6.9L & 7.3L 093 Turbo Upgrade Kit

CONGRATULATIONS! You have just purchased the finest turbo system available for the 6.9 and 7.3 liter diesel engine. The following information will assist you in the installation of your ATS turbo system.

IMPORTANT: It is very important to read all the instructions carefully prior to any installation of your turbo system. Normal mechanical and safety procedures should be followed.

1. Disconnect both batteries at the negative terminals.
2. Remove the air cleaner and the air cleaner canister from the engine.
3. Remove the 1/2" nut holding the wire loom clamp to the rear engine lifting bracket.
4. Remove the rear engine lifting bracket.
5. On the 1983-1992 year models, the vacuum block located above the right bank valve cover (passenger side) needs to be unbolted from fire wall. Then, if the vehicle has sound insulating blanket covering the fire wall, you must remove one half or approximately 14" off the passenger side using a utility knife. If there is any insulation that is left hanging loose, it should be retained to the fire wall using the screws removed from the passenger side. Next, reinstall the vacuum block, using an 1/8" drill bit, three inches more to the passenger side and three inches higher than the original location.

   NOTE: On the 1992 1/2 and new trucks, the vacuum block has been relocated to the drivers side inner fender.

6. On vehicles with an automatic transmission, you need to remove the 1/2" cap screw holding the dipstick tube and
vacuum line to the bell housing. Remove the dipstick tube. Next on 1983-1988 year models, move the vacuum line to the drivers side of the transmission and then secure the vacuum line to the transmission with a 1/2" cap screw. Reinstall the 1/2" cap screw on the passenger side of the transmission. On some 1991 and all 1992-1993 trucks, there is a ground strap on the back of the right cylinder head (passenger side). Remove the ground strap from the back of the cylinder head and bolt it to the top of the head, using one of the valve cover bolts on the passenger side.

**NOTE:** There are different dipstick tubes for the C6 and the E4OD Transmissions.

7. Using a pry bar or a piece of 2" pipe, Bend the lip on the fire wall rearward directly behind the right bank head (passenger side), where the head shield is riveted to the body.

8. Remove the anti-depression valve from the rear of the intake manifold. Install the grommet (item #20) into the valley pan where the anti-depression valve was removed. The grommet is supplied in kit.

9. Remove the two rubber fuel return lines from the #7 injector (located on the passenger side at the rear of the engine). Also, remove the fuel return line from the rear fuel block (drivers side) that was previously connected to the #7 injector. Use a pair of pliers to remove the clamps. Remove the steel injector line from the #7 injector, using a 5/8" open end wrench. Next, remove the plastic injector cap and replace it with the new injector cap (item #28). Reinstall the steel injector line to the #7 injector. Reinstall the 1/4" rubber fuel return line from injector #5 to injector #7. Remove the 1/4" rubber fuel line from the #1 injector. (This is the line that goes from the fuel filter to the #1 injector). You are going to splice the tee into this line. **NOTE:** If there is a wire loom on this line, remove the wire loom. Cut approximately 2" off the injector end of the fuel return line (SAVE THIS 2" PIECE). Install the brass tee (item #47) into the fuel return line and reinstall the 2" piece of hose to the end of the brass tee. Also, slide the new rubber fuel return line (item #40) onto the brass tee (item #47). Use 3 hose clamps (item #48) to secure the return lines to the brass tee. Reconnect the 2" piece of fuel return line to the #1 injector. Route the new fuel return line
between the intake manifold and the valley pan and connect it to the fuel return block (where the old fuel return line was connected). Secure the new fuel return line to the fuel return block using a hose clamp (item #48)

NOTE: On "83 to 87", 6.9l diesel engines, the #2 injector line (item #29) has to be replaced with optional line (#2 injector is the drivers side front steel line). Also use item #50 screw type hose clamp on fuel return block. CAUTION: Fuel line may leak without this clamp.

10. Using two 3/8-16 X 2 1/2" hex head bolts (item #33, to bolt the heat shield (item #11) to the engine block where the rear lifting bracket was previously bolted.

11. Lubricate and install the O-ring seals (item #14 and #16) into the oil drain casting (item #2).

12. Using two 5/16" X 1 3/4" flange bolts (item #34), install the oil drain casting into the valley pan grommet (item #20) and bolt to the back side of intake manifold, where the anti-depression valve was previously located.

13. On 1987 and new model vehicles, tie wrap the wire loom that is near passenger side rear #7 injector to the large yellow or red wires on the glow plug controller box located behind the intake manifold.

