BRZ & FR-S Stage 1 Turbo Kit Installation Guide

6MT Manual 2013+ Subaru BRZ, Toyota GT86, Scion FR-S
Part #: S6Z12GS7A001T
6AT Automatic 2013+ Subaru BRZ, Toyota GT86, Scion FR-S
Part #: S6Z12HS7A001T

The AVO BRZ & FR-S Stage 1 Turbo Kit is a tested and proven performance upgrade for the naturally aspirated 2.0-liter. While it is quite safe to install, for reliability reasons you should spend some time before the install making sure your engine is in tip-top shape. Change the oil, check the spark plugs and wires, and inspect all of the engine components beforehand.

Before you start, make sure to have all the tools you need on hand. You will need a jack and two jackstands at minimum to do the work underneath the car. Having the car on a lift is recommended.

We do recommend that you change the oil once after starting up the car with the turbok-it installed, just to flush any possible debris out of the system.

Kitting List
Before you start the install, check to make sure that all these pieces are present.

Turbocharger and Actuator

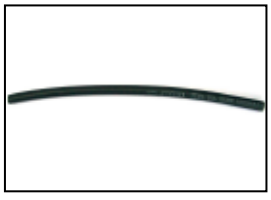
1 x Turbocharger
PN: AVO 18/49
CHECK [ ]

1 x 5 psi Actuator
PN: TB4WT005
CHECK [ ]

1 x Actuator Bracket
PN:
CHECK [ ]

1 x Actuator Rod End
PN:
CHECK [ ]

1 x Split Pin
PN:
CHECK [ ]



1 x 4mm x 15cm vacuum line
PN: END7T01
CHECK [ ]

1 x Turbo Exhaust Gasket
PN: ABF7T001
CHECK [ ]

1 x Turbo Gasket
PN: GCH60T02
CHECK [ ]

1 x Heat Shield
PN:
CHECK [ ]

1 x Heat Shield Bracket
PN:
CHECK [ ]

Turbo Water Supply

2 x 5/16 Straight Fitting
PN: PBHNT001
CHECK [ ]

1 x 5/16 x 53cm Water Hose
PN: ENH7T001
CHECK [ ]

4 x 14mm Copper Washer
PN: AENU4T01
CHECK [ ]

4 x 10/16 Hose Clamps
PN: MCBP4T01
CHECK [ ]

2 x 14mm Banjo Bolts
PN: BBNWTT01
CHECK [ ]

Kitting List - Page 2

Before you start the install, check to make sure that all these pieces are present. Some parts are pre-installed to the turbocharger or exhaust, so doublecheck those assemblies when viewing this checklist.

Turbo Oil Supply System

1 x 55cm oil supply Hose

PN: ER2FBT01

CHECK [ ]

2 x 12x1.25mm Turbo oil fitting

PN: OBTHWT01

CHECK [ ]

2 x 12mm copper washer

PN: AQUK4A01

CHECK [ ]

1 x Oil Scavenge Pump

PN: MCUV4T01

CHECK [ ]

1 x Oil Pump Adapter Plate

PN: 5Q9BBT01

CHECK [ ]

1x Oil Tank Assembly

PN: PBSPTT01

CHECK [ ]

1x 5/8" Oil Drain Hose 150cm

PN: ENYH7T01

CHECK [ ]

1 x Oil drain Gasket

PN: GP0H4T01

CHECK [ ]

2 x 6x1x 15mm Bolts

PN: BBUFT002

CHECK [ ]

2 x 6mm Star Washer

PN: ABFLT001

CHECK [ ]

60cm x13mm Oil Breather Hose

PN:

CHECK [ ]

3 x Hose Clamp

PN:

CHECK [ ]

Front pipe

1 x Stainless Steel Downpipe

PN: S612CAFG0T

CHECK [ ]

5 x 8x1.25mm stud bolt

PN: BCZU4T01

CHECK [ ]

