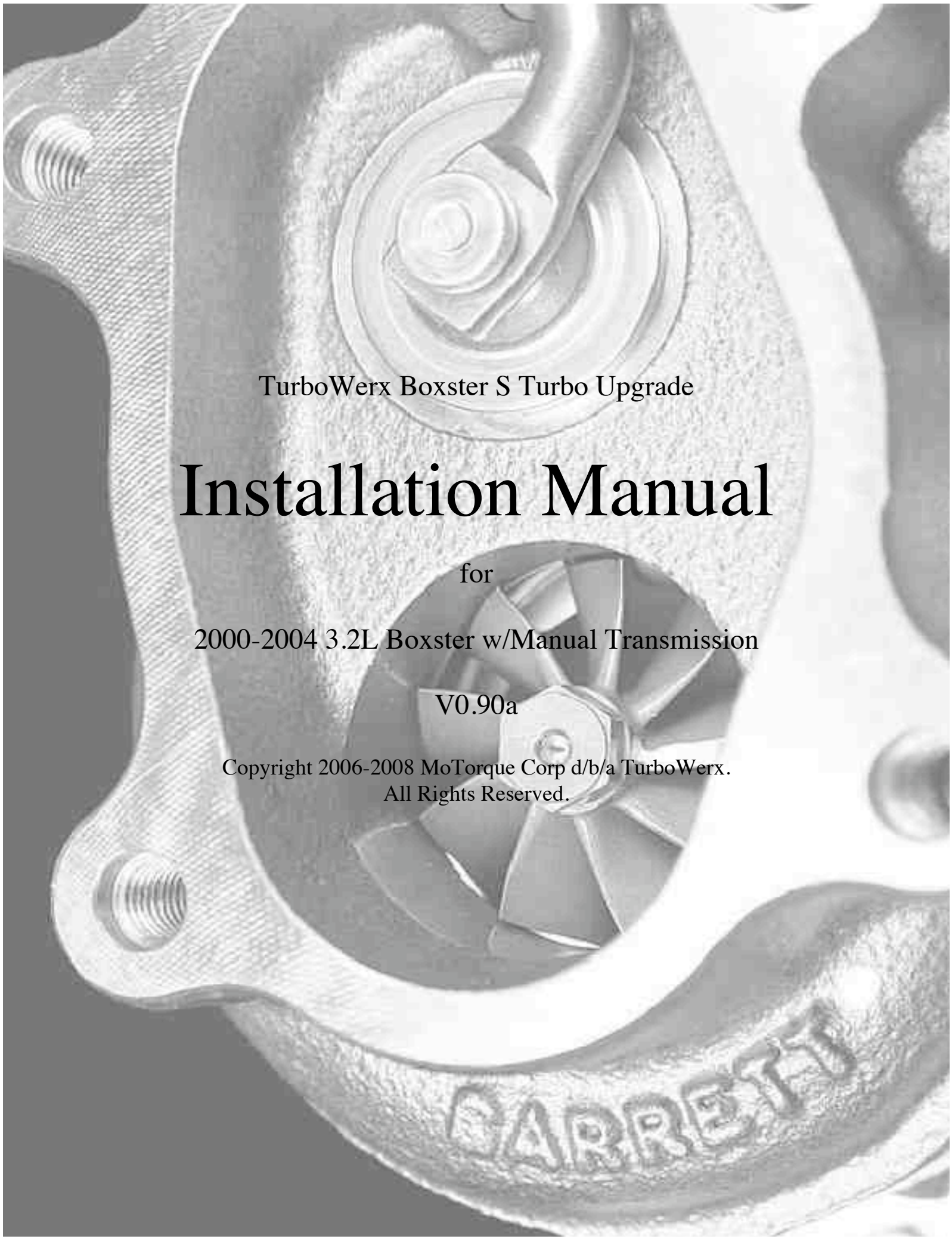


TurboWerx Boxster S Turbo Upgrade

Installation Manual

for

2000-2004 3.2L Boxster w/Manual Transmission

V0.90a

Preface

Thank you purchasing the Boxster S Turbo Upgrade Kit from TurboWerx. The installation of the kit is straightforward and does not require any specialized tools. Although the estimated time for a complete installation is 10-14 hours, please allow extra time for maintenance items or other unanticipated issues.

Once installed, the upgrade will offer years of trouble-free service and will require no special maintenance other than is already required from Porsche. The system will have an extra 0.5 qts (1 liter) of oil circulating, due to the volume in the turbos' oiling system. However, once this initial oil volume is added at kit installation time, it will not impact future engine oil changes, as it will remain in the turbo's oiling system during a standard engine oil/filter change.

The break-in period for a new turbo is very short. Only a few hours of normal driving is needed. If there are any driveability issues related to the kit, please contact the reseller where it was purchased, or TurboWerx technical support (support@turbowerx.com).

Preliminary

Preparation:

Read this Installation Manual cover-to-cover before beginning installation!

The Boxster will need to be elevated for most of the installation process. A repair lift is ideal, but secure placement of jack stands at the car's jack points on a smooth, hard level surface will suffice. You will need enough space to comfortably work directly under the engine.

If you have not already, you will need to remove the ECU and send to TurboWerx for re-programming. The ECU is located in the trunk, behind the front gray panel attached to the firewall.

Tool Requirement:

A full set of metric tools will be needed. 1/2", 3/8" and 1/4" ratchet with various sockets, extensions, open and box end wrenches, adjustable wrench, screwdrivers, etc. You will also need a floorjack to support the transmission during turbo bracket installation.

Kit contents

Section 1.

Summary: Install supplied fuel-injectors, -3AN Oil Adapter, and 3AN Oil Line. Tap plenum.

In past versions of our installation manuals we have listed instructions for installing the fuel-injectors. We have deleted this section and now highly recommend that a professional mechanic do this portion of the installation. The potential for a fuel leak is simply not worth the small money savings over a few hours of professional labor.

Note that after this section is completed, the car can be driven. You can simply drive it normally until ready to finish the rest of the turbo installation. You may use the original un-programmed ECU, or install the TurboWerx re-programmed version. It makes no difference at this time. <u>If you do need to drive it, be sure and verify the -3AN Oil Line has the temporary Male Plug in the end and the plastic plenum port cover is re-installed!</u>

While the injectors are being installed, the -3AN Oil Adapter and -3AN Oil Line needs to be installed, and the plenum tapped. The procedure follows:

1. When the left side fuel rail and plenum are loose, remove aluminum oil plug from left side cam housing with 6mm Allen wrench or socket drive. Be sure and seat the Allen drive ALL the way into the oil plug. It is likely that debris will need to be cleaned out of the hex hole. Also, don't forget to remove the aluminum crush o-ring with it. See Photo 1.0-1.1. Install -3AN Oil Adapter and tighten until crush ring is fully compressed.

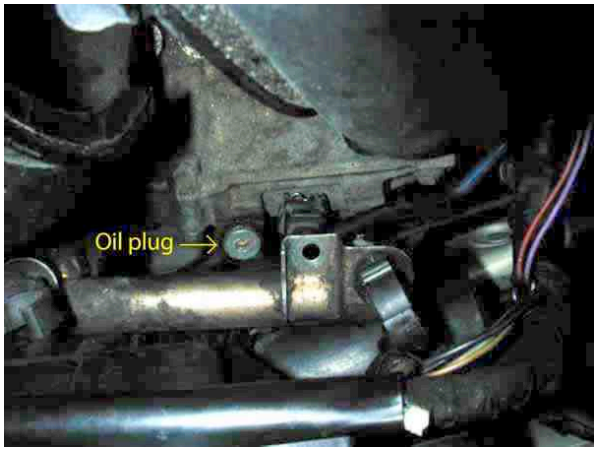


Photo 1.0.

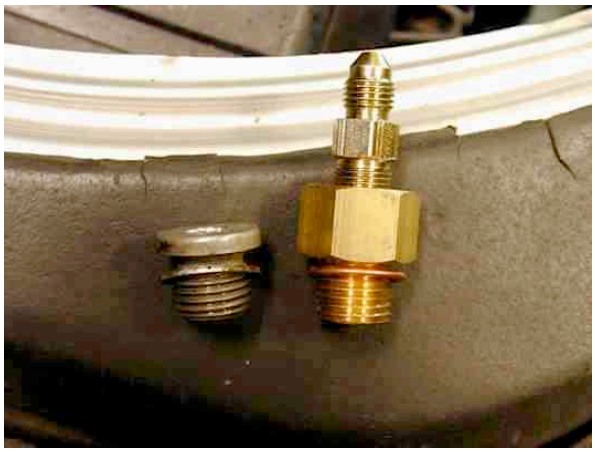


Photo 1.1. Original oil plug & new -3AN Oil Adapter.

2. Install -3AN Oil Line on Adapter. Firmly tighten. Slide the rubber sheath all the way down to the adapter. This will protect the plastic on the intake air box from chaffing. See Photos 1.2-1.3.

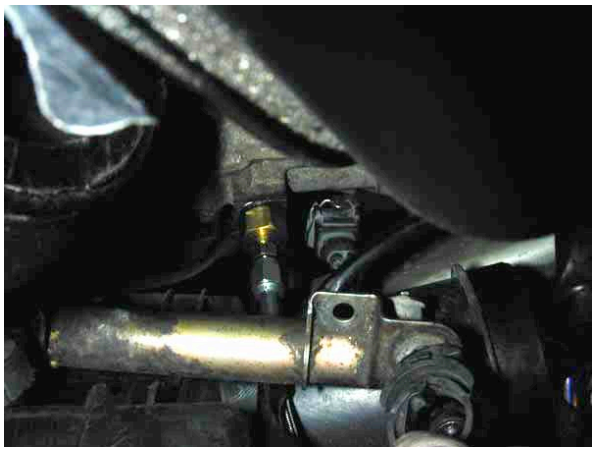


Photo 1.2. –3AN adapter and –3AN oil line installed.

Photo 1.3. Sheath slid in place.

3. While the left side plenum is loose, remove the small plastic port cover plate from it (2 M6 screws). See Photo 1.4. (This cover will not be used with the turbo kit.) Protect the intake ports in the cam housing from falling debris. Tap the port with a ¼" NPT tap. See Photos 1.5-1.6. Using compressed air, blow out the plastic shavings. (Even if some plastic shavings are missed, don't worry they will not harm the engine at all.)

Photo 1.4. Plenum port cover plate.

