

OWNERS MANUAL

WITH INSTALLATION
INSTRUCTIONS

banks

POWERPACK

S Y S T E M

FORD 460 EFI CLASS-A MOTORHOMES
JOHN DEERE/OSHKOSH CHASSIS

THIS MANUAL IS FOR USE WITH SYSTEM PART NUMBERS 49087

banks

GALE BANKS ENGINEERING

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www.bankspower.com

**BANKS
POWERPACK® SYSTEM
FOR FORD 460 EFI ENGINES
IN JOHN DEERE/OSHKOSH
CHASSIS MOTORHOMES**

Dear Customer,

Your new Banks PowerPack is a unique combination of air intake and exhaust components designed to make the most of your engine's power potential. By removing intake and exhaust restrictions, providing cooler intake air, and tuning the exhaust to create a scavenging effect, your engine can produce more power at a higher level of efficiency. If your driving habits remain the same, your fuel mileage should go up, and you can run on the same octane fuel you are accustomed to using.

If you have any questions concerning the installation of the Banks PowerPack kit, please call Gale Banks Engineering at (626) 969-9600 between 8:00 - 5:00 PT and ask for the service department.

Thank you.

GENERAL INSTALLATION PRACTICES

For ease of installation and trouble-free operation of your Banks PowerPack®, please read this 12-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.

Inspect all components supplied for any foreign material that may have entered during shipping and handling.

WARNING: Motorhomes are very heavy. Whatever methods are used to elevate the vehicle must be of sufficient capacity for the vehicle weight involved. 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.

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

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

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.

The Banks Motorhome PowerPack is designed to fit class A 460 Ford/Oshkosh and John Deere engine/chassis combinations. Because of different equipment layouts used by various coach builders, some accessories and components may have to be relocated to accommodate the air-intake components of the Banks PowerPack.

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.

FACTORY EXHAUST MANIFOLD BOLT REMOVAL

Because of a condition inherent in the factory design, the exhaust manifolds may crack the manifold-to-head bolts as manifolds undergo changes in length from expansion and contraction. In some cases, these forces may also crack the exhaust bolt bosses on the cylinder head. Cracked bolts will not show any external damage, but bolt heads may break off upon removal.

We recommend that you do the following to minimize the possibility of broken manifold bolts.

1. Apply a penetrating oil (such as Liquid Wrench) to the area where each exhaust manifold bolt enters the cylinder head.
2. If some bolts turn more easily than others, remove these bolts first. This may reduce stress on the tighter bolts.
3. The use of an impact wrench is recommended, when available. The hammering action of the impact tool helps loosen the bolts better than the steady pull of a wrench handle.

If a manifold bolt does break off, it may be removed by one of the following methods.

1. If there is enough thread remaining on the broken bolt to install two nuts, it may be possible to jam the nuts together to turn the bolt. Tighten the nuts against each other, then turn the bolt by turning the inner nut counterclockwise.
2. If there is some thread protruding from the head, but not enough to install double nuts, it may be possible to grip the bolt with a tool such as a Vise-Grip pliers.
3. If the bolt has broken off near or below the flange surface of the head, it may be drilled and removed with a screw extractor, such as an Easy-Out. Make sure you drill the pilot hole in the center of the broken bolt with the proper size drill for the extractor used. If the hole is not on center, it may cause the extractor to bite into the threads in the head, preventing the extractor from turning.

INSTALLATION INSTRUCTIONS

1. Remove the "dog house" cover from the engine for access.
2. If a heavy-duty hoist is available, raise the vehicle and remove the front wheels for easier access. If the rear wheels remain on the ground, block the rear wheels.
3. Disconnect all cables from the battery(s).
4. Starting from the rear of the vehicle and working forward, remove the tail-pipe assembly from the vehicle. Leave exhaust pipe hangers in place on the chassis. *NOTE: Some joints may require the heat from a torch to loosen them for disassembly.*
5. Remove muffler from catalytic converter.
6. Disconnect oxygen sensor wire at oxygen sensor. (Plug is located about two feet up the wire loom).
7. Disconnect catalytic converter air-injection piping at rubber hose connections on feed piping on engine. Remove bracket bolts holding air piping to exhaust system. Save all clamps and hardware.
8. Unbolt catalytic converter at converter inlet flange. Remove converter with air piping attached. Save all hardware.
9. Remove head-pipe assembly from exhaust manifolds.
10. Disconnect sparkplug wires at sparkplugs. Label wires to assist in reinstallation.
11. Remove sparkplug heat shields.
12. Disconnect EGR valve feed tube from fitting at rear of left hand exhaust manifold and at EGR valve. A 1 $\frac{1}{2}$ " tubing wrench may be required (Snap-On No. RX34), and fitting may have to be heated, then sprayed with WD40, or similar lubricant to assist in removal from the exhaust manifold.
13. Remove exhaust manifolds from engine. Unbolt ignition coil bracket, emissions control bracket, and dipstick tube bracket as required.
14. Disconnect the main positive power cable (large red cable) from the stud on the starter motor. Re-route the main power cable to the starter motor by feeding the cable between the side engine mount and the oil pan. Cut the plastic cable ties on the forward part of the cable bundle as required to provide slack as needed for the new

cable routing. Re-connect the cable to the starter motor.

