove hoses completely if replacing with new hoses.

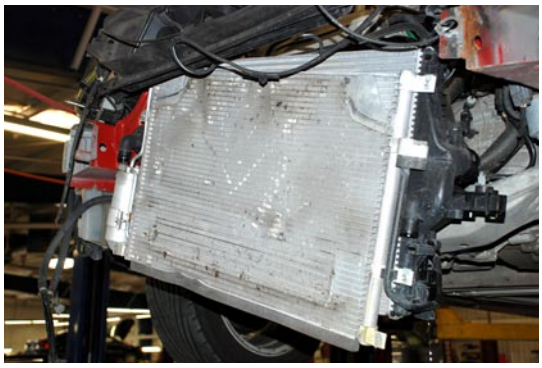


Figure 4.3

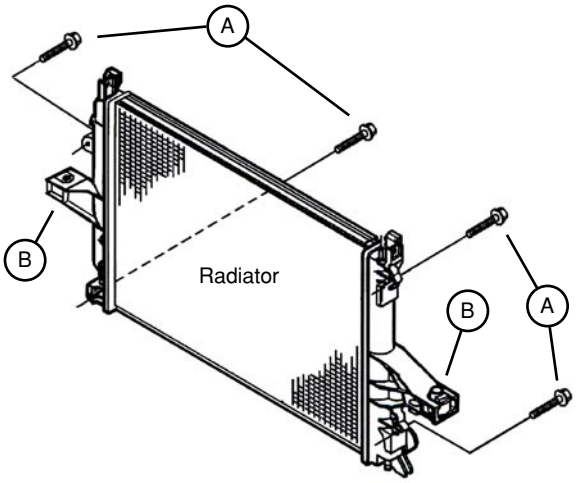
4.6 Remove Cooling Fan Assembly

- Locate and remove two (2) bolts securing cooling fan assembly to radiator. These will be located at the upper corners of the cooling fan assembly.
- Disconnect fan wiring harness.
- Lift fan assembly to disengage two (2) mounting tabs near bottom of fan assembly.
- Carefully lift cooling fan assembly from behind radiator, being sure not to damage radiator cooling fins or core when extracting the fan assembly.

4.7 Remove Primary Intercooler

Note: The AC condenser, intercooler and radiator are lowered together (see Fig. 4.3) before removing the intercooler. The AC condenser is not completely removed from the vehicle and the AC lines are NOT disconnected during this process. Care must be given to ensure the AC lines and connections are not damaged during this process.

- Locate wiring connector on AC condenser, on passenger side, attached to AC Dryer (silver canister). Disconnect connector.
- Locate and remove the two (2) bolts securing top of radiator to radiator bulkhead.
- Locate the four bolts connecting the AC condenser, primary intercooler and radiator (see Items A in Fig. 4.4). Remove the two upper connecting bolts. Remove the two lower connecting bolts.
- Locate and remove the two (2) bolts securing the radiator to the vehicle (see Items B in Fig. 4.4). Carefully lower radiator, AC condenser and intercooler into position shown in Fig. 4.3.



Radiator/AC Condenser/Intercooler Mounting Points

Figure 4.4

Illustration / Volvo Cars North America

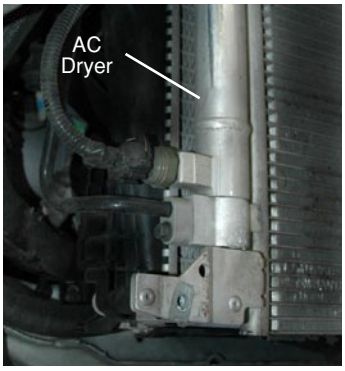
- Carefully separate AC condenser and radiator from intercooler and remove intercooler. It will be necessary to extract the intercooler towards the top of the AC condenser and radiator due to the various AC lines. Exercise care to avoid damaging AC condenser and radiator fins during this process.

4.8 Reposition AC Dryer

Note: This step may or may not be required for your particular vehicle. V70R model years 2004-2005 use a larger AC dryer canister than the later 2006-2007 models (see Fig. 4.5 and 4.6). If your vehicle is equipped with the smaller AC dryer canister you will not need to perform this step and should skip to Step 4.9.

This step in the installation process requires repositioning the AC dryer (see Figure 4.7) by bending the AC dryer bracket slightly. This procedure does not require any special tools, equipment or techniques. However, the bracket to be bent is attached to the AC condenser and care must be taken not to damage the AC condenser during the process. Do not force AC lines during the removal process.

