

OWNERS MANUAL

WITH INSTALLATION
INSTRUCTIONS

banks

POWERPACK

S Y S T E M

FORD 460 CARBURETED ENGINE
IN CLASS-A MOTORHOMES
WITH JOHN DEERE/OSHKOSH CHASSIS

THIS MANUAL IS FOR USE WITH SYSTEM PART NUMBERS 49085

banks

GALE BANKS ENGINEERING

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**POWERPACK® SYSTEM
460 FORD ENGINE
OSHKOSH & JOHN DEERE
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 am and 5:00 pm (PT) and ask for the service department.

Thank you.

GENERAL INSTALLATION PRACTICES

1. For ease of installation and trouble-free operation of your BANKS PowerPack®, please read this entire 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.

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

3. CAUTION: 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.

4. 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.

5. Right-hand and left-hand designations refer to the driver's right or left, as seated in the vehicle, (i.e.: Right-hand refers to the passenger side of the vehicle, unless noted otherwise.)

6. The Banks Motorhome PowerPack® is de-signed 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.

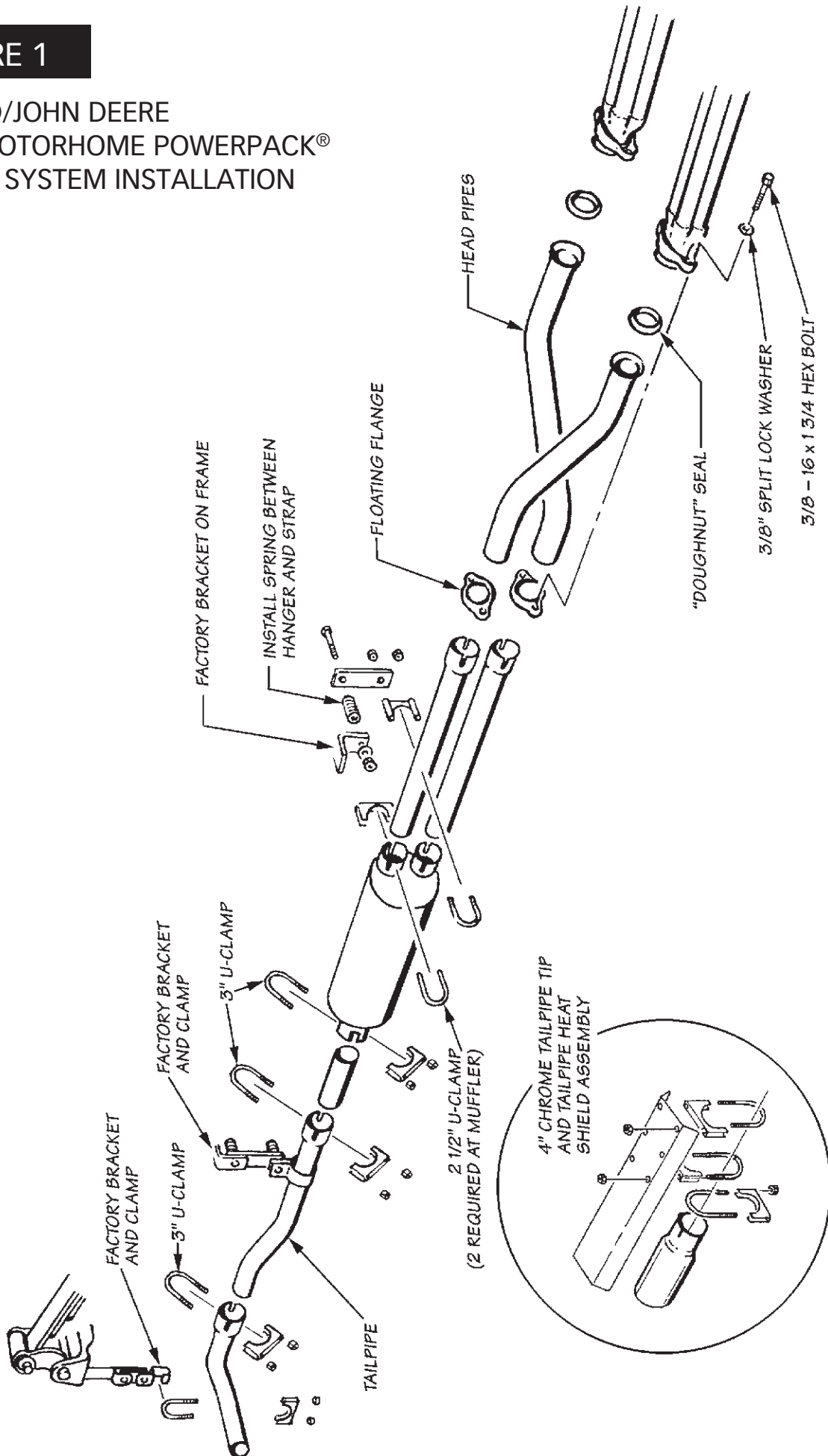
1. If there is enough thread remaining on the broken bolt to install two nuts, it may be possible to jam the nuts together to turn the bolt. Tighten the nuts against each other, then turn the bolt by turning the inner nut counterclockwise.