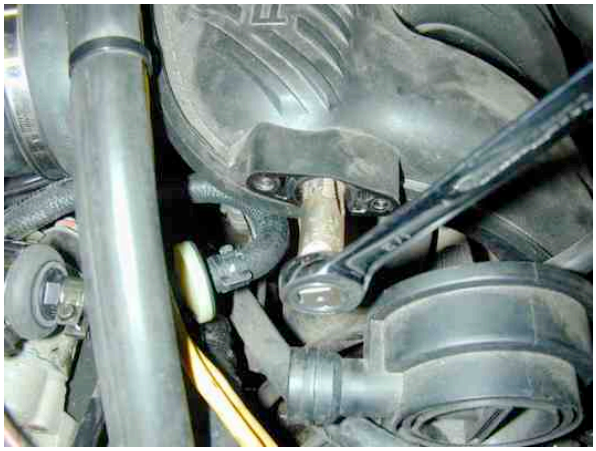


Photo 1.5. ¼" NPT tap.

Photo 1.6 ¼" NPT tapped thread.

Section 2.

Summary: Prepare car for installation of the complete turbo kit.

Note: For the most thorough engine cleaning, skip jacking up the car and move the car to a suitable location where a garden hose can be used for Step 9 below.

Procedure:

1. Elevate rear of car. Place on jack stands at car jack points, and remove rear wheels.

2. Unlatch the convertible top.

3. Begin lowering top, but stop with about 5" gap between front edge of convertible top and top edge of windshield frame.

4. Disconnect battery negative terminal (10mm). (You will need the Radio Code to enable the radio after reconnection of battery.)

5. Unlatch both cables (left and right side) from convertible top. Unlatch fabric cover from rear firewall.

6. Push backside of convertible top upward to vertical position.

7. Remove storage unit (2 latches). If the rear speaker option exists, locate connector on right side corner and disconnect cable.

8. Remove engine cover (5 latches).

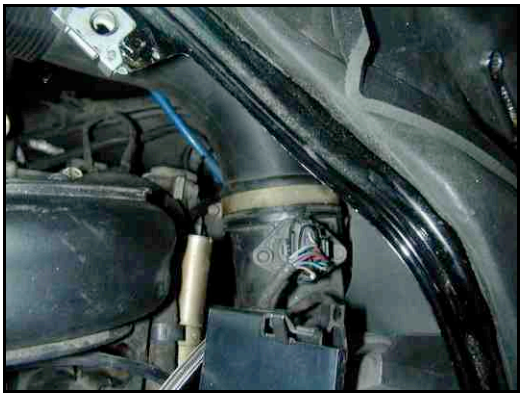
9. Engine will probably be covered in dirt. This is normal. Although not required, you can clean up all the visible surfaces with paper towels/rags, and all-purpose kitchen surface cleaner. This will make the rest of the installation less messy. (You can certainly use engine cleaner/degreaser, brushes, and more water for a more thorough job.)

Section 3.

Summary: Remove stock air-duct and vent tube, install One-way Valve Assembly.

1. Remove the large plastic air duct between MAF and throttle body by loosening 2 clamps. Note it is a tight squeeze working the air duct's "tumor" part out. Just keep

working it and force it out – it's a very durable piece. This part will not be re-installed with the turbo kit. See Photos 3.0 and 3.1.



Photos 3.0-3.1. Intake clamps loosened.

2. Remove vent tube by using a pair of pliers, move the small black spring clamp up the rubber hose, then pull the hose off. Remove the vent tube by squeezing the plastic rings around the end connectors and wiggling/pulling each end. See Photo sequence 3.2-3.4.

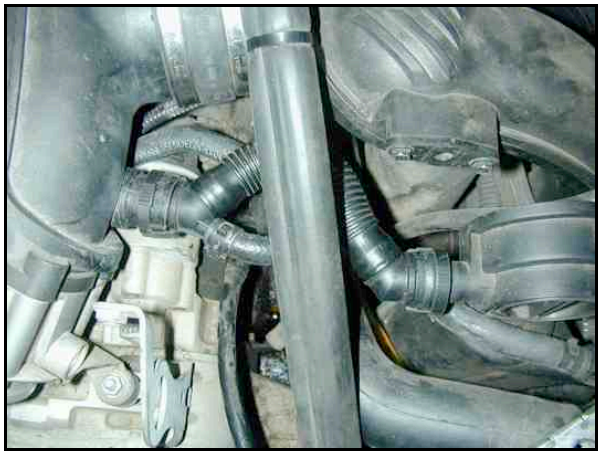


Photo 3.2. Corrugated vent tube.

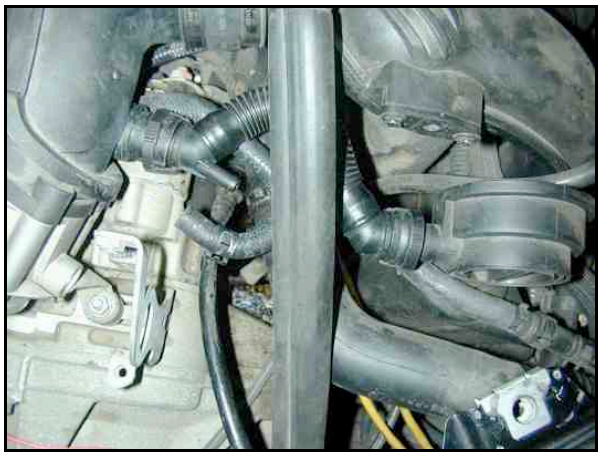


Photo 3.3. Rubber hose removed.

Photo 3.4. Vent hose removed.

4. Connect the hose to the one-way valve port, and secure with the small spring clamp. See Photo 3.6. Install rubber end on the intake plenum port and tighten clamp. See Photo 3.7.

Photo 3.5. One-way Valve Assembly.

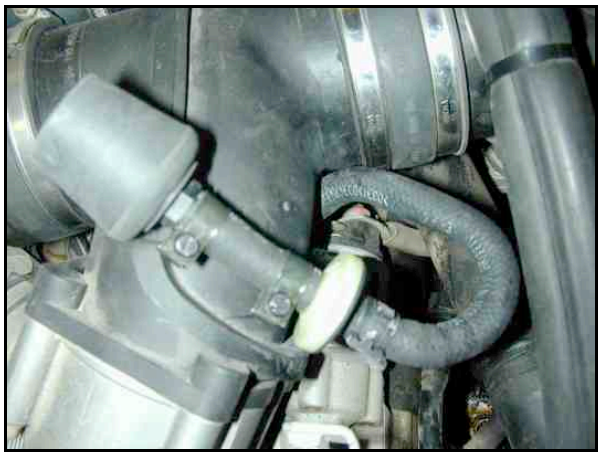


Photo 3.6.

Photo 3.7.

Section 4.

Summary: Loosen both suspension support struts, remove transmission shield.

1. Remove the 4 nuts on the strut. Remove the small screw attaching the steel bracket to the plastic undertray. Loosen the remaining bolt. Once bolt is loosened, let the strut drop down far enough to swing forward out of the way, or you can just remove the bolt and remove the struts altogether. See Photos 4.2-4.3. This applies to both left and right side struts.

Photo 4.0 Suspension support strut.

Photo 4.1 Support strut fasteners.


Photos 4.2-4.3. Support struts dropped and swiveled away.

2. Remove transmission shield by removing 2 bolts and 2 nuts. See Photo 4.4. This will not be re-used – included in the Turbo Kit is a hex strut bar to replace the functionality.

Photo 4.4. Transmission shield.

Section 5.

Summary: Remove the entire exhaust system after the header collectors, remove transmission shield support bar.

1. Loosen the exhaust clamp between the rear catalytic converter and the U-pipe. See Photo 5.0. Slide them back over the catalytic converter pipe. (This will be easier if the bolt threads and the clamps' internal surfaces are heavily pre-soaked with penetrating oil 10+ minutes earlier.) This applies to both left and right side clamps.

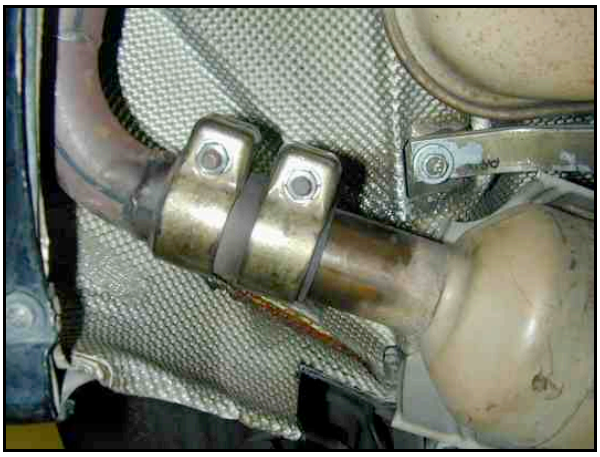


Photo 5.0. Exhaust clamp.

3. Loosen the 3 exhaust header collector flange bolts. See Photo 5.1. The exhaust gasket will be re-used. Remove the 2-bolt clamp at rear. See Photo 5.2. Remove the catalytic converter. This applies to both left and right side flanges.

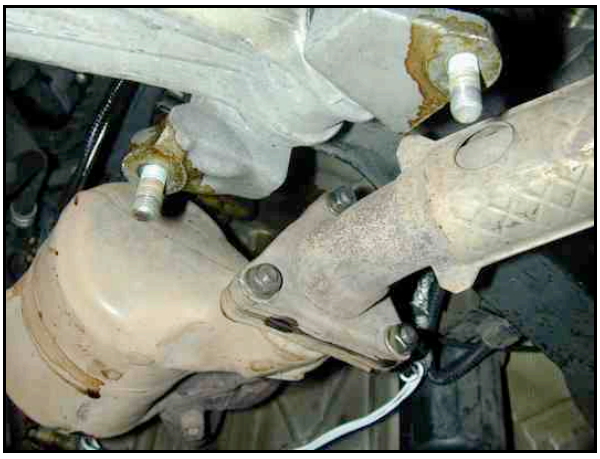


Photo 5.1.

Photo 5.2.

4. Remove the square aluminum transmission support bar by removing 2 bolts. The bar will not be re-used. However, you will be re-using one of the support bar bolts later.

5. Remove the muffler lower support bar (4 fasteners). See Photo 5.3.

Photo 5.3.

