

Models 675/675A

The Model 675A Engine Brake is designed and approved for use on all Mack six-cylinder 672 (and 711) CID Automotive Engines: E6, EC6, EM6 and EMC6 that have the two-valve head configuration. The Model 675A replaces the Model 675 in the Jacobs Engine Brake product line.

Jacobs Service Letters should be consulted for additional applications and updated information

INSTALLATION

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Safety Precautions

The following symbols in this manual signal potentially dangerous conditions to the mechanic or equipment. Read this manual carefully. Know when these conditions can exist. Then, take necessary steps to protect personnel as well as equipment.



THIS SYMBOL WARNS OF POSSIBLE PERSONAL INJURY.



THIS SYMBOL REFERS TO POSSIBLE EQUIPMENT DAMAGE.

NOTE:

INDICATES AN OPERATION, PROCEDURE OR INSTRUCTION THAT IS IMPORTANT FOR CORRECT SERVICE.

Do not work on this equipment when mentally or physically fatigued. Always wear eye protection.

Fuels, electrical equipment, exhaust gases and moving engine parts present potential hazards that could result in personal injury. Take care when installing an engine brake. Always use correct tools and proper procedures as outlined in this manual.



SEE JACOBS DRIVER'S MANUAL FOR PROPER ENGINE BRAKE DRIVER TECHNIQUES

THE JAKE BRAKE RETARDER IS A VEHICLE SLOWING DEVICE, NOT A VEHICLE STOPPING DEVICE. IT IS NOT A SUBSTITUTE FOR THE SERVICE BRAKING SYSTEM. THE VEHICLE'S SERVICE BRAKES MUST BE USED TO BRING THE VEHICLE TO A COMPLETE STOP.

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Section 1: Introduction

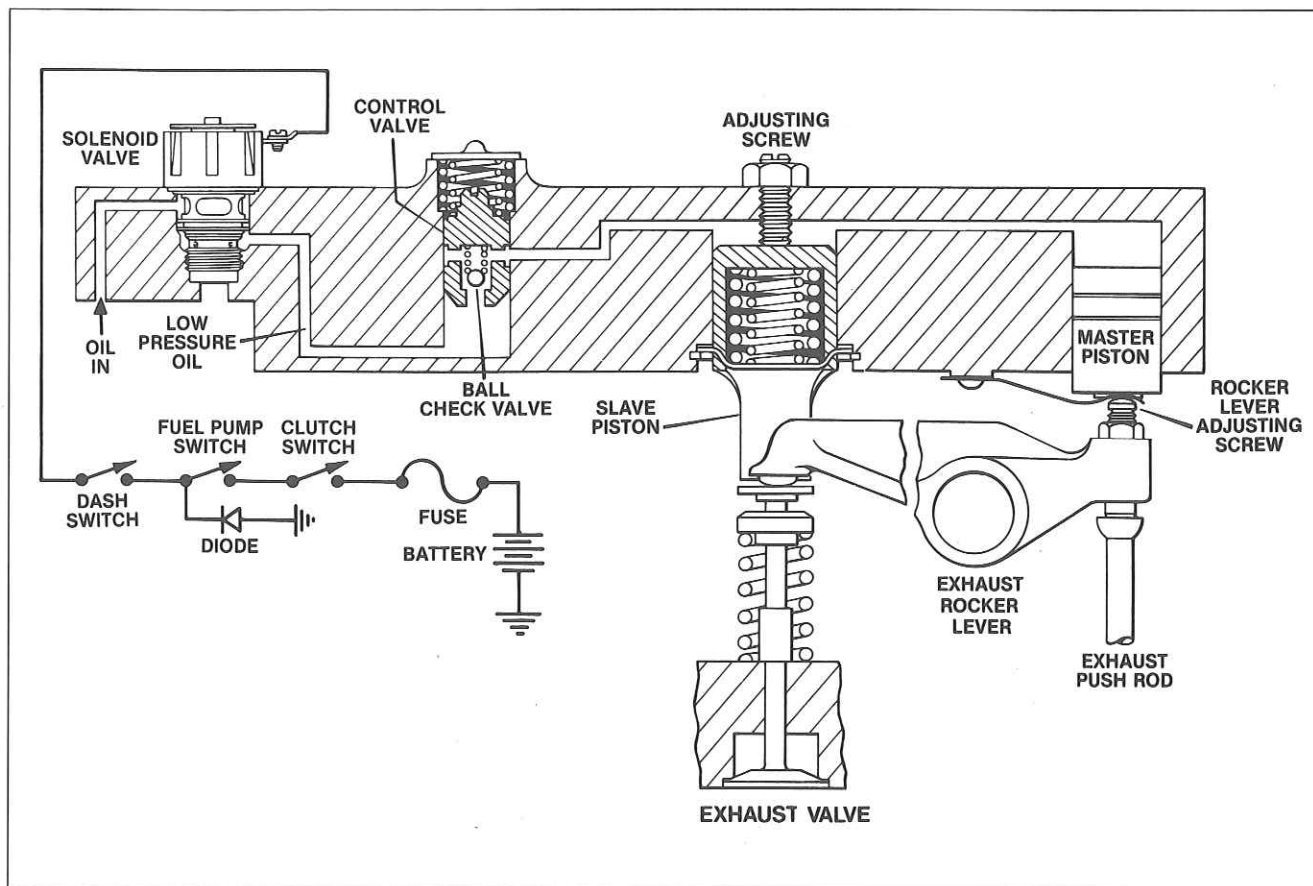


FIG. 1: SCHEMATIC DIAGRAM OF ENGINE BRAKE OPERATION

Master-Slave Circuit Relationship Listed in Engine Firing Order

Location of Master Piston	Location of Slave Piston
Actuates	
No. 1 Push rod	No. 3 Exhaust Valve
No. 5 Push rod	No. 6 Exhaust Valve
No. 3 Push rod	No. 2 Exhaust Valve
No. 6 Push rod	No. 4 Exhaust Valve
No. 2 Push rod	No. 1 Exhaust Valve
No. 4 Push rod	No. 5 Exhaust Valve

Theory of Operation

Simply stated, energizing the engine brake effectively converts a power-producing diesel engine into a power-absorbing air compressor. This is accomplished through motion transfer using a master-slave piston arrangement which opens cylinder exhaust valves near the top of the normal compression stroke, releasing the compressed cylinder charge to exhaust.

The blowdown of compressed air to atmospheric pressure prevents the return of energy to the engine piston on the expansion stroke, the effect being a net energy loss since the work done in compressing the cylinder charge is not returned during the expansion process.

Exhaust Blowdown

Referring to the schematic drawing, exhaust blowdown occurs as follows:

1. Energizing the solenoid valve permits engine lube oil to flow under pressure through the control valve to both the master piston and the slave piston.
2. Oil pressure causes the master piston to move down, coming to rest on the corresponding exhaust rocker arm adjusting screw (see below for master-slave piston operating relationship).
3. The exhaust rocker pushrod begins upward travel (as in normal exhaust cycle) forcing the master piston upward and creating a high pressure oil flow to the slave piston braking cylinder. The ball check valve in the control valve imprisons high pressure oil in the master-slave piston system.
4. The slave piston under the influence of the high-pressure oil flow moves down, momentarily opening the exhaust valve, while the engine piston is near its top dead center position, releasing compressed cylinder air to the exhaust manifold.
5. Compressed air escapes to atmosphere completing a compression braking cycle.

Method of Driving a Vehicle Equipped with a Jacobs Engine Brake

It is easy to learn the proper method of driving a vehicle equipped with a Jacobs Engine Brake. Since the engine brake is most effective at rated engine speeds, gear selection is very important. Gearing down the vehicle, within the limits of rated engine speed, makes the engine brake a more effective retarder. Obviously, maximum retarding occurs with the selection of the lowest gear that prevents exceeding rated engine speed.

The Model 675A Engine Brake kit contains a progressive switch that provides three or six cylinder operation of the engine brake. This switch provides the operator with greater flexibility in selecting the amount of retarding needed for various road and load conditions.

For more information on driving with the Jake Brake, read your Jacobs Driver's Manual.

To get a detailed presentation on driving with the Jacobs Engine Brake, consult your Jacobs distributor.

Engine Brake Housing Location and Model Number Identification

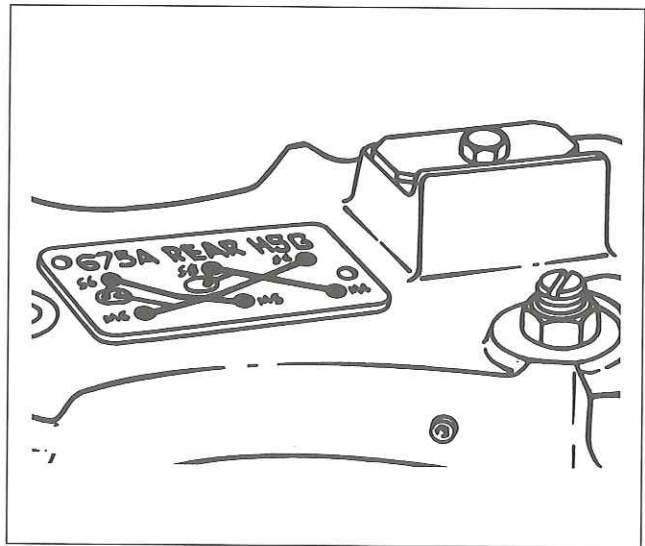


FIG. 2

Each engine brake housing assembly has an identification tag showing model number and installation location marked FRONT or REAR.

This Installation Manual should be used in conjunction with Jacobs Parts Manual, P/N 019044, when replacement part information is required. The Parts Manual can be obtained from your Jacobs distributor.

Special Tools

The following special tools should be available for installation:

1. Jacobs feeler gauge 0.030 inch (0.760 mm), P/N 011355
2. 9/16" crowfoot wrench

Automatic Transmissions

For control system wiring information on vehicles with automatic transmissions, refer to Jacobs Service Letters or contact your nearest distributor.

Recommended Torque Values

Rocker bracket hold-down bolts	35 lbft. (50 N•m)
Engine brake hold-down bolts	35 lbft. (50 N•m)
Slave piston adjusting screw nut	20 lbft. (25 N•m)
Compressor housing bolts (for mounting switch bracket on Robert Bosch pumps)	100 lbin. (10 N•m)

Section 2: Engine Preparation

Before starting installation, make sure all necessary optional components for various engine configurations are available. Some engine configurations requiring special parts include: low-mounted tuned manifolds, overboard breather tube, chassis-mounted charge air cooled engines and engine-mounted charge air cooled engines. See Section 7 and refer to Jacobs Parts Manual P/N 019044 for optional components.

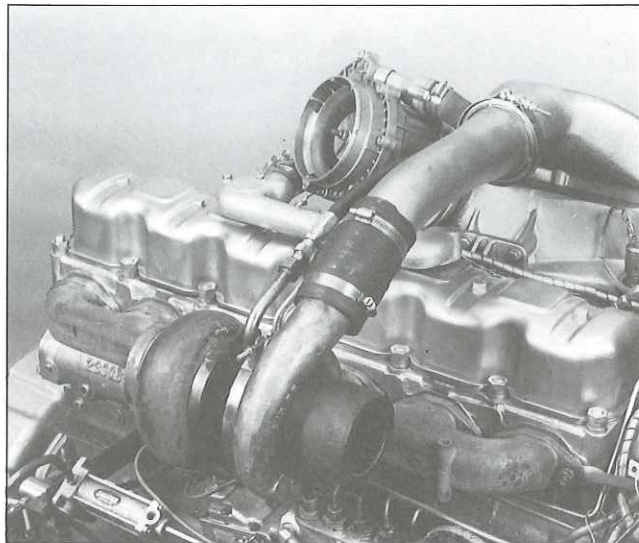


FIG. 3

1. Clean engine thoroughly. Remove all engine components required to allow clear access to cylinder head covers. Remove both cylinder head covers.

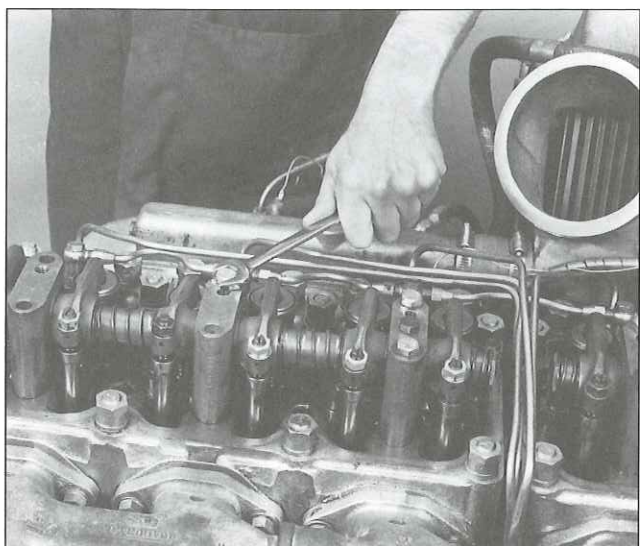


FIG. 4

2. Remove the rocker arm shaft assemblies from engine.

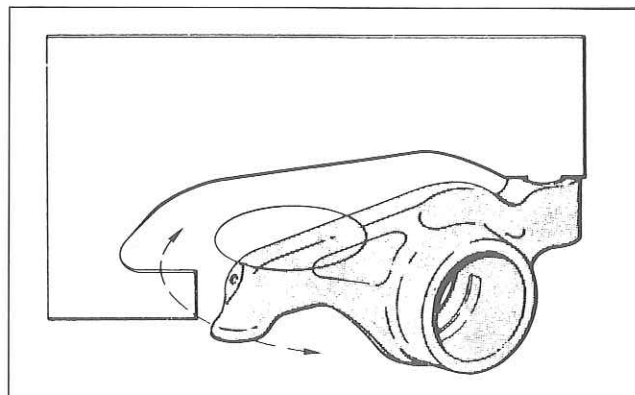


FIG. 5



FIG. 6

3. Remove the Mack exhaust rocker arm adjusting screws. Save the Mack locknuts.
4. Install the Jacobs rocker adjusting screws in the exhaust rocker levers. Re-use the locknuts. Discard Mack screws.

