Step 1 - Removing the Front Bumper Bar

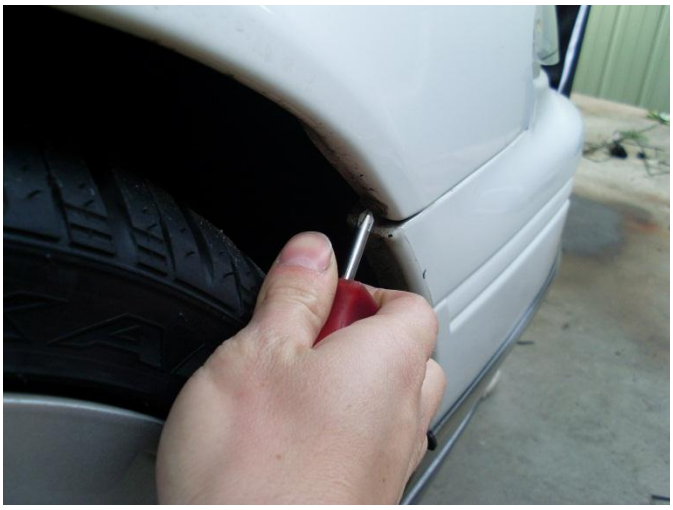
WARNING: Disconnect the negative battery terminal for safety reasons.

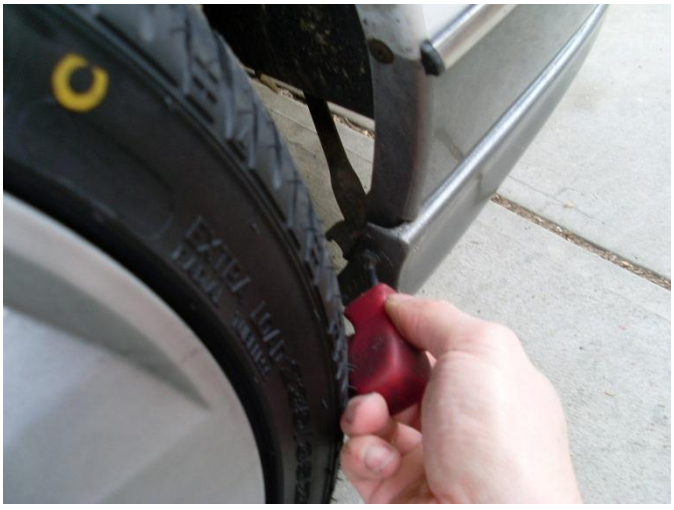
NOTE: Step 6 of this process requires that the core be allowed to set overnight and can be completed first, such that it can set while steps 1-5 are undertaken.

The VS Commodore's front bar is retained by a large number of screws. Most of the exterior screw locations are shown below while some are also hidden on the inside of the bumper.

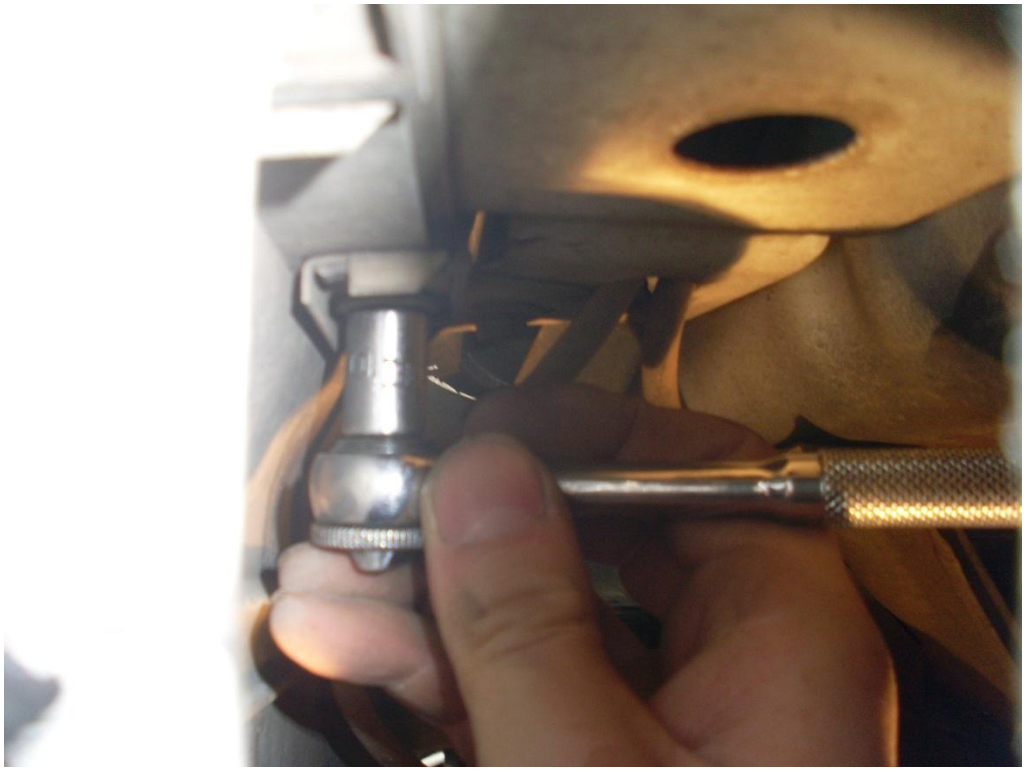
If your vehicle is fitted with 20 inch wheels and/or lowed, it may be helpful to jack up the vehicle and remove the front tyres for easier access to inner bolts.

Remove all the screws retaining the bar as shown in the following images.





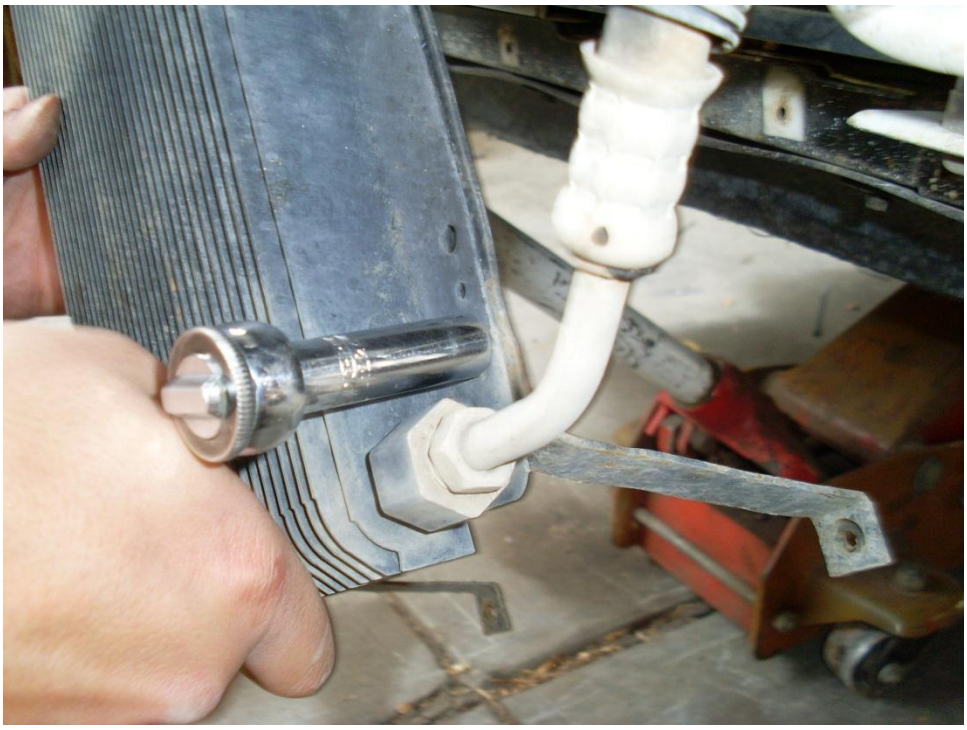
The following images show the screws on the inside of the bumper which need to be removed.

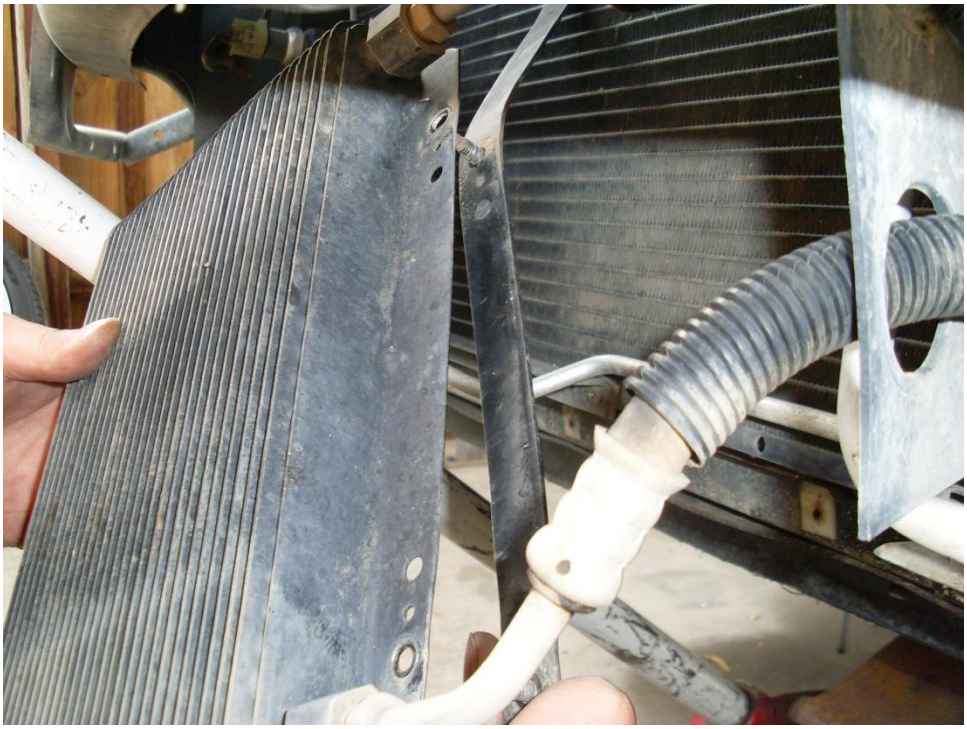


Step 2 – Relocating the Transmission cooler

Once the bar is removed, proceed by removing the transmission cooler which must be relocated onto the new front mount heat exchanger/radiator. Remove the 4 screws which fasten the brackets onto the top and bottom of the body work/chassis as shown below.

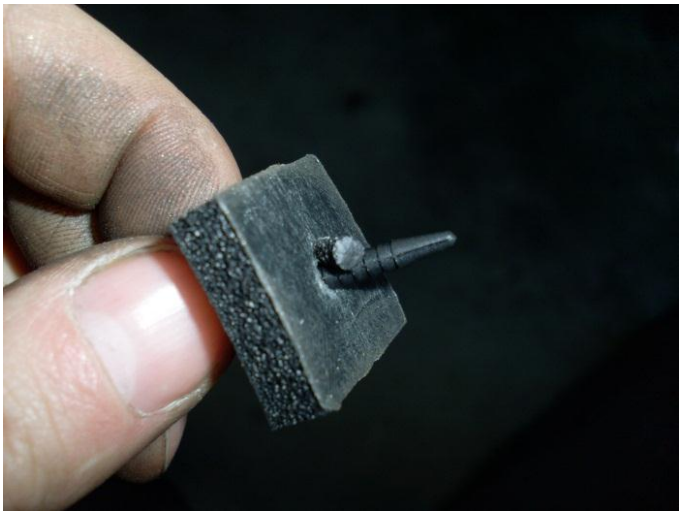
Remove the 2 brackets (top and bottom) behind the transmission cooler by undoing the nuts which retain the brackets as shown below. **NOTE: Keep the oil lines attached as the transmission cooler must not be completely removed in order to be relocated.**

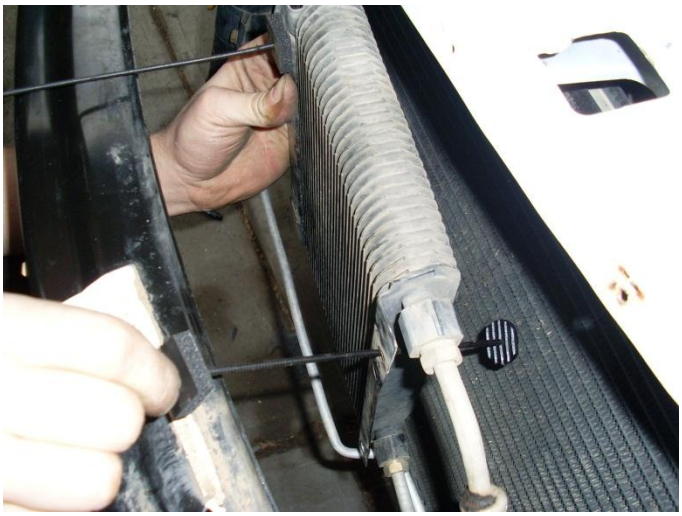


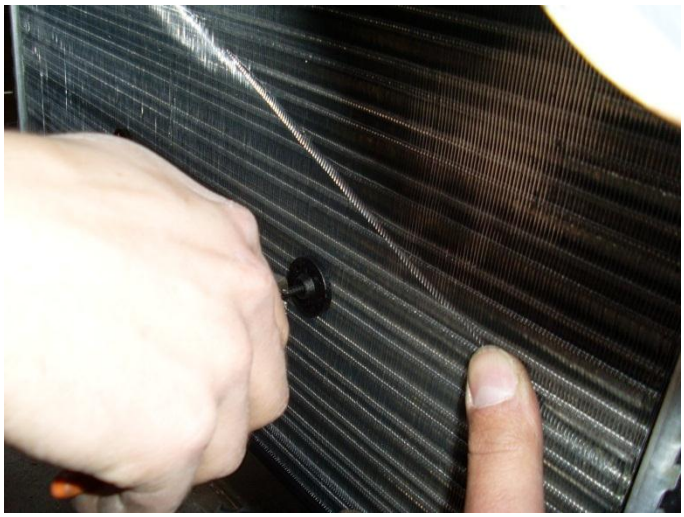


This panel must be cut off for extra clearance

The transmission cooler should be mounted onto the Large W2A Radiator core with the use of the Transmission cooler mounting kit which contains four nylon rods with locks and four rubber pads.
NOTE: The Trans cooler may also be mounted onto the condenser/radiator for a neater look.
The nylon rods should initially be inserted through the pads (which provides a backing) and then through the transmission cooler and radiator before the locks are inserted on top for support. The procedure is shown below.







