

OWNERS MANUAL

WITH INSTALLATION
INSTRUCTIONS

banks

SIDEWINDER

TURBO

BANKS SIDEWINDER® TURBO SYSTEM
FOR FORD 6.9/7.3L DIESEL TRUCKS
EARLY BODY STYLE

THIS MANUAL IS FOR USE WITH SYSTEM PART NUMBERS: 21041, 21042, 21045 & 21046

banks

GALE BANKS ENGINEERING

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SIDEWINDER TURBO SYSTEM FORD 6.9/7.3L TRUCKS

Dear Customer:

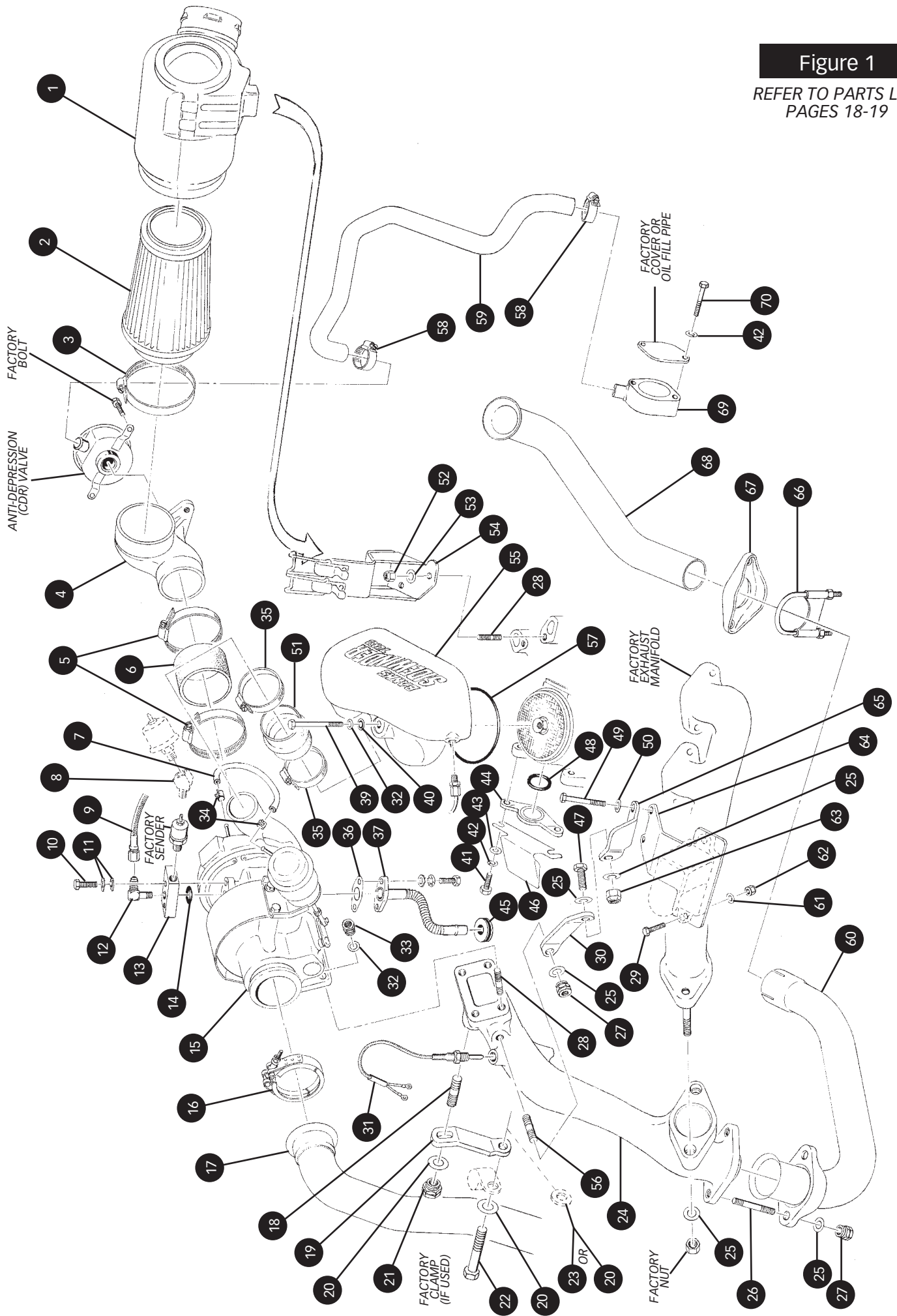
You have just purchased the finest, most technologically advanced turbocharging system available for light truck diesel engines. GALE BANKS ENGINEERING has utilized the knowledge and experience gained through years of turbocharged engine design to combine performance, durability and good looks into a professional quality turbocharger system. Best performance and installation of your Sidewinder system will be realized by thoroughly reading and following the installation instructions before and throughout the installation process.

Your Sidewinder turbo system operates by utilizing the engine's exhaust gases to spin a turbine wheel, which in-turn drives a compressor through a common shaft. The compressor draws air through the air cleaner and forces it into the engine at a greater density and pressure than that which the atmosphere would normally provide. This additional air will burn more completely the available fuel, or additional fuel, resulting in greater performance and efficiency. The volume and pressure (boost) that the turbocharger puts out is controlled by the size of the turbocharger in relation to the size of the engine, the position of the accelerator and the load on the vehicle. A small amount of engine oil is fed to the turbocharger shaft assembly to lubricate the shaft bearings, and then returned to the engine. **Your GALE BANKS ENGINEERING Sidewinder Turbo System is emissions legal in all 50 states when used with the Banks Turbo Exhaust System.**

We at GALE BANKS ENGINEERING are confident that you will be pleased with the performance of your Sidewinder turbocharged diesel and hope we may be of service in the future.

Figure 1

REFER TO PARTS LIST
PAGES 18-19



GENERAL INSTALLATION PRACTICES

1. For ease of installation and trouble-free operation of your Banks Sidewinder Turbo System, please read this entire 20-page owner's manual before starting any work. (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.

3. **WARNING!** NEVER work under any vehicle supported only by a jack of any kind. DO NOT USE concrete blocks or other masonry items that may collapse under the vehicle weight.

4. Pay particular attention to the routing of wires and hoses. Keep them away from exhaust heat, moving parts and sharp edges that may cause cuts or other damage. Route or tie

away from critical areas as required. Keep all wires a minimum of 6" from hot exhaust parts, 8" or more is recommended whenever possible.

5. 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.)

6. These instructions cover both wastegated and non-wastegated Sidewinder turbo systems.

Notification

The Banks Ram-Air Filter comes pre-oiled and no oiling is necessary for initial installation. Service the filter as specified in the Cleaning and Oiling the Banks Ram-Air Filter Section of this manual.

INSTALLATION INSTRUCTIONS

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 filter. Cover intake manifold opening to prevent any foreign object from falling into the manifold.

3. Disconnect wire from oil pressure gauge sending unit (located at the upper rear of engine), and remove oil pressure sender unit and its connections from the engine. On some models, the oil pressure sender is mounted on the firewall (remove fittings, hose and bracket, etc. if firewall mounted). Retain sender for later installation. Install a 1/4" NPT brass pipe plug in the hole at the rear of the engine where the sender unit was removed. Use Teflon tape or sealant on the threads.

4. Remove inspection cover plate from front of engine forward of injection pump (on pre-1987 models, remove oil fill pipe from this location).

5. **INJECTION PUMP ADJUSTMENT:** To obtain the maximum available performance from your BANKS 6.9/7.3L Sidewinder 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. These adjustments are made by turning an internal screw, found within the pump. The pump

adjustment will provide a greater increase in rear wheel horsepower, suitable for general use, work trucks and towing. **These adjustments are the ONLY emissions legal settings.**

- **49 states and California thru '91:** 90° or 1/4 turn clockwise.

- **California only, '92 and later models:** 60° or 1/4 turn clockwise

NOTE: Exhaust gas temperature (EGT) must NOT exceed 1050°F. If the EGT approaches this temperature under heavy, uphill load, the fuel pump capacity adjustment must be reduced.

Adjust injector pump delivery, as follows:

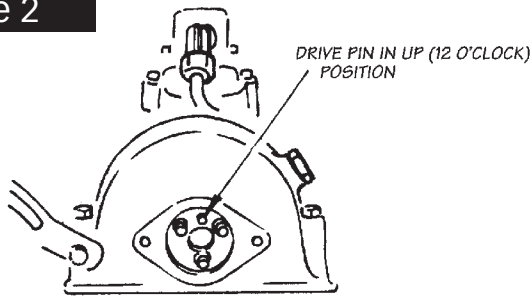
CAUTION: The engine must be cold before starting this procedure.

NOTE: Do not allow any foreign material, including lint from rags, to enter the injector pump during the adjustment procedure. Lay removed parts on a clean newspaper during the adjustment procedure.

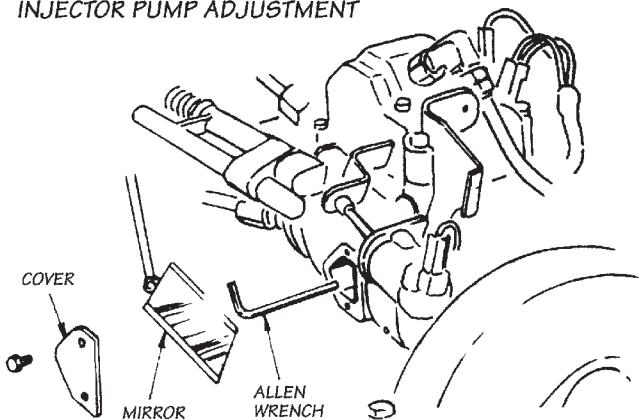
A. Place a drip pan under the flywheel inspection cover area at the rear of the engine, to catch spilled fuel. Clean the small access cover area of the pump, located on the left side, with diesel fuel or parts solvent.

B. Remove the cover plate, retained by two small screws. Use care not to damage the rubber gasket; it will be reused during reassembly.

Figure 2



INJECTOR PUMP ADJUSTMENT



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 Allen-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 **FIGURE 2**.

CAUTION: Do not rotate the crankshaft using the starter. 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.