Early Style AC Dryer Figure 4.5

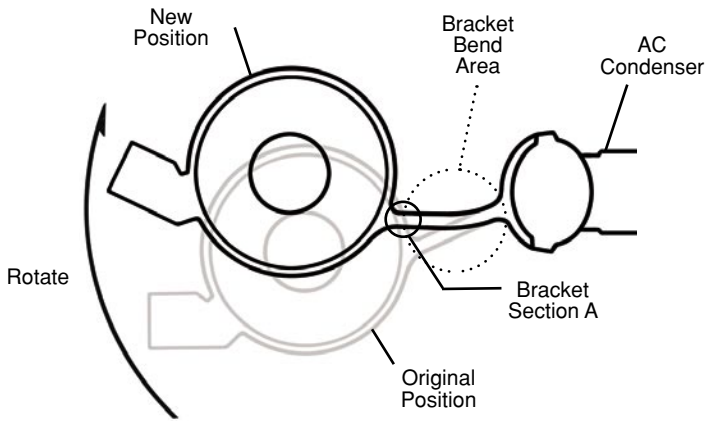


Late Style AC Dryer Figure 4.6

The AC dryer is attached to the AC condenser with an aluminum bracket. This bracket is fairly easy to bend into the new position by rotating the AC dryer as shown in Figure 4.7. The AC dryer will be moved approximately 1" when rotated from it's original position. The before and after positions of the AC dryer can be seen in Figures 4.8a and 4.8b.

- Grip the AC dryer canister firmly with both hands or with a large pair of channel lock pliers. Carefully rotate AC dryer canister, bending the bracket as shown in Figure 4.7. Only the aluminum bracket should bend within the bracket bend area indicated in Figure 4.7.

When the AC dryer is properly positioned Section A of the bracket will be in line with the face of the AC condenser (see Figures 4.7, 4.8a and 4.8b).



AC Dryer Positions - Bottom View Figure 5.7

4.9 Reassemble AC Condenser and Radiator

- Reassemble radiator / AC condenser assembly. At each of the four connecting points position supplied Radiator/AC Condenser Spacer between the radiator and AC condenser and insert supplied bolt and washer assembly into each corner of the radiator /AC condenser assembly (see Figure 4.9, Note: Spacer, normally black, is shown here in silver for photographic clarity).

Figure 5.8a

Figure 5.8b

- On vehicles with larger AC dryer canister check clearance of AC dryer to radiator. There should be no contact between AC dryer and radiator, if there is contact, carefully rotate AC dryer to provide additional clearance (see Step 4.7). There should be at least 1/8" between AC dryer canister and any part of the radiator.
- Tighten four (4) bolts to secure AC condenser to radiator.
- Return AC condenser / radiator assembly to original position and reinstall two (2) bolts securing radiator to vehicle (see Items B in Fig. 4.4). Do not tighten these bolts until after step 6.2. Do not reinstall two (2) bolts securing top of radiator to radiator bulkhead.

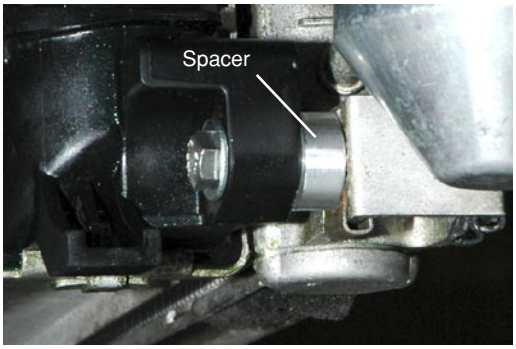


Figure 5.9

5.0 Drilling, Trimming and Misc.

5.1 Installing Horn Brackets

Installation of the larger intercooler requires the use of new horn brackets. These brackets rotate the horns from their original vertical position in the upper grill opening to a horizontal position (see Fig. 5.1). The following brackets and fasteners are provided with your intercooler system:

New Components

Horn Bracket - Left	(x1)
Horn Bracket - Right	(x1)
M6-1.0 x 20mm Bolt - Hex Head	(x2)
M6-1.0 Hex Nut (Mechanical Locknut)	(x2)
M6 Washer	(x4)