The heat exchanger does not need to be bolted on at this stage and can simply be held up for this fitment. The fins may need to be slightly alleviated (with a thin screwdriver or similar) in order to easily slip the nylon rods through the heat exchanger. Trim the nylon rods back once the locks have been fitted.

Step 3 – Fitting the Front mount heat exchanger

The hole at the top of the radiator must be blocked off using the M20 plug provided. Be sure to use **Teflon tape** on all threads to prevent water leakage.

Orientation of the front mount radiator is such that the plug faces outwards on the passenger side of the vehicle.

Position the bracket with the LONGER flange onto the driver's side of the radiator and drill a hole into the bottom of the reo bar as shown. The brackets are of different sizes to offset the radiator in order to accommodate for the air-conditioning drier/receiver.

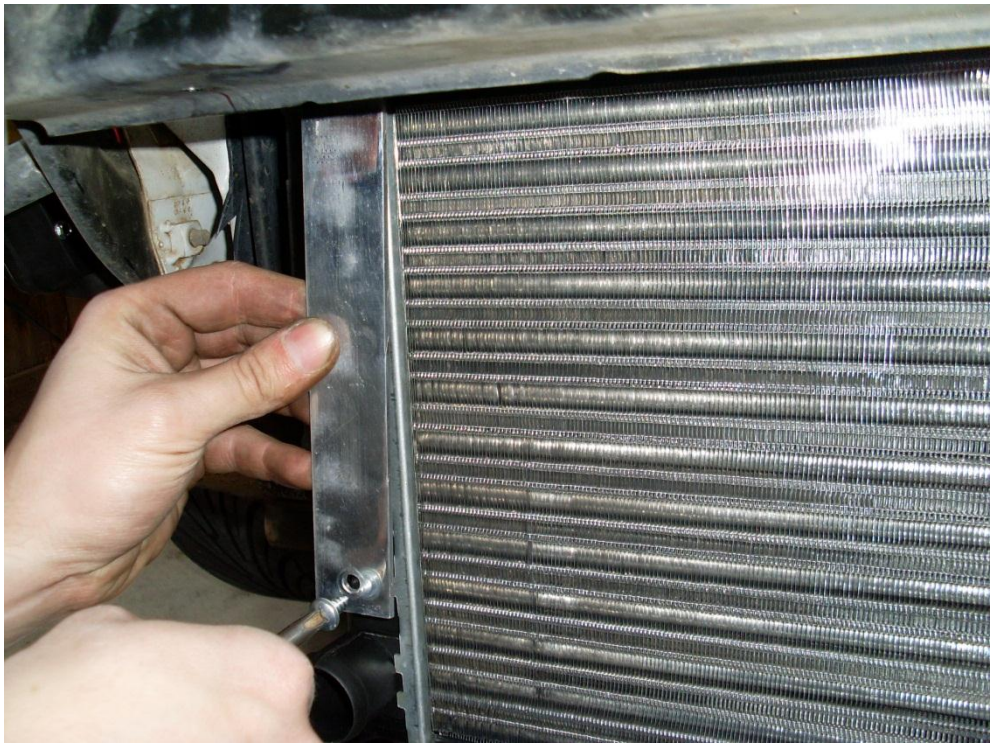
Once the hole is drilled, it is possible to place a mark (using a pencil) on the bracket to locate the position of the hole to be drilled into the bracket.

Repeat this process on the passenger side this time using the bracket with the SHORTER flange.

Once the brackets have been marked (shown in blue), begin drilling the holes.

The holes which are drilled will use the 5mm self-tapping screws to secure the bracket to the reo bar.

The pre-drilled hole on the bracket is used in conjunction with the pre-tapped radiator mounting holes. The 5mm button headed screws are used to secure the bracket onto the radiator. Repeat this process for both brackets/sides.

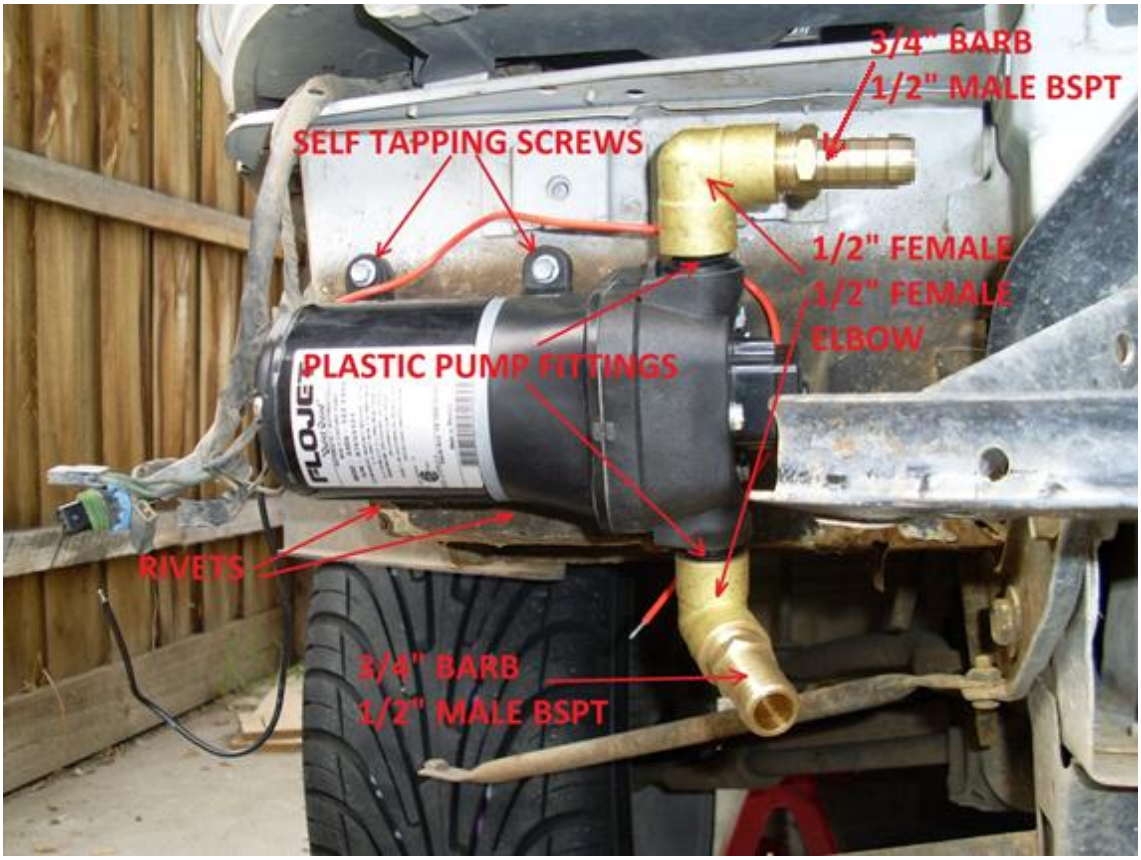


The brackets are mounted to the reo bar using the 5mm self-tapping screws provided. Using a socket wrench, screw them into the reo bar and through the bracket.

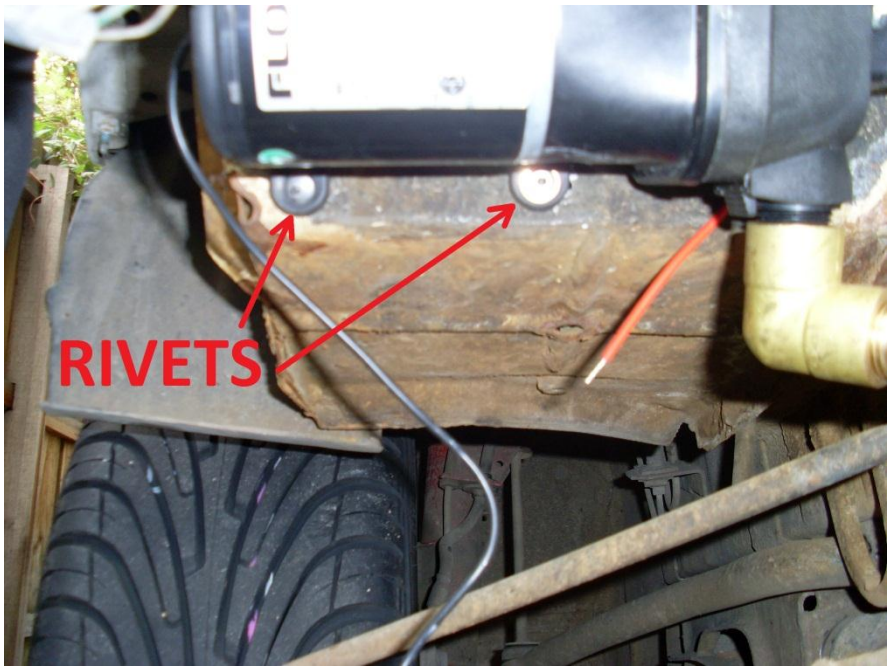
Step 4 – Fitting the water pump and radiator connections

Remove the secondary horns (where necessary) as shown below.

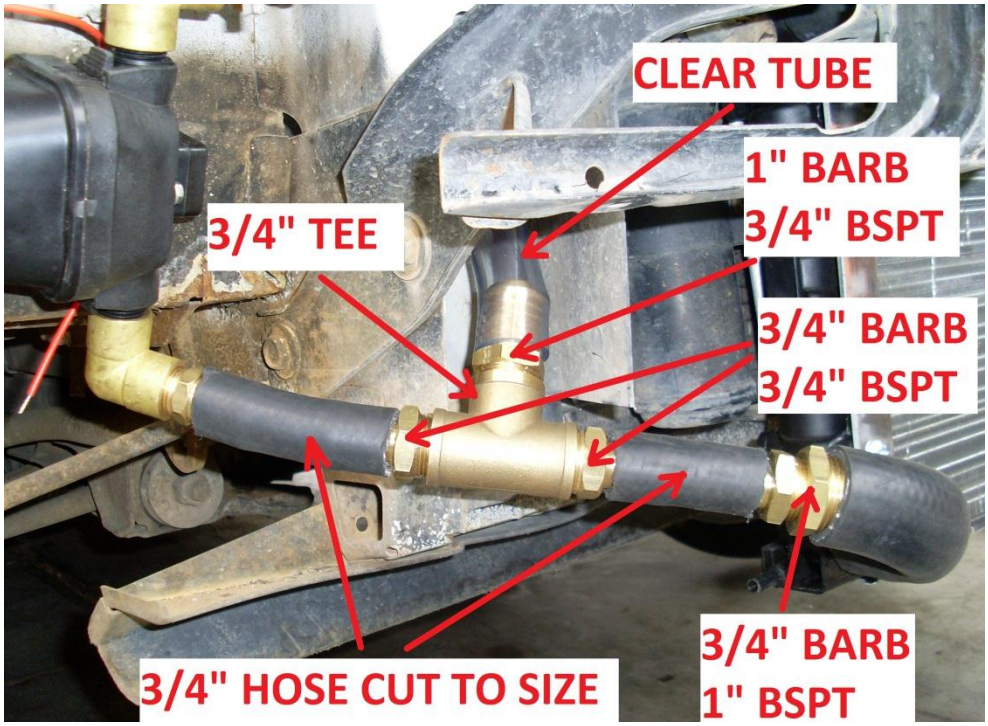
The image below shows the location of the pump and the fittings required. Be sure to use Teflon tape on all threads



The top side of the pump should be fastened using the provided 5mm self-tapping screws. The bottom side must be secured using rivets, to prevent drilling through the battery behind the bodywork. The rivets are also provided.



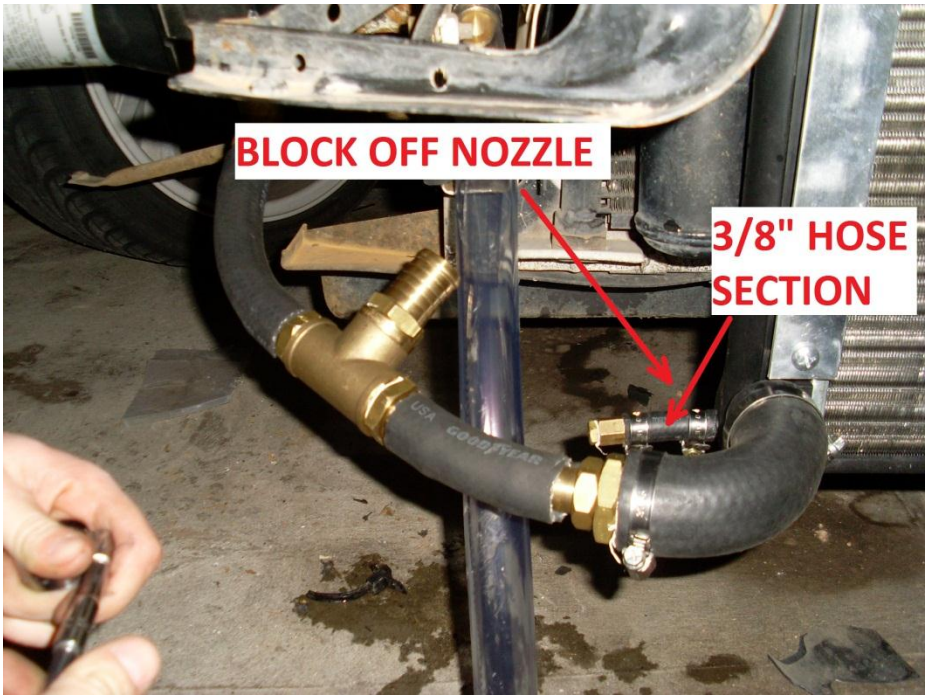
The image below shows the connections between the pump and the heat exchanger.
Note: The image shows the fitting on the rubber elbow made up of 2 pieces. The updated kit supplies a single ¾" barb 1" BSPT piece to replace the 2 fittings.



