

Nash Motorsports
BMW E36 LS1 Conversion
Part 3
Rev 18Oct05

Install the Motor

Follow these instructions step by step and by the end your car should be ready to the exhaust shop.

While it is possible to complete this prep work in a weekend it is more realistic to plan on 6-7 good days to get everything done.

It is best to print out these instructions in black and white. Color is nice but it takes a long time and you will burn up a lot of ink.

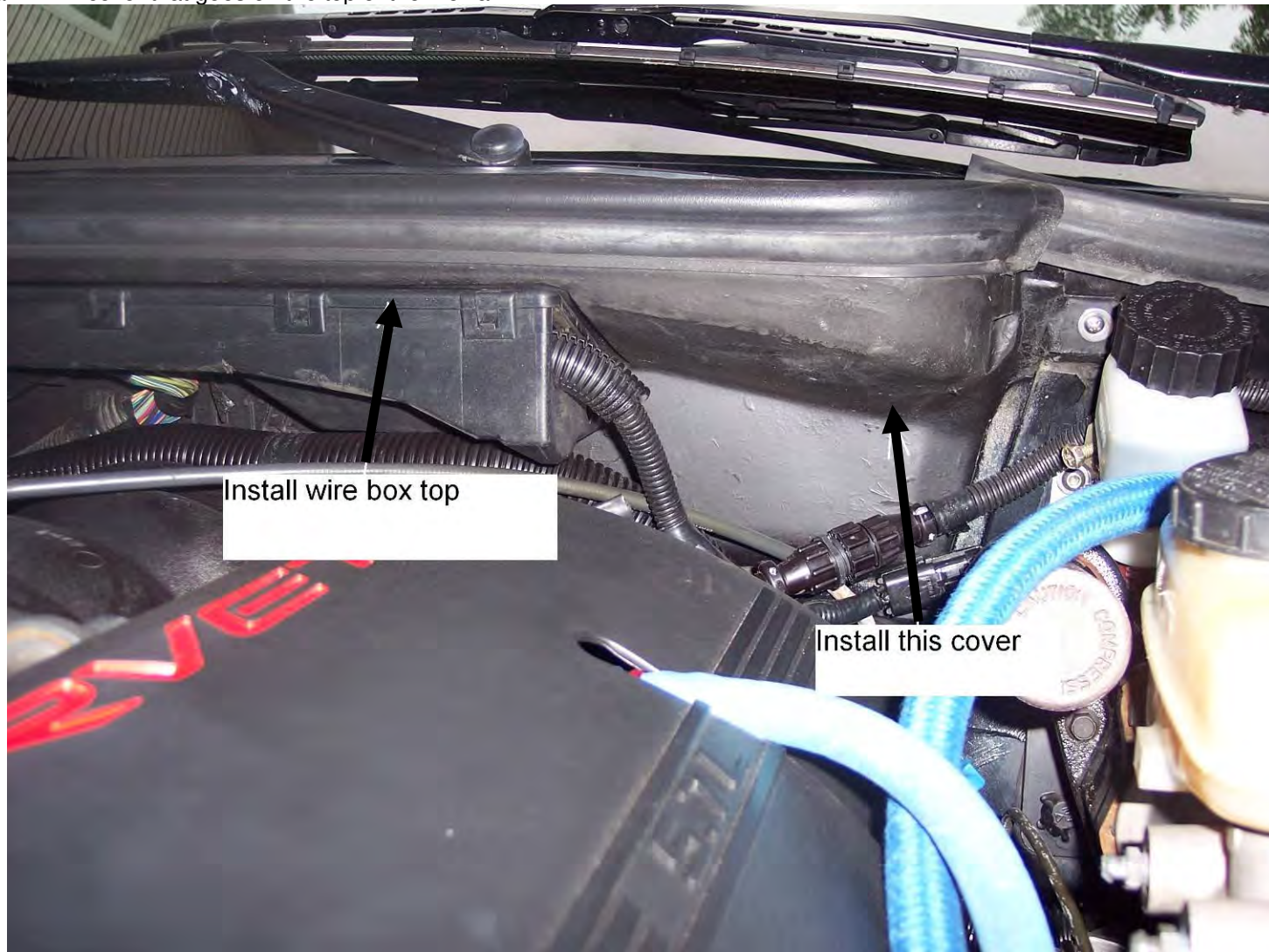
If there are any questions, please call. I am here to help and want your swap to be a fantastic experience!

