680 CK LOADER BACKHOE

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CASE CORPORATION

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LUBRICATION AND MAINTENANCE SCHEDULE

DISASSEMBLY AND ASSEMBLY OF DECOMPRESSOR

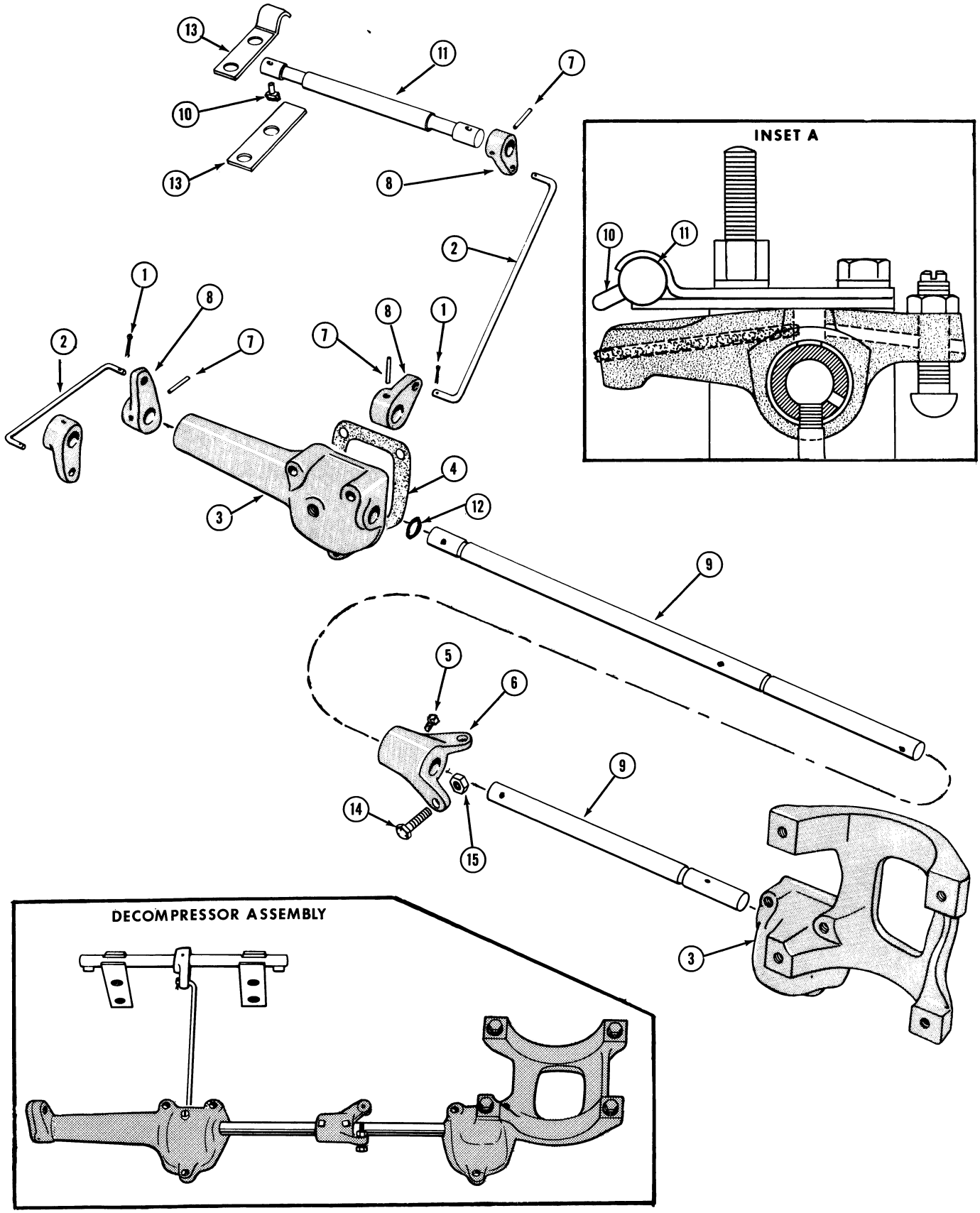


Figure K-7

LOCATING TOP DEAD-CENTER AND TAPPET ADJUSTMENT

6 Cylinder

Firing Order ---------- 1-5-3-6-2-4

The top dead center position of Nos. 1 and 6 cylinders is indicated by the TDC mark on the crankshaft pulley flange.

