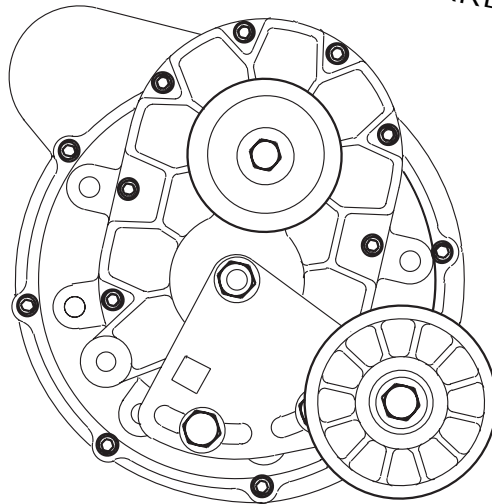


Ford 4.0L Explorer/Ranger Supercharger System Installation Instructions

FORD EXPLORER 1991-1994 MODEL YEARS
FORD RANGER 1990-1994 MODEL YEARS
50 STATE SMOG LEGAL AS PER CARB EO #D-213-17



ENGINEERING, LLC

1650 PACIFIC AVENUE • CHANNEL ISLANDS, CA 93033-9901 • (805) 247-0226
FAX (805) 247-0669 • www.vortechsuperchargers.com • M-F 8:00 AM - 4:30 PM PST

FOREWORD

Proper installation of this supercharger kit requires general automotive mechanic knowledge and experience. Please browse through each step of this instruction manual *prior* to beginning the installation to determine if you should refer the job to a professional installer/technician. Please call Vortech Engineering for installers in your area.

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FORD 1991-1994
4.0L EXPLORER/RANGER
Installation Instructions

Also applicable for the 1990-94 Mazda Navajo and 1994 Mazda B4000

50 State Smog Legal, as per CARB EO #D-213-17

Congratulations on selecting the best performing and best backed automotive supercharger available today... the VORTECH® V-2® Supercharger!

NOTE: This supercharger kit is designed to fit on Ford Explorer/Mazda Navajo vehicles. This kit, with the addition of the Ranger Supplement assembly part number 4FD248-050, may be installed on 1990-1994 Ford Ranger and 1994 Mazda B4000 vehicles.

Before beginning this installation, please read through this entire instruction booklet and the Street Supercharger System Owner's Manual which includes the Limited Warranty Program and the Warranty Registration form and return envelope.

Vortech supercharger systems are performance improving devices. In most cases, increases in torque of 30-35% and horsepower of 35-45% can be expected with the boost levels specified by Vortech Engineering. This product is intended for use on healthy, well maintained engines. Installation on a worn-out or damaged engine is not recommended and may result in failure of the engine as well as the supercharger.

Vortech Engineering is not responsible for engine damage.

Installation on new vehicles will not harm or adversely affect the break-in period so long as factory break-in procedures are followed.

For best performance and continued durability, please take note of the following key points:

1. Use only premium grade fuel 92 octane or higher (R+M/2).
2. The engine must have stock compression ratio.
3. If the engine has been modified in any way, check with Vortech prior to using this product.
4. Always listen for any sign of detonation (pinging) and discontinue hard use (no boost) until problem is resolved.
5. Perform an oil and filter change upon completion of this installation and prior to test driving your vehicle. Thereafter, always use a high grade SF rated engine oil or a high quality synthetic, and change the oil and filter every 3,000 miles or less. **Never attempt to extend the oil change interval beyond 3,000 miles, regardless of oil manufacturer's claims, as potential damage to the supercharger may result.**
6. Before beginning installation, replace all spark plugs that are older than 1 year or 10,000 miles with original heat range plugs as specified by the manufacturer and reset timing to factory specifications (follow the procedures indicated within the factory repair manual and/or as indicated on the factory underhood emissions tag). **Do not use platinum spark plugs unless they are original equipment.** Change spark plugs every 15,000 miles and spark plug wires every 50,000 miles or earlier.

TOOL & SUPPLY REQUIREMENTS

- Factory Repair Manual
- 3/8" socket and drive set: SAE & metric
- Flat #2 screwdriver
- Phillips #2 screwdriver
- Large screwdriver or pry bar
- Adjustable wrench
- Open end wrenches:
3/8", 7/16", 9/16", 5/8", 3/4", 7/8
- Ford style Snap Lock fuel disconnect tool
- 3/32" drill bit
- Drill motor
- Center punch
- 11/16" Greenlee™ Punch
- Silicone sealer

Note: If your vehicle has in excess of 10,000 miles since its last spark plug change, then you may need:

- Spark plug socket
- 6 new OE heat range spark plugs

NOTICE

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1991-1994 EXPLORER/RANGER

Part No. 4FD218-050SQ

PARTS LIST

IMPORTANT: Before beginning installation, verify that all parts are included in the kit. Report any shortages or damaged parts immediately.