Sincerely,

Mike Collins
586-943-6385

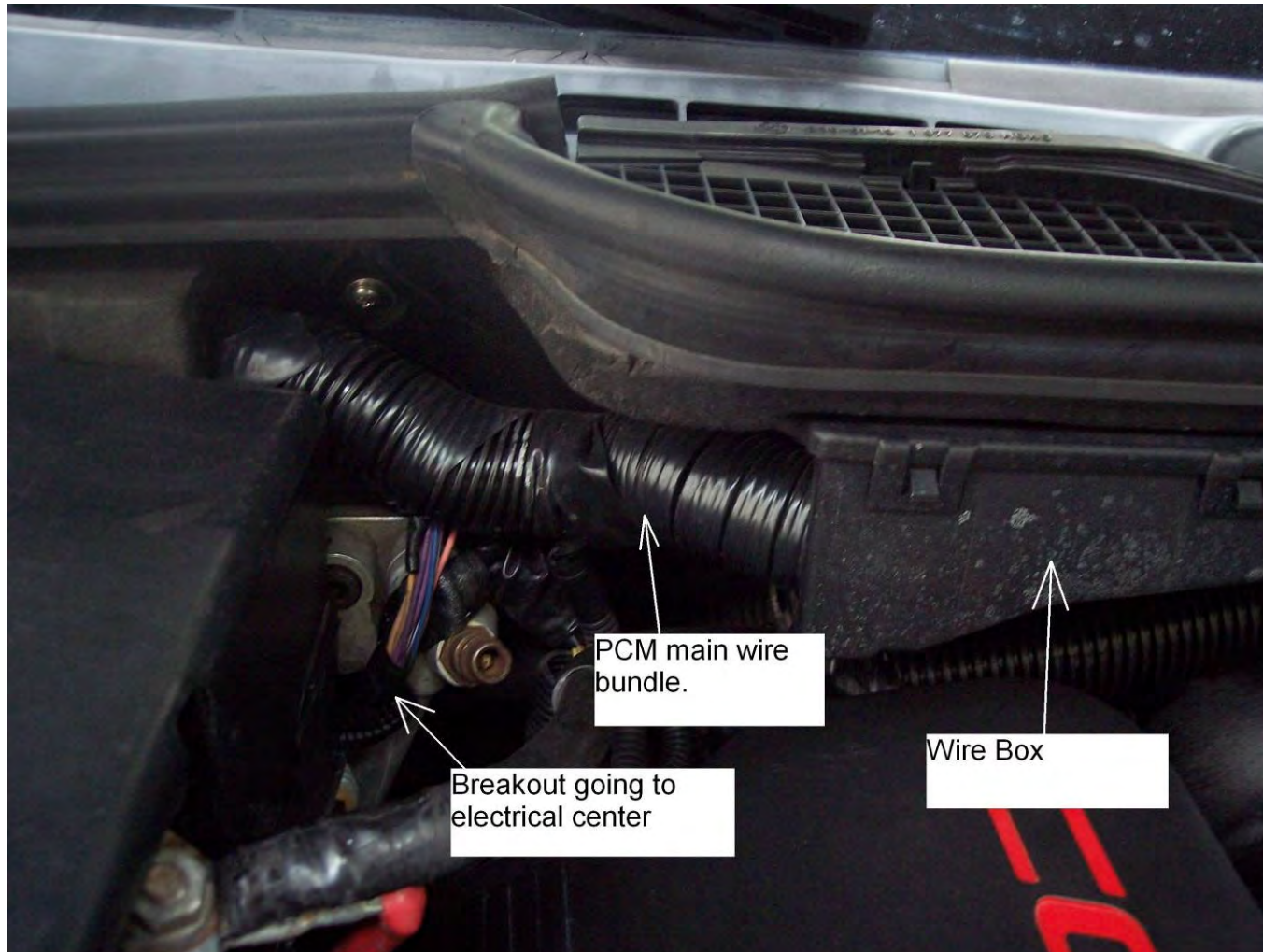
- 1 Using engine hoist lower engine and transmission into car. Note: If you did not remove the front clip then the fuel pressure regulator will have to be unbolted and held out of the way while the motor is being lowered into the car.
- 2 With motor hanging from hoist, attach clutch line from T56 to the clutch line on the BMW
- 3 Fill Clutch reservoir with brake fluid (DOT 3 or DOT 4)
- 4 Use Mity Vac to suck air out of the clutch system as follows:
 - Install the tapered fitting supplied onto the Mity Vac suction hose.
 - Firmly seat the tapered fitting onto the port in bottom of the fluid reservoir.
 - Pump the Mity Vac to create as much vacuum as possible.
 - Kink hose on Mity Vac and remove from the reservoir port allowing the fluid to be sucked into the clutch system.
 - Refill reservoir.
 - Suck some fluid into the Mity Vac Line and reinstall onto reservoir port
 - Pump the Mity Vac again allowing any air bubbles to migrate up the hose.
 - When the bubbles stop. release the vacuum and allow the fluid to be sucked into the system.
 - Repeat until no more air can be sucked from the system.
- 5 Bleed clutch manually to remove any remaining air.
- 6 With transmission lowered install shifter and tighten shifter bolts
- 7 Use floor jack to raise tail of the transmission up high enough to install the transmission mount to the bolt in the bottom of the rubber trans mount.
- 8 Raise the trans up high enough to allow alignment of the bolt hole in the trans mount with the weld nuts in the underbody. Bolt trans mount to BMW using M8 flange head bolts.
- 9 Lower motor far enough to allow installation of the driver side header. Use the factory exhaust gaskets and torque header bolts to 35 N-m
- 10 Install passenger side header and torque header bolts to 35 Nm
- 11 Raise motor and install the front cross member. Don't forget the motor mount heat shield on passenger side.
- 12 Lower motor onto motor mounts. Tighten top and bottom motor mount nuts to 65 Nm. Need to include 1/4" thick washers and use swivel head socket on passenger side.
- 13 Connect clutch line.
- 14 Install O2 sensors in headers and connect O2 wires to sensors.
- 15 Secure wires with tie straps.
- 16 Attach clutch line.

- 17 Install BMW cover that goes on the top of the firewall.



[Top of Firewall Cover.JPG](#)

- 19 Slide PCM into the PCM pocket and if you are using a VATS simulator then place the VATS simulator in the PCM pocket also.
- 20 Protect the PCM with foam tubing and install cover over PCM pocket.
- 21 Run main wire bundle into the BMW wire box



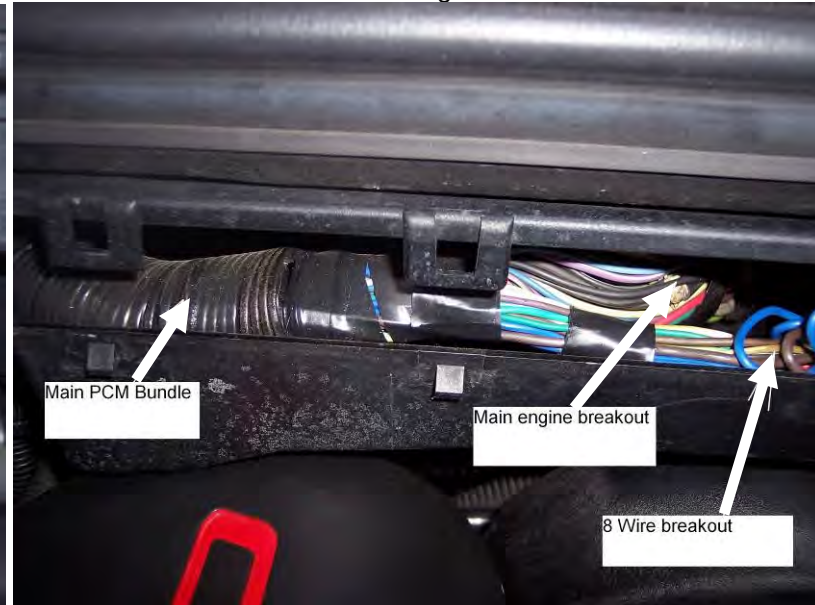
[PCM Main Wire Bundle.JPG](#)

23 Break out main bundle through bottom of the box. Cut hole in bottom of BMW box to allow main engine bundle to exit.



Cut hole in bottom of wire box for main engine harness to exit

[Engine bundle exit.JPG](#)