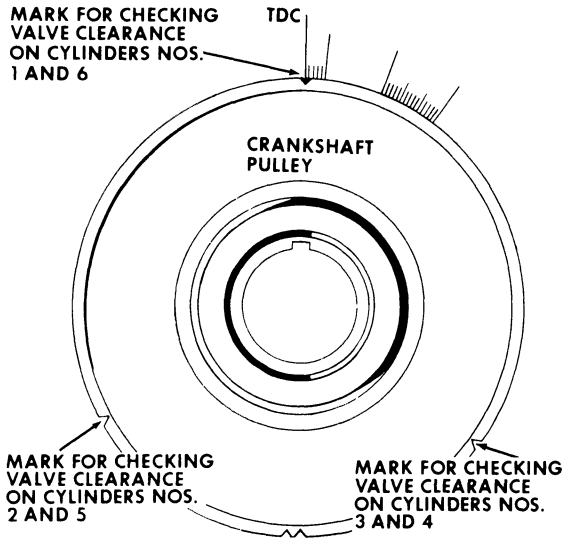


Figure K-30

NUMBER 1 CYLINDER

To set No. 1 cylinder on top of compression stroke, remove the valve covers and crank engine until the push rods are loose on No. 1 cylinder (top of compression stroke) and the rocker arms on the opposing cylinder No. 6 can be rocked open or closed with a slight movement of the crankshaft. Then crank and adjust the valve tappets on No. 1 cylinder, refer to Figure K-31.

NUMBER 5 CYLINDER

Crank the engine approximately 1/3 turn or until the push rods on No. 5 are loose and the rocker arms on No. 2 can be rocked open or closed slightly by crank movement. Adjust tappets on No. 5 cylinder.

NUMBER 3 CYLINDER

Crank engine another 1/3 revolution or until the push rods on No. 3 cylinder are loose and the rocker arms on No. 4 can be rocked open or closed slightly by crank movement. Adjust tappets on No. 3 cylinder.

NUMBER 6 CYLINDER

Crank engine another 1/3 (TDC mark) revolution or until the push rods on No. 6 are loose and the rocker arms on No. 1 can be rocked open or closed slightly by crank movement. Adjust tappets on No. 6 cylinder.

NUMBER 2 CYLINDER

Crank engine another 1/3 revolution or until the push rods on No. 2 cylinder are loose and the rocker arms on No. 5 can be rocked open or closed slightly by crank movement. Adjust the tappets on No. 2 cylinder.

NUMBER 4 CYLINDER

Crank engine another 1/3 revolution or until the push rods on No. 4 cylinder are loose and the rocker arms on No 3 can be rocked open or closed slightly by crank movement. Adjust the tappets on No. 4 cylinder.

