

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-161-36
Relating to Exemptions Under Section 27156
of the Vehicle Code

GALE BANKS ENGINEERING
SIDEWINDER TURBO MODELS S73 AND S73W

Pursuant to the authority vested in the Air Resources Board by Section 27156 of the Vehicle Code; and

Pursuant to the authority vested in the undersigned by Section 39515 and 39516 of the Health and Safety Code and Executive Order G-45-5;

IT IS ORDERED AND RESOLVED: That the installation of the Sidewinder Turbo models S73 and S73W, manufactured by Gale Banks Engineering of 546 Duggan Avenue, Azusa, California 91702, has been found not to reduce the effectiveness of required motor vehicle pollution control devices, and therefore is exempt from the prohibitions of Section 27156 of the Vehicle Code for installation on 1983-1993 model year Ford trucks equipped with 6.9 or 7.3 liter Navistar diesel engines.

Modification to the vehicles emission control systems include turning the fuel injection pump adjustment screw 60 degrees (1/6 turn) clockwise and the relocation of the anti-depression valve.

This exemption shall not apply to any device, apparatus, or mechanism advertised, offered for sale or sold with, or installed on, a motor vehicle prior to or concurrent with transfer to an ultimate purchaser.

This Executive Order is valid provided that installation instructions for this device will not recommend tuning the vehicle to specifications different from those submitted by the device manufacturer.

Changes made to the design or operating conditions of the device, as exempted by the Air Resources Board, that adversely affect the performance of a vehicle's pollution control system shall invalidate this Executive Order.

Marketing of this device using an identification other than that shown in this Executive Order or marketing of this device for an application other than those listed in this Executive Order shall be prohibited unless prior approval is obtained from the Air Resources Board. Exemption of a kit shall not be construed as an exemption to sell, offer for sale, or advertise any component of the product as an individual device.

This Executive Order does not constitute any opinion as to the effect that the use of this device may have on any warranty either expressed or implied by the vehicle manufacturer.

THIS EXECUTIVE ORDER DOES NOT CONSTITUTE A CERTIFICATION, ACCREDITATION, APPROVAL, OR ANY OTHER TYPE OF ENDORSEMENT BY THE AIR RESOURCES BOARD OF ANY CLAIMS OF THE APPLICANT CONCERNING ANTI-POLLUTION BENEFITS OR ANY ALLEGED BENEFITS OF THE SIDEWINDER TURBO MODELS S73 AND S73W.

No claim of any kind, such as "Approved by the Air Resources Board" may be made with respect to the action taken herein in any advertising or other oral or written communications.

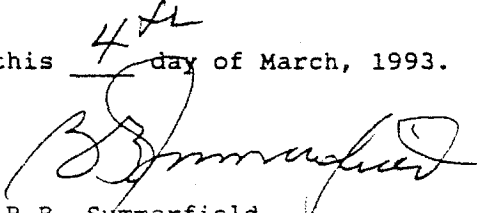
Section 17500 of the Business and Professions Code makes untrue or misleading advertising unlawful, and Section 17534 makes violation punishable as a misdemeanor.

Section 43644 of the Health and Safety Code provides as follows:

"43644, (a) No person shall install, sell, offer for sale, or advertise or except in an application to the state board for certification of a device, represent, any device as a motor vehicle pollution control device for use on any used motor vehicle unless that device has been certified by the state board. No person shall sell, offer for sale, advertise, or represent any motor vehicle pollution control device as a certified device which, in fact, is not a certified device. Any violation of this subdivision is a misdemeanor."

Any apparent violation of the conditions of this Executive Order will be submitted to the Attorney General of California for such action as he deems advisable.

Executed at El Monte, California, this ^{4th} day of March, 1993.


R.B. Summerfield
Assistant Division Chief
Mobile Source Division

State of California
AIR RESOURCES BOARD

EVALUATION OF GALE BANKS ENGINEERING'S SIDEWINDER TURBO MODELS
S73 AND S73W FOR EXEMPTION FROM THE PROHIBITIONS OF VEHICLE CODE
SECTION 27156 IN ACCORDANCE WITH SECTION 2222, TITLE 13, OF THE CALIFORNIA
CODE OF REGULATIONS

March 1993

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by

Mobile Source Division
State of California
Air Resources Board
9528 Telstar Avenue
El Monte, CA 91731-2990

(This report has been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.)

SUMMARY

Gale Banks Engineering (Banks) of 546 Duggan Avenue, Azusa, California 91702, has applied for an exemption from the prohibitions in Section 27156 of the California Vehicle Code (VC) for the Sidewinder Turbo models S73 and S73W. The Sidewinder Turbo is designed for installation on 1983-1993 model year Ford trucks powered by Navistar 6.9L and 7.3L diesel engines.