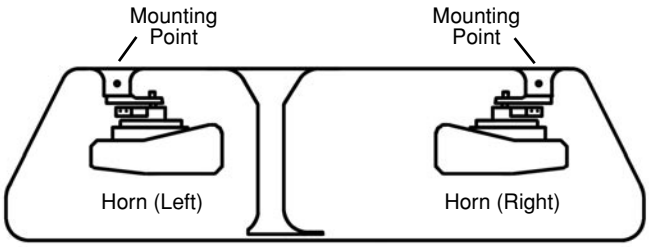


Figure 5.1

- Remove horns and original brackets. Locate and remove bolts securing the twin horns in the upper grill opening. Note orientation of horns. The horns are secured with one bolt per horn. Disconnect wiring connector from each horn. Remove horns and label as “Right” and “Left.”
- Remove factory brackets from each horn. Secured with a single bolt which will be used to attach the new horn brackets.
- The factory horns have a trumpet style shape and the opening of that shape is in close proximity to the top of the new intercooler. This proximity can reduce the effective volume level of the horns and we recommend that you trim the horn trumpet slightly to allow for proper horn volume.

  Referring to Figure 5.3, trim each horn using a hacksaw.
- Identify new left and right brackets and attach to horns as shown in Figure 5.2 (Left side horn and bracket shown, reverse for right side). Tighten bolts. Note: Left refers to passenger side, right to driver side.
- Place horns into grill opening, behind power steering cooler and install using the supplied nuts, bolts and washers. Note that the horns are now rotated 90º from their original position. Figure 5.1 shows the horns in their new positions (power steering cooler not shown) with mounting bolts for brackets facing up, rather than forward. Note position of wiring connectors, these should face forward. Align horns and tighten.
- Attach wiring connectors to each horn.

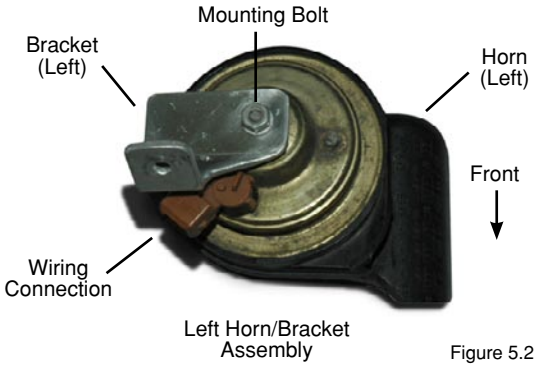


Figure 5.2

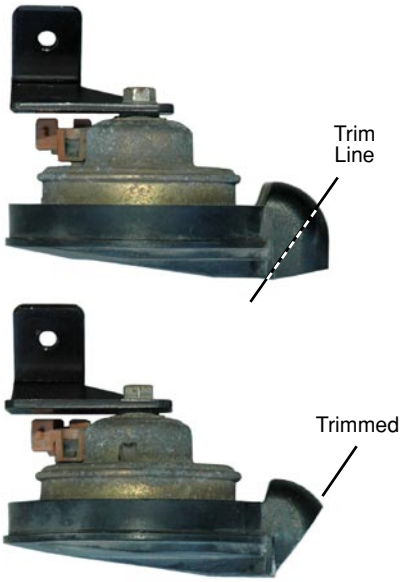


Figure 5.3

5.2 Trim Radiator Bulkhead

Note: This step involves cutting and/or grinding to remove metal from the upper radiator bulkhead. This material is removed the enlarge the opening for the AC charging port. A hacksaw and file or a Dremel tool with cutting wheel and grinder will accomplish the job with little difficulty. However, if you are not comfortable with tackling this job yourself, any good paint and bodyshop will be able to do this for you.

- Locate AC charging port opening in radiator bulkhead. It is located just above the left edge of the upper grill opening, as shown in Figure 5.3 and Figure 5.4b (detail).

