



IH S-Series Instructions

HYPERMAX ENGINEERING, INC.

*** IH S-SERIES TRUCK - 6.9L/7.3L DIESEL ***

INSTALLATION INSTRUCTIONS

Time will be saved if these instructions are read PRIOR to installation of turbocharger package.

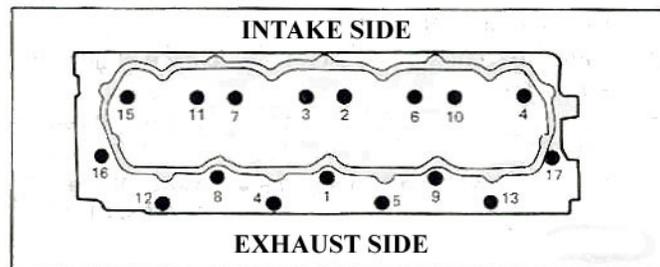
A. ITEMS TO BE REMOVED:

1. Negative battery cables.
2. Remove exhaust piping and muffler (do not remove manifolds).
3. Air filter.
4. Crankcase blow valve, bracket and valley cover grommet.
5. Right rear lifting eye - note: shorten bolts 3/8" before reinstalling.

Note: Right side refers to passenger-side of vehicle.

B. PRELIMINARY SET-UP:

1. To reduce the possibility of cylinder head gasket leakage, it is advisable to re-torque the cylinder head bolts to (6.9L 85 ft. lbs., 7.3L 110 ft. lbs.) after 3,000 miles has been accumulated on the vehicle. Reinstall the rocker arms and posts in their original location with the timing mark on the front pulley at the eleven o'clock position as viewed from the front of the engine. Torque the post bolts to 20 ft.-lbs.



Head Bolt Torque Sequence

1983-1989 Models:

Provide a 1-5/16" diameter hole in the center of the rear circular impression on the left hand valve cover for installation of the grommet and baffle for the crankcase breather. Note: A smooth edge is required on this hole, use silicone sealer if hole quality is in question. The baffle is most easily installed under the valve cover grommet by starting the grommet halfway into the valve cover then hooking the baffle onto this portion of the grommet. The remaining portion of the grommet can then be worked into the valve cover and baffle simultaneously. Note: models with the CDR valve mounted on the left side valve cover do not require this procedure.

2. Remove oil pressure sending unit and install combination fitting with 1/8" NTP x 1/4" NTP adapter. Orientate the fitting such that the sending unit can be re-installed with its electrical terminal toward the drivers seat. Bolt on extension wire to the sending unit with the wire facing down and connect the other end to wiring harness. Fasten the wire to the combination fitting with a zip tie provided.

3. Install one 1" rubber expansion plug into the rear of the intake manifold. Use "Loctite" on threads. Install the other 1" rubber expansion plug into the existing crankcase breather tube on valve cover.

4. If engine valley cover has a steel plug, remove it and install the 3/4" I.D. grommet into the opening of the engine valley cover.

5. Some intake manifold/tappet chamber cover gaskets do not allow adequate turbocharger oil drain back. This is due to a manufacturing variance. To ensure adequate drain back, punch three holes (1/8" to 3/16" diameter) with a sharp pointed punch or awl through the grommet hole to the gasket baffle chamber. It will be necessary to perforate two layers of the steel gasket. The layers are about 1" apart. The first layer is the top of the baffle chamber, the second is the bottom of the chamber. Be careful not to go any deeper than necessary to perforate both layers to avoid damaging the roller tappet retainer located about 1" below the baffled chamber. Note: Intake manifold gasket may not have a turbocharger drain tube hole. If so, you will need to replace with a Ford 7.3L Diesel manifold gasket.

C. REROUTING FUEL RETURN LINES: 1983

1. Remove the right bank injection nozzle fuel return hose that connects the last injector (No.7) to the main return line fitting.
2. Connect the right and left bank injector returns at the front of the engine with the 28" length of hose provided. This hose can be shortened if desired. Re-use hose clamps.
3. Cap-off the (No. 7) injector and the main return line fitting with the caps removed from (No.1 & No.2) injectors in step 2. Re-use clamps.

