ATTENTION

THIS IS AN ADDENDUM TO ALL GALE BANKS TURBOCHARGER SYSTEM INSTRUCTIONS. THE INSTRUCTIONS SHOW (2) 3/8" 16 X 1" HEX BOLTS TO MOUNT THE OIL DRAIN TUBE. WE HAVE SUBSTITUTED (2) 3/8" 16 X 3/4." HEX BOLTS IN THEIR PLACE. YOUR BILL OF MATERIALS WILL NOT HAVE THESE BOLTS LISTED.
DEAR CUSTOMER:

To obtain optimum performance from your BANKS turbocharger system, it is necessary to make an adjustment to the fuel injection pump. This adjustment is easily made by following the enclosed instructions. However, it is extremely important that the instructions be followed very carefully. Before starting the injection pump adjustment procedure, please note the following:

The engine must be COLD (preferably overnight) before starting the injection pump adjustment procedure. DO NOT attempt to turn the engine over or adjust the injection pump while the engine is warm.

To gain access to the injection pump adjusting screw, it is necessary to rotate the engine crankshaft, so that the screw is properly positioned. As noted in the instructions, the crankshaft is rotated by hand, IN THE CLOCKWISE DIRECTION ONLY, by turning the vibration damper mounting bolt using an appropriate socket, extension and breaker bar. (On some late model trucks it may be necessary to remove the front crankshaft pulley to gain access to the vibration damper bolt.) DO NOT ROTATE THE CRANKSHAFT USING THE STARTER, for any reason. Even though the fuel solenoid is de-energized, the engine can still start. This is extremely hazardous and can result in both severe personal injury and major mechanical damage. Again when making the injection pump adjustment, DO NOT ROTATE THE CRANKSHAFT WITH THE STARTER.

3. If you removed the front crankshaft pulley to gain access to the vibration damper bolt, be sure to reinstall the pulley (and belts) before starting the engine.

GALE BANKS ENGINEERING
IMPORTANT

In order to protect your engine from water damage, Ford Motor Company recommends that the air inlet duct be disconnected from the air filter housing when fording streams. This warning can be found on both ends of the air inlet duct (it does not appear on some very early models). Removing this duct allows the engine to draw air into the air filter from a higher elevation, reducing the risk of water entering the engine. The duct should be replaced when fording is completed.

This air inlet duct is reused with your BANKS 6.9/7-3L turbo kit. You should continue to follow the fording instructions after the turbo kit is installed.

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GENERAL INSTALLATION PRACTICES

1. For ease of installation and trouble-free operation of your BANKS turbocharger system, PLEASE READ THIS ENTIRE INSTRUCTION PACKAGE BEFORE STARTING ANY WORK. (This package contains 15 pages of instructions, 12 sheets of illustrations, and two sheets of parts listing. If any pages are missing from this package, please call GALE BANKS ENGINEERING immediately for a replacement.) Become thoroughly familiar with all components and phases of the installation before starting any work.

2. Inspect all components supplied for any foreign material that may have entered during shipping and handling. Wash all fuel and oil hoses with solvent and blow dry with compressed air before assembly. Inspect all castings for damage resulting from shipping. Check all machined surfaces for nicks or other damage. Clean all castings with solvent and blow dry with compressed air prior to assembly.

3- Any time the vehicle is raised off its wheels, it should be supported by jack stands or ramps of adequate capacity for the vehicle's weight. NEVER PERFORM ANY WORK UNDER A VEHICLE SUPPORTED ONLY BY ITS BUMPER OR A HYDRAULIC JACK.

4- Use the Teflon tape provided on all pipe thread connections. Hold tape back from the first two threads of the fitting so tape will not flake off into the fluid. (This is especially critical on oil lines.)

5- Any threads to be secured with Loctite must be clean, dry and free of any oil or grease. Clean threads with lacquer thinner as required.

6. Pay particular attention to the routing of all hoses and wiring. Keep them away from exhaust heat, moving parts and sharp edges that may cause cuts or other damage. Route or tie hoses away from critical areas as required. Keep all hoses a minimum of 1" from hot exhaust, parts, 1-1/2" or more is recommended whenever possible.
7. Collet stainless steel locknuts are used on the studs in the turbine mounting bracket. The locknuts should be installed as shown in fig. 3- The nuts will spin on freely and lock only when tightened.

8. Muffler and exhaust piping are not included with this kit. An exhaust parts kit containing these components is available separately from GALE BANKS ENGINEERING, or you may have a local muffler shop fabricate the exhaust system. The BANKS 3" exhaust system is REQUIRED for emissions legal installations.

NOTE: If you have a muffler shop fabricate the exhaust system, or if you complete the system yourself, it is highly recommended that you install a BANKS 3" core muffler to realize the full benefits of your BANKS turbo system.

9- General assembly diagrams are provided in addition to the specific step or section diagrams in the text. General assembly diagrams show relationships of individual components for reference; however, numbered step-by-step procedures should be followed for proper assembly sequence.

10. Right-hand and left-hand designations refer to the driver's right or left, as seated in the vehicle, (i.e.: Right-hand refers to the passenger side of the vehicle, unless noted otherwise. "FWD" in sketches refers to "forward", or front of vehicle.

11. All BANKS components are designed, tested and manufactured to standards far exceeding factory OEM specifications. However due to normal variations in production vehicles, it may be necessary to slightly modify some exhaust components for proper fit.

NOTE: All parts are furnished in kit unless noted otherwise.
INSTALLATION PROCEDURE

1. Disconnect ground cables from both batteries. Disconnect electrical connections from top of injection pump.

2. Disconnect plastic air inlet duct from air cleaner-housing and remove air cleaner housing and element.

3. Disconnect wire from oil pressure sender unit, located on top-rear of engine. (On some models, the oil pressure sender is mounted on the firewall.)

4. Remove oil pressure sender unit and its connections from rear of engine block. (Fittings, hose, and bracket, etc., if firewall mounted). Retain sender for later installation.

5. Install 1/8" NPT brass pipe plug in hole at rear of block where oil pressure sender unit and fitting were removed. Use Teflon tape on threads.

6. Remove steel tube connected to transmission modulator valve.

7. Remove oil fill-pipe from front of engine. (Note: 1987 and later models use an inspection cover plate, remove cover plate). See fig-U.