The clear tube is used as a filler tube/water level gauge and should be trimmed at the top to a suitable size. The end should be blocked off using the 1” end plug and secured using a hose clamp.

Create a block off for the nozzle on the radiator with the fittings shown below. Block the supplied 5/16” Barb with the 1/8” end plug plug (shown below) again using Teflon tape and secure both using a spanner and a shifter.

Now slip the 3/8” hose onto the barb and secure it with a 14-27MM hose clamp before slipping it over the nozzle as shown below.



Secure all the fittings using hose clamps as shown below.

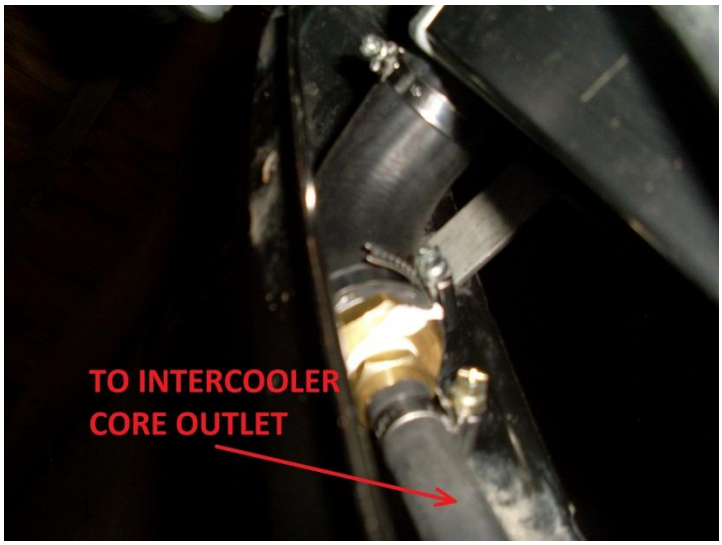
Cut a length of ¾” hose (enough to reach intercooler core) and connect it to the top connection on the pump as shown below.

This hose will eventually feed to the intercooler core inlet.

Construct the connection shown below with the supplied fittings

The location of this connection is on the top right side of the radiator which is hidden by the reo bar. The approximate location is indicated by the red arrow.

Secure the connection using hose clamps as shown below. Once again cut a length of 3/4” hose (enough to reach intercooler core) and attach it as shown.

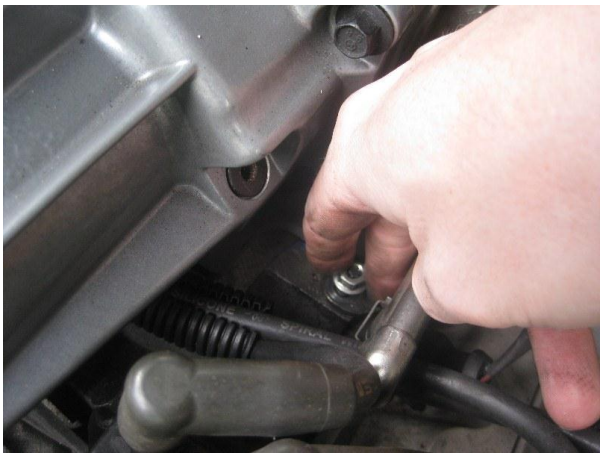


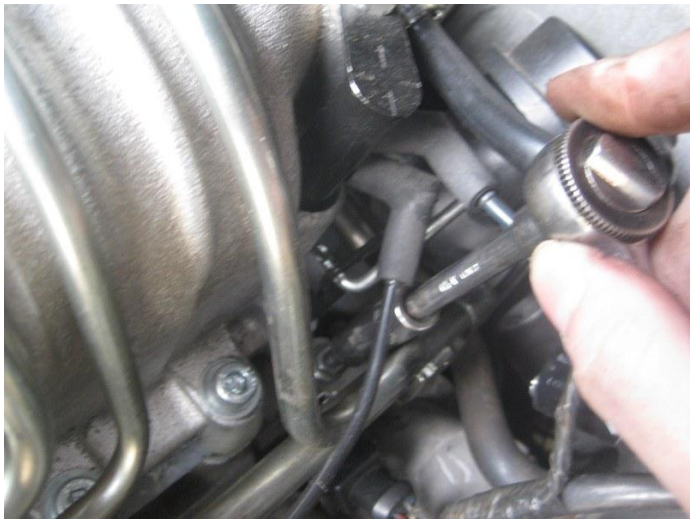
This hose will eventually connect to the intercooler core outlet.

Step 5 – Removing the supercharger

Start by removing the engine cover which is secured by 4 nuts on top of the cover. Using a socket wrench remove the nuts which will enable the cover to be simply lifted off. Also remove the rear bracket used to support the engine cover by turning the required nuts.

Proceed by removing the injector rails by unfastening all the injector rail bolts. There are 5 areas where the injector rail is fastened as shown below.





The support bracket for the alternator must then be removed by removing the bolts on the alternator and supercharger.

Removing injector cables

Unclasp the clips shown below in order to detach the cable from each injector. This can be done by pushing in the metal clip and simply pulling the plastic injector connection off.

Removing injector cable clips

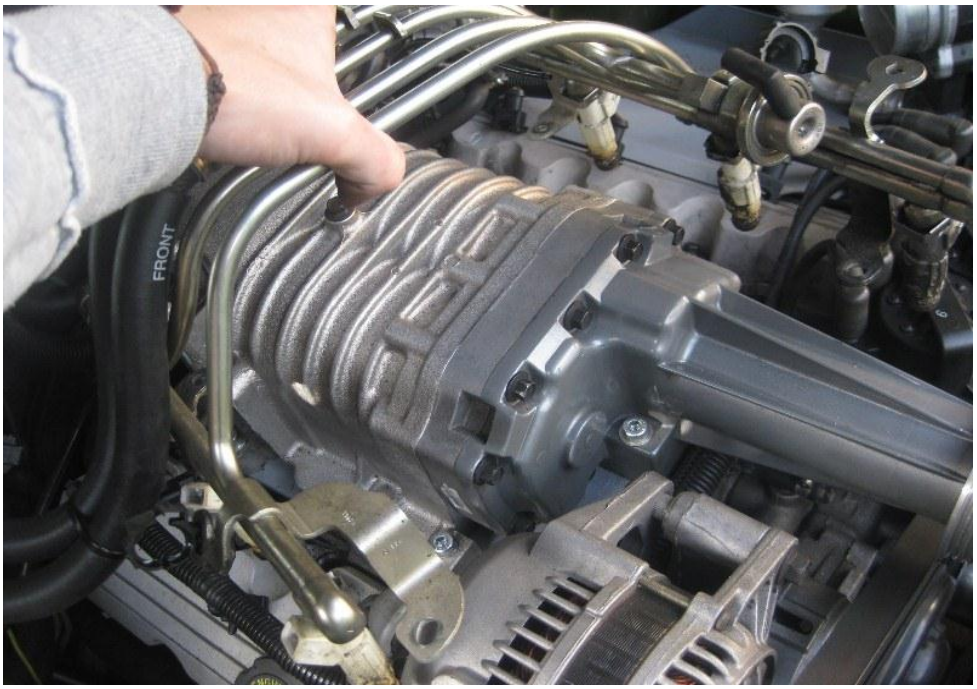
Also remove any plastic clip-on brackets by detaching them using a screwdriver, in order to release the cables from the injector rail.

There are 2 clips as such, with one on either side of the rail.

Lifting off injector rail

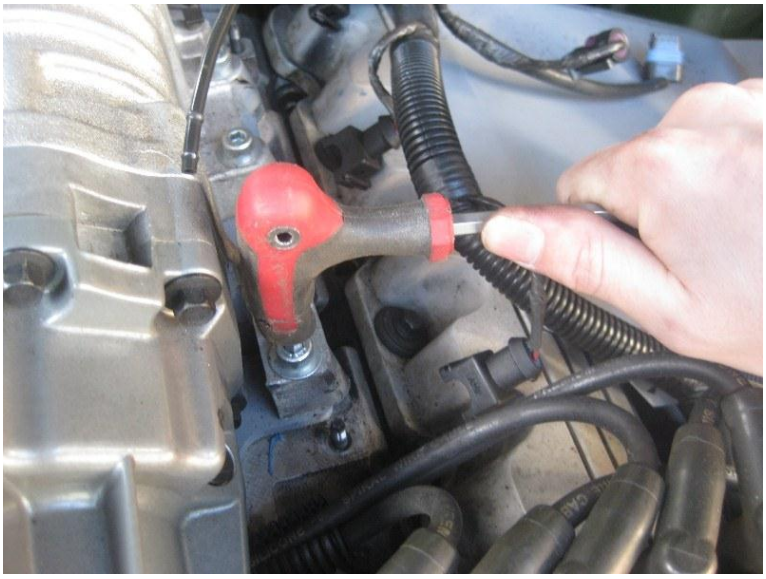
Carefully lift the injector rail off the supercharger ensuring each injector is released from the cylinder heads.

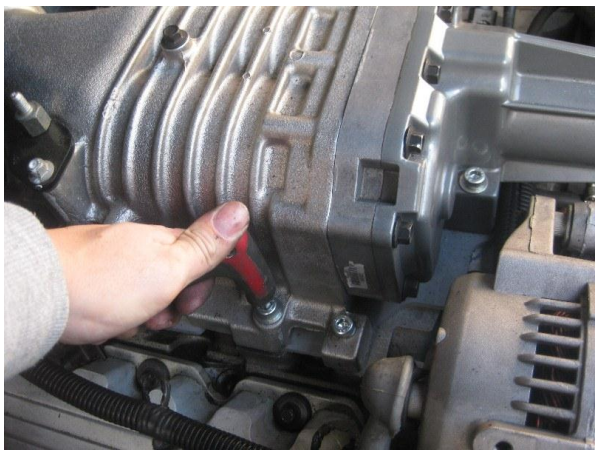
The injector rail need not be completely detached from the vehicle, as it can be maneuvered out of way whilst still being connected by the two black hoses.



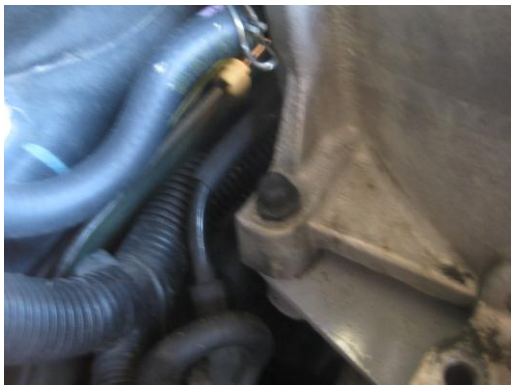
Removing supercharger bolts

Once the supercharger belt has been removed (by turning the 15mm nut on the end of the tensioner), proceed by removing all the bolts which fasten the supercharger onto the lower inlet manifold.
There are 10 bolts as such. Take notice of 2 bolts which are hidden at the back of the supercharger housing.



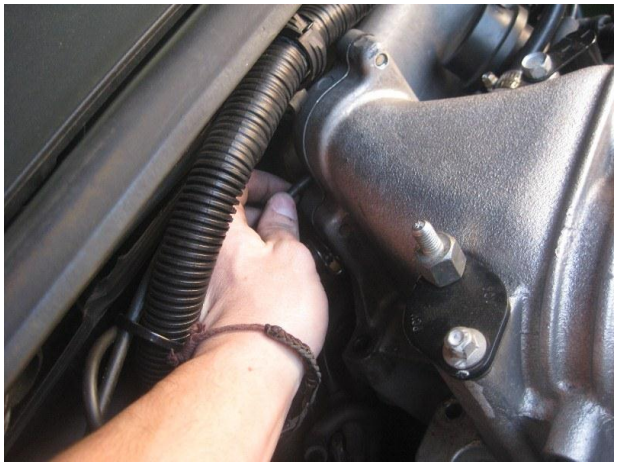


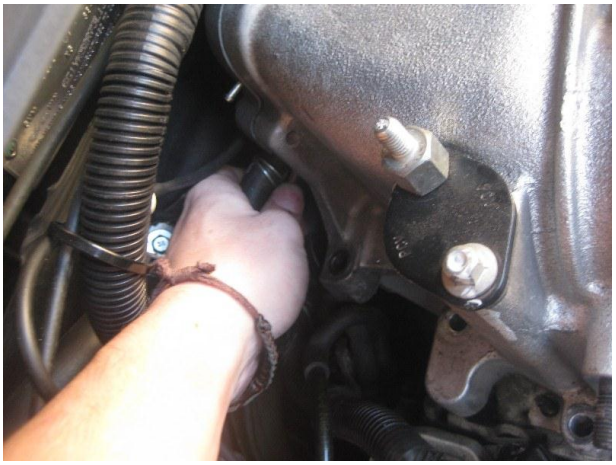
The following images show some of the hidden bolts at the back of the supercharger.