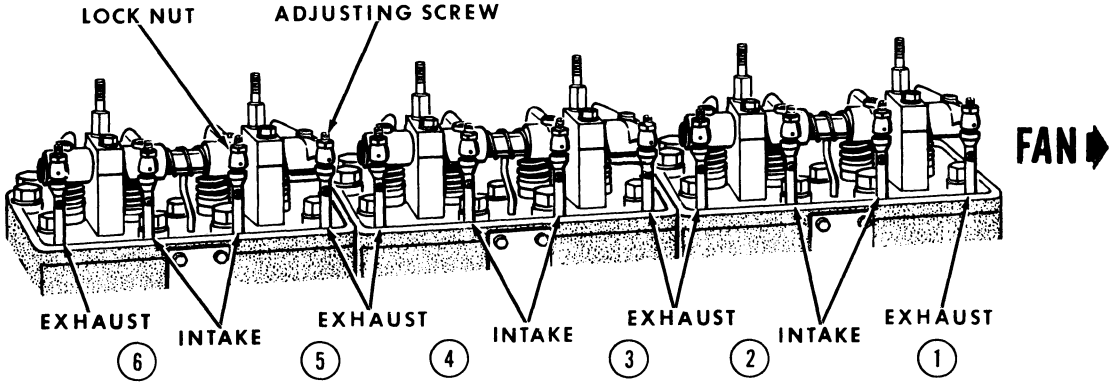
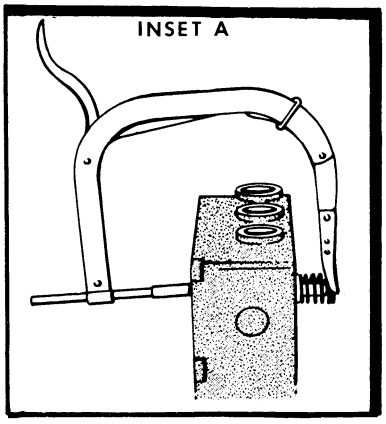
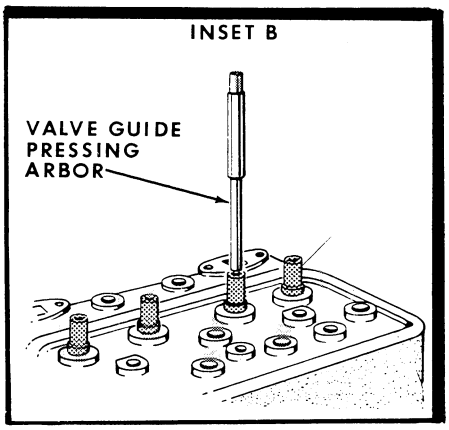
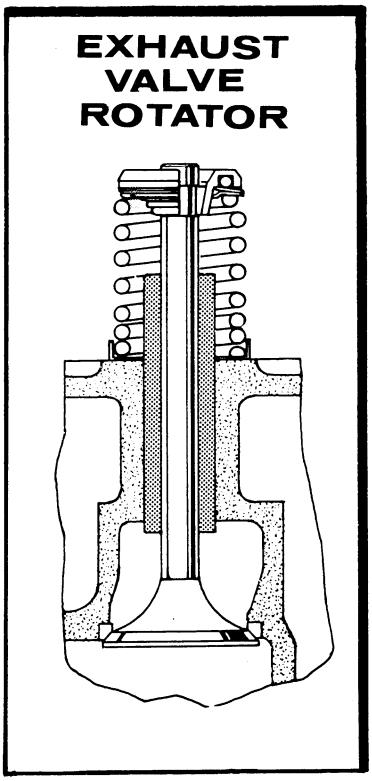