ELECTRICAL & CONTROL CABLES 1983-1985

1. Remove alternator wires from right hand side glow plug harness and reroute down along right frame rail. Note: reuse clamp from right rear wiring harness on frame to hold harness along inside of frame rail and up to alternator. Air conditioner wire may need to be lengthened, if so equipped.
2. Fuel return line should be rerouted back under floor of cab and cable tied to clear the exhaust pipes.

3. Main battery cable to starter must be removed from clamp on engine and cable tied to inside of frame for pipe clearance.

REROUTING FUEL RETURN LINES: 1984 & Later Models

1. Remove the return hose connecting the right and left injection nozzle banks at the rear of the engine and retain the clamps (discard hose). Note: 1990 models use 3/16" or 1/4" inside diameter return hose. Install the same size replacement hose (both sizes are provided for this model year).
2. Slide the clamps on both ends of the 28" length of hose provided.
3. Route the hose around the front of and underneath the intake manifold to reconnect the right and left bank nozzle return fittings.
4. Remove the clamp holding the fuel return line to the frame on the passenger side and route it under the floor of the cab away from the exhaust pipe.
5. Tie wrap the hose to one of the injection lines on the passenger side of the engine for maximum clearance between the turbocharger and hose.

D. RELOCATING GLOW PLUG WIRING HARNESS & RELAY 1987 & later Models:

1. Remove the entire glow plug harness from the vehicle and label the wires disconnected from the glow plug relay.
2. Bolt the relay to the relocation bracket using the stock bolts and (2) 1/4" lock nuts provided. Connect the ground wire to one of the mounting bolts.
3. Set glow plug relay mounting plate under fuel filter mounting bracket with bumper resting on valve cover.
4. Passenger side: The (No. 1) glow plug connector must be untapped to obtain the full length of that connector. Route that wire bundle around the front of the fuel filter assembly. Connect the (No.1) plug. Route the rest of the wire bundle through the lifting eye and finish the rest of the connections.
5. Locate the wire bundle at the rear of the engine with the connectors that were removed from the glow plug relay. Crimp the power cable provided to the power cable removed from glow plug harness, and carefully tape the connection with electrical tape. Remove the sheathing from the wire bundle with the glow plug relay wires and untape them. Reposition those wires along with the power cable so they exit the wire bundle near the brake vacuum canister. Connect the wires to the glow plug relay and tape the wire bundle together. Reinstall the sheathing.
6. The drivers side glow plug connectors will be reversed. The (No.2) connector will be connected to the (No.8) glow plug and (No.8) will be connected to (No.2) (numbers of cylinders are stamped on the intake manifold). This will reverse the positioning of the injection pump connectors and the temperature probe in the cylinder head. Remove the plastic sheathing, untape the wires, and reverse the position of those wires so they can be reconnected. Retape the wires and reinstall the sheathing.
7. Remove the clamps holding the wire bundles to the back of the transmission and tie wrap them under the back of the cylinder head, away from the exhaust pipe.
8. Vehicles equipped with an Allison AT 545 Automatic transmission have cooling lines that are routed across the top of the transmission and along the right side of the engine. These lines should be routed along the frame away from hot piping. The hose on the right side may have to be lengthened.

E. EXHAUST & TURBINE INLET PIPING:

1. Bend firewall for turbo mount clearance. Use a port-a-power or a long breaker bar to bend firewall for 1/2" clearance around turbo mount plate. Note firewall clearance location in picture supplied with instructions.
2. Bolt the mounting plate onto the rear face of the right hand cylinder head with (3) 3/8 NC x 1" bolts and lock washers. Center the plate on the bolts before final tightening.
3. Bolt the intermediate pipe to the mounting plate inlet. Use "Never Seeze" at all pipe slip joints and or flange mounts.
4. Install the pipes connecting the right and left hand exhaust manifolds. Be sure to slip this assembly into the intermediate pipe. Leave nuts loose enough to adjust for the best pipe joint alignment - then tighten nuts securely.
5. Install and tighten (4) 2-1/4" muffler clamps. Just tighten enough to seal slip joints.
Avoid distorting the pipes by over tightening.