5 x 8mm Flat Washer

PN: ABBHUT01

CHECK [ ]

1 x 2.5" Gasket

PN: GCJK4T01

CHECK [ ]

5 x 8x 1.25 Lock nuts

PN: ACEH4T01

CHECK [ ]

Exhaust Manifold

1 x Stainless Steel Downpipe

PN: S612EAFG0T

CHECK [ ]

Four 8x1.25mm stud bolt

PN: BCZU4T01

CHECK [ ]

4 x 8x1.25 Lock nuts

PN: ACEH4T01

CHECK [ ]

4 x 8mm Flat Washer

PN: ABBHUT01

CHECK [ ]

1 x Long Bolt

PN:

CHECK [ ]

Kitting List - Page 3

Before you start the install, check to make sure that all these pieces are present.

Front Mount Intercooler Parts

1 x Intercooler Assembly
PN: S612IBAJ0T
CHECK [ ]

1 x RH Rubber Hose
PN: FMJJ7F01
CHECK [ ]

1 x LH Rubber Hose
PN: FMHH7F01
CHECK [ ]

1 x LH Steel Piping
PN:
CHECK [ ]

1 x Inlet Steel Pipe
PN:
CHECK [ ]

1 x 65mm to 70mm Hose
PN:
CHECK [ ]

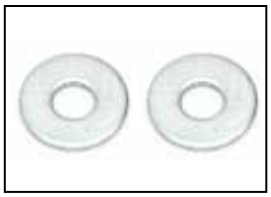
2 x 70/90 Hose Clamps
PN: MCK34T01
CHECK [ ]

1 x Turbo to Air Box Pipe
PN: FMJK7F01
CHECK [ ]

1 x Compressor Outlet Pipe
PN: MCE04T01
CHECK [ ]

6 x 60/80 Hose Clamp
PN: MCI44T01
CHECK [ ]

2 x Plastic Connectors
PN:
CHECK [ ]



8 x 24mm washer
PN: ABVUT001
CHECK [ ]

8 x 1.25mm x 25mm bolts
PN: ABEHUT25
CHECK [ ]

2 x 30/45 Hose Clamp
PN: MCE04C01
CHECK [ ]

1 x 40/60 Hose Clamp
PN: MCF24C01
CHECK [ ]

2 x 50/70 Hose Clamp
PN:
CHECK [ ]

Other Parts

4 x Bolts and Washers
PN:
CHECK [ ]

4 x Spacers
PN:
CHECK [ ]

You have two options for a blow-off valve, the AVO Adjustable BOV and an OEM Subaru Blow Off Valve. The AVO Stage 1 Turbo Kit does require a BOV to be fitted to ensure a stable idle.

OEM Bov Kit 1 PN : S2C08KT0AOEMJ

1 x BOV
PN:
CHECK [ ]

2 x 30/45 Hose Clamps
PN:
CHECK [ ]

1 x 6mm T Piece
PN:
CHECK [ ]

1 x 6mm x 100cm Vacuum Hose
PN:
CHECK [ ]

Adjustable vent-to-atmosphere Bov Kit 2 PN : S2C08KT0A001T

1 x BOV
PN:
CHECK [ ]

2 x 30/45 Hose Clamps
PN:
CHECK [ ]

1 x 6mm T Piece
PN:
CHECK [ ]

1 x 6mm x 100cm Vacuum Hose
PN:
CHECK [ ]

We strongly suggest one of our two Breather Tank Kits to be fitted along with the turbo kit for maximum reliability against oil blow-by. There are two versions, a street and a track kit. The track kit comes with additional hardware for dealing with the extremes of circuit racing. Both kits come with all fittings and accessories necessary, including a turbo-specific high pressure PCV valve replacement that will deal with any potentionl boost leaks and protect against pressurizing the crankcase under boost. This is also a requirement for higher boost builds.