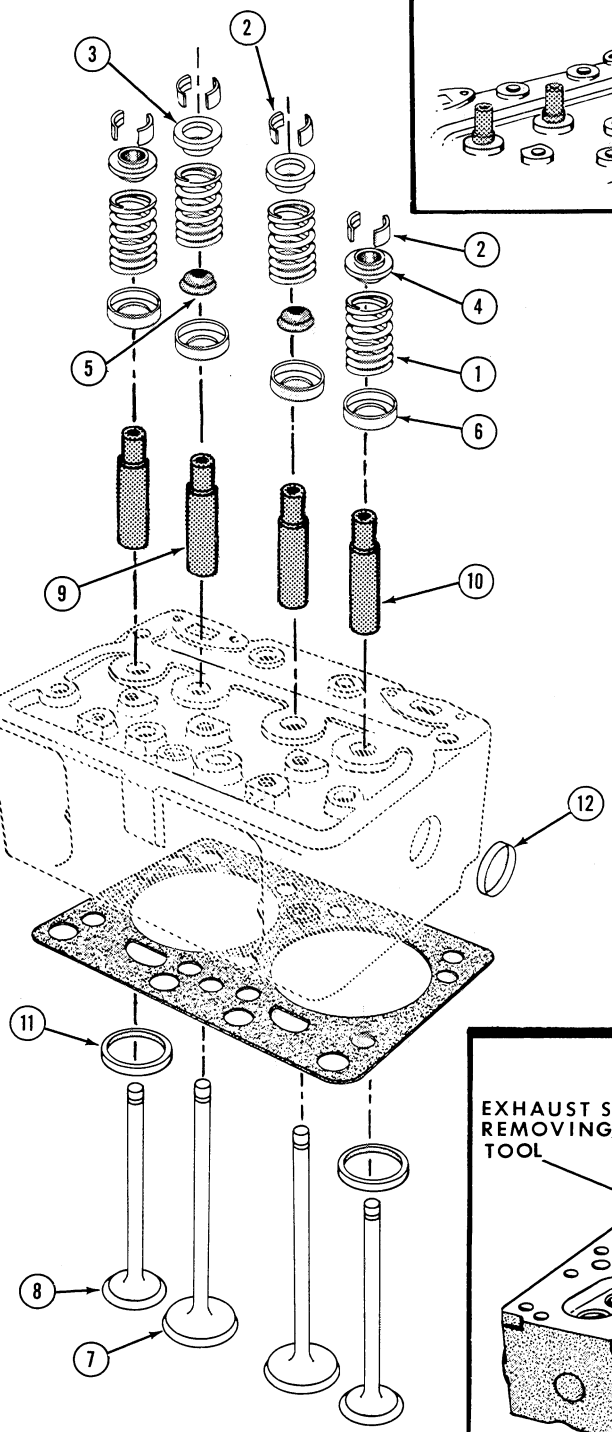
Figure K-31

DISASSEMBLY AND ASSEMBLY OF THE CYLINDER HEAD AND VALVES









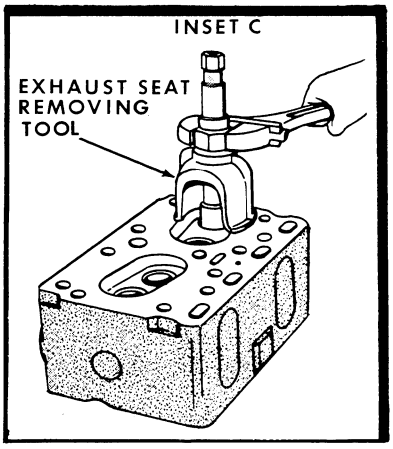


Figure L-8

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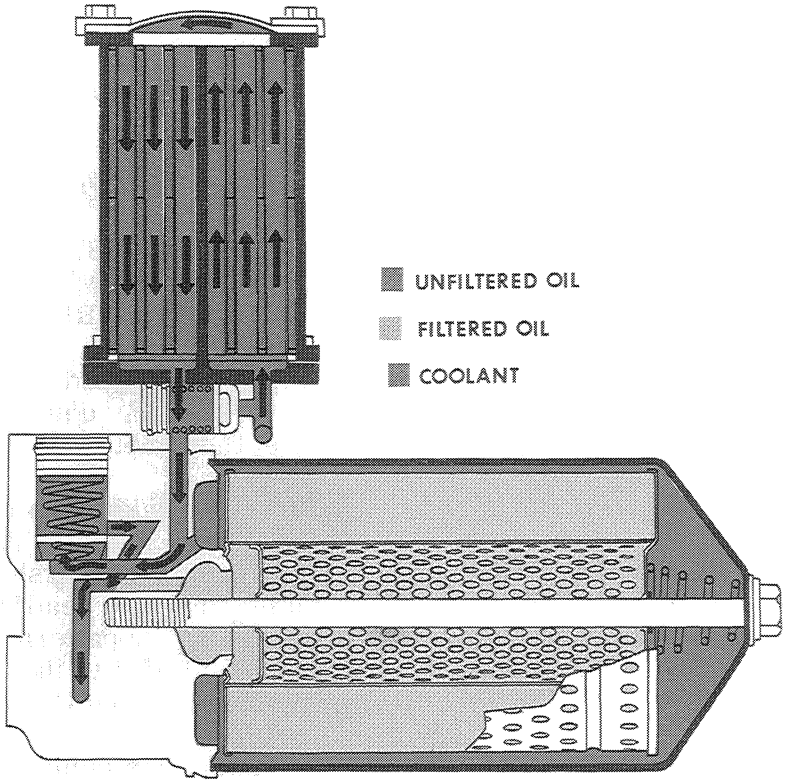