Banks submitted a completed application and other required information, as well as results from snap-idle tests performed at the Gale Banks facility in Azusa, California on a 1992 Ford F-350 powered by a Navistar 7.3 liter engine, in accordance with Section 2182, Title 13, California Code of Regulations.

Based on the submitted information and an engineering evaluation based on similarity to previously exempted Banks turbo kits, the staff concludes that the Banks Sidewinder Turbo models S73 and S73W will not adversely affect exhaust emissions from vehicles for which an exemption is requested.

The staff recommends that Gale Banks Engineering, be granted an exemption as requested and that Executive Order D-161-36 be issued.

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EVALUATION OF GALE BANKS ENGINEERING'S SIDEWINDER TURBO MODELS S73 AND S73W FOR EXEMPTION FROM THE PROHIBITIONS OF VEHICLE CODE SECTION 27156 IN ACCORDANCE WITH SECTION 2222, TITLE 13, OF THE CALIFORNIA CODE OF REGULATIONS

I. INTRODUCTION

Gale Banks Engineering (Banks) of 546 Duggan Avenue, Azusa, California 91702, has applied for an exemption from the prohibitions in Section 27156 of the California Vehicle Code (VC) for their Sidewinder Turbo models S73 and S73W. The Sidewinder Turbo is designed for installation on 1983-93 Ford trucks powered by a Navistar 6.9 liter or 7.3 liter heavy-duty diesel engine.

Banks submitted a completed application and other required information, as well as results from snap-idle tests performed at the Gale Banks facility in Azusa, California, in accordance with Section 2182, Title 13, California Code of Regulations.

II. CONCLUSIONS

Based on the submitted information and an engineering evaluation, the staff concludes that the Banks Sidewinder Turbo will not adversely effect exhaust emissions from vehicles for which an exemption is requested.

III. RECOMMENDATION

The staff recommends that Gale Banks Engineering, be granted an exemption for their Sidewinder Turbo model S73 and S73W for installation on 1983-1993 Ford trucks powered by Navistar 6.9 or 7.3 liter heavy duty diesel engines. The staff also recommends that Executive Order D-161-36 be issued.

IV. SIDEWINDER TURBO MODEL S73 AND S73W DESCRIPTION

The purpose of the Banks Sidewinder Turbo is to increase the efficiency of the engine by compressing the intake charge. The increased density of the intake charge allows more air to enter the engine, allowing more oxygen for the combustion process. The fuel flow is increased slightly in order to maintain proper air-fuel ratio. The result is increased power output from the engine when the engine is in a loaded condition.

The Sidewinder Turbo, using a Mitsubishi Heavy Industries model TEO6H turbocharger, will become Gale Banks Engineering's primary turbocharger for the Ford trucks equipped with Navistar 6.9/7.3 liter diesel engines. The turbo kit is offered with two different configurations. Kit model number S73 consists of the Mitsubishi turbocharger, a 1.0 area ratio turbine housing, a modified air filter, and the hardware and exhaust piping required to install the kit on the vehicle. Kit model number S73W includes the Mitsubishi Turbocharger, a 0.9 area ratio turbine housing, a modified air filter, a turbo wastegate valve, and the hardware and exhaust piping required to install the kit on the vehicle. The smaller turbine inlet increases the velocity of the exhaust gas entering the turbine, thereby increasing the acceleration of the turbo. The wastegate valve operates by diverting some exhaust gas from the turbine when the maximum desirable boost is obtained.

For both the model S73 and model S73W turbo kits, the fuel pressure is increased by rotating the adjusting screw on the injector pump 1/6 turn clockwise. This allows a proper air-fuel mixture to be maintained.

A 3 inch diameter exhaust system is required for use of this kit on emission controlled vehicles, as testing performed by Banks on previously exempted systems has shown that the vehicles will not meet the emission standards without the use of the 3 inch diameter exhaust.

V. DISCUSSION

Gale Banks Engineering has requested that the Sidewinder Turbo be exempted for 1983-1993 model year Ford trucks powered by 6.9 or 7.3 liter heavy-duty diesel engines. The Sidewinder Turbo will be marketed in two kits. Kit model number S73 will be very similar to the Banks 6.9F turbo kit, which is currently exempted under Executive Order Number D-161-30, with the replacement of the Rotomaster or Schwitzer turbocharger with a Mitsubishi turbocharger. The changes to the kit include a redesign of the air filter layout and reconfigured exhaust piping to allow the installation of the Mitsubishi turbocharger. Banks has submitted compressor maps and information from Mitsubishi Heavy Industries America, Inc. showing that the Mitsubishi turbocharger has characteristics which are very similar to the previously exempted Schwitzer and Rotomaster turbochargers. Based on the information provided to us by the Gale Banks Company, the use of the Mitsubishi turbocharger and the changes made to the kit will not significantly change the emissions characteristics of the turbocharger kit.