NOTE: Not all installations will require this. If the battery cable does not cross over from the frame to the starter adjacent to the exhaust manifold area, this step may be omitted. See step 18.

15. Inspect the cylinder head exhaust flange surfaces. Remove any loose carbon, rust, old gasket material, etc. as required to provide a clean, flat manifold mounting surface.

NOTE: Banks TorqueTube exhaust manifolds feature a heavy-duty machined flange that is designed to bolt directly against the cylinder head without the necessity of gaskets, which are prone to deteriorate and blow out in time. In some instances the factory cylinder-head flange surfaces may have become excessively eroded from leaking factory exhaust manifolds such that the Banks manifolds will not seal to the head. In these instances gaskets will have to be installed between the head and manifold to provide a seal.

16. Put the transmission in low gear (make sure wheels are blocked to prevent rolling). Bolt the TorqueTube manifolds to the cylinder heads while noting the following items. *NOTE: It may be necessary to turn front wheels all the way to the left to provide installation clearance.*

A. Four different bolt lengths are utilized. Refer to **Figure 2** for bolt locations.

B. The tabs that attach the spark-plug boot heatshields must be bent to line up with the bolt holes in the manifold flange. Adjust the tabs as required so spark plugs may be serviced.

C. Spacers are used with the bolts to mount the dipstick tube and ignition coil bracket. The emissions control bracket is not remounted. Bend the mounting tabs for these components to line the tabs up with the manifold and spacer bolt holes. The dipstick may be bent slightly as needed to clear the manifold tube. Be careful not to kink the dipstick tube. *NOTE: End tabs on some shields may not line up with bolt holes. In this case use center-mounting tabs only.*

17. Reconnect the EGR-valve exhaust feed tube to the EGR valve, then to the bung on the left-hand TorqueTube manifold. Feed tube may be bent slightly if needed. A light lubricant or Anti-Sieze on the threads eases installation.

18. Check that the positive battery cable to the starter motor has at least 3 inches of clearance to any part of the TorqueTubes. Also check that the cable will not rub on any sharp edges that could cut through the insulation and cause a short. Reposition or tie the cable in place to correct any of these conditions.