Figure M-9. Oil Flow With Plugged Filter Element

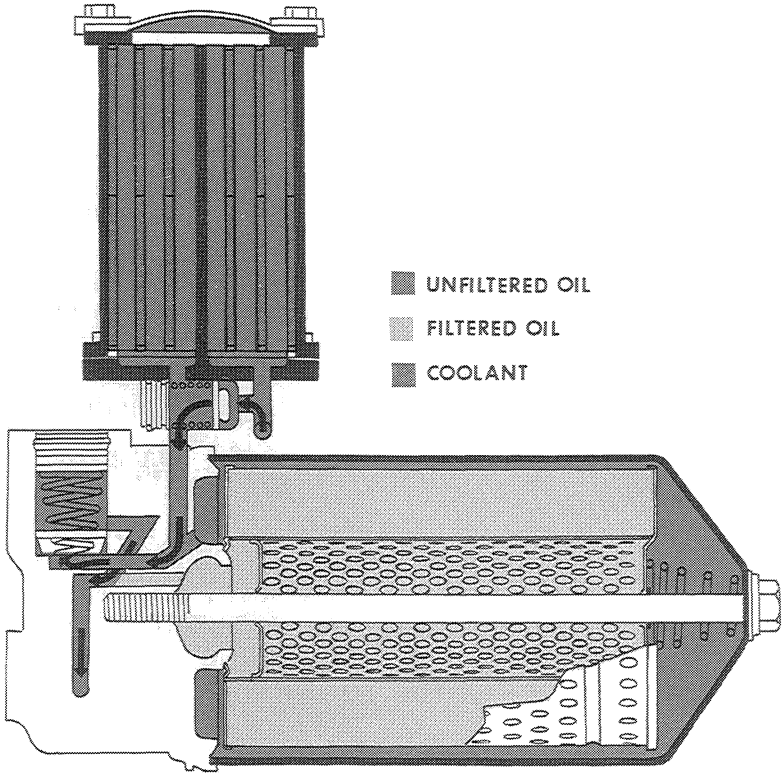


Figure M-10. Oil Flow With Plugged Oil Cooler and Oil Filter Element

2. Use an inside micrometer, Figure M-25 or a cylinder bore gauge, Figure M-26. Check the measurement of the inside diameter of the sleeve at a point 9/16 of an inch from the cylinder head end of the sleeve - (this is the top end of the ring travel).

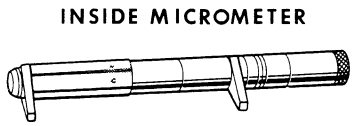


Figure M-25

NOTE

CHECK THE INSIDE DIAMETER OF THE SLEEVE BOTH LENGTHWISE AND CROSSWISE, FIGURE M-26. CHECKING BOTH LENGTHWISE AND CROSSWISE WILL DETERMINE WHETHER OR NOT THE SLEEVE IS OUT OF ROUND. REFER TO "SPECIFICATION" SECTION.

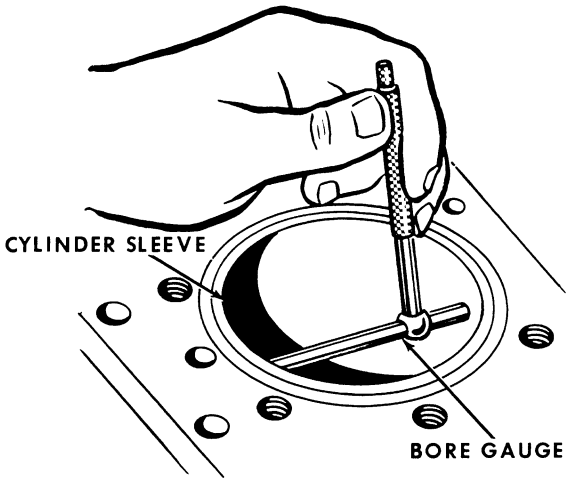


Figure M-26

3. The difference between the measurement of the piston and cylinder sleeve will give you the clearance. Refer to "Specification" Section.