Street Breather Tank Kit: S6Z12G0QB0TCT

1 x BOV
PN:
CHECK [ ]

Race Breather Tank Kit: S6Z12G0QBRACT

1 x BOV
PN:
CHECK [ ]

Before grabbing a bunch of wrenches and attacking your car take a moment to

STOP AND THINK

Read these supplied installation instructions thoroughly from start to finish – do you understand all of the mechanical operations required? Are you sure that you can adequately complete all of the mechanical operations required? Prior to installation, make sure that your car is in excellent mechanical condition and that there are no outstanding faults or problems. This part has been designed to work only with a car that is in good state of repair. Pre-existing problems or faults can result in improper operation and/or failure of your engine. This is your responsibility to ensure. No matter how carefully we design our turbocharger kit, this is one area we have no control over and cannot be held responsible. Always make sure to run the highest grade fuel. Always fit all the required parts on this kit for the best performance.

Turbokit installation preparation

Before you start the install you should make sure you have all tools on hand and all the parts in the kit ready to go.

Tools and materials you should have on hand:

Full set of metric sockets and wrenches	Large and small sized plus and minus head screwdrivers
Hydraulic floor jack.	Floor stands or a lift.
High temperature Silicone sealant.	WD-40 or similar.

Oil filter, crush washer, and Turbo Grade engine oil

Install Guide Contents

This install guide is broken up into 3 main sections: Bumper removal and FMIC install, Turbocharger assembly install, and the turbocharger/intake piping install. We suggest you follow this order when installing the parts.

The installation of a turbocharger kit is a complex process, so make sure you understand what you are doing with all of the parts before you start the actual install. Read this entire guide from front to back, and if you are unsure about any part of the install, please do not hesitate to contact us or your local dealer before you start.

Section 1 - Bumper removal and Front Mount Intercooler Install

The bumper is held onto the car by a large amount of plastic Pop-its. It's suggested to keep a small box on hand to place all the pop-its into so that they don't become lost. There is some specialty tools for removing pop-its, but in most cases a screwdriver will do the job. If a pop-it is quite difficult to remove, it's frequently because of age and dirt buildup, it may be necessary to replace those pop-its at the end of the install when replacing the bumper.

1. At the top of the bumper there is several pop-its holding on a flat sectional piece. Remove the pop-it's with a screwdriver, then pull that piece up and off.

2. Along the front bottom edge of the bumper there is a combination of pop-its and regular bolts holding the bumper on. Remove the pop-its with a screwdriver, and then the bolts.

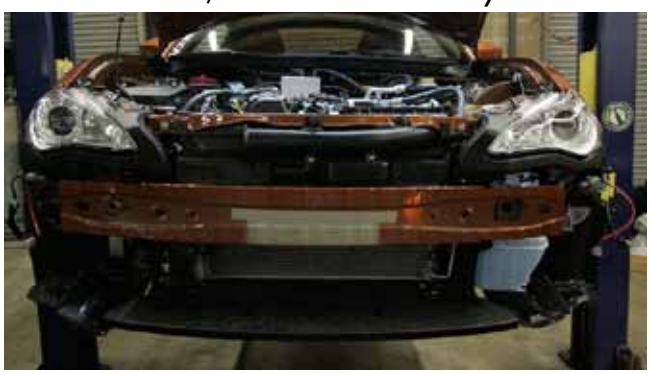
3. At the bottom of the tire fenderwall area, there is another pop-it as well. Then the fender liner is held in place with a series of smaller pop-its, you will need to "unscrew" these with a plus-head screwdriver.

4. With the pop-its removed holding the fender liner on (at the front), you con peel it back slightly where the bumper meets the front fender. There is a pop-it back behind there.

5. You will need to reach back behind there and unclip the light from the signal lamp housing. It's a push-in and twist type. With it removed, carefully pull the side marker housing out, exposing the pop-its inside that clip the bumper to the fender. Remove those pop-its.