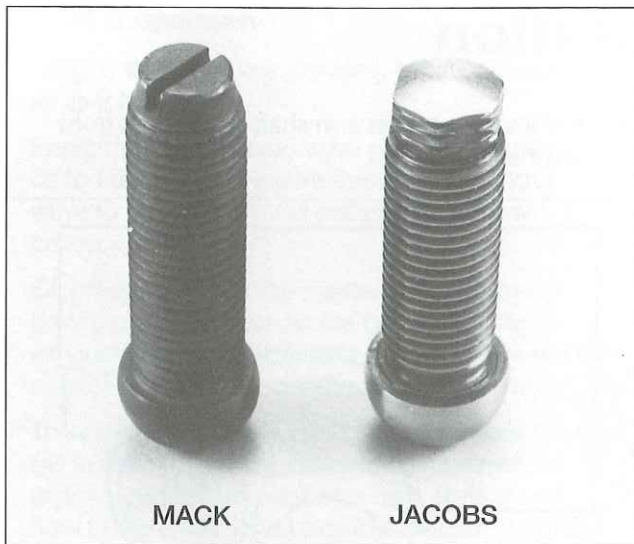


FIG. 7

NOTE:

THE JACOBS ADJUSTING SCREWS HAVE HEX HEADS. MACK SCREWS HAVE A SCREW-DRIVER SLOT.



FIG. 8

NOTE:

CURRENT ENGINES HAVE 0.435 INCH (11.1 MM) DIAMETER VALVE STEMS. USE JACOBS VALVE STEM CAP, P/N 009263, ON THESE ENGINES. MACK ENGINES WITH SERIAL NUMBERS BELOW 9V6755 CAN HAVE LARGER DIAMETER EXHAUST VALVE STEMS, 0.486 INCH (12.3 MM). JACOBS VALVE STEM CAP, P/N 002032, MUST BE USED ON THESE EARLIER ENGINES.

6. Place the Jacobs valve stem caps on top of each exhaust valve.



USE THE CORRECT SIZE VALVE STEM CAP. THE CAPS ARE NOT INTERCHANGEABLE. IMPROPER USAGE WILL CAUSE ENGINE DAMAGE.

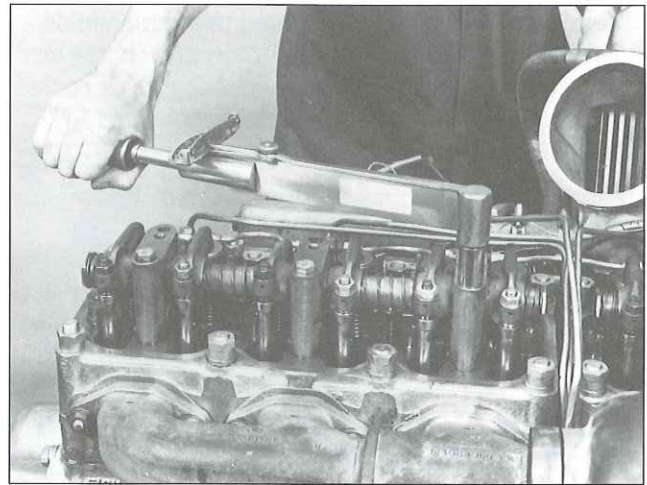


FIG. 9

7. Replace rocker assemblies using new "O" rings (Mack or equivalent) under the brackets. Apply clean engine oil to six Mack hold-down capscrews. Install one capscrew in each rocker shaft bracket on the exhaust side of each bracket (next to push rods). Check that all push rods are in their sockets and rocker adjusting screws are backed out so valves are not forced against pistons. Tighten each bracket hold-down capscrew to 35 lbft. (50 N•m).

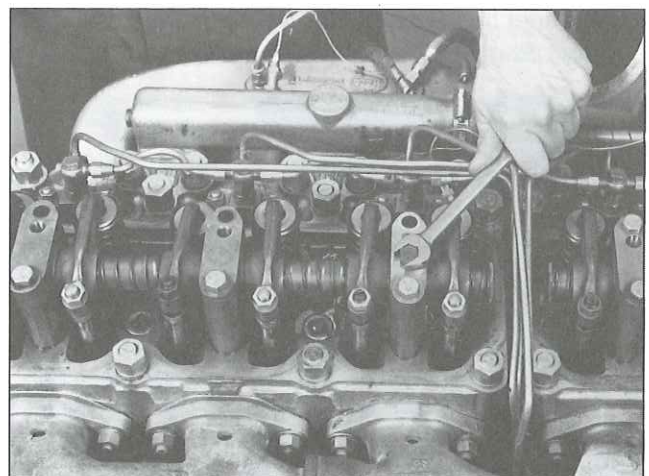


FIG. 10

8. Remove the hex head screws that lock the rocker shafts in position, located on the rocker brackets over cylinders 1 and 4.

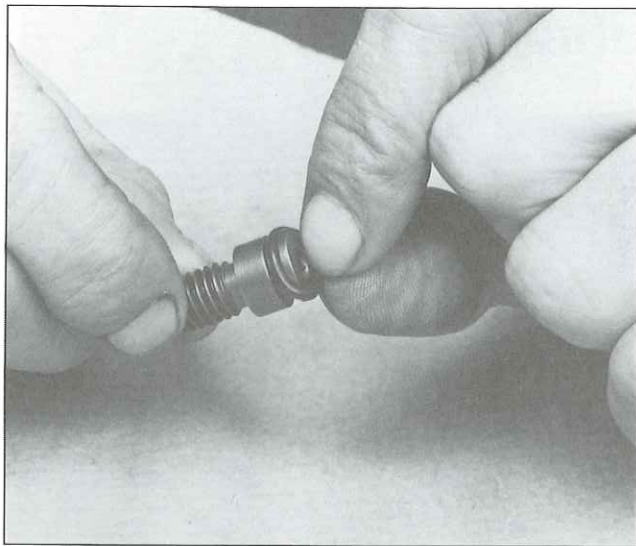


FIG. 11

9. Install "O" rings in the grooves in the oil supply screws.

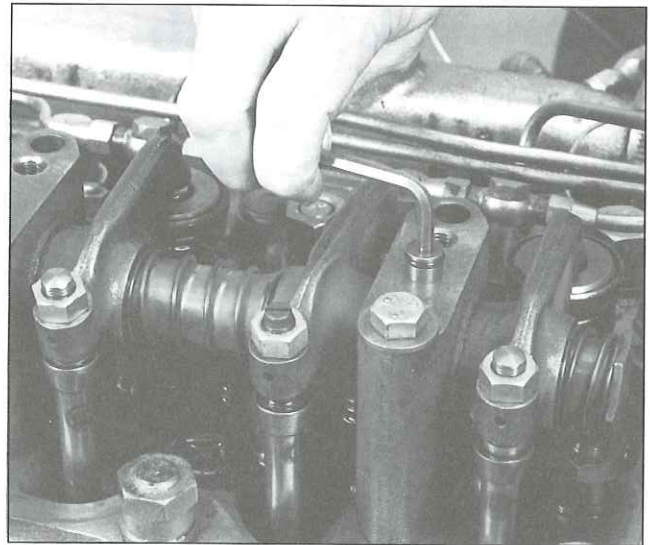


FIG. 12

10. Install the Jacobs oil supply screws in place of hex head rocker shaft locating screws. Tighten the screws against the bracket. Apply clean engine oil to the "O" rings and screws.

Section 3: Housing Spacer Installation

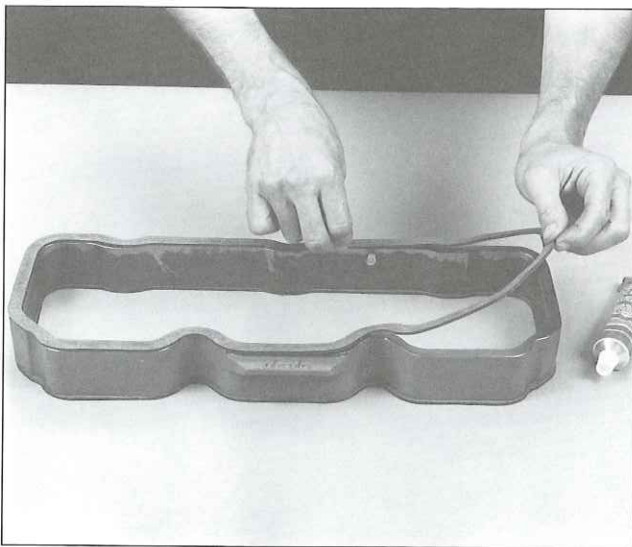


FIG. 13

1. Two Mack valve cover gaskets (4 per engine) are required for each spacer. Apply a thin layer of "Scotch Grip" 3M Company, No. 1711 (or equivalent) contact-type cement to both spacer mounting surfaces and gaskets. Let stand for several minutes. Assemble adhesive side of one gasket to upper spacer surface and adhesive side of second gasket to lower spacer surface. Allow several minutes for gaskets to bond to spacer.

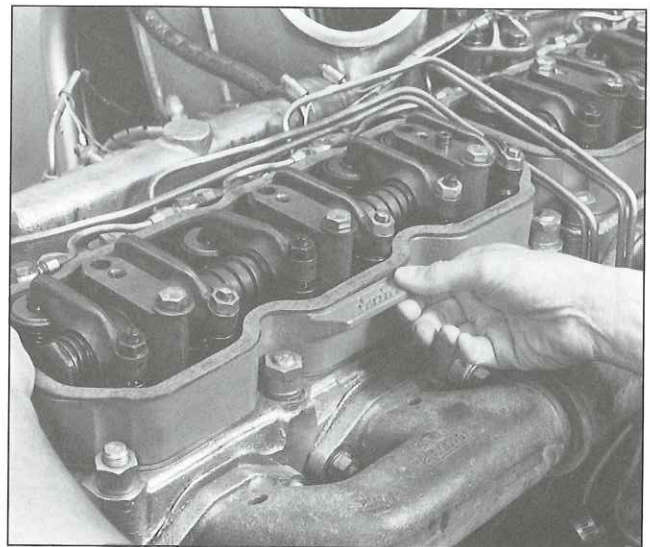


FIG. 14

2. Wipe clean the top of the cylinder head. Install the Jacobs spacers making certain the gaskets remain bonded to the spacers.

Section 4: Housing Installation

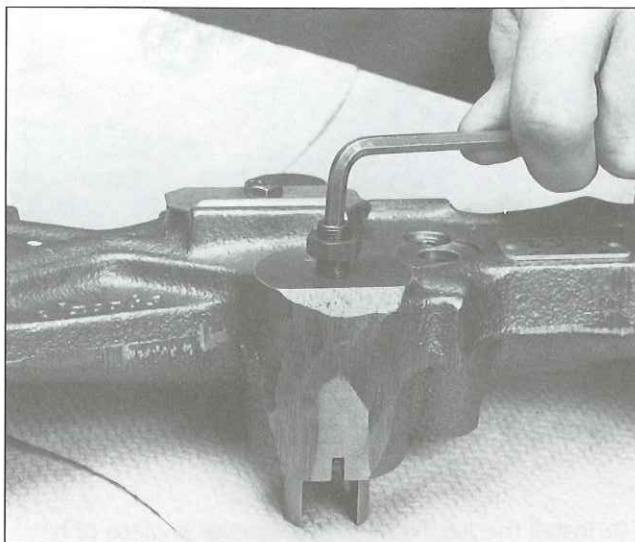


FIG. 15

1. Check to be sure that all slave pistons adjusting screws are backed out so that the slave pistons are fully retracted (screws loose).