ONPUMP ADJUSTMENT

To obtain the maximum available performance from your BANKS 6-9/7-3L diesel turbo system, and to comply with emissions requirements, it is necessary to make an adjustment to the fuel injection pump. The pump adjustment increases the fuel delivery capacity of the pump. This adjustment is made by turning an internal screw, found within the pump. The pump adjustment will provide a 30 percent or greater increase in rear wheel horsepower, suitable for general use, work trucks and towing. (This is the ONLY emissions legal setting).

NOTE: Exhaust gas temperature (EGT) must NOT exceed 1150 degrees F, as shown on the EGT gauge (pyrometer) furnished with the kit. If the EGT approaches this temperature under heavy, uphill load, the fuel pump capacity adjustment must be reduced. The recommended pump setting should cause no problem, very rarely approaching this temperature.
8. Adjust injector pump delivery as follows:

NOTE: The engine must be COLD before starting this procedure. Review warnings at the beginning of instruction booklet.

NOTE: Utmost cleanliness should be exercised. DO NOT allow any foreign material, including lint from rags, to enter the injector pump during the adjustment procedure - the lint from a rag can clog an injector. Lay any removed parts on a clean newspaper during the adjustment procedure.

a. Place a drip pan under the rear of the engine, under the flywheel inspection cover area, to catch spilled fuel. Clean the area of the pump in the vicinity of the small access cover, located on the left side of the pump, as viewed from the front of the vehicle, with diesel fuel or parts solvent. DO NOT clean the pump while it is hot; doing so may damage the pump.

b. Remove the cover plate, retained by two small screws. Use care not to damage the rubber gasket; it will be reused during reassembly. IMPORTANT: Utmost care must be used to prevent foreign objects and dirt from falling into the pump to prevent damage.

c. Rotate engine slowly by hand, in a clockwise direction, using a breaker bar, short extension and suitable socket on the harmonic balancer retaining bolt, to align the injector drive pin, as viewed through the opening for the oil fill pipe or inspection cover, in a straight up (12 o'clock) position. Using a small mirror, check that the Alien head adjustment screw is visible within the inspection hole on the pump. It may be necessary to rotate the engine somewhat more to gain access to the adjusting screw. See figs. 5 and 6. DO NOT ATTEMPT TO ROTATE THE ENGINE WITH THE STARTER!!.

d. Using a 5/32" Alien wrench (with sharp corners), rotate the screw 1/4 turn, clockwise.

NOTE: The Alien screw turns fairly tightly and is self locking. Turning the screw clockwise increases fuel delivery capacity. Keep track of your adjustments!

e. Replace access cover on pump. Again exercise care to prevent foreign material from entering pump.

f. Wipe up any spilled fuel remaining on valley cover. This completes the pump adjustment procedure.
Reroute the injector return hoses. Refer to fig- 7A. which shows how the return lines should be routed. Remove and install necessary components as required to complete the system as shown. (Additional hose is provided for the rerouting.) Note that there should be a minimum of four inches clearance between the injector return line and the turbine housing or turbo mounting bracket. Be sure that the new injector return hose does not interfere with the transmission kickdown linkage.

1989 and later models - if the injector return fittings on the injector nozzles have the late style "off center" nipples, see fig. 7, the injector return lines do not need to be rerouted. Go to step 10.

10. Remove the engine lifting lug from right front of the intake manifold. Retain the bolts for later installation.

11. Remove the engine lifting lug from right rear of the intake manifold. Replace bolts with new 3/8"-16 x 2-1/2" hex head bolts provided, and original washers. (Do not use original bolts or reinstall lifting lug.)

12. Remove the engine lifting lug from left rear of the intake manifold. Retain the bolts for later installation.

13. Remove the crankcase anti-depression valve (the round sheet metal can attached to the rear of the intake manifold). Remove standpipe and grommet from valley cover. (Standpipe may come out attached to anti-depression valve.) Retain anti-depression valve and mounting bolts for later installation. Note, 1987 and later models: Remove short length of hose and clamp from anti-depression valve.

14. Carefully clean around the hole where the original grommet was installed at the rear of the valley cover and where the anti-depression valve was mounted on intake manifold. (Use acetone, lacquer thinner or other non-oil based solvent.)

15. Install grommet in valley cover as follows. Fill grommet groove with RTV silicone sealer provided. Press grommet through opening in valley cover and smooth RTV around grommet. Remove excess RTV. See fig- 8.

16. Install rubber o-ring in groove in manifold block-off plate See fig. 8.

17. Install manifold block-off plate (and o-ring) on intake manifold where anti-depression valve was removed, using two 5/16"-18 x 1" hex head bolts and split lockwashers. See Fig. 8.
18. 1987 and later models, glow plug relay relocation:

   A. Unbolt the glow plug relay from the rear of the intake manifold (leave wire loom attached to relay. Remove cable clamps holding wire loom to rear of engine. Disconnect relay ground wire from engine. If vehicle has the E 4 0 D transmission (4 speed automatic / overdrive) save one of the cable clamps for step 49-

   B. Remove the two intake manifold bolts located between the third and fourth fuel injector (counting from the front to the rear) on the right (passenger) side of the engine. See fig- 9-

   C. Mount the glow plug relay to the glow plug relay bracket (provided) using two 1/4" -28 x 1" hex bolts, two 1/2" O.D. x 1/4" I.D. washers, and two 1/4"-28 nylock nuts. Clamp the relay ground wire under one of the nuts. See fig. 9-

   D. Install the bracket and relay on the intake manifold using the intake bolts and washers removed in section B. Route the wiring as shown in fig- 10. Plastic clips may be removed from wire loom jacket as required for rerouting wiring.

19- Remove the screws holding the vacuum hose junction block, located on upper right portion of firewall, and lift block upward as far as possible. (Do not disconnect any vacuum hoses.) Temporarily retain the vacuum block up, out of the way, by tying with heavy string or other means.

20. Remove exhaust head pipes and exhaust system, including muffler and tailpipe.

21. Remove the transmission dipstick from the dipstick tube. Then unbolt, the transmission dipstick tube at the bellhousing and remove the dipstick tube from the transmission. Retain all these components for later installation. Cover the dipstick tube opening with a clean rag, paper towel or tape to prevent contamination from entering the transmission. Reinstall bellhousing bolt.

22. Remove 1/8" NPT pipe plug for oil feed connection, located on lower left side at rear of block, above and to the rear of the oil filter. See fig. 11.