F. TURBOCHARGER HOUSING ORIENTATION:

1. Grease the end of the turbocharger oil drain tube and insert it into the grommet previously installed in the engine valley cover.
2. Loosen the retaining bolts on the turbocharger's exhaust and compressor housings.
3. Install turbocharger, and exhaust gasket onto the mount plate (compressor housing facing left side of the engine) with (4) 3/8" NC nuts. Tighten (4) nuts.
This is a TRIAL FIT step.
(Note: mount plate has special locking threads and will lock when bolts are tightened.)
4. Rotate center housing of turbocharger to align with drain tube.
5. Lightly secure drain tube flange to turbocharger with (2) 3/8" x 1" bolts and lock washers.
6. Rotate center housing and lower end of drain tube to permit uniform tube to grommet contact; i.e. - be certain drain tube is not loading one side of grommet heavier than the opposite side.
7. Tighten (2) center section to exhaust housing bolts.
8. Install intake manifold cover with its "O" ring (apply grease to "O" ring). Retain lightly with 3/8 NC x 4" bolt with "O" ring washer and backup washer.
9. Rotate compressor housing to obtain best alignment with connector tub on intake manifold cover - a 3/8 - 1/2" gap will be present.
10. Tighten (2) center section to compressor housing bolts.
11. Remove intake manifold cover.

12. Remove drain tube bolts and remove turbocharger from mounting plate. Leave drain tube in place.
13. Crankcase oil vapors are ingested into the inlet of the turbocharger and may collect in the compressor housing. This oil may leak from the hold-down bolt holes or from between the compressor housing and back-plate. After aligning the compressor housing, put a reference mark on it and the backplate. Remove the compressor housing and apply a thin film of silicone sealer or equivalent product to the mating surfaces of the housing and backplate as well as the bolt threads. Align reference marks.
14. Tighten compressor and exhaust housing bolts and bend over lock tabs.

G. FINAL TURBOCHARGER INSTALLATION:

1. Reinstall turbocharger using "Never Seeze" compound on the exhaust gasket. Center exhaust housing on bolts and tighten.
2. Bolt drain tube with its gasket to turbocharger with (2) 3/8 NC x 1" bolts and lock washers.
3. Recheck for optimum drain tube to gromet condition.
4. Tighten turbocharger mounting and drain tube bolts for final time.
5. Remove plastic plug from oil inlet passage at top of turbocharger and fill passage with clean oil.
6. Install turbocharger oil lube fitting using pipe sealer on threads. Fitting should face rearward. Do NOT overtighten.
7. Wash inside of oil feed tube (1/4" diameter). (Lubricate seal gromets).
8. Tighten flex fitting nuts until they just bottom on their fittings.

H. INTAKE MANIFOLD COVER INSTALLATION:

1. Slide compressor discharge hose and clamps onto the manifold cover.
2. Install intake manifold cover and hose onto the compressor discharge and onto intake manifold simultaneously.
3. Rotate cover form optimum hose alignment. Be certain cover is bottomed against intake manifold.
4. Install 3/8 NC x 4" bolt with "Loctite" with its "O" ring and back up washer. Tighten only enough to compress "O" ring - DO NOT overtighten and bend cover! Tighten compressor discharge clamps.

I. AIR CLEANER MOUNT INSTALLATION

1. Remove the (2) 5/16" bolts on the throttle linkage bracket.

2. Install the 3" x 2-3/4" diameter 90 degree rubber elbow onto the air cleaner mount.
3. Install the hose onto the turbocharger air inlet and bolt the air inlet and bolt the air cleaner mount with (2) 5/16" NC x 1 1/4" bolts and flat washers in front of the throttle linkage bracket.
 4. Install and tighten hose clamps securing 90 degree rubber elbow to turbocharger and air filter mount.
 5. Install crankcase breather grommet into valve cover and baffle (if not done in step B-2), screw in 90 degree nylon fitting. Mount crankcase breather valve (CDR) onto air cleaner mount with original bolts. Use lockwashers supplied. Install hose. Note: All models require shortening the long leg of the hose.
 6. Models with the CDR valve on left valve cover: Cut off the bracket that is welded to the left valve cover, and make connections as in step #5. Note: A baffle is already installed on these models.