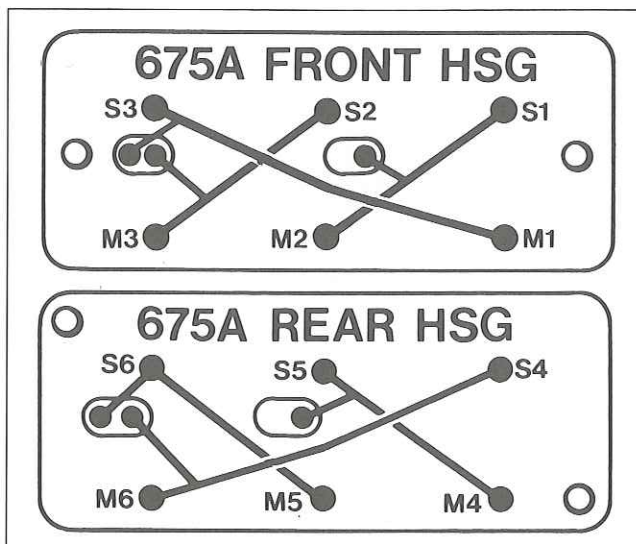


FIG. 16

2. The engine brake housings have identification plates on the top which identify FRONT and REAR.

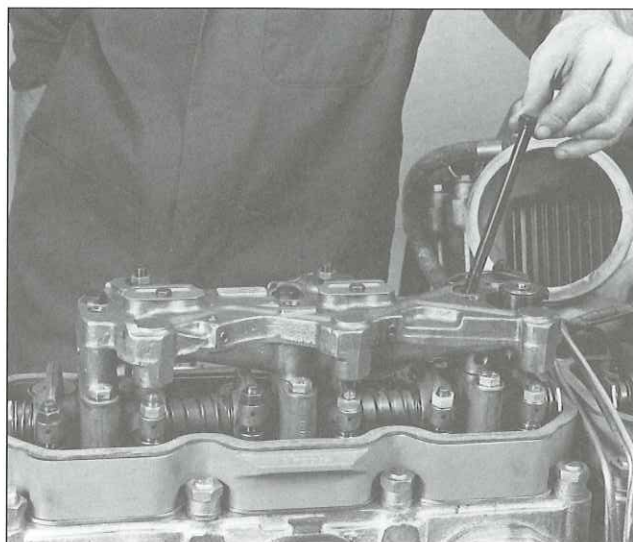


FIG. 17

3. Place the engine brake housings in position on the rocker shaft brackets. Be sure the front housing is over cylinders 1, 2 and 3, and rear housing over cylinders 4, 5 and 6. Apply clean engine oil to the six Jacobs hold-down capscrews and install them through each brake housing and the rocker shaft brackets, as shown.

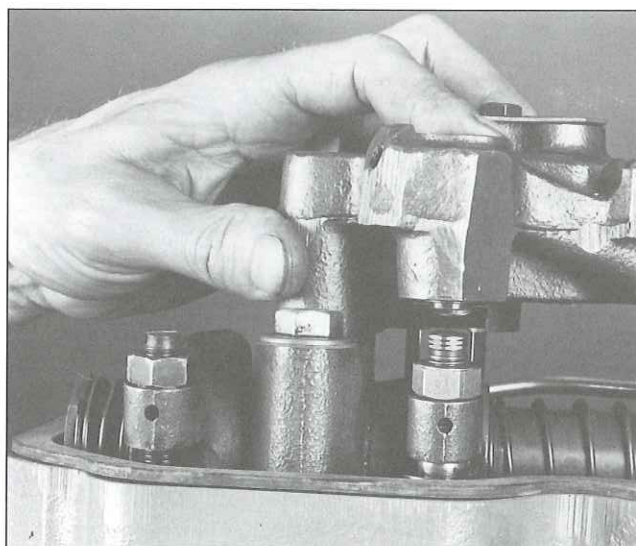


FIG. 18

4. Move housings, as necessary, to center master pistons over exhaust rocker adjusting screws.

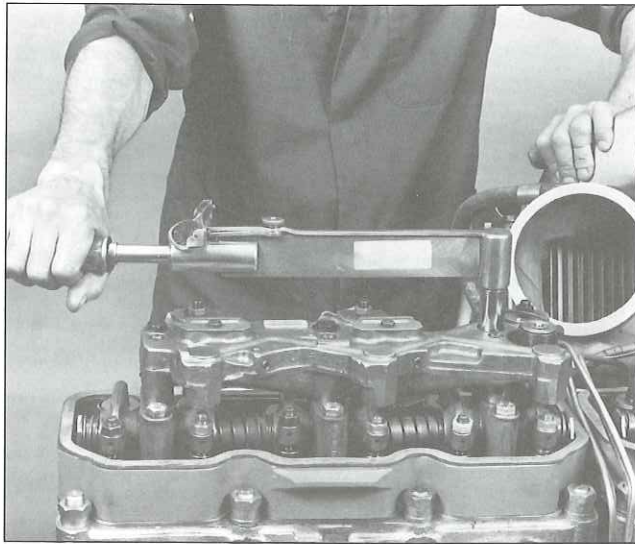


FIG. 19

5. Tighten the three Jacobs capscrews to 35 lbft. (50 N•m) on each housing.

Valve Adjustment

Exhaust and intake valves must be readjusted prior to adjusting the engine brake.

Adjust the valves as described in the current Mack Service Manual.

Valve Lash Must Be Set Under Static Conditions. [Coolant temperature below 100° F (38° C).] The valve lash adjustment on **all** engines should be set under static conditions to eliminate the possibility of damaging the pistons. Incorrectly adjusted valve lash could result in valve hitting the piston.

To properly adjust the valves under static conditions, the vibration damper must be marked in 120° increments (see Mack Service Manual).

If engine does not have a timing indicator, install indicator and mark damper as described in the "Special Instructions for Assembly of Service Blocks" in the Mack Service Manual.

With timing indicator installed and vibration damper properly marked, intake and exhaust valves are ready for adjusting.

NOTE:

MAKE VALVE ADJUSTMENT ACCURATELY. IMPROPER VALVE ADJUSTMENTS WILL SIGNIFICANTLY REDUCE ENGINE BRAKE PERFORMANCE.



WITH THE ENGINE BRAKE INSTALLED, VALVE ADJUSTMENT MUST NEVER BE MADE WITH ENGINE RUNNING. UNADJUSTED VALVES MAY NOT HAVE SUFFICIENT CLEARANCE BETWEEN ROCKER ARM ADJUSTMENT SCREWS AND ENGINE BRAKE HOUSING.

ENGINE DAMAGE COULD RESULT.

Slave Piston Adjustment



FOLLOW INSTRUCTIONS CAREFULLY. PAY SPECIAL ATTENTION TO THIS ADJUSTMENT TO ENSURE MAXIMUM BRAKE OPERATING EFFICIENCY AND TO PREVENT ANY ENGINE DAMAGE.

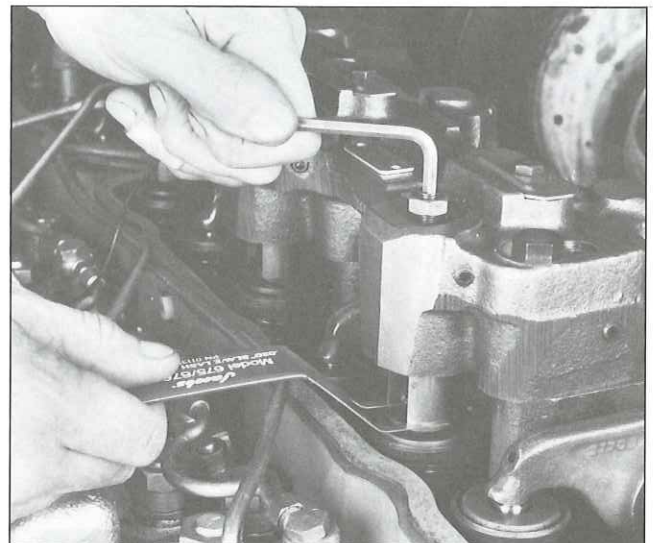


FIG. 20

1. Be sure that the exhaust valve is fully closed when making the slave piston adjustment on each cylinder. Insert the Jacobs 0.030 inch (0.76 mm), P/N 011355, feeler gauge between the feet of the engine brake slave piston and the exhaust valve cap. Turn the slave piston adjusting screw until a light drag is felt on the feeler gauge.



THE SLAVE PISTON ADJUSTMENT MUST BE MADE WITH THE ENGINE COLD [COOLANT TEMPERATURE BELOW 100° F (38° C)].

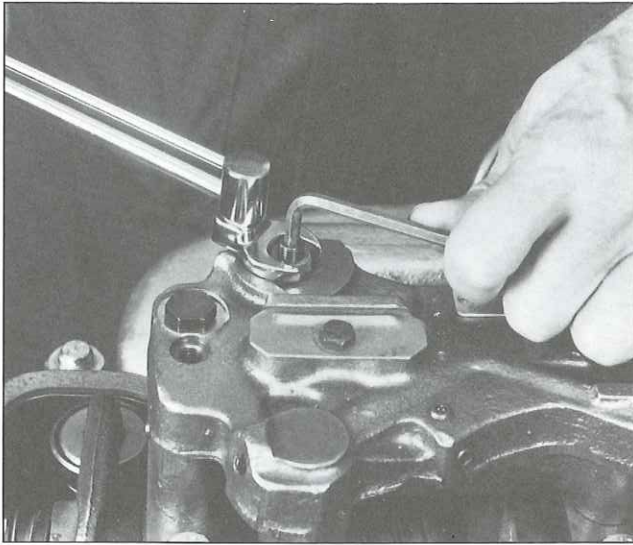


FIG. 20

2. While holding the adjusting screw in position, tighten the locknut to 20 lbft. (25 N•m) using a crowfoot wrench. After torquing the locknut, recheck the clearance with the Jacobs feeler gauge.



MAKE THIS ADJUSTMENT CAREFULLY. AFTER SLAVE PISTON ADJUSTING SCREW LOCKNUT IS PROPERLY TORQUED, RECHECK THE CLEARANCE WITH THE JACOBS FEELER GAUGE.

Section 5: Electrical System Installation

For vehicle with automatic transmission, refer to Jacobs Service Letters or contact your nearest distributor.

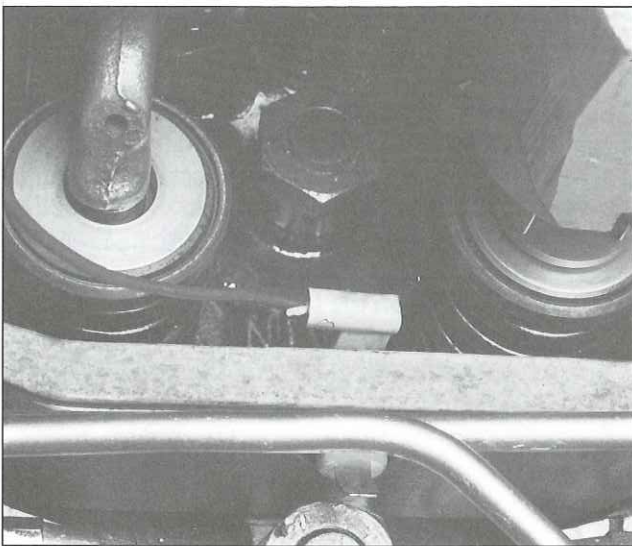


FIG. 21

Connect the solenoid valve electrical harness to the terminal leadout on the inside of the cover spacer. Note horizontal position of terminal assembly.

Dash Switch

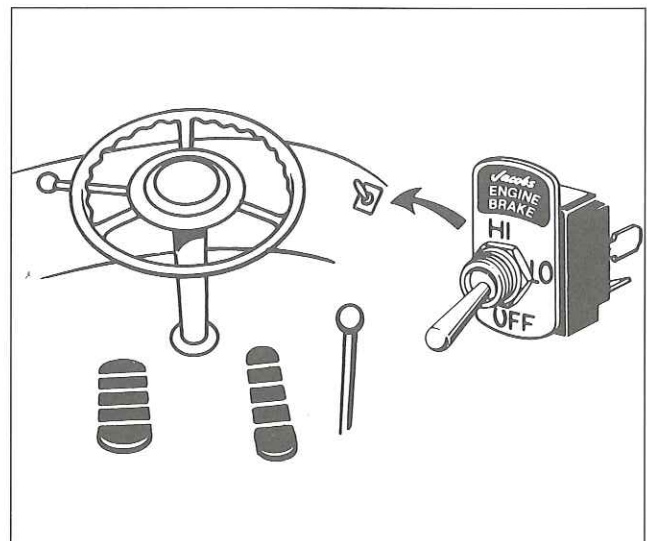


FIG. 22

Install the dash switch in a convenient location in the cab. Carefully measure and cut all harnesses to proper length. Thread wires through the expandable loom provided. Install receptacles at locations shown in wiring diagram furnished in the kit.

Clutch Switch

The optional over-travel bracket should be used when the clutch switch is installed in the wheel well location or a location where a build-up of road contamination (ice, mud, etc.) can stick to the actuator arm.