Banks will also offer a wastegated version of the kit, model S73W. The wastegated version is identical to the non-wastegated version except that a smaller turbine inlet is used, increasing the velocity of the exhaust gases entering the turbine. This improves the response of the turbocharger and

reduces the time between the opening of the throttle and the turbocharger reaching operating speed. The reduction of turbo lag time could decrease Hydrocarbon and particulate emissions by reducing the duration of the oxygen shortage. The difference in turbo lag time between the standard turbo kit and the wastegated turbo kit is not sufficient to increase the combustion temperature. For this reason, the staff has determined that the Oxides of Nitrogen emissions will not be increased. A wastegate valve is added to this kit to maintain the maximum boost at 9-10 p.s.i.g.

Snap-Idle tests were conducted at Gale Banks Engineering in Azusa, California on a 1992 Ford F-350 pick-up truck equipped with a Navistar 7.3 liter engine and the Sidewinder wastegated turbo kit (model S73W). The results of the snap-idle test performed at Banks are shown in Table 1.

Table 1

SNAP-IDLE TEST RESULTS

(Gale Banks Engineering)

Snap-Idle Smoke Opacity Test Results

20%, 22%, 23%

These results show that the modified vehicle emissions do not exceed the 40% opacity standard. This further demonstrates that the addition of the Gale Banks Engineering Sidewinder Turbo Kit for Ford 6.9/7.3 will not have an

adverse effect on emissions for 1983-1993 model year Ford trucks equipped with Navistar 6.9 and 7.3 liter heavy duty diesel engines. Banks submitted all of the required information and fulfilled the requirements for an exemption.

APPENDIX A



**BANKS SIDEWINDER
TURBOCHARGER SYSTEM
FOR FORD 6.9/7.3 DIESEL PICKUPS
WASTEGATE AND NON-WASTEGATE MODELS**

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 rear of engine. (On some models, the oil pressure sender is mounted on the firewall.)
4. Remove oil pressure sender unit and its connections to rear of 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 the engine lifting lug from right rear of the intake manifold. Replace bolts with new 3/8"- 16x 2-1/2" hex head bolts provided, and original washers. (Do not use original bolts or reinstall lifting lug.)
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. (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.

8. 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.)
9. 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.
10. Install rubber o-ring in groove in manifold block-off plate. See fig. 8.
11. 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 lock washers. See Fig. 8.
12. 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.
13. 1987 and later models, glow plug relay relocation:
 - 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. 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.
 - C. Position the glowplug relay bracket over the manifold bolt holes where bolts were removed in step 13.
14. Install new intake manifold bolts through turbo support bracket (and glow plug relay bracket, when used) and into intake manifold bolt holes. Tighten bolts. Re-route glow plug relay wiring as shown, if equipped. Plastic clips may be removed from wire loom to facilitate re-routing, if necessary.
15. 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.

16. Remove exhaust head pipes and exhaust system, including muffler and tailpipe.
17. 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.
18. Install 1/8" NPT x - 4AN turbo oil feed elbow in block. Aim elbow at approximately one o'clock position. See fig. 11.
19. Install oil pressure sender onto turbo oil inlet fitting. Use Teflon tape on threads. See fig. 12.
20. Install oil inlet fitting on turbocharger oil inlet flange.
21. Connect oil feed hose to elbow installed in step 15.
22. 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.
23. 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.
24. If vehicle is equipped with a plastic acoustic shield on the firewall, cut and remove a section as shown in fig. 14.
25. Bend firewall lip back as far as possible, on right hand 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'- 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.

26. On 5-speed models, saw the "ear" off of the right side of the transmission case in the bellhousing area. Make the cut as close to the transmission body as possible. A coarse tooth hacksaw works well for this job. See fig. 15 A.

On 4-speed models, saw approximately one inch off each of the two bosses on the upper right hand side of the transmission housing. See fig. 15B.

27. Install the pyrometer adapter fitting and probe (from the pyrometer kit) into the 1/4" NPT threaded hole in the turbo feed pipe.
28. Install four 3/8"x 1-1/2" studs in the rectangular pad on the turbo feed pipe. Note that the coarse threads on the studs fit into the turbo feed pipe.
29. Install two 3/8"x 2" studs in the circular pad on the turbo feed pipe. Again note that the coarse threads on the studs fit into the turbo feed pipe.
30. Install Turbo feed pipe onto right hand exhaust manifold.
31. Mount turbo on turbo feed pipe, 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).
32. **IMPORTANT:** Remove the plastic caps from the turbocharger oil inlet and outlet connections.
33. 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.
34. Anchor the turbo feed pipe with turbocharger in place to 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 support bracket, into the turbo feed pipe.
35. Install the other two bolts in the turbo feed pipe and 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 section of bracket.) Leave bolts loose enough to adjust turbo support bracket position to suit.