FIGURE 1

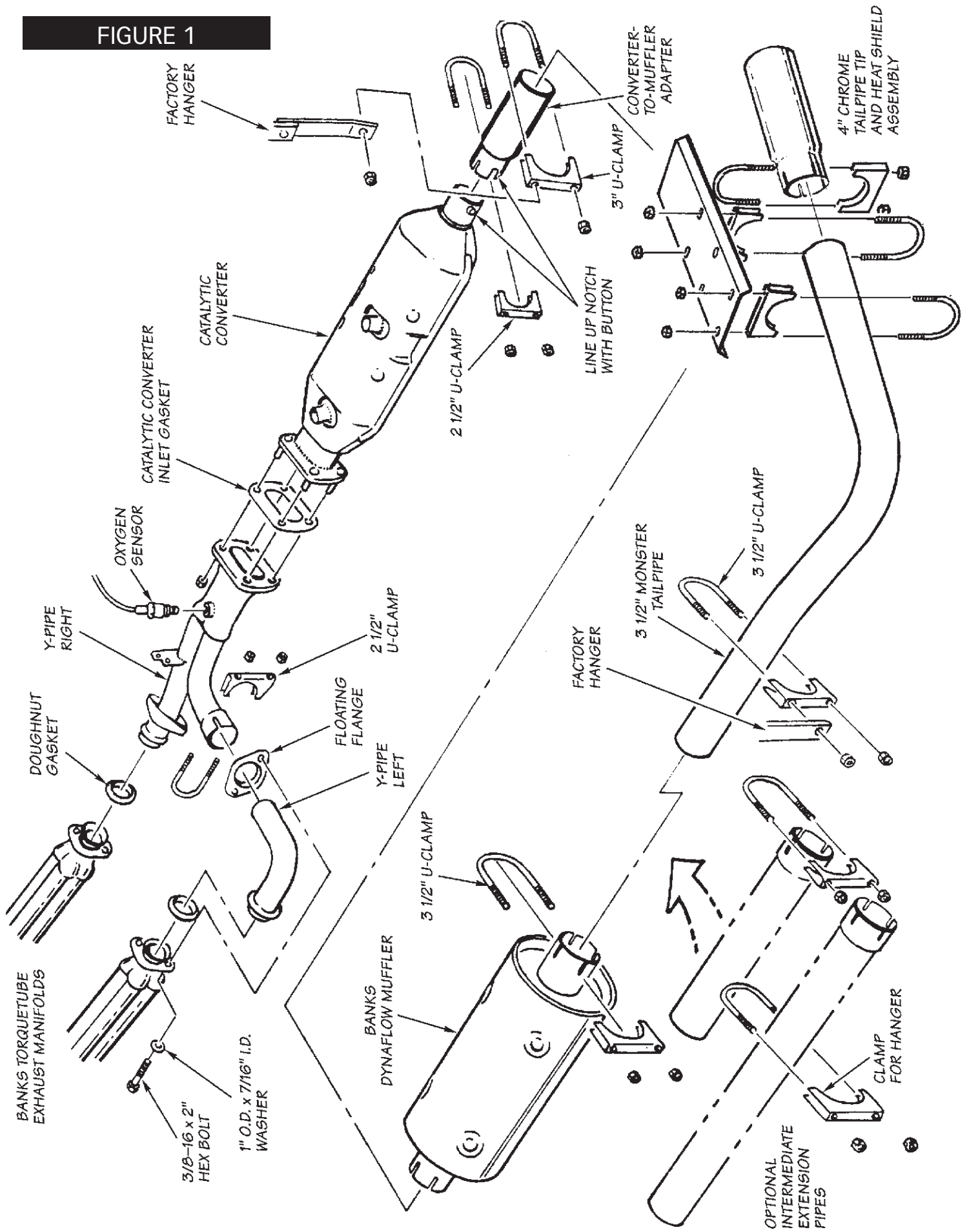


FIGURE 3

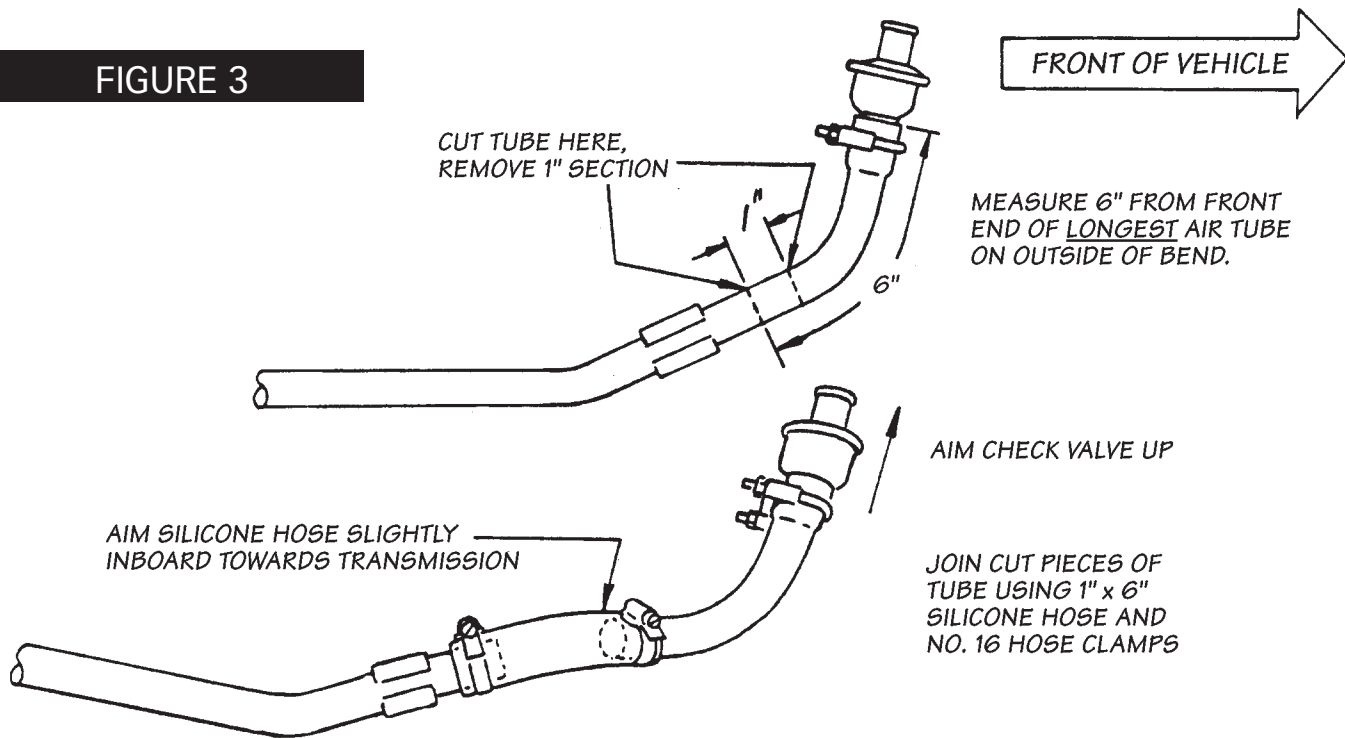
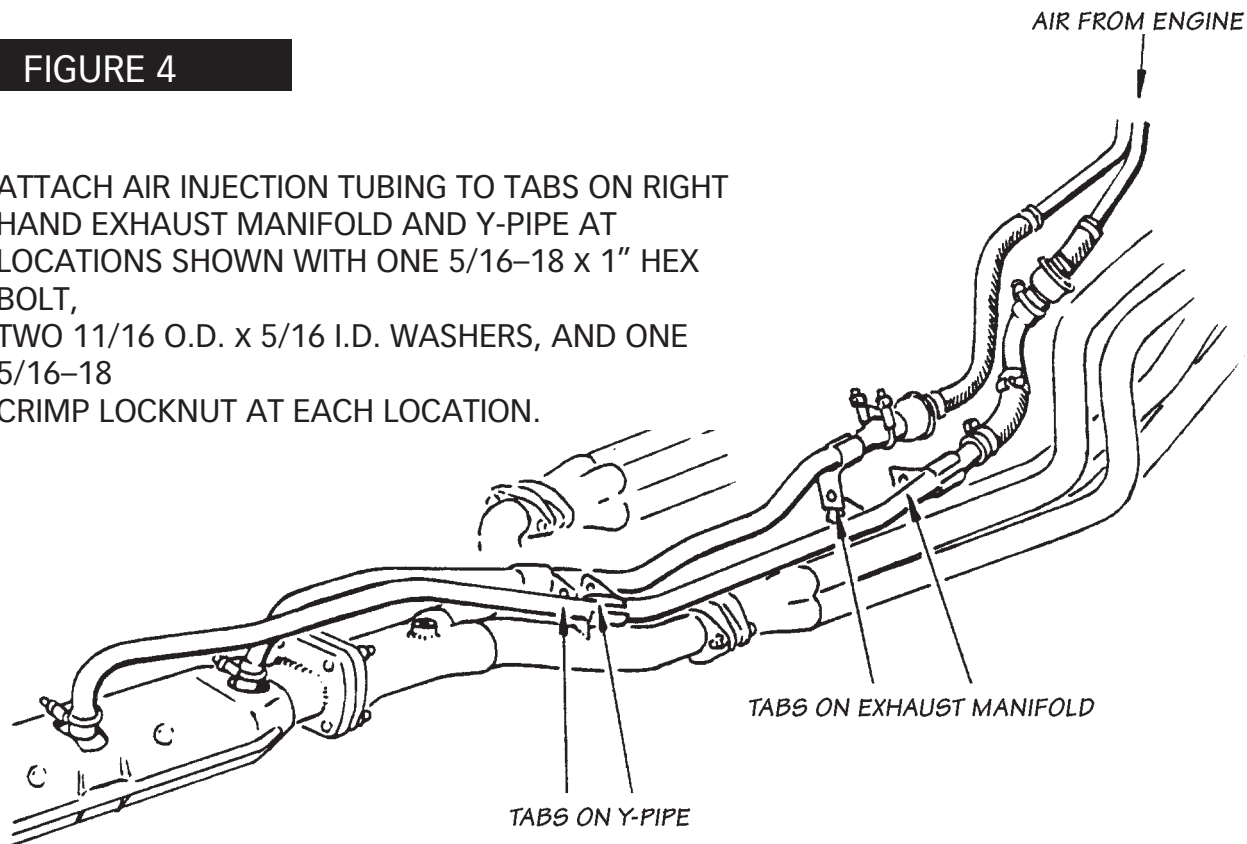