D. Using a $\frac{5}{16}$ " Allen wrench, rotate the screw clockwise, by the amount indicated for year model.

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

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

6. Remove the engine lifting lugs from the rear corners of the intake manifold. Replace bolts with four $\frac{3}{8}$ - 16 x $2\frac{1}{2}$ " hex bolts and $\frac{3}{8}$ split lock washers. Do not re-install lifting lugs.

NOTE: On automatic transmission models with C-6 three speed transmission, disconnect transmission

Figure 3

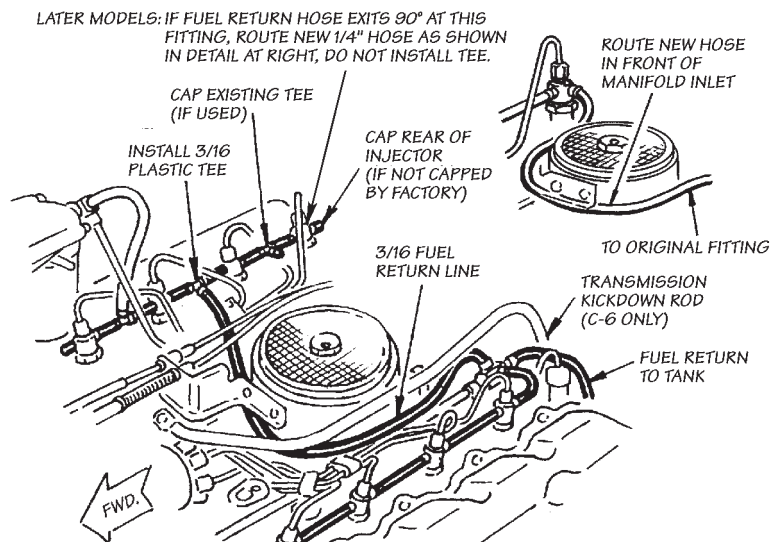
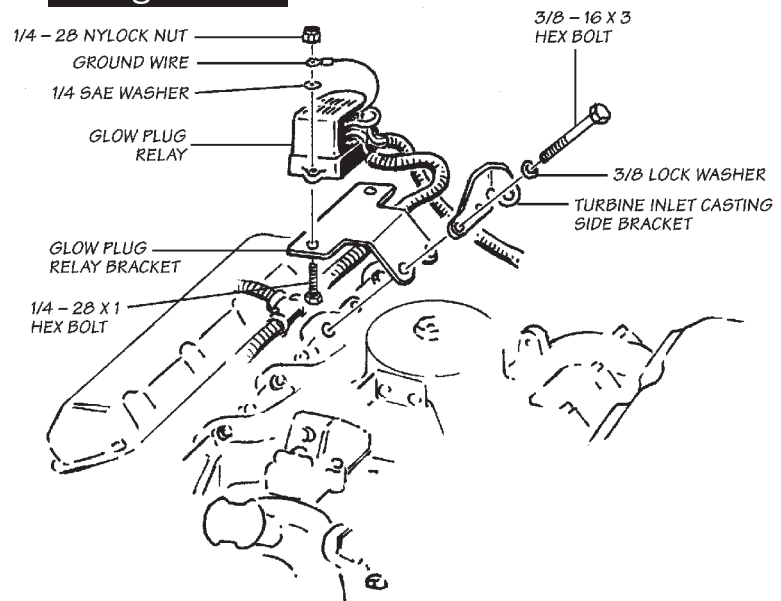


Figure 4



modulator tube from clip on transmission and temporarily bend tube away from bellhousing area.

7. Remove the crankcase anti-depression valve (the round sheet metal can that is attached to the rear of the intake manifold). Remove standpipe and grommet from valley cover where valve was attached (standpipe may come out attached to anti-depression valve). Retain anti-depression valve and bolts for later installation.

NOTE: On '87 and later models, remove short length of hose and clamp from anti-depression valve.

8. On models where fuel injector return hose passes from one side of the engine to the other behind the intake manifold inlet, re-route the hose in front as shown in **Figure 3**. This removes the hose from high heat areas.

Figure 5

TIE WIRE LOOM TO INJECTOR TUBES WITH CABLE TIES

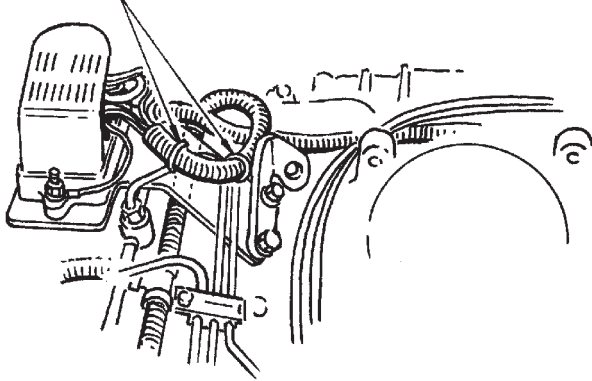
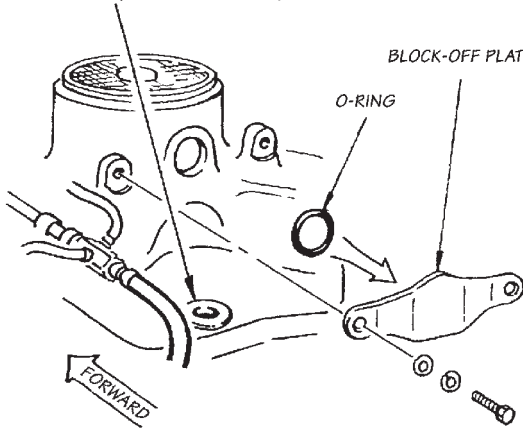


Figure 6

GROMMET (SUPPLIED WITH KIT)

BLOCK-OFF PLATE

O-RING



A. On 1987 and later models, 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.

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 Figure 4.**

C. On 1987 and later models, Mount the glow plug relay to the glow plug relay bracket (provided) using two $\frac{1}{4}$ " – 28 x 1" hex bolts, two $\frac{1}{2}$ " O.D. x $\frac{1}{4}$ " I.D. washers, and two $\frac{1}{4}$ " – 28 nylock nuts. Clamp the relay ground wire under one of the nuts. **See Figure 4.**

D. Install the turbine inlet casting support bracket and glow plug relay bracket to intake manifold using two $\frac{3}{8}$ " – 16 x 3" hex bolts and two $\frac{3}{8}$ " split lock washers. Leave bolts loose. See Figure 4. Route the relay wiring, if equipped, as shown in **Figure 5.**

Important! The glow plug relay bracket must be installed on all models to provide proper spacing between the turbine inlet casting support bracket and the intake manifold, regardless of the presence of a

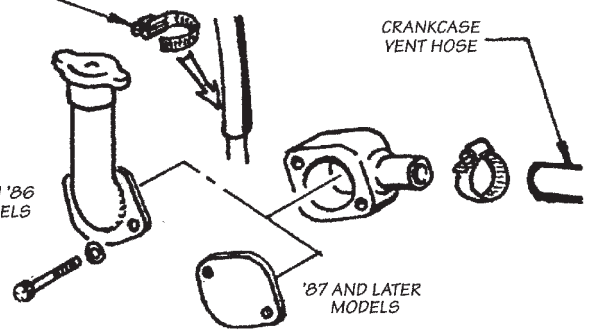
Figure 7

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

CRANKCASE
VENT HOSE

THRU '86
MODELS

'87 AND LATER
MODELS



glow plug relay.

9. Locate oil pressure gauge sender wire (disconnected in **step 3**). Carefully pull approximately one foot of this free from the wire loom jacket.

10. 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. Install grommet in valley cover as follows. Fill new grommet groove with RTV silicone sealer provided. Press grommet through opening in valley cover and smooth RTV around grommet. Remove excess RTV. **See Figure 6.** Install rubber o-ring in groove in manifold block-off plate. See Figure 6. Install manifold block-off plate (and o-ring) on intake manifold where anti-depression valve was removed, using two $\frac{5}{16}$ " – 18 x 1" hex head bolts and split lock washers. See Figure 6. Do not tighten bolts at this time.

11. Remove and discard the hose clamp from the heater hose connection on the water pump. Hose clamp may be loosened and cut with snips to avoid disconnecting hose.

A. Thoroughly degrease the injector pump drive cover flange (oil fill-pipe flange on pre-1987 models) using acetone, lacquer thinner, or other non-oil based solvent. Install the crankcase vent hose adapter and original cover (or oil fill pipe) using two $\frac{5}{16}$ " – 18 x 2" hex bolts and two $\frac{5}{16}$ " split lock washers. Use silicone sealer at both joints.