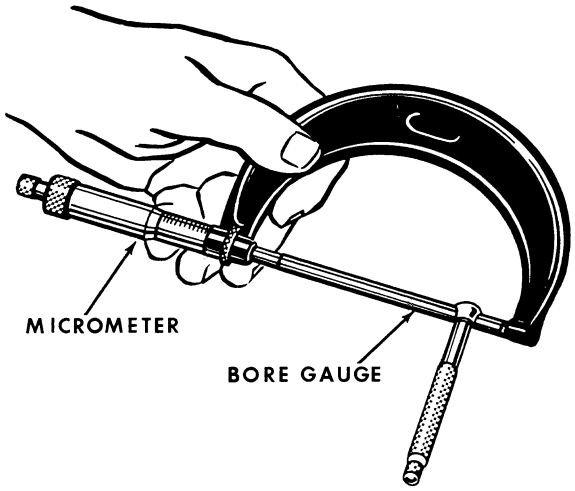


Figure M-27

4. After checking the sleeve 9/16 of an inch from the top, lengthwise, check at several points down the length of the sleeve. Subtract the smallest diameter from the largest diameter will give the taper of the sleeve. Refer to Figure M-28 and "Specification" Section.

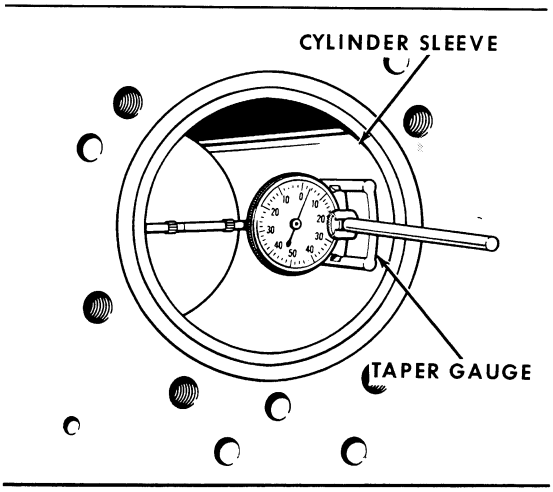


Figure M-28

Top to bottom of ring travel (approximately 3 inches) is where excessive wear usually occurs in the cylinder sleeve bore.

The bearing liners illustrated in Figure M-45 , failed because the oil supply was cut off due to installing a lower main bearing liner in the block instead of an upper half. The lower half does not have an oil hole and groove, thus the bearing did not receive any pressure lubrication from the oil pump. A stained circle on the back of the bearing gives proof the oil hole in the

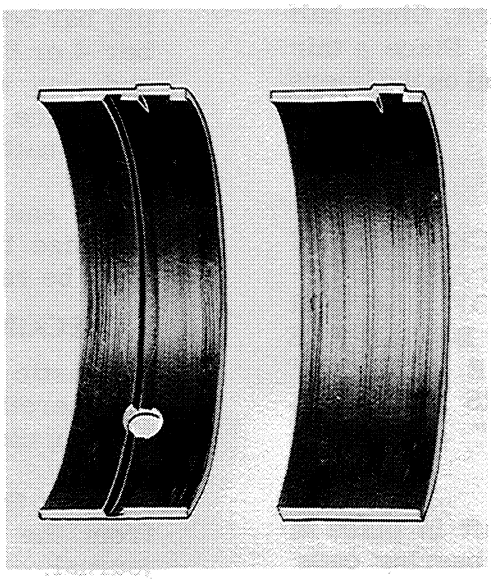


Figure M-45

cylinder block was cut off by the bearing. DO NOT INTERCHANGE BEARING LINER HALVES ON MAIN BEARINGS.

Figure M-46 illustrates diesel bearing liners that have been pitted by sulfuric acid resulting from too high a sulphur content in the fuel. This pitting is also caused by running the engine at a low engine coolant temperature.