FIGURE 4

ATTACH AIR INJECTION TUBING TO TABS ON RIGHT HAND EXHAUST MANIFOLD AND Y-PIPE AT LOCATIONS SHOWN WITH ONE 5/16-18 x 1" HEX BOLT, TWO 11/16 O.D. x 5/16 I.D. WASHERS, AND ONE 5/16-18 CRIMP LOCKNUT AT EACH LOCATION.



19. Install the Banks Y-Pipe assembly to the TorqueTube manifolds using four $\frac{3}{4}$ - 16 x 2" hex bolts, four $\frac{3}{8}$ USS washers and a 2 $\frac{1}{2}$ " U-clamp. Use two donut gaskets, provided, between the manifold outlets and Y-Pipe flanges. **See Figure 1.**

20. To prevent the transmission shift rod from rattling against the TorqueTubes, bend the shift rod bell crank lever as required to provide clearance between the tubes and the rod. Run

the shift lever in the vehicle through all gear positions, and check that the shift rod clears the TorqueTubes. If possible, try to maintain $\frac{1}{4}$ inch or more clearance to prevent contact during engine rock-over. **See Figure 5.**

21. Cut the longer air injection tube to provide clearance to the exhaust manifold. Cut the tube 6 inches from the most forward bend, as shown in **Figure 3.** Then cut one inch off of

FIGURE 5

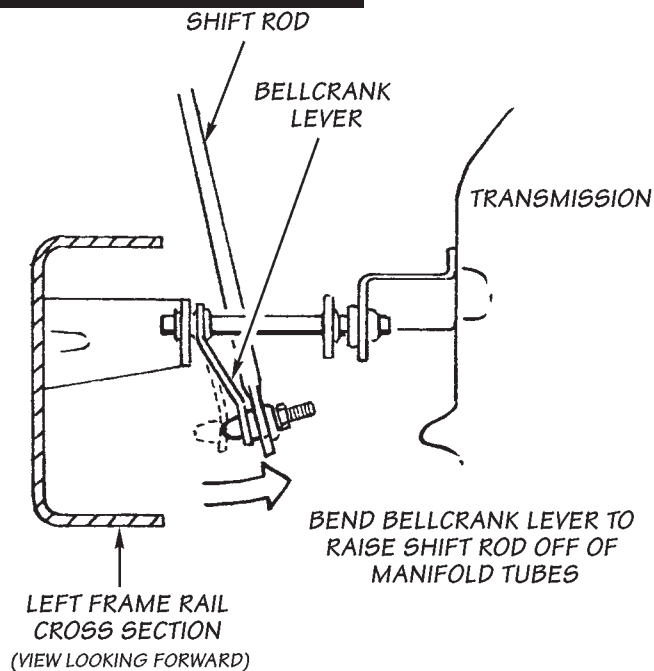
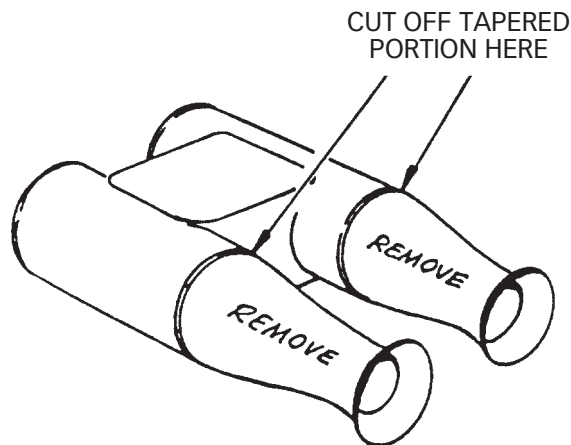