6. Remove 2 remaining muffler support bolts, and remove muffler. See Photo 5.4.

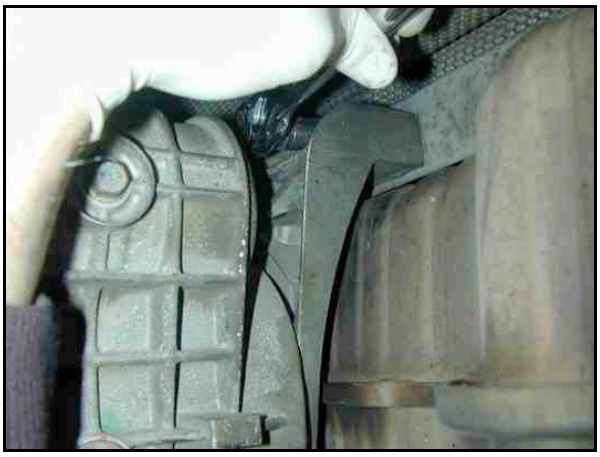


Photo 5.4. Ratchet on muffler support bolt.

Section 6.

Summary: Install upper Intake Pipe.

Upper Intake Pipe parts

1. Carefully bend downward the steel clutch line, until it is touching the transmission case. Photos 6.0-6.2 show different views of it.

Photo 6.0.

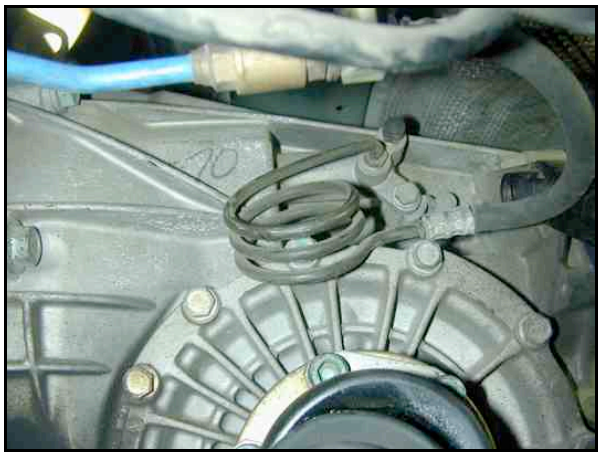


Photo 6.1.

Photo 6.2.

2. Temporarily pop the clutch line out of its mount to allow easier access for installation of the intake pipe. Photo 6.3.

Photo 6.3. Clutch line.

3. Install the Intake Pipe. Work the silicone all the way over the MAF outlet and tighten the clamp. Leave slightly loose for now to allow some rotation for later. Photos 6.5-6.7.

Photo 6.5. Intake Pipe installed on MAF.

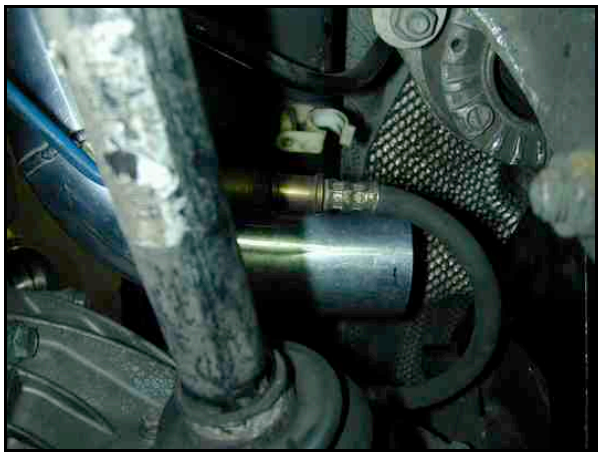


Photo 6.6. Side view of Intake Pipe.

Photo 6.7 Rear view of Intake Pipe.

4. Slide the clamp on to the end of the Intake Pipe. Install the long leg of 45 degree silicone on the end of the Intake Pipe. Photo 6.8-6.9.

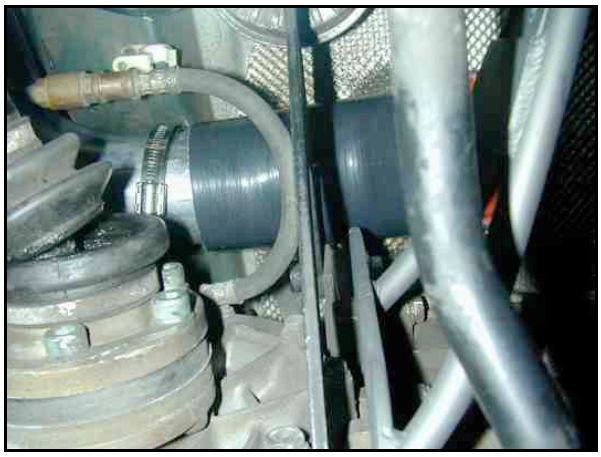


Photo 6.8. 45 degree silicone.

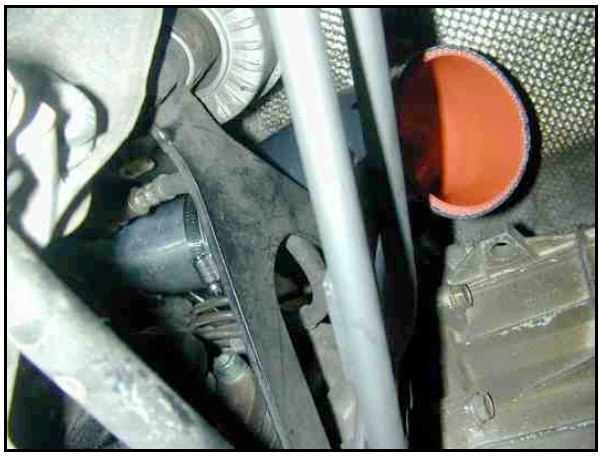


Photo 6.9. 45 degree silicone installed.

Section 7.

Summary: Install Turbo Support Bracket, exhaust pipes.

Right Side Exhaust parts

Turbo Support Bracket

X-Pipe

1. Use a hydraulic jack to support the transmission, and remove the two left side bolts. Photo 7.0. Install Turbo Support Bracket. Note that once the bolts are removed, the steel transmission support bracket can be moved around as needed during Turbo Bracket installation. Photo 7.1. Hydraulic jack no longer needed.

Photo 7.0. Jack supporting transmission.

Photo 7.1. Turbo Bracket installed.

2. Install right side exhaust pipe. Be sure and re-install original gasket. At this point, only lightly tighten bolts to allow some movement. Photo 7.2.

Photo 7.2. Right side exhaust pipe installed.

3. Secure the ABS cable with a plastic tie-wrap. Photo 7.3.

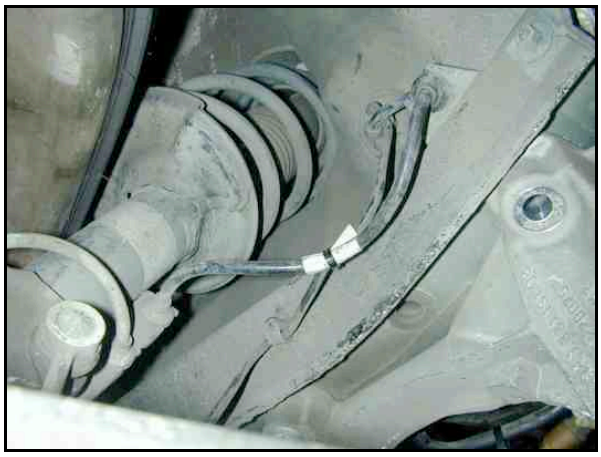


Photo 7.3. ABS cable secured with tie-wrap.

4. Create cut-out in the rear wheel panel. Photo 7.4 shows a somewhat oversize, square rough cut. You can cut a more aesthetic curve to better match the contours of the X-Pipe.

Photo 7.4. X Pipe cut-out.

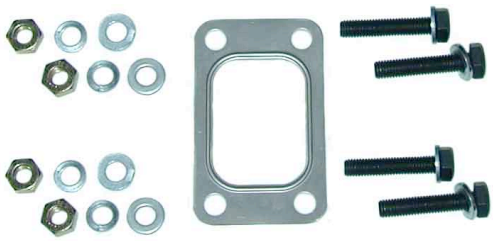
5. Install the X-Pipe with one re-used gasket and one new gasket supplied in the kit. Leave the fasteners slightly loose for now to allow movement. Use two of the M10 bolts/nuts from the turbo to temporarily secure to the Turbo Support Bracket. See Photo 7.5.

Photo 7.5. X-Pipe installed.

Section 8.

Summary: Install Turbocharger, -3AN Oil Line, and lower air intake.

TurboWerx Custom Turbocharger



Turbocharger gasket and fasteners

-3AN Oil Line

Lower intake parts

1. Mount turbo on bracket with supplied gasket. Use all 4 M10 bolts/nuts, but leave loose for now. Note that turbo is shipped with compressor housing loose so that it may be rotated as needed later in the installation process. Photo 8.0.

Photo 8.0. Turbo mounted.

2. Install the 3” coupler and 3” 90d silicone with clamps, but do not fully tighten the clamp on the turbo compressor inlet yet. The compressor still needs to be rotated later. Follow the photo sequence:

Photo 8.1.

Photo 8.2.

2. Route -3AN Oil Line over Intake Pipe as shown in Photo 8.1. Route the end to the turbo oil inlet. Secure the middle of line with a small hose clamp as shown in Photo 8.2. Connect line to turbo and tighten firmly. Photo 8.3.

Photo 8.1. -3AN Oil Line routing.

Photo 8.2. -3AN Oil line secured.

Photo 8.3. -3AN Oil line connected to turbo.

Section 9.

Summary: Install the Oil Return Assembly.

Oil Return Assembly

1. Unclamp and disconnect the plastic oil filler tube. Bend the tube backwards and temporarily secure with tape. See Photo 9.0. Note that it is not uncommon for the plastic oil filler tube to be very brittle with pre-existing cracks. If so, it will need to be replaced.