Part Number	Description	Quantity	Part Number	Description	Quantity
2E228-020	V-2 SUPERCHARGER ASSEMBLY	1	4FD130-026	OIL FEED ASSEMBLY	1
4FD111-021	MOUNTING BRACKET ASSEMBLY	1	7U030-016	1/4" oil feed x 23"	1
4FD011-021	Mounting bracket	1	7P125-103	-4 x 45° 1/8" NPT male elbow	1
4FD110-043	Welded bracket assembly	1	7P250-066	#4 swivel x 1/4" hoses, barb fit	2
4FD010-063	Bracket C	1	7P525-067	.500 crimp ferrules	2
4FD015-136	Support brace	1	7P250-082	1/4" NPT x -4 90° fitting	1
7U250-020	11mm dowels	2	7P250-034	1/4" NPT x 1/4" NPT straight tee	1
7A375-124	3/8-16 x 1-1/4" bolts	4	4FD130-036	OIL DRAIN ASSEMBLY	1
7A375-100	3/8-16 x 1" bolts	5	7P375-042	Male connector, inverted flair	1
7A375-075	3/8-16 x 3/4" bolts	9	7P500-020	Tube nut, inverted flair	1
7F375-016	3/8-16 nuts	3	7P500-002	1/2" x 8" aluminum tube	1
7L312-000	5/16 - split (lock) washers	4	7P375-017	3/8" NPT x 1/2" straight hose barb	1
7A375-325	3/8-16 x 3-1/4" bolts	1	7P375-045	3/8" NPT 45° street elbow	1
7C080-050	8mm x 1.5 x 150 bolts	4	7P100-121	Sealing nut	1
7C010-035	M10-1.5 x 35mm bolt	1	7R001-008	#8 stainless hose clamps	2
7L375-075	3/8" lock washers	3	7U030-036	1/2" x 5" oil drain hose	1
7K375-040	3/8" AN flat washers	13	4FD238-068	FUEL MANAGEMENT UNIT (WITH LINES)	1
4FD010-034	Mounting plate	1	6Z110-111	12:1 black fuel management unit	1
4FD112-010	AIR PASSAGE ASSEMBLY	1	4FD145-156	Fuel line assembly, male	1
4FD012-010	Inlet duct A	1	4FD146-166	Fuel line assembly, female	1
4FD012-020	Intake tube A	1	7U030-046	5/32" x 32" vacuum line	1
4FD012-030	Intake tube B	1	7U100-055	6" nylon tie wraps	7
7R005-001	208-91 3.75" T-bone clamp	1	7E010-046	#8 x 3/4" sheet metal screws	2
7S300-000	3" 90° rubber elbow	1	4FD113-010	CHECK VALVE ASSEMBLY	1
7R002-052	#52 hose clamps	2	7U400-001	One-way valve	1
7S300-300	3" x 3" sleeve	1	7P250-126	1/4" restrictor	1
7S300-200	3" x 2" sleeves	2	7P250-125	1/4" tee	1
4FD050-010	Air plenum	1	7U030-030	1/4" x 12" vacuum line	1
4FD015-020	Dual pipe bracket, adjustable	1	4FD101-002	FUEL PUMP ASSEMBLY	1
4FD015-010	Dual pipe bracket, fixed	1	8F001-002	155 inline fuel pump	1
7F250-040	1/4-20 nut plates, clip on	2	7R003-024	1-1/2" adel clamp	1
7A250-175	1/4-20 x 1-3/4" bolts	2	7R001-004	#4 hose clamps	5
7R002-048	#48 hose clamps	6	7P500-014	Ford fuel fitting adapter	1
7C060-010	6mm x 1.0 x 16 flat allen	1	7P312-003	5/16" female fuel connector	1
7F006-093	6mm nylock nut	1	7U100-055	6" nylon tie wraps	8
7C080-023	8mm x 1.25 x 20 flat allen	1	5W001-011	16-14GA eyelet	1
7R002-044	#44 hose clamps	4	5W001-010	16-14GA female slides, insulated	3
7S275-200	2-3/4" x 2" sleeves	2	5W001-002	Fuse tap	1
4FD012-040	Discharge tube A	1	5W018-021	18GA standard black wire	1
4FD012-050	Discharge tube B	1	7J010-001	#10 flat washers	2
4FD012-060	Discharge tube C	1	7F010-032	10-32 nylock nut	1
7S250-200	2-1/2" x 2" sleeves	3	5W018-036	18GA standard red wire	1
7R002-040	#40 stainless hose clamps	6	7U031-018	5/16" x 20" fuel hose	1
2A046-103	BELT	1	7U030-010	12mm x 20" fuel hose	1
			7C011-075	10/32" x 3/4" bolt	1

1. PREPARATION/COMPONENT REMOVAL

- A. Disconnect the battery.
- B. Remove the air intake duct and valve cover breather hose.
- C. Remove the accessory drive belt.
- D. Rotate the vacuum reservoir located on top of the air conditioning condenser 180° (see Fig. 1-a), rerouting the vacuum line attached to the mounting tab.
- E. Remove the air conditioning compressor, but do not break open any lines. Disconnect the air conditioning line bracket located in front of the water pump. Remove the air conditioning clutch electrical connector. Temporarily secure the compressor on top of the radiator shroud to provide work area.

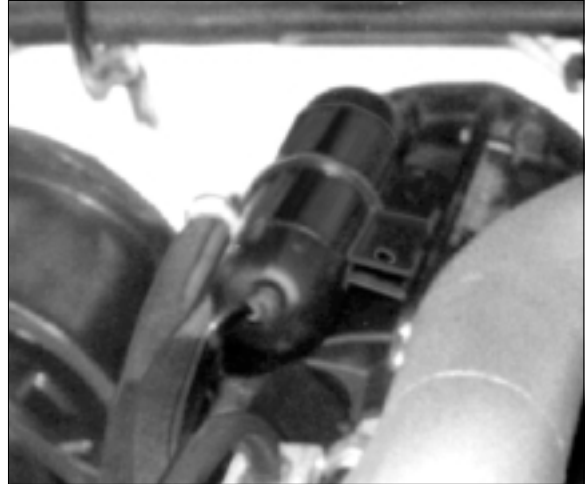


Fig. 1-a

2. OIL FEED LINE INSTALLATION

- A. Remove the oil pressure sender (located near the power steering pump).
- B. Thread the 1/4" NPT street TEE into the oil pressure sender extension in the block. Position the tee so that the branch portion faces forward.
- C. Thread the 1/4" NPT x #4 flare 90° fitting into the upper branch so that the flare end points up toward the brake master cylinder.
- D. Thread the original pressure sender into the center branch and reconnect sender wire.