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 and 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.

FIGURE 1

460 FORD/JOHN DEERE BANKS MOTORHOME POWERPACK® EXHAUST SYSTEM INSTALLATION



INSTALLATION INSTRUCTIONS

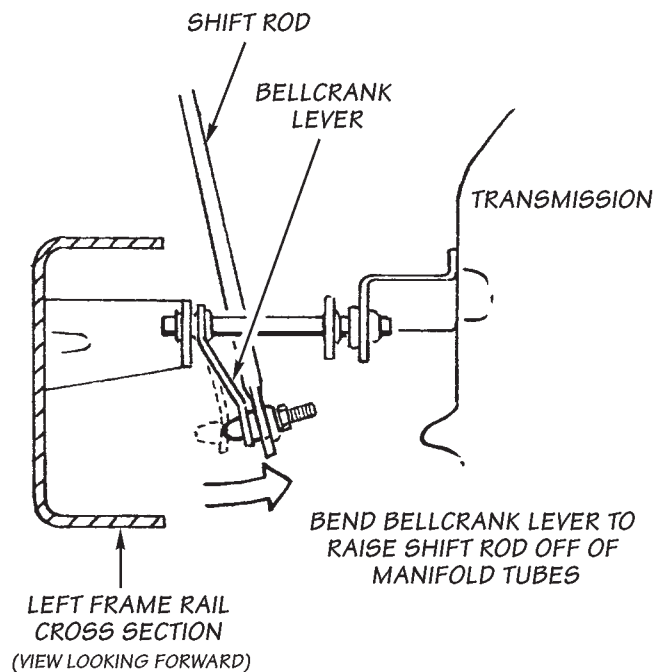
1. Remove the "dog house" cover from the engine for access.
2. If a heavy duty hoist is available, raise the vehicle and remove the front wheels for easier access. If the rear wheels remain on the ground, block the rear wheels.
3. Disconnect all cables from the batteries).
4. Starting from the rear of the vehicle and working forward, remove the exhaust system from the vehicle. Leave exhaust pipe hangers in place on the chassis.
5. Disconnect the rubber hoses from the air injection tubing on the exhaust manifolds. Remove the exhaust manifolds from the engine. (see notes on bolt removal)

NOTE: Some models do not use manifold air injection. If not equipped with manifold air injection, go to step 7.

6. Remove the air injection tube assemblies from the exhaust manifolds. You may need to use heat and/or penetrating oil on the tubing nuts. Use a flare-nut wrench to avoid rounding of the corners of the tubing nuts.
7. Disconnect the main positive power cable (large red cable) from the stud on the starter motor.
8. 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.
9. 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.
10. Put the transmission in low gear (make sure wheels are blocked to prevent rolling). Bolt the Banks exhaust manifolds to the cylinder heads. Use the new gasket/heat shields provided between the cylinder heads and manifolds. Attach the new manifolds with $\frac{3}{8}$ -16 x 1 inch 12-point bolts. Use anti-sieze compound on the threads.
11. Re-install the air injection tubing assemblies to the new exhaust manifolds. Hook up the hoses to the air injection tubing assemblies. (If engine is not equipped with a manifold air injection system, install eight plugs, provided, in the new exhaust manifolds.)
12. Re-connect the hot air tube from the air cleaner to the heat stove pipe on the exhaust manifold.

