ATP Turbo

General Turbo Kit Installation Procedure

Purpose: To outline the key steps in installing an aftermarket turbo kit.

Pre-installation checklist:

1. Drain engine oil – Always good to fill engine with new engine oil after a turbo kit installation. Even if oil in engine is relatively new, the oil has a high chance of being contaminated by debris or other fluids such as water or coolant during the install process.

2. Penetrating oil (liquid wrench spray) – Saturate all exhaust studs, nuts, and bolts prior to attempting to remove. Used exhaust components and joints get stressed, seized, and rusted after use and need a lot of care during removal. The longer you soak the components prior to removal, the less chance of breakage on the way out. Breaking, damaging, or stripping a nut or bolt can unnecessarily delay the entire installation process.

3. Avoid thread sealant where possible. Contrary to popular belief, thread sealant material (especially liquid sealants) can do more harm than good in a turbo system. With the exception of parts using "NPT" (pipe thread) where Teflon tape is recommended, most fitting connection joints are compression/flare types where a bowl and valve seat is used and NO sealant of any type is to be used. Sealant material, under the extreme heat of the turbocharger system will often come apart, melt and plug up critical fluid supply passages.

Installation:

1. Bolt turbo exhaust manifold provided to exhaust side of cylinder head per factory specs. The procedure for connecting the aftermarket turbo manifold to the cylinder should not be any different than that of a factory manifold to the cylinder head.
2. Pre-drive, by hand, the (4) mounting studs onto the turbine inlet flange at the other end of the exhaust manifold. The exhaust manifold is flanged with a 4 bolt rectangular pattern (either T25, T3, or T4 depending on which turbo the manifold has been built for) and should have 4 tapped holes. Drive the short end of each of the studs into each of the tapped holes on the flange until the threads stopped at the blank area called the "shank". This leaves each stud with a protruding long section of thread to connect to the nut once the turbo is connected.
3. Once the (4) studs are driven into the manifold, carefully slip on the metal gasket that is appropriate for the turbo pattern used (once again, either T25, T3, or T4) depending on the turbo being used.
4. Place the turbo on the manifold and direct the 4 drilled holes on the turbine inlet flange of the turbine housing of the turbo on the 4 studs protruding from the

manifold. The turbo should bottom out at the face of flange on the manifold and should seat flat.

5. Place (4) flat washers into the protruding studs on the back of the turbine inlet flange.
6. Place (4) Copper locking nuts on top of the washers and drive by hand into each of the studs until the studs start and drive properly into the each stud. Each of the copper nuts will "stop" once it reaches the locking mechanism atop the head of the nut. This is normal. Continue to drive all nuts into place using the proper wrench or socket driver and torque all 4 nuts to 24.5 ft/lbs of torque.

Caution: Be careful to observe that the turbo placed into the manifold has been properly "clocked". The compressor housing outlet should pointing in the ideal direction for the turbo kit (towards the intercooler charge pipe). It is very important that the oil inlet (oil feed) port is pointing close to upwards and vertical as possible. Oil drain port (relies on gravity to drain) , should be pointing close to directly downwards and vertical as possible. If both criteria are not met, do not continue with the installation and consult the turbo kit manufacturer for proper turbo re-clocking before continuing. Failure to do so may result in both engine and turbo damage!

Caution 2: Check to make sure all bolts securing compressor housing to backplate and turbine housing to center section has been tightened and torqued down. If the bolts are not tightened down, the housing will come loose and destroy the entire turbo upon initial operation.