23- Install 1/8" NPT x -4AN turbo oil feed elbow in block. Aim elbow at approximately one o'clock position. See fig- 11-

2^\. Install oil feed hoses onto oil feed line tee. Use Teflon tape on threads. See fig- 12.

25. Install oil pressure sender onto oil feed line tee. Use Teflon tape on threads. See fig- 12.
26. Install oil feedline tee on intake manifold, using rear-most intake manifold mounting bolt hole, on the left side. Use original bolt and washer. Replace the other left rear manifold bolt with one new 3/8"-16 x 2-1/2" hex head bolt and original washer. NOTE: Oil feed line to block must go under injector tubing loop at rear-most injector.

27. Connect oil feed hose to elbow installed in step 23-

28. Lengthen the oil pressure gauge sender wire as follows:
Cut the plug from the wire loom leaving 2-3 inches of wire attached to the plug. Lengthen the wire from the loom as required using wire and connectors provided in the kit. Route the wire in front of the intake manifold air inlet opening to the gauge sender. Keep wire clear of any moving parts. Note: Connectors squeeze together onto the wire with pliers. Re-install plug on sender.

29- Tie wrap glow plug wiring and throttle cable at rear of intake manifold (snugly but not tight enough to cause binding or kinking). See fig. 13-

30. If vehicle is equipped with a plastic acoustic shield on the firewall, cut and remove a section as shown in fig- 14-

31. Cut one 9" x 24." heat blanket into one piece 9" x 12" and two pieces 9" x 6 " . Wrap one 9" x 6" piece around the glow plug wiring and throttle cable near turbine housing. Secure using wire ties provided. Save the other pieces for later installation. On 1989 and later models, wrap injector return hose together with glow plug wiring and throttle cables near turbine housing.

32. Bend firewall lip back as far as possible, on both sides, for installation of exhaust piping. Use adjustable wrench to grip lip as deeply as possible and bend entire seam back parallel with bell housing. A 3 '-4 ' piece of pipe or metal bar may be used as a lever against the seam to flatten the metal. It may also be necessary to slightly reshape the floorpan heat shields for proper exhaust system clearance. See fig. 15-

33- Install the pyrometer adapter fitting and probe (from the pyrometer kit) into the 1/4" NPT threaded hole in the turbo mounting bracket.

34- Install four 3/8" x 1-1/2" studs in the rectangular pad on the turbo mounting bracket. Note that the coarse threads on the studs fit into the turbo mounting bracket.

35- Install two 3/8" x 2" studs in the circular pad on the turbo mounting bracket. Again note that the coarse threads or the studs fit into the turbo mounting bracket.
36 Mount turbo on turbo mounting bracket, using four 3/8"-24 stainless steel collet lock nuts and four 5/8" O.D. x 3/8" I.D. flat washers. No gasket is required. (See general notes on collet locknut installation, Fig. 3)-

37 IMPORTANT: Remove the plastic caps from the turbocharger oil inlet and outlet connections.

38 Use gasket adhesive ("Gasgacinch" or similar) to attach the oil drain tube gasket to the oil drain tube. Place a small bead of RTV silicone sealer around the oil drain pipe about 3/8" up from the bottom, then insert the oil drain pipe into the grommet in the valley cover.

39 Position the turbo mounting bracket and turbocharger in place at the rear of the right hand cylinder head. Start one 3/8"-16 x 1-1/4" hex head bolt, two or three turns, through the top mounting hole in the turbo mounting bracket, into the cylinder head.

40 Mount the oil drain tube in position on the turbo, using two 3/8"-16 x 1" hex head bolts and four 3/8" I.D. circle lock washers. (Circle lock washers must be used in pairs as shown in Fig. 17.) Carefully smooth the RTV around the oil drain pipe at the grommet with a rag, to assure a good seal. An additional bead of RTV sealant may be added if desired.

41 Install the other two bolts in the turbo mounting bracket (one 3/8"-16 x 1-1/4" hex head and one 3/8"-16 x 1" hex head; short bolt goes through thin corner of bracket.) Leave bolts loose enough to adjust turbo mounting bracket position to suit.

42 Install 1/4" NPT x -4AN elbow in the oil inlet connection on top of the turbocharger. Aim the fitting as shown in Fig. 16. Use Teflon tape on the pipe threads.

43 Place air inlet gasket and intake casting in position on the intake manifold. Make sure the intake casting touches and sits squarely on the gasket.

44 Line up turbo compressor discharge connection with the intake casting hose joint, lifting the turbo slightly if needed for proper alignment. Tighten the top bolt in the turbo mounting bracket, then the other two.

NOTE_ If the turbocharger needs to be rotated to correct misalignment, it can be easily aligned by loosening, but not removing, the six turbine housing bolts and the six compressor housing bolts and rotating these parts slightly into the proper position. Be sure to bend the locking tabs over against the heads of the bolts after re-tightening.
45 Remove intake casting from intake manifold.

46 Modify the transmission dipstick tube as shown in fig- 19-

47 Lower turbo down-tube in place, but do not mount.

48 ON C-6 AUTOMATIC TRANSMISSION VEHICLES ONLY, install transmission dip stick tube, using one 3/8" -16 x 1/2" hex head bolt and 3/8" split lockwasher. It may be necessary to bend the tube slightly to fit. Tube mounts to turbo mounting bracket.

49 On E40D (4 SPEED OVERDRIVE) AUTOMATIC MODELS ONLY, install transmission dipstick tube using a cable clamp retained from step 18, a 90° bracket, a 5/16-18 x 1" hex bolt, two 11/16 O.D. x 5/16 I.D. washers, and a 5/16-18 Nylock nut. 90° bracket mounts under bellhousing-to-engine bolt.  See figs. 19 and 21.

50 Line up the turbine heat shield and gaskets on the turbocharger. You may use 5/16" studs, pins or bolts with heads removed as guides to ease the installation.

51 Bolt the turbo down-tube to the turbocharger, using six 5/16"-18 x 7/8" stainless steel hex head bolts and 9/16" O.D. x 5/16" I.D. flat washers. Make sure gaskets and heat shield are properly in place, and that the heat shield does not touch the firewall. Note: Heat shield may be crushed slightly to provide clearance.

52 ON E40D (4 SPEED OVERDRIVE) AUTOMATIC MODELS ONLY, use hacksaw to remove approximately 1/2" of the corners of the boss indicated in fig- 27. This is necessary for the Y-pipe assembly to clear the transmission-bellhousing area.