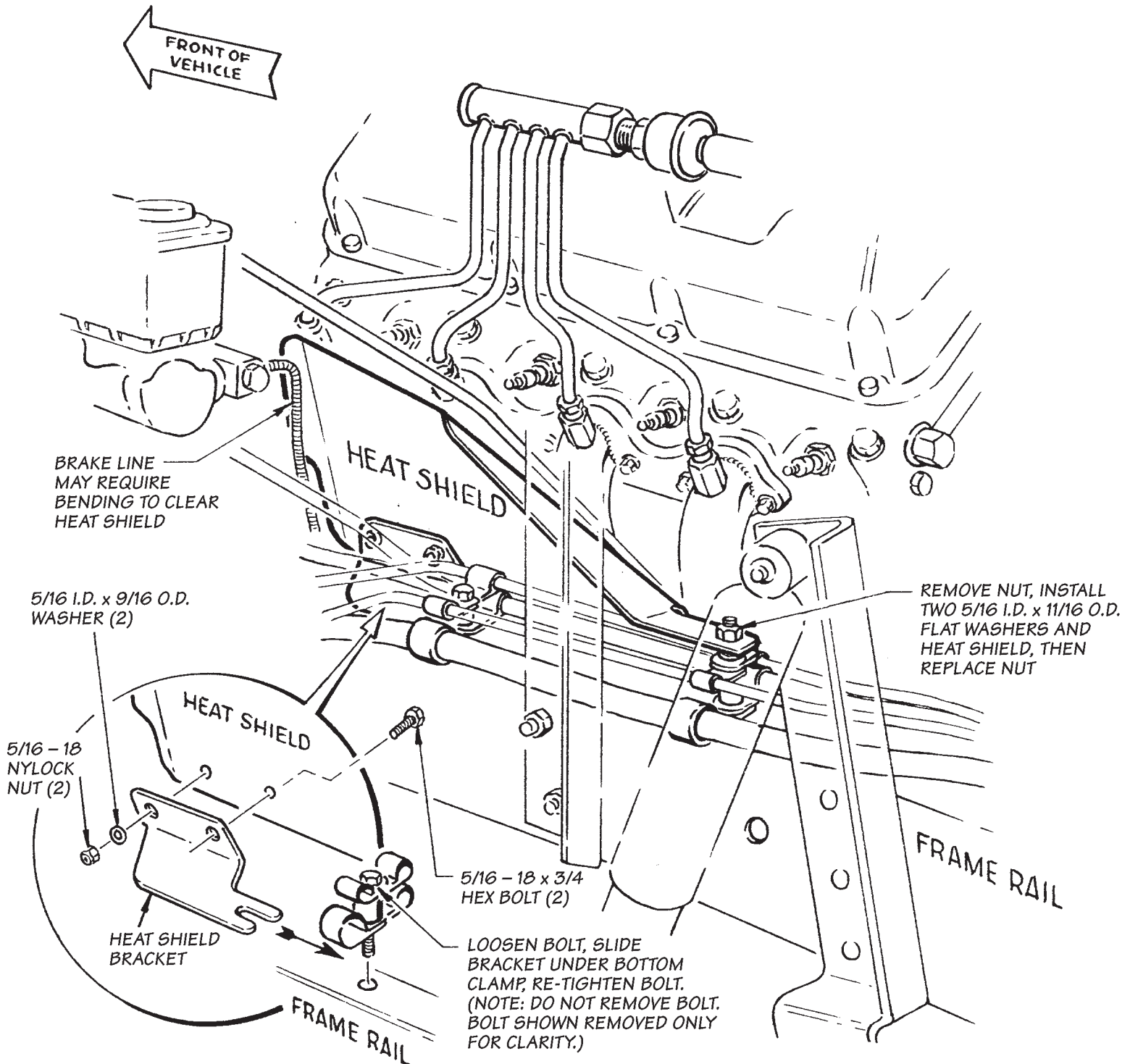
13. Check that the re-routed cable to the starter motor has at least 3 inches of clearance to any part of the exhaust manifold tubing. Also check that the cable will not rub on any sharp edges that could cut through the insulation and cause a short. Reposition or tie the cable in place to correct any of these conditions.
14. Starting from the exhaust manifold outlets, install the new exhaust piping and muffler (see Figure 1). The two floating exhaust flanges must be slid onto the head pipes prior to installation. Note the new position of the spring at the forward muffler hanger. Universal hangers and clamps are provided for your use if necessary.
15. To prevent the transmission shift rod from rattling against the exhaust manifold tubes, bend the shift rod bellcrank 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 exhaust tubes. If possible, try to maintain $\frac{1}{4}$ inch or more clearance to prevent contact during engine rock-over. See Figure 2.