Main PCM Bundle

Main engine breakout

8 Wire breakout

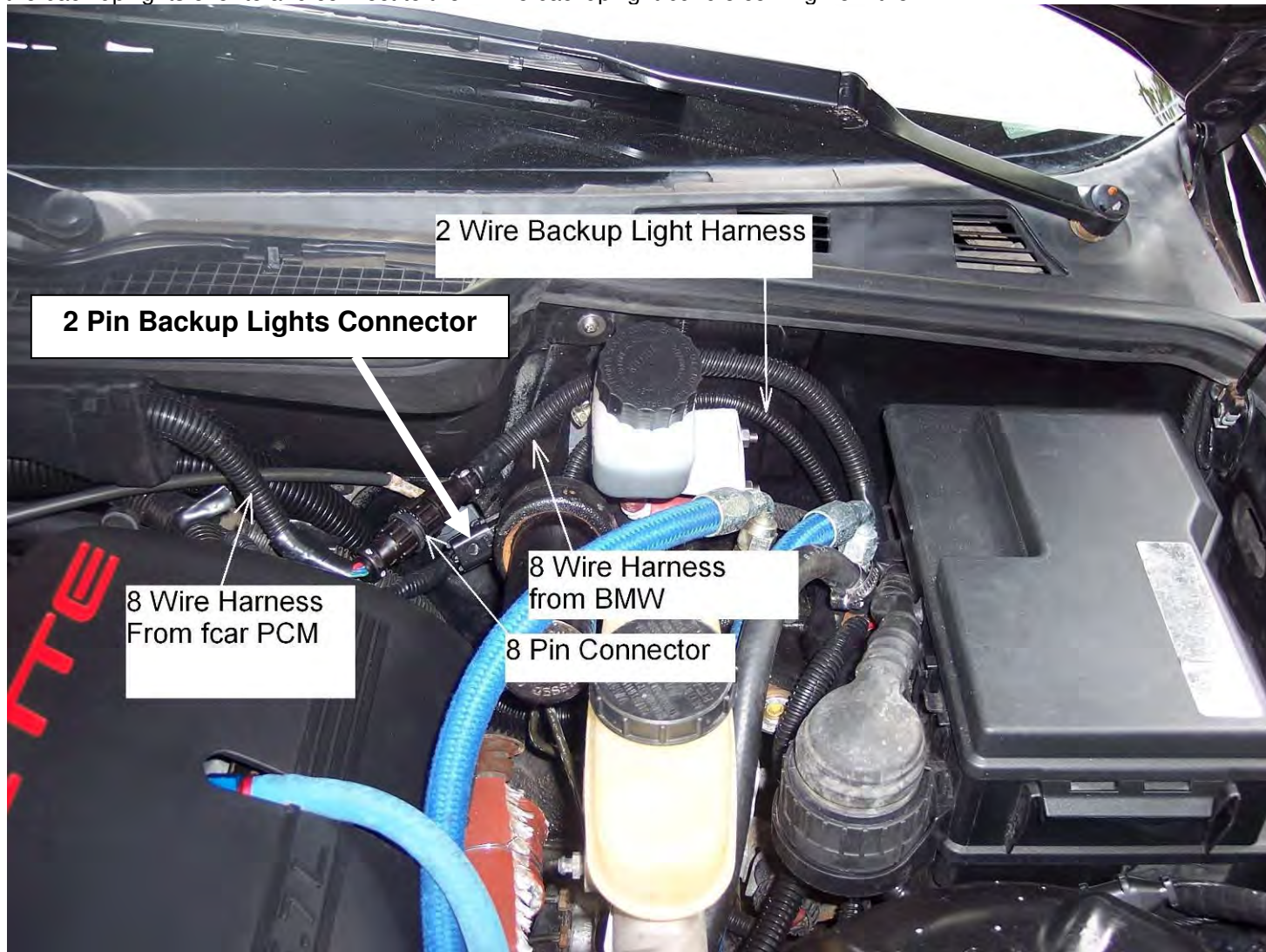
[Break out inside wire box.JPG](#)

- 24 Run the 8 wire bundle through the wire box and connect to the 8 pin connector coming from the BMW and close the wire box



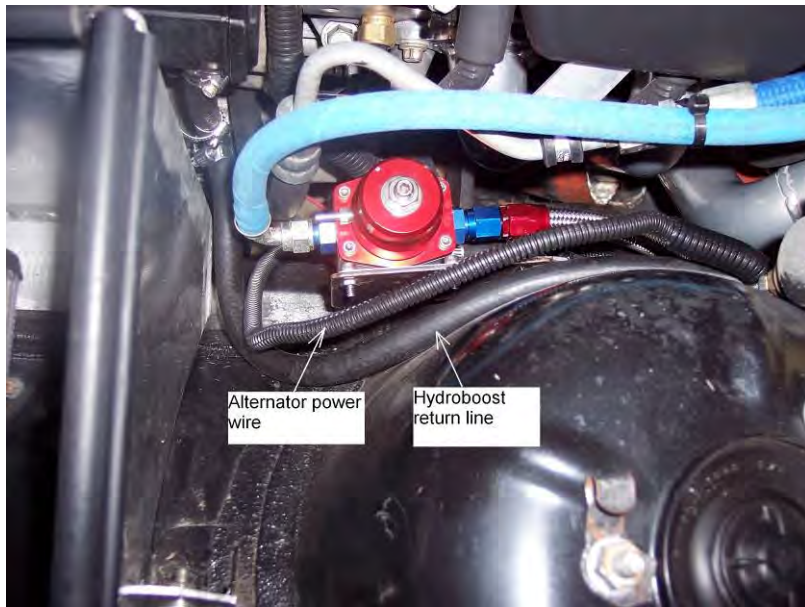
[8 wire breakout.JPG](#)

25 Run the back up lights over to and connect to the 2 wire backup light bundle coming from the BMW.



[Electrical 8 Wire Harness 1.JPG](#)

- 27 Run large red alternator wire up to the BMW electrical center and connect to the main power lug on the BMW EC. You will have to cut this wire to length and solder on a connector lug. Protect the wire with wire loom. Caution! Remember that the motor and alternator moves back and forth in the engine compartment so leave a some slack between the alternator and the first body attachment.



[Alternator Main Wire.JPG](#)

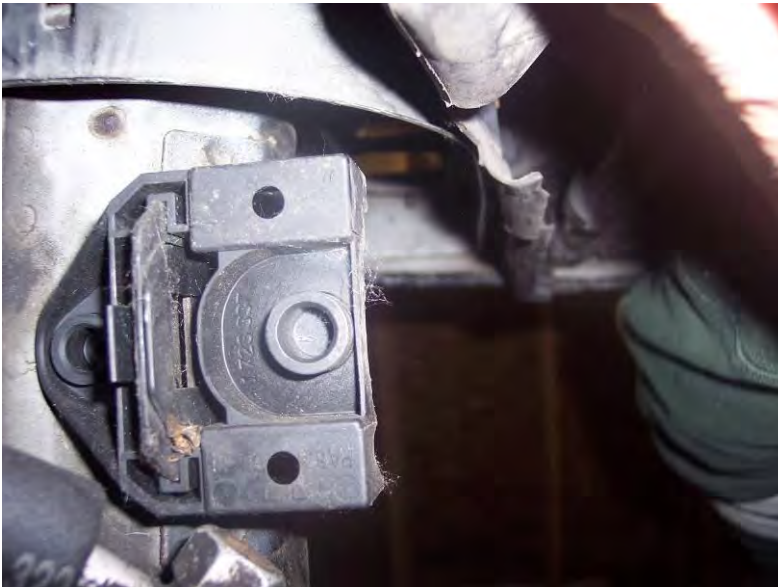
[Alternator Main Wire Attachment to BMW.JPG](#)

- 28 Locate four connectors C100, C101, and C105 these connectors are all close together on a separate breakout from the main harness and close to the PCM. C100 is a 10 pin black, C101 is a 10 pin grey, and C105 is an 8 pin black connector.
- 30 Plug connectors coming from new fuse and relay box to C100, C101, and C105
- 31 In the same EC breakout, run the serial data wires from the PCM that go to the Data Link Connector. If you have a 1998 computer these wires are the purple wire connected to PCM C2 pin 58 and the tan wire connected to PCM C2 pin 3. If you have a 1999 or newer computer you only connect the dk green wire from PCM C1 (red) pin 58 to Connect these wires using bullet connector to the wires that go to the DLC mounted in the glove box.

1998 PCM C2 (blue) pin 58 purple wire connects to wire coming from pin 2 on the DLC
PCM C2 (blue) pin 3 tan wire connects to wire coming from pin 9 on the DLC.

1999 and newer: PCM C1 (red) pin 58 dark green wire connects to wire coming from pin 2 on DLC.