J. REMAINING EXHAUST CONNECTIONS:

1. Install exhaust housing (turbine) discharge pipe between the engine and firewall. Fasten it to the housing with the band clamp provided - lightly tighten clamp so that pipe can be rotated.
2. Install the (1) 5/16" NC x 3/4" bolts and lock washers through the mounting tab on turbine discharge pipe into turbo mounting plate.
3. To complete final exhaust system connections, install muffler extension pipe (2-1/2" x 3" dia.) onto turbine discharge pipe with (1) 2-1/2" muffler clamp. Mount 3" muffler with clamps and hangers provided.
4. Adapt system to remaining exhaust on vehicle.

K. MISCELLANEOUS:

1. Examine the entire installation. Check for interference and contact between wires, tubes and cables with the hot side of the turbocharger.
2. Bend the (2) tabs on the bottom on the stock air cleaner out approximately 1/2".

Note: The lower air filter housings on some trucks incorporate a baffle which may cause a restriction when the filter assembly is mounted. Remove the baffle and stud-guide by drilling out the spotwelds or by sawing.

3. Mount air cleaner and attach cold air duct.
4. Reconnect batteries - start engine and check for leaks.

L. OPERATING NOTES:

1. As with any turbocharger diesel engine, use a brand name Series Three lubricating oil. Remove the dipstick when adding oil to the

crankcase to prevent an airlock slowing the filling process.

2. Injection pump timing should be at the nominal factory specifications! If it has been advanced or combustion noise is unusually loud, have the timing checked.
3. The turbocharger supplied with this package has been matched to the vehicle's exhaust system and will not over-boost the engine. Do NOT alter the exhaust system to exceed 12 PSIG intake manifold pressure.
4. If the fuel injection pump is re-adjusted, do not increase the fuel delivery more than 25% of the difference between the maximum delivery and the stock delivery without having a pyrometer installed on the vehicle. Limit turbine inlet temperature to 1300 degrees F. A pyrometer tap is provided in the exhaust connector pipe. A boost pressure tap is provided in the intake manifold cover.
5. The 1983 and early 1984 6.9L cylinder head gaskets may develop a slight external coolant leak under prolonged high output operation. This is not due to a combustion leak but rather the result of thermal and mechanical deformation of the cylinder heads at the lower corners. The problem, should it occur, CANNOT be solved by replacing the gaskets. A simple fix is the addition of a product such as "PRESTONE" Heavy Duty Cooling System Sealer to the radiator. As this product will not block the cooling system, its use is advisable as a precautionary measure should a leak develop.

Installing 1985 cylinder head gaskets will permanently alleviate this problem.

6. Remember to re-torque the cylinder head bolts to 85 ft./lbs. approximately 3000 miles after installing new cylinder head gaskets.
7. Pickup Trucks Equipped with Optional Firewall Sound Insulation Package - a 32" W x 21" H section of the firewall insulation MUST BE CUT AWAY at the rear of the engine to provide turbocharger and pipe clearance. Since the turbocharger itself reduces engine combustion noise, the effect of removing the insulation will not be noticeable.

HYPERMAX ENGINEERING has accumulated a considerable amount of data during the 6.9L turbocharger development program. If your specific application should warrant a system variation, call us with your requests or problems - we have already been there!

6.9/7.3L FUEL INJECTION PUMP ADJUSTMENT

The fuel injection pump must be adjusted to realize any performance improvement with the 6.9/7.3L turbocharger package.

By following this simple procedure, the adjustment can be made WITHOUT removing the injection pump from the engine.