FIGURE 1



16. Bolt the heat shield bracket to the left side heat shield using two $\frac{5}{16}$ -18 x $\frac{3}{4}$ hex bolts, $\frac{5}{16}$ I.D. x $\frac{9}{16}$ O.D. washers, and $\frac{5}{16}$ -18 nylock nuts (see Figure 3).

FIGURE 3



17. The slotted hole on the heat shield bracket bolts to the left side frame rail adjacent to the engine mount. On some models there may be a cable clamp or hydraulic line clamps bolted in this location. If so, loosen (do not remove) this bolt so that the heat shield and bracket assembly can be slid under the cable or hydraulic line clamps. See Figures 3 & 4.

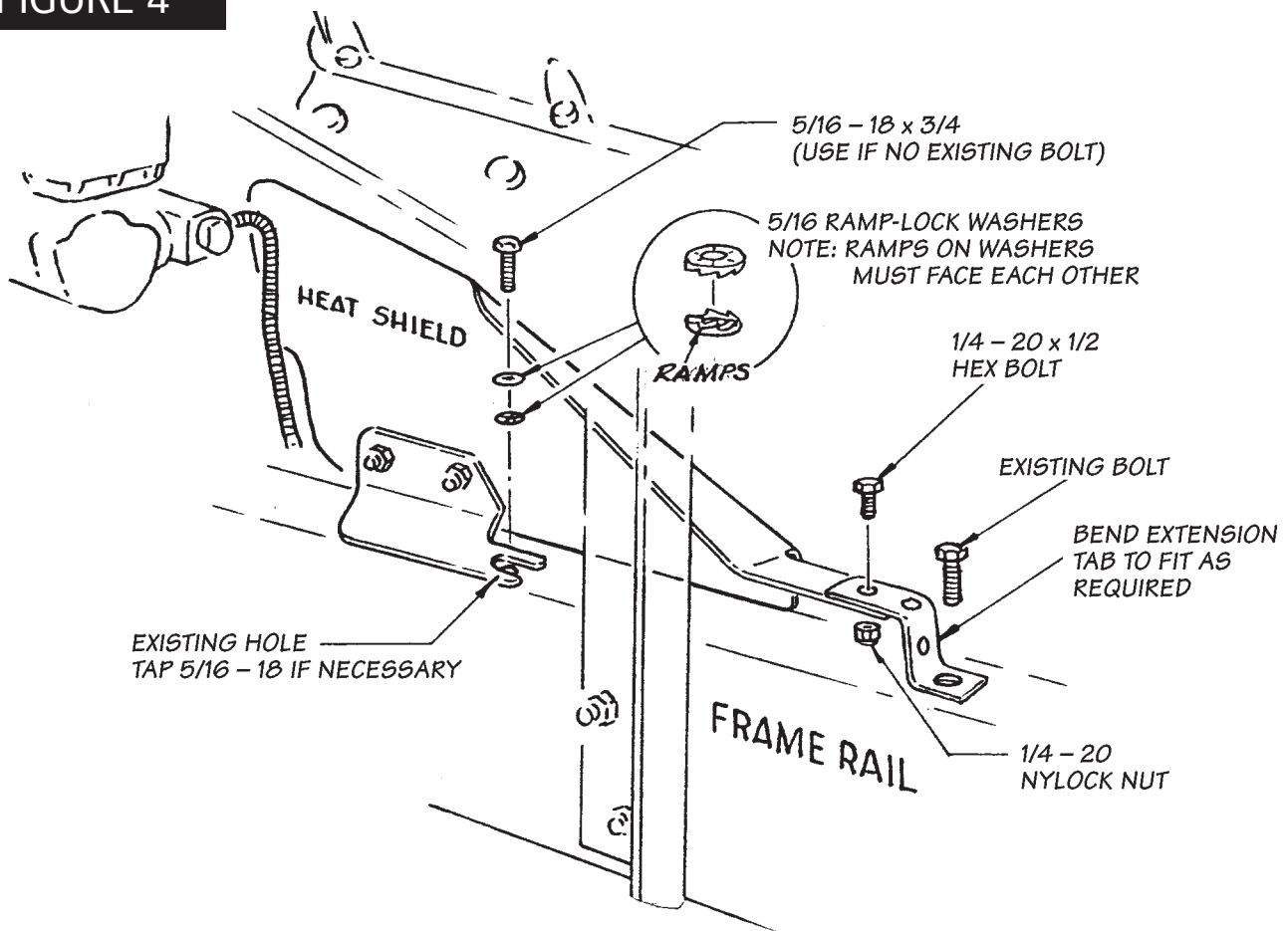
18. If no bolt exists at this location, tap the bolt hole with a $\frac{5}{16}$ -18 tap, and install a $\frac{5}{16}$ -18 x