6. With all the pop-its removed, and all bolts un-bolted, all that is holding in the bumper is a series of clips along the top edge of the bumper where it meets the fender and the lights. For this step it's recommended to have two people to remove the bumper skin, as once it's off there is nothing holding it on. Carefully push in and up slightly to bring the bumper edge off the clips, and pull it out.

7. With the bumper skin off, you have access to the bumper beam and it's foam cushion. Take the foam cushion out for now, it merely slides in with some slots, and comes off easily.



8. Next is the front undertray. There is pop-its along the top holding the radiator air deflectors on. Remove those.

9. Underneath there is a series of bolts holding it on. Unbolt those with a socket wrench. With all these off, the undertray should come off smoothly. Put it aside for now.

10. At the front of the radiator is a secondary horn. Unclip the wiring harness from it, and then unbolt it and it's bracket completely.

11. Finally, remove the water tank for now. It's advised to have a bucket to empty your windshield wiper fluid into until you finish. There is one bolt at the back to remove, and the top of water tank is held on by a screw-in type pop-it.

12. Lastly, unclip the wiring harness from the pump, and pull the water line off. Plug that off, and pull the water tank up and out of the car.

13. The easiest way to mount the FMIC is to remove the bumper beam off the car. At the back of the bumper beam is several holes. Find the two smaller holes towards the inside, these are the ones you will be mounting the FMIC to.

14. Use the supplied fittings and insert them into the holes.

15. You will need one of these tools to insert it.

16. Screw the FMIC down to the bumper beam. Make sure it is snug against the bottom of the inner bumper beam.

17. Now mount the bumper beam with the FMIC back to the car.

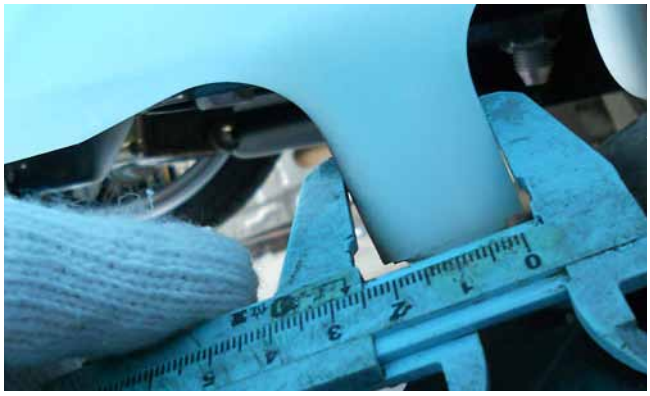
The bumper beam mounts on the bumper beam are slotted, so when fitting it back to the body, lift the bumper beam up while bolting it down. This will raise it slightly and give the FMIC more space, and give more space between the water tank and the bumper beam for the inter-cooler hose.

18. Fit the radiator air deflectors to the side to see where the silicone intercooler hoses will go, then trim them so that the hoses will pass through smoothly. Don't just discard these deflectors, they do an important job of keeping air going through the radiator!

19. The right-side silicone piping will be passing through there up into the engine bay. To allow proper space to fit, you have a choice of slightly trimming the rear of the bumper beam in that location, or adjusting the location of the water tank a inch downwards. We will cover the water tank adjustment next.

20. The windshield washer fluid tank mainly rests on a large hole at the bottom of the frame. What you will need to do is dremel it out to a larger size, this will enable you to shift the water tank down without removing the support entirely.

21. When it's about 30mm in diameter, it should be about right.



22. Next, slot the hold for the bracket at the back. You should be able to slide it into place at a lower point now. The water tank neck will stretch higher, so it can still bolt into place.

23. With those changes, the silicone pipe should fit in between the bumper beam and the water tank smoothly, and go up into the engine bay.

The upper neck of the water tank is adjustable, so is easy to fit back. You may want to wait till the kit is fully installed before doing that, to leave extra room for the install.