14. Route the throttle and the cruise control cables under the automatic transmission kick-down linkage, on 1983-1987 year models. For the 1987-1993 year models, route the cables behind the oil drain casting and in front of the glow plug controller box, that is bolted to rear of the intake manifold.

15. Take the valve cover (item #21) furnished in the kit and set it on the bench. Next, get item #22, #23, and #25. You will also need the anti-depression valve and the two bolts and washers that held it to the back side of the intake manifold. Install the oil drain hose (item #22) into valve cover. Next, install the grommet (item #23) onto the backside of the anti-depression valve. Take steel plate (item #25) and slide it over the grommet (item #23) with the recessed portion facing away from the anti-depression valve. Next take the anti-depression valve with item #23 and #25 and push that assembly into the anti-depression valve grommet
keeping the steel plate (item #25) between the anti-depression valve and the bracket on the valve cover. Use the two bolts and washers from the intake manifold to secure the anti-depression valve to the bracket on the valve cover.

16. Before removing any valve covers, you need to find the cover with the emissions certification and fuel pump settings. The certification decals must remain on the engine. In some cases, the certification decals are on the passenger side and some on the drivers side. If the decals are on the drivers side, that valve cover needs to be reinstalled on the passenger side so that the new valve cover (furnished in kit) can be installed on the drivers side.

**NOTE:** IT IS A FEDERAL OFFENSE TO REMOVE THE CERTIFICATION DECALS FROM THE ORIGINAL ENGINE THEY CAME ON.

17. Remove the turbo assembly from the box and set it on the bench. Take the turbo inlet pipe (item #5) and slide it over the studs and on the turbo. (orient the inlet pipe to the turbo with the matching boss on the inlet pipe facing to the back of the turbo). Then secure it with four, 3/8" lock nuts (item #37).

**NOTE:** A gasket is used between the turbo housing and the turbo inlet pipe (supplied with the turbo).

18. Lubricate and install the 2" ID. O-ring seal (item #15) into the pressure chamber. At this time, check to make sure that the 1/8" pipe plug (item #44) is tightened into the pressure chamber (item #3). With the O-ring seal lubricated, push the pressure chamber over the turbo compressor housing discharge.

19. Place the large flat rubber seal (item #17) over the inlet of the air intake manifold (Making sure that the sealing surface of the air intake manifold is clean).

20. Install the turbo assembly onto the oil drain casting, using two 3/8" lock nuts (item #37) tighten into position using a "bent" 9/16 wrench. Then, install a 3/8" X 2 1/2" flange bolt (item #33) into the pressure chamber and bolt it to the top of the air intake manifold and tighten to 15 ft. lbs.

21. Install the oil supply line (item #18) to the turbo oil fitting on the top of the turbo and tighten. Route the supply line down the back side of the engine underneath
the injector return lines. At this time, the fuel injection pump should be set up. Refer to: INJECTION PUMP SETTING PROCEDURES at the end of the instruction.

22. At this time, install the steel vent tube (item #27). Slide the tube into the anti-depression grommet (item #23) approximately 1" into the grommet and clamp with (item #24).

23. Take the air cleaner lower housing (item #6) and bolt it to the intake manifold using two 3/8" X 16 1 1/4" flange bolts (item #35).

24. Install the air filter element (item #30) into the air filter base casting.

25. Install the air filter restriction indicator (item #46) into the air filter cover casting (item #7 using a 1/8" NPT coupler (item #45) supplied in the kit. Also, install the hose reducer (item #26) to the small opening on the air filter cover, using one hose clamp (item#24).

26. Install the hump hose (item #13) and the hose clamps (item #31 and #32) onto the turbo compressor inlet. Angle the hose clamps so that the studs point up and are on the passenger side of the turbo inlet.

27. Slide the clamp (item #24) over the steel vent tube (used later). Install the air filter cover by first sliding the air filter cover into the hump hose (item #13). Slide the steel vent tube into the hose reducer (item #26) as you slide the air filter cover into place. Secure the air filter cover with three 1/4-20 X 3/4" flange bolts (item #36). Make sure they are all started straight before tightening them. Now go ahead and tighten them. Next, install clamp (item #24) onto hose reducer (item #26). Also tighten the hose clamps (item #31) on the hump hose at the air cleaner cover outlet.

28. Install the fresh air inlet hose to the air filter bottom housing and grill fixture. Also cut away the insulation on the underside of the hood just in front of where the air intake is fastened to the grill support (left front corner). On 1992 and later trucks, there is rubber seal (approximately 3" wide) between the grill and radiator support. You need to cut about 11" off from the drivers side, in front of the air intake pipe. This will improve air flow to the air intake.
NOTE: You must inspect the bug deflector (if used) to make sure it is not closing off the opening between hood and grill.