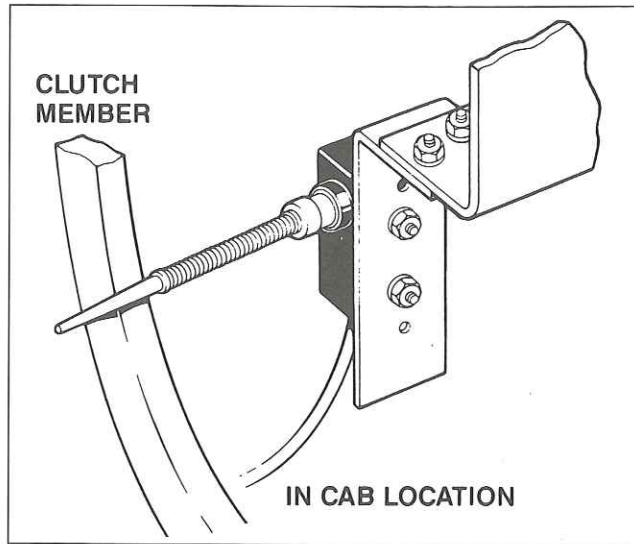


FIG. 23

1. Mount the clutch switch in the most convenient or accessible location possible. Locations may include in cab under dash, under floor wheel well location, or in the area of the bell housing.
2. Install this switch with the switch actuator arm in contact with the clutch pedal arm or other clutch member.

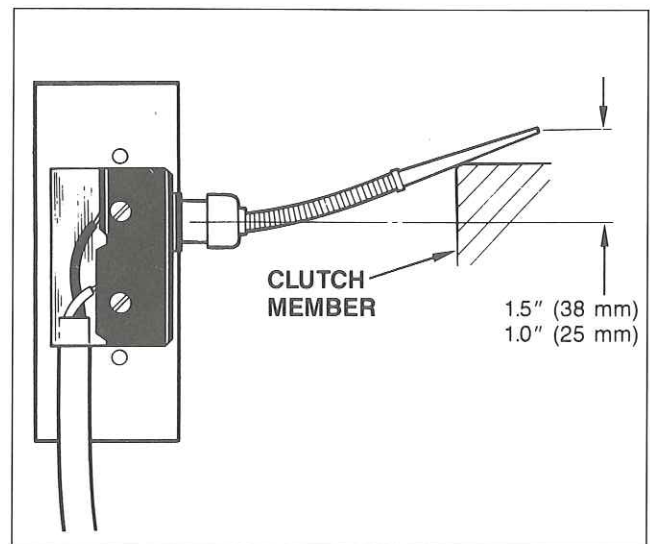


FIG. 24

3. Adjust the switch by moving the switch along the mounting bracket. The actuator arm should be deflected 1.0 - 1.5 inches (25 - 38 mm), measured at the tip of the actuator, when the clutch pedal is in the up (clutch engaged) position.
4. Check installation by moving the clutch pedal. The switch should click in the freeplay motion of the clutch pedal before actual clutch disengagement takes place.

Fuel Pump Switch

NOTE:

THE FOLLOWING INSTRUCTIONS SHOW FUEL PUMP SWITCH INSTALLATION ON A.P.E. TYPE FUEL PUMPS. SWITCH ASSEMBLIES AND BRACKETS ARE ALSO AVAILABLE FOR USE ON OTHER MACK FUEL SYSTEMS. CHECK THE JACOBS PARTS MANUAL, P/N 019044, FOR FURTHER INFORMATION ON OPTIONAL FUEL SWITCH ASSEMBLIES.

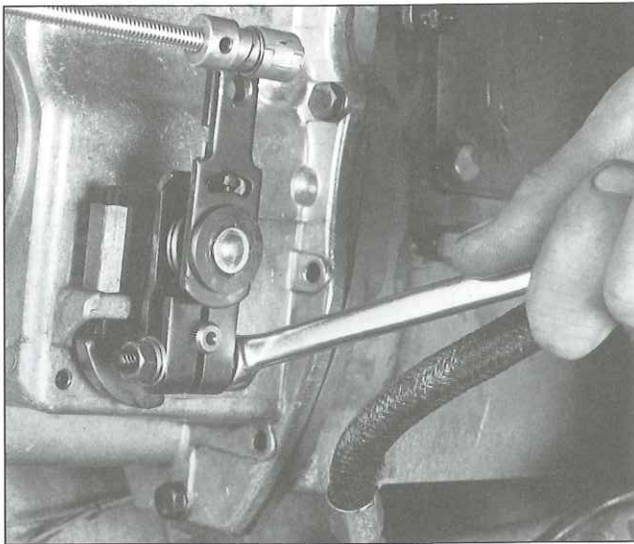


FIG. 25

1. Remove the nut, bolt and washer from the bottom of the operating lever.

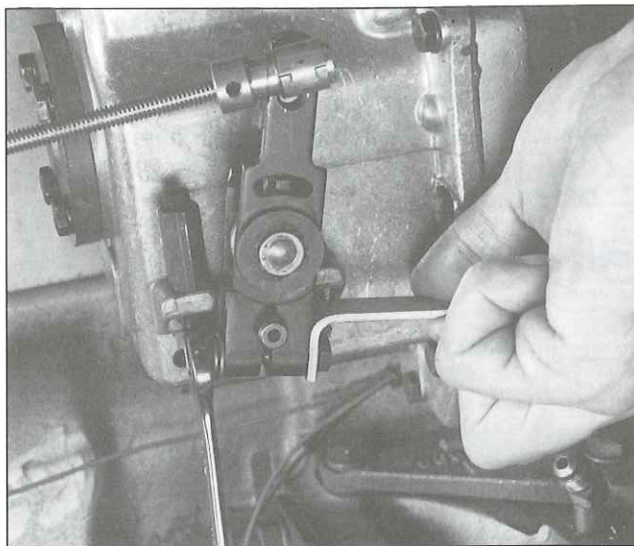


FIG. 26

2. Install the Jacobs actuating arm as shown, using the nut, bolt and washer previously removed. Tighten to 55 lbin. (6 N•m).

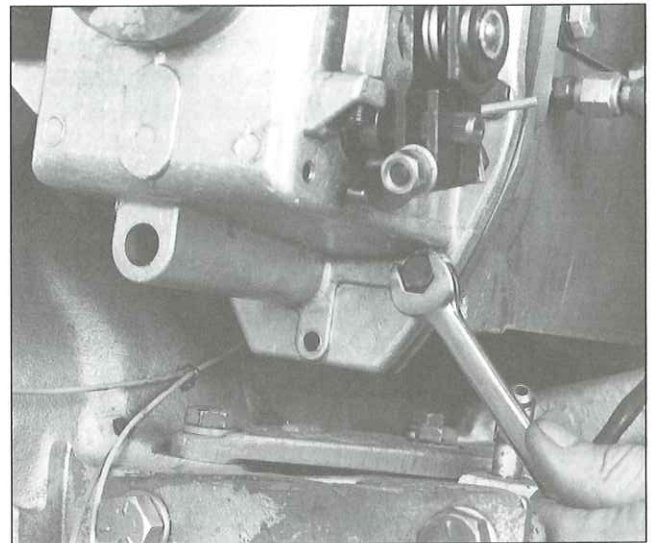


FIG. 27

3. Remove the two screws from the rear of the fuel pump housing as shown.

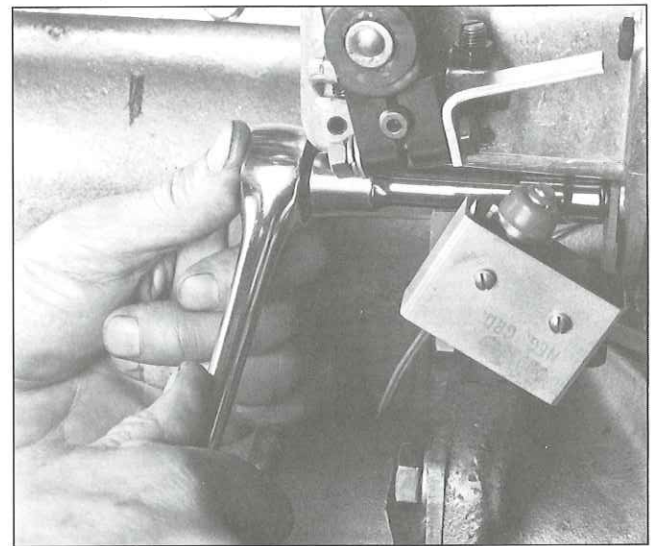


FIG. 28

4. Install switch in position shown using the two screws just removed. Tighten to 100 lbin. (10 N•m).

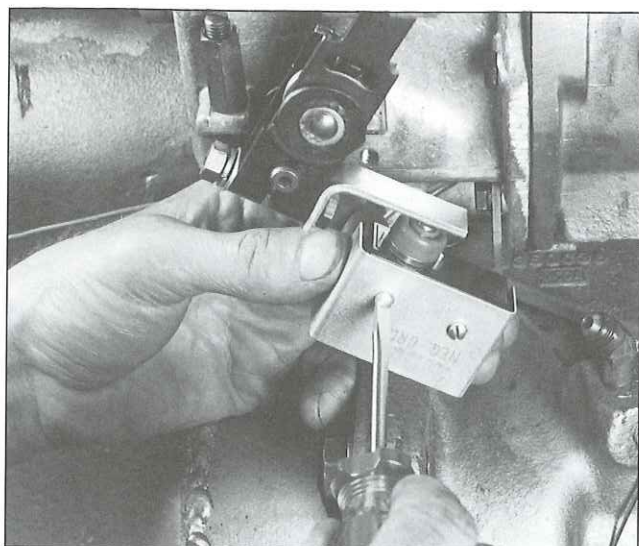


FIG. 29

- Adjust the switch with the operating lever in the idle fuel position. Correct adjustment is made by slightly bending the actuating arm until a "click" is heard when the operating lever moves to the idle fuel position.



CHECK THE FUEL PUMP THROTTLE LEVER TO ENSURE THAT THE THROTTLE PEDAL WILL MOVE THE LEVER TO THE FULL FUEL POSITION AFTER INSTALLING THE ACTUATING ARM.

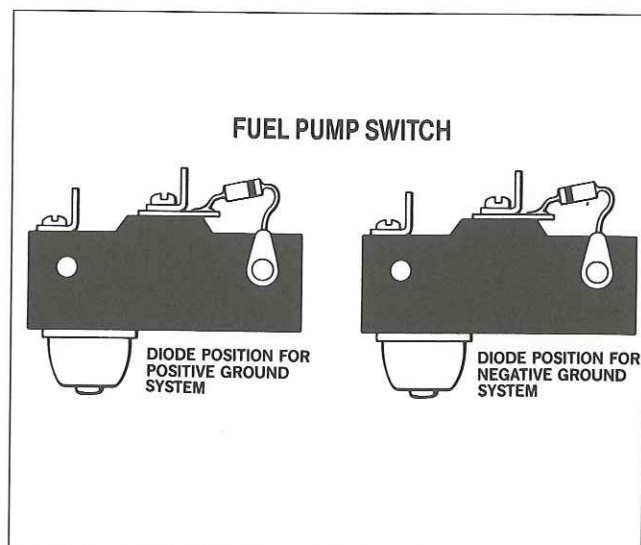


FIG. 30

NOTE:

THE THROTTLE SWITCH CONTACTS ARE PROTECTED AGAINST ARCING BY A SMALL DIODE CONNECTED BETWEEN THE LOAD SIDE SWITCH TERMINAL AND GROUND. THE ENGINE BRAKE MUST BE CONNECTED TO THE LOAD SIDE TERMINAL. IF THE VEHICLE HAS A POSITIVE GROUND ELECTRICAL SYSTEM, REVERSE THE POSITION OF THE DIODE.

- Check all wiring. Make sure all wiring has been cut to correct length, installed properly, tied off, and moved out of sight. Wires should be routed where no chafing, mechanical interference, or similar interference can occur. Generally, a malfunctioning engine brake is due to faulty or careless wiring.