FIGURE 6

AIR SILENCER MODIFICATION



the removed section. Join the tube halves with the 1-inch I.D. silicone hose and two No. 16 hose clamps, provided. Make sure the tube ends are pushed about one inch into the hose.

22. Reinstall the catalytic converter and air injection tubes on Y-Pipe flange. Use new gasket provided.

23. Bolt the air injection tube to the tabs on the right hand TorqueTube and Y-pipe assembly using four 5/16-18 x 1" hex bolts, eight 5/16 SAE washers and four 5/16-18 crimp-lock nuts. **See Figure 4.**

24. Carefully remove the oxygen sensor from the original head-pipe assembly and reinstall in the Banks Y-Pipe. Re-connect the wiring. If wiring will not reach sensor connector, trace wire loom forward to locate excess wire bundle in engine compartment. Untie bundle and route wire as required.

25. Install the Banks Dynaflo muffler to the catalytic converter. The stainless-steel adapter supplied mounts between the converter and muffler. Note the alignment notch on the adapter. Use one 2 1/2-inch and 3-inch U-clamp to complete the assembly. **See Figure 1.**

26. Attach the existing front muffler hanger bracket to the 3-inch U-clamp to support the front of the muffler.

27. Install the Monster tailpipe assembly. Use existing hangers in vehicle to support tailpipe. The following combinations of tailpipe components should be used to cover the wheelbases listed. Do not snug U-clamps until you are satisfied with pipe alignment.

A. If the coach is a **178" wheelbase model**, install the tailpipe bend directly into the muffler outlet.

B. If the coach is a **208" wheelbase model**, install a 32 1/2" intermediate pipe between the muffler and the tailpipe. If the wheelbase is between 178" and 208", shorten the intermediate pipe as necessary.

C. If the coach is a **228" wheelbase model**, install a 52 1/2" intermediate pipe between the muffler and tailpipe. If the wheelbase is between 228" and 208", shorten the intermediate pipe as necessary. An additional U-clamp is provided with this pipe for hanging.

28. Install the chrome tip and chrome tailpipe heat shield on the tailpipe as shown in **Figure 1**. Tip may be slid in or out on the tailpipe to match the body width.

NOTE: If possible, leave tailpipe within 2" of end of chrome tip inside the tip. This will protect the chrome from changing color from high exhaust heat. Shorten tailpipe if required.

29. Cut the 6 x 14" foil heat blanket, provided, lengthwise to form two 3" x 14" strips. Wrap one strip lengthwise around each brakeline tube where the brakeline tube is closest to the exhaust manifold tubing on each side of the engine. Secure foil strips with wire ties provided. **DO NOT** wrap the foil heat blanket material around the TorqueTubes. The heat blanket will not survive if it is in direct contact with the manifold tubing.

NOTE: Brake lines may be bent somewhat to provide additional clearance to the TorqueTubes. Be careful not to kink brake lines. Vapor recovery line on right side of engine may also need to be bent back if it is within 1 1/2" of TorqueTubes.

FIGURE 7

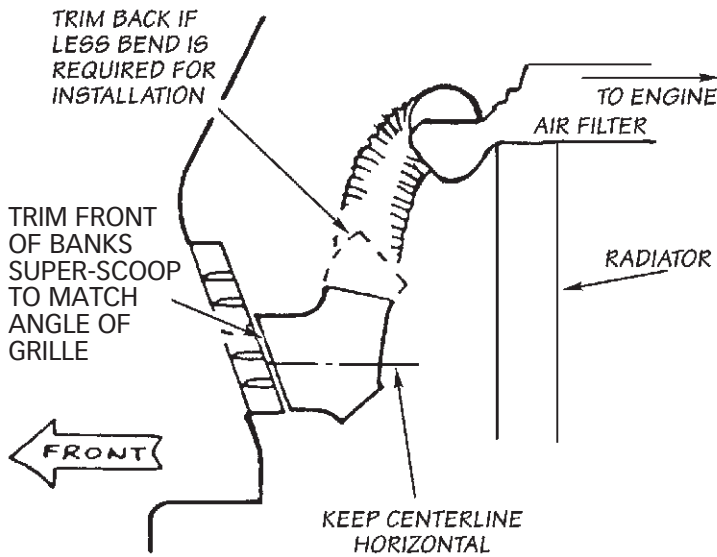
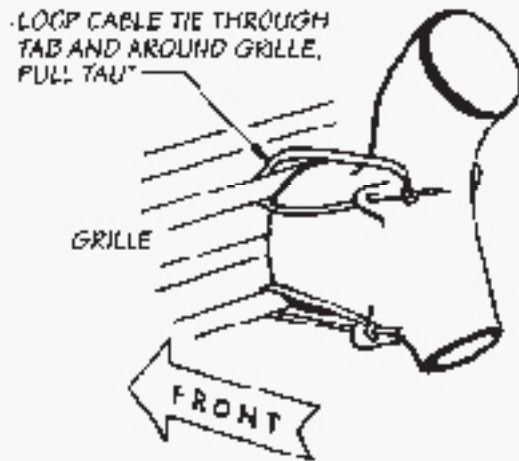