B. Replace the hose clamp previously removed from the heater hose with a No. 10 hose clamp. Keep the tail of the hose clamp clear of the drive belt. **See Figure 7.**

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

13. On automatic transmission models, remove the transmission dipstick and then remove the dipstick tube from the transmission. Retain all these components for later installation. Cover the

Figure 8

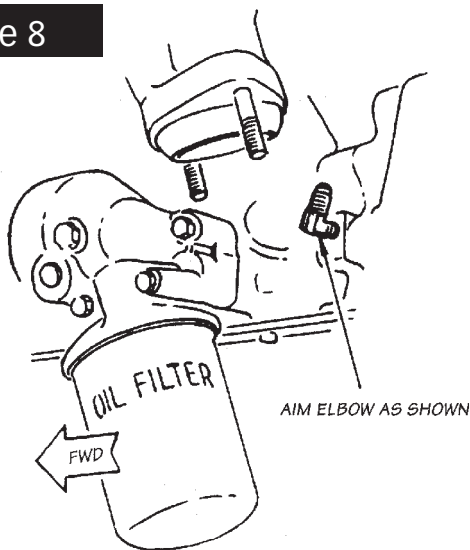


Figure 10

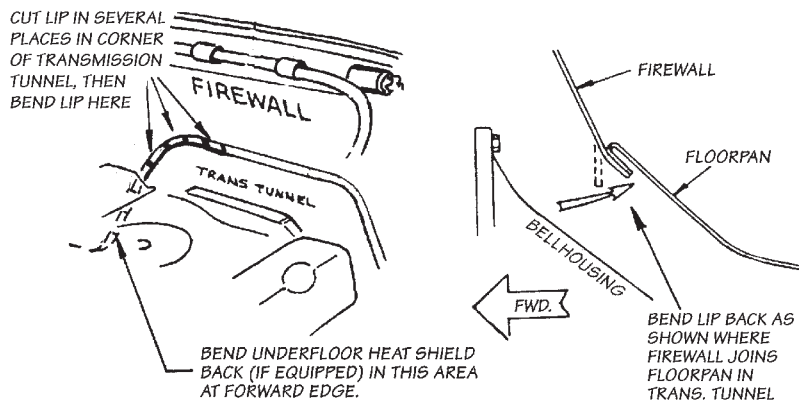


Figure 9

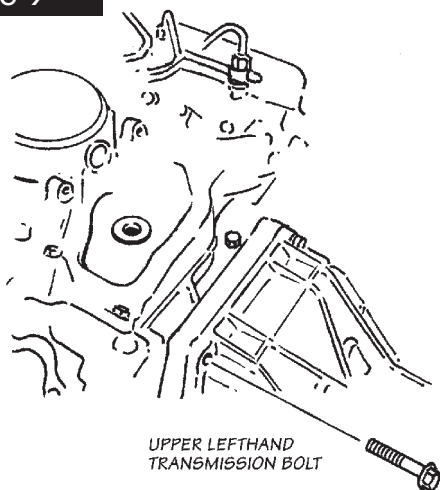
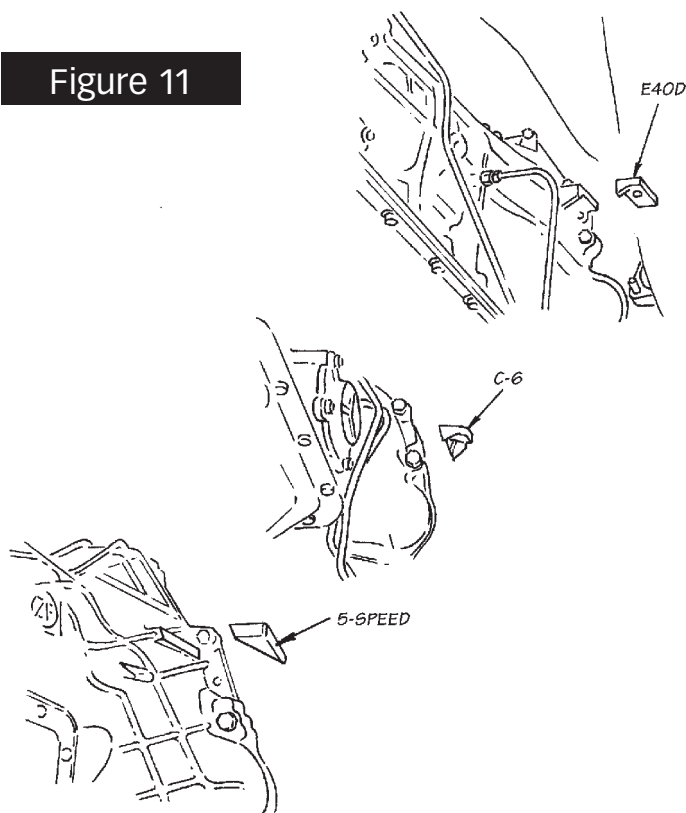


Figure 11



dipstick tube opening with a paper towel or tape to prevent contamination from entering the transmission. Remove 1/2" NPT pipe plug for oil feed connection, located on lower left side at rear of engine block, above and to the rear of the oil filter. **See Figure 8.** Install the shorter 1/2" NPT x - 4AN elbow fitting where the pipe plug was removed. Use Teflon tape on the threads. Aim elbow at approximately one o'clock position when tightening.

A. Install and tighten one end of the braided stainless steel oil feed hose to the elbow fitting. Cover the open end of the hose with tape during installation.

B. Remove the top left hand transmission-to-engine bolt (bell housing-to-engine bolt on manual transmission models). **See Figure 9.**

14. Bend firewall lip back as far as possible, on right side of transmission tunnel, 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' to 4' piece of pipe or metal bar may be used as a lever against the seam to flatten the metal. **NOTE:** If access to a Sawsall or an air chisel is

available, a series of cuts in the firewall lip will ease the bending operation. Some truck models incorporate an additional floorpan heat shield behind the firewall lip. It may be necessary to reshape this heat shield to provide additional clearance during exhaust system installation. **See Figure 10.**

A. On automatic transmission models, and 5 speed models, saw the "ear" off the right side of the transmission case in the bellhousing area. **See Figure 11.** A Sawsall or coarse tooth hacksaw works well.

B. On automatic transmission models, install o-ring on new dipstick tube. On C-6 transmission models, bolt new dipstick tube to bellhousing with original bolt. On E40D transmission models, attach dipstick tube to rear

Figure 12

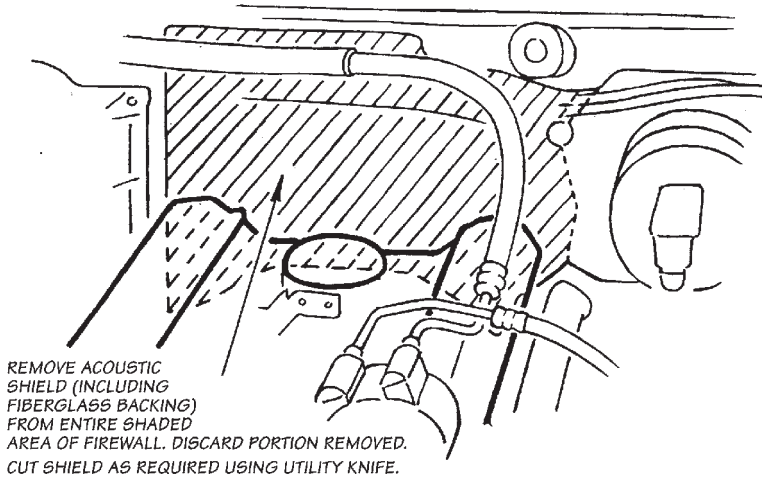
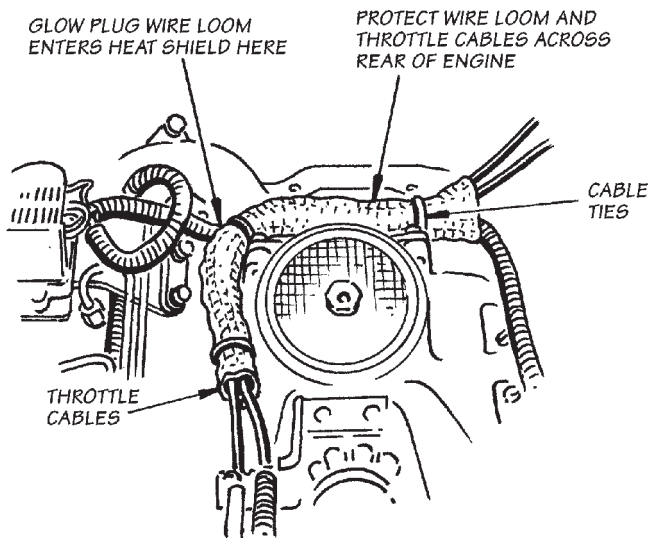


Figure 13



of right cylinder head using a $\frac{3}{8}$ - 16 x $\frac{3}{4}$ " hex bolt, $\frac{3}{8}$ " S.A.E. washer and $\frac{3}{8}$ " split lock washer. To align bolt tab on new dipstick tube, carefully bend lower half of dipstick tube.

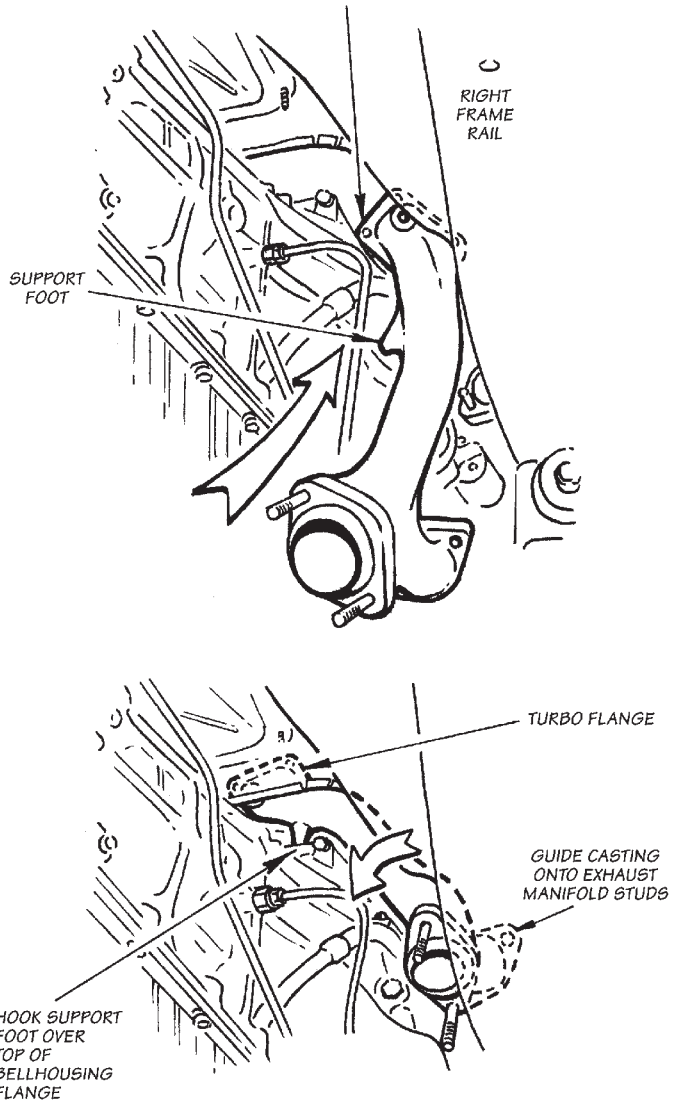
15. If vehicle is equipped with a plastic acoustic shield on the firewall, cut and remove a section as shown in **Figure 12**.