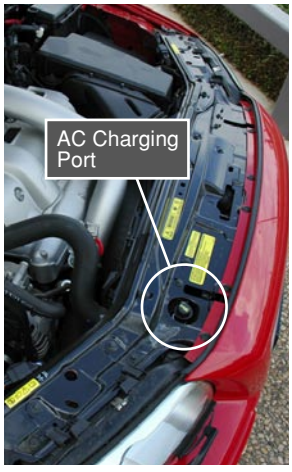


Figure 6.3


Figure 6.4a

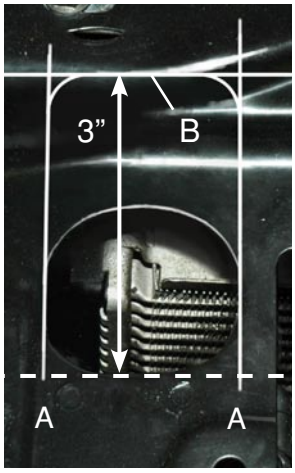


Figure 6.4b

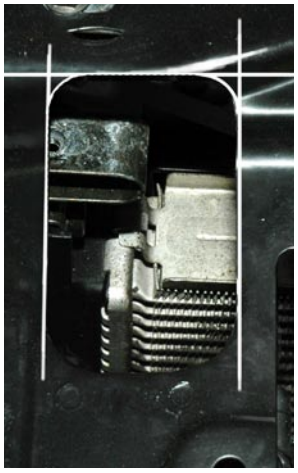


Figure 6.4c

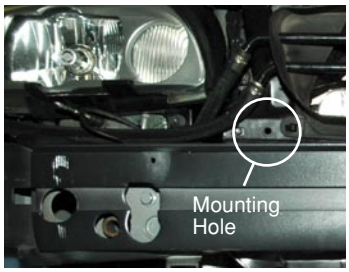
- Using a grease pencil draw a line straight back from the edge of the existing hole in the radiator bulkhead (Items A in Figure 5.4b).
- Draw a line across, connecting the two previous lines, 3 inches from the bottom of the opening (Item B in Figure 5.4b).
- Radius each of the upper corners as shown in Figure 5.4b. A .5" radius is shown.

Using a hacksaw or cutting tool, cut carefully along lines. Exercise care to avoid damaging the radiator. Smooth edges with flat and round files. Figure 5.4c shows the finished AC charging port opening shape.

- Coat any exposed metal with touch-up paint.
- Properly reposition radiator and AC condenser assembly and tighten two (2) bolts securing top of radiator to radiator bulkhead.
- Tighten two (2) bolts securing radiator to vehicle (see Items B in Fig. 4.4).
- Reinstall upper and lower radiator hoses and refill engine coolant with specified type and quantity. Close coolant reservoir cap.

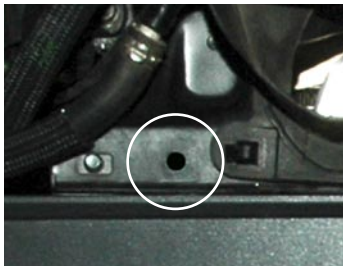
5.3 Enlarge Intercooler Mounting Bracket Holes

- Locate the two holes to be used for new intercooler mounting brackets. These are located on either side of the upper grill opening and are attached to a flange at the back of the bumper cross member (as shown in Figures 5.5a and 5.5b). A detail photo is shown in Figure 5.6.
- Using the .457 drill bit, enlarge each of the two holes. The holes are only approximately .25" deep, only drill deep enough to properly enlarge the holes to prevent damage to radiator.



Left Side Figure 5.5a

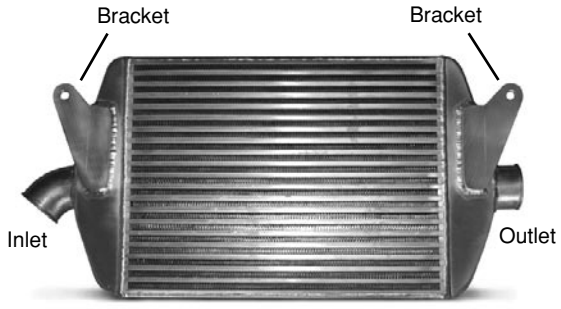
Right Side Figure 5.5b


Left Side - Detail Figure 5.6

6.0 Installing New Intercooler

New Components

AC Condenser / Radiator Spacer	(x4)
M10-1.25 x 60mm Bolt - Hex Head	(x2)
M6-1.0 x 40mm Bolt - Hex Head	(x4)
M10 Washer	(x4)
M6 Washer	(x4)
M10-1.25 Hex Locknut (Mechanical)	(x2)
Intercooler	(x1)
Intercooler Spacer	(x2)



Intercooler - Front View

Figure 6.2

6.1 Install New Intercooler

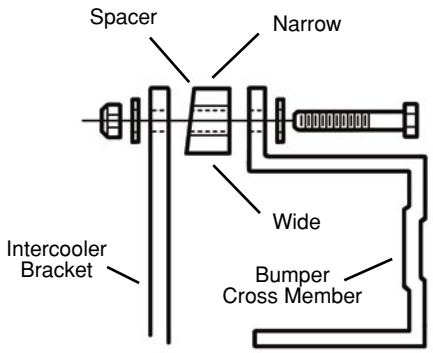
Th

installed properly there will be approximately a .5" gap between the Intercooler face and the AC condenser face. The Intercooler should be parallel to the AC condenser.