53 Install exhaust "Y-pipe" assembly to engine exhaust manifolds 'under the vehicle. Bolt the extension tube flange to the turbo mounting bracket using two 3/8-24 stainless collet lock nuts and two 13/16 O.D. x 3/8 I. D. flat washers. Leave nuts loose enough for alignment. Do not install U-clamp at this time.

NOTE: ON E40D (4 SPEED OVERDRIVE) AUTOMATIC MODELS ONLY, unbolt the shift linkage pivot bracket from the left side of the transmission to allow the extension half of the Y-pipe to be mounted in place between the linkage and the transmission. It is not necessary to completely remove the linkage. When the Y-pipe assembly is in place, reinstall the linkage. See fig. 27.

54 Tighten Y-pipe collet lock nuts.
55 Install exhaust U-clamp on slip connection joining Y-pipe-halves. NOTE: Both 2 1/2 and 2 1/2 inch U-clamps are included, use the proper size clamp for the tube size supplied. See fig. 1.

56 Connect oil feed hose to turbocharger oil inlet elbow.

57 If installing optional boost gauge, install boost gauge fitting (supplied in boost gauge kit) in the 1/8 N.P.T. boss on the intake casting. NOTE: Nut on fitting may be removed to allow installation. Fitting should be aimed toward left side of vehicle. Refer to fig. 20. If boost gauge will not be installed, substitute 1/8" NPT pipe plug, from kit. Use Teflon tape on pipe threads.

58 Install 2" diameter x 2" long silicone hose and two #36 hose clamps on the intake casting compressor connection. Tighten the clamp nearest the intake casting, leave the other clamp loose. Position the clamps as shown in Fig. 2 to provide access for tightening and prevent clamp from touching kick-down rod.

59 Install turbocharger compressor air inlet elbow and clamps on turbocharger. NOTE: Large end uses #56 clamp, small end uses #52 clamp. Do not tighten clamps at this time.

60 Install intake casting (and gasket) on intake manifold, using one 3/8"-16 x 1/2" hex head bolt, and 13/16" O.D. x 3/8" I.D. flat washer. Guide the intake casting and turbocharger hose joints together as the casting is set in place. Make sure all loose clamps are in position on the hoses. Torque the mounting bolt to approximately 12 - 15 ft. lbs. NOTE: On some models, fuel return line tube may have to be bent slightly so fuel hose will not be kinked by the underside of the intake casting. Check for clearance.

61 Tighten remaining turbocharger compressor discharge hose clamp.

62 WARNING! Make sure transmission kick-down rod has clearance thru its entire travel. Improperly located clamps, bent throttle levers, hoses, etc. may rub or push against the kick-down rod and interfere with transmission shifting and/or throttle operation. Check this before starting engine.

63 Tighten air inlet elbow hose clamps, at turbocharger and air filter body.

64 Install air filter element in the intake casting. Check that element is properly seated in groove.

NOTE Be sure you have the 3 1/2" high air filter element. The older 3" high element, if installed, will not filter in this casting.
65 Install air filter cover, including gasket, using eight 5/16"-18 x 2" hex head bolts and 9/16" O.D. x 5/16" I.D. flat washers. Make sure that air filter element is properly engaged in groove on underside of cover before tightening bolts. Use a light coat of grease on body gasket, hold gasket in place during assembly and to facilitate service.

66 Install air filter body support bracket, using two original intake manifold bolts and washers and two 3/8"-16 x 1" hex head bolts and 3/8" O.D. x 3/8" I.D. flat washers. Start all bolts before tightening. See fig. 22.

67 Remount vacuum block on firewall, relocating upward as required to provide clearance to turbo system. Drill new mounting holes to suit and use original sheet metal screws.

68 Install anti-depression valve on the intake casting body, using original bolts, with hose connection facing upward. Be sure original seal is in place on anti-depression valve mounting surface. Remove existing o-ring and nylon sleeve from the anti-depression valve hose connection, if still in place. See fig. 22.

69 Remove and discard the hose clamp from the heater hose connection on the water pump. Hose clamp may be cut with snips to avoid disconnecting hose. See fig. 23.

70 Thoroughly degrease the oil fill-pipe flange face (injector pump drive cover flange face on 1987 and later models) using acetone, lacquer thinner or other non-oil based solvent. Install the crankcase vent hose adapter and oil fill-pipe (inspection cover on 1987 and later models) using two 5/16"-18 x 2" hex bolts and two 5/16 split lock washers. Use silicone sealer on both flange surfaces. See fig. 23.

71 Replace the hose clamp previously removed from the heater hose with a No. 10 hose clamp, provided in the kit. Keep the tail of the hose clamp clear of the alternator drive belt. See fig. 23.

72 Install crankcase vent hose, from crankcase vent adaptor nipple to anti-depression valve, using two #16 hose clamps, as shown in fig. 23. Be sure that hose is installed with no low areas that could cause oil puddling in the hose.

73 Reinstall flexible fresh air inlet hose on intake casting.

74 Install pyrometer and gauge panel. Refer to Instructions included with pyrometer.
65 Install air filter cover, including gasket, using eight 5/16"-18 x 2" hex head bolts and 9/16" O.D. x 5/16" I.D. flat washers. Make sure that air filter element is properly engaged in groove on underside of cover before tightening bolts. Use a light coat of grease on body gasket surface to hold gasket in place during assembly and to facilitate future service.

66 Install air filter body support bracket, using two original intake manifold bolts and washers and two 3/8"-16 x 1" hex head bolts and 13/16" O.D. x 3/8" I.D. flat washers. Start all bolts before tightening. See fig. 22.

67 Remount vacuum block on firewall, relocating upward as required to provide maximum clearance to turbo system. Drill new mounting holes to suit and use original sheet metal screws.

68 Install anti-depression valve on the intake casting body, using original bolts, with hose connection facing upward. Be sure original seal is in place on anti-depression valve mounting surface. Remove existing o-ring and nylon sleeve from the anti-depression valve hose connection, if still in place. See fig. 22.

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73 Reinstall flexible fresh air inlet hose on intake casting.

74 Install pyrometer and gauge panel. Refer to instructions included with pyrometer.
Install accessory instruments, if used. Refer to manufacturer's instructions included with instruments.

Install muffler and exhaust system (not included with the turbo system) as shown in fig- 26. Because of various vehicle/chassis combinations, the illustration provided is general, but typical of the exhaust system routing.