A. On '83 to '92 models, remove the screws holding the vacuum hose junction block, located on firewall above engine, and lift block upward as far as possible (do not disconnect any vacuum hoses). Temporarily retain the junction block up, out of the way, by tying with heavy string or other means.

B. Wrap the throttle cables and plug wire loom with a 3" x 16" aluminum foil heat blanket starting above the driver's side intake manifold bolts and working around toward the forward end of the throttle cables. Secure blanket with three cable ties. **See Figure 13.**

Figure 14

GUIDE TURBO FLANGE UP ALONG JUNCTION OF ENGINE AND TRANSMISSION ADAPTER, JUST FORWARD OF TRANSMISSION



C. Install the glow plug wire loom heat shield between the intake manifold block-off plate and the flat washers on the bolts. Position the throttle cables and heat blanket under the heat shield, then tighten the bolts.

16. Install a $\frac{7}{16}$ x $1\frac{3}{8}$ " long stud in the side of the turbo flange on the turbine inlet casting. Use anti-sieze compound on the stud threads.

Install turbine inlet casting from under the vehicle by guiding the turbo mounting flange up and along the junction of the engine and the transmission adapter plate. The casting will have to be rotated counterclockwise as it is raised to a point where the support foot (**Figure 14**) can be hooked over the top edge of the bellhousing flange to rest on the engine-to-transmission adapter plate. Guide the casting onto the exhaust manifold studs. Install two $\frac{7}{16}$ SAE washers with the original nuts on the exhaust manifold studs.

Caution! Do not drop anything into the turbo mounting flange opening. Any item dropped into the turbine inlet

Figure 15

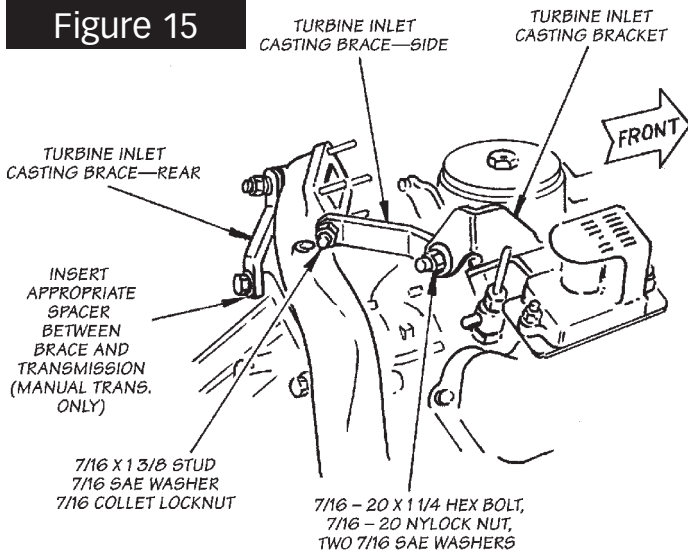
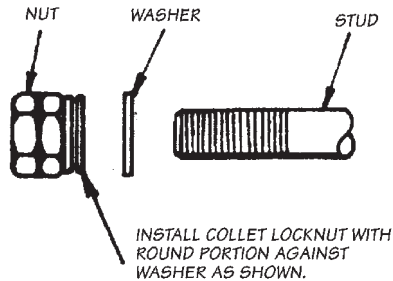


Figure 16



casting will cause immediate turbocharger damage upon startup.

A. Install four $\frac{3}{8}$ " diameter, $1\frac{1}{2}$ " long studs in the turbo mounting flange. Install a $\frac{1}{2}$ " diameter, $1\frac{3}{4}$ " long stud in the rear of the turbine inlet casting, behind the turbo mounting flange. Use anti-sieze compound on the threads.

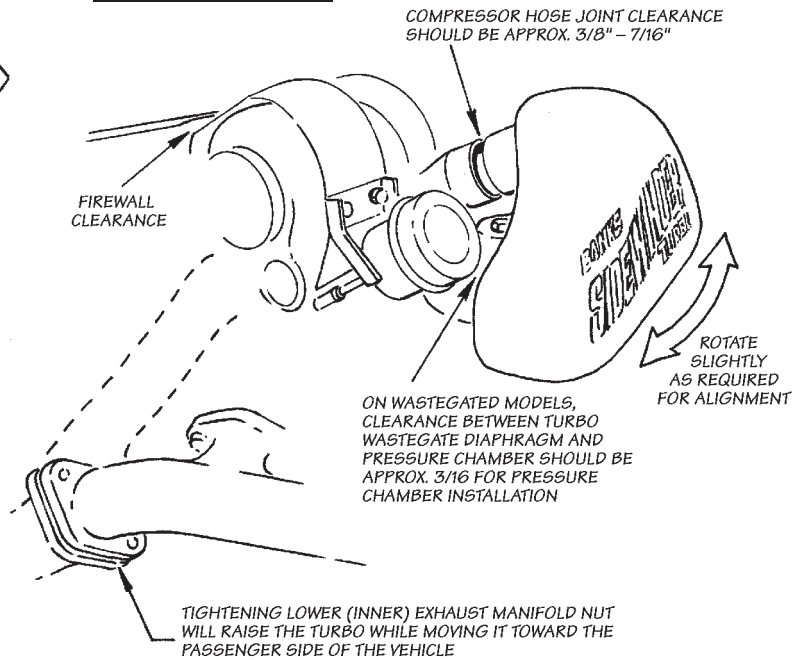
B. Install the rear turbine inlet casting support brace where the upper lefthand transmission bolt was removed. On automatic transmission models, install the brace with a $\frac{1}{2}$ - 13 x 2 $\frac{1}{2}$ inch hex bolt through the round hole (not the slot). Make sure the stud on the rear of the turbine inlet casting is positioned in the slot on the brace. Lightly snug the bolt.

On manual transmission models, install the brace with a washer between the brace and the transmission. Use a $\frac{1}{2}$ inch SAE washer on 5-speed models, or the $\frac{3}{16}$ thick spacer washer for the 4-speed models. If the vehicle uses a loop clamp at this location, first slip the $\frac{1}{2}$ inch bolt through the clamp before installing the bracket.

C. Use a $\frac{1}{2}$ - 20 collet stainless locknut and $\frac{1}{2}$ inch SAE washer on the stud at the top of the rear support brace. Snug the nut and washer against the brace finger tight. **See Figure 16** for correct locknut installation.

17. Important! Alignment of the turbocharger and intake components is determined by the tightening of the two lower nuts where the inlet casting

Figure 17



bolts to the exhaust manifold. The following outlines the alignment procedure.

A. Install exhaust gas temperature pyrometer probe in the $\frac{1}{4}$ NPT boss near the turbo mounting flange. Use anti sieze compound on the probe threads. If a pyrometer probe was not supplied, install a $\frac{1}{4}$ " NPT hex pipe plug.

B. Install the 5 inch diameter o-ring on the intake manifold inlet flange (make sure surface is free of oil, dirt, old gasket, etc.).

C. Temporarily set the turbocharger in place on the turbine inlet casting and secure it with a couple of $\frac{3}{8}$ - 24 stainless collet lock nuts, finger tight.

D. Set the pressure chamber casting in place on the intake manifold. Make sure the pressure chamber drops over the o-ring. Install the pressure chamber with a $\frac{3}{8}$ - 16 x 4" bolt, $\frac{3}{8}$ " AN washer, and $\frac{3}{8}$ " sealing (o-ring) washer. Lightly snug the bolt so the pressure chamber can be rotated slightly on the intake manifold.

E. Adjust the position of the turbocharger and pressure chamber to provide the best side-to-side line up of the turbo compressor hose joint while providing clearance between the turbine heat shield and the firewall. Additional firewall clearance may be obtained by slightly bending the turbine heat shield at either side of the slit in the shield. The turbine inlet casting can be adjusted for position by tightening the two nuts at the exhaust manifold studs. Start by alternately tightening the nuts until they are evenly tight against the casting flange. If the side-to-side alignment is off, the turbo location may be adjusted by tightening one nut and backing off the other. Tightening the outside (upper) nut or loosening the inner (lower) nut will drop the turbo

compressor hose joint while moving it slightly toward the driver's side of the vehicle. Reversing the tightening will reverse the movement of the turbocharger. Optimum positioning should provide approximately $\frac{3}{8}$ " gap between the turbo/pressure chamber hose joint while maintaining firewall clearance and about $\frac{3}{16}$ " gap between the pressure chamber and turbocharger. Rotational alignment of the hose joint may be adjusted by squeezing the compressor snap ring (use Snap-On No. PR-569A snap ring pliers or equivalent) and rotating the compressor housing. **See Figure 17.**

F. Once the best alignment of the turbo and pressure chamber has been established, tighten the nut and bolt to secure the rear brace to the turbine inlet casting and the transmission. Make sure both nuts at exhaust manifold are tight. **See Figure 15.**

G. Install the side support brace between the turbine inlet casting and support bracket on the intake manifold. The end of the brace with the greater bend goes against the bracket. See Figure 15. Use a $\frac{7}{16}$ " - 20 x $1\frac{1}{4}$ " long hex bolt, $\frac{7}{16}$ " - 20 nylock nut, $\frac{7}{16}$ " - 20 stainless collet locknut and three $\frac{7}{16}$ " S.A.E. washers. See Figure 16 for correct locknut installation. Tighten nuts and bolts at side brace and intake manifold bracket.

18. Remove the turbocharger and pressure chamber from the engine. Cover the turbo flange opening and intake manifold openings.

19. Install oil inlet block and o-ring on turbocharger, using two 8mm x 30mm hex bolts (bolts are gold colored for identification) and two pairs (4 total) of ramp lock washers. **See Figure 19** for proper installation of ramp lock washers. Install a $\frac{1}{8}$ " NPT x - 4 AN elbow fitting in the oil inlet block. Use Teflon tape on the elbow threads. Aim the elbow as shown in **Figure 18.**

A. Run a bead of silicone sealant around the oil drain tube about $\frac{1}{4}$ " up from the unflanged end. Insert the drain tube into the grommet behind the intake manifold while keeping the throttle cable(s) and wire loom between the oil drain tube and intake manifold. Push the drain tube about $\frac{1}{2}$ " into the grommet.