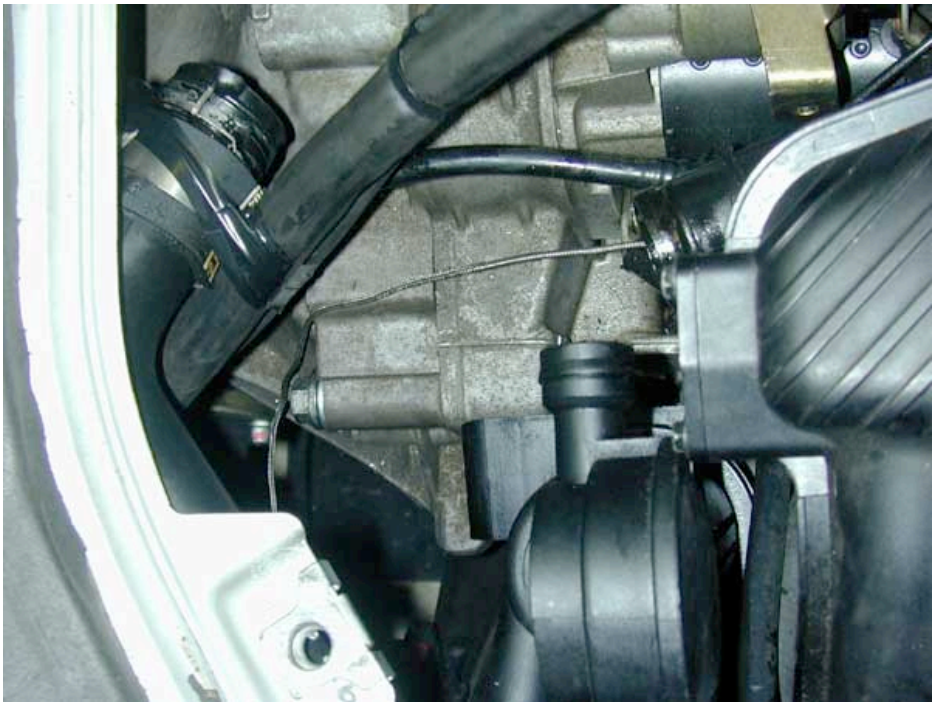


Photo 9.0. Temporarily securing plastic oil filler tube.

2. Disconnect the lower plastic vent tube on right side of air-oil separator. See Photo 9.1.

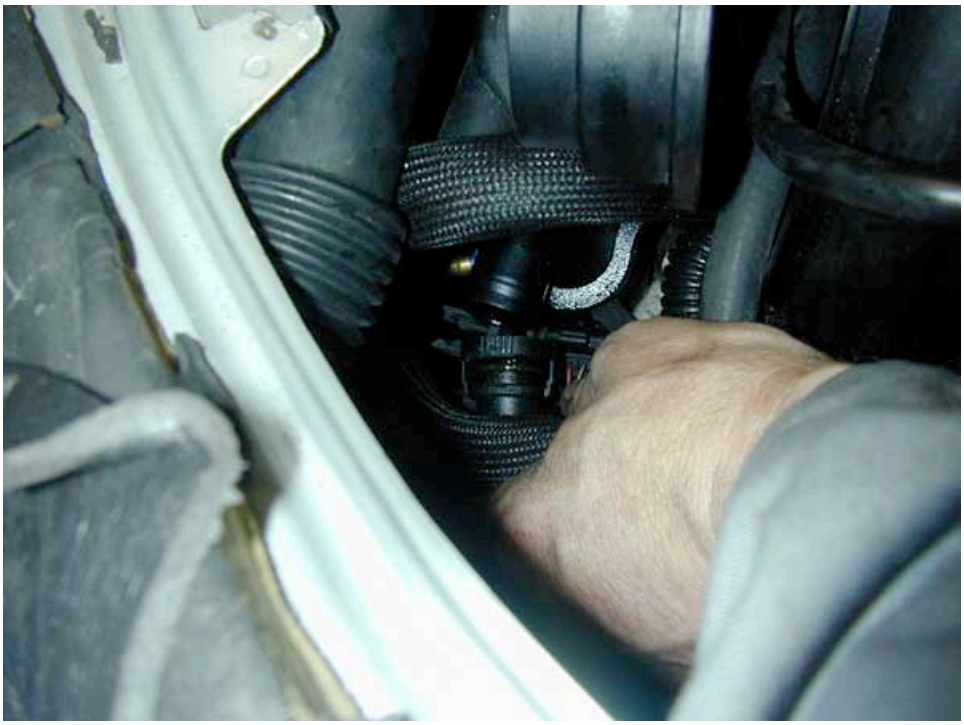


Photo 9.1. Disconnecting vent.

3. Remove two 10mm bolts holding air-oil separator. See Photo 9.2

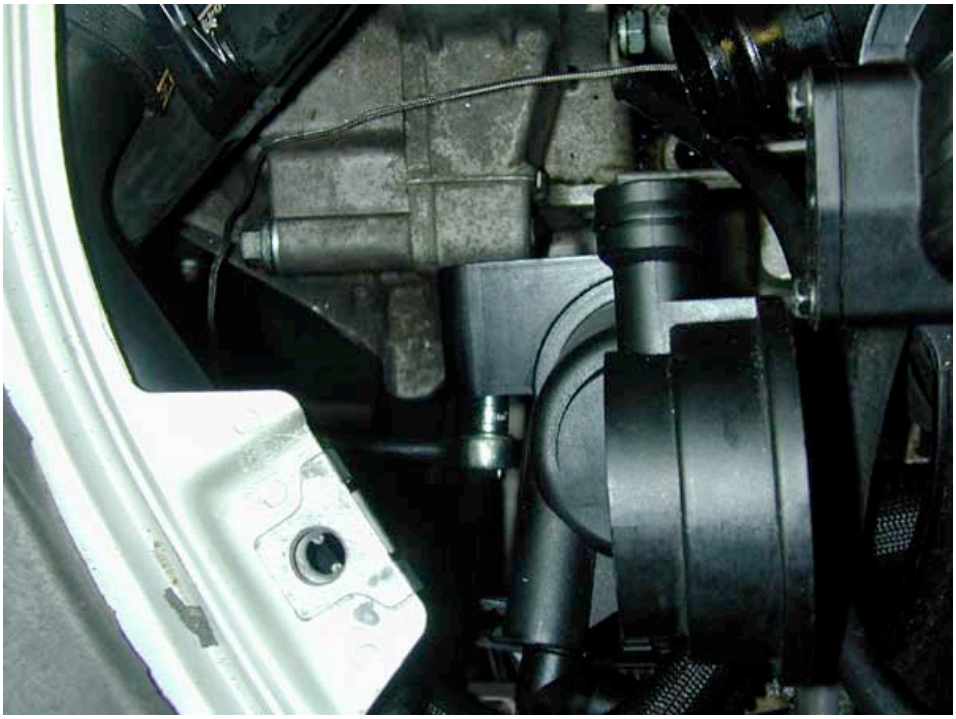


Photo 9.2. Removing 10mm bolts from air-oil separator.

4. The Oil Return Assembly will replace the rubber bellow directly underneath the air-oil separator. The rubber bellow usually has regular hose clamps securing it. If so, then simply loosen these and remove the air-separator. However some have spring clamps. If so, then this will require some effort to forcibly pull the air-oil separator off it. It is likely the rubber bellow will be destroyed in the process. This is not important since this part will not be re-used. Result should be Photo 9.3.

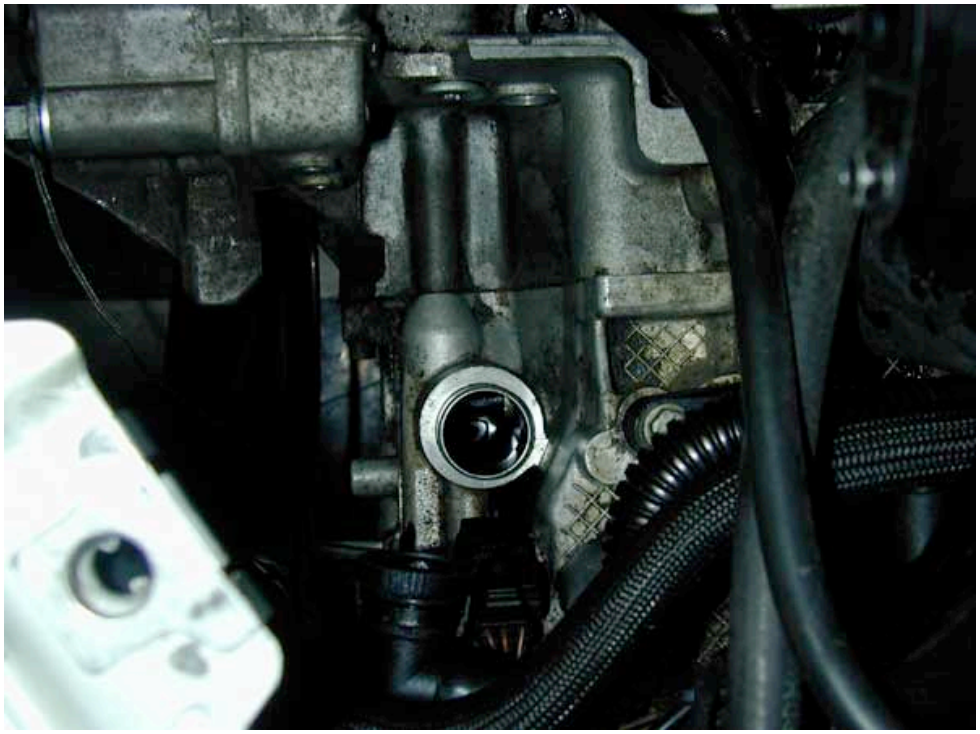


Photo 9.3. Air-oil separator removed.

5. Install oil return assembly clamps loose. Note orientation with internal fitting aimed down. See Photo 9.4.

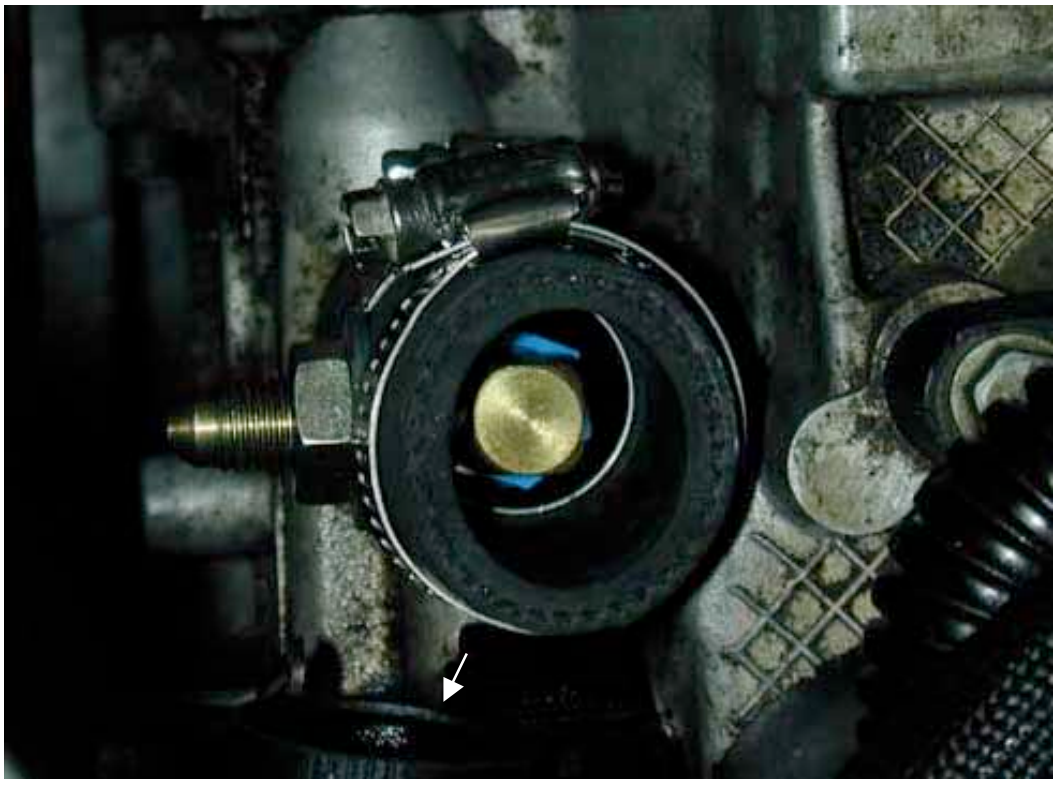


Photo 9.4. Oil return assembly installed with loose clamps.