FUEL PUMP SWITCH MOUNTING BRACKETS

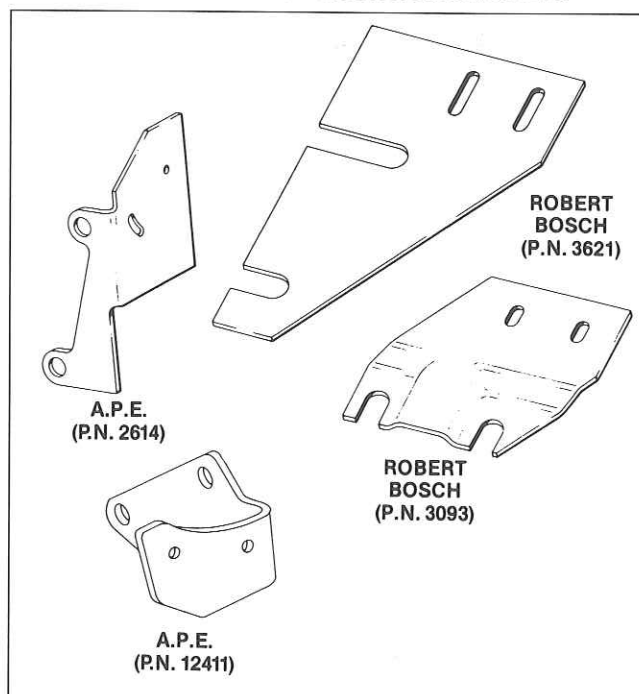


FIG. 31

Jacobs® Engine Brake Control System Installation

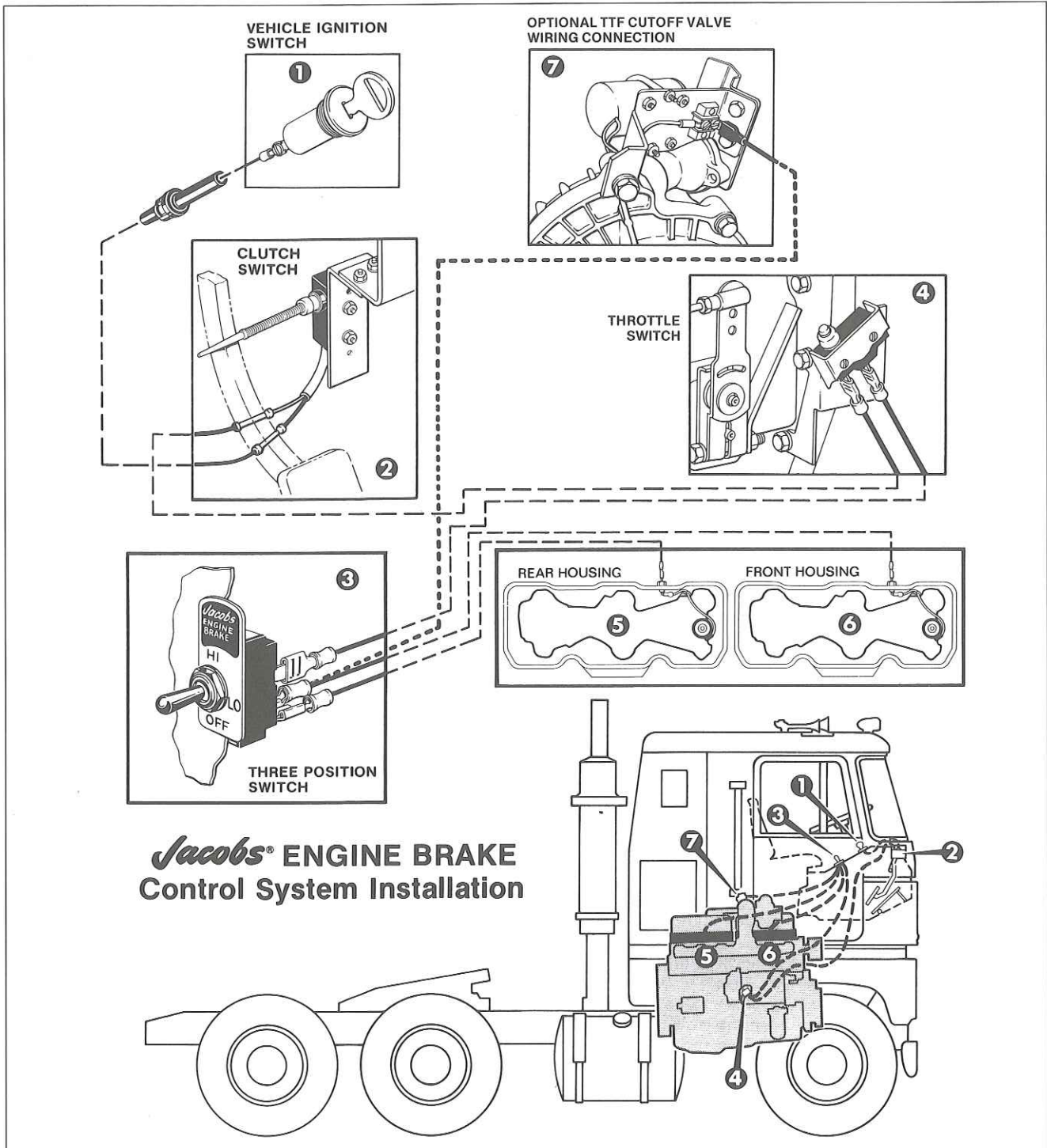


FIG. 32

Section 6: Engine Brake Operation Check

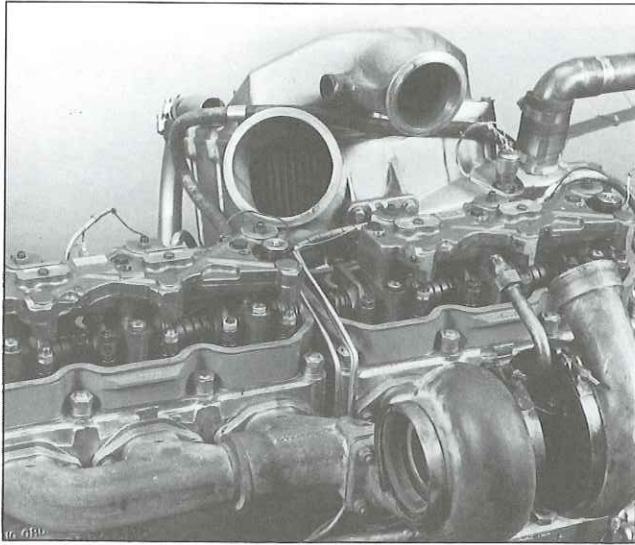


FIG. 33

The Jacobs Engine Brake housing installation is now completed. The following procedures and adjustments should be made.

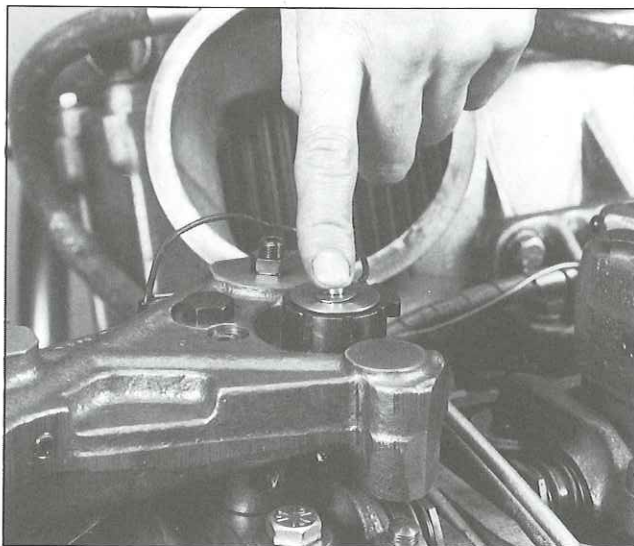


FIG. 34

1. Bleed brake units and check their operation. Start engine and allow to run 5 to 10 minutes. Accelerate engine to approximately 1800 rpm. Release throttle and then manually depress each solenoid armature. Repeat this procedure five or six times to permit engine oil to fill the brake housing passages completely.



WEAR EYE PROTECTION AND DO NOT EXPOSE YOUR FACE OVER ENGINE AREA. TAKE PRECAUTIONS TO PREVENT OIL LEAKAGE DOWN ON THE ENGINE.

WHENEVER ENGINE IS RUNNING AND VALVE COVERS ARE REMOVED, OIL SPLASHING IN THE ENGINE BRAKE AREA COULD CAUSE PERSONAL INJURY.

2. With the engine shut down, check electrical system by turning on ignition switch and moving Jacobs dash switch from OFF to LOW to HIGH. In LOW, only the rear brake housing solenoid valve should activate. In HIGH, both front and rear solenoids should activate.

Section 7: Installation Completion

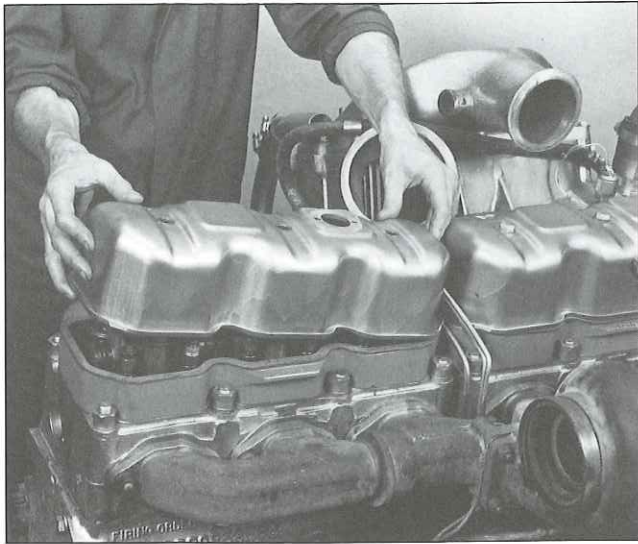
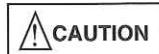


FIG. 35

Wipe excess oil from spacer and gasket surfaces. Replace cylinder head cover and all previously removed parts. Tighten capscrews to 25 lbft. (30 N•m).



BE SURE SOLENOID VALVE WIRE HARNESS IS CLEAR OF VALVE COMPONENTS. DO NOT TRAP WIRE HARNESS BETWEEN ENGINE BRAKE HOUSING AND COVER. WIRE WILL SHORT OUT IF INSULATION IS BROKEN. THIS WILL CAUSE FUSE TO BLOW. ENGINE BRAKE WILL NOT OPERATE.

The following instructions address specific requirements necessary to complete the engine brake installation on the various types of Mack engines. See Jacobs Parts Manual, P/N 019044, for necessary parts.

Low Mounted Tuned Manifolds

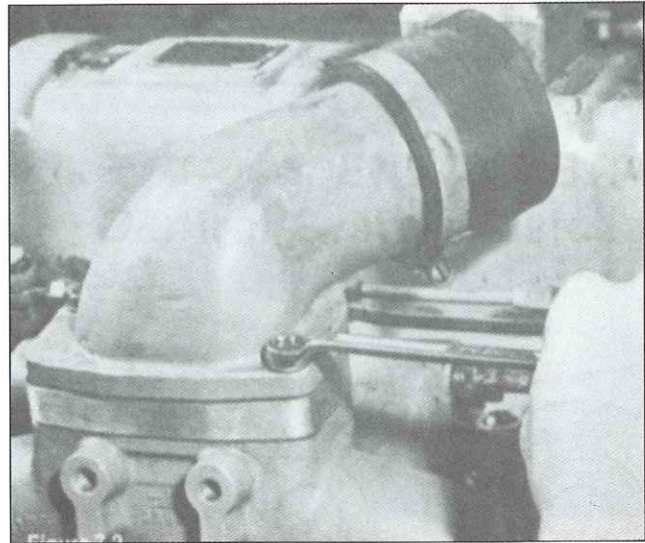


FIG. 36

On engines with low-mounted tuned manifolds, use manifold spacers and longer manifold support brackets.

Overboard Breather Tube

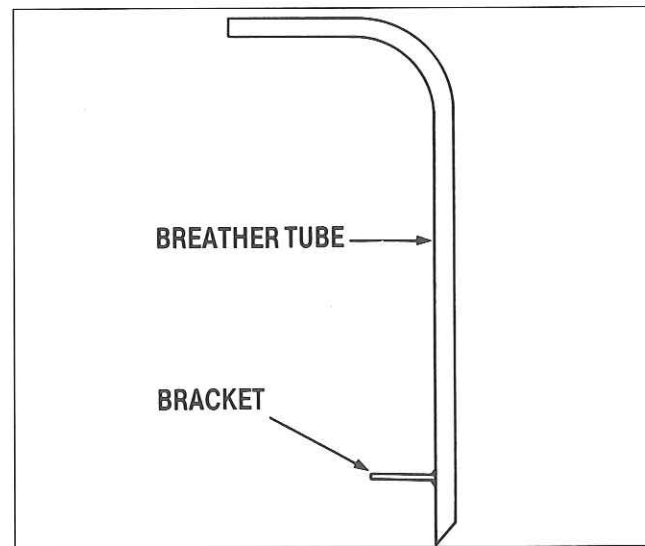


FIG. 37

The overboard breather tube, which connects to the valve cover breather, will be raised about 2 inches (50 mm) with the Jacobs Engine Brake installed. The lower mounting bracket on the tube must be relocated. This can be accomplished by:

- a. bending the bracket itself; or
- b. breaking the bracket weld and rewelding it 2 inches (50 mm) lower; or
- c. cutting the tube in a convenient location and adding a 4-inch (100 mm) length of 1-1/2 inch (40 mm) I.D. neoprene hose, or equivalent, and securing this hose with two 2-inch (50 mm) hose clamps. Locate this hose section away from the intake manifold.

Chassis Mounted Charge Air Cooled Engines

Replace the turbocharger lube oil feed line with Mack P/N 42QEA44511RB-32. The present 27-inch (686 mm) hose is too short.

Engine Mounted Charge Air Cooled Engines

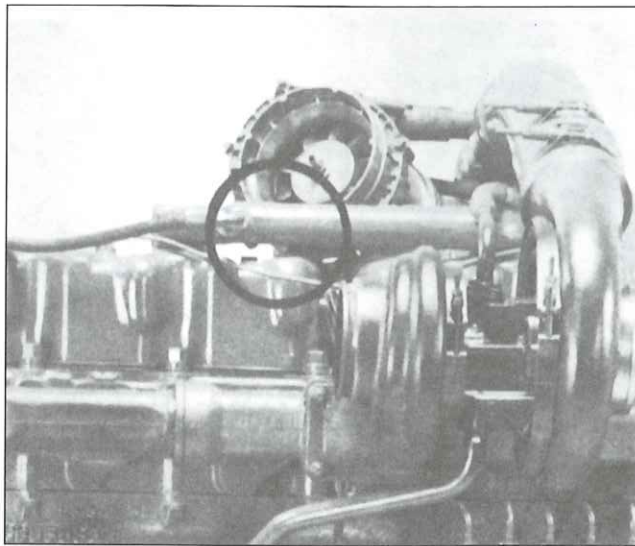


FIG. 38

When installing a Model 675A on an engine with engine mounted charge air coolers (either single or series), an adapter kit is required to eliminate interference between the tip turbine fan (TTF) and the valve cover breather.