NOTE: The factory muffler and exhaust system are NOT suitable for turbocharged engines. The entire exhaust system, from the turbo down-pipe through to the tail pipe, should be three inch diameter, including the muffler. Use of a smaller muffler or exhaust piping will result in significantly inferior performance. A separate 3" high-flow exhaust system is available from GALE BANKS ENGINEERING. This exhaust system includes a special low restriction 3" core muffler, pre-formed tubing sections and all components necessary to install the complete exhaust system. The BANKS 3" exhaust system is REQUIRED for emissions legal applications. Use of any other exhaust with the turbo system is not emissions legal.

For those wishing to do their own exhaust system fabrication, the following recommendations should be followed:

a. Be sure to use a high quality, low restriction 3" core muffler, designed for turbocharged diesel applications. (Most 3" mufflers available from muffler shops are low quality, high restriction "economy" replacement mufflers, usually based on a 2-1/2" or smaller core.)

b. Make all bends as gradual as possible. Align all weld joints as carefully as possible so the exhaust flow will not experience "steps" in the tubing. See fig. 26A.

c. Do not "cheat" bends or make miter-weld joints. These types of bends are too abrupt for proper exhaust flow.

d. Maintain adequate clearance to chassis, floorboards, driveline, moving suspension parts, etc. Suspend exhaust tubing in rubber hangers to allow for engine movement. The original hangers may be reused if in good condition.

Install a 9" x 24" heat blanket on turbo down-pipe. Slide blanket up from bottom as far as possible. Wrap top of pipe with the remaining part of the other 9" x 24." heat blanket. Secure using wire ties provided.

Install a 7" x 24" heat blanket on Y-pipe extension, (that portion of exhaust piping connected to the turbo mounting bracket) sliding it up from the bottom, all the way up to the pyrometer fitting on the turbo mounting bracket. Secure, again using wire ties.

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Use your pyrometer (exhaust temperature gauge) to monitor your engine’s operation. At idle, EGT (exhaust gas temperature) will be very low, perhaps only 150 degrees F. As the throttle is opened for higher speeds and greater loads, the EGT will rise. The highest EGT will be seen under maximum load at full throttle, such as climbing a steep grade with a heavily laden vehicle. Use caution if your EGT approaches 1100 degrees F, with 1150 degrees F being the ABSLUTEMAXIMUM!

If the vehicle approaches those EGT level under these conditions, downshift the vehicle to reduce the load, or back off the throttle. If frequent high EGT levels are encountered, the fuel delivery of the injection pump will have to be reduced by backing out the Alien-head screw in the injection pump as indicated in the Pump Adjustment section. A high EGT can also be caused by a restrictive exhaust system.

We recommend engine oil temperature be below 24.0 degrees F, as measured in the oil pan. (An optional oil temperature gauge is available from GALE BANKS ENGINEERING). Optimum oil temperature is 230 degrees F. Continuously high oil temperature is indicative of the need for an additional oil cooler. If you do not have an oil temperature gauge, watch your oil pressure. Falling oil pressure under a heavy load is caused by rising oil temperature. Use caution.

We recommend that coolant temperature, also, should not exceed 220 degrees F.
Your BANKS turbocharged diesel engine should exhibit the following operating characteristics:

Cruise Conditions (Constant 60 mph on Level Road): EGT should be approximately 400 degrees F; boost gage, if so equipped, should read 1 to 2 pounds.

High Load Conditions (Uphill with Heavy Load): EGT should typically be 900 to 1000 degrees F, with 1100 as a maximum; boost levels may approach 9 pounds.

It is important to realize that diesels, unlike gasoline engines, run cooler with additional air. It is impossible to run a diesel too "lean". Exhaust gas temperature rises as more fuel is added. Turbocharging a diesel typically lowers the EGT. Normal cruise condition EGT for a normally aspirated (non-turbocharged) diesel engine is typically 600 to 650 degrees F. As noted above, cruise condition EGT for a turbocharged diesel is typically /i.00 degrees F. This lower EGT translates directly to lower piston and valve temperatures, and significantly increased engine life.

It is also important to understand that turbocharged boost pressures are load related, that is the turbocharger makes boost only when called upon to do so (by load requirements). The turbo will not "make boost" with the transmission in neutral, but makes boost proportional to the load. Long uphill grades, with a heavy load, will result in maximum boost. In other words, the turbo makes boost only when it is needed. This characteristic makes turbochargers so attractive that the vast majority of long haul trucks and off-road earth moving equipment are equipped with turbochargers. Turbocharging typically results in more power and torque, better fuel economy and increased engine life.