24. Next, we want to remove the air intake pipe in preparation for fitting the other parts of the turbo kit. Take your screwdrivers and loosen off the clamps on the inlet pipe at the throttle body and air box. Loosen off the clamp going to the sound box. Pull the smaller breather line hose off the inlet, then with that out, pull the inlet up and off the engine. You will not be using any part of it after this.

This is also a good time to remove the back of the air box and air filter, just to give space during the install process. You will need to unclip the wiring harness for this.

25. The sound box is fixed to the engine by two bolts. Remove those.

26. The sound tube from the back of the sound box goes into the firewall, in a recess that looks like it's part of the frame. It simply pulls out of a self-sealing socket inside there.

27. This is the computer running the injectors. For now, you will need to unplug the wiring harness, as you will be removing it and the black frame it's attached to so that you can get to some areas underneath. A small screwdriver is needed to slide in and unclip the wiring harness.

28. Once the wiring harness is unclipped fully, you will notice there is a small clip on it holding it to the black frame. Slide a screwdriver down and unclip it. Then with a socket wrench, remove the 3 bolts holding the black frame on (the one at the back is the hardest to get to), and remove the 3 bolts holding the computer on (the one underneath is hard to see). Remove the frame and computer, and put them aside for now.

29. On that same side of the engine, look for this plate at the back of the head. Unbolt it, and then you'll need to lever it off as it's basically just sealed on with some silicone gasket sealant.

AUTOMATIC TRANSMISSION MODELS:

See Page 21 for special instructions.

30. With the plate removed, you can see that there's a oil port and rotating clip assembly here. This is where the supplied oil pump will be fitted. These slots on the rotating assembly of the pump need to be fitted into their corresponding ridges inside the head.

31. First, you need to remove the large plate from the supplied oil pump, and bolt it up lightly to get the placement figured out. Apply silicone sealant to the oil pump itself where it meets the plate, and fit the oil pump through the plate into the head, and get the rotation of the piece on the back of it right so that it slots into the head smoothly. Lightly bolt the oil pump to the plate - then remove the entire plate/pump from the head.

32. Now fully bolt the oil pump down to the plate itself - this process was to make sure the oil pump was situated properly. Fit it once more to the head to make sure it all lines up, if it doesn't, loosen the oil pump bolts off lightly and adjust. Once it's correctly set, put silicone sealant on the larger plate where it meets the head, and bolt the entire assembly in place.

33. You can fit up the oil line to the oil pump at this time, and run it down towards the steering rack. It will be tucked up between the steering rack and the frame there, and run to the other side of the engine. Mount it up to the other hose running underneath the engine on that side, then leave it alone for now till the turbo is mounted up.

34. On the same side of the head as the oil pump, and near the front, there will be a large bolt at the top of the head. Remove it, and fit the oil fitting in it's place. This is where the oil line will be fitted that goes to the turbo.

35. This oil line, once fitted, will come out the front side of the bracket once it's fitted back. However, wait till the turbocharger is fitted before fitting the oil line, as it's easier to fit the line to the turbo before the turbo goes on the car.

36. To fit the turbokit in place, you will need to completely remove the exhaust manifold. First unbolt the exhaust manifold from the engine crossover pipe.

37. Unclip these two wiring harnesses that go to the o2 sensors on the exhaust manifold.

38. You may also want to loosen off this bracket that holds the secondary catalytic converter to the car. This is to give the system some wiggle room while removing and replacing the exhaust manifold.

39. Using a socket wrench with a long extender, unbolt the exhaust manifold from the engine itself. You should be able to easily remove it completely at this point.

