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Trackspeed DIY Turbocharger System Installation Instructions v1.00 (10/12/16)

Thanks for ordering a Trackspeed DIY EFR Turbo System. The parts provided in this system are intended to provide you with a solid base from which to build your own turbo setup. These instructions are intended to provide you with guidance on the unique characteristics and quirks of these components. They are not designed to provide a step-by-step how-to guide. The DIY aspect of this system requires you to use your own good judgment and experience when assembling components. You are expected to have at least a basic knowledge of how a turbocharger system works, how to plumb an intercooler system, how to hook up the wastegate and bypass valves properly, and a multitude of other small jobs which may or may not be mentioned in these instructions.

In short, these DIY instructions are meant to be a flashlight guiding your path, illuminating specific areas which may need explanation beyond what is available to the average DIYer or shadetree mechanic. They are not intended to be the safety ropes on the side of that path, telling you which bolts to tighten, when to tighten them, and how tight to make them. You are expected to use good judgment and assembly practice in order to get the best results from your particular installation.

If you need help or assistance, we are a phone call or email away.

Section 1 - The Warnings

Turbocharging your car is a major project. The rewards are substantial, as are the risks. Evaluate your technical skills honestly. Mistakes that seem small or insignificant can result in catastrophic engine damage and repair bills that far outstrip the cost of this system. These instructions assume that the person reading them has basic technical and troubleshooting skills and can install and operate the system without causing such damage. If you don't feel comfortable proceeding with the installation, call on a professional to help you. If you are unsure of what you are doing at any point, call on a professional to help you. There is very little in the way of a safety net to catch you if you make a serious mistake when installing or tuning this system. Be aware of this, double-check your work, and understand that you and you alone are responsible for the proper installation and safe operation of this system.

This turbocharger system **requires** the use of an aftermarket engine management system. You cannot run the system for any length of time on the stock ECU alone. Operating this turbocharger system without some form of aftermarket engine management will permanently damage your engine in short order. **DON'T DO IT! AT ALL! FOR ANY REASON, FOR ANY LENGTH OF TIME! NO, NO, NO!**

We strongly recommend installing your engine management system and fuel system components before adding the turbocharger to your car. It is much easier to troubleshoot issues within those systems without the added complexity of a brand new turbo system complicating things.

Section 2 - Turbocharger Prep

We will start by preparing the turbocharger. It will need to be reconfigured from its out-of-the-box state for use in your Miata.

BorgWarner EFRs clock in three unique sections. The turbine housing and compressor covers are their own unique parts. The entire CHRA is a solid unit, including the holes for the wastegate actuator. We will use this to properly orient the turbocharger for use in this kit.

Reinstall the wastegate actuator bracket as pictured. Note the location of the bracket in relation to the oil feed fitting. Once you have completed this step, align the turbine housing so that the actuator and wastegate flapper arm are approximately lined up.

Note the location of the oil drain and feeds in relation to the location of the turbine inlet flange. The inlet flange will face slightly down from horizontal (by 12 degrees). The oil drain flange should face slightly towards the engine, and the oil feed should face slightly away from the engine (by approximately 10 degrees from vertical each). The compressor housing clocks independently of the rest of the turbo (including the WG actuator bracket), and it should face down and towards the engine at a 45deg angle. The exact position is not important now - we will clock the turbo fully after it's installed on the manifold/engine.

Inside the baggie of water and oil fittings, find the following:

- straight M14x1.5 to -6AN adapter (with dowty seal)
- M14 banjo bolt
- M14 banjo
- two M14 copper crush washers
- oil drain adapter flange

Install the straight M14 adapter on the side of the turbo that is closer to the motor. It will install in the top water port. Install the M14 banjo/bolt/crush washers on the opposite side and on the bottom water port. Tighten the M14 straight and leave the M14 banjo loose until you have the orientation of the water lines finalized later on in the install.

Install the oil drain adapter. You will use the bolts and flange, but not the washers provided. Be sure to keep the provided o-ring between the turbo and the oil feed adapter during installation.

Section 3 - Manifold Prep and Assembly

Install the four Inconel studs into the manifold using the provided Resbond. Detailed instructions on this process can be found on our website on the product page for our Inconel stud kits.