Pay

intercooler will not align with the AC condenser face.

- Move intercooler into position in front of AC condenser. Be careful not to damage cooling fins on Intercooler or AC condenser.
- Install mounting fasteners and spacers through as shown in Figure 6.3. Be sure spacers are rotated as shown, with widest section to the bottom, to ensure proper spacing between the intercooler and AC condenser.
- Align bottom edge of Intercooler to bottom edge of radiator / AC condenser Assembly and tighten mounting fasteners.
- Check for proper alignment and spacing between intercooler and AC condenser (approximately .5") and parallel mounting to the AC condenser.



Bracket and Fastener Diagram

Figure 6.3

7.0 Installing New Intercooler Tubes

New Components

Intercooler Inlet Tube	(x1)	Hose Clamp (T-Bolt) - 3.0"	(x2)
Intercooler Outlet Tube	(x1)	Silicone Hose - Straight 2.5" Dia.	(x1)
Throttle Inlet Tube	(x1)	Silicone Hose - Straight 3.0" Dia.	(x1)
Hose Clamp (T-Bolt) - 2.0" or 2.25"	(x1)	Silicone Hose - Bellows 2.5" Dia.	(x2)
Hose Clamp (T-Bolt) - 2.5"	(x7)	Silicone Hose - Reducer 2.0" or 2.25" - 2.5" Dia.	(x1)

Note: To ensure the intercooler tubes are securely installed you will need to properly position the silicone hose and hose clamps in f
of the tube under high boost pressure.

Fo -
er tubes mark all tubes with a line 1" in from the bead. This will allow you be sure the clamp and hose are properly positioned.

Hose clamps should be tightened to the point where the silicone hose cannot be rotated against the metal tube. Overtightening can result in cutting and damaging the silicone hose.

7.4b and 7.4c to allow for easy access for tightening while not rubbing on the front fascia bodywork.

7.1 Relocate Wiring Harness

To avoid damage to wiring harness due to close proximity to accessory drive belt and pulley it is necessary to relocate a short portion of the wiring harness. This section of wiring harness is located behind radiator and lower left corner of radiator and runs between the engine and the radiator. To relocate this section you will disconnect the tabs securing the harness, wrap the harness in a poly wire loom (provided with system) and relocate the harness closer to the radiator. Care must be exercised when working with the wiring harness so as not to damage any of the wires.

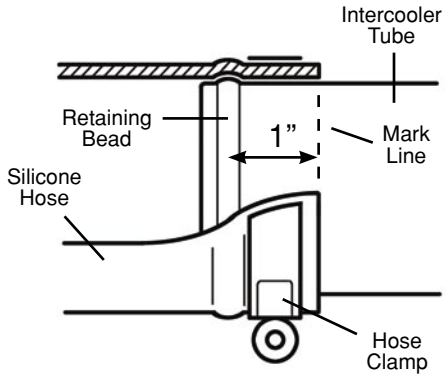
- Locate wiring harness. Harness is located between the radiator and engine near lower left corner of radiator. Note position of harness in relation to crossmember and radiator. Harness will be moved forward towards radiator.
- Locate and remove bolt securing wiring harness guide to engine crossmember.
- Separate two halves of wiring guide. Carefully clip zip ties as needed so as not to damage any wires.

Figure 7.1

- Extract wiring harness from guide to just past securing bolt.
- Using a hacksaw or suitable cutting tool carefully cut wire guide .5” outboard of mounting tab securing guide. Cut both halves of guide. Remove cut section of guide.
- Using electrical tape carefully wrap exposed wiring harness to keep loose wires bundles. Use tie wraps to secure taped bundle every six inches.
- Carefully insert exposed wiring harness into poly wire loom (provided with system). Secure ends of wire loom with tie wraps.
- Reposition fully wrapped wiring harness forward towards radiator. Harness will be held away from accessory drive belt and pulley by intercooler inlet tube.

7.2 Install Intercooler Inlet Tube

- Mark both ends of intercooler inlet tube with line 1” from bead (see Fig. 7.2).
- Position silicone reducer hose (2.25” - 2.5” dia.) and 2.25” hose clamp on over-engine-pipe (tube running forward across top of engine). Position hose clamp so it will not contact any surrounding components during engine movement (approx. .25” gap). Tighten clamp.
- Position second hose clamp (2.5”) on opposite end of silicone reducer hose.
- Install bellows (hump) silicone hose (2.5” dia.) and 2.5” hose clamp on Intercooler inlet (see Figs. 7.3a and 7.3b). Position properly behind bead and tighten hose clamp (see Fig. 7.2).
- Position a second hose clamp (2.5”) on opposite end of silicone bellows hose at Intercooler inlet.
- Install intercooler inlet tube. Both ends of tube will be inserted into the respective hoses at the same time.
- Position tube so it will not contact any surrounding components, a .25” gap should be sufficient to account for engine movement.
- When tube is properly positioned, tighten hose clamps.