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## Bill of Materials

**For AUTOMATIC TRANSMISSION**

<table>
<thead>
<tr>
<th>ITEM #</th>
<th>QTY / KIT</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Banks Turbocharger</td>
</tr>
<tr>
<td>2 buy</td>
<td>1</td>
<td>Turbo Mounting Bracket</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>Intake Casting</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>Air Filter Cover</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>Air Filter Element, 3-1/2&quot; tall</td>
</tr>
<tr>
<td>8 buy</td>
<td>1</td>
<td>Air Filter Support Bracket</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>Intake Manifold Block-off Plate</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>Turbo Oil Drain Tube</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>Y-pipe, left half</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>Y-pipe, right half</td>
</tr>
<tr>
<td>U</td>
<td>1</td>
<td>Turbo Down Pipe</td>
</tr>
<tr>
<td>--</td>
<td>1</td>
<td>Bracket, dipstick tube</td>
</tr>
<tr>
<td>--</td>
<td>1</td>
<td>2-1/4&quot; Exhaust U-clamp</td>
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<tr>
<td>17</td>
<td>1</td>
<td>2-1/2&quot; Exhaust U-clamp</td>
</tr>
<tr>
<td>18</td>
<td>1</td>
<td>Pyrometer Adapter and Probe</td>
</tr>
<tr>
<td>20</td>
<td>1</td>
<td>Turbine Heat Shield</td>
</tr>
<tr>
<td>21</td>
<td>1</td>
<td>7&quot; x 24&quot; Heat Blanket</td>
</tr>
<tr>
<td>22</td>
<td>2</td>
<td>9&quot; x 24&quot; Heat Blanket</td>
</tr>
<tr>
<td>23</td>
<td>1</td>
<td>Air Inlet Gasket</td>
</tr>
<tr>
<td>24</td>
<td>1</td>
<td>Air Filter Cover Gasket</td>
</tr>
<tr>
<td>25</td>
<td>1</td>
<td>Turbo Oil Drain Gasket</td>
</tr>
<tr>
<td>26</td>
<td>2</td>
<td>Turbine Outlet Gasket</td>
</tr>
<tr>
<td>27 buy</td>
<td>1</td>
<td>O-ring</td>
</tr>
<tr>
<td>28 buy</td>
<td>1</td>
<td>Grommet</td>
</tr>
<tr>
<td>29</td>
<td>1</td>
<td>2&quot; I.D. x 2&quot; Silicone Hose</td>
</tr>
<tr>
<td>30</td>
<td>1</td>
<td>Compressor Air Inlet Elbow</td>
</tr>
<tr>
<td>31 buy</td>
<td>1</td>
<td>Crankcase Vent Hose</td>
</tr>
<tr>
<td>32 buy</td>
<td>1</td>
<td>Crankcase Vent Hose Adaptor</td>
</tr>
<tr>
<td>33 buy</td>
<td>1</td>
<td>Turbo Oil Feed Hose, 13-1/2&quot; Long</td>
</tr>
<tr>
<td>34 buy</td>
<td>1</td>
<td>Turbo Oil Feed Hose, 21&quot; Long</td>
</tr>
<tr>
<td>35 buy</td>
<td>1</td>
<td>Glow Plug Relay Bracket</td>
</tr>
<tr>
<td>36</td>
<td>2</td>
<td>No. 16 Hose Clamp</td>
</tr>
<tr>
<td>37</td>
<td>2</td>
<td>No. 36 Hose Clamp</td>
</tr>
<tr>
<td>38</td>
<td>1</td>
<td>No. 52 Hose Clamp</td>
</tr>
<tr>
<td>39</td>
<td>1</td>
<td>No. 56 Hose Clamp</td>
</tr>
<tr>
<td>40</td>
<td>1</td>
<td>No. 10 Hose Clamp</td>
</tr>
<tr>
<td>ITEM</td>
<td>QTY/KIT</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>------</td>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>41</td>
<td>Buy 2</td>
<td>1/8&quot; NPT Brass Hex Head Pipe Plug</td>
</tr>
<tr>
<td>42</td>
<td>Buy 1</td>
<td>1/8&quot; NPT x -4AN 90-degree Elbow</td>
</tr>
<tr>
<td>43</td>
<td>1</td>
<td>1/4&quot; NPT x -4AN 90-degree Elbow</td>
</tr>
<tr>
<td>44</td>
<td>Buy 1</td>
<td>1/4&quot; NPT Tee with Tab</td>
</tr>
<tr>
<td>47</td>
<td>4</td>
<td>5/16&quot; Split Lock Washer</td>
</tr>
<tr>
<td>48</td>
<td>8</td>
<td>13/16&quot; O.D.x3/8&quot; I.D. Flat Washer</td>
</tr>
<tr>
<td>49</td>
<td>4</td>
<td>3/8&quot; Circle Lock Washer</td>
</tr>
<tr>
<td>50</td>
<td>1</td>
<td>3/8&quot; Split Lock Washer</td>
</tr>
<tr>
<td>51</td>
<td>14</td>
<td>9/16&quot; O.D.x5/16&quot; I.D. Flat Washer</td>
</tr>
<tr>
<td>52</td>
<td>4</td>
<td>5/8&quot; O.D.x3/8&quot; I.D. Flat Washer</td>
</tr>
<tr>
<td>53</td>
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<td>5/16&quot;-18x1&quot; Hex Head Bolts</td>
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<td>54</td>
<td>8</td>
<td>5/16&quot;-18x1-3/4&quot; Hex Head Bolts</td>
</tr>
<tr>
<td>55</td>
<td>1</td>
<td>3/8&quot;-16x1/2&quot; Hex Head Bolt</td>
</tr>
<tr>
<td>56</td>
<td>5</td>
<td>3/8&quot;-16x1&quot; Hex Head Bolt</td>
</tr>
<tr>
<td>57</td>
<td>2</td>
<td>3/8&quot;-1 6x1-1/4&quot; Hex Head Bolt</td>
</tr>
<tr>
<td>58</td>
<td>3</td>
<td>3/8&quot;-16x2-1/2&quot; Hex Head Bolt</td>
</tr>
<tr>
<td>59</td>
<td>1</td>
<td>3/8&quot;--16x4 1/2&quot; Hex Head Bolt</td>
</tr>
<tr>
<td>61</td>
<td>Buy 6</td>
<td>3/8&quot;-24 Collet Locknut</td>
</tr>
<tr>
<td>62</td>
<td>6</td>
<td>5/16&quot;-18x1&quot; Stainless Hex Head Bolt</td>
</tr>
<tr>
<td>63</td>
<td>4</td>
<td>3/8&quot;x1-1/2&quot; Stud</td>
</tr>
<tr>
<td>--</td>
<td>2</td>
<td>11/16&quot; O. D. x 5/16 flat washer</td>
</tr>
<tr>
<td>65</td>
<td>2</td>
<td>3/8&quot;x2&quot; Stud</td>
</tr>
<tr>
<td>--</td>
<td>1</td>
<td>5/16&quot; - 18 Nylock Nut</td>
</tr>
<tr>
<td>68</td>
<td>2</td>
<td>5/16&quot;-18x2&quot; Hex Head Bolt</td>
</tr>
<tr>
<td>--</td>
<td>1</td>
<td>K&amp;N Air Filter Cleaner</td>
</tr>
<tr>
<td>--</td>
<td>1</td>
<td>K&amp;N Air Filter Oil</td>
</tr>
<tr>
<td>69</td>
<td>2</td>
<td>1/4&quot;-28x1&quot; Hex Head Bolt</td>
</tr>
<tr>
<td>70</td>
<td>2</td>
<td>1/4&quot;-28 Nylock Nuts</td>
</tr>
<tr>
<td>71</td>
<td>2</td>
<td>1/2&quot; O.D.x1/4&quot; I-D. Flat Washers</td>
</tr>
</tbody>
</table>

**Please!! 2** "Banks Turbo" Emblems May I have some please®

**NOTE:** SOME ITEMS IN KIT ARE NOT SHOWN IN ILLUSTRATIONS.
NOTE: THE CONFIGURATION OF THIS PIPE AND THE LOCATION OF THE SLIP JOINT WILL VARY WITH THE VEHICLE'S TRANSMISSION TYPE. (640D MODEL SHOWN)

C-G DIPSTICK SHOWN

SEE UPDATE

3/8-16 x 3 3/4
Fig. 7
Injector Return Fittings on Nozzles

Early Style Thru Mid '89
Hose enters "off center"
Late Style Mid '89 & Later
Hose enters "on center"
This configuration does not require hose routing.