6. Re-installing the air-oil separator is a little tricky. The oil return assembly will need to be tilted in the direction of the white arrow in Photo 9.4. This tilt will allow the air-oil separator enough of an angle to allow the small vent at the bottom to be successfully inserted into the engine block. It will require some force to push the bottom of the air-oil separator into the oil return assembly.

Start with placing the bottom port of the air-oil separator into the rim of oil return assembly at an angle, but not fully inserting yet. Then work the small vent into the engine block. Then straighten up air-oil separator, push directly down to finish fully inserting the bottom port in the oil return assembly. Again, it will take some coercive force. You will know it is fully inserted when it wiggles only slightly (~1") and is difficult to pull out. See Photos 9.5-9.6.

Photo 9.5. Air-oil separator during installation.

Photo 9.6. Air-oil separator with small vent lined up for insertion.

8. Re-install two 10mm mounting bolts.

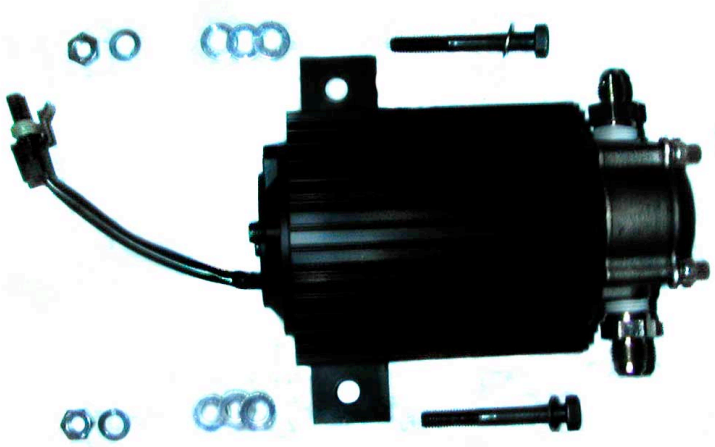
9. Tighten both clamps on Oil Return Assembly. Photo 9.7.

Photo 9.7. Oil Return Assembly installed.

10. Re-insert lower plastic vent tube on right side of air-oil separator. Refer back to Photo 9.1.

Section 10.

Summary: Install the Scavenge Pump, install the -4AN Oil Line, install the Intercooler Bracket.



Scavenge Pump and fasteners

-4AN Oil Line

Intercooler Bracket

1. Mount the Scavenge Pump to the muffler support bracket as shown in Photo 10.0. Be sure and place 3 of the washers between pump bracket and the muffler support bracket. Fully tighten the two fasteners.

Photo 10.0. Scavenge Pump mounted.

1. Connect the –4AN Oil Line to Oil Return Assembly. Tighten while counter-holding fitting. See Photo 10.0.

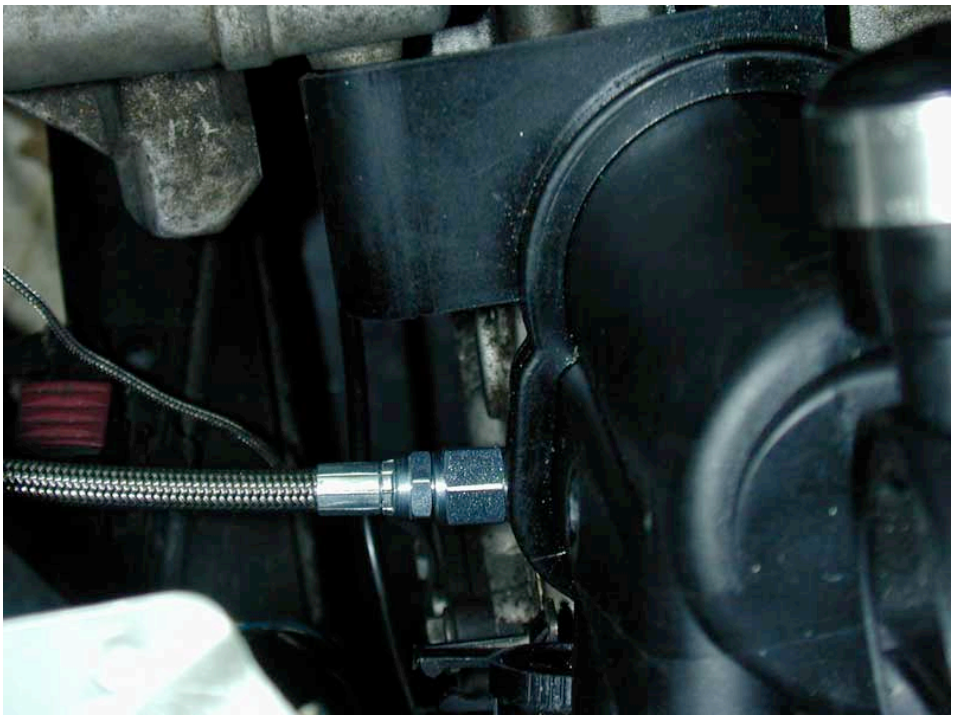


Photo 10.0. –4AN Oil Return Line.

2. Attach -4AN Oil Line clamp to the firewall stud (use 8mm socket), as shown in Photo 10.1. Oil Line will create a loop as shown.

Photo 10.1. -4AN Oil Line looped through clamp.

3. Install the Intercooler Bracket. For now, leave the bolt loose. Photo 10.2.

Photo 10.2. Intercooler Bracket mounted.

4. Connect the -4AN 90d swivel on the -4AN Oil Line to the outlet of the Scavenge Pump. Angle the swivel so that the -4AN Oil Line is suspended, not rubbing anything. Fully tighten everything. Photo 10.3. Note: If there is an aluminum shield mounted to the upper right side of the transmission, just remove it. It will not be re-used.

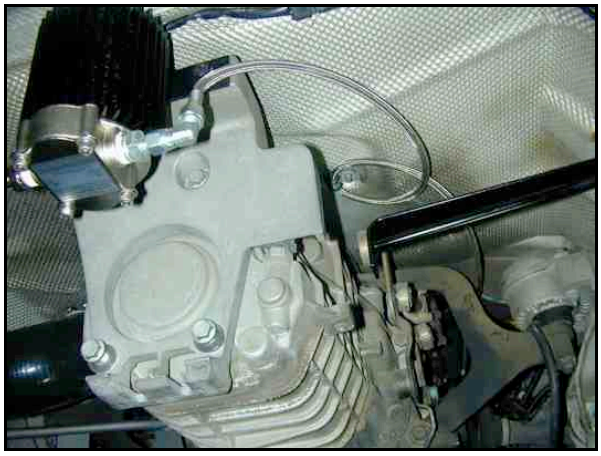
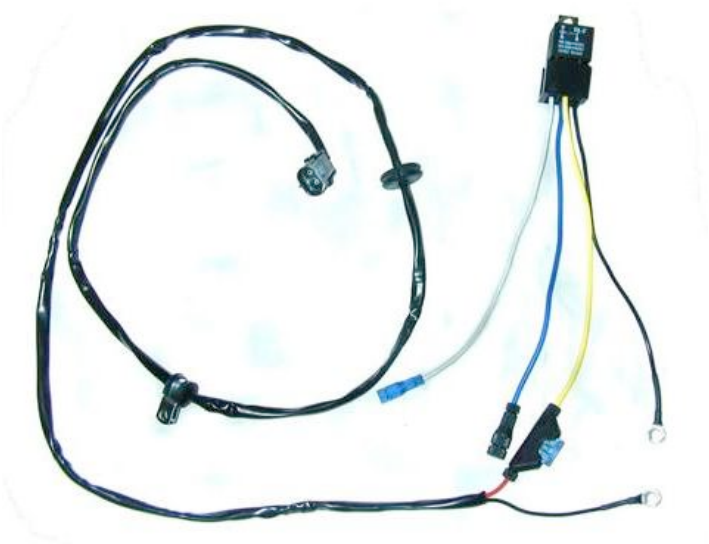


Photo 10.3. -4AN Oil Line installed.

Section 11.

Summary: Install the Relay Harness.



Relay Harness

1. Remove all the inner liners from the trunk area. Following steps are per Photos 11.1-11.3:
    a. Mount the Relay to the indicated M6 stud,
    b. Connect the Relay Black Wire ring terminal to the indicated M6 stud,
    c. Connect the Relay White Wire to the Boxster's small black w/red stripe wire.
    d. Connect the Relay Blue Wire to the Boxster's large red w/blue stripe wire.