Hose and Clamp Placement Diagram

Figure 7.2

Note: There is a small plastic tab located on the back of the radiator assembly, for positioning a wiring harness, which may rub on tube. If it does rub, carefully remove the tab with a hacksaw and file rough edges.

7.3 Install Intercooler Outlet Tube

Note: Tube is equipped with a port to allow for installation of Aquamist water injection system. Remove port plug for use.

- Mark both ends of intercooler outlet tube with line 1” from bead (see Fig. 7.2).
- Install bellows (hump) silicone hose (2.5” dia.) and 2.5” hose clamp on Intercooler outlet (see Figs. 7.4a, 7.4b and 7.4c). Position hose and clamp properly behind retaining bead and tighten hose clamp (see Fig. 7.2).
- Position a second hose clamp (2.5”) on opposite end of silicone hose. Note position of clamp (see Fig. 7.4c).
- Install intercooler outlet tube. Do not tighten clamps.

Figure 7.3a

Figure 7.3b

7.4 Install Throttle Inlet Tube

- Mark both ends of throttle inlet tube with line 1” from bead (see Figure 7.2).
- On large end (3.0” dia.) of throttle inlet tube position straight silicone hose (3.0” dia.) and hose clamp (3.0”). Position so 1” of hose extends past end of throttle inlet tube. You will need estimate position of hose clamp and test install onto throttle inlet to determine final position. When final position is determined, tighten hose clamp.

Figure 7.4a

Figure 7.4b

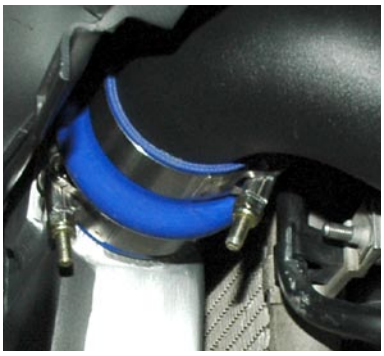


Figure 7.4c

- Position second hose clamp (3.0”) on silicone hose and install on throttle inlet. Be sure hose and clamp are seated squarely against throttle inlet. Snug hose clamp to allow you to rotate hose into position with intercooler outlet tube.
- Install straight silicone hose (2.5” dia.) and hose clamp (2.5”) on other end of throttle inlet tube. Do not tighten.
- - tioning hose and clamps according to bead reference line. Position tubes with a minimum of .25” of clearance to all surrounding components. Check that silicone hose and hose clamp at throttle inlet are still squarely seated against throttle inlet.
- Tighten hose clamps, including throttle inlet clamp.
- Recheck clearance of both tubes, providing a minimum of .25” of clearance from all surrounding components. Adjust as needed.

7.5 Install Hoses and IAT Sensor

- Reinstall vacuum/boost hose, attaching to hose boss on throttle inlet tube (see Fig. 7.5).
- Using supplied bolt and washer, reinstall IAT sensor attaching to mounting boss on intercooler outlet tube as shown (see Fig. 7.5).
- Reconnect IAT sensor wiring harness.

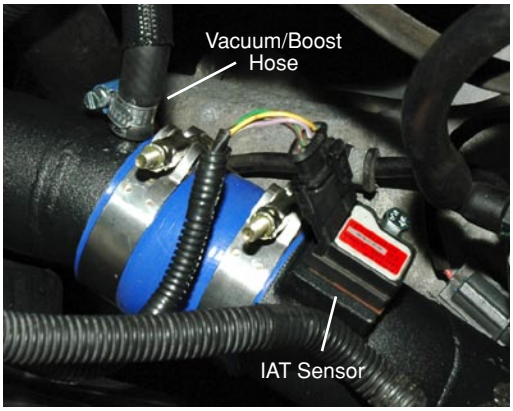


Figure 7.5

7.6 Recheck Clearances and Hose Clamps

Before proceeding, recheck all tube clearances. Also recheck all hoses and hose clamps to ensure they are properly positioned to the bead reference lines and are properly tightened. Be sure to check both hose clamps at the throttle inlet.