29. Remove entire exhaust system, retaining stock exhaust hangers.

30. Remove the 1/8" pipe plug from the engine block (oil galley). Location is directly behind the driver side exhaust manifold flange and in line with the lowest transmission mounting bolt. Use a square socket to prevent the plug from being damaged during removal.

31. Install the 1/8" oil adapter elbow (item #19) into the oil galley where the plug was removed and tighten the elbow to the 1:00 o'clock position.

32. Connect the turbo oil supply line to the elbow and tighten.

33. On the C-6 automatic transmissions, it is necessary to cut off the machined locating boss, located above the starter well, between the two transmission bolts. Cut flush with transmission adapter plate. 

   NOTE: This is most easily done with a power hacksaw.

34. Remove the exhaust flange studs from the right bank (passenger side) exhaust manifold flange. Next, install these studs into the "Y" collector casting (item #4).

35. Install the "Y" collector (item #4) into the turbo feed pipe (item #5) using a high temperature anti seize (1200 degrees or above) on the ball end. Secure with two 7/16" X 1 3/4" STD bolts (item #39) and two 7/16" hardened washers (item #42). Make sure that when you tighten the "Y" collector to the exhaust manifold it centered and parallel to the stock exhaust manifold flange.

36. Install the bracket (item #12) to the top stud of the "Y" casting before installing the crossover pipe, then install the crossover feed pipe assembly (item #8) using the original nuts.

37. Before installing the 3" down pipe (item #9) (supplied in exhaust kit), lubricate with high temperature anti seize compound and then install. Make sure that it is all the way into the turbo outlet elbow and then bolt the down pipe (item #9) to the bracket (item #12) previously installed using (items #38, #41, and #43).
38. Install the optional automatic transmission dipstick tube (item #10) using the RH rear exhaust manifold mounting bolt to secure the dipstick tube. 

**NOTE:** Lubricate the original O-ring seal and then place it onto the new dipstick tube before installing.

39. Install the optional 3" mandrel bent exhaust system at this time. 

**NOTE:** If the ATS optional exhaust is not used, then a free flowing 3" exhaust with a walker muffler part number 61468 or equivalent should be used. (You must purchase item #9 separate if you are not using the ATS exhaustsystem).

40. Reconnect both battery cables.

Over heating of the 6.9 and 7.3 liter engines is almost always attributed to over fueling. Over fueling also results in lower mileage, further upsetting your customer. **THE IMPORTANCE OF CORRECTLY SETTING THE FUEL CANNOT BE OVER EMPHASIZED.**

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**INJECTION PUMP FUEL SETTING PROCEDURE**

To realize the benefit from turbo charging your diesel engine, the injection pump maximum fuel delivery should be increased. This is done by removing the timing cover on the passenger side of the injection pump. Remove the top cap screw of the timing cover by using a 1/4" wrench. Loosen the bottom cap screw and let the timing cover plate rotate to the bottom with the rubber gasket. Now rotate the engine using a 15/16" socket and ratchet on the alternator belt pulley until the allen head leaf spring screw is centered in the fuel pump opening. After lining up the allen screw with the center of the fuel pump opening, you are ready to set the fuel.

On all non-serpentine belt model engines, tighten the leaf spring adjustment screw clockwise using a 5/32 allen wrench. Tightening this screw changes the roller to roller dimension increasing fuel delivery. On most engines less than one flat of the allen wrench rotation in the clockwise direction is sufficient. However, this is only a preliminary setting. Final settings of this adjustment are to be determined upon opacity. Refer to directions below.

On serpentine belt model engines (1992 1/2 and newer) adjustment of the torque screw alone should provide
sufficient fuel delivery in most cases. Turn the 1/8" allen screw counterclockwise 4 turns out and tighten the lock nut. replace the plastic cap. When setting the injection pump fuel delivery with the pump off the engine, set it to 1993 1/2 or 1994 Ford Factory Turbo specifications for fuel delivery.

**PROCEDURE FOR CHECKING AND SETTING OPACITY**

**DO NOT FOREGO THE OPACITY CHECK.** An opacity card, a square piece of smoke colored Plexiglas is supplied with each system and should be used with each installation.

Warm up the engine to normal operating temperature. Rev the engine to about 2000 RPM and hold for 10 seconds to clean out the system. Next, set the engine idle to 700-800 RPM. Use a stand or have someone hold the opacity sight gauge (included with kit) a few inches above the exhaust tail pipe outlet. Set the park brake and put the truck in neutral. Set the passenger side mirror so that the tail pipe is visible from the drivers seat.