36. Bolt the oil drain tube to the turbo, using two 3/8"-16 x 3/4" 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.
37. Install 1/4"NPT x - 4AN adapter in the oil inlet connection on top of the turbocharger. Use Teflon tape on the pipe threads.
38. 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.
39. 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. See fig. 18.

NOTE: If the turbocharger needs to be rotated to correct any misalignment, it can be easily aligned by loosening, but not removing, the turbine housing V-band bolt and rotating these parts slightly into the proper position.

40. Install cross-over pipe Y-pipe on turbo feed pipe, 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 to move pipe as required for alignment.
41. Lower turbo down-tube in place between engine and firewall. This will require rotating the tube as it is lowered into place.
42. Clamp the turbo down-tube to the turbocharger, using the V-band clamp provided. Make sure that the tube does not touch the firewall. Leave clamp slightly loose for alignment.
43. Install cross-over pipe assembly onto left engine exhaust manifold.
44. Tighten cross-over pipe collet lock nuts at both ends of cross-over pipe.
45. Connect oil feed hose to turbocharger oil inlet elbow.

46. If installing optional boost gauge, install the straight boost gauge fitting (supplied in boost gauge kit) in the 1/8 N.P.T. boss on the intake casting. Refer to fig. 10. If boost gauge will not be installed, substitute 1/8" NPT pipe plug, from kit. Use Teflon tape on pipe threads.
47. Install 2 1/4" 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.
48. Install turbocharger compressor air inlet elbow hose, and clamps on turbocharger. NOTE: Large end uses #56 clamp, small end uses #52 clamp. Do not tighten clamps at this time.
49. Install intake casting (and gasket) on intake manifold, using one 3/8"-16 x 4 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.
50. Tighten remaining turbocharger compressor discharge hose clamp.
51. Install air filter body support bracket, using 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. 20.
52. Install air filter element in the filter housing. Check that element is properly seated inside.
53. Tighten air filter hose clamp, at air filter body.
54. Latch air filter housing onto air filter body support bracket.
55. 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.
56. Install anti-depression valve on the intake elbow, using original bolts, with hose connection facing down. 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. 20.

57. Remove left (drives) side valve cover from engine. Using illustration, drill a 1 1/4" hole through valve cover as indicated. Deburr the hole and install grommet provided. Re-install valve cover on engine.
58. Install crankcase vent hose and crankcase vent adaptor nipple between valve cover and anti-depression valve, using two #16 hose clamps, as shown in fig. 21.
59. Reinstall flexible fresh air inlet hose onto air cleaner inlet.
60. Install pyrometer and gauge panel. Refer to manufacturer's instructions included with pyrometer.
61. Install accessory instruments, if used. Refer to manufacturer's instructions included with instruments.
62. Install muffler and exhaust system (not included with the turbo system) as shown in fig. 22. 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 or the optional 3 1/2 inch "Monster" exhaust system is available from **GALE BANKS ENGINEERING**. These exhaust systems include a special low restriction 3" core muffler, pre-formed tubing sections and all components necessary to install the complete exhaust system. **The BANKS exhaust systems are REQUIRED for emissions legal applications.** Use of any other exhaust with the turbo system is not emissions legal.

63. Tighten v-band clamp at turbocharger outlet.

INJECTION PUMP 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 greater increase in rear wheel horsepower, suitable for general use, work trucks and towing. (This adjustment is the **ONLY** emissions legal setting to comply with the California 40% smoke opacity limit).

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.

64. 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 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 figs. 5 and 6. **DO NOT ATTEMPT TO ROTATE THE ENGINE WITH THE STARTER.**

d. Using a 5/32" Allen wrench (with sharp corners), rotate the screw clockwise, 60 degrees or 1/6 turn.

NOTE: The Allen 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.

65. Reconnect battery cables. Do not connect injector pump wires.
66. Loosen oil feed line connection at the turbo charger. Crank engine until oil flows from connection. (A cup may be used to catch oil.) Re-tighten connection and crank another 5-10 seconds. Cranking time should be limited to 20 to 30 seconds, followed by one minute of cooling. This cycle should be repeated as required.
67. Reconnect wires to injection pump.
68. Start engine. It may not start immediately, due to fuel lost when adjusting the injector pump. Observe the cranking recommendations noted above. It also may be necessary to depress the accelerator pedal somewhat.
69. Visually check the installation for any improperly installed components, improperly routed wires and hoses, intake air leaks and any wires or hoses too close to hot exhaust, turbo components, or sharp edges.

70. 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.
71. 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.
72. Check injector pump adjustment. See "CHECKING ENGINE PERFORMANCE".