NOTE: Keep all oil fittings and hoses absolutely clean. Use Teflon paste SPARINGLY ON THE MALE PIPE THREADS ONLY. NEVER use Teflon tape. Apply ONLY MOTOR OIL TO FLARE FITTINGS. NEVER OVERTIGHTEN FITTINGS.

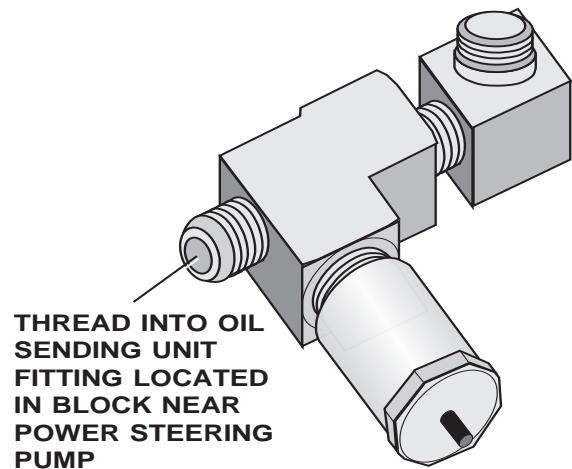


Fig. 2-a

- E. Install the Vortech supplied oil line onto the flare fitting. Cover the loose end with a plastic bag for later assembly.

3. OIL DRAIN FITTING

- A. Remove the two vacuum lines on the EGR reference module and mark their position for reinstallation. Remove module and bracket.
- B. Remove EGR reference module from mount. Bend the mount down lengthwise so that the module will run perpendicular to the ground to accommodate the discharge tube. (See Fig. 3-a.)
- C. Remove the EGR tube coming from the exhaust. Disconnect the EGR guard, vacuum line and electrical connector. Remove the EGR valve and assembly and set aside for reinstallation later. Remove the guard/bracket. Cut off and discard the upper portion of the bracket in the area shown in Fig 3-b.
- D. Remove the breather line connecting the intake to the vapor canister (located on the left fender apron) for clearance. Remove three left side spark plug wires from the spark plugs and the PCV valve and line for access to the left valve cover.
- E. Remove the EGR tube from the exhaust manifold.
- F. Remove the left valve cover using care to save the gasket.
- G. An 11/16" hole must be punched or drilled. Measure and mark the hole location following the graphic on the next page.
- H. Make an 11/16" diameter hole at the mark using a drill or chassis punch. Deburr the hole completely. Thoroughly clean the valve cover. (See Fig. 3-c.)
- I. Install the 1/2" hose fitting into the 3/8" NPT x 45° elbow and tighten.
- J. Insert the elbow fitting through the hole in the valve cover so the barb points forward and slightly up from horizontal. Secure with the sealing nut provided in the kit. Make sure to place the sealing side of the nut against the valve cover surface.
- K. Reinstall the valve cover. (See Fig. 3-d.)
- L. Install the 1/2" oil drain hose piece and #8 clamps to drain fitting on valve cover.
- M. Reinstall the PCV valve and spark plug wires. Check and reposition any existing lines around the area.