40. With the exhaust manifold fully off, remove the two oxygen sensors.

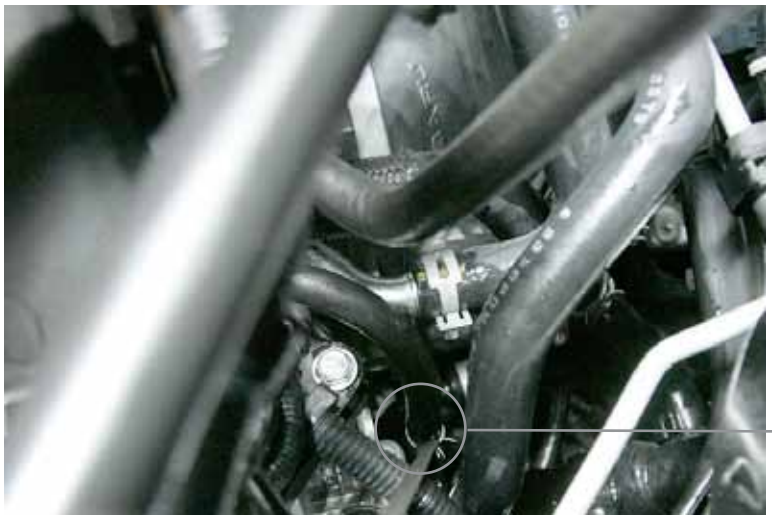
41. The pre-cat one goes onto the AVO exhaust manfold, and the post-cat sensor goes onto the turbo discharge pipe.

42. With the exhaust manifold out, now is a good time to tackle this bracket. You need to unbolt it at the top and bottom, and take it off the car.

43. With it out of the car, you will need to modify it slightly at the bottom. As there will be silicone hosing resting against it once everything is installed, we recommend flattening down the outer edges so they don't cut into the silicone pipes. Then bolt it back in with the supplied rounded head bolts used at the bottom.

44. With the intake still off, now is a good time to hook up the water lines for the turbo. The shorter water line provided will hook up to this water line off the throttlebody on the side and towards the back.

You will remove the standard water line here completely.



45. The standard water line reaches to the back of the engine here. Fit the longer water line here, after routing it underneath the intake manifold.

46. Finally, slide the metal pipe with the single bracket into the right side silicone hose (where the water tank is). The bracket needs to be at the silicone side.

47. This bracket will attach to the air box mounting bracket at the front there. You need to use the metal spacer between the pipe bracket and the existing bracket for a nice, solid fit.

48. Before mounting up the turbo you should mount the heat shield to the engine. The supplied bracket will go underneath the head, in between these two bolts near the grounding strap.

49. Unbolt the grounding strap and mount the heat shield with the grounding strap between it and the body, and bolt it down there and at the bracket. w

50. With everything else sorted out, now is a good time to attach the oil line to the turbo, make sure all the fittings are on the turbo, and that the turbo, exhaust manifold, and turbo discharge pipe are bolted together. Finally, attach the below silicone pipe to the turbo compressor discharge, tighten the clamp, and fit turbo to the car. It attaches to the turbo at the bottom part as in the photo, and the top part will be fitted to the steel pipe that was fitted in [46]. Refer to page 4 if you are not sure of the layout.

51. There is a bracket on the turbo flange of the exhaust manifold. This will bolt up to the engine here, using the supplied bolt.

52. With the exhaust manifold fitted up to the car, and the turbo discharge pipe fitted up to the rest of the exhaust, you can now hook up the oil line from the pump to the oil reservoir tank.

53. Screw the oil line off the turbo up to the oil fitting on the block. You can now replace the steel bracket that goes over that, and fit the fuel computer back as well, clipping the wiring harness back into it.

54. Fit the water lines to the turbo charger, one to each side on the supplied turbo water fittings. Clamp them down. Use supplied fasteners to keep the lines together, and away from the pulleys.

55. Now fit the air inlet pipe that will go from the airbox to the turbo. Fit it to the turbo first, and make sure it's clamped on tight. Run the breather line to the smaller fitting off the side, and clamp that in. Then prepare a clamp on the bigger fitting, this is where the BOV will fit into.

56. The metal fitting off the side of the oil reservoir tank is for a oil breather line. It may need to be trimmed to fit to your oil breather (oil/air separator) tank depending on placement.