At this time also check for any wiring harnesses or other components that may have come loose during the installation. This is especially important in the area surrounding the engine drive belts as any loose wiring or component that comes into contact with this belt could be severely damaged.

15 minutes spent looking for potential problems now can prevent expensive and/or dangerous damage later.

8.0 Reinstall Air Filter Assembly

Reinstall air filter box in reverse sequence of removal (Section 3.0, pg. 4).

- Reattach vacuum line bundle to tab on side of air filter box.
- Insert air filter outlet into air inlet tube. This tube will snap in place when properly positioned.
- Reconnect mass air sensor harness.
- Install three bolts securing air filter box. Only tighten lower right bolt, leave others loose so air filter box can be shifted during installation of cold air snorkel.
- Insert cold air snorkel into slot in radiator bulkhead. Be sure the snorkel fits over receiver within the radiator bulkhead.
- Install bolts securing cold air snorkel to radiator bulkhead. Tighten.
- Insert other end of cold air snorkel into air filter box. Be sure tabs engage.
- Install bolts securing cold air snorkel to air filter box and tighten.
- Tighten remaining two air filter box bolts.
- Tighten hose clamp connecting air filter box to air inlet tube.

9.0 Start Engine and Check Connections

NOTE: PRIOR TO STARTING ENGINE BE SURE RADIATOR HOSES ARE SECURELY REINSTALLED AND ENGINE COOLANT HAS BEEN REPLACED AND IS AT RECOMMENDED LEVEL. FAILURE TO REPLACE COOLANT CAN RESULT IN SEVERE ENGINE DAMAGE.

Be
check the engine and make sure all components are functioning properly. The car will not be driven at this time, but this will allow you to determine that all wiring harnesses, vacuum/boost lines, and intercooler tubes have been connected properly.

- Remove car from jack stands or lift.
- Reconnect battery.
- Start engine and allow engine to warm to operating temperature. Watch temperature gauge closely and check for function of engine cooling fan.
- Engine should idle and rev normally. If it does not, shut off engine and check for loose intercooler tubes/hoses and disconnected wiring harnesses. Restart engine and check for normal idle and revs.
- Shut off engine and disconnect battery.
- Place car back on jack stands or lift to complete installation of front fascia bodywork.

10.0 Trim and Install Front Fascia (Nose Section)

This step requires relatively easy trimming of the plastic and urethane components of the front fascia and underbody tray. All trimming can be easily accomplished with a hacksaw or cutting wheel and cleaned up with a file and sand paper.

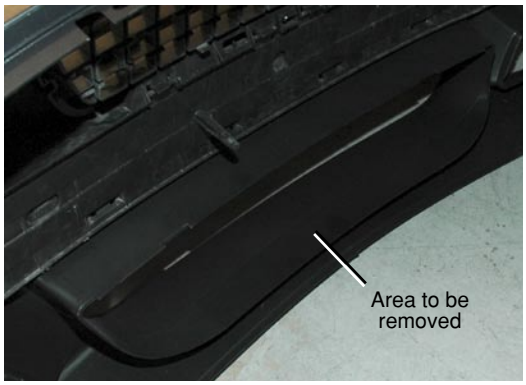


Figure 10.1

10.1 Trim Lower Grill Opening

To provide adequate room for the new intercooler it is necessary to trim the back of the lower grill opening (see Fig. 10.1). Volvo has provided a convenient trimming line in the form of the edge of the painted surface in this area (see Fig. 10.2a). You will be applying a strip of masking tape along this paint line to protect the paint and provide a cutting guide. Overlap tape onto unpainted surface by approximately 1/8". This will prevent you from cutting through the painted surface and will prevent paint from chipping during the cutting process.

- Identify paint line on lower grill area (see Fig. 10.2a).
- Apply masking tape to the painted side of this line, covering painted surface (see Fig. 10.2b).
- Using hacksaw or cutting wheel, carefully cut along line.
- Clean up cut edge with file and sandpaper. The finished cut can be seen in Figure 10.2c.

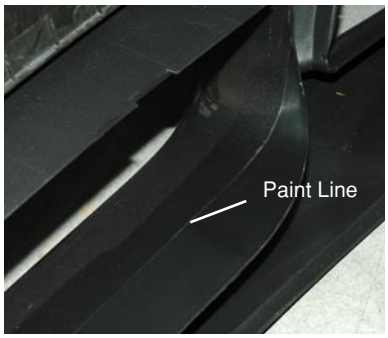


Figure 10.2a

Figure 10.2b

Figure 10.2c

10.2 Trim Left Driving Light Area

To provide space for the intercooler inlet tube it is necessary to trim a portion of the front fascia in the area behind the left side (passenger side for US/Canada market cars) as shown in Figures 10.3 and 10.4a.