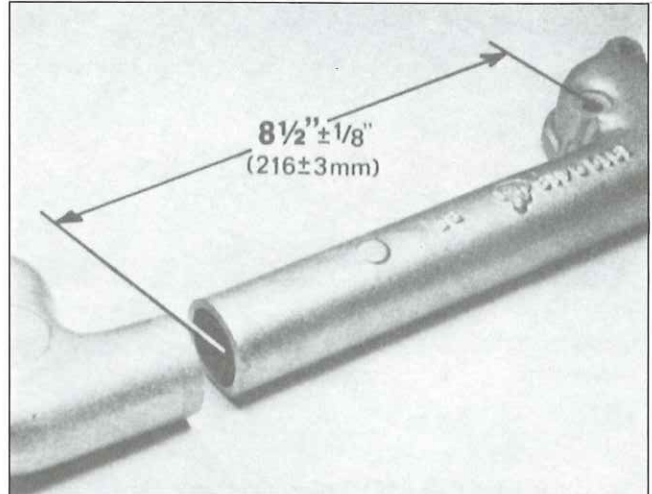


FIG. 39

1. Cut the Mack valve cover breather as shown. Discard the breather elbow (smaller section).

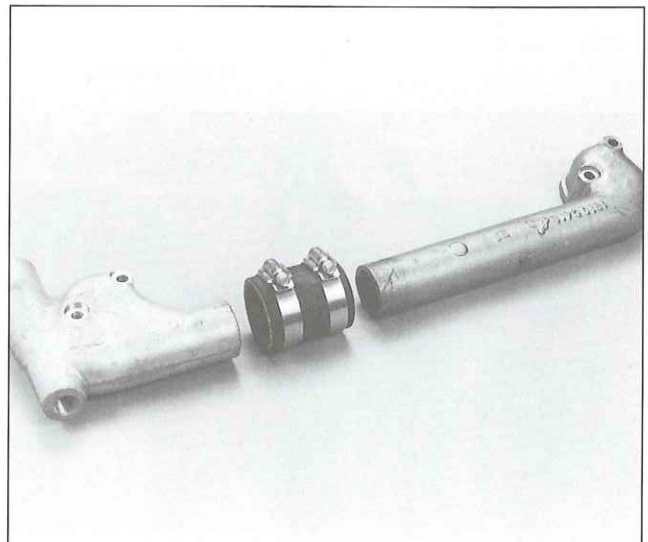


FIG. 40

2. Connect the remainder of the Mack valve cover breather section to the Jacobs manifold breather using the hose and clamps furnished. Install the new breather assembly on top of the valve covers and secure the hose clamps.

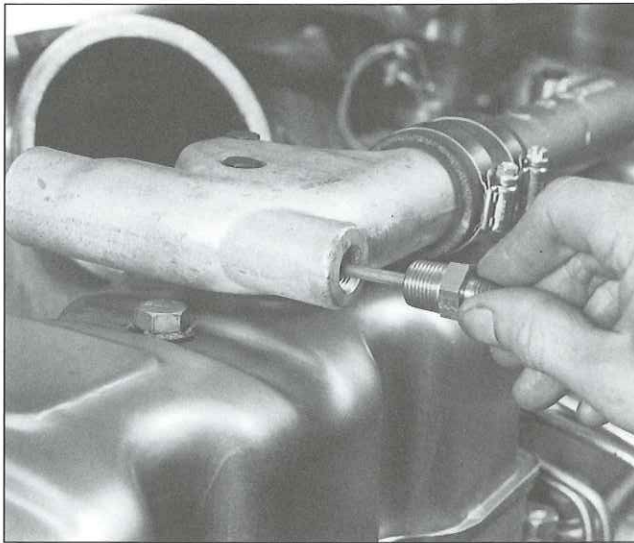


FIG. 41

3. Replace the sensor tube in the 3/8-inch pipe tapped hole in the Jacobs manifold breather, on engines so equipped. On all others engines, install the 3/8-inch pipe plug furnished in the kit.

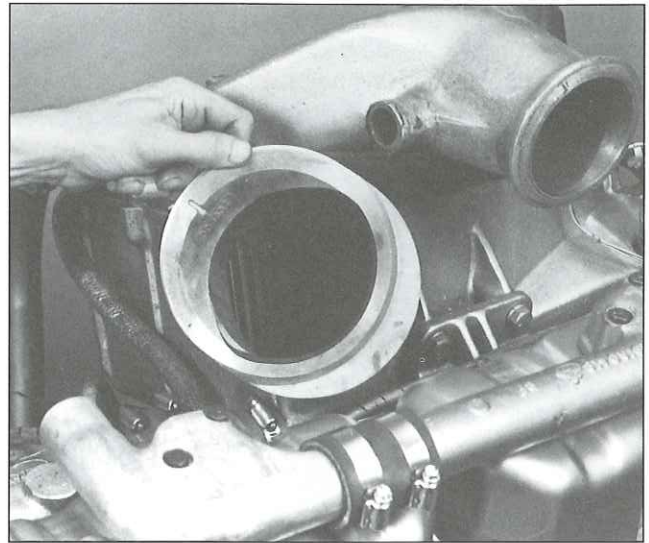


FIG. 43

5. Install the Jacobs TTF offset spacer to the inter-cooler manifold using a V-band clamp. Rotate the spacer clockwise to about 45° from its highest position, but do not tighten the V-band clamp.

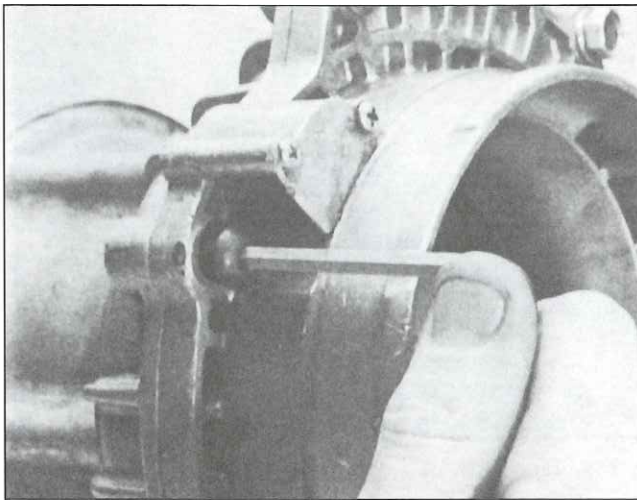


FIG. 42

4. Replace the Mack hex head capscrew with the Jacobs button-head screw on the tip turbine fan housing as shown. This screw eliminates an interference between the existing hex head capscrew and the rear valve cover.

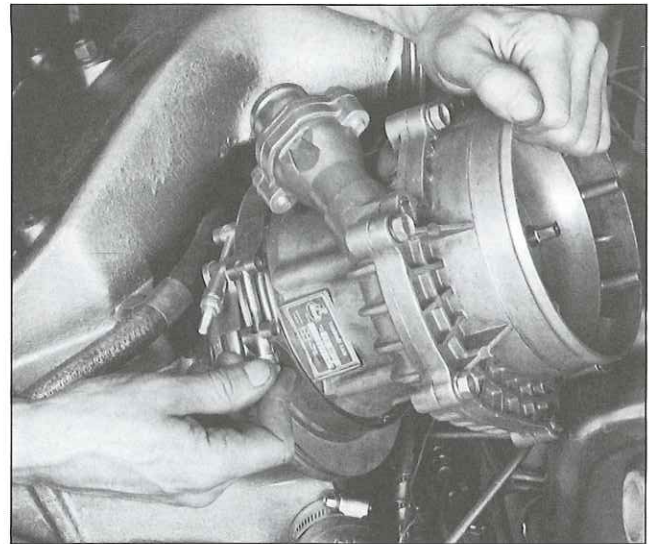


FIG. 44

6. Attach the TTF to the Jacobs spacer using the second V-band clamp. Do not tighten clamp yet.

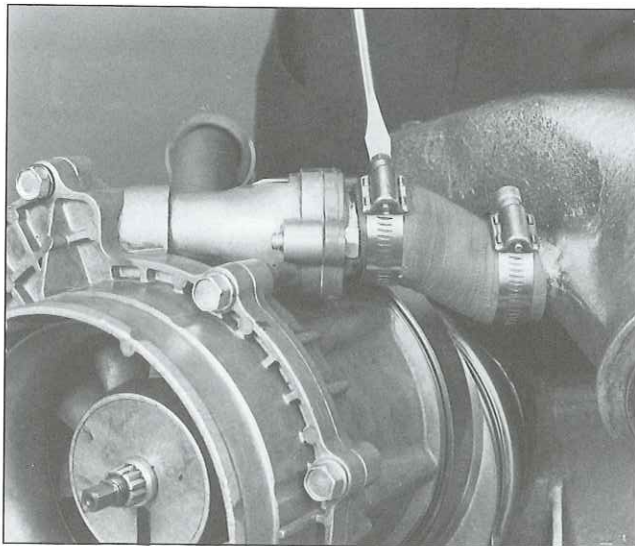


FIG. 45

7. Install the offset air inlet hose. Use the Mack band clamps. Do not tighten clamps yet.

NOTE:

TO EASE THE INSTALLATION OF THE SMALL END OF THE HOSE TO THE INTERCOOLER HEADER, APPLY A SMALL AMOUNT OF LUBRICANT TO THE TUBE ON THE HEADER.

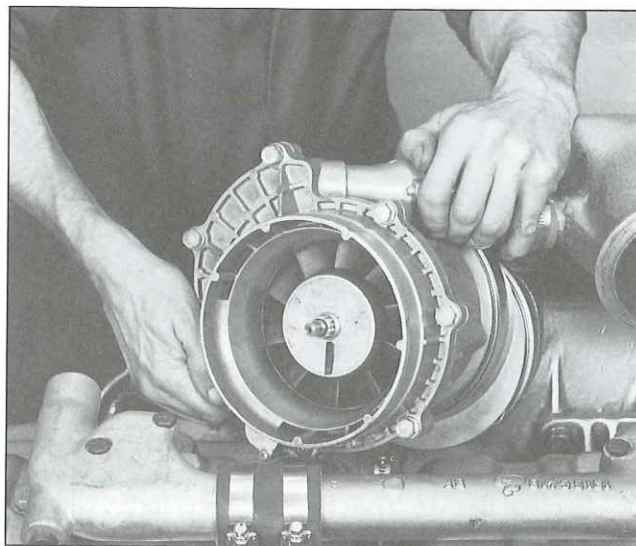


FIG. 46

8. Rotate the TTF and offset spacer until a maximum clearance is obtained between the valve cover breather and the tip turbine fan.

Tighten both V-band clamps and both air inlet hose clamps.

NOTE:

EARLY TIP TURBINE FAN, MODEL 418-GB-43C, HAS EXTERNAL OIL LUBRICATION LINES AND A NEW LONGER OIL DRAIN TUBE HOSE ASSEMBLY WILL BE REQUIRED. EITHER REPLACE THE FLEXIBLE HOSE SECTION WITH A LONGER HOSE OR REPLACE THE ENTIRE HOSE AND TUBE ASSEMBLY WITH A HOSE OF CORRECT LENGTH.

Tip Turbine Fan Cutoff Valve Kit (Optional)

The Jacobs Tip Turbine Cutoff Valve Kit is an option for engines with engine mounted single stage charge air coolers.

TTF cutoff is actuated by an electrical solenoid when the HIGH position dash switch is selected. The air that is normally bled off to the TTF is cut off and fed into the engine (during braking only) and improves the engine brake performance.

The TTF cutoff valve is installed in the TTF and replaces the Mack Air Valve Assembly.



FIG. 47

1. Remove and discard the Mack Air Valve assembly and gasket. Save the two lockwashers.

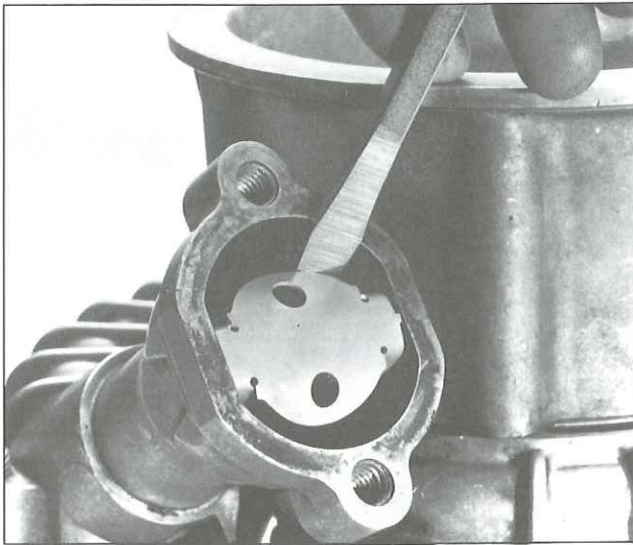


FIG. 48

2. Early fan models with the rubber check valve have a check valve deflector. Remove this check valve deflector from the TTF and discard.