7. Oil feed line connection:
    a. Connect adapter fitting to the engine side. Fitting provided to convert from original engine supply source (or tee into oil pressure sender) into -4 flare male (to receive one end of the -4 steel braided oil feed line).
    b. Connect oil feed fitting into the turbo inlet port. The oil inlet port is usually the smallest port on the center housing (bearing housing) of the turbo. On the small frame GT Ball bearing turbos, the oil inlet port consists of a small threaded hole where a double ended male fitting will screw directly into. Always face the "bullet nose" end of the fitting away from the turbo when screwing into the oil inlet port. The bullet nose end is the end that receives the other end of the steel braided -4 oil feed line. On the T3/T4 turbo, there is a narrowly spaced two bolt pattern and an oil feed flange has to be bolted into place. Out of this feed flange is a male flare to receive the -4 steel braided oil feed line.
    c. Connect the steel braided line to join the flare connection at the engine to the flare connection at the turbo and tighten down to 15 ft/lb.

Caution: Do not let the oil feed line rest on any hot objects such as parts of the exhaust manifold, turbine housing, or downpipe/exhaust components! The exhaust heat from these components will melt and rupture the oil feed line causing high oil pressure to spray all over the engine bay which could result in an engine fire!

8. Oil Return line connection:
    a. Bolt oil drain flange to the oil drain port which will provide a protruding barb nipple out of the drain flange for a hose to clamp to. Use the proper oil drain flange gasket as necessary. The oil drain port is directly opposed the oil feed port on the turbo. The oil drain port should be pointed as close as possible to straight down to properly use gravity to scavenge oil out of the turbocharger. In some rare cases, the oil drain port can be orientation (although still downwards), aimed slightly towards the engine block to help get a direct connection to the drain back port on the engine block or oil pan. This is acceptable and within the proper operation range of the oil drain system. A turbo that sits low enough to place the oil drain port (coming out of the turbo) lower than the top of the oil pain "lip" is considered a "low hanging turbo" which increases the chances of a random oil leak due to improper oil drainage. In these cases, the oil has the tendency to get "trapped" inside the turbo bearing housing causing seepage into the end housing through the back of the wheels. Symptoms are smoking exhaust system and oil in the intercooler pipes. This commonly occurs even on a perfectly good turbo and the only real fix is to reposition the turbo in the kit to sit higher up to have an adequate oil drain line/path.
    b. Ensure that there is a barb/nipple of the same diameter (as on the oil drain flange) on the engine block or oil pan side. If not, bolt on the proper flange with the barb/nipple attached. If using a flange, use the proper flange gasket as necessary.
    c. Connect the oil drain hose between the barb nipple on the turbo drain port flange and the drain port on the engine block or oil pan as provided.
    d. Install hose clamp at each end of the oil drain hose and clamp down.

Caution: Do not let the oil return line rub against any moving objects after install to avoid tearing and rupturing! Check oil drain line for proper clearance with the drive shaft once the car is back on the ground. Account for the amount of engine movement and anticipated any possibility of anything rubbing against the oil drain line and make all adjustments priority to finalizing the installation.

9. Coolant inlet/outlet connections (if applicable):
    Some turbos are only oil cooled and do not have coolant ports. Turbos such as the GT Ball bearing turbos have mirrored coolants on opposing sides of the bearing housing located 90 degree to the oil in/out ports. The coolant in and out passages are cast into the bearing housing as an independent cavity and do not interfere with the oil feed/return ports in any way. The two coolants ports will have the same thread pattern and are located directly opposed from each other. Most journal bearing turbos only have oil cooling and there are no coolant ports. On turbos with coolant ports, the coolant supply is critical is preserving long

service life on the turbo and to avoid spontaneous failures due to heatsoak/heat trap damage.