Fig. 3-a



Fig. 3-b

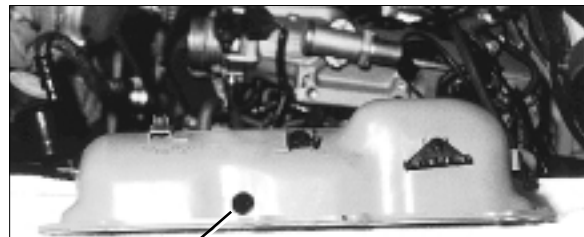


Fig. 3-c

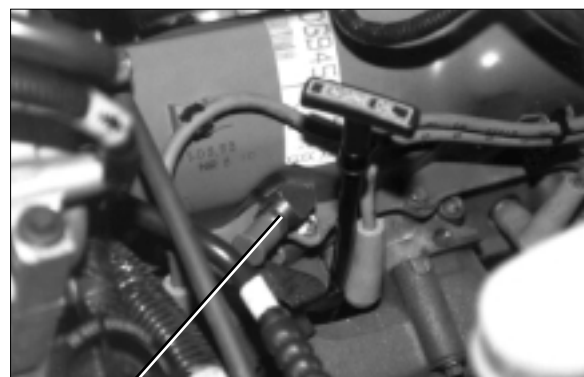


Fig. 3-d

3. OIL DRAIN GRAPHIC

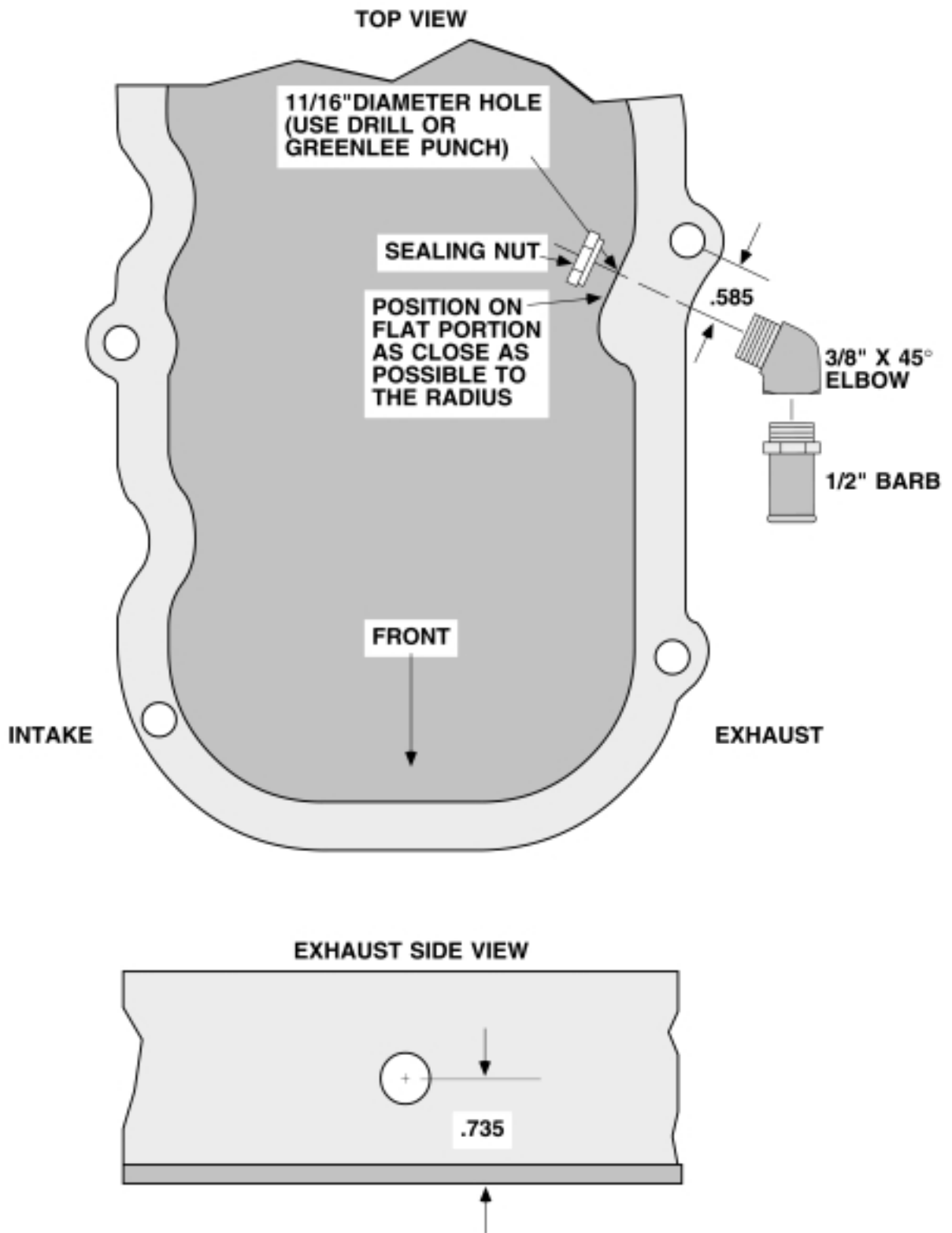


Fig. 3-e

4. MOUNTING BRACKET INSTALLATION

- A. With the air conditioning compressor temporarily moved off to one side, install the two Vortech supplied 11mm dowel sleeves into the air conditioning compressor mount. (See Fig. 4-a.)
- B. Position the spacer and bracket on the air conditioning compressor mount as shown. (See Fig. 4-b.)
- C. Remove the factory dowel sleeves from the bottom of the air conditioning compressor and set aside. Install the compressor on top of the air conditioning mount and brackets.
- D. Install the factory dowel sleeves into the Vortech aluminum adapter bracket and install the bracket on top of the air conditioning compressor. Insert the four supplied 8mm x 150mm bolts and AN washers. Start all bolts before tightening in a crisscross sequence. Make sure all dowels and brackets are aligned properly. (See Fig. 4-c.)
- E. Using the supplied tie wraps, resecure the left side air conditioning line to prevent contact with the power steering pump or brake lines.
- F. Install the supercharger mounting plate using four 3/8-16 x 1" bolts, four AN washers, two 3/8"-16 nuts and two 3/8" lock washers.
- G. Reroute and install air conditioning clutch wiring connector. (See Fig. 4-d.)

NOTE: If your vehicle has gone over 10,000 miles since its last spark plug change, you will need to change the spark plugs now before test driving the vehicle.