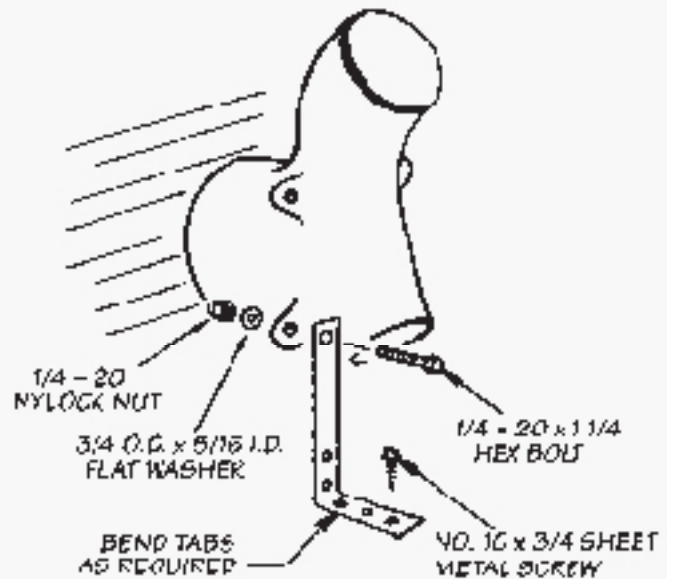
FIGURE 8

RAM-AIR SUPER-SCOOP MOUNTING METHODS

CABLE TIE MOUNTING



STRAP MOUNTING



30. Reconnect spark plug wires. Replace spark plug wires and distributor cap if condition looks marginal.

31. Remove plastic air intake silencer from air inlet hoses between air filter assembly and engine.

32. Using a hacksaw, cut the tapered sections off the silencer as shown in **Figure 6**. Reinstall the silencer in the air intake hoses using the original clamps. This increases air flow through the intake system.

BANKS RAM-AIR SYSTEM

The Banks Ram-Air cold air induction components are designed to extend the factory air intake path so that cooler outside air can be picked up from directly behind the vehicle's grille. These components include a molded Banks Super-Scoop™, 4" diameter flexible tubing, Ram-Air Filter Cover and installation hardware. **Figure 7** shows a typical hook-up of the air-intake components as they tie to the factory system. The Super-Scoop also serves as a water separator to drain out any rain water that may enter through the grille.

The Banks Ram-Air system is intended to fit a number of motorhome body configurations. Because each coach builder has a different layout of behind-the-grille components, there can be no one set installation procedure for the Banks Ram-Air package. The following instructions are intended as a guideline for installing the Ram-Air system. Also, some coach builders may have installed difficult to relocate components (such as air conditioning freon piping or heater hoses) in the areas where the Banks system is normally mounted. In these cases, the installer will have to find an alternate location for the Ram-Air components, or omit these pieces that are impossible to mount.

33. Remove the air cleaner housing cover. Replace the factory paper element and filter cover with the Banks Ram-Air filter element and cover. Use new 6mm x 40mm bolts, don't overtighten.

34. Determine a location for the Banks Super-Scoop. It should be placed as low as possible directly behind the grille, with the air inlet opening pointing straight ahead. If the grille is at an angle, the Super-Scoop should be trimmed at an angle, whenever possible, to place the air inlet opening against the back side of the grille with the centerline of the inlet opening horizontal. **See Figure 7.** Use heavy snips or a hacksaw to trim the air inlet opening of the Super-Scoop. The height between the Super-Scoop and the air inlet hood should be as great as possible to prevent any

rain water not eliminated by the Scoop's water drain hole from climbing up into the air filter. The curved outlet section of the Super-Scoop may be trimmed back if less bend is required to make a more streamlined hose routing. **See Figure 7.**

35. Once a location has been determined for the Super-Scoop, mount it using one of the methods outlined below.

The Banks Super-Scoop may be mounted by several means. If the grille consists of horizontal bars or a perforated metal screen heavy enough to support the inductor, it may be secured using four 14" nylon cable ties, provided, slipped through the ears on the Scoop and through the grille. **See Figure 8.**

An alternate method is to mount the inductor using the four perforated metal straps provided. These can be bent as required and attached to the Scoop's ears with the 1/4" 20 x 1 1/4" hex bolts, 1/4"-20 nylock nuts and 3/4" O.D. x 5/16" I.D. flat washers provided. The opposite end of the straps may be attached to any convenient mounting points such as the gravel pan, grille brackets, etc. as required, with four No. 10 x 3/4" sheet metal screws provided. A combination of cable ties and scraps may also be used.