- 32 Attach fan to radiator using plastic connectors supplied with the fan.
- 33 Set radiator and fan in place. Alum brackets should rest on top of the plastic rad support brackets. Lean radiator back against the motor and secure it there until front clip is reinstalled.
- 34 Reinstall front clip.
- 35 Position radiator so the mounting bracket is tight to the frame rail on the driver side.
- 36 Drill 5/16" hole through bottom of plastic BMW radiator support brackets and through alum brackets on radiator.
- 37 Secure radiator with m8 x 35 bolts

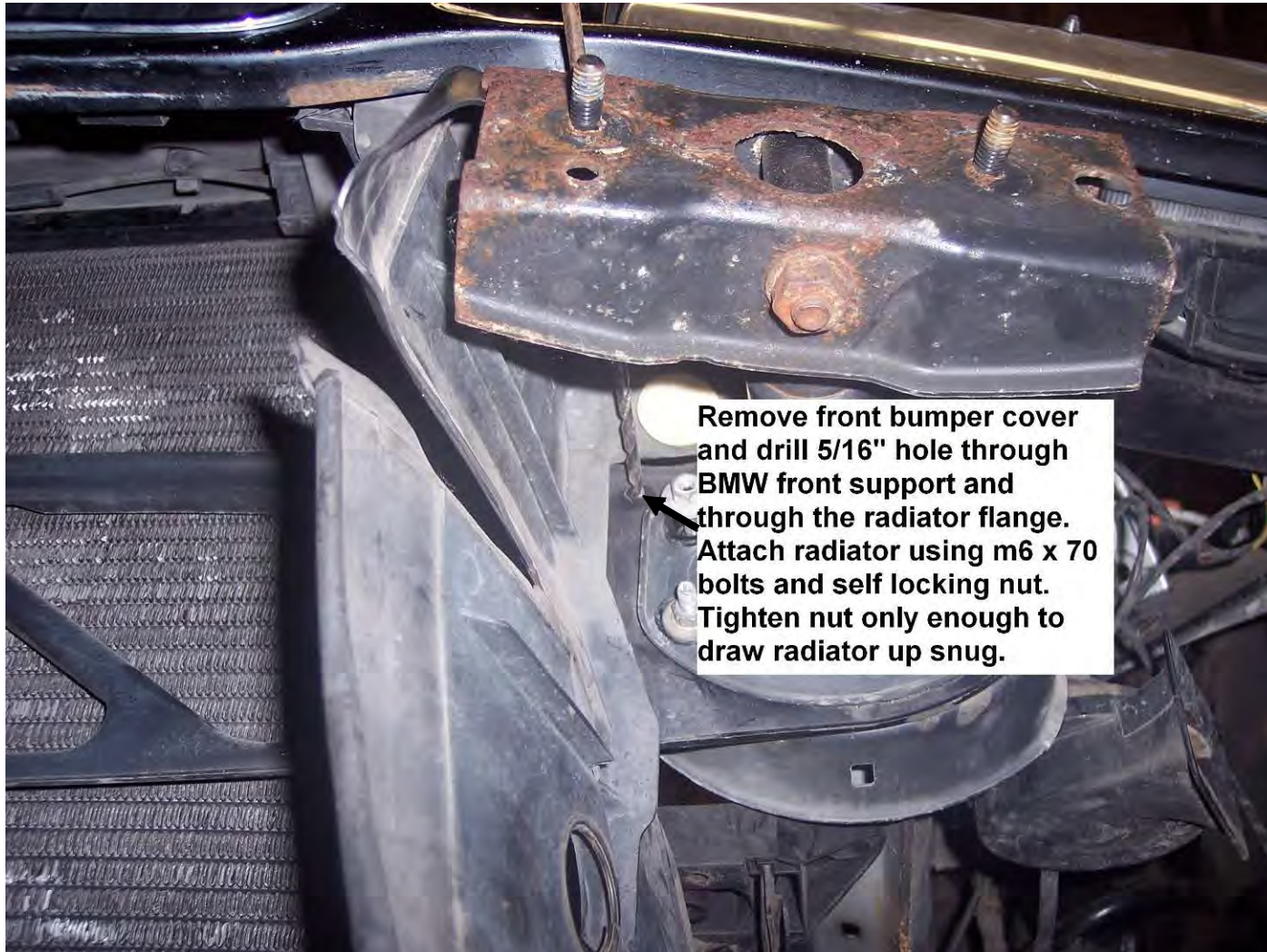


[Radiator - Lower BMW bracket.jpg](#)



[Radiator Bracket Attachment - Lower.JPG](#)

38 Drill 5/16" hole through bumper support and through radiator bracket.



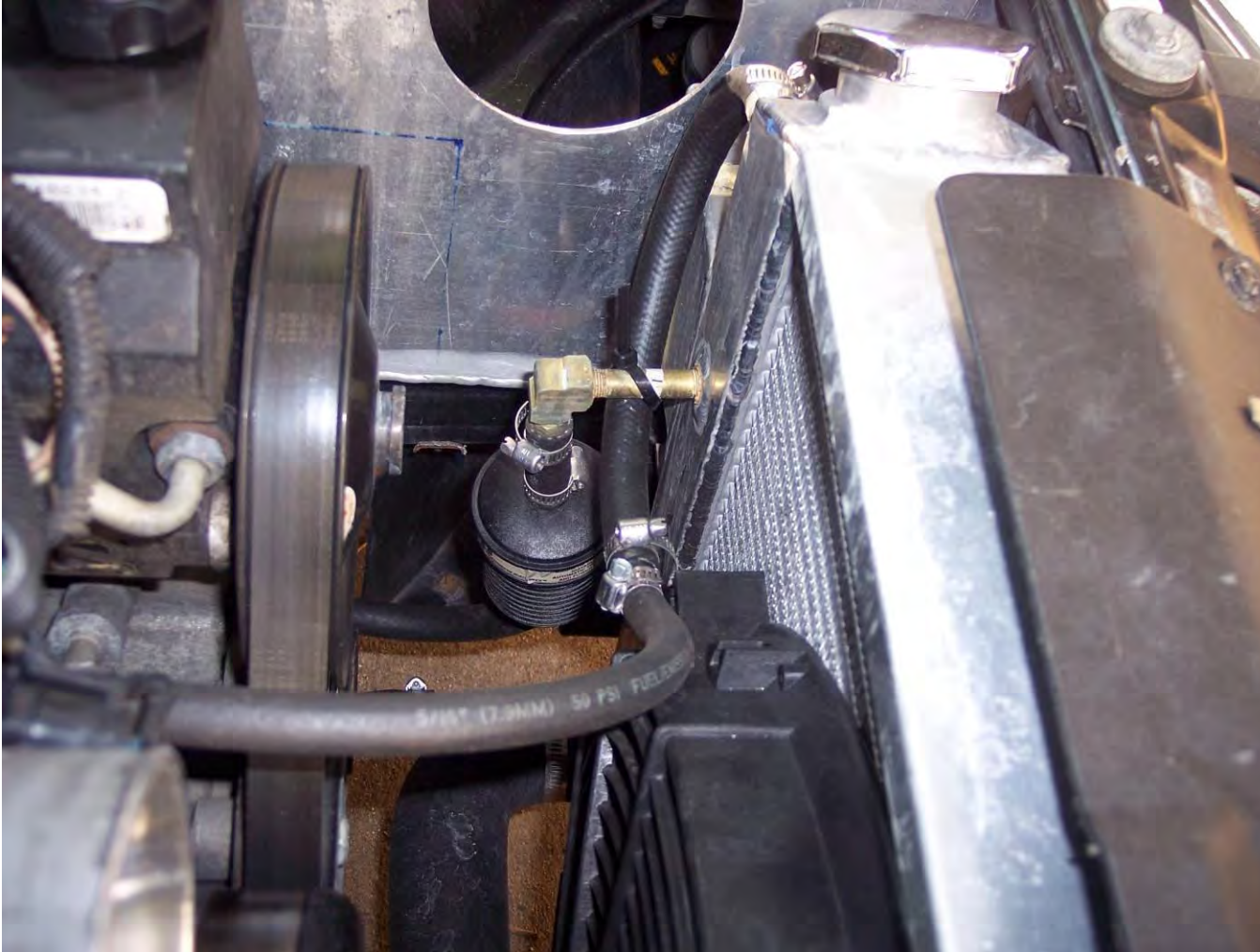
[Radiator Attachment - Upper.JPG](#)