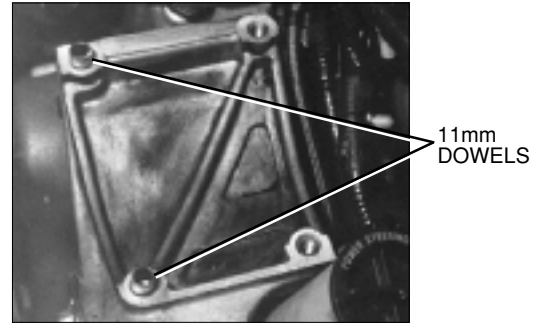


Fig. 4-a

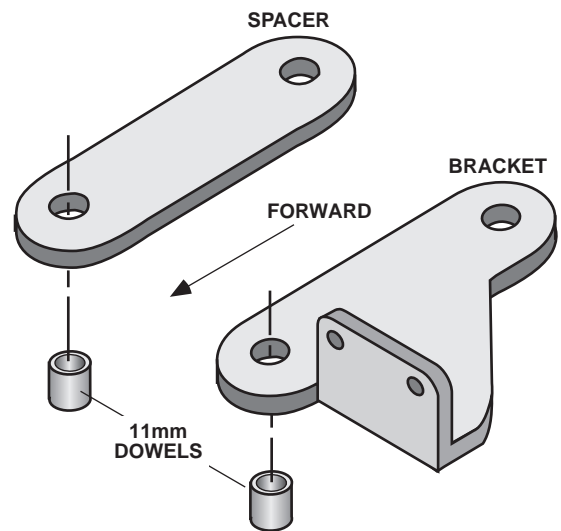


Fig. 4-b



Fig. 4-c

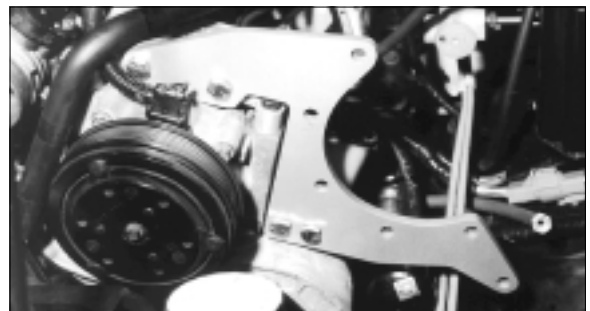


Fig. 4-d

5. FMU INSTALLATION

- A. Locate the return fuel line spring lock connector (left side frame below master cylinder). Separate the return line with a spring lock disconnect tool. Snap the Vortech fuel line with the male spring lock connector into the fuel rail outlet. Attach the other end to the Vortech fuel management unit inlet.
- B. Snap the second line with the female spring lock connector onto the fuel return line that returns to the tank (see Fig. 5-a.) Connect the other end to the FMU outlet at the center fitting. (See Fig. 5-b.)

EXPLORER/MAZDA NAVAJO FMU:

1. Remove windshield washer fluid/coolant overflow reservoir by removing the two mounting bolts on the left side fender apron, disconnecting the fluid lines and wiring connection.
2. Mount the FMU behind the gas vapor canister bracket on the driver's side (FMU lines should be attached to the unit before it is mounted) using the sheet metal screws supplied in the kit.
3. Connect the 5/32" vacuum line from the FMU to the intake manifold vacuum tree (located at the top rear of the upper intake manifold) and secure. (See Fig. 5-c.)

RANGER/MAZDA B4000 FMU:

1. Mount the FMU on the left side fender apron, forward of the starter relay (FMU lines should be attached to the unit before it is mounted), using the sheet metal screws supplied in the kit.
2. Connect the 5/32" vacuum line from the FMU to the intake manifold vacuum tree (located at the top rear of the upper intake manifold) and secure. (See Fig. 5-c.)

NOTE: Make sure you have routed all fuel lines away from all moving parts, sharp edges, exhaust pipes and manifolds. Secure the fuel lines with the tie wraps provided.

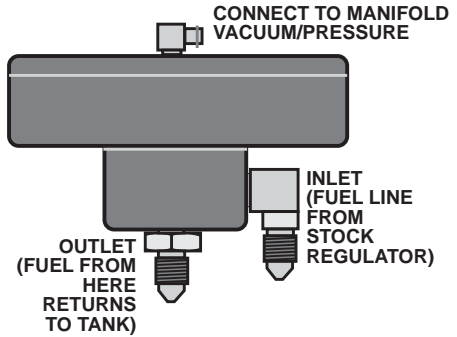


Fig. 5-a

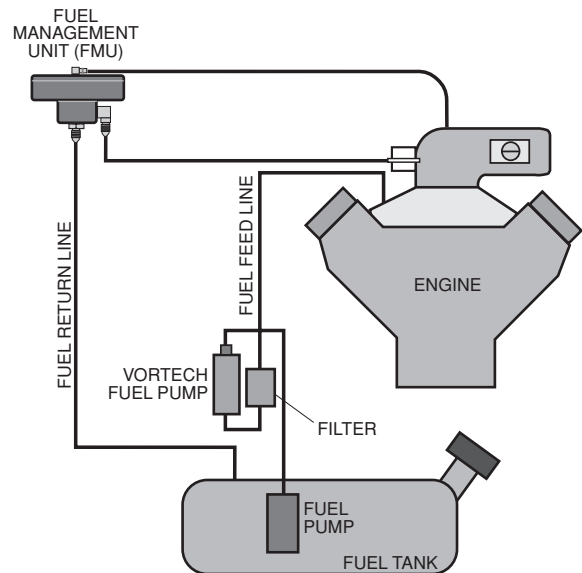


Fig. 5-b

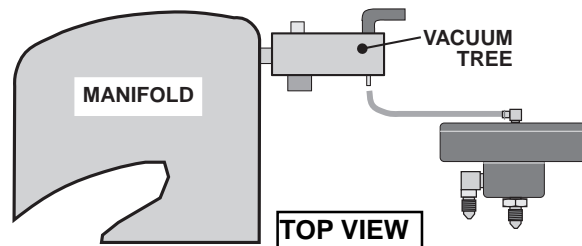


Fig. 5-c

6. FUEL PUMP

- A. Release any pressure from the fuel tank by momentarily loosening the filler cap.
- B. Disconnect the line to the fuel filter by carefully removing the white retaining tab. Attach the line to the adapter fitting as shown.
- C. Mount the fuel pump on the frame near the filter using the supplied #10 nut and bolt.
- D. Connect the fuel pump inlet to the adapter with the 3/8" hose provided.
- E. Connect the fuel pump outlet to the filter inlet with the 5/16" hose. Use the supplied Ford fuel connector and hose clamp.

NOTE: Make sure that the hoses are routed smoothly with no kinks or sharp bends and away from sharp objects.

- F. Attach the negative pump terminal to a clean ground fastener with the wire provided.
- G. Connect positive terminal on fuel pump to fuse box (30 amp A/C works well).
- H. Secure the fuel pump and hose with the clamps provided.
- I. After installation is complete, start engine and check system for leakage.