Disconnecting supercharger elbow hoses

Remove the 2 hoses which are connected to the elbow bend behind the supercharger.

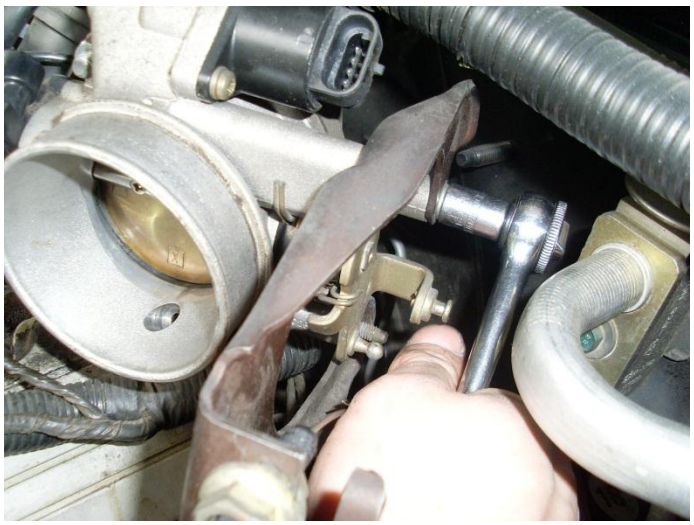


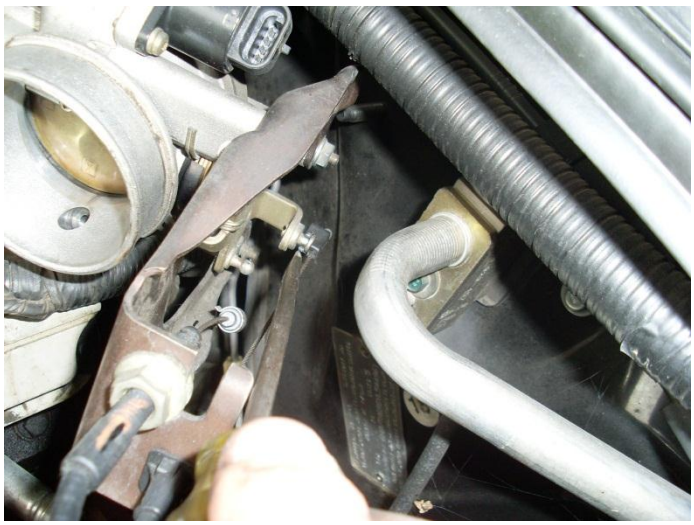


There is a small hose and a larger hose. The larger hose is attached by a clamp which can be removed by hand or using some vice grips.

Disconnecting the throttle cable

There are 3 nuts connecting the throttle cable bracket to the throttle body which must be removed. Proceed by unclipping the cables from the throttle linkage by carefully wedging a screw driver in between the clip to unclasp the plastic clips.





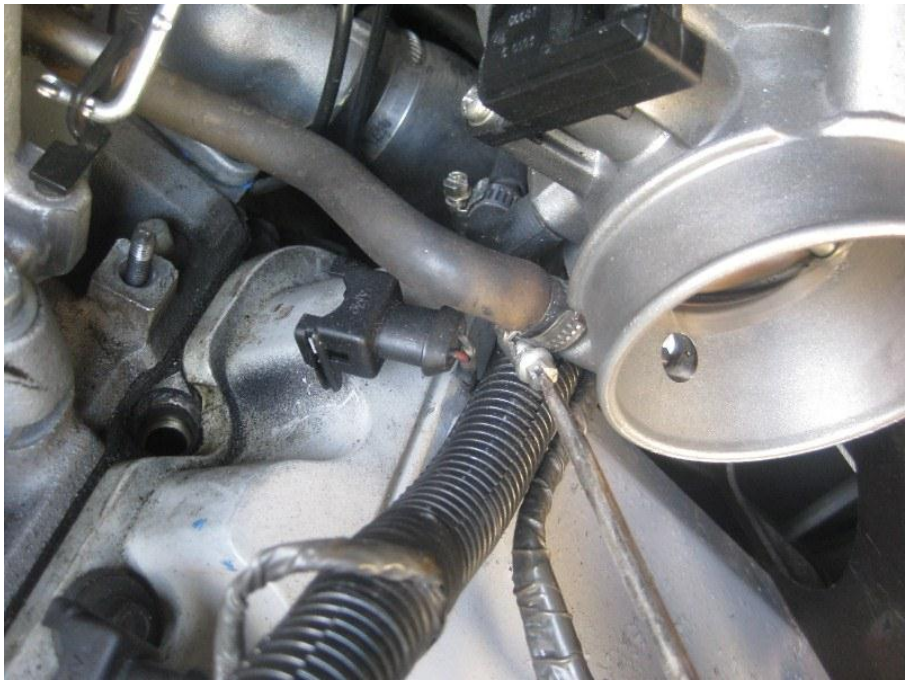
Removing sensors

Remove the plug from the throttle position sensor which is located on the left side of the throttle body.

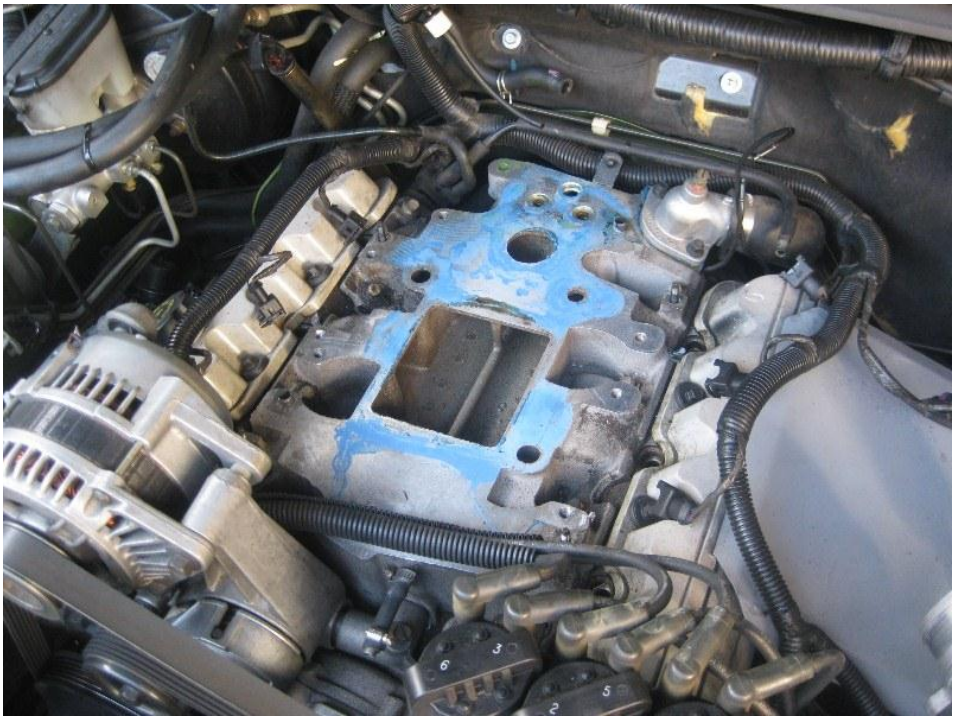
Also remove the plug from the idle air control valve located on the right side of the throttle body.

Disconnecting throttle body hoses

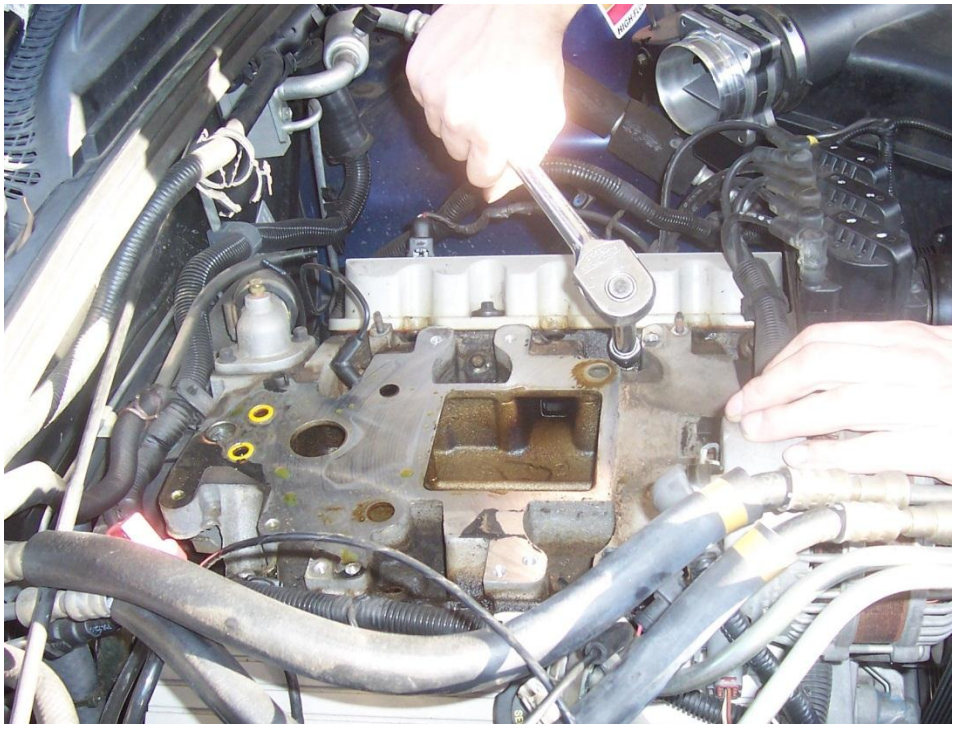
Remove the 2 hoses which are connected to the throttle body by loosening the hose clamps where necessary.

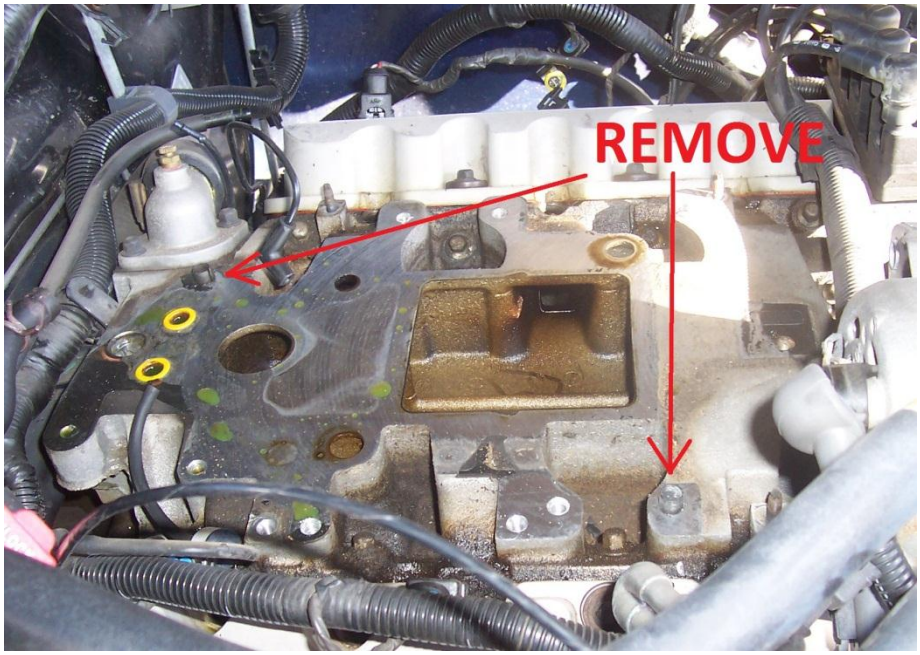


Once all bolts and hoses are removed, the supercharger is then free to be lifted off the car.



It is a good idea at this stage to tighten the inlet manifold bolts (as shown below) as they can be prone to loosen. These should be torqued up to about 15 Nm.