Install the 3/8" NPT stainless steel plug in the EGR port on the manifold.

Install the turbocharger on the manifold. The lower rear nut will need to be installed and tightened as the turbo slides over the studs. Some turbine housings are tighter than others in this spot. Use Resbond 907TS on all four nuts during installation. Trim the Stage 8 locking tabs as needed to clear the turbine housing. You do not need to maintain a full closed circle around the nut when trimming the tabs -

Install the manifold on the car. The two inner nuts on the top will need to be installed before the manifold is fully seated. The heater core feed will need to be bent towards the firewall to clear the downpipe, so leave that nut off for now.

Section 4 - Oil and Water Lines

Find and identify the following items from the oil/water line fittings baggie:

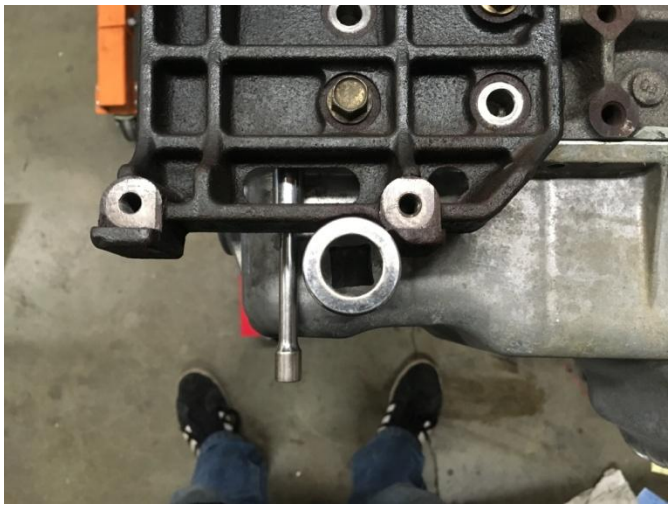
- oil feed adapter
- 1/8"NPT to -4AN adapter
- 48" -4AN feed line
- 18" -10AN drain line
- 3/8"NPT to -10AN adapter
- -6AN compression nuts (two)
- 3/8" stainless water hardlines (two)
- silicone hose pieces (two)
- hardline brackets (two)

Unplug the oil pressure sensor (located under the intake manifold) and remove it using a deep socket ratchet. Mark the location of the side port on the oil feed adapter with a sharpie so it can be seen clearly from the end. Use teflon tape or paste on the oil feed adapter male threads, then thread the adapter into the block (94-00) or oil line (01-05). Tighten until hand tight, then use a 7/8" deep socket ratchet to tighten 2-3 additional turns. The side port should be oriented at the 10pm position as shown.

Use teflon tape or paste on the -4AN to 1/8" NPT adapter, then thread the NPT side into the side port of the adapter. Tighten until finger tight, then add 2 turns with a wrench. Use teflon tape or paste on the OEM pressure sensor and install it in the end of the oil feed adapter. Tighten until hand tight, then add 2 turns.

The oil feed line will route around the back of the engine as shown. It should follow the route of the old EGR pipe behind the engine, then run underneath the heater hoses, underneath the brake booster, and around to the turbo from the driver's side. Make sure it's clear of the downpipe. Tighten at the turbocharger first, then tighten at the oil feed adapter second.

Drill and tap the oil pan for the turbo oil drain. This is a lot scarier to talk about than it is to actually do. You need to drill on the left side of the oil pan underneath the A/C compressor (or where that would be, if not equipped). You want to drill between two of the oil pan bolts to allow removal of the oil pan later on if necessary. Use your best judgment here. If your car is not equipped with A/C, you can and should drill higher on the oil pan, but be sure to leave plenty of clearance for wrenches and for the oil drain line. The drain line uses a larger hydraulic-style fitting, so be sure that you leave room for that fitting when drilling.