a. If straight adapter fittings are supplied, screw each of the straight fittings into the coolant port and tighten down to 24.5 ft/lb. Make sure that the sealing crush washer is in place between the adapter fitting an the coolant port on the turbo. Once the fitting is in place, the other end of the fitting which is the male flare side is ready to receive a -6 size steel braided coolant line.
b. If banjos are supplied with NPT threads, screw the male adapter fitting into the banjo fitting (use Teflon tape for sealant at this joint) and tighten down to 30 ft/lb while aiming the male flare bullet nose end in the ideal direction to receiving the steel braided hose. Once the banjo has been prepped with the adapter fitting screwed into place, stick the banjo bolt through the banjo fitting, ensure that there is a sealing crush washer at the top and at the bottom of the banjo and tighten down to the coolant port on the turbo. Tighten banjo bolt to 34 ft/lb of torque.
c. Connect steel braided -6 coolant line to the male flare out of the adapter fitting (or banjo fitting) and tighten down to 24 ft/lb.
d. Repeat for both coolant ports on each turbo.
e. On the end of the steel braided hose coming away from the turbo, connect the barbed termination adapter. This adapter converts the female flared end of the steel braided hose to a barb where a short section of regular rubber hose can be used to join the end of the steel braided hose to a factory hose nipple at the factory connection point (either to the cylinder head or coolant system).

10. Connect downpipe or 02 housing to join the turbine housing outlet to the exhaust system
11. If turbo system is externally wastegated, bolt the external wastegate to the external wastegate port on the manifold using bolts or studs and gasket provided. Ensure that the spring in the external wastegate is the proper pressure level for your application. This is your “base” pressure which is also the lowest possible boost level that you can run. Make any changes to the spring pressure before installing the wastegate to prevent re-installation later.

    Caution: If applicable, do not forget to slip on the wastegate “valve seat” to the bottom of the wastegate before bolting it to the manifold. Failure to do so will result in improper wastegate operation and delayed turbo response.

    If turbo system is internally wastegated, make sure the swingarm, actuator and actuator bracket is all bolt securely to the turbocharger and the swinging mechanism is swinging properly without interference or rod binding. Make sure the actuator pressure rating is proper for you application. The spring level inside the actuator is your “base” pressure which is also the lowest possible boost level that you can run. Make changes to the actuator unit before installing to prevent uninstalling and reinstalling after all work is done.

12. Connct the wastegate pressure signal to the wastegate using 3/16" or ¼" high pressure hose. The pressure source should come from the compressor outlet neck on the compressor housing. If a nipple is not available at the compressor outlet neck, use a "quicktap" to create a pressure signal nipple at the first silicone hose right out of the compressor housing outlet and it will work just the same. Do not use intake manifold pressure or tee into the same vacuum line as the boost gauge or fuel pressure regulator, to provide wastegate pressure signal. Doing so can result in erratic boost control and potential engine damage due to improper device control.
13. On an internal wastegate setup, the pressure source signal (from compressor housing outlet) should run directly to the single nipple on the wastegate actuator using a high pressure hose. If the actuator has two nipples, use the nipple that is furthest away from the rod and leave the second nipple open to vent.
14. On an external wastegate setup, the pressure source signal (from compressor housing outlet) should run directly into the side port of the wastegate (not the top port directly opposing the wastegate exhaust inlet flange).

    Caution: Never deviate from the above connections unless specifically called for by the installation of a boost control device.

    Caution: To avoid potential engine damage, never start up and drive a turbocharged vehicle without first installing a boost gauge. Without a boost gauge to monitor and maintain a boost level that is within the desired range, there is no way to determine if you have installed everything properly.
15. Install compressor inlet hose. Keep the inlet pipe into the turbo as free from restriction as possible and run as large of an inlet as possible to promote quicker spoolup and better HP.
16. Install MAF housing if applicable and then install air filter or airbox.
17. Fill with proper fluid to proper levels.
18. Prime turbo with engine oil. Disconnect the ECU or coil packs to prevent engine from starting during start cranking. Turn ignition as though to start the engine for 30 – 60 seconds to circulate oil into the turbo system. Reconnect the disconnected ECU or coil packs and start engine.
19. Let engine idle while watching for leaks.
20. While idling and watching for leaks, observed coolant levels and top off as necessary to prevent the coolant system from overheating. Purge the coolant system of air bubbles as necessary.
21. Once confirmed no leaks and all fluid temps and levels are normal, driving vehicle while ensuring boost is within range for the specific tuning system being used.