Fig. 8
Gromet (supplied with kit)
Block-off plate
O-ring

Fig. 7A
Cap existing tee (if used)
Install \( \frac{3}{16} \) plastic tee
Cap rear of injector (if not capped by factory)
Fuel return line
Transmission kickdown rod
Fuel return to tank

Sheet 4 of 14
FIG. 3

INSTALL COLLET LOCKNUT WITH ROUND PORTION AGAINST WASHER AS SHOWN.

FIG. 4

REMOVE OIL FILL PIPE THRU 86 MODELS

REMOVE COVER 87 AND LATER MODELS

FIG. 5

DRIVE PIN IN UP (12 O'CLOCK) POSITION

FIG. 6

INJECTOR PUMP ADJUSTMENT

COVER

MIRROR

ALLEN WRENCH
FIG. 9
1987 AND LATER MODELS

FIG. 10
1987 AND LATER MODELS
FIG. 14

REMOVE ACOUSTIC SHIELD (INCLUDING FIBERGLASS BACKING) FROM ENTIRE SHADED AREA OF FIREWALL. DISCARD PORTION REMOVED. CUT SHIELD AS REQUIRED USING UTILITY KNIFE.

FIG. 15

BEND LIP HERE

BEND LIP HERE

FIREWALL

FLOORPAN

BEND LIP BACK AS SHOWN WHERE FIREWALL JOINS FLOORPAN IN TRANS. TUNNEL

SHEET 7 OF 14
FIG. 16

ELOBOW

AIM ELBOW AS SHOWN

FIG. 17

CIRCLE-LOCK WASHERS MUST BE USED IN PAIRS AS SHOWN.

RANPS ON WASHERS MUST FACE EACH OTHER

OIL DRAIN TUBE

UPDATE - $\frac{3}{8}'' - 10 \times \frac{3}{4}''$

SHEET 8 OF 14
FIG. 18

CHECK HOSE JOINT LINE-UP

FIG. 19

C-6 3 SPEED
DRILL \( \frac{7}{16} \) DIA.
REMOVE
BEND \( \frac{7}{16} \), \( \frac{1}{16} \), \( \frac{1}{2} \)
BEND HERE AS NEEDED

E-40D 4 SPEED OVERDRIVE
REMOVE BRACKET
CLAMP
BELLHOUSING BOLT

FIG. 20

\( \frac{7}{8} \) N.P.T PIPE PLUG (SUPPLIED WITH TURBO KIT)

TO GAUGE

ELBOW (SUPPLIED WITH OPTIONAL BOOST GAUGE) NUT AND SLEEVE MAY BE REMOVED IF NEEDED WHILE INSTALLING.
FIG. 21
E4OD 4 SPEED OVERDRIVE AUTOMATIC

90° BRACKET ATTACHES TO BELLHOUSING BOLT.

BEND TRANS-COOLER TUBE HERE AS REQUIRED TO CLEAR EXHAUST.

FIG. 22

ORIGINAL INTAKE MANIFOLD BOLTS AND WASHERS

ANTI-DEPRESSION VALVE WITH ORIGINAL SEAL, BOLTS AND WASHERS

AIR FILTER SUPPORT BRACKET
FIG. 23

No. 10 HOSE CLAMP
OPEN CLAMP AND INSTALL ON HEATER HOSE

CRANKCASE VENT HOSE

THRU '86 MODELS

87 AND LATER MODELS

FIG. 24

PROTECT NEUTRAL SWITCH WIRES
BY LIFTING WIRE LOOM UP
BETWEEN HEAT BLANKET AND TRANS
HEAT BLANKET

EXHAUST Y-PIPE

NEUTRAL SAFETY SWITCH (C-6 MODEL SHOWN)

FIG. 25

STEEL TUBE TO VACUUM MODULATOR ON TRANSMISSION

VACUUM JUNCTION ON FIREWALL

PIVOT PLASTIC ELBOW
SO HOSE MAY BE ROUTED AS SHOWN

SHEET 11 OF 14
6.9 FORD DIESEL TURBO EXHAUST SYSTEM INSTALLATION USING BANKS PRE-FORMED TUBE SECTIONS

FIG. 26

NOTE: MAKE SURE PIPES ARE CLAMPED AND POSITIONED TO PROVIDE CLEARANCE TO FLOOR, FRAME, AND ALL MOVING PARTS SUCH AS SUSPENSION, DRIVELINE, ETC. MAKE SURE ALL WIRES AND HOSES ARE ROUTED AWAY FROM HOT EXHAUST SYSTEM PARTS.

FOR VEHICLES ORIGINALLY EQUIPPED WITH AN OVAL MUFFLER

REMOVE THIS SECTION OF STRAP IN ORIGINAL HANGER

INSTALL THIS SECTION OF STRAP IN ORIGINAL HANGER

DRILL 3/8-HOLE AS REQUIRED TO BOLT THESE SECTIONS TOGETHER.
TURBO EXHAUST SYSTEM

For owners wishing to fabricate their own exhaust system

Entire exhaust system must be 3" dia. tubing or turbo will not function properly. Muffler must be low restriction type such as Riker HD 307B or EPIUK (available from Banks)

Original muffler hanger

3" U-clamp (with tab added to support muffler)

3" slip connector and U-clamp (supplied with turbo kit)

Original tailpipe hanger
(removable from stock tailpipe & weld to new 3" exh. system)

Note: Stock tailpipe may be used as a model for fabricating new 3" tailpipe.

All joints in exhaust system must be smooth and free flowing. Do not miter or "cheat" tube intersections.

Correct

Mitered joints

Wrong!

"Cheated" bend

Wrong!

Wrong!

Wrong!

"Less" may be left on bends to minimize welds

3" U-bends available from Banks
FIG. 27
E4OD (4-SPEED OVERDRIVE) AUTOMATIC ONLY

REMOVE CORNERS OF BOSS AS INDICATED FOR Y-PIPE CLEARANCE.

UNBOLT SHIFT LINKAGE HERE WHILE INSTALLING Y-PIPE.