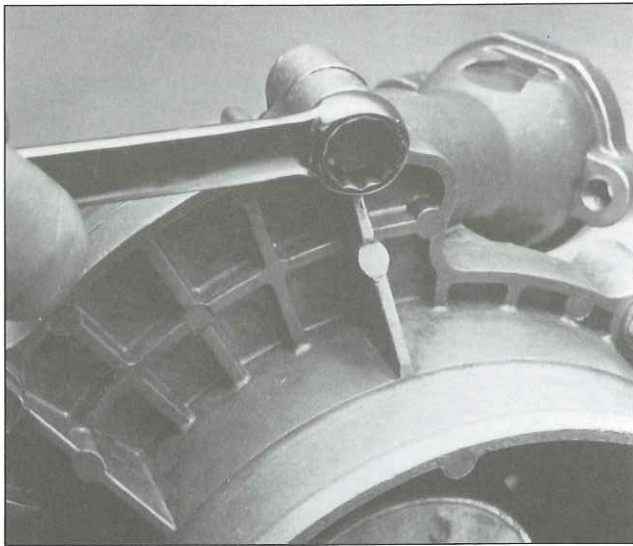


FIG. 49

3. Remove the hex head bolt and lockwasher from the housing as shown. Keep them for reuse.

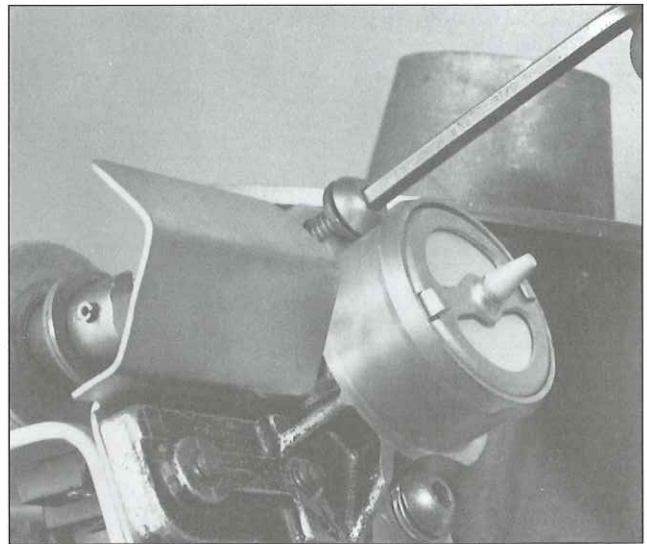


FIG. 50

4. Install the Jacobs TTF cutoff valve on the TTF bleed air inlet flange using the Jacobs gasket. Install and tighten the two Jacobs button head screws.

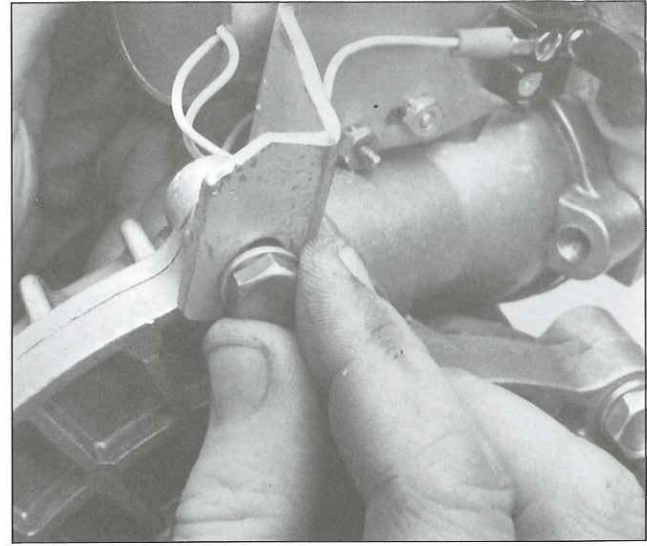


FIG. 51

5. Replace the Mack hex head bolt and lockwasher to secure the end of the bracket to the fan housing.

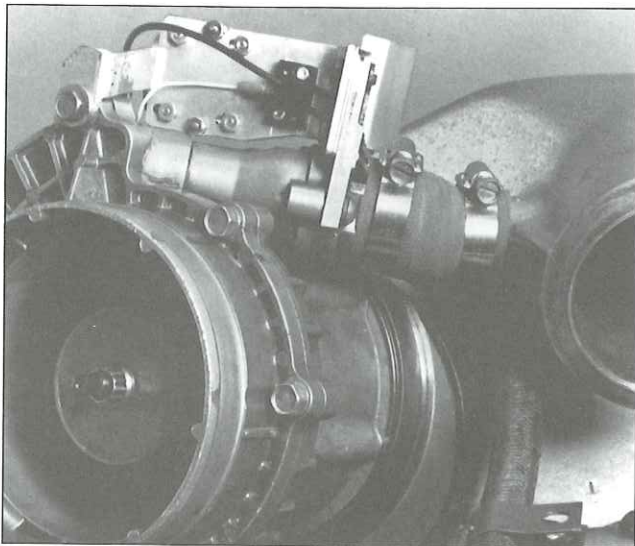


FIG. 52

6. Reinstall the TTF as shown in Section 7, Steps 4 through 8.

Section 8: Engine Brake Maintenance



NEVER REMOVE ANY ENGINE BRAKE COMPONENT WITH ENGINE RUNNING. PERSONAL INJURY MAY RESULT.

The Jacobs Engine Brake is a relatively trouble-free and maintenance-free device. However, periodic inspections and part replacement will need to be made from time-to-time. Use the following procedures to keep the engine brake in top condition.

This section will cover how to properly remove, clean and reinstall engine brake components. Use and OSHA-approved cleaning solvent when washing parts. Be sure to coat parts with clean engine oil when reinstalling them.

Control Valve



REMOVE CONTROL VALVE COVERS CAREFULLY. CONTROL VALVE COVERS ARE UNDER LOAD FROM THE CONTROL VALVE SPRINGS. REMOVE WITH CARE TO AVOID PERSONAL INJURY.

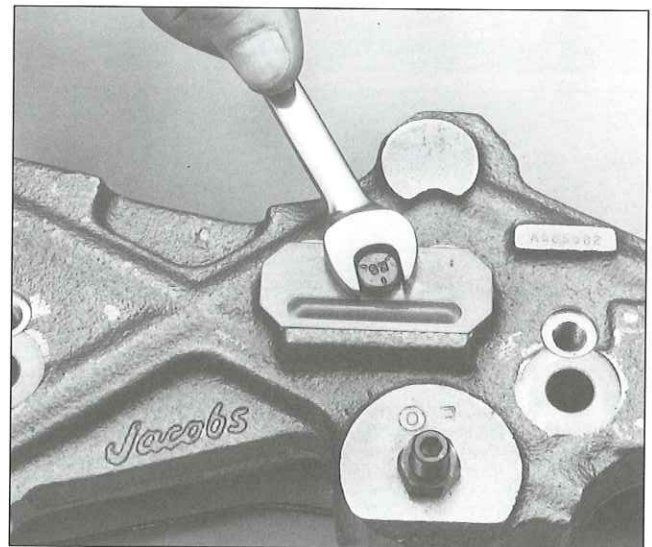


FIG. 53

1. Apply pressure to the control valve cover and slowly remove the hex head capscrew. Slowly raise the cover until all spring pressure is relieved.



FIG. 54

NOTE:

MODEL 675A HAS TWO SPRINGS OVER EACH CONTROL VALVE; MODEL 675 HAS ONE OVER EACH CONTROL VALVE. DIFFERENT CONTROL VALVES ARE USED ON MODELS 675 AND 675A.

2. Remove the control valve springs.

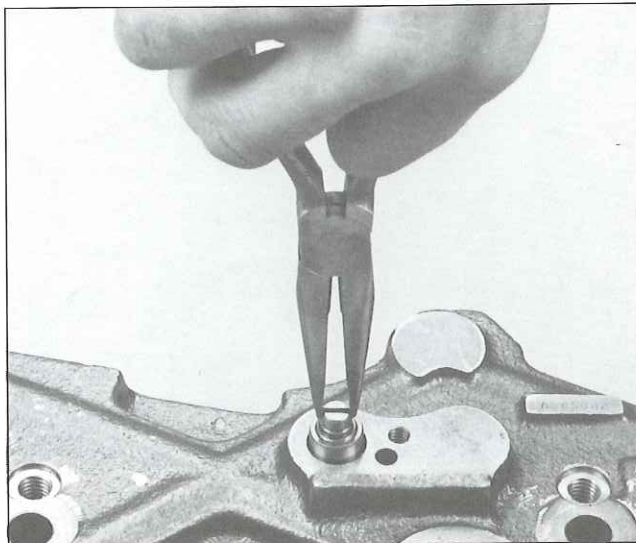


FIG. 55

3. Using needle-hose pliers, reach into the bore and grasp the stem of the control valve. Pull valve straight up and out of its bore.
4. Wash the control valves with an approved cleaning solvent. Push a wire through the hole in the base of the valve to the distance required to insure that the ball check is free. The ball should lift with light pressure on the wire. Dry the valve with compressed air and wipe clean with a paper towel.

5. Thoroughly clean the control valve bore in the housing, using clean paper towels.
6. Dip the control valves in clean lube oil. Holding the valve by the stem, let the valve drop into its bore. If binding occurs or if the ball is stuck in the valve, the control valve should be replaced.

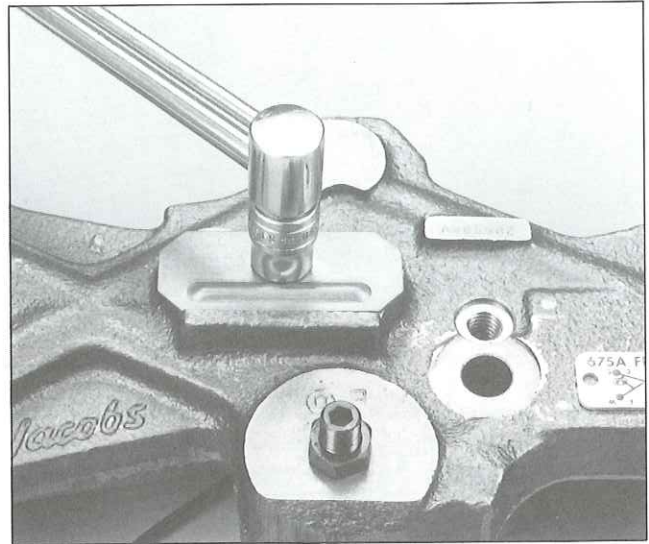


FIG. 56

7. Reassemble parts in the reverse order as removed. Tighten the hex head capscrew to 10 lbft. (15 N•m).

Solenoid Valve

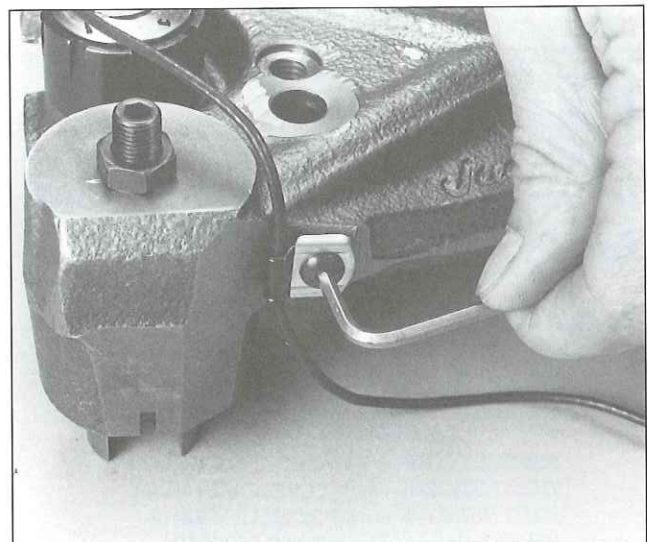


FIG. 57

1. Remove the button head screw and harness clamp assembly.

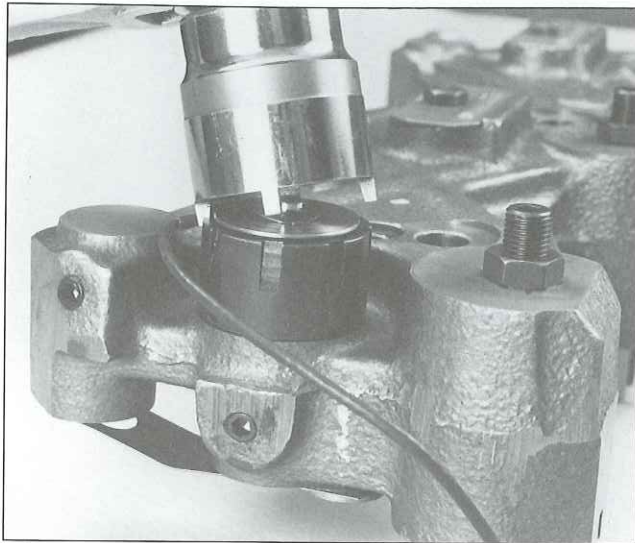


FIG. 58

- Using the Jacobs solenoid wrench, unscrew the solenoid valve.