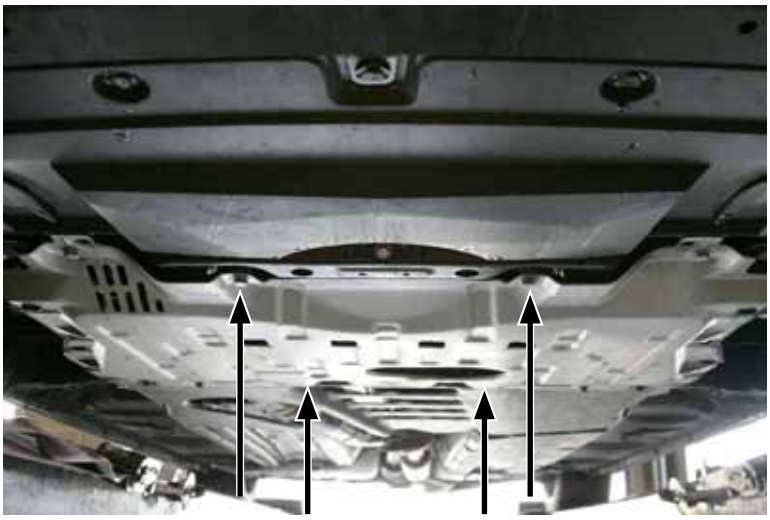
For breather tank routing, please refer to the AVO Breather Tank instructions.

57. With everything else sorted and squared away, now is the time to check all the pieces, and get everything fastened down prior to fitting the intake pipe.

58. The BOV needs to be fitted to the underside of the intake pipe and clamped on. Then fit the intake pipe into the passenger side silicone hose (from the FMIC). Then fit the BOV discharge to the inlet pipe from the air box. Clamp all those together. Then fit the supplied small vacuum hose to the fitting on the BOV, and run it to the back of the engine where the vacuum line from the intake to the brake booster is.

59. Route the vacuum hose from the BOV to the back of the engine, and tee it into the brake booster line.

60. Fit the intake pipe to the throttle body, and clamp down the silicone hoses.



61. When fitting the front engine undertray back to the car, you should fit the supplied spacers at the front to ensure extra clearance for the exhaust manifold. They will be fitted to the 2 bolts at the front and two at the rear as indicated.

62. You will fit the spacer between the tray and the body of the car at the front, and at the rear. All other bolts and plastic pop-its should fit as normal.

63. Fit the air box to the silicone inlet pipe, and fit the air filter back in place. Clamp the air box back up and fit the wiring harness to the MAF sensor. Check all your fittings, hoses, and other pieces, and make sure you've tightened up the exhaust. Now is a good time to do a test start of the car and make sure there are no leaks. If everything checks out, replace the bumper onto the car in a reverse process of the removal.

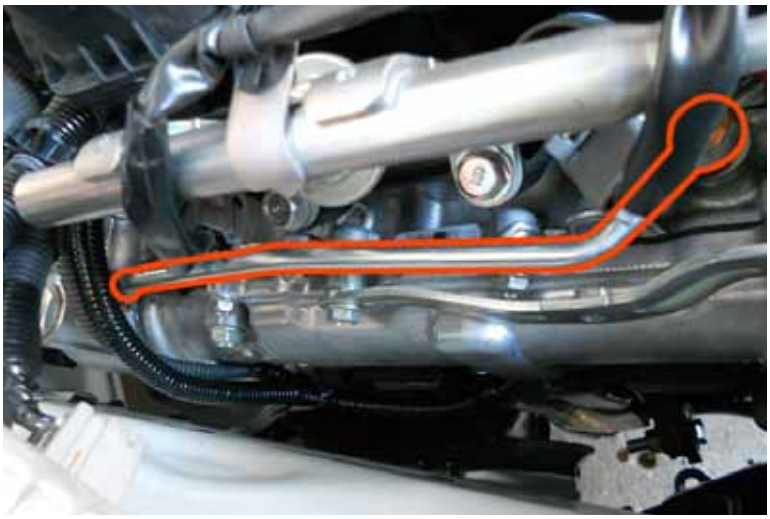
If everything checks out, now is a good time to reflash your car with the AVO Stage 1 base map!