B. Install the turbocharger on the turbine inlet casting using four $\frac{3}{8}$ " - 24 stainless collet locknuts and four $\frac{3}{8}$ " AN washers. No gasket is used between the turbo and the casting. The upper nut on the driver's side can be more easily accessed by reaching between the turbo compressor cover and the firewall on the driver's side.

C. Bolt the oil drain tube against the flange on the bottom of the turbocharger center bearing section. Use a drain gasket, two 10mm x 25mm hex bolts (pre-installed by Banks) and two pairs (4 total) of ramp lock washers.

D. Place a $2\frac{1}{4}$ " diameter hump hose and two No. 36 hose clamps onto the turbocharger compressor outlet connection.

E. Set the pressure chamber onto the intake mani-

Figure 18

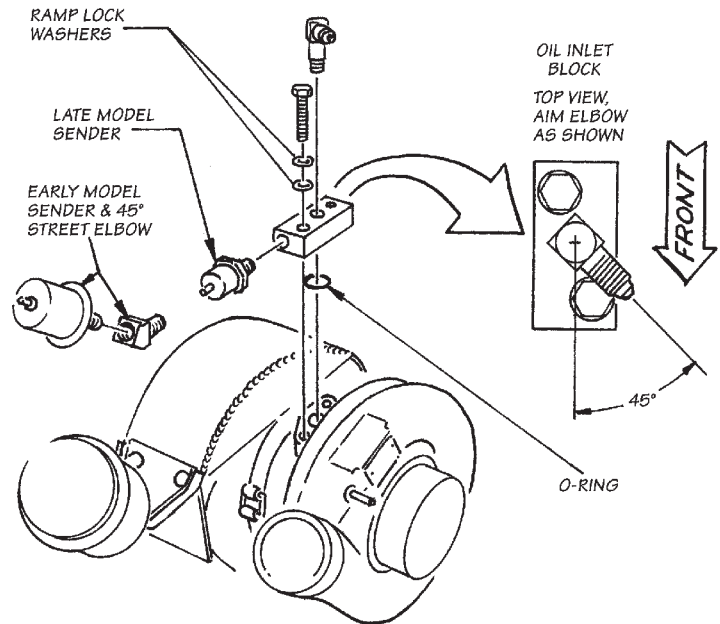
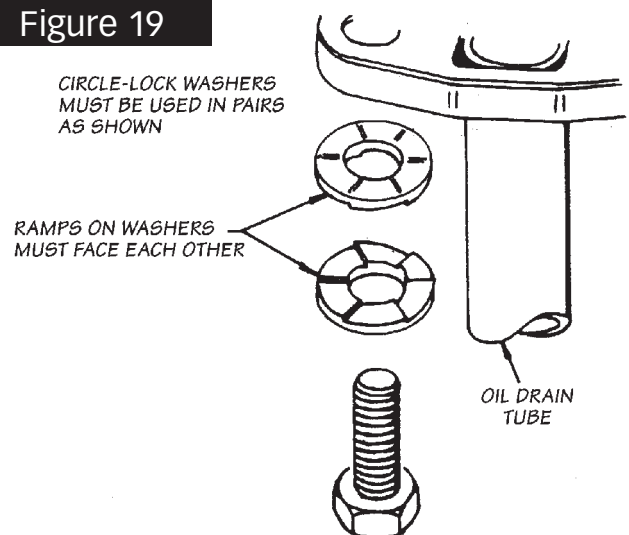


Figure 19



fold with 5" o-ring in place. Install the center bolt, AN washer and sealing washer. Align the pressure chamber and tighten the center bolt. Make sure the pressure chamber contacts the intake manifold so no gap exists at the junction. This assures that the o-ring is captured and sealing.

F. Center the hump hose between the turbo and pressure chamber, then tighten the two hose clamps.

NOTE: On C-6 automatic transmission models, check that transmission kick-down rod does not bind or hang up on anything in the vicinity of the turbocharger.

G. Bolt the anti-depression valve to the turbo compressor inlet elbow using the original bolts. Hose nipple on anti-depression valve must be oriented up. An optional valve adapter is required on pre-'87 models.

H. Slide a 3" diameter by $1\frac{7}{8}$ " long silicone hose and two No. 52 clamps onto the compressor inlet of the

Figure 20

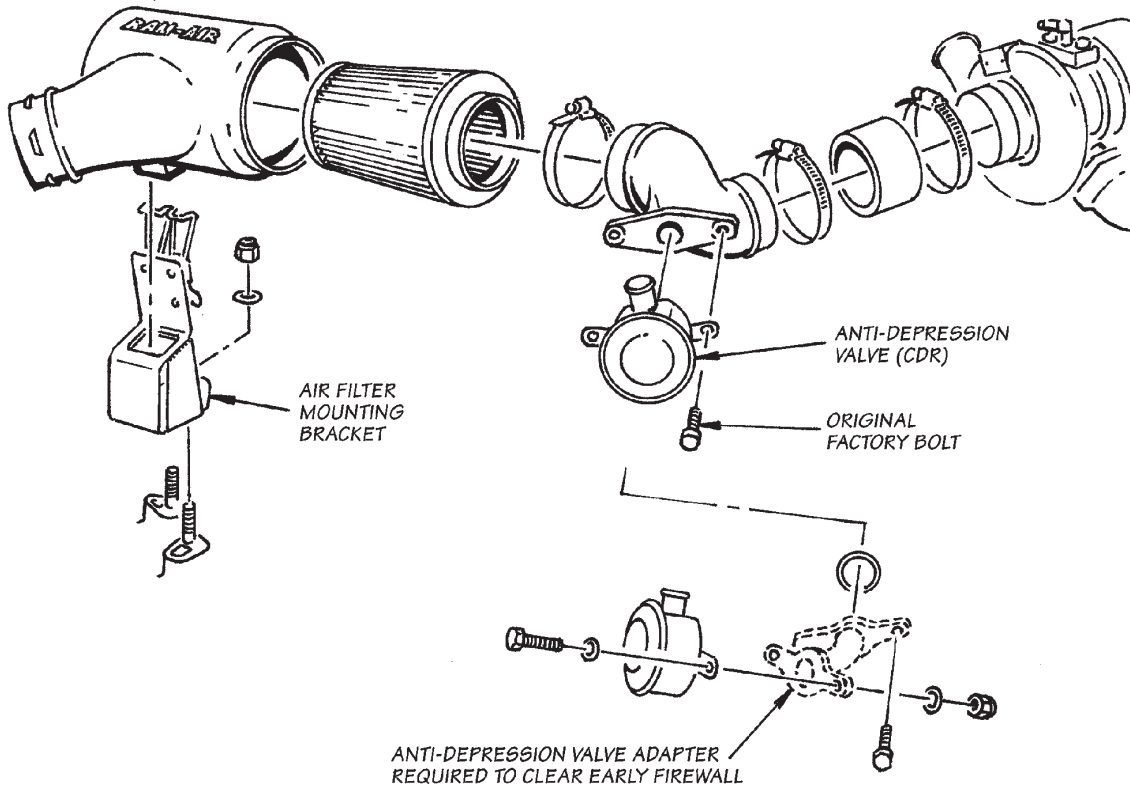
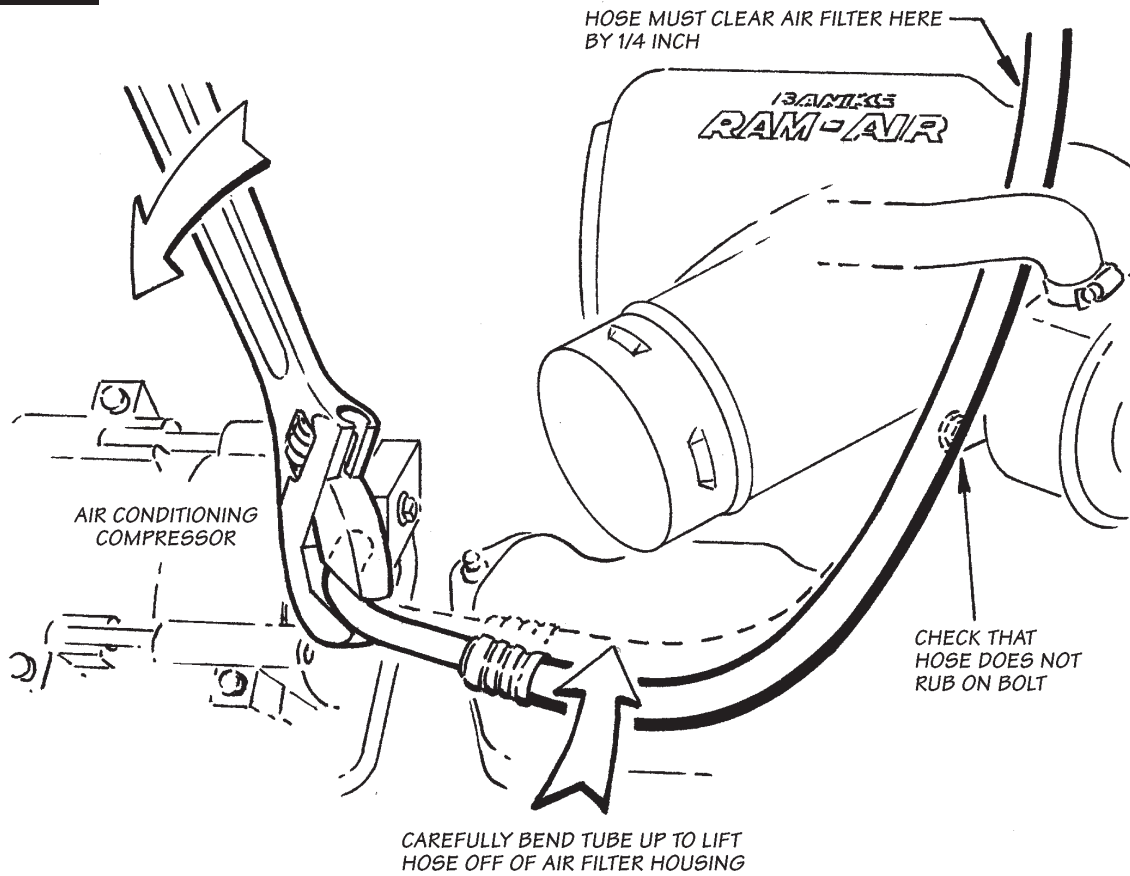


Figure 21



turbocharger. Install the compressor inlet elbow into the 3" silicone hose. Do not tighten hose clamps. Install two 3/8" x 1 1/2" long studs in the two threaded holes on the intake manifold, near the driver's side of the injector pump.