FORWARD

NEUTRAL SAFETY SWITCH

SHEET 14 OF 14
# TURBO DIESEL TROUBLE SHOOTING CHART

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>High EGT</td>
<td>Excessive Fuel Delivery</td>
<td>Change injector pump setting</td>
</tr>
<tr>
<td></td>
<td>Faulty injector(s)</td>
<td>Repair injectors</td>
</tr>
<tr>
<td></td>
<td>Restricted exhaust system</td>
<td>Check for obstruction</td>
</tr>
<tr>
<td>Excessive fuel smoke, (black)</td>
<td>Faulty injector(s)</td>
<td>Repair injector</td>
</tr>
<tr>
<td>poor performance</td>
<td>Dirty air cleaner</td>
<td>Clean or replace</td>
</tr>
<tr>
<td></td>
<td>Restricted air intake</td>
<td>Check for collapsed or blocked air intake hoses</td>
</tr>
<tr>
<td></td>
<td>Poor quality or dirty diesel fuel</td>
<td>Replace filters, clean lines, injectors and tanks as required</td>
</tr>
<tr>
<td>Excessive oil smoke (blue)</td>
<td>Blocked or restricted turbo oil drain</td>
<td>Eliminate restriction or low spots in drain line</td>
</tr>
<tr>
<td></td>
<td>Leaking turbo oil seal</td>
<td>Rebuild turbo/replace seal (seal leakage may be caused by blocked turbo oil drain)</td>
</tr>
<tr>
<td></td>
<td>Excessive engine blow-by being vented into the air intake</td>
<td>Replace worn piston rings or valve guides. Check engine oil level.</td>
</tr>
<tr>
<td>Lack of boost, excessive oil smoke, and poor performance</td>
<td>Damaged turbo bearings and seal caused by dirty oil or lack of lubrication</td>
<td>Rebuild turbo, check oil level, change oil and filter at regular service intervals</td>
</tr>
<tr>
<td></td>
<td>Worn or damaged engine components</td>
<td>Check compression, replace rings or valves</td>
</tr>
<tr>
<td>SYMPTOM</td>
<td>CAUSE</td>
<td>REMEDY</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>--------------------------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>Low boost, poor performance, sometimes with</td>
<td>Restricted exhaust system</td>
<td>Eliminate restrictions. check for obstruction</td>
</tr>
<tr>
<td>high EGT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of boost or low boost, poor performance</td>
<td>Intake system leaks</td>
<td>Locate and seal leaks; Check seal between</td>
</tr>
<tr>
<td></td>
<td></td>
<td>pressure chamber and intake manifold</td>
</tr>
<tr>
<td></td>
<td>Exhaust system leaks ahead of turbocharger</td>
<td></td>
</tr>
<tr>
<td></td>
<td>exhaust inlet</td>
<td>Listen for leaks, repair as necessary</td>
</tr>
<tr>
<td></td>
<td>Broken turbocharger blades caused by foreign</td>
<td>Rebuild turbocharger, eliminate means of</td>
</tr>
<tr>
<td></td>
<td>objects entering intake or exhaust system</td>
<td>foreign object entry</td>
</tr>
<tr>
<td>Pyrometer not working</td>
<td>Check that wires are not reversed</td>
<td>Reverse wires</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor connections</td>
<td></td>
<td>Clean and secure connections</td>
</tr>
<tr>
<td>Wiring connections shorted together</td>
<td></td>
<td>Insulate connections</td>
</tr>
<tr>
<td>Gradual loss of performance, and possibly</td>
<td>Clogged (or partially clogged) fuel filter</td>
<td>Replace fuel filter(s)</td>
</tr>
<tr>
<td>boost (&quot;Flattens out&quot; at higher RPM)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil wetting of inside surfaces of bottom of</td>
<td>This is normal. This oil is present in the</td>
<td>If no blue smoke is present at the vehicle's tailpipe, no action is necessary. If blue smoke is present, the cause may or may not be from the turbo. Poor engine oil control (worn rings or valve guides, or oil overfill) may cause this condition.</td>
</tr>
<tr>
<td>air filter casting, air inlet elbow, and</td>
<td>vapors from the crankcase ventilation</td>
<td></td>
</tr>
<tr>
<td>turbo compressor housing.</td>
<td>system. These vapors are also present in</td>
<td></td>
</tr>
<tr>
<td></td>
<td>the intake manifold of the engine prior</td>
<td></td>
</tr>
<tr>
<td></td>
<td>to turbocharging. THIS IS NOT the result of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a failed turbo shaft seal. A failed turbo</td>
<td></td>
</tr>
<tr>
<td></td>
<td>shaft seal will be accompanied by great</td>
<td></td>
</tr>
<tr>
<td></td>
<td>clouds of BLUE smoke from the vehicle's</td>
<td></td>
</tr>
<tr>
<td></td>
<td>tailpipe and a sudden loss of oil pressure.</td>
<td></td>
</tr>
</tbody>
</table>

Rev. 01/30/89                      TRBL-SHT.DOC                      SHEET 2 of 2
CARE OF K&N AIR FILTER

When your K&N air filter becomes excessively dirty through use, it may require cleaning and re-oiling, as outlined in these instructions. The K & N filter has a 50,000 mile service interval, but it should be cleaned more frequently as needed under dusty conditions.

NOTE: Use only K&N CLEANER & DEGREASER and K&N AIR FILTER OIL, provided in kit. (Additional supplies are available from GALE BANKS ENGINEERING or most local auto parts stores.)

IMPORTANT: K&N air filter elements must be oiled prior to use. For your convenience you K&N oil filter has been pre-oiled at the factory. When reinstalling the filter element after cleaning, be sure to re-oil it as described below.

CLEANING THE REUSABLE K&N FILTER ELEMENT:

1. Lightly tap off surface dirt and wet with cold water. (See fig. 1.)

2. Spray inside of filter element with K&N Filter Cleaner & Degreaser (K&N p/n KNCD-32) provided. Let filter stand for five minutes to dissolve dirt. (See fig. 2.)

3. From the outside in, rinse your K&N filter with cold water. Shake and allow to air dry. Do not use air hose. (See fig. 3.)

4. When completely dry (overnight is best), re-oil the element using K&N Air Filter Oil (part no. KNFO-6) provided. Spray along full length of each pleat. Wait 5 to 10 minutes for oil to wick, yielding a uniform red color. (See fig. 4.)

- G B E -

Rev. 5/22/88