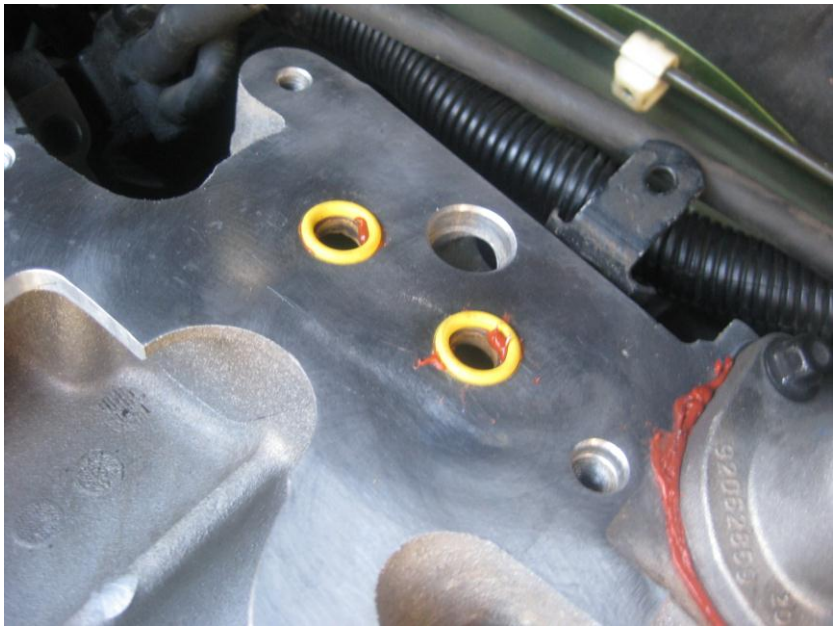




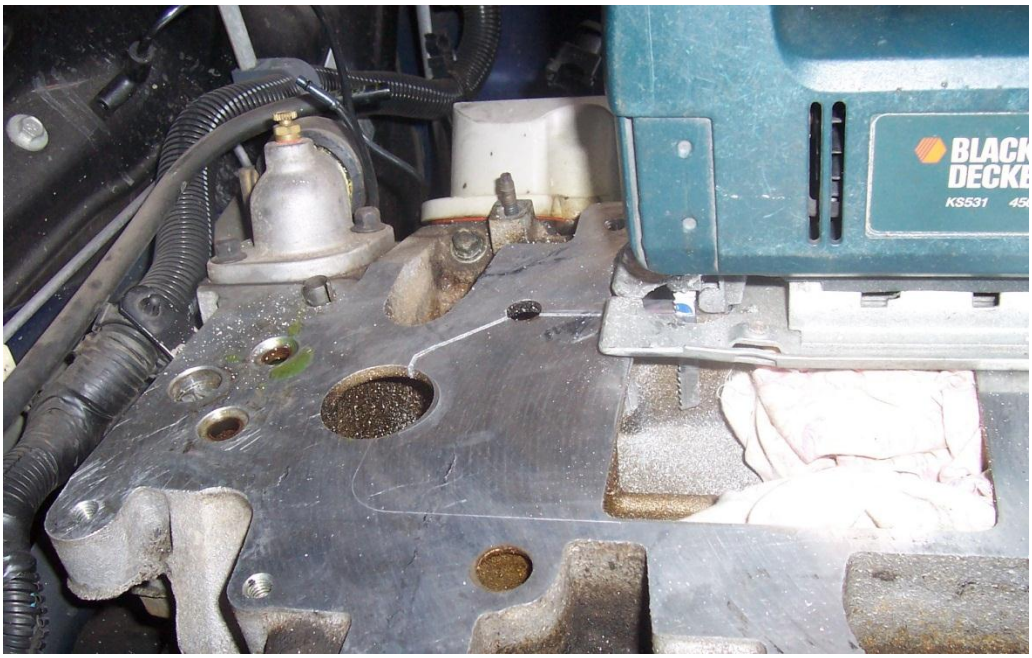
Cleaning surfaces

It is strongly recommended to clean the surface of the lower inlet manifold and supercharger before installing the intercooler plate on the vehicle. This can be done using a scraper (to remove old gasket) and a wire brush whilst ensuring all entries are covered to ensure no debris or contaminants enter the cylinder chambers.

Seal and/or replace O-rings on lower inlet manifold



The inlet manifold should ideally be ported as it is causes a restriction when the intercooler core is fitted. This can be done using a jig saw by approximately marking out a path similar to the one shown. Alternatively if you would like the inlet manifold CNC ported, MACE do offer this service which requires that the inlet manifold be removed and posted/dropped to MACE.

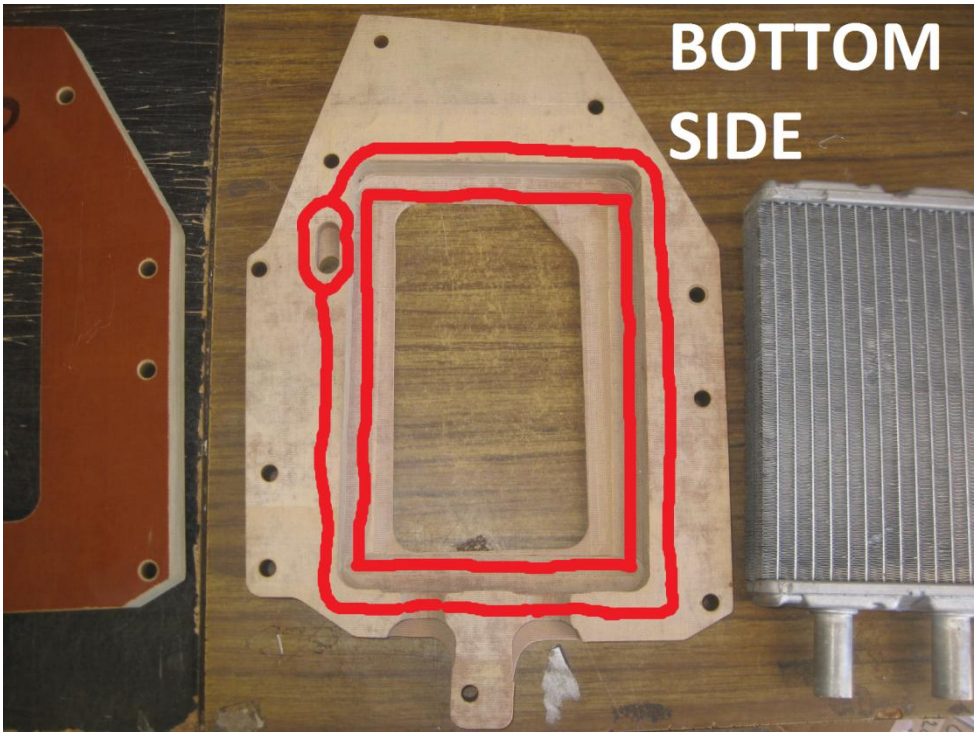


Sand the edges using sand paper to provide a smoother finish.

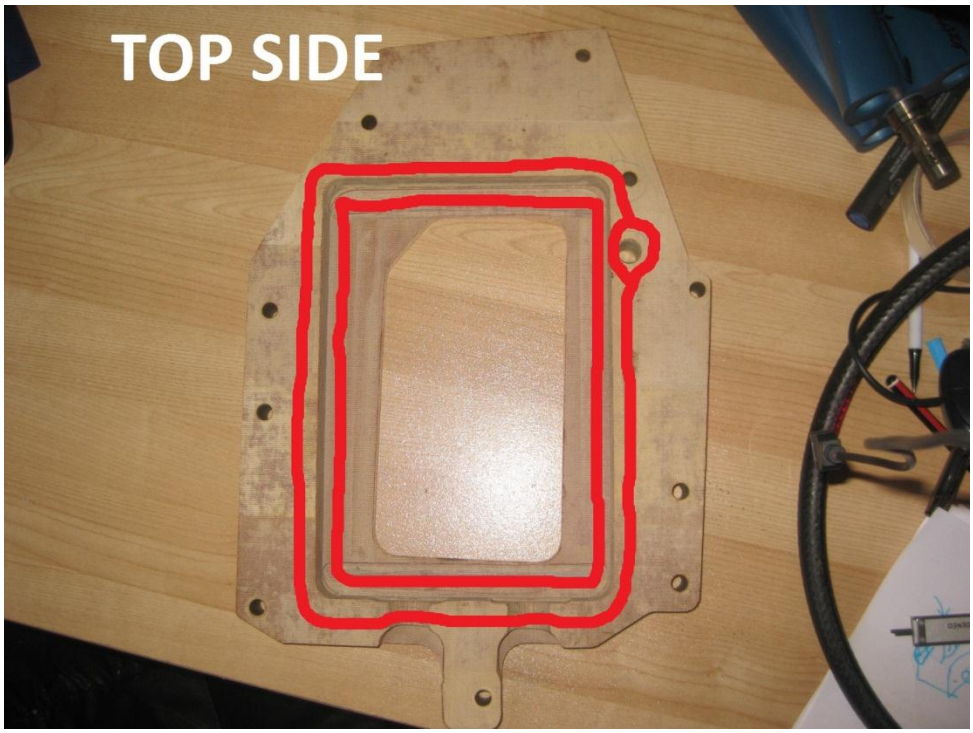
Place the lower half of the intercooler core enclosure onto the inlet manifold making sure all holes are aligned. Mark (using a permanent marker) the hole as shown as it needs to be drilled to 12mm.

Step 6 - Assembling the intercooler core

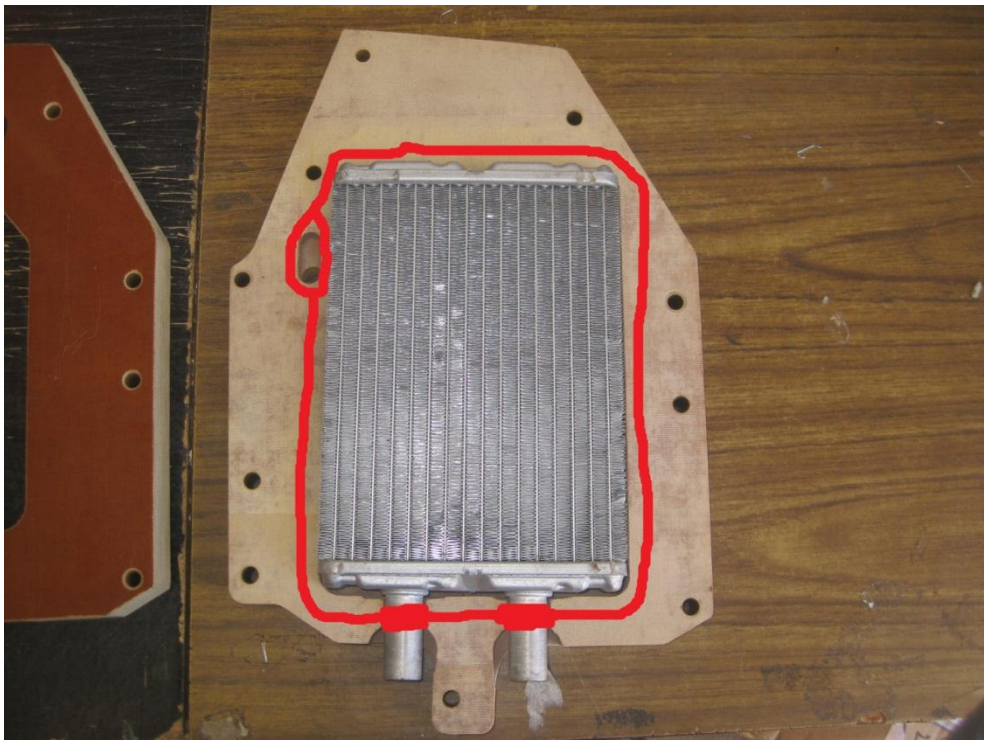
Begin applying sealant to the inner part of each core as shown below.



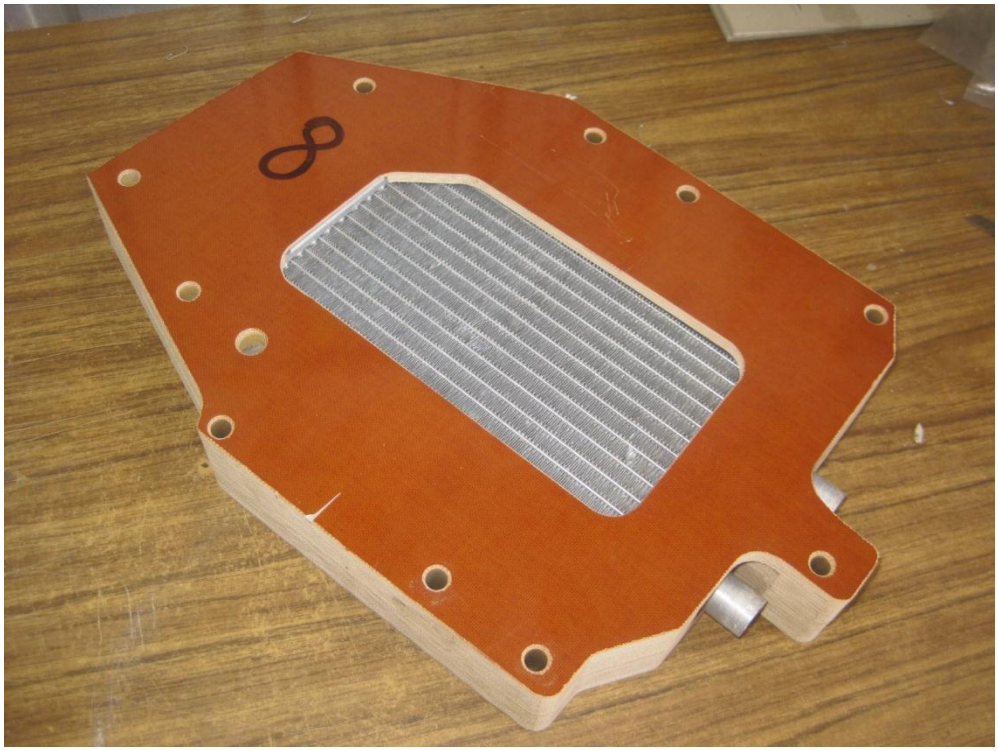
Applying a plentiful amount of sealant is important to prevent air from flowing around the radiator. Apply the sealant to BOTH HALVES of the core as shown below.



Place the radiator into place and apply more sealant around the nozzles as shown.



It is now time to join the two halves by fixing them with a few nuts and bolts as shown. Also firmly clamp the two halves together using G-clamps and allow to set overnight.



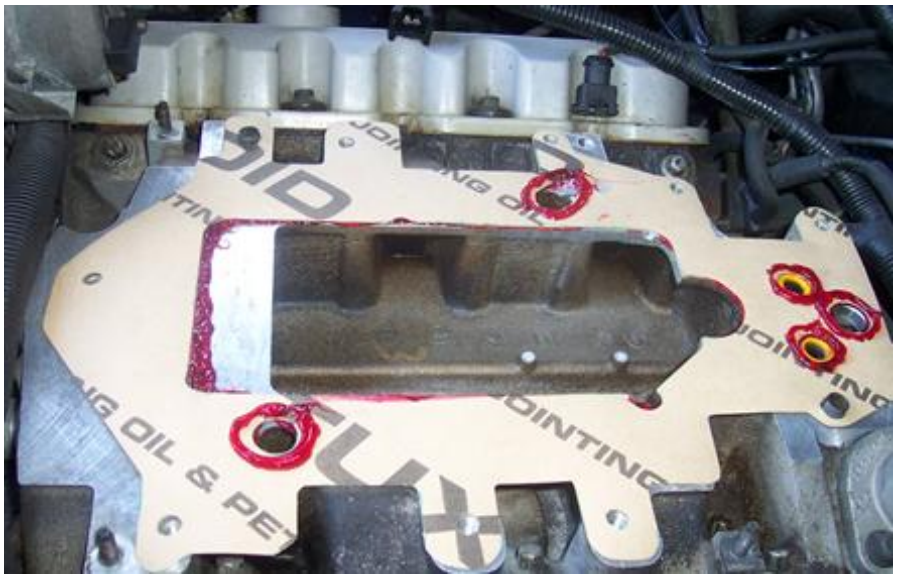
Note: Mini Blizzard core only used for illustrational purposes

Step 7 – Fitting the intercooler core

The firewall may first need to be modified to prevent contact with the supercharger. The firewall will need to be hammered back by about an inch using a large hammer.