$\frac{3}{4}$ hex bolt and two ramp-lock washers.

NOTE: the ramp-lock washers are used as a pair, with the ramps tightened against each other. Do not tighten this bolt at this time.

19. Determine if the heat shield will fit into place. On some models the brake line leaving the rear of the master cylinder may interfere slightly with the heat shield. **CAREFULLY** bend this line to clear the shield. On other

FIGURE 4



vehicles, the interference to the shield may be much more severe, requiring bending of the heat shield. Different brake line configurations have been used by the factory.

20. On the left frame rail adjacent to the rear of the engine, remove the nut that secures the hydraulic lines and cables to the top of the frame rail (see Figure 3). *NOTE: Not all vehicles have the hydraulic lines shown in Figure 3, however the nut and bolt should be present.*

21. Drop two $\frac{5}{16}$ I.D. x $\frac{11}{16}$ O.D. flat washers onto the threads where the nut was removed. These will act as spacers for the heat shield.

22. Tighten the forward bolt that attaches the heat shield bracket (at the slotted hole) to the frame rail. Check that the heat shield has clearance between it and the exhaust tubes, to prevent rattles during engine operation. Adjust as necessary.

23. On the right side of the engine, wrap the 6 x 14" heat blanket, provided, around the brake line and vapor recovery line where they pass the exhaust manifold tubing. Use the wire ties, provided, to secure the heat blanket to the brake and vapor recovery tubing. **DO NOT** wrap the heat blanket around the exhaust manifold tubing! The heat blanket will not survive if it is in

direct contact with the exhaust tubing.

BANKS RAM-AIR SYSTEM

The Banks PowerPack 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 and installation hardware. **Figure 5.** 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 PowerPack cold air induction package 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 Ram-Air 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.