- 39 Secure radiator with m8 x 75mm bolts and self locking nuts. Tighten nuts only enough to hold radiator snugly in place. Over tightening will bend the brackets.
- 40 Install steering rack.
- 41 Install control arms.
- 42 Install front sway bar
- 43 On BMW aux fan cut the blue wire and attach blue wire coming from the fan to the white Fan-2 wire coming from the new electrical center.
- 44 Connect the power wire from the motor side fan to the white Fan-1 wire coming from the new electrical center.
- 45 Connect motor side fan ground wire to BMW ground lug. need pic
- 46 Run stainless braided fuel line along rail and tie strap the the ABS bracket then down to the fuel BMW fuel supply line. Be sure fuel line is at least 1" from the headers and then cut to length and connect and secure with hose clamp.
- 47 Run the fuel return hose from the BMW next to the fuel supply hose and attach to the bottom port on the pressue regulator using a hose clamp.
- 48 Install barb fitting into lower cooler port in radiator.
- 49 Attach rubber hose from PS rack to barb fitting just installed. Note: If hose is not long enough to reach barb fitting then remove the barb fitting and install a brass pipe nipple and coupler between the cooler port and the barb fitting to extend the barb fitting far enough to reach the return hose from the rack.



[PS return from rack.JPG](#)

- 50 Secure hose with hose clamp
- 51 Install 2" brass pipe into top cooler port in radiator.



[PS return from cooler.JPG](#)

- 52 Install brass elbow and barb fitting onto end of brass pipe. Tighten and leave barb fitting pointing down. (Use teflon tape to seal threads)
- 53 Cut small piece of power steering return hose and install onto barb fitting.
- 54 Install PS filter and attach return line to brass T fitting



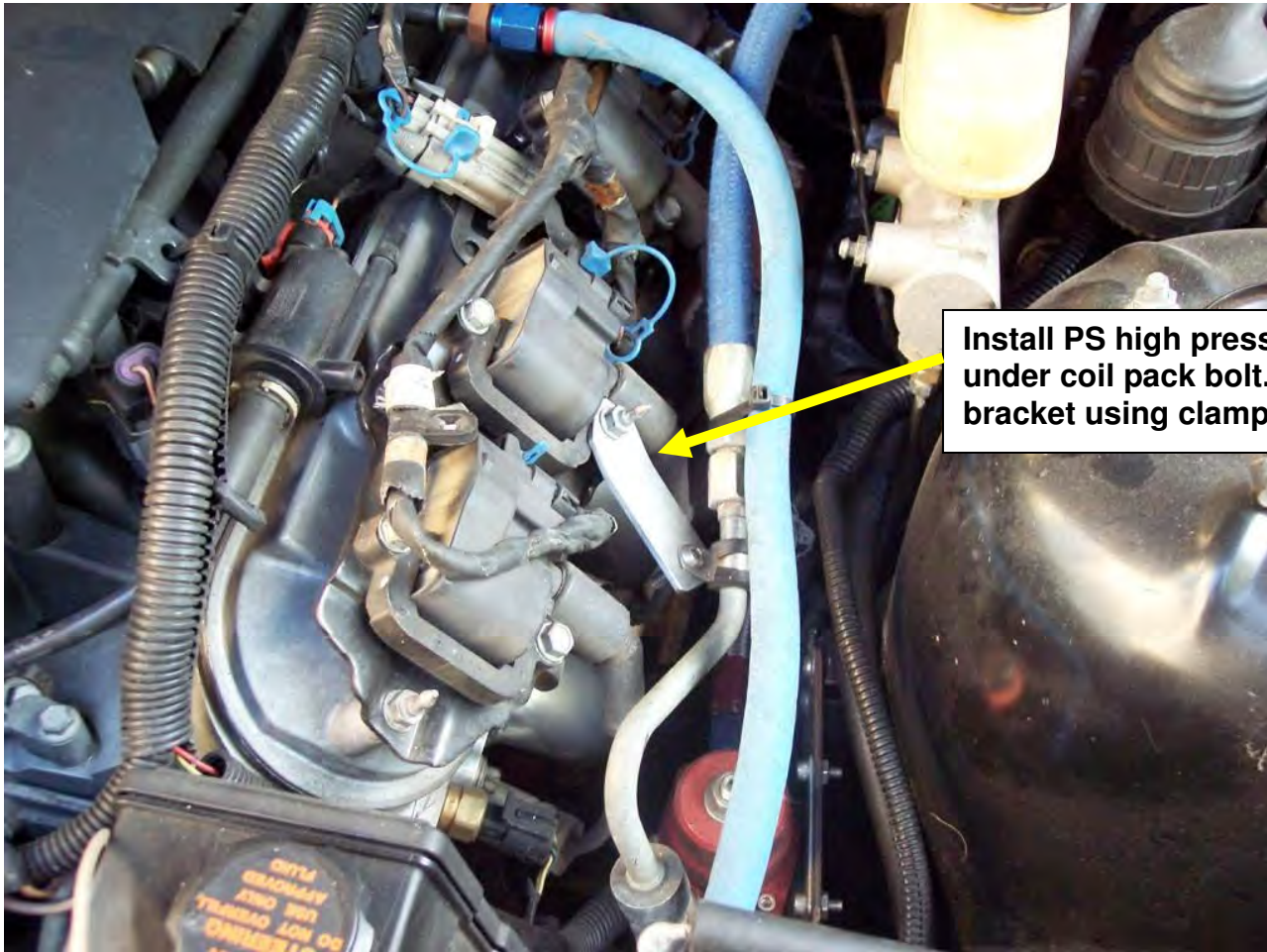
[PS return T.JPG](#)

- 55 Attach hydroboost return line to T fitting
- 56 Attach PS reservoir line to T fitting
- 57 Attach long hydroboost line to steering rack -6 fitting installed earlier.
- 58 Cut PS pressure line 2" beyond second bend as shown.