The area shown in red is a point on the firewall which may make contact with the top of the supercharger elbow and may need to be trimmed as required using a jigsaw. Every car is different therefore some cars may need more or less amending.

Place one gasket over the core and mark out the area required to be cut out. Apply sealant to the TOP AND BOTTOM of the gasket as shown.



Apply sealant to the bottom of the assembled core (as shown below) and place the assembled core onto the gasket keeping all holes centred using the bolts supplied. Attempt to screw the bolts into place through the core and adjust the core where needed.

The core can be painted for a certain desired look or may be left as is for a standard look.

Alter the second gasket as shown (cutting out the middle section to suit the lower inlet manifold. Place the gasket onto the core and apply sealant to the gasket.

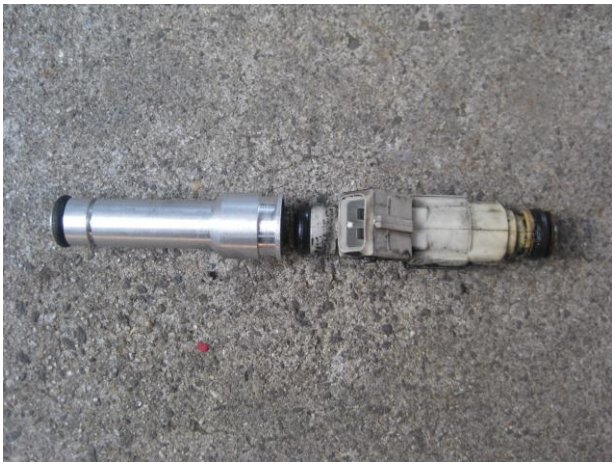
Place the supercharger over the core and locate all inlet manifold holes using the bolts provided. Adjust the supercharger by moving it around until all bolts screw into their respective holes

Lightly tighten the bolts using an Allen key or socket wrench to progressively fasten each bolt. Using a TORQUE WRENCH initially torque the bolts to 10Nm before setting the torque wrench to 17Nm and further tightening the bolts. It is CRITICAL not to over tighten the supercharger bolts as the supercharger housing will deform and make contact with the supercharger rotors. Be sure to spin the supercharger pulley by hand to inspect for any rubbing. If rubbing occurs slightly loosen the bolts.

Step 8 – Installing injector rail extenders

Start by removing the existing studs from the manifold. There are 4 studs as such.

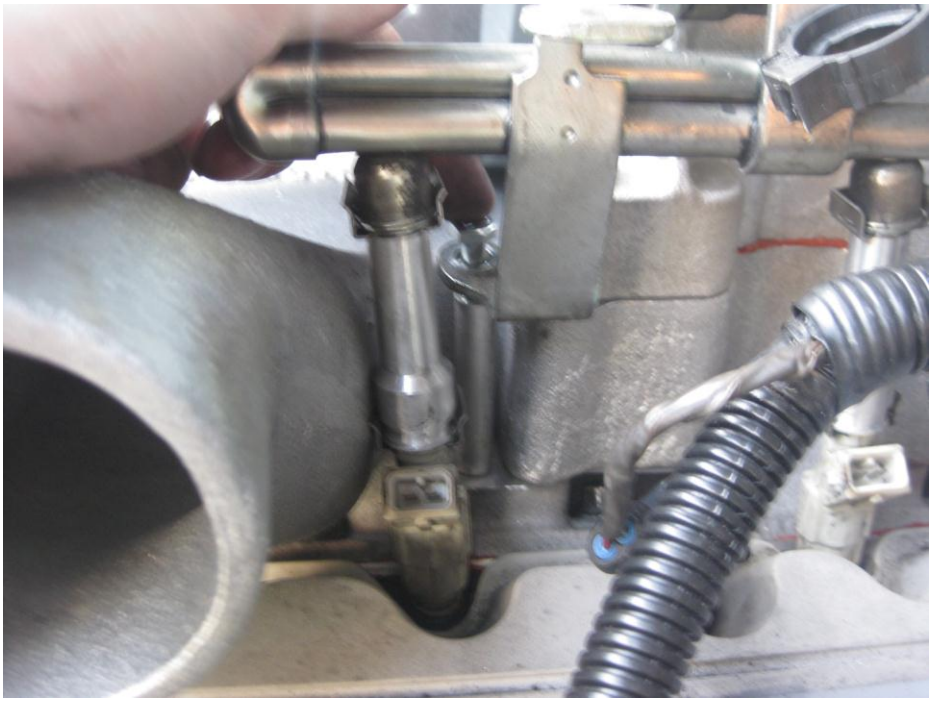
Remove the injectors from the rail by removing the metal clips in order to fit the extender in between as shown below. Injectors and extenders must clip in around the o-rings for a perfect fitment.



Refit metal clips and use extra clips as provided in order to assemble the injector and extender to the rail as shown below.

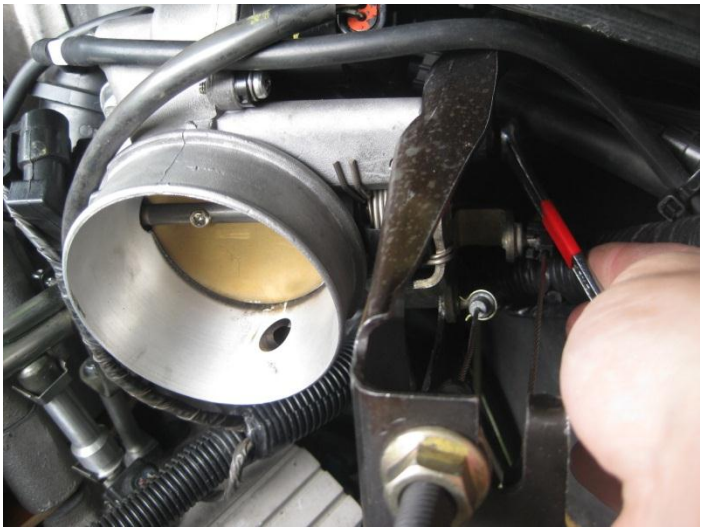
It is important to first connect the injectors into the cylinder heads ensuring all o-rings pop into place. Proceed by carefully wedging the hollow cylinder shafts in between the manifold and the existing fuel rail brackets before placing the 4 bolts through the holes and fastening them.

Please note that the following image is originally from an A2A kit but uses the same injector rail extenders.

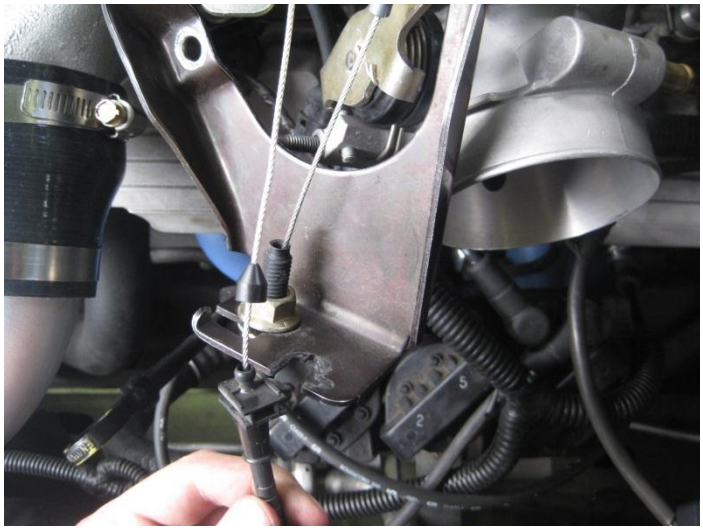


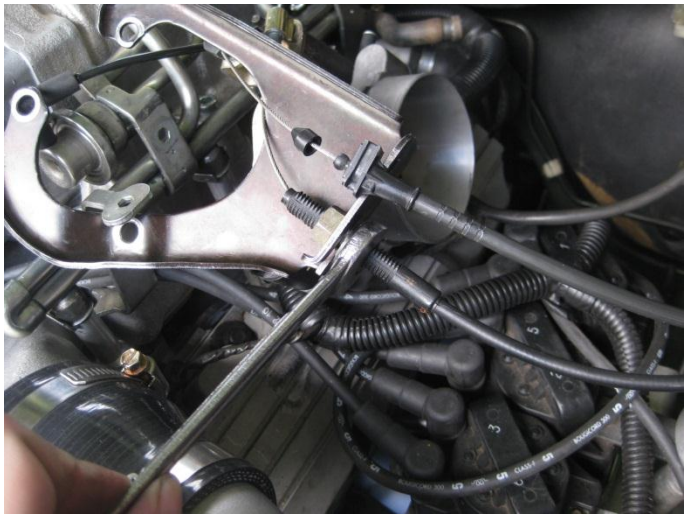
Step 9 – Turning the throttle body upside down

Clearance constraints require the throttle body to be turned upside down which is relatively easily achieved as the holes and studs line up even when turned upside down. The bracket can only be mounted at 2 locations and will need to be trimmed. Proceed by removing the throttle body (if not already removed) by removing the three nuts on the bracket (shown left) and the two nuts at the top and bottom of the throttle body housing (shown right).

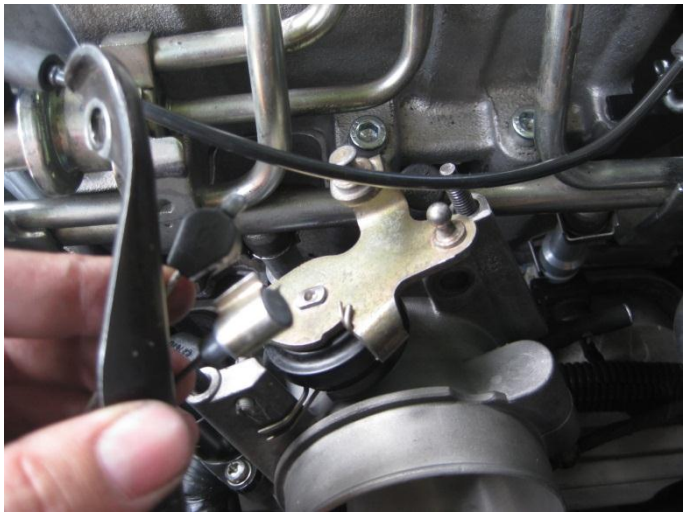


After the throttle body is detached, the bracket must be removed which is now only attached at the throttle and cruise control cable. First remove the cruise control cable by carefully unclipping the plastic clip. Then use a spanner to undo the nut on the throttle cable and slide the cable out as shown below.





Now remove the clips which connect the cables to the throttle linkage as shown below (a screwdriver may be of help).



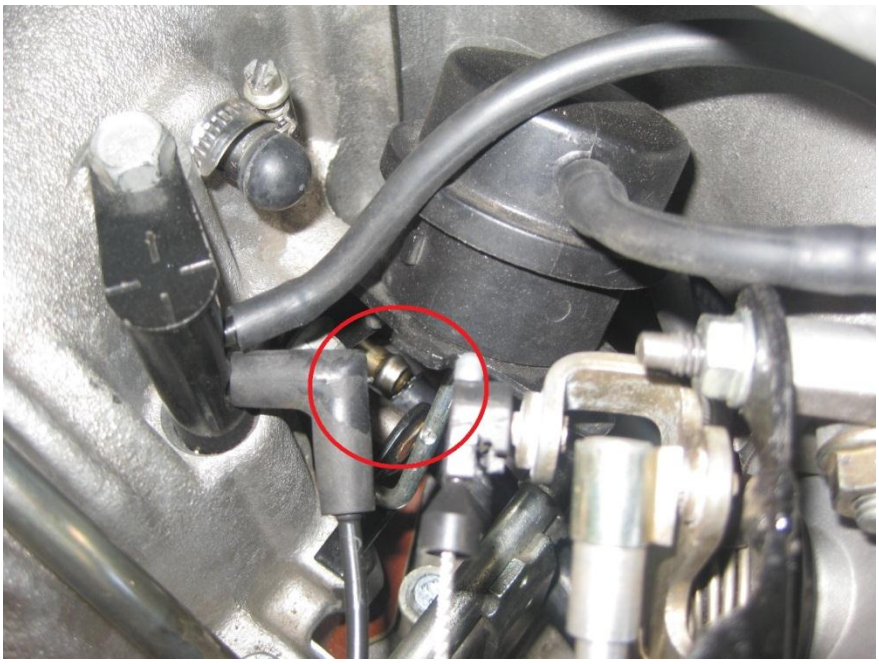
Once the bracket is removed it can be marked (as shown) and trimmed using a hand saw or angle grinder. The bottom arm shown is cut off completely while the top should be grinded down for adequate bonnet clearance.

Reinstall the throttle body (upside down) as shown below

The vacuum hose from the throttle body to the back of the supercharger will no longer reach the supercharger once the throttle body is upside down and will need to be replaced by the supplied longer hose. This longer hose will then need to be spliced and teed (process is shown further down).