Install the air filter support bracket over the studs using two 3/8" - 24 nylock nuts and two 3/8" AN washers. Leave the nuts loose enough to adjust the position of the bracket. NOTE: Make sure the latches are in a raised position before tightening nuts or latches will not clear pressure chamber.

A. Slide air filter into filter housing. The step on the small end of the filter should extend about 1/8" through the plastic housing to support and center the filter. Push the filter all the way into the housing.

B. Position a No. 74 hose clamp over the neck of the air filter. Place the rectangular projection on the bottom of the filter housing through the corresponding opening on the filter mounting bracket. Slide the filter/housing assembly rearward in the bracket while guiding the turbo inlet elbow into the air filter neck until it stops. Now tighten the two No. 52 hose clamps at the turbo and the intake elbow. Push the filter and filter housing forward within the confines of the slot in the air filter bracket, then latch the filter housing in place. Make sure the front end of the filter projects 1/8" through the filter housing. Now tighten the filter bracket bolts and the No. 74 hose clamp at the filter neck.

NOTE: On air conditioned models, one refrigerant hose passes over the air inlet elbow. To prevent this hose from putting undue pressure on the air filter neck or rubbing on the air inlet elbow, it can be lifted somewhat by one of the following methods. If the hose does not rub on the air inlet elbow, proceed to Step 20.

20. On models with a threaded hose connection at the air conditioning compressor, carefully loosen the nut on the hose connection just enough to

rotate the hose into a more desirable position providing additional clearance. This can usually be accomplished without the loss of any refrigerant. Tighten the nut when complete. On models where the hose terminates into a bent steel tube section and is bolted to the compressor, carefully bend the steel tube section up slightly to raise the hose. Slide the factory protective sleeve on the hose to a position adjacent to the windshield wiper motor, then tie the hose to the motor with a cable tie wrap to pull the hose up and away from the inlet elbow. **See Figure 20,21.**

On late model vehicles where engine intake air is drawn through a plastic duct from over the grille, the duct must be cut just where it begins the last bend, **see Figure 22.** Some early model vehicles where duct comes from below battery may require similar modifications if inlet hose kinks.

A. Install the factory flexible air inlet hose between the air filter housing and factory air inlet duct. Check that brake line tube from master cylinder does not rub on flex hose. Carefully bend tube if required. NOTE: On late model vehicles where engine intake air is drawn over the grille, trim the padding away from the underside of the hood above the air inlet as shown in **Figure 23.** This prevents the padding from being sucked up against the air intake and blocking air flow.

21. Install the factory oil pressure sender in the oil inlet block on the turbocharger. Use teflon tape on the threads. On early model vehicles which use the large diameter pressure sender, install a 45° brass street elbow between the turbo and the sender to clear the turbo. When sender is installed, reconnect sender wire from wire loom. Make sure wire is routed away from hot turbo surfaces. **See Figure 18.**

A. Connect the turbo oil feed hose to the elbow on the turbo center section.

B. On wastegated models, connect the 3/8" nipple on

Figure 22

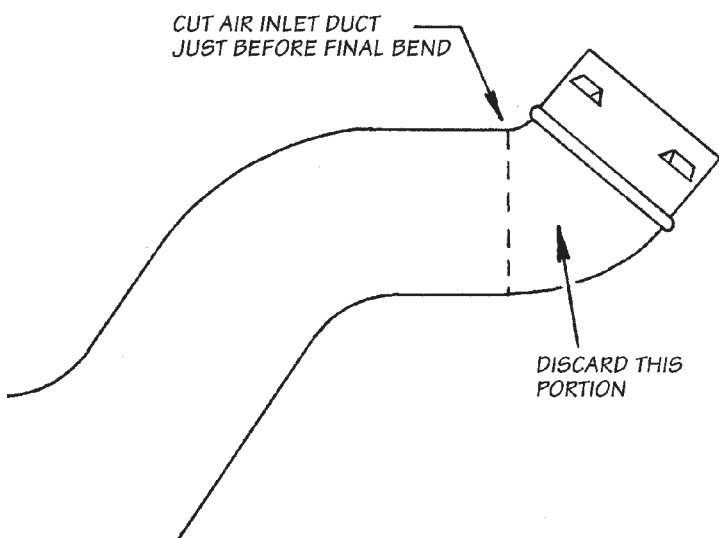
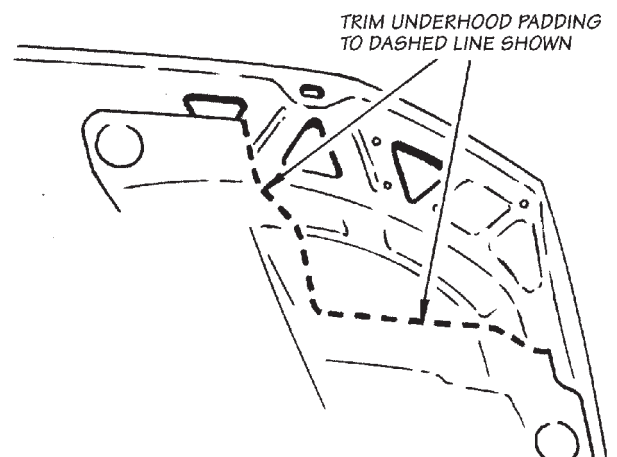


Figure 23



the turbocharger compressor to the wastegate actuator diaphragm (on turbine housing) using a $\frac{3}{4}$ " x 10" silicone hose and two spring band clamps.

22. Install the 7" x 24" heat blanket on turbo down-pipe. Form heat shield to the pipe to allow protection for the firewall. Secure using wire ties provided.

Drop the turbocharger exhaust outlet pipe between the rear of the engine and the firewall. Start by lowering the pipe with the flared end pointing toward the passenger side of the vehicle (away from the turbo), then rotate the pipe clockwise as it is lowered. Install the V-band clamp to couple the outlet pipe to the turbo. Check that the outlet pipe is reasonably centered on the outlet flange of the turbo as the clamp is tightened. Leave the clamp just loose enough to allow the outlet pipe to move slightly for exhaust system adjustment.

A. Remount the vacuum junction block (if removed) on the firewall, relocating it upwards as required to provide maximum clearance to the turbocharger and exhaust outlet pipe. Drill new mounting holes to suit and reuse original sheet metal screws.

NOTE: On C6 automatic transmission models, reconnect transmission modulator hose and tube. Route hose away from hot turbo and exhaust piping.

Install pyrometer (exhaust gas temperature) gauge and any other optional instruments. Instructions for pyrometer installation are supplied with the pyrometer instrument. Route all wiring away from heat sources, moving parts and sharp edges.

NOTE: If an optional turbo boost gauge (available from Banks) is not to be installed, install a $\frac{1}{8}$ " NPT pipe plug in the port on the passenger side of the pressure chamber casting (plug is supplied with turbo system hardware).

23. Install the crankcase vent hose between the antidepression valve and the crankcase vent adapter on the front of the engine. Use two No. 16 hose clamps.

24. From under the vehicle, install the exhaust cross-over pipe assembly between the left exhaust manifold and the turbocharger inlet casting. Reuse original nuts on left manifold studs. Use two $\frac{7}{16}$ " – 20 stainless collet locknuts and two $\frac{7}{16}$ " SAE washers on the turbo inlet casting studs.

25. Install Banks muffler and exhaust system working back from turbocharger outlet pipe. **See Figure 24.** Because of various vehicle/chassis combinations, some installations will require an extension pipe.

NOTE: The factory muffler and exhaust system is NOT suitable for turbocharged engines. The Banks "standard" and "monster" exhaust systems are specifically designed for use with this turbocharger system. The use of any other exhaust components may result

*in significantly inferior performance and may cause excessive exhaust gas temperature. The use of a Banks exhaust system is **required** for the turbo system to be emissions legal.*

25. Now that the complete exhaust system is installed, go back to the turbine outlet pipe and tighten clamp to approximately 25 to 30 inch pounds.

FINAL CHECKS:

A. Check to be sure the injector return hose does not rub on firewall lip or any other sharp edges. Reconnect battery cables.

B. Disconnect oil feed line connection at the turbocharger. Crank engine until oil flows from feed line and crank another 5 to 10 seconds. Cranking time should be limited to 20 to 30 seconds, followed by one minute of cooling. This cycle should be repeated as required.

C. Reconnect wires to injection pump. Start engine. It may not start immediately, due to fuel lost when adjusting the injector pump. Observe the cranking recommendations noted previously. It also may be necessary to depress the accelerator pedal somewhat.

CAUTION: Visually check the installation for any improperly installed components, improperly routed wires and hoses too close to hot exhaust, turbo components, or sharp edges.