FIGURE 5

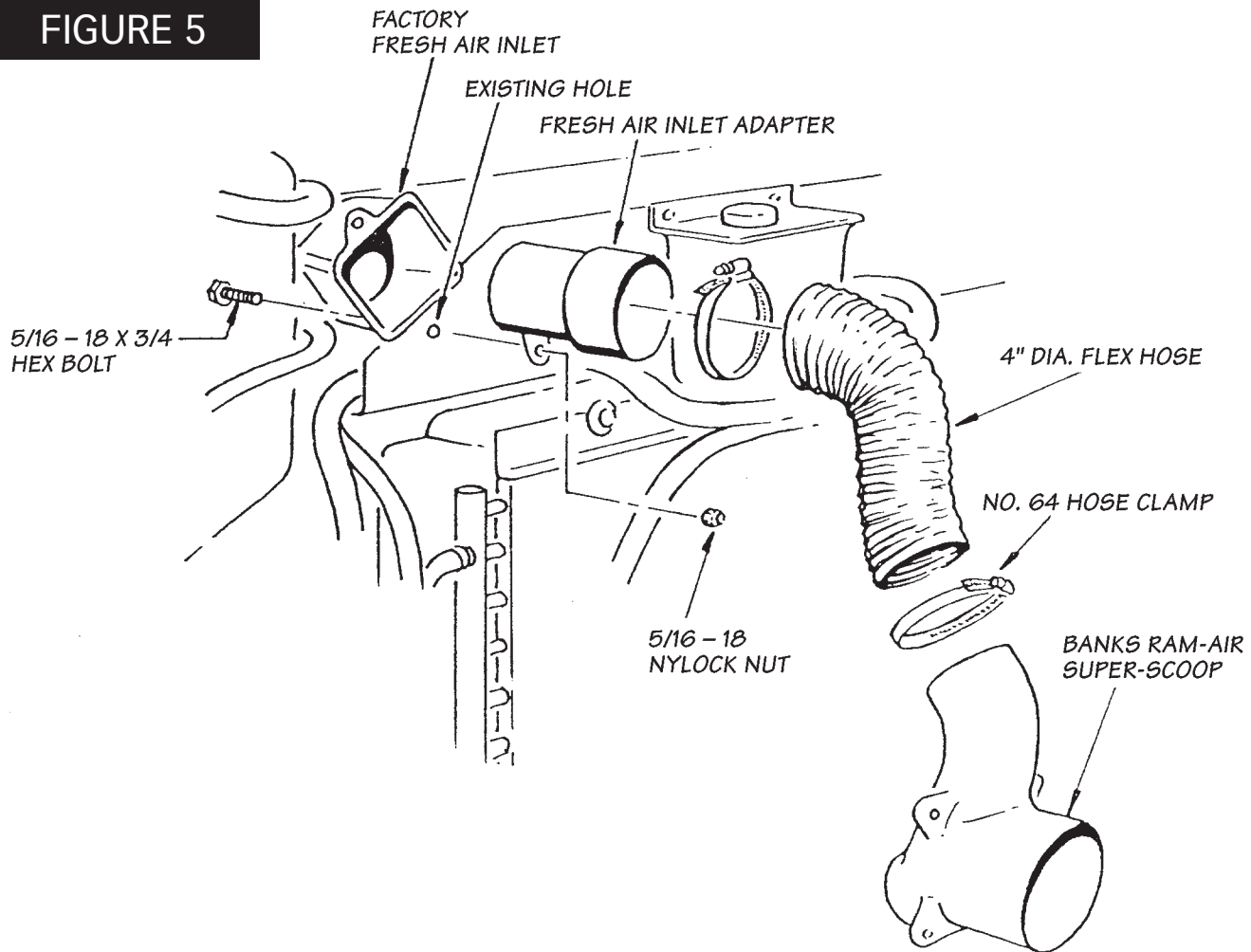


FIGURE 6

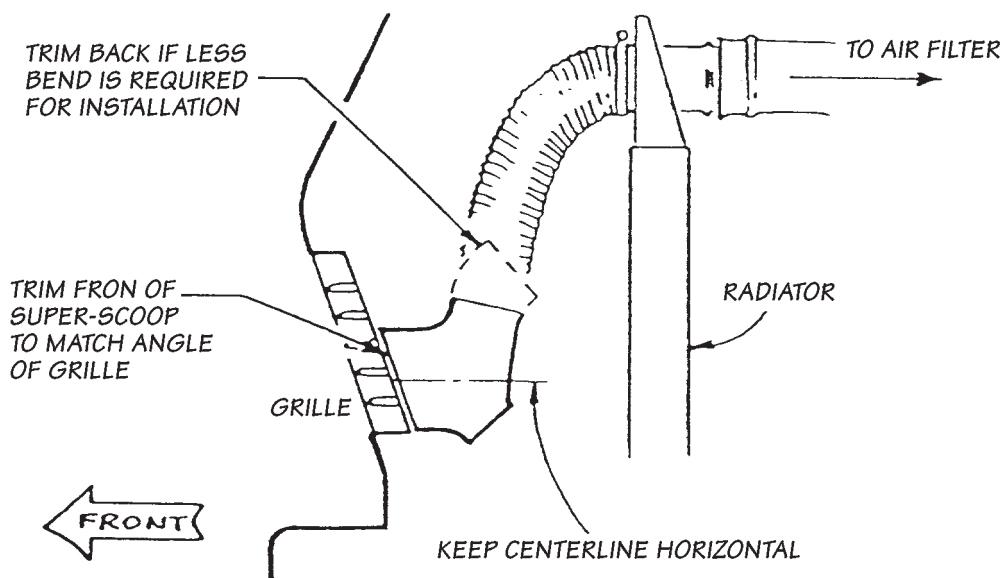
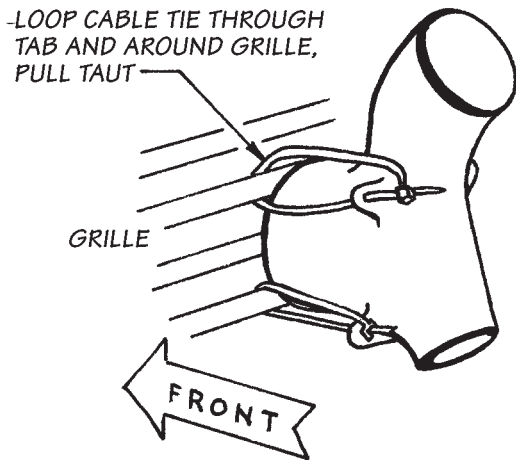
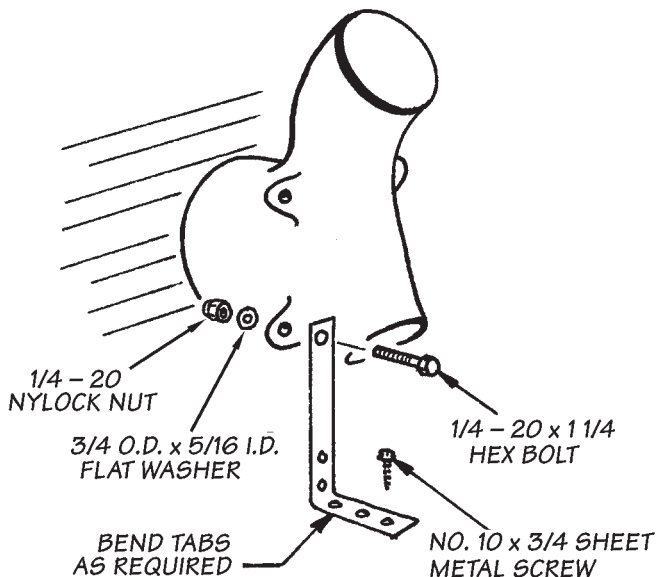