Automatic Model Oil Pump Fitting

64. Automatic models have an air pump for the brake booster. This will need to be removed, and the hose routed to the back of the intake manifold. There is a port already there which manual transmission models use.

65. The air pump consists of the air pump assembly, and a metal line that goes to a banjo bolt at the front of the head.

After removing the rubber hose, you will need to undo the banjo bolts, and then unbolt the air pump assembly itself from the back of the head. It's held on by silicone sealant, so may take a bit of force to pry it off.



66. The hard line from the air pump goes underneath the injectors. You will need to remove the injector protection plate and the injector computer before accessing the line and the banjo bolt. Remove the hard line and the banjo bolt, and replace that bolt with the supplied oil fitting.

67. To finish it up, you need to re-route the hose from the brake booster to the back of the intake manifold. You can use the OEM hose from the manufacturer for a manual transmission model, or simply use aftermarket hosing to accomplish the same goal.

To use an OEM hose, use OEM Subaru part number 26194CA110 for left hand drive models.

For right hand drive models, use OEM Subaru part numbers: Brake Vacuum Hose set (RH) 26140CA070 & 26140CA090

Vacuum Pipe: 26144CA020

1. You will need a Windows PC laptop with at least two USB ports. Windows XP through to Win7 is ok.
2. Plug the supplied dongle into one of the USB ports. This dongle is important, never lose it!
3. Go to www.ecutek.com/downloads, and download the EcuTek App Downloader, install it and then run the program.
4. First click on the "Download Now" button, and wait for that to finish.
5. Open the ProECU application that was downloaded, and let it run any updates it finds.
6. Go to the Help menu, and click on the EcuTek AppDownloader.
7. That will close the program and open up the App Downloader again. This time, click on the Apply Feature Update button. When that is finished, you are ready to connect it to the car.
8. Make sure the battery on the Laptop is fully charged. Head to the car, and locate where the OBD-II port is. It is underneath the driver's side dash, located right about where your right knee would be. Plug the provided OBD-II cable into that port. A green light will go on on the cable if it is in correctly.
5. Plug the cable into the laptop. The EcuTek software should say that it's connected to the car properly as this point.
6. Go to the Tools menu, manually select the vehicle (frs/brz), and then next screen, program ECU. Not that you actually are programming at this point.
7. The next screen that loads up should have a query ECU button. Hit that, and it'll say what type of ECU you have. It will also let you know how many licenses you have (it should say 1).
8. At the top left, there's a button that says Choose ROM File. Click on that, and find the ROM file that we sent you.
9. Once you've done that, hit the Program ECU button. Since this is the first time, it will warn you that it's using one license, and ask you to OK that. OK it.
10. Follow the on-screen directions from this point. Do not hit any buttons or switches on the car during the flashing progress! Don't turn the heat on/off, or the radio on/off, etc.
11. When it's done, it'll ask you to switch the car off. Do so, and then when it says it's ok, you can start the car up. Start it up, and let it idle till the rev's come down to normal idle speed. At this point you are ready to go!

Note: Make sure there are no leaks from the oil fittings, the water fittings, and from the exhaust! If you are having stumbling/hesitation, it's likely one of the hoses on the intercooler/turbo/intake is not fully tightened or slipped loose.

AVO Turboworld recommends that you finalize your tune on a dyno or road tune by a ProTune professional. While our Stage 1 Base Map has been optimized to run on a variety of gas qualities and local conditions, it is always best to have your tune finalized for your local conditions. Not only will it be safer, but you will likely pick up some additional power.

NOTE! – If in any doubt over the operation or installation of your parts, contact AVOTurboworld, or the dealer you purchased it from for advice and assistance in troubleshooting your questions.