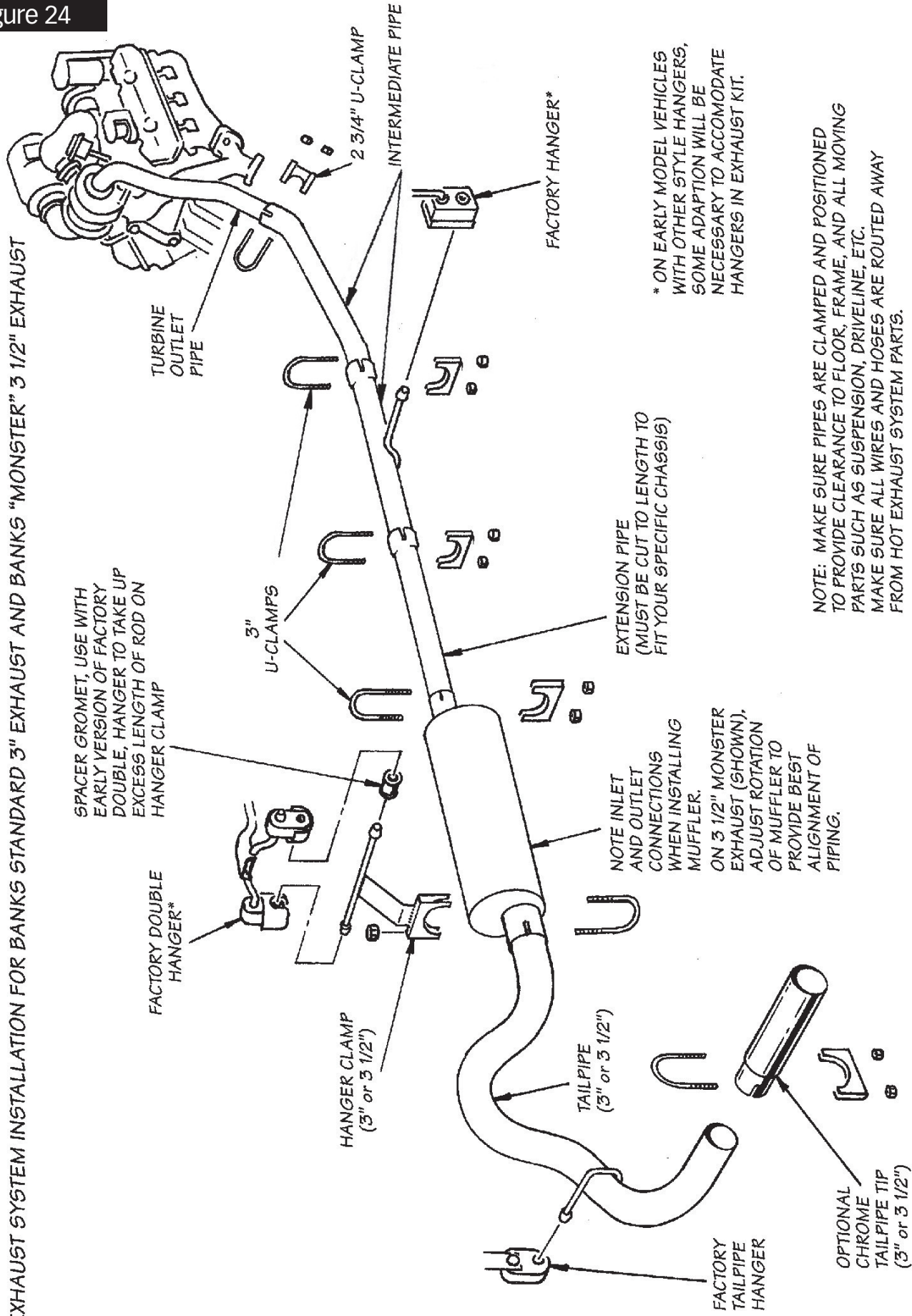
D. Run engine at idle for a few minutes, to allow it to warm. Check oil feed lines for leaks. Engine may idle erratically or surge until air is fully purged from fuel system.

Drive vehicle. Several short bursts of acceleration are required to completely purge the fuel system of air. The engine may run slightly rough until the purge is complete, but will not in any way cause damage to the engine.

Check injector pump adjustment. See "CHECKING ENGINE PERFORMANCE."

Figure 24

7.3/6.9 FORD DIESEL TURBO EXHAUST SYSTEM INSTALLATION FOR BANKS STANDARD 3" EXHAUST AND BANKS "MONSTER" 3 1/2" EXHAUST



SPACER GROMMET, USE WITH EARLY VERSION OF FACTORY DOUBLE, HANGER TO TAKE UP EXCESS LENGTH OF ROD ON HANGER CLAMP

FACTORY DOUBLE HANGER*

HANGER CLAMP (3" or 3 1/2")

3" U-CLAMPS

2 3/4" U-CLAMP

INTERMEDIATE PIPE

FACTORY HANGER*

EXTENSION PIPE (MUST BE CUT TO LENGTH TO FIT YOUR SPECIFIC CHASSIS)

NOTE INLET AND OUTLET CONNECTIONS WHEN INSTALLING MUFFLER. ON 3 1/2" MONSTER EXHAUST (SHOWN), ADJUST ROTATION OF MUFFLER TO PROVIDE BEST ALIGNMENT OF PIPING.

* ON EARLY MODEL VEHICLES WITH OTHER STYLE HANGERS, SOME ADAPTION WILL BE NECESSARY TO ACCOMMODATE HANGERS IN EXHAUST KIT.

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

OPTIONAL CHROME TAILPIPE TIP (3" or 3 1/2")

FACTORY TAILPIPE HANGER

TAILPIPE (3" or 3 1/2")

CHECKING ENGINE PERFORMANCE

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°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 1000°F, with 1050°F being the SAFE MAXIMUM!

If the vehicle exceeds those EGT levels 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 Allen-head screw in the injection pump as indicated in the Pump Adjustment section (**Step 5**).

We recommend engine oil temperature be below 240°F, as measured in the oil pan (an optional oil temperature gauge is available from GALE BANKS ENGINEERING). Optimum oil temperature is 230°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°F.

Oil temperature, Turbo Boost Pressure, diesel Tachometers and other instruments and accessories are available from GALE BANKS ENGINEERING.

Important! Banks Wastegated Sidewinder turbo-charger system utilizes a wastegate to control the maximum intake manifold boost pressure. Although injector pump calibrations vary with truck models and may provide slightly different maximum boost levels, the wastegate control point is pre-set at our factory, and any unauthorized adjustment above this pressure may result in serious engine damage.

The factory wastegate calibration is the only wastegate setting that is certified as emissions legal.

OPERATING CHARACTERISTICS

Your Banks Sidewinder turbocharged diesel engine should exhibit the following operating characteristics:

Cruise Conditions (constant 60mph on Level Road): EGT should be approximately 400°F to 600°F; boost gauge, if so equipped, should read 1 to 2 pounds.

High Load Conditions (uphill with heavy load): EGT should typically be 900°F to 1000°F, with 1050°F as a safe maximum.

It is important to realize that diesels, unlike gasoline engines, run cooler with additional air. 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°F to 800°F. As noted above, cruise condition EGT for a turbocharged diesel is typically 400°F to 600°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.

CLEANING AND OILING THE BANKS RAM-AIR FILTER

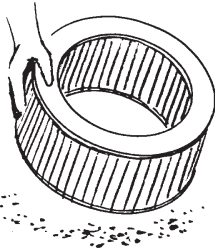
Notification

The Banks Ram-Air Filter comes pre-oiled and no oiling is necessary for initial installation.

Use Banks Ram-Air Filter cleaning system (Part# 90094) available from Gale Banks Engineering to service the Air Filter. Follow the instructions included with the cleaning system to clean and re-oil your Banks Ram-Air Filter.

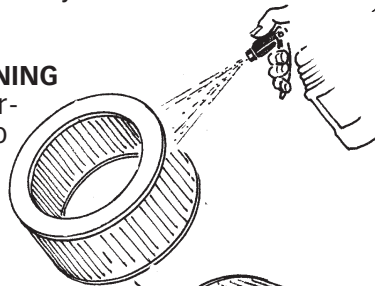
1. PRE-CLEANING

Tap the element to dislodge any large embedded dirt, then gently brush with a soft bristle brush. NOTE: If complete cleaning is not practical at this time, reoil the element and reinstall in your vehicle.



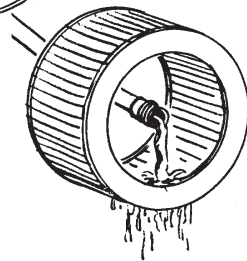
2. SPRAY-ON CLEANING

Spray Banks air-filter cleaner liberally onto the entire element and let soak for 10 minutes.



PAN CLEANING

Large air-filter elements can be berolled or soaked in a shallow pan of Banks air-filter cleaner. Remove immediately and let soak for approximately 10 minutes.

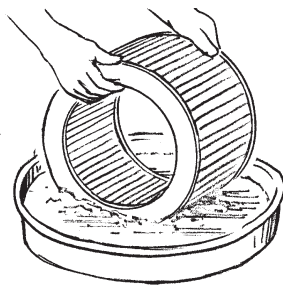


3. CLEANING HINTS

Use only Banks air-filter cleaner. NO gasoline cleaning, NO steam cleaning, NO caustic cleaning solutions, NO strong detergents, NO high-pressure car wash, NO parts cleaning solvents. Any of these NOs can cause harm to the cotton filter media plus SHRINK and HARDEN the rubber end caps.

4. RINSE OFF

Rinse off the element with low-pressure water. Tap water is okay. Always flush from the clean side to dirty side. This removes the dirt and does not drive it into the filter.

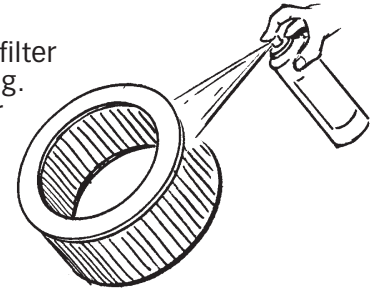


5. DRYING HINTS

Always dry naturally. After rinsing, shake off all excess water and let the element dry naturally. DO NOT USE COMPRESSED AIR – DO NOT USE OPEN FLAME – DO NOT USE HEAT DRYERS! EXCESS HEAT WILL SHRINK THE COTTON FILTER MEDIA. COMPRESSED AIR WILL BLOW HOLES IN THE ELEMENT.

6. AEROSOL OILING

After cleaning air filter always reoil before using. Spray Banks Ram-Air filter oil down into each pleat with one pass per pleat. Wait 10 minutes and re-oil any white spots still showing.



7. OILING HINTS

Never use a Banks Ram-Air filter without oil (the filter will not stop the dirt without the oil). Use only Banks Ram-Air filter oil. Banks air-filter oil is a compound of mineral and animal oil blended with special polymers to form a very efficient tack barrier. Red dye is added to show just where you have applied the oil. Eventually the red color will fade but the oil will remain and filter the air. NEVER USE Automatic Transmission Fluid. NEVER USE Motor Oil. NEVER USE Diesel Fuel. NEVER USE WD40, LPS, or other light-weight oils.