[PS pressure line.JPG](#)

- 59 Attach PS pressure line to hydroboost line using compression fitting.
- 60 Remove coil pack bolt and Install PS pressure line bracket under this bolt.
- 61 Attach PS pressure line to the bracket using the clamp provided.



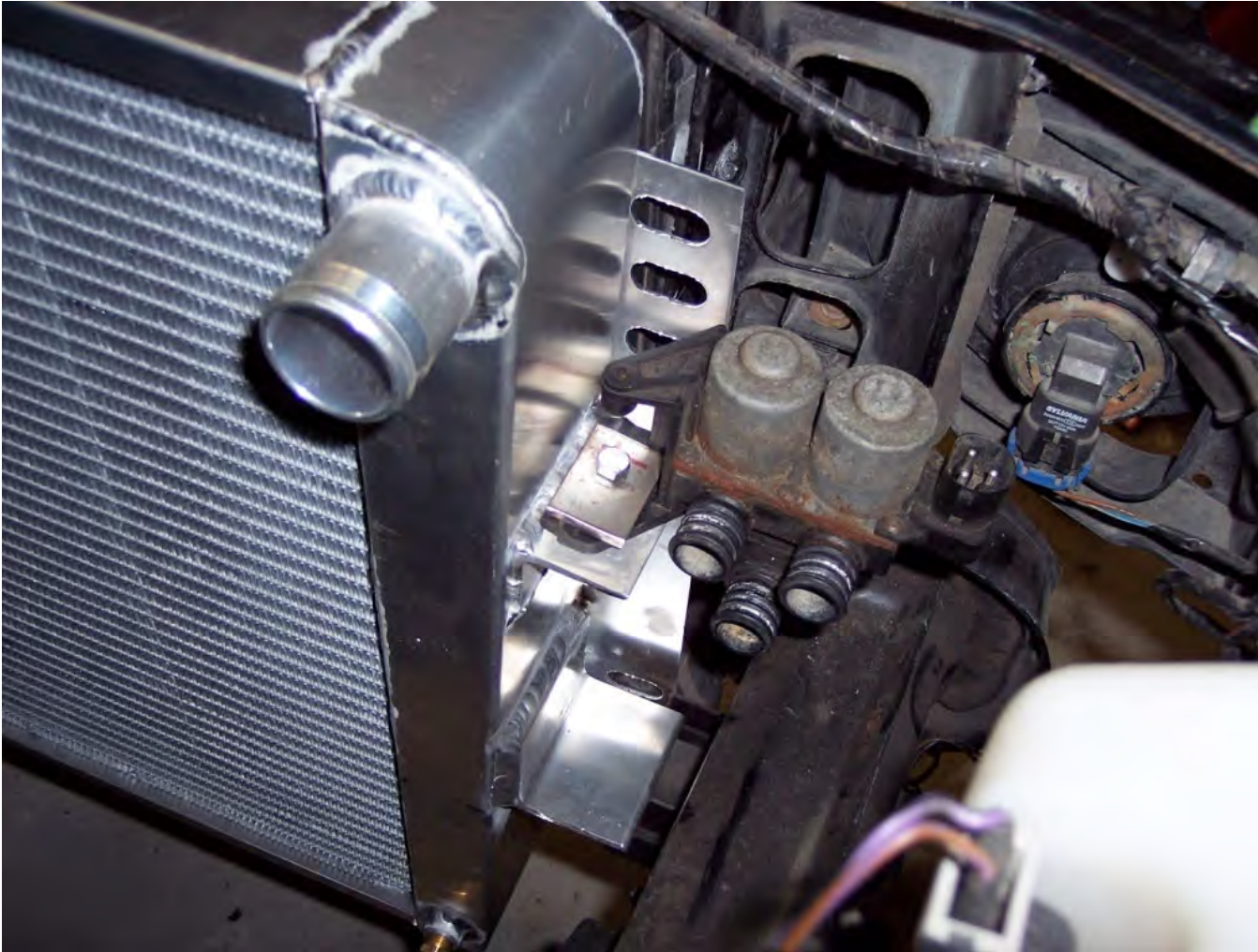
[PS Hosebracket installed.JPG](#)

62 Run 1/4" hose from manifold port to port with the barb fitting on the radiator just below the upper radiator hose. Secure with hose clamps.



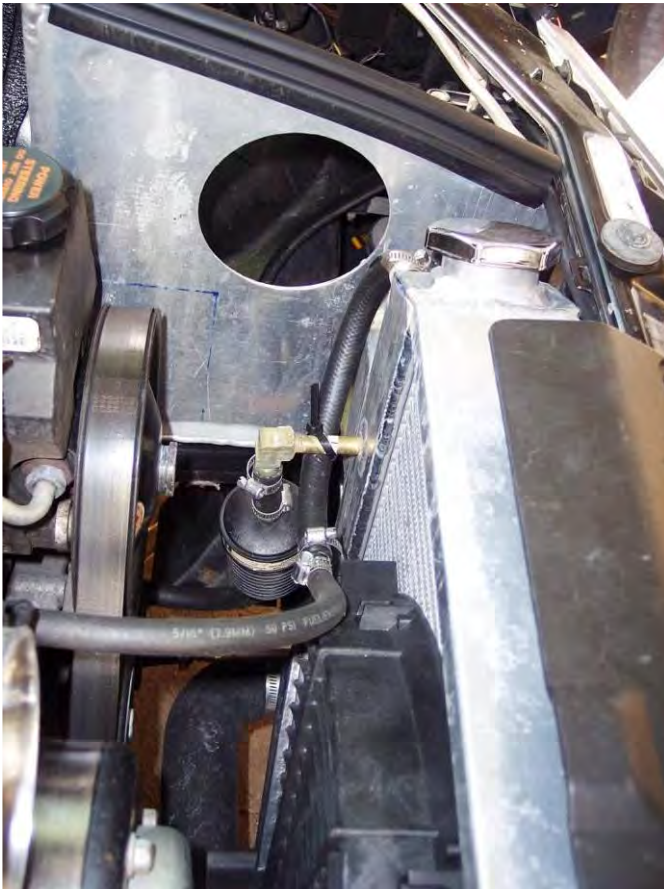
[head vent hose.jpg](#)

- 63 Install upper and lower rad hoses.
- 64 Mount heater control valve (HCV) onto radiator.



[Heater control valve installed.JPG](#)

- 65 Run 5/8" heater hose from the lower port of HCV to the rearward (5/8") heater port on the LS1 water pump.
- 66 Attach 3/4" heater hose (port towards passenger side of car) to the forward port on the LS1 water pump.
- 67 Attach other two 5/8" hoses to the upper ports of the HCV.
- 68 Cut heater control valve wires and splice in enough wire to rout wires along driver side fender, and across the radiator support and attach to the heater control valve mounted on the radiator.
- 69 Set cold air intake box in place.