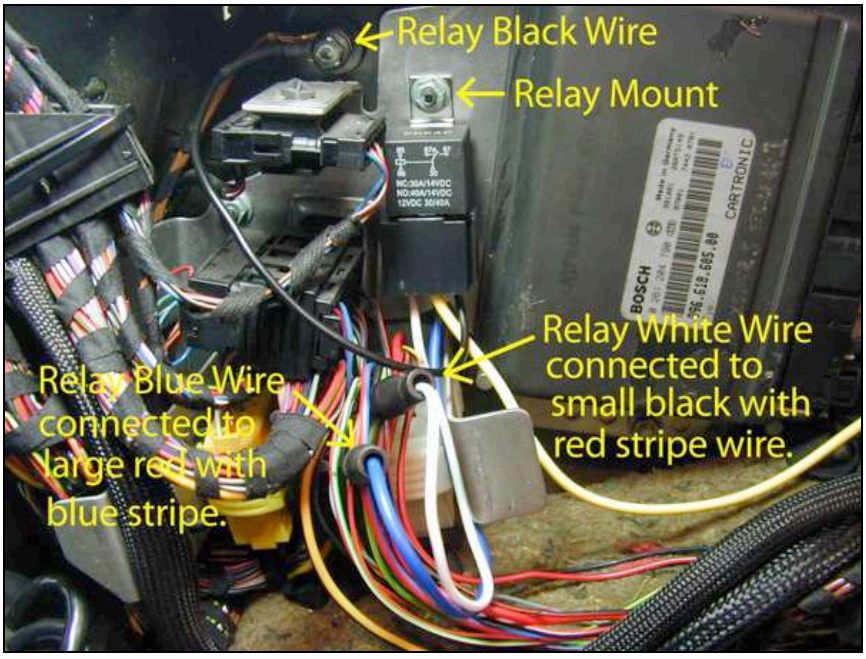


Photo 11.1. Relay connections.

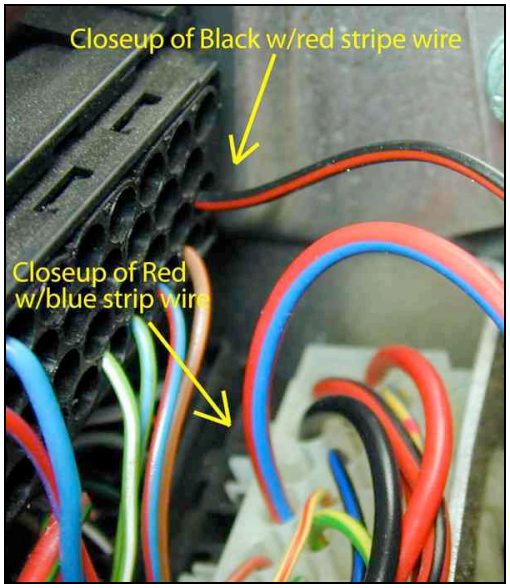


Photo 11.2. Close up of Boxster wires for relay connections.

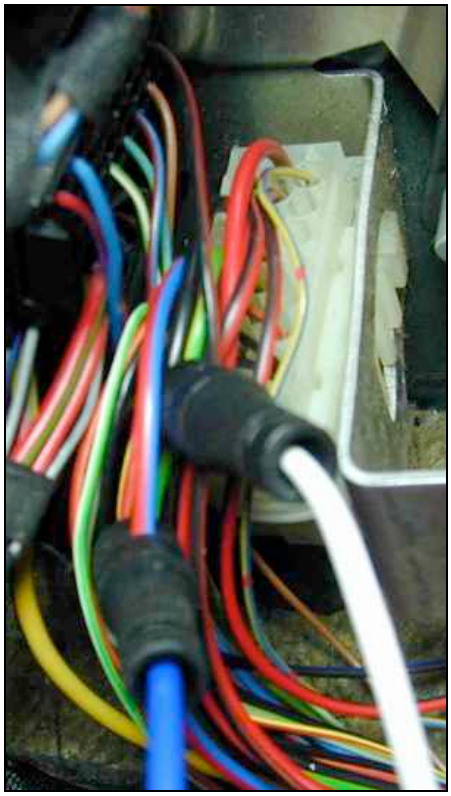


Photo 11.3. Close up of relay connections.

2. Connect the Pump Black Wire to the indicated M6 stud, per Photo 11.3.

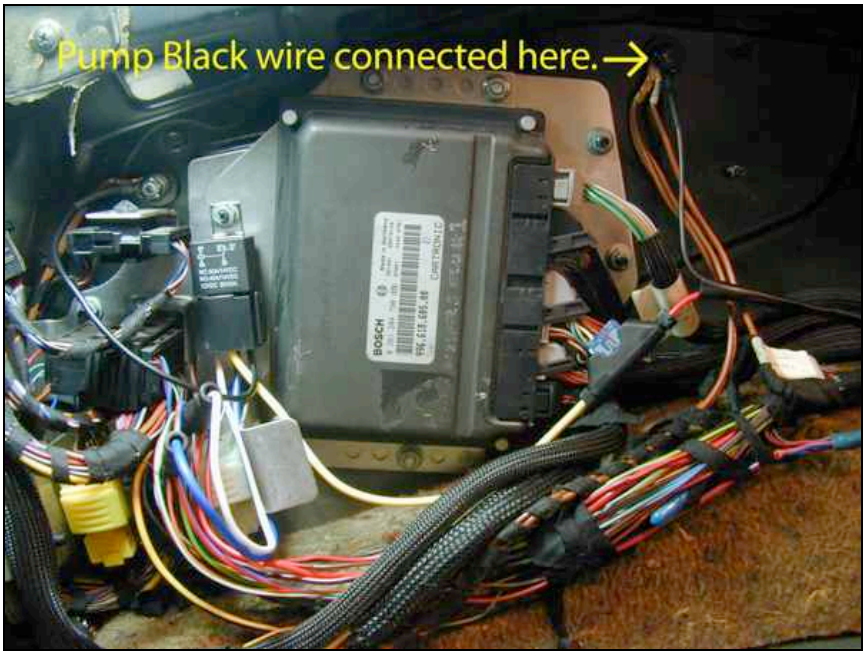


Photo 11.4. Pump Black wire connected to chassis ground.

3. Pull Boxster's right side plastic plug and drop the end of the Harness down though the hole per Photo 11.5. Modify the plastic plug with a ~1/4" (1cm) hole per Photo 11.6. (3/8" drill works well.) Cut a slit between the hole and edge per Photo. Install the plug with the harness, per Photo 11.7.

Photo 11.5. Harness dropped through trunk hole.

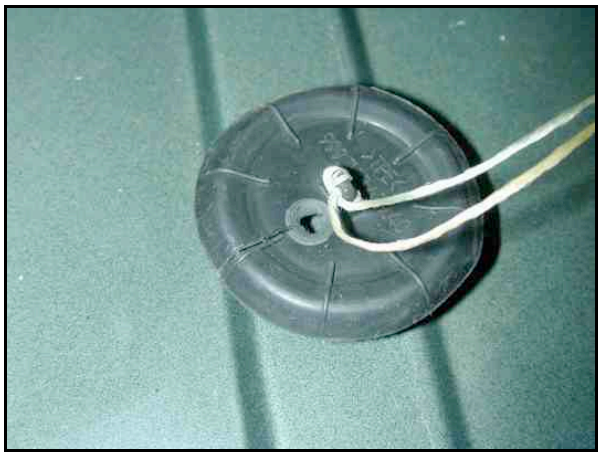


Photo 11.6. Modified plastic plug cap.

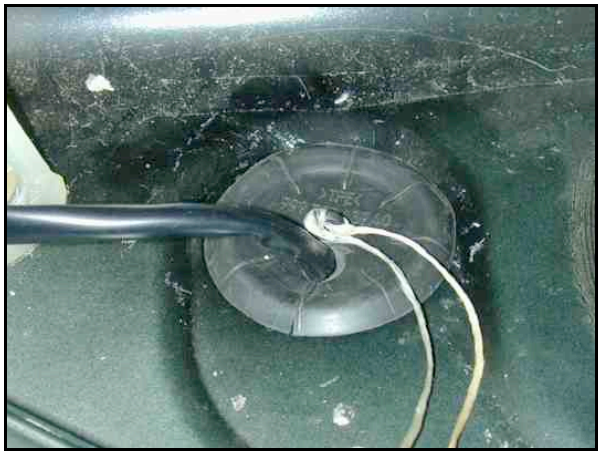


Photo 11.7. Harness inserted through modified plug cap.

3. Position the rubber grommet in aluminum heatshield per Photo 11.8. Attach clamp to firewall stud per Photo 11.9. Connect Harness to Pump. Take up any slack by pulling Harness up into trunk as needed. Photo 11.10.

Photo 11.8. Harness grommet installed.

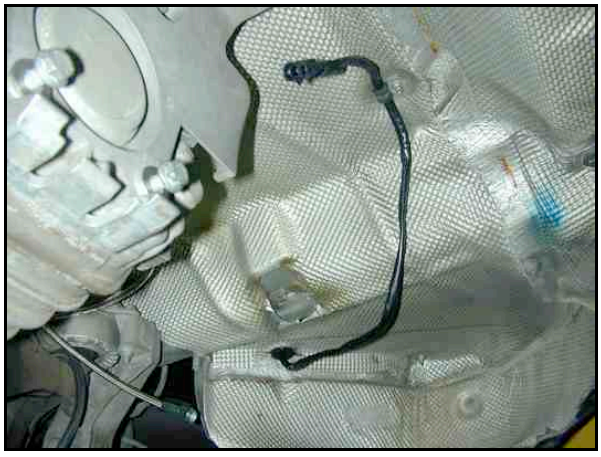


Photo 11.9. Harness clamped to firewall.

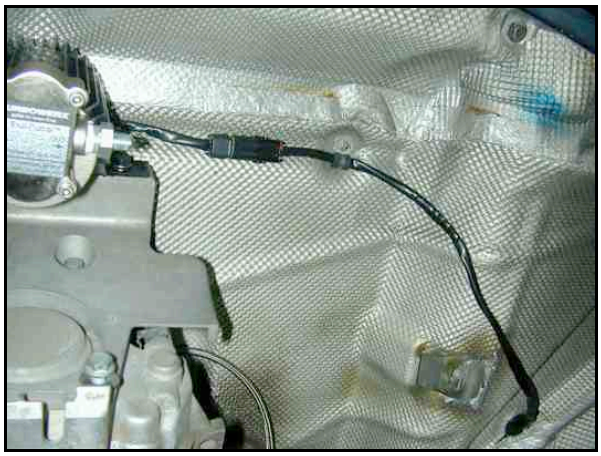


Photo 11.10. Harness connected to Scavenge Pump.

4. Replace fuse at C1 location in the fuse box with a 40A.

5. Test the Scavenge Pump system by reconnecting the battery and turning the ignition switch to the on position. Scavenge Pump should instantly come on. When ignition is switched off, so should the Scavenge Pump. If not, then re-check all wiring, verify all chassis ground stud connections are tight, verify pump connector is fully inserted. *The scavenge pump system **must** function perfectly before continuing with the installation*.