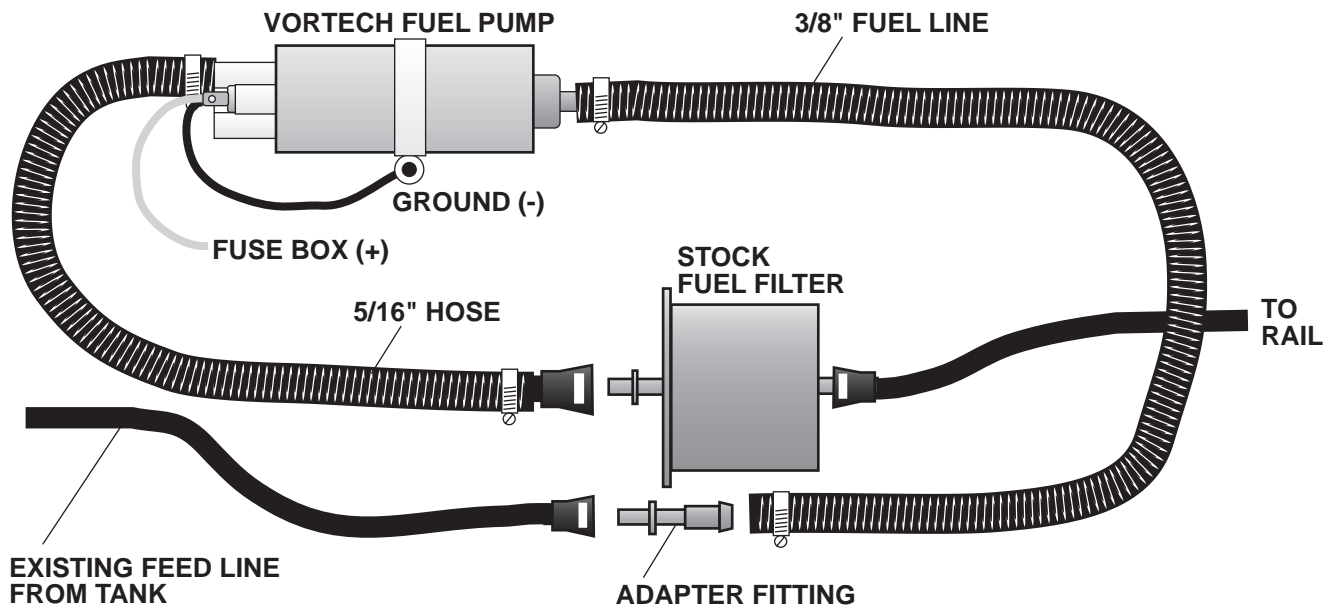


Fig. 6-a

7. SUPERCHARGER INSTALLATION

- A. Reinstall the EGR valve by connecting the exhaust manifold tube first, then the valve. Tighten all the fittings, EGR bolts and connect all the vacuum lines.
- B. Reinstall the modified EGR guard. Reconnect all wires and vacuum lines.
- C. Mount the modified EGR reference module. Reconnect all wires and hoses.
- D. Mount the supercharger mounting brace from the back of the mounting plate to the cylinder head using the supplied 10mm x 1.5 bolt, 3/8-16 x 3-1/4" bolt, 3/8 x 16 nut and 3/8" lock washers. (See Fig. 7-a.)
- E. Align the drain tube according to Fig. 7-b.)
- F. Mount the supercharger by guiding the drain tube into the 1/2" drain hose on the valve cover. Secure the drain hose with the hose clamp. Fasten the supercharger to the mounting plate with the five 3/8-16 x 3/4" bolts and AN type washers provided.
- G. Install the 45° flare to the 1/8" pipe fitting into the oil feed on the supercharger and "clock" it to the 4 or 5 o'clock position.
- H. Attach the oil feed line and secure away from all moving parts and the exhaust manifold with tie wraps.
- I. On Explorer/Navajo applications, reinstall the washer/coolant tank and the necessary plumbing and wiring connections.



Fig. 7-a

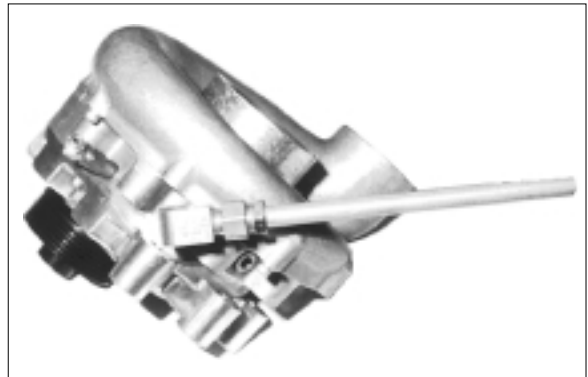


Fig. 7-b

8. SUPERCHARGER DRIVE BELT

- A. The new longer accessory drive belt is routed the same as the original belt except for accommodation of the supercharger and idler pulleys.
- B. Route the belt around the outside of the supercharger drive pulley then around the inside of the idler pulleys as shown in Fig. 8-a).