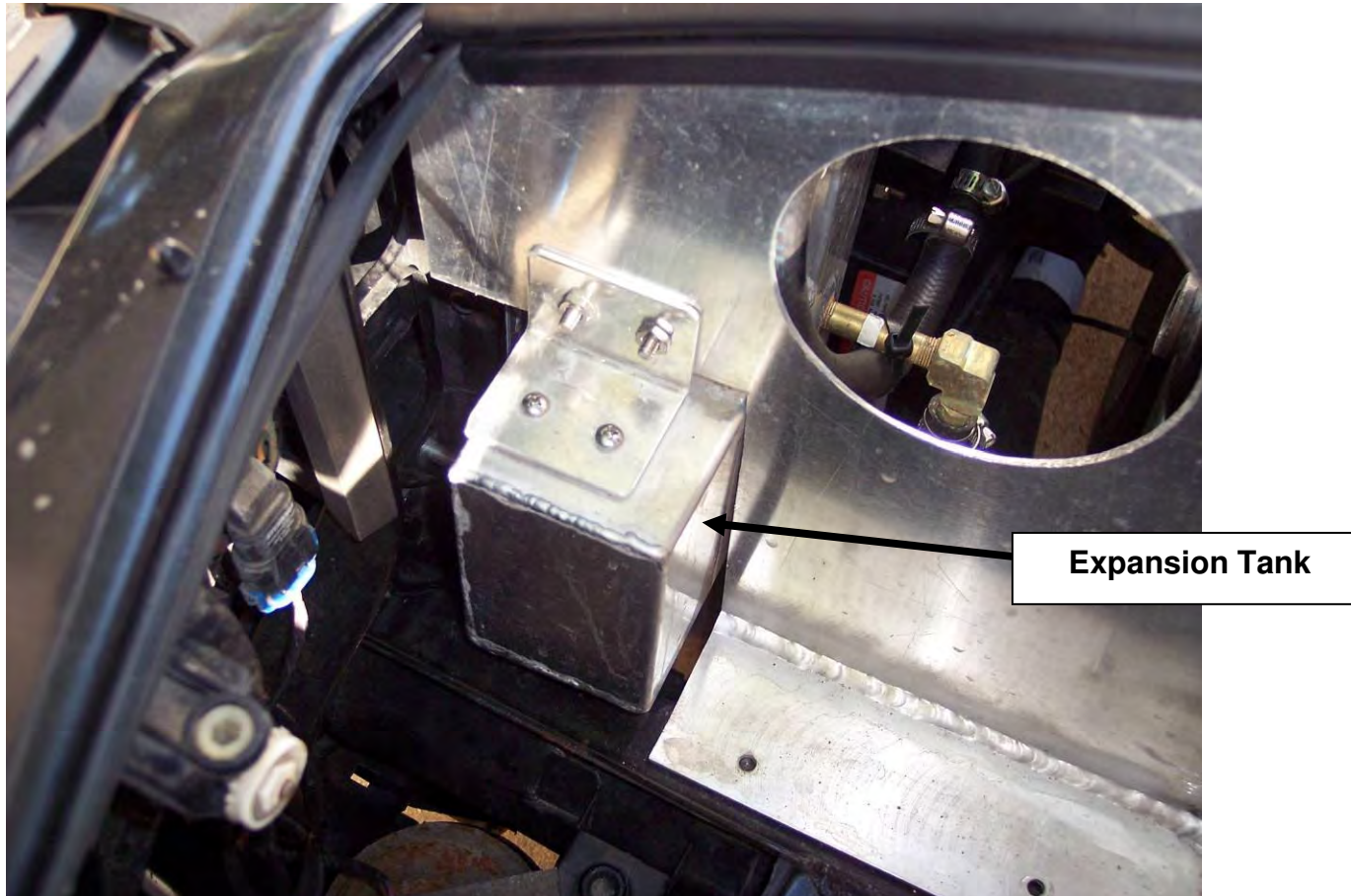
[Fan PS lines.JPG](#)

70 There are two brackets used to attach the cold air box. Use the bracket with three holes to attach to the bracket on the fender.



[Airbox rear bracket-1.JPG](#)

- 71 First attach bracket to the existing BMW bracket.
- 72 Next position air box for best fit and mark hole locations using sharpie marker.
- 73 remove air box and drill 1/4" holes as marked.
- 74 Reinstall air box and secure using m6 bolts and nuts
- 75 Next set bracket with 4 holes onto the radiator expansion tank as shown.



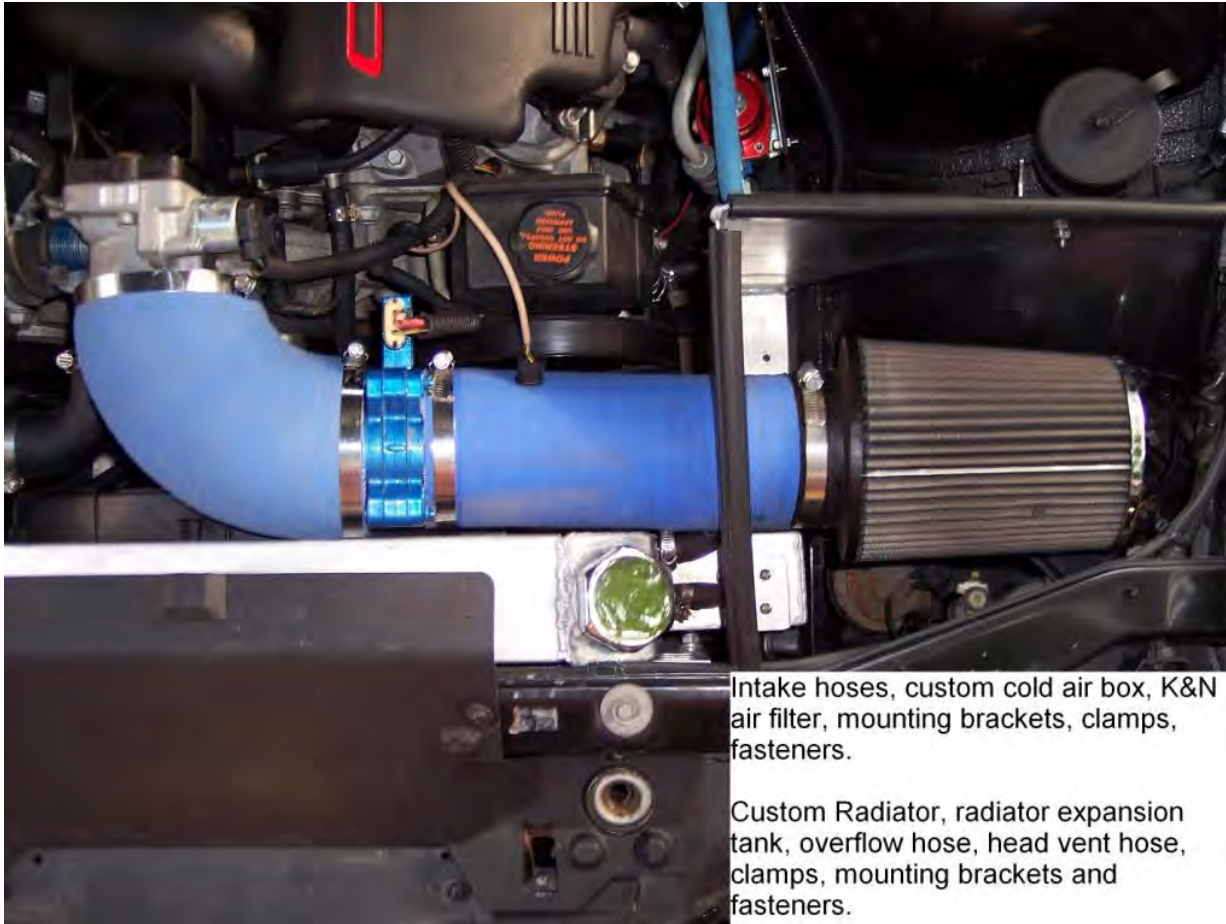
[Airbox rad bracket.JPG](#)

- 76 Clamp the bracket in place and drill 9/64" holes in top of the expansion tank using the bracket as a template.
- 77 Secure bracket to expansion tank using #10 x 3/4" sheetmetal screws.
- 78 Mark the air box using a sharpie marker
- 79 remove air box and drill 1/4" holes as marked.
- 80 Reinstall air box and secure using m6 bolts and nuts
- 81 Install 1" long intake hose over motor side of the MAF.