ALL MODEL YEARS:

1. Locate the triangular-shaped cover plate on the passenger-side of the fuel injection pump – below the throttle lever.
2. Remove (2) 1/4" hex head screws retaining the cover to the pump housing. Place rags under the pump to absorb the fuel that will drain from the pump when the cover is removed.
3. Prepare to rotate the engine by hand using a 15/16" socket, 3" extension and ratchet on the crankshaft damper retaining bolt. Rotate the engine clockwise as viewed from the front to avoid loosening the bolt.
4. By directing a flashlight on to a small mirror and aiming the light onto the hole (exposed by removing the cover plate), a 5/32" hex allen screw is the leaf spring or fuel screw. Turning the screw in a clockwise direction increases the fuel delivery.
5. Have an assistant rotate the engine by hand until the 5/32" hex socket screw comes into view. (2) revolutions of the engine may be required to bring the hex screw into alignment with the hole.
6. Refer to the BHP VS Fuel Flow Curve attached (upper curves) and decide what power level is desired. Note : The California setting is 1-1/2 to 2 flats increase in fuel delivery and two degrees retarded injection pump timing.

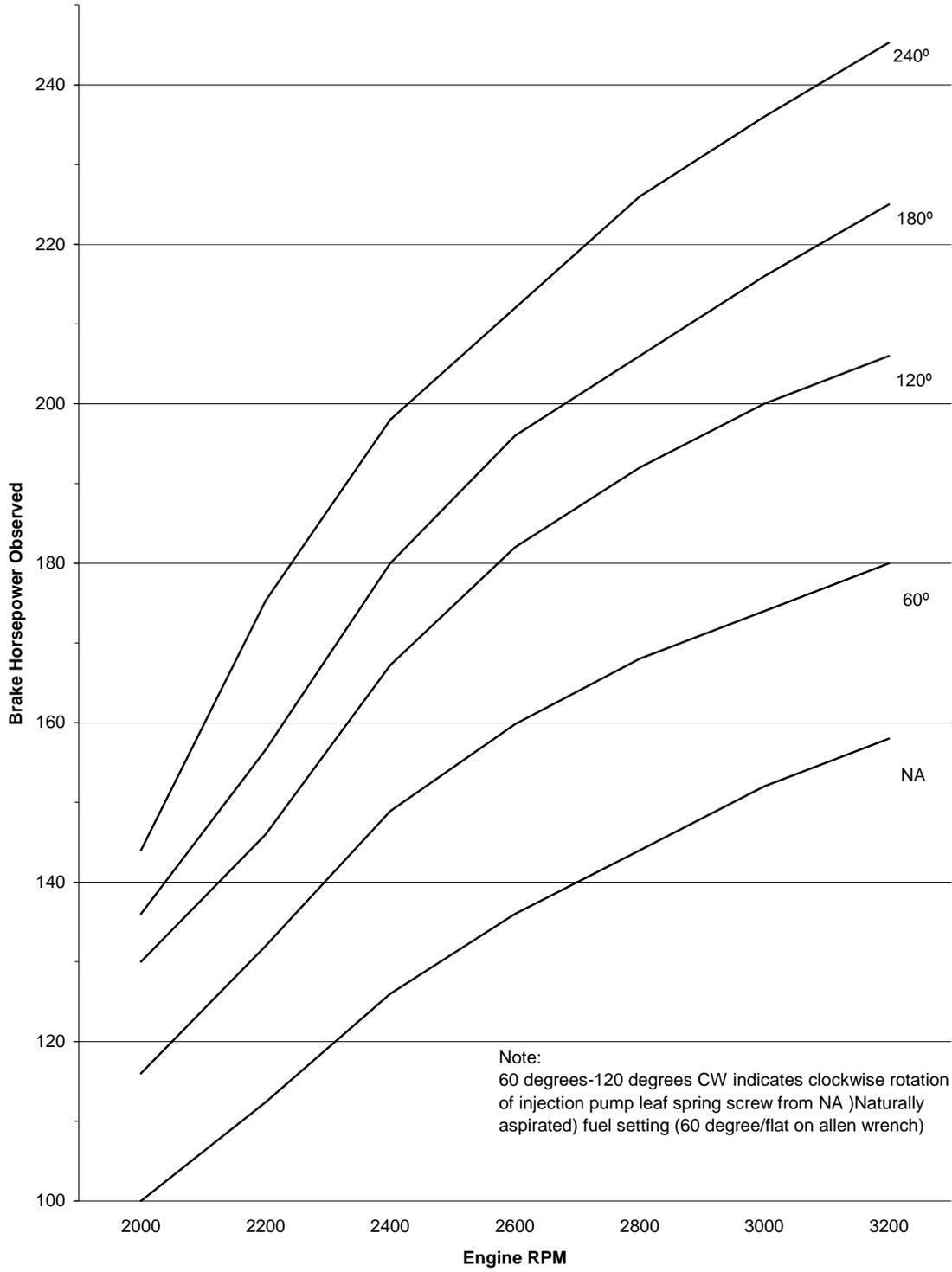
The injection pump timing is retarded two degrees by loosening the three mounting stud nuts and rotating the injection pump clockwise two degrees (as viewed from the drive end or front of the engine) this corresponds to 1/16" on the circumference of the mounting flange. If these instructions are not understood by the installer take the vehicle to a qualified diesel injection shop for these adjustments.