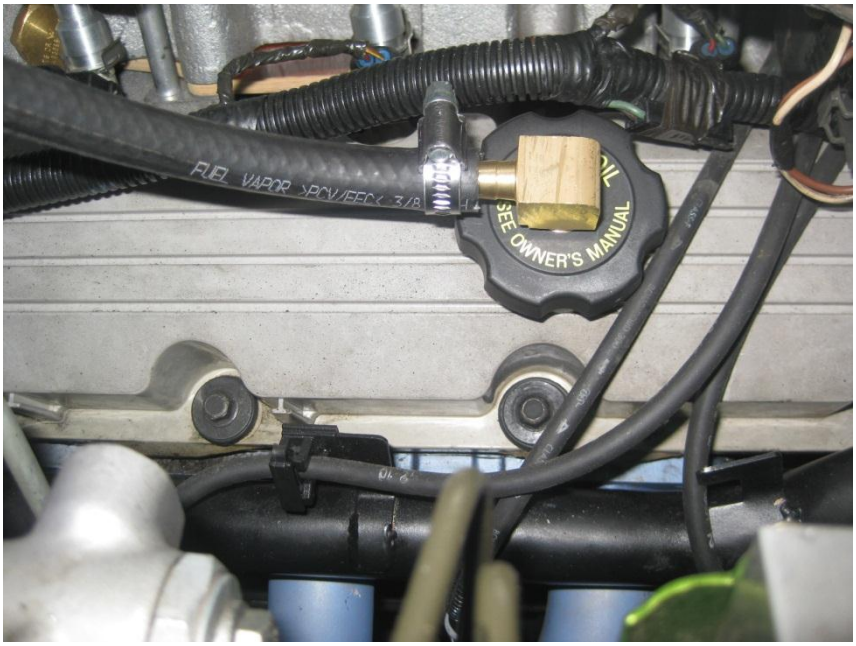
Cut the hose about ¼-1/3 down its length and fit the 3/8” barbed tee, securing it with hose clamps as shown.

Refit the throttle body (upside down) and fit the end with the shorter hose to the back of the supercharger where the old hose was connected. The nozzle is hard to see but is marked in red below. The other end simply fits into the throttle body as the old hose did.

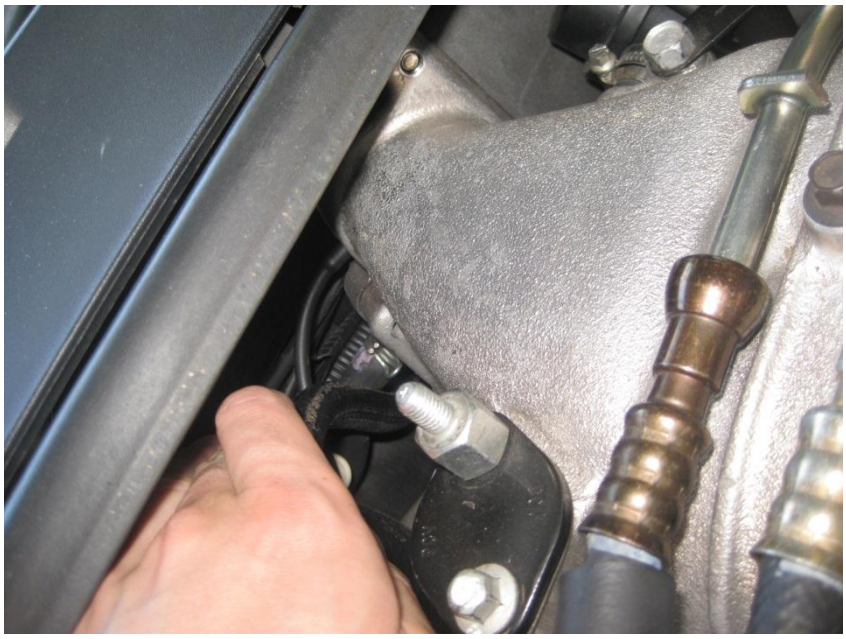


Prepare the connection shown above by using 3/8” Barb ½” Male BSPT Elbow and screwing into the supplied threaded oil cap (using Teflon tape on thread) and secure the 1 metre long hose with a hose clamp as shown below. The other end of the hose will connect to the Tee.

Fit the modified oil cap as shown below

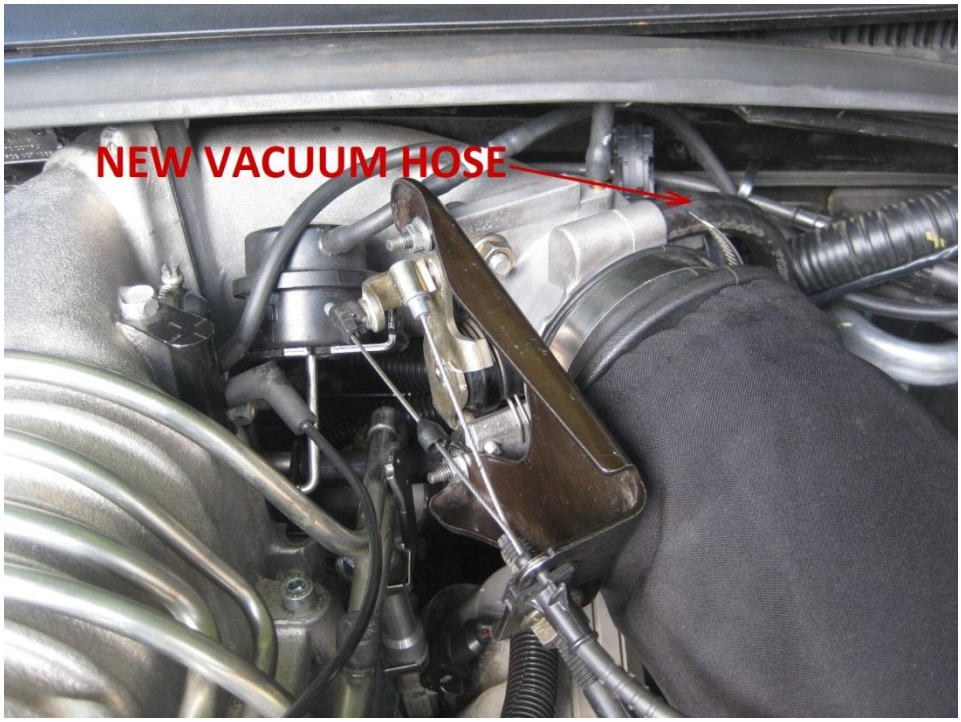


Run the hose behind the back of the engine hiding it as best as possible for a neater look.



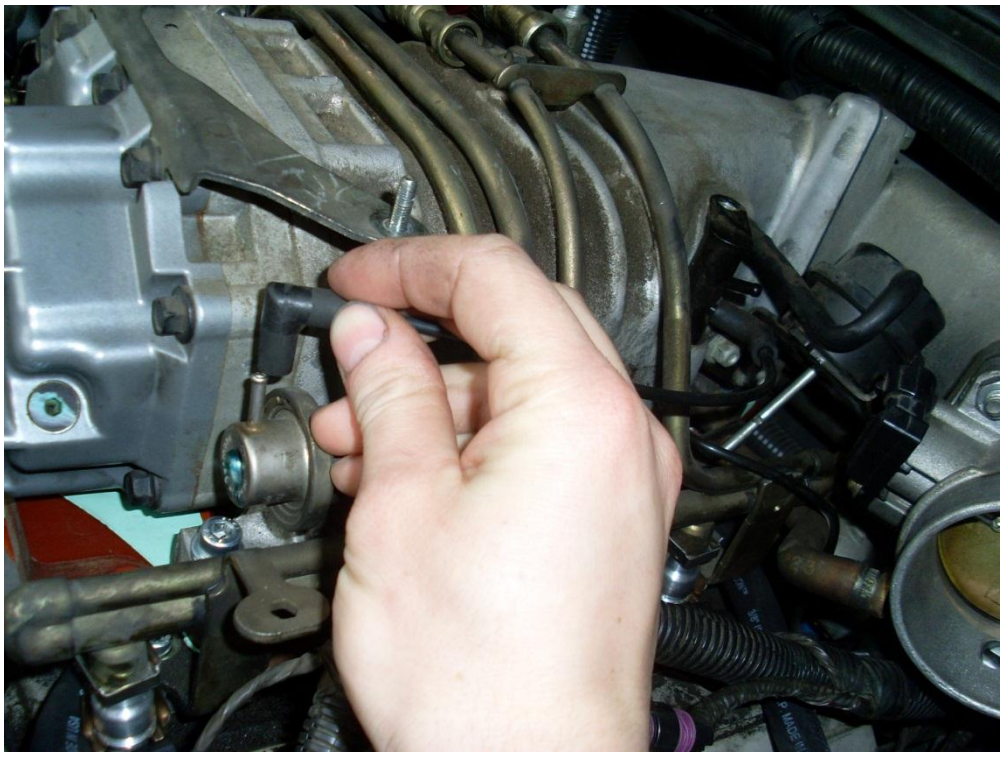
Connect the hose from the oil cap to the tee as shown below. This continues the vacuum process which was previously blocked off by the intercooler core. Secure the Tee fitting using hose clamps as shown.

Refit all necessary throttle body components (if not already fitted) such as IAC plug and TPS plug.



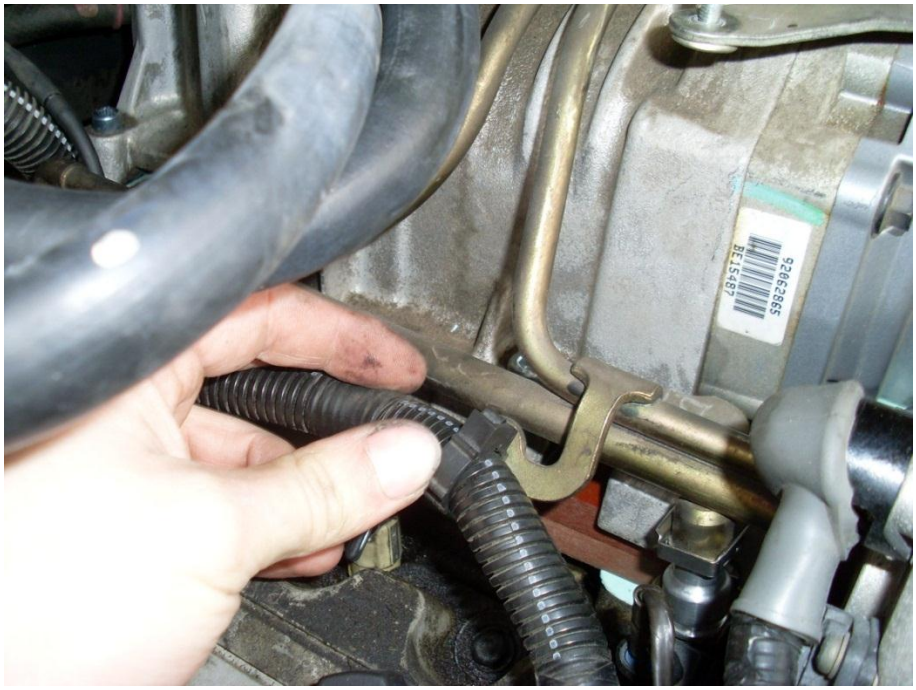
Step 10 – Refitting Components

Refit the shown vacuum lines



Be sure to BLOCK off the shown nozzle in the vacuum tree using the vacuum block-off plug provided

Refit all injector loom clips into the injector rail

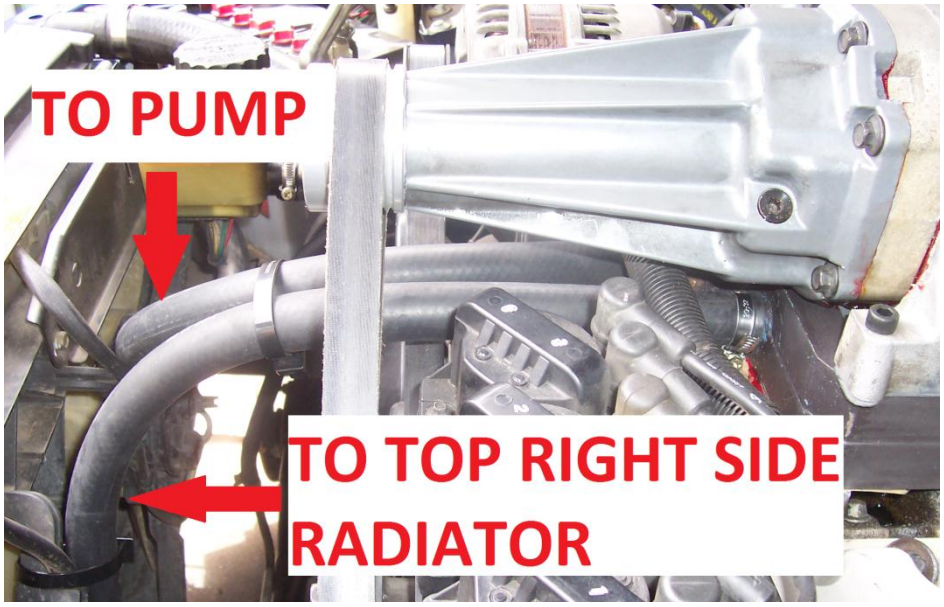


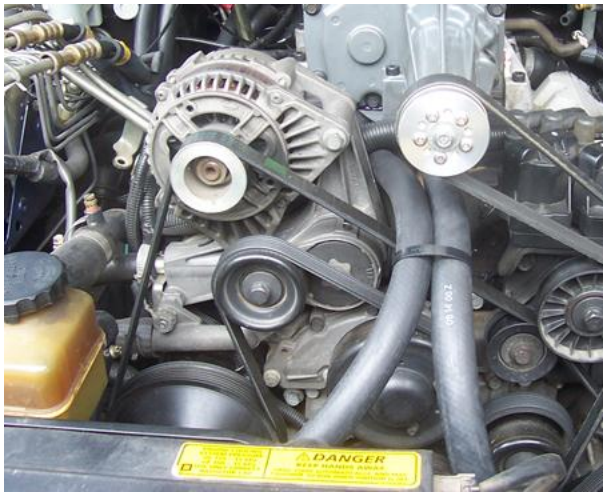
Refit the small vacuum hose to the back of the supercharger elbow

Refit the vacuum brake booster line as shown

Step 11 – Fitting hoses and pump connection

Fit the drive and supercharger belts to the vehicle. Depending on the size of the pulley used, a different size belt may be required. Connect the hose running from the PUMP to the inlet side of the core (driver's side) and secure it with a hose clamp as shown. Connect the hose running from the top passenger side of the radiator to the right side of the core (passenger side) and connect it using a hose clamp. Be sure to secure the hose using zip ties to prevent any contact from belts.