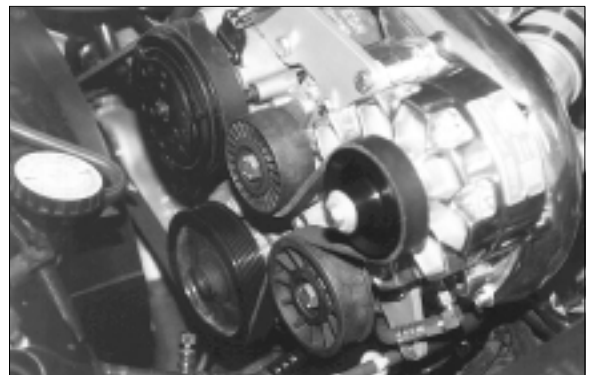


Fig. 8-a

9. AIR INLET DUCT

- A. Rotate the vacuum tree located on the rear left side of the intake manifold approximately 180° to gain clearance for the intake/discharge plenum. (See Fig. 9-c.)
- B. On automatic transmission equipped applications, the transmission vacuum line must be removed from the manifold, rerouted and formed to run along the firewall for plenum clearance. The rubber portion of the transmission vacuum line must be cut and the Vortech supplied restrictor and check valve assembly spliced into the two cut ends. (See Fig. 9-a.)
- C. Remove the plastic throttle cable retaining clip from the top of the intake manifold.
- D. Attach the two 1/4-20 nut plates to each of the supplied steel plenum mounting tabs. Mount the plenum mounting tab assemblies to the upper intake manifold. The thin, non-slotted tab is mounted to the upper manifold boss that is located near the idle-air motor using the supplied 6mm flat head screw. At the top rear of the upper intake manifold, install the thick, slotted tab with the 8mm flat head screw. (See Fig. 9-b.)
- E. Position the plenum bosses over the adjustable tabs and secure with 1/4-20 bolts.
- F. Mount the plastic intake duct to the supercharger inlet with the 3-1/2" T-bolt clamp, leaving the clamp loose.
- G. Secure intake tube 'B' to the plenum and plastic intake duct using 3" x 2" and 3" x 3" blue silicone sleeves and #48 clamps as shown in Fig. 10-a on the page 10.
- H. Position intake tube 'A', 3" x 2" silicone sleeve and #48 clamps onto the plenum. Mount the 3" 90° rubber elbow and #52 clamps into the mass air flow housing and connect to the intake tube. Connect the crankcase breather hose to the barb on intake tube 'A'.

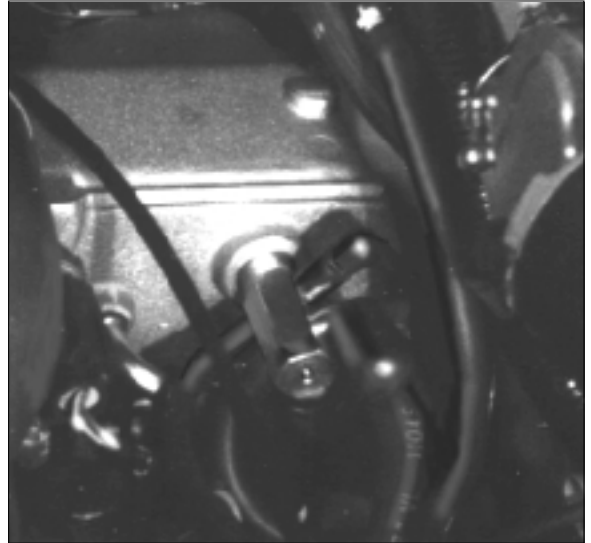


Fig. 9-c

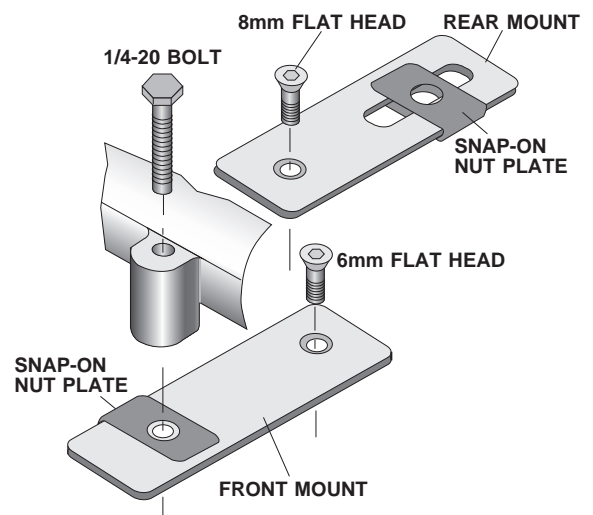


Fig. 9-b

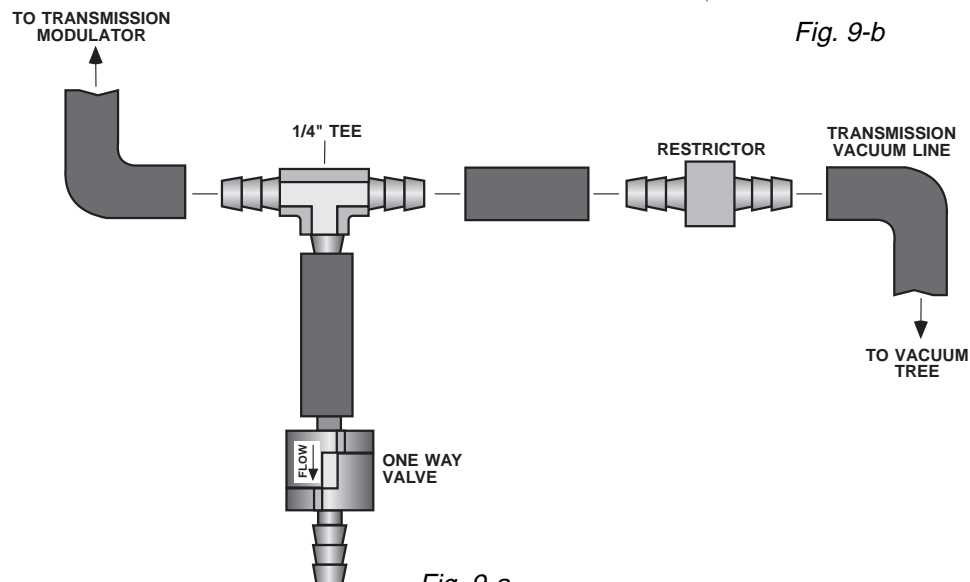


Fig. 9-a

10. SUPERCHARGER DISCHARGE DUCT

- A. Slide a 2-3/4" x 2" sleeve and two #44 clamps onto the supercharger discharge. Use a 2-1/2" x 2" sleeve with #40 clamps on the discharge plenum. Install discharge tube A. Refer to *Fig. 10-a* on page 10.
- B. Mount discharge tubes B and C together using a 2-1/2" x 2" sleeve and #40 clamps. Slide a 2-3/4" sleeve onto the throttle body and a 2-1/2" sleeve onto the discharge plenum. Attach the discharge tube assembly to the plenum and throttle body using #40 and #44 clamps.
- C. Underhood lamp must be removed or relocated to provide adequate clearance for the supercharger.