Example: If 227 horsepower is desired at 3300 RPM, the 5/32" hex screw must be rotated 180 degrees in a clockwise direction; this corresponds to turning the 5/32' allen wrench (3) flats as indicated by the lower set of fuel curves.

NOTE: It is important to obtain a high quality 5/32" allen wrench to avoid damaging the hex driver portion of the screw since rotating the screw will require considerable effort.

7. After rotating the fuel screw to the desired setting, replace the housing cover plate.

6.9L/7.3L BHP VS. Fuel Flow



LIMITED WARRANTY

All Hypermax Engineering, Inc. non-competition products or merchandise is warranted to be free from defects in material and workmanship, under normal use and service for a period of one year (365 days) from date of delivery to the initial end user.

Hypermax Engineering, Inc.'s liability under this warranty is limited to repair or replacement at its option, subject to the provisions set forth herein, of any parts which upon examination by Hypermax Engineering, Inc. are found to be defective. The user shall prepay cost for transportation of defective parts to Hypermax Engineering, Inc. for inspection.

Hypermax Engineering, Inc. shall not have any responsibility under this warranty unless the defect results in a claim arising within the operational periods listed above, the part was properly installed, normally maintained and not subject to misuse, negligence or accident, and the turbocharger, such a way that, in the judgement of Hypermax Engineering, Inc. its performance or reliability was adversely affected.

Remedies are expressly limited to the repair or replacement of defective Hypermax Engineering, Inc. products or merchandise as specified herein. Neither Hypermax Engineering, Inc. nor its distributors or dealers have any liability for any other claims including claim for special, indirect, or consequential damages (including but not limited to turbocharger removal installation, equipment down time, prospective profits or other economic loss) because of any defect. Any claim arising from defects in material or workmanship must be presented in writing to Hypermax Engineering, Inc. within thirty (30) days after the date on which the claim arised, and any action on the claim must be commenced within six (6) months after original Hypermax Engineering, Inc. shipping date.

THIS REPRESENTS THE COMPLETE WARRANTY OFFERED BY HYPERMAX ENGINEERING, INC. AND IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. NO PERSON IS AUTHORIZED TO BIND HYPERMAX ENGINEERING, INC. TO ANY WARRANTY OR TERMS NOT SET FORTH HEREIN.

Note: This turbocharger package may not meet state or local pollution control regulations. It is the buyer's responsibility to investigate any applicable laws prohibiting the purchase of or installation of this package on road vehicles.