- Using grease pencil draw cut lines on front fascia as shown in Figure 10.4b.
- Using hacksaw or cutting wheel, carefully cut along lines.
- Clean up cut edges with file and sandpaper.
- Finished cut can be seen in Figure 10.4c.

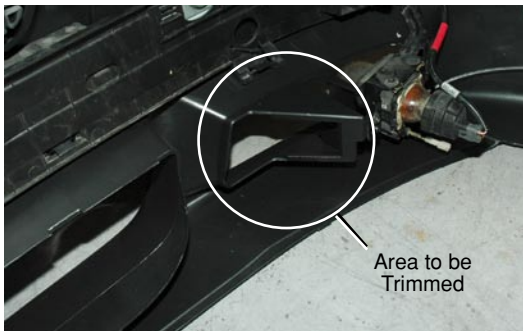


Figure 10.3

10.3 Trim Left Driving Light Grill Tab

- Remove driving light insert from left side front fascia (passenger side for US/Canada market cars).
- Identify tab indicated in Figure 10.5.
- Cut off tab and clean up cut edge with file and sandpaper.
- Reinstall driving light insert into front fascia.

Figure 10.4a

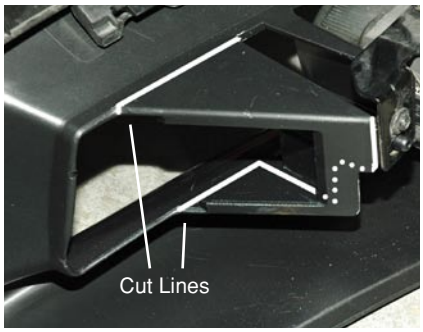


Figure 10.4b

Figure 10.4c

10.4 Trim Underbody Tray

To provide space for the intercooler inlet tube it is necessary to trim a portion of the underbody tray in the area behind the left side (passenger side for US/Canada market cars) as shown in Figure 10.6a.

- Using grease pencil, draw cut lines on underbody tray (see Fig. 10.6b).
- Using hacksaw or cutting wheel, carefully cut along lines.
- Clean up cut edges with file and sandpaper.

10.5 Reinstall Underbody Tray

- Reinstall underbody tray in reverse sequence of removal.
- Insert right side tab into slot below bumper.
- Secure rear mounting points with bolts.

10.6 Reinstall Front Fascia

Reinstall front fascia in reverse sequence of removal process (see Step 2.0, pg 3).

- Position front fascia in front of car and connect driving light wiring connectors.
- Lift fascia and guide into position. Be sure to feed headlight washer tubes through headlight wiper openings.
- The upper corners of the fascia, at the fender, must be guided into small retaining grooves. Fascia should be flush with fender.
- Position rear edges of fascia on securing clips (see Fig. 2.5).
- Tighten securing clips at each rear edge (Torx T25 fastener).
- Install front mounting bolts and tighten.
- Install six plastic rivets across radiator bulkhead.
- Install headlight wipers and connect washer tubes.

Driving Light Insert (Left)

Figure 10.5

Figure 10.6a

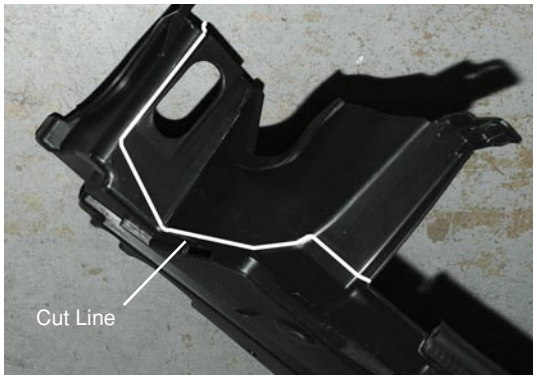


Figure 10.6b

11.0 Test Drive and System Checks

Test Drive and System Checks

Testing should be done with the radio and AC/heat fan off and with all windows rolled up to allow you to properly hear the engine. Allow engine to reach operating temperature and make certain the engine is running smoothly and normally, both at idle and under load, prior to applying boost.

- When the engine has cooled, check the area around the engine drive belts to be sure no wiring harnesses have worked loose and come into contact with the engine drive belts.
- Recheck engine coolant level and fill as needed.

Installation is now complete.

It
position. This is also the time to check for any potential clearance issues.