Connect the fresh air inlet on the air filter housing to the Super-Scoop using the 4" diameter flex hose provided. Cut the hose to the desired length using a knife and diagonal cutting pliers. Secure with No. 64 hose clamps.

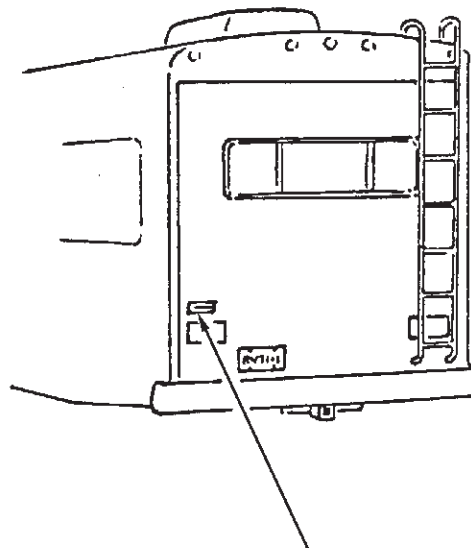
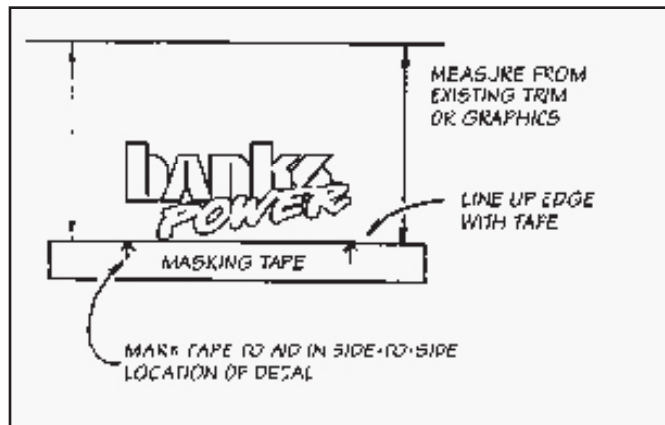
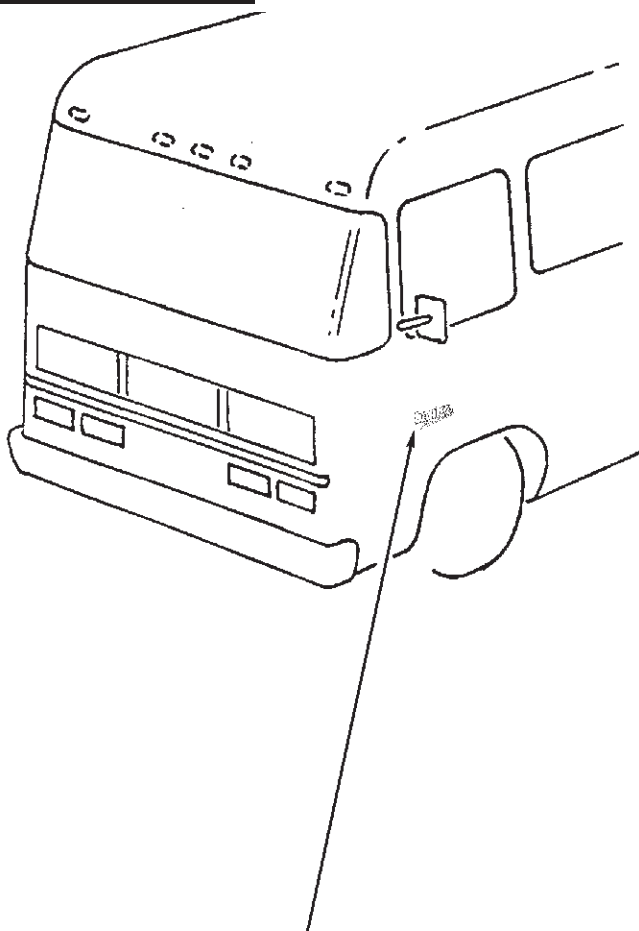
36. Check over the entire installation for loose clamps or bolts, hoses and wiring too close to hot or moving parts, sharp edges, etc. , and correct as necessary.

37. Reconnect battery cables. Reinstall engine "dog house" cover.

38. Start engine and listen for any exhaust leaks. Tighten bolts or clamps to correct leaks as required. Allow engine to warm up and test drive vehicle. *NOTE: Exhaust tubing will smoke for the first 15-20 minutes of operation. This is normal, as grease used in the bending process will burn off the inside of the pipes.*

39. Three Banks PowerPack plaques have been included in your kit. These may be affixed to your vehicle by peeling off the backing and pressing firmly in the desired location. A piece of masking tape applied to the vehicle with reference measurements to other emblems or body trim may be used to level and locate your plaques. **Figure 9** shows suggested locations for plaques.