PARTS LIST - S-SERIES TRUCK WITH 6.9L/7.3L DIESEL

Line No.	Qty.	Description
1	(1)	Turbocharger .96 Airesearch
2	(1)	Mount - turbocharger
3	(1)	Pipe - exhaust manifold connecting
4	(1)	Pipe - short intermediate connecting
5	(1)	Pipe assembly - turbine discharge w/mounting strap
6	(1)	Pipe - muffler connecting 2-1/2"/ 3-1/2" adapter (48")
7	(1)	Pipe - right manifold w/flange
8	(1)	Pipe - left manifold w/flange
9	(1)	Muffler - 3-1/2" diameter inlet and outlet
10	(1)	Tube assembly - turbocharger oil drain
11	(1)	Tube assembly - 1/4" dia. turbocharger lube oil supply
12	(1)	Mount - air cleaner
13	(1)	Cover - intake manifold
14	(1)	Gasket - turbocharger exhaust housing mounting
15	(1)	Gasket - turbocharger oil drain tube assembly
16	(1)	Injection nozzle fuel return hose (3/16" I.D.) 28" long
17	(1)	Injection nozzle fuel return hose (1/4" I.D.) 28" long 1990-93 ONLY
18	(1)	Hose - breather connecting
19	(1)	Hose - turbocharger compressor discharge (2" I.D.) 2-3/8" long
20	(1)	Hose - turbocharger compressor inlet (3" I.D. x 2-3/4" I.D.) 90 degrees formed

Line No.	Qty.	Description
21	(1)	Hose - fuel return line (3/8" I.D.) 15" long (1987 ONLY)
22	(1)	Hose - flexible cold air inlet (1988-93)
23	(1)	Clamp - turbocharger exhaust "V" band
24	(2)	Clamp - muffler 2-1/4" dia.
25	(1)	Clamp - torctite 2-1/4" dia.
26	(1)	Clamp - muffler 2-1/2" dia.
27	(2)	Clamp - turbocharger compressor inlet hose
28	(2)	Clamp - turbocharger compressor discharge
29	(2)	Clamp - crankcase breather hose
30	(1)	Clamp - fuel line return (1987 ONLY)
31	(1)	"O" ring - intake manifold cover (-353)
32	(1)	Fitting assembly - combination oil pressure sender turbo lube w/flex fitting
33	(1)	Fitting - 1" x 90 degrees crankcase breather
34	(1)	1/8" NTP - 1/4" NTP adapter
35	(1)	Fitting turbo lube oil supply - 1/4" tube x 1/4" NP x 90 degrees flex
36	(1)	Gromet - turbo drain tube valley cover
37	(1)	Gromet - valve cover breather
38	(1)	Baffle - valve cover breather (models without bracket welded on valve cover only)
39	(1)	Plug - rubber expansion - intake manifold 1"
40	(1)	Plug - rubber expansion - intake manifold 7/8" (1983-1987)
41	(1)	Plug - 1/4" NP - pyrometer tap - exhaust manifold connecting pipe
42	(1)	Plug - 1/8" NP - boost pressure tap intake manifold cover
43	(1)	Plate - glow plug control mounting (1987-93 ONLY)
44	(1)	Wire - glow plug relay power extension (35" long)
45	(1)	Washer - lock 5/16"

- 46 (2) Washer - flat 5/16"
- 47 (2) Washer - flat 7/16"
- 48 (5) Washer - lock 3/8"
- 49 (1) Washer - flat 3/8" AN intake manifold cover bolt and "O" ring washer
- 50 (2) Lock nut - 1/4" NC 1987-93 (glow plug relay mounting)
- 51 (4) Nuts - flange 3/8" NC
- 52 (1) Bolt - 5/16" NC x 3/4"
- 53 (2) Bolt - 5/16" NC x 1 1/4"
- 54 (5) Bolt - 3/8" NC x 1"
- 55 (1) Bolt - 3/8" NC x 4"
- 56 (2) Bolt - 7/16" NC x 1 3/4"
- 57 (2) Hanger - universal type
- 58 (3) 3-1/2" muffler clamps
- 59 (8) Ties - plastic zip
- 60 (1) Instructions - 1600 Series Truck Installation

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