Step 12 – Wiring the water pump

Please note the following images were extracted from the VT Fitting instructions but convey the same information.

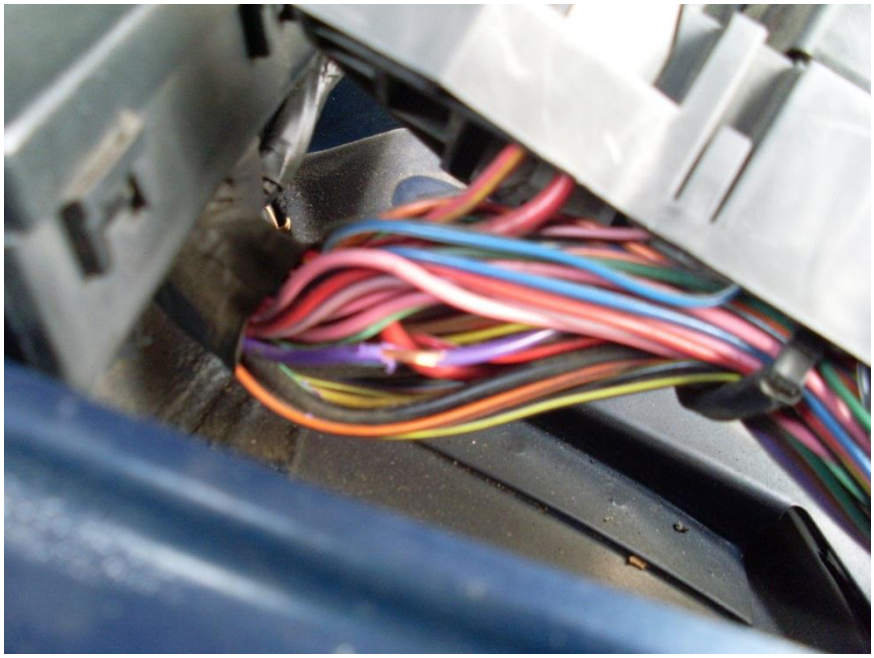
The water pump should be wired to the fuel pump cable under the fuses. The fuse box must be lifted. Start by opening the fuse box cover by unclipping it as shown below.

Remove the two bolts retaining the fuse box as shown

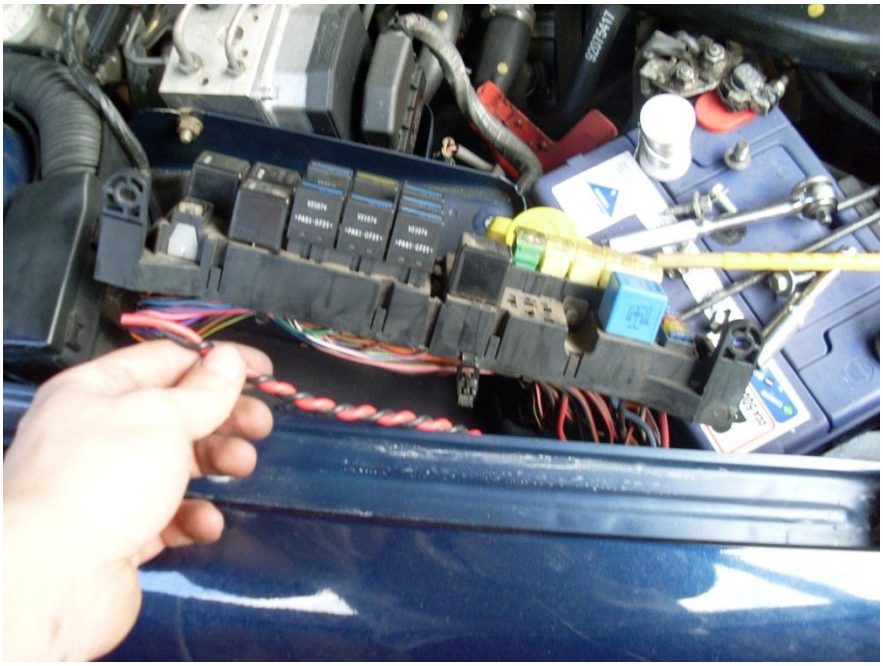
Also release the fuse box by unclipping it using a screwdriver as shown.

For extra room, remove the cruise control (shown below) by unfastening the 3 bolts which retain it.

Locate the fuel pump cable and remove some of the rubber lining as shown.
NOTE: NOT every vehicle's fuel pump cable is purple; therefore you may need to use a workshop/repair/wiring manual to locate the correct cable or if possible use the fuse diagram on the back of the fuse box cover (where applicable). A relay may also be added.



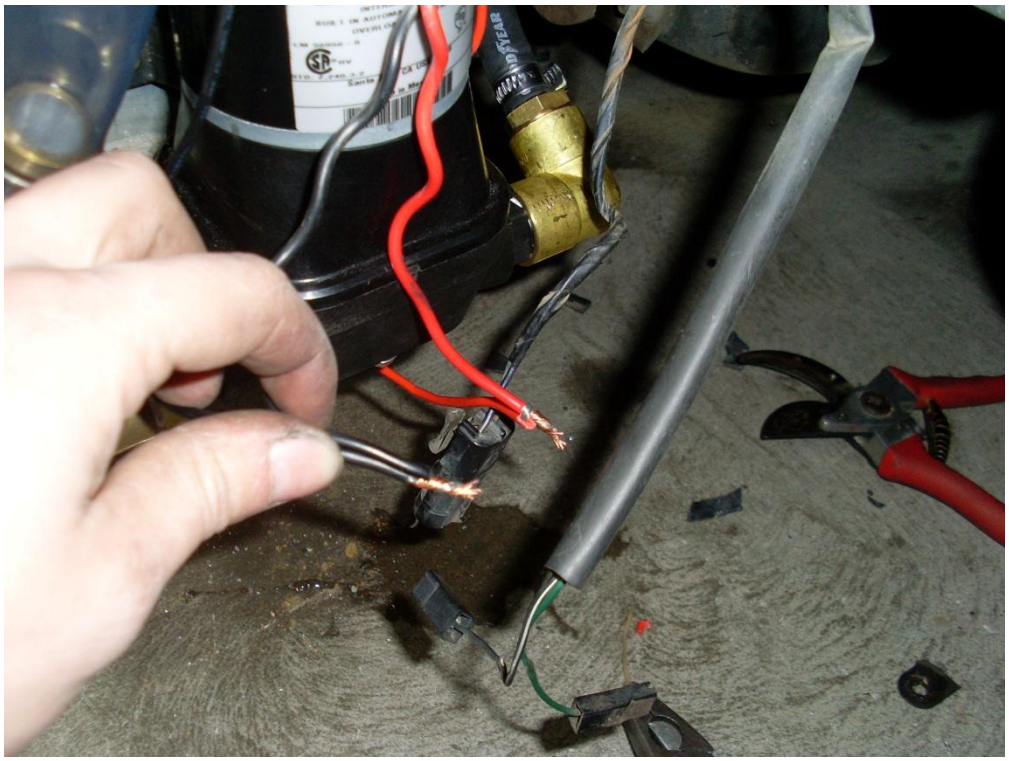
Use the two self-provided electrical wires and join the positive to the fuel pump wire. The other is negative and is simply used as a ground and can be grounded to the battery (shown later).



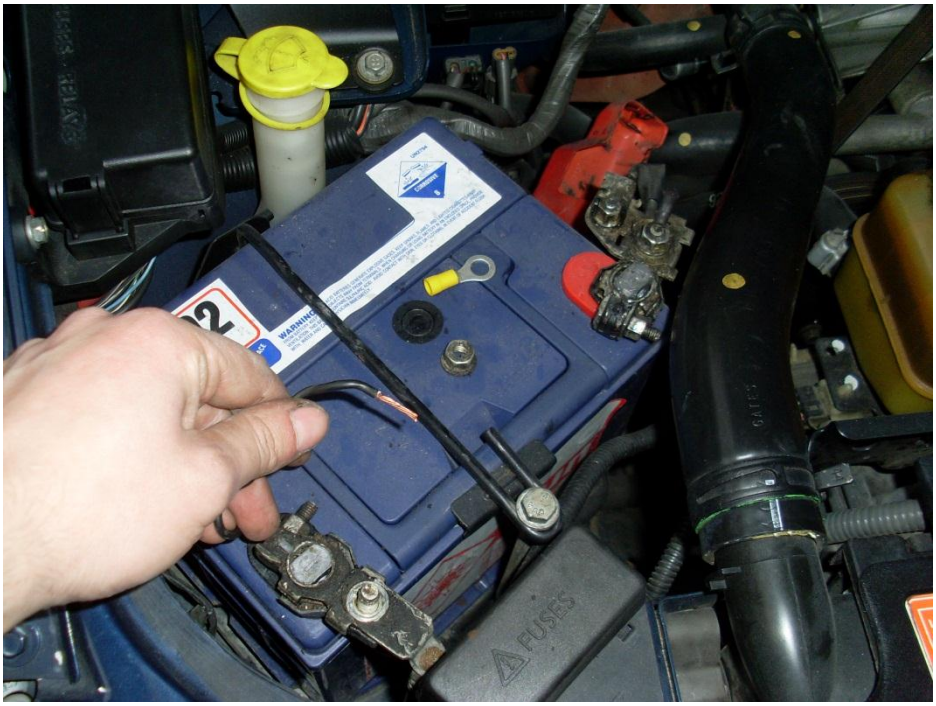
Solder the joined wires and insulate properly using electrical tape

Fit the fuse box and cruise control

Connect the positive wire to the positive wire on the pump. Connect the negative (ground) to the negative wire on the pump. Solder and insulate as shown.


GOODYEAR

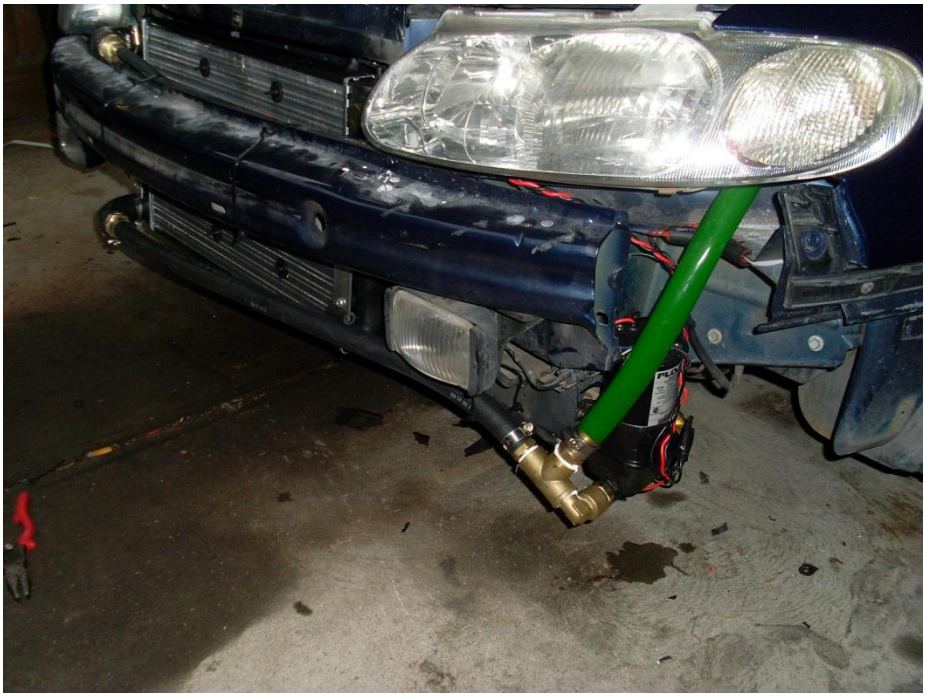
Ground the negative pump wire to the battery using an eyelet electrical connector.



Crimp the eyelet to the wire (using an electrical crimper) and fasten it using the nut on the negative battery as shown below.

Step 13 – Filling the system with coolant

Fill the system with coolant using the clear hose beside the air box. Prime the pump by switching it on while slowly pouring in the coolant in order to allow it to circulate through the system. This may take some time as all air bubbles need to escape through the top in order to fill the whole system. The capacity will vary depending on the lengths of hoses but generally between 3-4 litres can be required.



Step 14 – Modifying the bumper

For clearance issues, the bumper may need to be trimmed using a jigsaw or angle grinder. Test fit the bumper bar and using trial and error; locate the areas which need trimming. Refit the bumper and check all connections.

Step 15 - Relieving the bonnet area for clearance

Depending on the size of the pulley, the sound deadening on the underside of the bonnet may need to be relieved to avoid contact with the pulley.

Cut a decent size section out of the sound deadening using scissors and inspect any other areas for interference. Since all cars are different the exact areas and amount of relief needed varies. The bonnet may need to be grinded if it makes contact with the pulley.