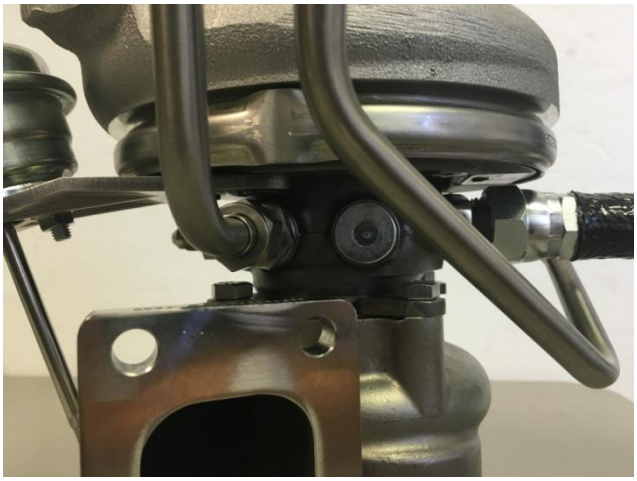
Once you are confident in your location, drill using a 37/64" drill bit. Go very slowly and use grease on the bit to catch the chips that come off the oil pan. The pan is approximately 4mm thick, and the oil pickup tube is in the same area. In order to avoid drilling into the pickup tube, you must use some method to prevent you from drilling further than 5mm into the oil pan. You can wrap your drillbit in electrical tape so that only 5mm of the drillbit's minor cutting edge is showing, or you can use a piece of PVC pipe or rubber hose to limit the depth of drilling. **If you damage the pickup tube, you will need to remove the engine and oil pan to replace it. Be careful.**

Once you have drilled the pan, use a 3/8" NPT tap to tap the pan. Grease the tap to catch shavings. Check thread depth using the 3/8" to -10AN fitting periodically to confirm adequate thread engagement. Make sure you do not

damage the pickup tube in the pan when drilling. Clean any shavings that are inside the pan by using a finger to draw some shavings out of the hole.

Once you have drilled and tapped the pan, install the provided fitting. Use a small amount of JB Weld (I prefer JB Qwik, the quick-set version) and smear it around the threads like Loctite. Install the fitting hand-tight, then add 2 turns with a wrench. Once the JB Weld has dried, temporarily install the oil drain line, remove your oil drain plug, and run a quart of mineral spirits down the oil drain line. This will flush any remaining shavings out of the pan. You can also use a pressurized air source, such as a compressor with a regulator, to pressurize the crankcase during this process. This will force the chips to blow out of the pan instead of falling into the pan.

Install the water lines as shown. The lines will run parallel to each other past the compressor housing between the turbo and the engine. Slowly tighten the compression nuts and the tube separators at the same time to align them properly. Do not force or bend the water lines into alignment - rotate and adjust them until they line up as intended.



Use the provided short silicone hoses and hose clamps to attach the water lines to the engine as shown. If you have deleted the front water neck, attach the hose to the throttle body hose or to the factory oil warmer. If you have a 94-97 engine, your water ports are 5/16". The 3/8" hoses should tighten down onto your smaller fittings, but if you want smaller silicone hoses, contact us.

Section 5 - Downpipe

Softly bend the dipstick tube towards the back of the engine bay. It needs to be bent towards the rear of the engine bay to clear the heater core feed tube and downpipe.

Test fit the upper downpipe. it will install from the top. Be sure to align the v-band to the turbo. The flange has a small step which aligns to the turbine housing as shown. You may need to clearance your rear package shelf. 5-speed users will need to cut this tab off their transmission as shown.

The downpipe should be rotated so it sits as close as possible to the transmission without actually touching it.

Bend the heater core feed tube to clear the downpipe as needed. Go slowly so as to not kink the tube. Test fit as you go until you have adequate clearance as shown. You may want to shorten the heater core hose to fit the new location of the heater core tube. Be sure to use silicone heater hoses or wrap your rubber hoses in reflective heat wrap to protect them.

Slip the lower downpipe onto the upper and align it with your exhaust. 99-05 NB users, you will need an additional sleeve to go between the upper and lower downpipe. Use the provided clamp to clamp the two together tightly. If you can still rotate the lower DP by hand after tightening the clamp, disassemble and add additional slits in the lower DP (and adapter 99-05). If you have access to a welder, you can weld the two halves together for a more secure fit. Before welding , be sure that you can remove the downpipe from the bottom as one single unit (it will rotate out and to the right).

Install the provided O2 sensor plug in the upper downpipe.

From here, you will need to build an intercooler setup, turbo intake, and take care of other items such as heat shielding