FIGURE 9



TYPICAL LOCATIONS FOR "BANKS POWER" DECAL

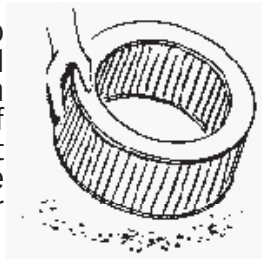
CLEANING AND OILING THE BANKS RAM-AIR FILTER

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 the Banks Ram-Air Filter.

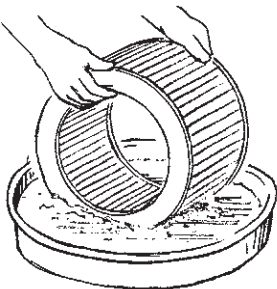
1. PRE-CLEANING

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

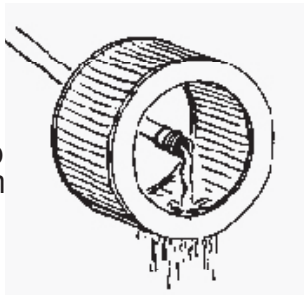
Large air-filter elements can be rolled or soaked in a shallow pan of Banks air-filter cleaner. Remove immediately and let soak for approximately 10 minutes.

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.



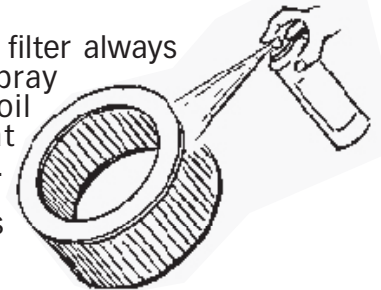
5. DRYING HINTS

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 re-oil 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

Ford 460 EFI Class-A Motorhome PowerPack® System

QTY	DESCRIPTION	PART#	QTY	DESCRIPTION	PART#
1	ADAPTER, Cat. Conv. to Muffler	52602	1	RAM-AIR, Banks	49089
4	BOLT, 5/16" 18 x 1", Hex.....	91229	1	Air Duct, Hose, 4" x 3'	94091
4	BOLT, 3/8" 16 x 2", Hex	91466	4	BOLT, 1/4" 20 x 1 1/2", Hex.....	91119
1	BOLT, Manifold, 3/8" 16 x 1", 12 Point	91951	4	BOLT, 6mm x 40mm.....	91760
13	BOLT, Manifold, 3/8" 16 x 1 1/2", 12 Point.....	91952	1	CARD, Product Registration	96392
1	BOLT, Manifold, 3/8" 16 x 2 1/2", 12 Point.....	91954	2	CLAMP, Hose, #64	92864
1	BOLT, Manifold, 3/8" 16 x 3", 12 Point	91955	1	COVER, Filter, Banks Ram-Air	42521
1	CARD, Product Registration.....	96392	1	DECAL, Carb. E.O. -D-161-38.....	96016
2	CLAMP, Exhaust, 2 1/2", HD-G	52461	1	ELEMENT, Filter, Banks Ram-Air	41508
1	CLAMP, Exhaust, 3", HD	52465	4	NUT, 1/4" 20 Nylock	91110
6	CLAMP, Exhaust, 3 1/2", HD	52467	4	SCREW, Sheet Metal, #10 x 3/4", Hex wsr hd slt	
2	CLAMP, Hose #16	92816	91840		
1	DECAL, Carb. E.O.-D-161-35	96018	1	SERVICE KIT, Filter, Banks Ram-Air	90094
1	DECAL, Carb. E.O.-D-161-27	96027	4	STRAP, Mounting.....	42611
1	FLANGE, Head Pipe.....	52343	1	SUPER-SCOOP, Banks Ram-Air.....	42602
1	GASKET, Cat. Conv. Flange.....	93164	4	TIE, Cable, 15", Black.....	62003
2	GASKET, Exhaust Outlet.....	93161	4	WASHER, 1/4", USS	91103
1	HEATSHIELD, Blanket, 6 x 14"	26001	1	SPACER, Manifold Bolt.....	35295
1	HEATSHIELD, Chrome Tailpipe.....	26067	1	SPACER, Spark Plug Shield	26099
1	HOSE, Silicone, 1" Bulk, Green (0.5 ft.).....	94147	4	TIE, Wire, Heatshield Blanket, 16"	26013
1	MANIFOLD, TorqueTube, Left	52242	1	WARRANTY STATEMENT.....	96363
1	MANIFOLD, TorqueTube, Right.....	52243	8	WASHER, 3/8", SAE	91402
1	MUFFLER, DynafLOW, w/Heatshield, Stainless.....	52405	4	WASHER, 3/8", USS	91403
4	NUT, 5/16" 18 Crimplock.....	91212	12	WASHER, 5/16", SAE	91202
1	OWNERS MANUAL	96347			
1	PIPE, 3 1/2" Monster Tailpipe, Stainless	52239			
1	PIPE, Chrome Tailpipe Tip, 4 x 12"	52281			
1	PIPE, Extension, Y-Pipe, Stainless	52247			
1	PIPE, Y-Assembly, Stainless.....	52246			
3	PLAQUE, Banks PowerPack.....	96008			