FIGURE 7**RAM-AIR SUPER-SCOOP
MOUNTING METHODS****CABLE TIE MOUNTING****STRAP MOUNTING**

24. Install the metal fresh-air hose adapter fitting in the fresh air duct above the radiator bulkhead panel. Push the fresh-air hose adapter so it may be bolted to the bulkhead. Use a $\frac{5}{16}$ - 18 x $\frac{3}{4}$ hex bolt and a $\frac{5}{16}$ - 18 nylock nut to mount the adapter to the existing hole in the bulkhead panel (see Figure 5). (If the adapter can be used, but the tab will not line up with the existing hole, drill a new hole as required.)

25. 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 6. 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 6.

26. 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 7.

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 $\frac{1}{4}$ 20 x $1\frac{1}{4}$ hex bolts, $\frac{1}{4}$ -20 nylock nuts and $\frac{3}{4}$ O.D. x $\frac{5}{16}$ 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 $\frac{3}{4}$ " sheet metal screws provided. A combination of cable ties and scraps may also be used.

27. 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 claps.

28. Remove the air cleaner housing cover. Replace the factory paper element with the Banks Ram-Air filter element.

29. 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.

30. Re-connect battery cables. Re-install engine "dog house" cover.

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.

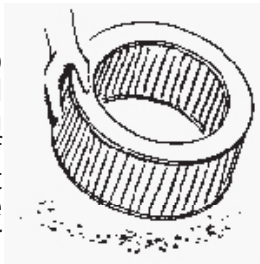
CLEANING AND OILING THE BANKS RAM-AIR FILTER

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.

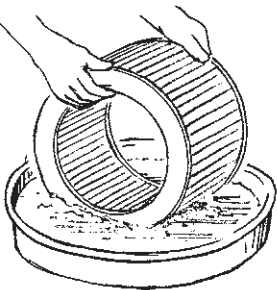
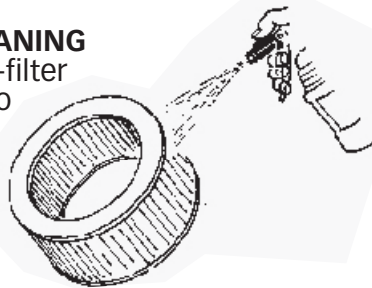
1. PRE-CLEANING

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

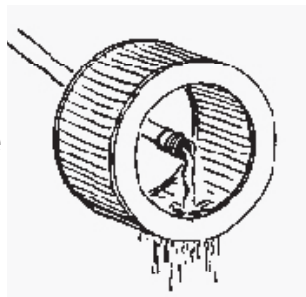
Large air-filter elements can be rolled or soaked in a shallow pan of Banks air-filter cleaner. Remove immediately and let soak for approximately 10 minutes.