Section 12.

Summary: Install the intercooler.

Intercooler

1. Mount the intercooler to the three locations illustrated in Photos 12.0-12.2. Tighten all three fasteners, and then tighten the Intercooler Bracket bolt. Photo

Photo 12.0. Intercooler front support bolt.

Photo 12.1. Intercooler rear support bolt.

Photo 12.2. Intercooler top support fastener.

Photo 12.3. Intercooler Bracket bolt.

Section 13.

Summary: Install Boost Pipe #1, -6AN Turbo Oil Drain Hose, Exhaust Tip, and Muffler.

Boost Pipe #1

-6AN Turbo Oil Drain Hose

Exhaust Tip with band clamp

Muffler with V-band clamp

1. Install Boost Pipe #1 according to Photos 13.0-13.4. Rotate the compressor cover as needed. Note the silicone hump hose has slight deflection. Ensure clearance between pipe and pump is between 0.5” (1cm) and 0.75”(1,5cm).

Photo 13.0. Boostpipe #1 installed.

Photo 13.1. Boostpipe #1 hump hose installed.

Photo 13.2. Boostpipe #1 clearance.

2. Install -6AN Turbo Oil Drain Hose. Leave hose ends slightly loose for now. Photo 13.3.

Photo 13.3. -6AN Turbo Oil Drain Hose installed.

3. Install Exhaust Tip with stainless stepped band clamp. Leave bolts slightly loose for now.

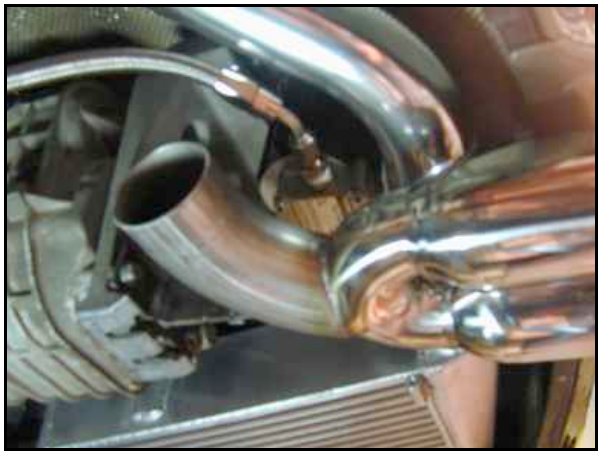


Photo 13.4. Exhaust tip mounted.

4. Install Muffler, by first removing exhaust stainless band clamp (as shipped), then by inserting the muffler outlet into the exhaust tip inlet. After everything is lined up, tighten the V-Band clamp. You will probably have to shift around the turbo, X-pipe, and the tip on their mounts to best line everything up. (This was the reason everything was left loose.) It is normal for the muffler outlet to be a slightly misaligned with the exhaust tip inlet – the band clamp's job is to mate uneven, un-perfectly aligned pipes. Once everything is lined up as best as possible, fully tighten all the fasteners – this includes the

entire exhaust and turbo system from tip back up to the collector flanges. See Photos 13.4-13.6.

Photo 13.4. Muffler mounted on turbo with V-Band clamp.

Photo 13.5. Muffler mated to tip.

Photo 13.6. Band clamp installed.

5. Position the -6AN Turbo Oil Drain Hose where it is spaced 2-3" (5-8cm), and tighten each hose end. Photo 13.7.

Photo 13.7. -6AN Turbo Oil Drain Hose clearance.

Section 14.

Summary: Install Boostpipe #2, and Boostpipe #3.

Boostpipe #2

Boostpipe #3

1. Install Boostpipe#2 by positioning it where the top is between the shift cables and the dipstick shaft, per Photo 14.0. Verify -4AN Oil Return Line is on the correct side of the Boostpipe as per Photo 14.1. Prepare and install the bottom of Boostpipe #2 as per photos 14.2-14.3.

Photo 14.0. Top of Boostpipe #2 in position.

Photo 14.1. Boostpipe #2 Line clearance from -4AN Oil Return Line.

Photo 14.2. Bottom of Boostpipe#2

Photo 14.3. Boostpipe #2 bottom installed.

2. Install Boostpipe #3 by inserting it in top of Boostpipe #2, then connecting to the throttlebody as per Photos 14.4-14.6.

Photo 14.4. Boostpipe #3 ready to install.

Photo 14.5. Boostpipe # installed.

Section 15.

Summary: Install Crankcase Vent Hose, and Recirculation Valve Assembly.

Crankcase Vent Hose

Recirculation Valve Assembly

1. Install Crankcase Vent Hose. Connect to the bottom port on the Intake Pipe, and to the Air-oil Separator port. Tighten the clamps. Photos 15.0-15.1.

Photo 15.0. Crankcase Hose connected to bottom port of Intake Pipe.

Photo 15.1. Crankcase Hose installed.

2. Install the Recirculation Valve Assembly per Photo 15.3. You may need to loosen the clamps on Boostpipe #3 to align the port for better fitment.

Photo 15.3. Recirculation Valve Assembly installed.

Section 16.

Summary: Install Wastegate Assembly, Wastegate Pipe, and Vacuum-Boost Hose

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Vacuum-Boost Hose

Wastegate Assembly.

Wastegate Pipe.

1. Install the Vacuum-Boost Hose as per Photo 16.0. The threaded Tee connects to the manifold. The other Tee connects to the wastegate. Install one clamp on the engine lifting eye bracket, in the unused M6 thread, per Photo 16.1 Install the other clamp on one of the left side plenum bolts as per Photo 16.2.

Photo 16.0. Vacuum-Boost Hose installed (top view).

Photo 16.1. Vacuum-Boost Hose clamp eye bracket location.

Photo 16.2. Vacuum-Boost Hose clamp plenum bolt location.

2. Route lower end of Vacuum-Boost Hose as indicated in Photos 16.3.

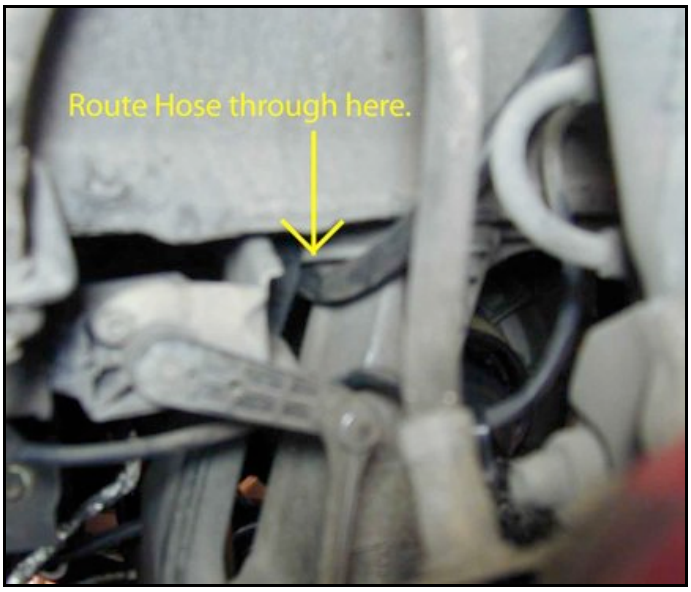


Photo 16.3. Vacuum-Boost Hose lower routing.

3. Install the Wastegate as shown in Photo 16.4. Use supplied gasket between Wastegate and flange. Fully tighten fasteners. Route the end of the Vacuum-Boost Hose up as show in Photo 16.4. Connect end of Vacuum-Boost Hose to Wastegate inlet port. Route Wastegate vent hose into second vent slat in Boxsters plastic fender liner. Now go back and take up any slack in the Vacuum-Boost Hose by pulling it through the plenum clamp.

Photo 16.4. Wastegate mounted with hoses attached.

4. Install Wastegate Pipe as shown in Photo 16.5. Use supplied gasket. Fully tighten fasteners.

Photo 16.5. Wastegate Pipe installed.

5. Re-install the suspension support struts.

Section 17.

Summary: Install the Intercooler Heatshield.

Intercooler Heatshield

1. Measure and mark the point dead-center in the suspension support strut as shown in Photo 17.0. Drill a 3/8" (9-10mm) hole through the bottom of the suspension support strut.

Photo 17.0. Location of drilled hole for heatshield center mounting point.

2. Position the Intercooler Heatshield front end (end with two holes) where the right-most hole of the pair lines up with an existing hole in the Boxster's plastic undertray, and install the supplied M6 fastening hardware. (The heatshield can be swiveled and allowed to droop for easy access to the top side.) See Photo 17.0.

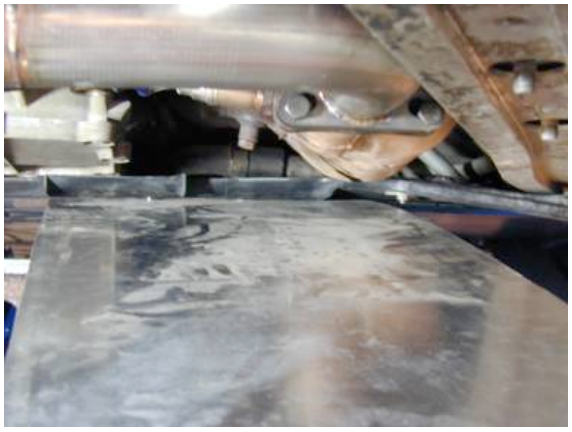


Photo 17.1. Intercooler Heatshield attached to plastic undertray.

2. Line up the rear-most mounting hole in the heatshield with the mounting hole in the intercooler front mount tab, and install the supplied M8 fastening hardware. See Photo 17.2. Now go back to the heatshield hole at the front of the heatshield and drill a new

hole in the plastic for the remaining M6 fastener. Install the other fastener, per Photo 17.3. (You might need to temporarily remove the front M8 fastener for easier access.)

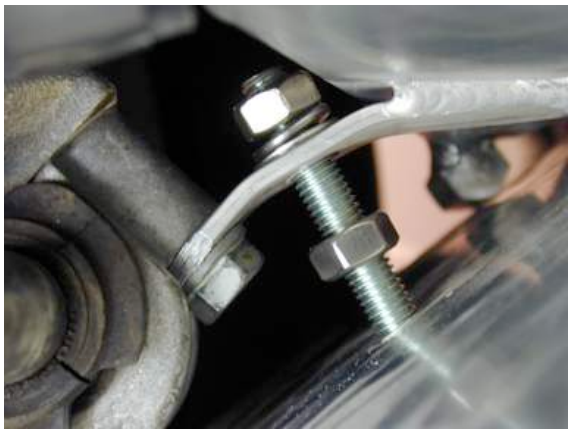


Photo 17.2. Intercooler Heatshield rear mounting (prior to tightening).