[Intake SI Ring.JPG](#)

- 82 Attach intake elbow to the throttle body (intake side is marked).
- 83 Attach MAF to intake elbow.
- 84 Slide straight intake pipe into the hole in the air box and then attach pipe to the MAF.
- 85 Secure intake hose to the throttle body and MAF using hose clamps provided.
- 86 Attach air filter to the intake hose and secure with hose clamp.



Intake hoses, custom cold air box, K&N air filter, mounting brackets, clamps, fasteners.

Custom Radiator, radiator expansion tank, overflow hose, head vent hose, clamps, mounting brackets and fasteners.

[Air Box Installed.JPG](#)

- 87 Attach blue pushlok hose to the barbed fitting on the fuel pressure regulator.
- 88 Attach barbed fitting to the fuel rail using the compression fitting provided.
- 89 Cut fuel hose to length and push on over barbed fitting on fuel rail. Do not clamp the pushlok hose.
- 90 Fill brake fluid reservoir and bleed brakes.
- 91 Install dirveshaft
- 92 Fill transmission with Dexron III ATF
- 93 Fill Radiator fluid.
- 94 Cut main battery wire coming from starter to length and solder copper battery lug onto starter wire.
- 95 Attach main power wire from the starter to the BMW battery terminal
- 96 Attach Power wires from the new fuse and relay box to the BMW battery terminal.
- 97 Attach ground wires from motor to BMW frame rail.
- 98 Inside car glue tunnel closeout in place over shifter. Center shifter tower in the tunnel closeout hole
- 99 Install the rubber BMW shifter grommet over the shifter tower and snap into the closeout hole.



[Tunnel Closeout Installed.JPG](#)

- 100 Using m8 bolts attach new shifter to the shifter tower.
- 101 Slip shifter boot over shifter and snap into place in console.
- 102 Remove third from front air intake bolt and install throttle cable bracket.

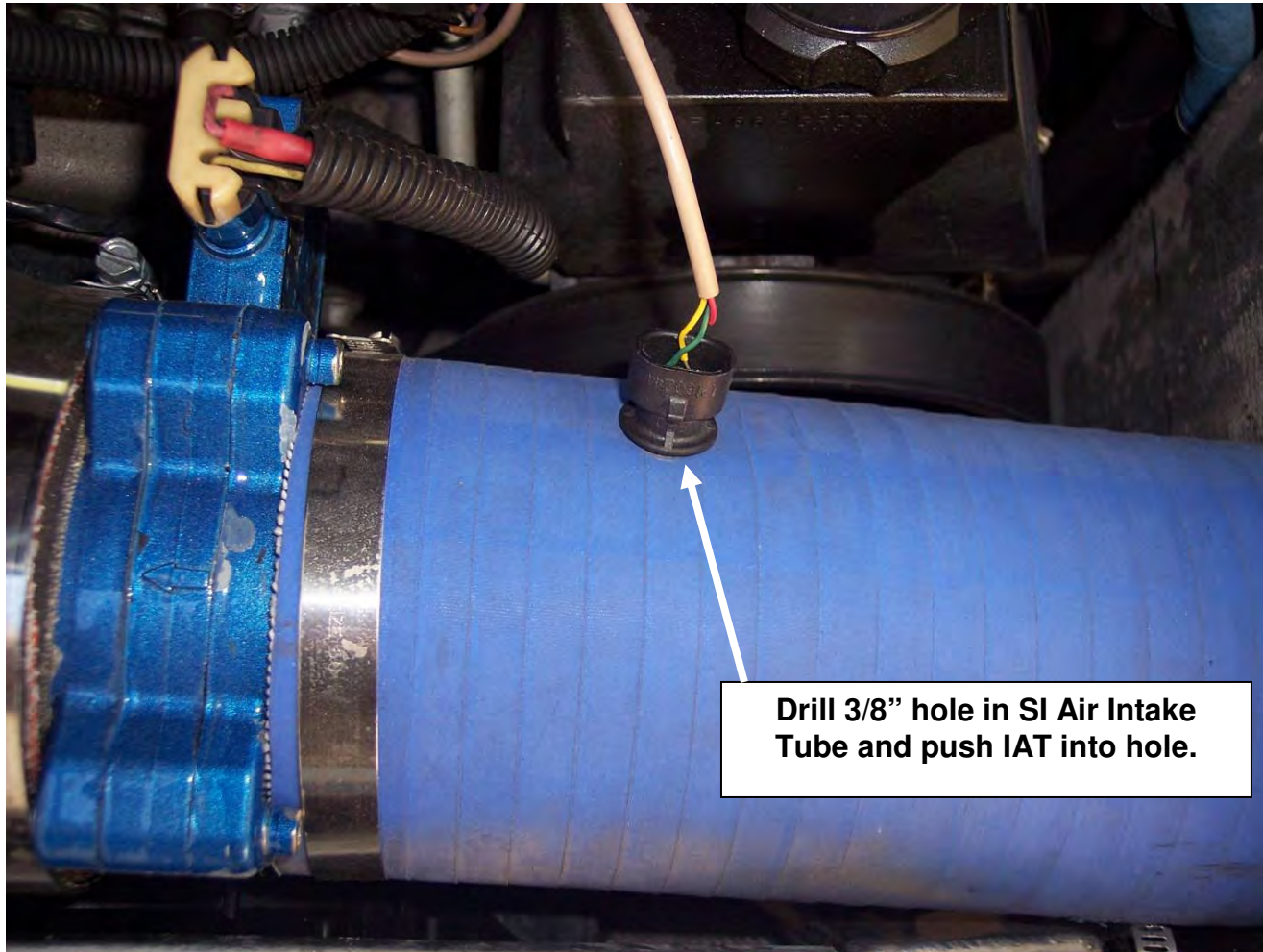


[Throttle Cable Bracket.jpg](#)

- 103 Remove existing throttle cable from the cable conduit.
- 104 From inside car feed new cable into cable conduit and connect to the accelerator pedal
- 105 Cut cable to length and attach to throttle body.
- 106 Inside car adjust pedal stop so that full throttle can be achieved



107 Install Inlet Air Temp (IAT) probe into air inlet tube.



THAT'S IT

It's a bit scary but after filling all fluids your killer E36 should be ready for it's maiden voyage!!

Revision History

July 1, 2006

1. Added better information on connecting the data link connector.
2. Added DLC information for the 1999 computer.