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.

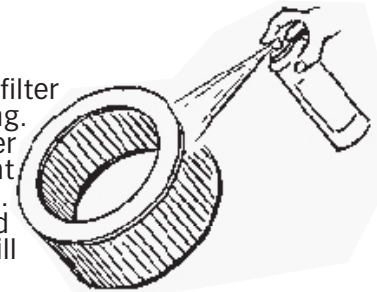


5. DRYING HINTS

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



7. OILING HINTS

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

8. REINSTALL

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

9. DO NOT DISCARD

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

10. PERFORMANCE HINTS

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

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

BILL OF MATERIALS

Ford 460 Class-A Motorhome PowerPack System Carbureted Engine • w/John Deere/Oshkosh Chassis

COMPONENT	PART #
MANIFOLD, Stainless TorqueTube, Left	52166
MANIFOLD, Stainless TorqueTube, Right	52167
PIPE, Headpipe, Left, 2 1/2"	52244
PIPE, Headpipe, Right, 2 1/2"	52245
(2) PIPE, Headpipe Extension, Left & Right, 2 1/2"	52272
(1) PIPE, Chrome Tailpipe Tip, 3 1/2 x 12"	52285
PIPE, Chrome Tailpipe Heatshield	26067
PIPE, Tailpipe	52664
PIPE, Tailpipe Extension	52665
ADAPTER	52472
MUFFLER, Banks Dynaflow™	52403
BANKS RAM-AIR™	49086
FILTER ELEMENT, Banks Ram-Air	41015
ADAPTER, Hose, Air Inlet	41154
SUPER-SCOOP™, Banks Ram-Air	42602
(4) STRAP, Mounting	42611
(4) TIE, Cable, 15" Black	62003
SERVICE KIT, Air Filter	90094
(4) WASHER, 1/4" USS	91103
(4) NUT, 1/4" 20 Nylock	91110
(4) BOLT, 1/4" 20 x 1 1/4" Hex	91119
NUT, 5/16" 18 Nylock	91210
BOLT, 5/16" 18 x 3/4" Hex	91224
(4) SCREW, Sheet Metal, #10 x 3/4", Hex washer hd slt	91840
(2) CLAMP, Hose, #64	92864
(3) HOSE, Air Duct, 4 x 3"	94091
(2) FLANGE, Headpipe	52343
(5) CLAMP, Exhaust, 2 1/2" HD-G	52461
(7) CLAMP, Exhaust, 3" HD	52465
(2) HANGER, Universal	52193
BRACKET, TorqueTube Heatshield	26093
(2) GASKET, Exhaust Outlet	93161
(2) GASKET, TorqueTube Manifold	93084
HEATSHIELD, Blanket, 6 x 14"	26001
HEATSHIELD, TorqueTube Manifolds	26091
(2) TIE, Wire, Heatshield Blanket, 16"	26013
TAB, TorqueTube Heatshield	26098
LUBRICANT, Anti-Seize, 1 oz.	90045
(8) PLUG, TorqueTube Air Injection Ports	92260
(6) TIE, Cable, 8" Black	62010
(2) BOLT, 5/16" 18 x 3/4" Hex	91224
(2) BOLT, 1/4" 20 x 1/2" Hex	91115
(4) BOLT, 3/8" 16 x 2" Hex	91466
(16) BOLT, Manifold, 3/8" 16 x 1 1/4" 12 point	91952
(2) NUT, 1/4" 20 Nylock	91110
(2) NUT, 5/16" 18 Nylock	91210
(4) WASHER, 5/16" Circle Lock	91205
(2) WASHER, 5/16" S/S AN	91201
(2) WASHER, 5/16" USS	91203
(4) WASHER, 3/8" Split Lock	91404
OWNERS MANUAL	96345
CARD, Product Registration	96392
DECAL, Carb. "Rep. Part"	96024
WARRANTY STATEMENT	96366

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