DO NOT READJUST OR TAMPER WITH THE SOLENOID VALVE. ENGINE DAMAGE COULD RESULT.



FIG. 59

- Remove and discard the three rubber seal rings. If the lower ring stays in the bottom of the housing solenoid bore, remove with a piece of wire.

- Wash out the solenoid valve with approved cleaning solvent. Use a brush to clean the oil screen. When clean, dry the valve with compressed air.
- Clean out the solenoid valve bore in the housing. Use clean paper towels. Never use rags, as they may leave lint and residue which can plug the oil passageways.



FIG. 60

- Reinstall solenoid using new seal rings. Seat lower seal ring in the base of the solenoid valve bore. Wipe clean lube oil into and around the bore. Place upper and center seal rings on the solenoid valve body. See Fig. 59 for seal locations.
- Be sure the seals are seated properly and carefully screw the solenoid into housing without unseating the seals. Torque the valve to 60 lbin. (7 N•m). Be careful not to twist the seals while installing.

Slave Piston



WEAR SAFETY GLASSES. REMOVE PISTON CAREFULLY.

THE SLAVE PISTON IS RETAINED BY SPRINGS THAT ARE UNDER HEAVY COMPRESSION. IF THE FOLLOWING INSTRUCTIONS ARE NOT FOLLOWED AND PROPER TOOLS NOT USED, THE SPRING COULD BE DISCHARGED WITH ENOUGH FORCE TO CAUSE PERSONAL INJURY.

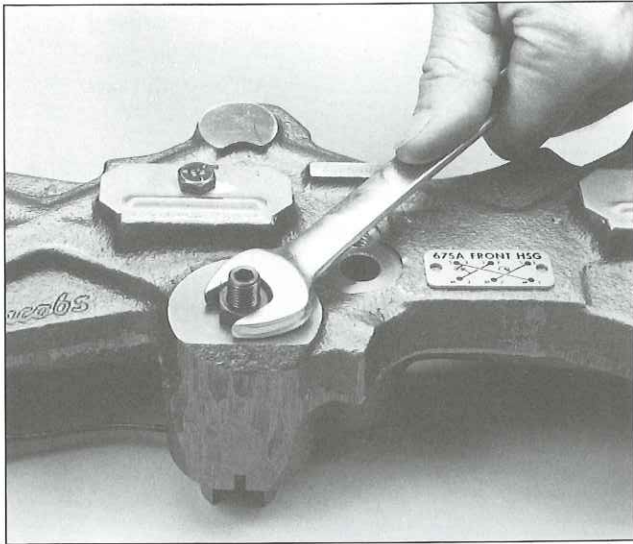


FIG. 61

1. Loosen adjusting screw locknut and remove the adjusting screw from the housing.

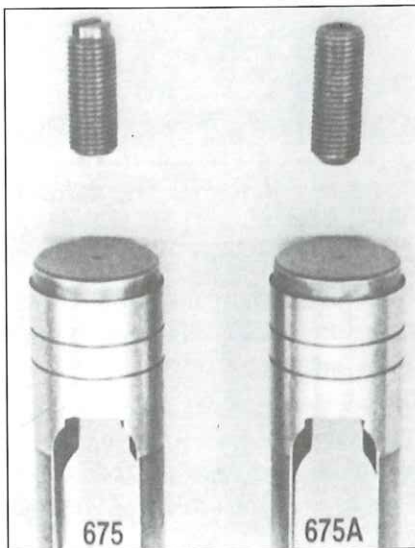


FIG. 62

NOTE:

MODEL 675 USES AN ADJUSTING SCREW WITH A SPRING-LOADED PISTON AT THE SLAVE PISTON END. THE PLASTIC PISTON SEALS A HOLE IN THE TOP OF THE SLAVE PISTON DURING ENGINE BRAKE OPERATION.

MODEL 675A USES A SOLID ADJUSTING SCREW AND A SOLID SLAVE PISTON (NO HOLE THROUGH THE TOP).

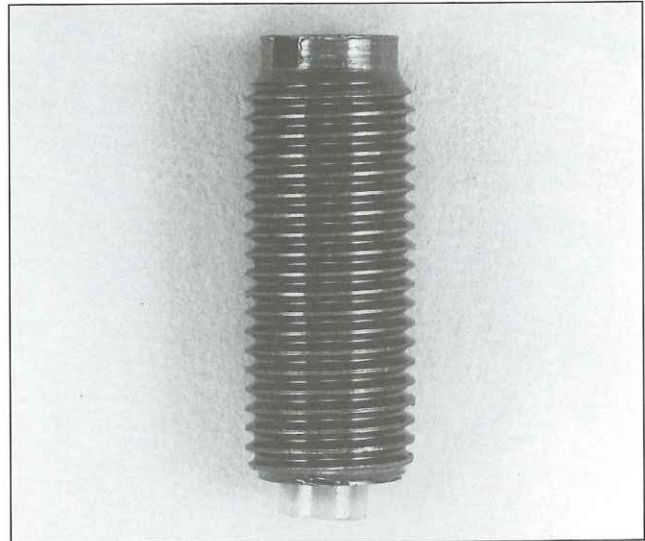


FIG. 63



SOLID ADJUSTING SCREWS MUST NOT BE USED IN MODEL 675 HOUSINGS BECAUSE THE HOLE IN THE TOP OF THE SLAVE PISTON WILL NOT BE SEALED AND ENGINE BRAKING WILL BE LOST. EXCESS OIL WILL BE SPILLED IN THE OVERHEAD.

2. Inspect the plastic plunger in the Model 675 adjusting screw. It should move freely in the screw. Clean or replace the entire screw, as necessary.

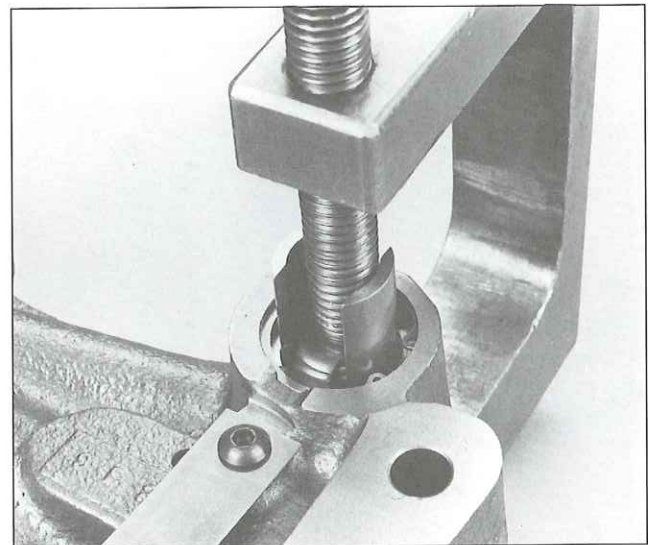


FIG. 64

3. Using an arbor press, or a suitable clamp, slowly apply pressure to the retainer and remove the snap ring. Relieve the clamping pressure gradually until the springs are free.

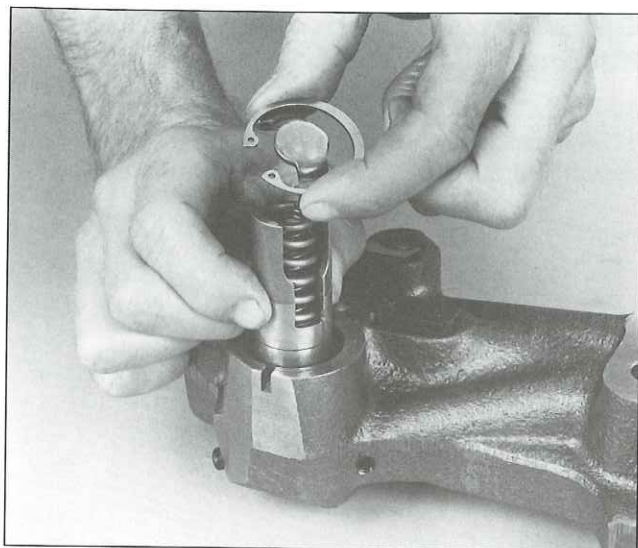


FIG. 65

4. Remove the retainer, springs and slave piston. Check the slave piston for binding or burrs. Clean in an approved solvent, or replace as necessary.
5. Reinstall all parts reversing the procedure previously shown for disassembly. Be sure the retaining ring is securely located in its groove before removing the clamp.

Master Piston

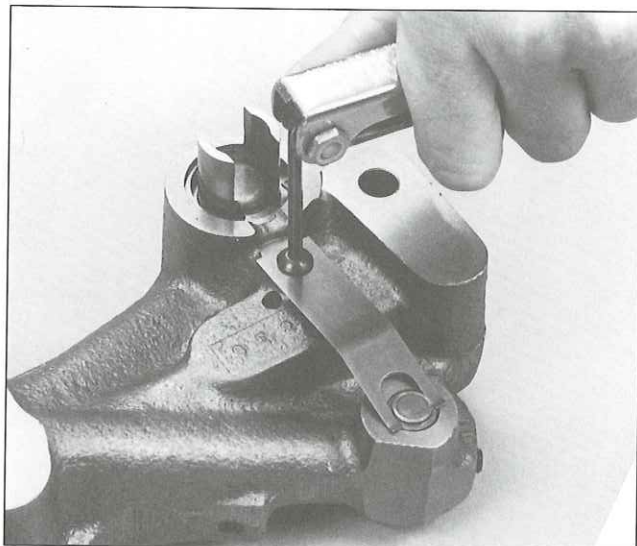


FIG. 66

1. Remove the button head screw and master piston spring from brake housing. Early Model 675 housings have a flat washer under the button head screw. This washer should be reused, or replaced if necessary. **Do not** add a washer to new housing assemblies.

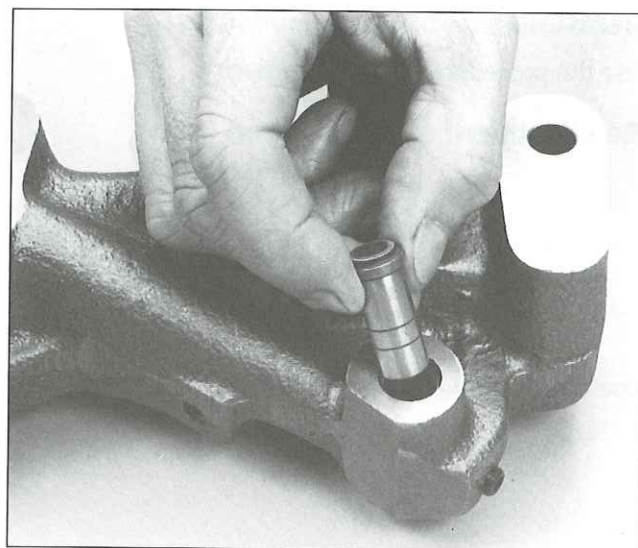


FIG. 67

2. Remove master piston from its bore using needle-nose pliers to initially pull the piston out, if necessary. If binding occurs, check for burrs or contaminants in lube oil. Clean in an approved solvent. Inspect the hard face surface. Pitted, chipped, cracked or galled pistons should be replaced.

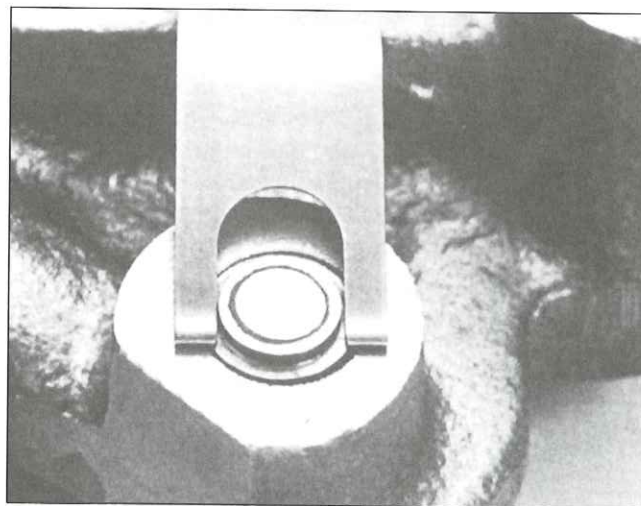


FIG. 68

3. Reassemble in reverse order. When tightening the cap screw, make certain the two spring tabs do not interfere with the sides of the master piston center raised portion.

NOTE:

THE TABS SHOULD BE EQUALLY SPACED FROM THE RAISED PISTON AREA.

Reinstallation of Brake Housings

Use the procedure shown in Section 4.

Readjustment of Slave Piston Lash



SLAVE PISTON LASH MUST BE READJUSTED.
EXHAUST VALVES ON THE CYLINDER TO BE
ADJUSTED MUST BE IN THE CLOSED
POSITION.

Use the procedure in Section 4.

Conversion of a 675 Housing to a 675A Housing

A Model 675 housing assembly can be updated to a 675A housing by changing all the different parts shown in the Jacobs Parts Manual, P/N 019044.

NOTES

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