8. REINSTALL

Reinstall your Banks Ram-Air filter element with proper care. Make sure the element seats properly in the filter case. Install the cover making sure it's in the right position. Tighten all the nuts, bolts, screws or clips to factory specifications.

9. DO NOT DISCARD

Affix the "Do Not Discard" sticker to the filter case (included with every Banks replacement element). Make sure you put the sticker in a highly visible place to alert your mechanic not to discard.

10. PERFORMANCE HINTS

Service every 50-100,000 miles on street-driven applications. Service more often in offroad or heavy-dust conditions. If an air-filter restriction gauge is installed, then change the element when the air-filter restriction reaches 18"/H₂O.

CAUTION! Extremely fine dust from agriculture or offroad use will pull the oil from the element. Frequent reoiling of the element's clean side might be required. Completely service when practicable. For extra protection use an air-filter sealing grease on rubber ends of the element. Service only with Banks air-filter cleaner and Banks air-filter oil.

PARTS LIST

Sidewinder® Turbo System, Ford 6.9/7.3L Diesel Trucks

QTY.	DESCRIPTION	ITEM#	WASTEGATED		STANDARD	
			21041 PART#	21042 PART#	21045 PART#	21046 PART#
1	BLANKET, Heatshield, 3 x 16"		26004	26004	26004	26004
1	CARD, Warranty		96365	96365	96365	96365
1	CASTING, Turbine Inlet	24	52158	52158	52158	52158
1	DECAL, Federal Emmissions Compliance		96020	96020	96020	96020
1	DECAL, D-161.....		96031	96031	96031	96031
1	ELBOW, Air Intake	4	42240	42240	42240	42240
1	FILTER ELEMENT, Banks Ram-Air	2	41506	41506	41506	41506
1	HOUSING, Banks Ram-Air Filter.....	1	42055	42055	42055	42055
1	HOSE, Crankcase Vent Hose	59	94044	94044	94044	94044
1	KIT, Premium Installation Package		21049	•	21049	•
	1 BLANKET, Heatshield, 7 x 24".....		26002	•	26002	•
	3 KIT, Pyrometer Gauge		64001	•	64001	•
	1 MOUNTING PANEL, One Gauge w/Fasteners		63001	•	63001	•
	1 SERVICE KIT, Air Filter		90094	•	90094	•
	1 TIE, Wire, Heatshield Blanket, 16"		26013	•	26013	•
1	KIT, Small Parts		21039	21039	21039	21039
	1 ADAPTER, Crankcase Vent Hose.....	69	94042	94042	94042	94042
	1 BRACKET ASSEMBLY, Air Filter Housing.....	54	42107	42107	42107	42107
	1 BRACKET, Glow Plug Relay.....	64	60081	60081	60081	60081
	1 BRACKET, Turbine Inlet Casting, Side	65	52147	52147	52147	52147
	1 BRACE, Turbine Inlet Casting, Side	30	52149	52149	52149	52149
	1 BRACE, Turbine Inlet Casting, Rear	19	52151	52151	52151	52151
	1 CLAMP, Exhaust, 2 1/4" Heavy Duty	66	52460	52460	52460	52460
	1 DRAIN, Oil, Turbo.....	37	24076	24076	24076	24076
	1 FLANGE, Oil Inlet	13	24206	24206	24206	24206
	1 FLANGE, Pipe Assembly.....	67	52330	52330	52330	52330
	1 HEATSHIELD, Glow Plug Relay Wiring	46	26030	26030	26030	26030
	1 HOSE, Hump, Air Intake	51	94507	94507	94507	94507
1	KIT, Clamp		92892	92892	92892	92892
	1 CLAMP, Hose, #10		92810	92810	92810	92810
	2 CLAMP, Hose, #16	58	92816	92816	92816	92816
	2 CLAMP, Hose, #36, w/Liner	35	92837	92837	92837	92837
	2 CLAMP, Hose, #52, w/Liner	5	92853	92853	92853	92853
	1 CLAMP, Hose, #72, w/Liner	3	92872	92872	92872	92872
	2 CLAMP, Spring Band, Black(needed for wastegated system only).....	34	92876	92876	N/A	N/A
	8 CLAMP, Spring Band, Green		92875	92875	92875	92875
	2 CLAMP, Spring Band, Red.....		92877	92877	92877	92877
	1 CLAMP, V-Band, Turbine Outlet.....	16	92882	92882	92882	92882
1	KIT, Fastener		91012	91012	91012	91012
	2 BOLT, 1/4"-28 x 1", Hex	29	91140	91140	91140	91140
	1 BOLT, 1/2"-13 x 2 1/4"	22	91932	91932	91932	91932
	2 BOLT, 8mm-1.25 x 30mm, Hex	10	91788	91788	91788	91788
	1 BOLT, 7/16"-20 x 1 1/4", Hex	47	91628	91628	91628	91628
	2 BOLT, 5/16"-18 x 1", Hex.....	41	91229	91229	91229	91229
	2 BOLT, 5/16"-18 x 2", Hex.....	70	91239	91239	91239	91239
	4 BOLT, Grade 8, 3/8"-16 x 2 1/2", Hex		91432	91432	91432	91432
	2 BOLT, Grade 8, 3/8"-16 x 3", Hex.....	49	91445	91445	91445	91445
	1 BOLT, Grade 8, 3/8"-16 x 4".....	39	91437	91437	91437	91437
	2 NUT, 1/4"-28, Nylock.....	62	91111	91111	91111	91111
	1 NUT, 1/2"-20, Collet Lock, Stainless	21	91818	91818	91818	91818
	4 NUT, 3/8"-24, Collet Lock, Stainless	33	91418	91418	91418	91418
	2 NUT, 3/8"-24, Nylock.....	52	91417	91417	91417	91417
	3 NUT, 7/16"-20, Collet Lock, Stainless.....	27	91618	91618	91618	91618
	1 NUT, 7/16"-20, Nylock.....	63	91617	91617	91617	91617
	1 SPACER, Support Brace, Rear		52153	52153	52153	52153

PARTS LIST

Sidewinder® Turbo System, Ford 6.9/7.3L Diesel Trucks

QTY.	DESCRIPTION	ITEM#	WASTEGATED		STANDARD	
			21041 PART#	21042 PART#	21045 PART#	21046 PART#
6	STUD, 3/8" x 1 1/2"	28	91503	91503	91503	91503
1	STUD, 1/2"-13 x 1/2"-20 x 1 3/4"	18	91972	91972	91972	91972
1	STUD, 7/16"-14 x 7/16"-20 x 1 3/8"	56	91670	91670	91670	91670
2	STUD, 7/16"-14 x 7/16"-20 x 2 1/2"	26	91675	91675	91675	91675
2	WASHER, 1/4", SAE	61	91102	91102	91102	91102
3	WASHER, 1/2", SAE	22	91902	91902	91902	91902
2	WASHER, 5/16", SAE	43	91202	91202	91202	91202
7	WASHER, 7/16", SAE	25	91602	91602	91602	91602
4	WASHER, 5/16", Circle Lock	11	91205	91205	91205	91205
4	WASHER, 5/16", Split Lock	42	91204	91204	91204	91204
5	WASHER, 3/8", AN, Stainless	32	91401	91401	91401	91401
6	WASHER, 3/8", SAE	53	91402	91402	91402	91402
2	WASHER, 3/8", Split Lock	50	91404	91404	91404	91404
1	WASHER, 3/8", Stat-O-Seal	40	91413	91413	91413	91413
1	KIT, Fitting		92792	92792	92792	92792
1	FITTING, 3/16", Tee-Plastic		92009	92009	92009	92009
2	FITTING, 1/8", NPT x -4 AN Elbow	12	92105	92105	92105	92105
1	FITTING, 1/4", Street Elbow	8	92175	92175	92175	92175
2	PLUG, 1/8", NPT, Hex Head		92250	92250	92250	92250
1	PLUG, 1/8", NPT, Hex Head (not needed if pyrometer is installed)		92262	92262	92262	92262
1	KIT, Hose		94352	94352	94352	94352
1	CAP, Rubber, Fuel Return, 1/4"		92027	92027	92027	92027
1	HOSE, Fuel, 3/16" Bulk, 30"		94095	94095	94095	94095
1	HOSE, Lola-4, Bulk Reel, 30"		94134	94130	94130	94130
1	HOSE, Silicone, 1 7/8 x 3"	6	94283	94283	94283	94283
1	HOSE, Turbo Oil Feed	9	94077	94077	94077	94077
1	HOSE, Wastegate Actuator (needed for wastegated system only)	7	94120	94290	N/A	N/A
1	LUBRICANT, Anti-Seize, 1 oz.		90045	90045	90045	90045
1	PLATE, Block Off, Intake Manifold	44	42130	42130	42130	42130
1	SET, Gasket		93312	93312	93312	93312
1	GASKET, Oil Drain	36	93042	93042	93042	93045
1	GROMMET, Oil Drain	45	93043	93043	93043	93043
1	O-RING, Intake Manifold to P/C	57	93153	93153	93153	93153
1	O-RING, Manifold Block-Off Plate	48	93150	93150	93150	93150
1	O-RING, Oil Inlet Flange	14	93146	93146	93146	93146
1	SILICONE, Blue Gasket		90023	90023	90023	90023
1	TAPE, Teflon, 1/2 x 100"		91099	91099	91099	91099
11	TIE, Cable, 11"		62002	62002	62002	62002
1	OWNERS MANUAL		96310	96310	96310	96310
1	PRESSURE CHAMBER	55	42075	42075	42075	42075
1	PIPE, Crossover, Left	68	52030	52030	52030	52030
1	PIPE, Crossover, Assembly, Right	60	52031	52031	52031	52031
2	PLAQUE, Banks Sidewinder		96003	96003	96003	96003
1	TURBOCHARGER, Banks Sidewinder	15	24010	24010	24009	24009
1	WARRANTY STATEMENT		96362	96362	96362	96362

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