Photo 17.3. Intercooler Heatshield front fasteners installed.

3. Tighten the top nut on the rear-most M8 bolt far enough where the heatshield is firmly against the intercooler and support strut, but not so far as to start bending/buckling the heatshield. Now run the bottom nut up and fully tighten them by counter-holding the top nut. Photo 17.4

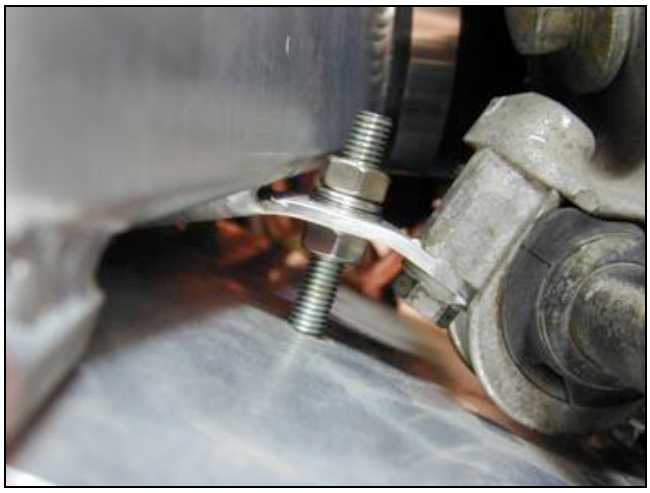


Photo 17.4. Intercooler Heatshield rear fastener installed.

4. Install the remaining M8 fastener in the center mount hole through the suspension support strut. Tighten the lower nut where the heatshield is firmly against the strut, but not tighten enough to buckle it. Firmly tighten the top nut by counter-holding the bottom one. Photo 17.5. Final result Photo 17.6.

Photo 17.5. Intercooler Heatshield center fastener installed.

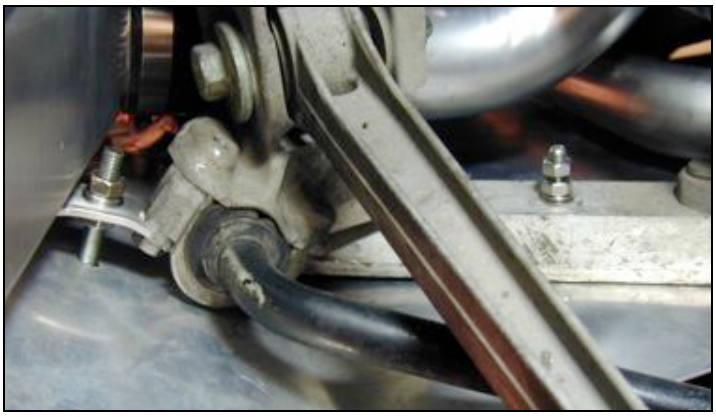
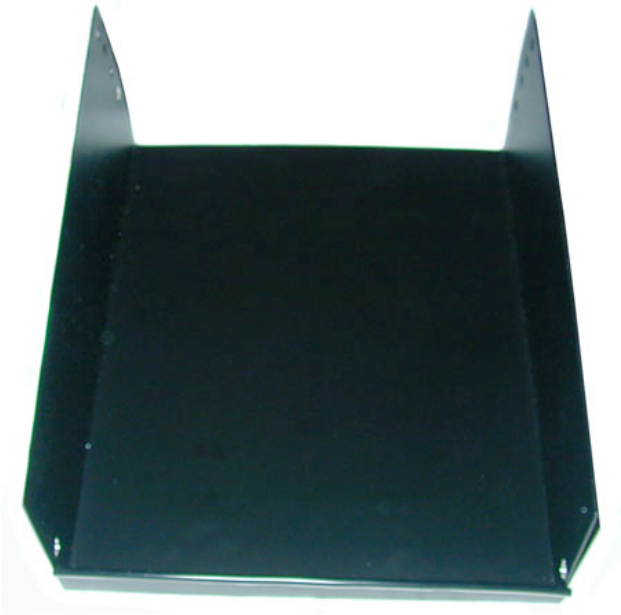


Photo 17.6. Intercooler Heatshield rear and center mounts.

Section 18.

Summary: Install the Cross-brace, and Intercooler Air-duct.

Cross Brace



Intercooler Air-duct

Intercooler Air-duct fasteners.

1. Loosen the rear-most bolts on each suspension support strut. Leave the nuts flush with the tip of the stud. Using a mallet, knock the two studs out. Photo 18.0.

Photo 18.0. Nut flush with stud for stud removal.

2. Install the Cross Brace with the supplied bolts. Note the bolt heads are modified to allow locking in place. Fully tighten the nuts. Note if you have trouble getting the bolts through the support strut, use a large screwdriver to insert and pry the holes into alignment.

Photo 18.1. Cross Brace installed.

2. Install Intercooler Air-duct with supplied fasteners, per Photo 18.2. Note the heatshield metal goes between the two plastic spacers on the fasteners. For most uses, the 2nd set of adjustment holes (second from the bottom) are the best choice. The higher settings are best for track use due to reduced ground clearance.

Photo 18.2. Intercooler Air-duct installed.

Section 19.

Summary: Install Boost Gauge.

A boost gauge is not needed for driving, but is very useful and absolutely mandatory during initial testing, verification, and debugging. The procedure here is the minimum to get the gauge ready for testing. However, you will need to determine the details of the permanent mounting, as this is highly subjective to personal requirements.

Remove the rear carpeted panel and aluminum engine access cover from behind the seats. Poke a hole in the rubber grommet between the shift cables. Route the red vacuum line from the rubber U at the plenum vacuum Tee, along the shift cables (Photo 19.0) through the grommet and under the console, or wherever you want to use it. Photo 19.1-19.2. Be sure and secure the vacuum line with tie-wraps, especially near the firewall as the moving rubber belt is very near. Note that a straightened coat hangar works very well to pull the vacuum line through. Just poke the hangar through the grommet, up over the engine and tape the vacuum line to it and pull it through.

Photo 19.0. Boost Gauge vacuum line routing.

Photo 19.1. Boost Gauge vacuum line routing through firewall grommet.

Photo 19.2. Suggested Boost Gauge installation.

Section 20.

Go back and tighten all clamps and fasteners left loose during the installation.

Section 21.

Summary: Initial system checkout, re-installation of remaining parts, driving tests.

We have no specific recommendations for where to mount the boost gauge. This is personal preference, and dependent on whether a permanent or temporary installation is desired.

At this point, go back through and re-check every part that was installed to make sure that everything is tight – especially the clamps. Have an all-purpose fire extinguisher handy. Re-install the ECU. Re-connect the battery. Turn the key on in the ignition. Verify the scavenge pump is running. Crank up the engine. Let engine run for **ONLY 30 seconds.** Note the vacuum/boost gauge during idle – it should be about 17-20+" Hg. If not, find the vacuum leak. Most importantly, inspect the fuel rails and injectors very carefully for any fuel leaks. If something is leaking, the entire rail must be removed and inspected for the reason. If there is no apparent reason, simply remove and re-install the fuel injectors, ensuring they are fully inserted/seated in the rail and the ports, and that there is nothing pushing against the injectors (like part of the harness out of view).

While inspecting for fuel leaks, inspect all the oil lines/hoses/fittings for leaks.

If everything looks good, crank up the engine and let the engine run at longer intervals before stopping for complete inspection of everything. Use intervals of 30 seconds, 60 seconds, 120 seconds, 5 minutes, and 10 minutes. During one of these intervals, go ahead and add 0.5 qt of engine oil.

During the longer test intervals, note the exhaust for any blue smoke. If you start to see blue smoke, verify the scavenge pump is on and pumping. After a few minutes of idling, you can feel the oil lines/hoses for warmth. If the –4AN return line is not getting warm, look at the pump and verify it is getting 12V.

After the success of the 10 minute test interval, start revving up the engine in short bursts to 2-3K rpm and re-check everything for any leaks. After 10-20 revving intervals, stop the engine and let it cool down for 1-2 hours. After it cools, check for any leaks.

Start the cooled down engine back up and let it idle until warm again (10 minutes). Do a final check for any leaks.

At this point, the basic system check out is complete. You can finish reassembling the car.

Driving Tests:

TurboWerx ships it's kits with boost conservatively pre-set to about 5.8psi. During the initial testing, if the boost ever rises above 6.0 psi, immediately lift the accelerator and drive very conservatively back avoiding generating positive boost pressure. Inspect all the vacuum lines, making sure nothing got pinched, etc.

For the first test drive, drive at low-speeds (2-3K rpm max, no wide open throttle!) around the block once or twice, stopping to inspect for any leaks and any blue smoke from the exhaust. There should be no bucking, no hesitation at all.

If there are no problems, then drive a little more aggressively, noting the vacuum/boost gauge during acceleration. You should see it go positive boost pressure by 2500 rpm in the lower gears. If you do not see positive boost pressure, there must be a boost leak in one (or more) of the boost pipes. Inspect and find the cause.

Continue driving longer and longer distances over an hour, accelerating with short bursts of 5-6 psi of boost in the lower gears. Continue testing in higher gears, making sure maximum boost is always around 5.8psi. If everything there are no other issues, then the system is ready for daily driving.

Important: After the first hour of driving, re-torque all the fasteners on the exhaust system, and turbo, especially all four wastegate fasteners.

Note that there is a learning period for the ECU. The ECU will be fine-tuning itself with the characteristics of all the new components and operating ranges. To facilitate this, in addition to the above procedures, drive for 10 minutes at a time at constant speeds/RPMs when possible. Suggested zones:

55mph/6th gear,
60mph/6th gear,
65mph/6th gear,
70mph/6th gear,
75mph/6th gear.

Other notes: If at any point under boost you feel a huge drop in power and the engine starts bucking/cutting out violently (barely able to drive the car at all), a coupler on one of the boost pipes has blown off. In this case, re-adjust the pipes/couplers/clamps to ensure all the clamps are on the outside of the beads on the pipes, and firmly tightened.

You should always use the highest fuel octane available for maximum performance, and never below 91 (R+M/2) octane.

Lastly, if you are in doubt about something, please contact the Dealer or Reseller from whom you purchased the kit. Failing resolution there, you can always contact TurboWerx directly by calling 512-692-7274, or emailing support@turbowerx.com.