NOTE: *Position the intake and discharge tubes as low as possible for hood clearance. Due to factory variations, on some models modification to hood insulation may be necessary.*

10. SUPERCHARGER DISCHARGE DUCT

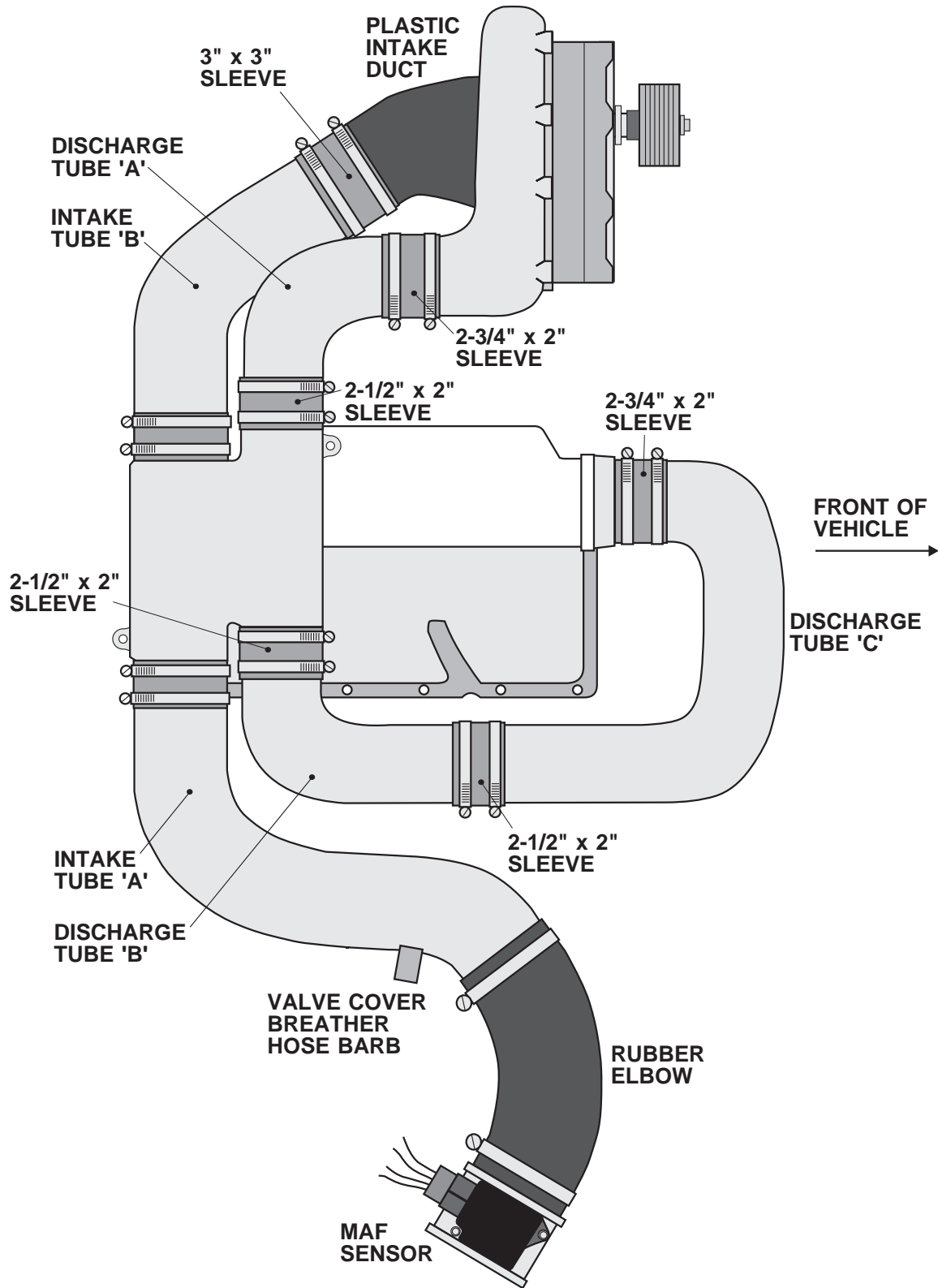


Fig. 10-a

11. FINAL REASSEMBLY & CHECK

- A. Reconnect the battery.
- B. Check all fittings, nuts, bolts and clamps for tightness. Pay particular attention to oil and fuel lines around moving parts, sharp edges and exhaust system parts. Make sure all wires and lines are properly secured with clamps or tie wraps.
- C. Check all fluid levels, making sure that your tank(s) is filled with 92 octane or higher fuel before commencing test drive.
- D. Start engine and allow to idle a few minutes, then shut off.
- E. Recheck to be sure that no hoses, wires, etc. are near exhaust headers or moving parts and for signs of any fluid leakage. Check ignition timing to make sure it is set to stock specifications before commencing test drive.
- F. **PLEASE TAKE SPECIAL NOTE:** Operating the vehicle without all of the subassemblies completely and properly installed may cause **FAILURE OF MAJOR ENGINE COMPONENTS.**
- G. Test drive the vehicle.
- H. Read the **STREET SUPERCHARGER SYSTEM OWNER'S MANUAL AND WARRANTY REGISTRATION FORM** within thirty (30) days of purchasing your supercharger system to qualify.



Fig. 11-a

WARNING: Do not attempt to operate the vehicle until ALL components are installed and ALL operations are completed including the final check.



ENGINEERING, LLC

1650 PACIFIC AVENUE • CHANNEL ISLANDS, CA 93033-9901 • (805) 247-0226
FAX (805) 247-0669 • www.vortechsuperchargers.com • M-F 8:00 AM - 4:30 PM PST