**NOTE:** (Test must be done outside or in natural light using a white background such as a white wall or white paper mounted on a board) Push the throttle to the floor rapidly while looking in the rear view mirror. At elevations under 3000 feet, the color of the exhaust smoke during the snap throttle test should not be as dark as the card. Above 3000 feet, the exhaust smoke during the snap throttle test can equal but be no darker than the card.

Check at least 3 times to be sure of an accurate reading. If the exhaust is darker than the sight gauge, turn back the injection pump fuel delivery screw until the exhaust is no darker than the gauge.

Other factors that affect heating are bug deflector, radiator screens push bars, etc. All of these type of items restrict airflow both through the radiator and between the hood and grill. Also, it is necessary to trim the rubber seal between the grill and core support directly in front of the fresh air intake to ensure adequate airflow. Do not, however, modify the fresh air intake ducting.

**REASONS FOR NOT SETTING FUEL DELIVERY WITH A PYROMETER**
There are several reasons for not supplying a pyrometer with our new wastegate turbo system. First of all, most pyrometers do not read the same, and one can easily see readings that vary as much as 100-150 degrees F. This becomes a major problem when we rely on accurate reading for setting fuel delivery. The gauges are very sensitive and do not handle vibration well. However, the biggest problem that we as the turbo system manufacturer have experienced is the lack of proper injection pump fuel delivery increases. With our non wastegate turbo system the fuel delivery was to be set so that the owner of the vehicle could under no circumstance ever exceed 1050 degrees f. even at high elevation. The problem arises out of the fact that very few dealers have chassis dynamometer so that the proper fuel setting could be obtained at high elevation.

However, by setting the fuel delivery to meet the snap throttle emission standards, we have much more precise fuel control at all elevations and excessive exhaust temperature will never occur if set according to instructions on opacity.

NOTE: If you feel you would like to have a pyrometer, the best way to connect it to our system would be to weld a 1/4" X 1" long pipe nipple onto the drivers side 2 1/2" from the end of the crossover exhaust pipe (weld it onto the crossover pipe so that it will point towards the truck main frame).

NOTE: This system comes with an adjustable wastegate. The adjustable wastegate is set to a maximum of 7 1/2 to 8 PSI from the factory. Attempting to adjust the wastegate to a higher manifold pressure will result in an actual HP loss.

At sea level, the 7.3 L diesel engine only needs 2-3 PSI manifold pressure to burn all the fuel that this engine can handle. At 5000 ft. elevation, the 7.3 L diesel engine needs 3-4 PSI manifold pressure to burn the fuel efficiently. At 10,000 ft. elevation, the 7.3 L diesel engine needs 7 PSI manifold pressure to burn the fuel. This is why we set the manifold pressure limit at 7 1/2 PSI, so that at any elevation this engine will burn all of the fuel. Turning up the boost limit will only result in higher intake air temperatures, which would create less dense air and cause as much as 100 degrees hotter intake air temperatures, causing a very noticeable loss in HP.

41. Start engine and check for any exhaust leaks, oil leaks, or air leaks.
**MAINTENANCE**

1. **GIVE YOUR ENGINE A GOOD WARM-UP PERIOD BEFORE YOU WORK YOUR ENGINE HARD.**

2. **GIVE YOUR ENGINE A COOL-DOWN PERIOD AFTER WORKING THE ENGINE BY LETTING THE ENGINE IDLE FOR APPROXIMATELY THREE TO FIVE MINUTES BEFORE SHUT DOWN.**

3. **CHANGE OIL AT INTERVALS OF NOT MORE THAN 2,500 MILES. CHANGE OIL FILTER WITH EACH OIL CHANGE.**

4. **KEEP AIR FILTER ELEMENTS CLEAN. WHEN THE ELEMENT GETS DIRTY, CHANGE IT! A DIRTY AIR CLEANER ELEMENT WILL CAUSE EXCESSIVE EXHAUST TEMPERATURES, EXCESSIVE OIL CONSUMPTION AND AN INCREASE IN SMOKE. AIR FILTER SHOULD BE CHANGED AT LEAST EVERY 15,000 HIGHWAY MILES, WHEN OPAcity EXCEEDS 35% (SEC. #41), OR WHEN RESTRICTION INDICATOR SHOW (CHANGE FILTER).**

5. **KEEP FUEL FILTERS CLEAN. DRAIN WATER FROM FUEL REGULARLY. CLEAN DIESEL FUEL WILL ASSURE LONG TROUBLE FREE INJECTION PUMP AND INJECTOR LIFE.**

6. **NEVER REV YOUR ENGINE UNTIL OIL PRESSURE IS OBTAINED!**