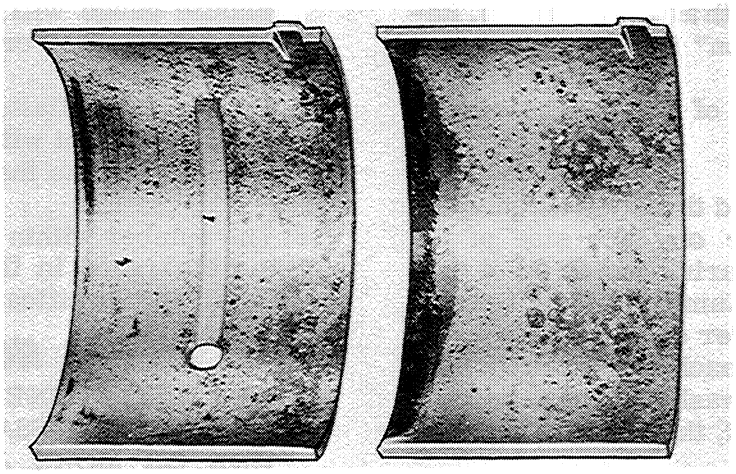


Figure M-46

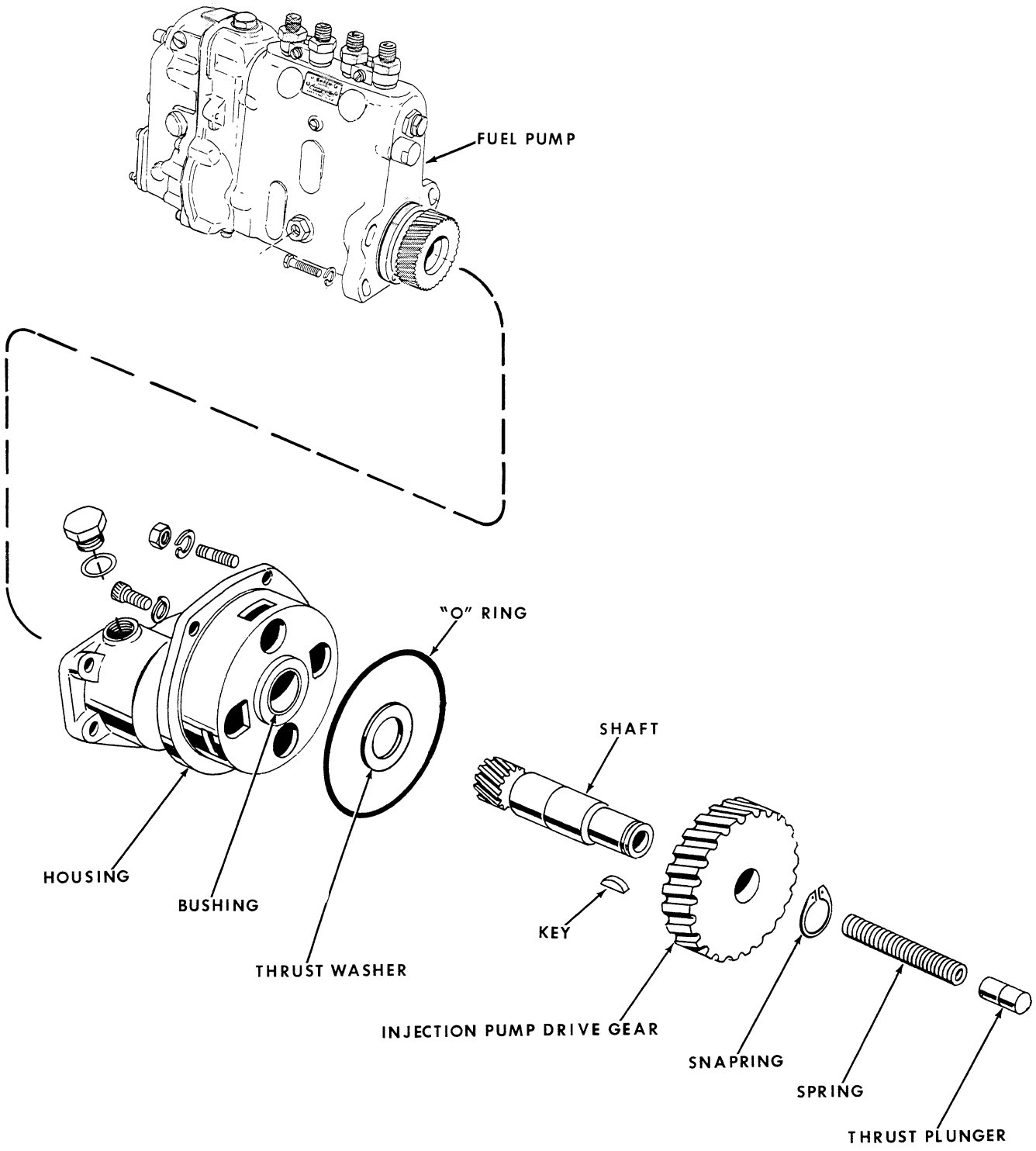
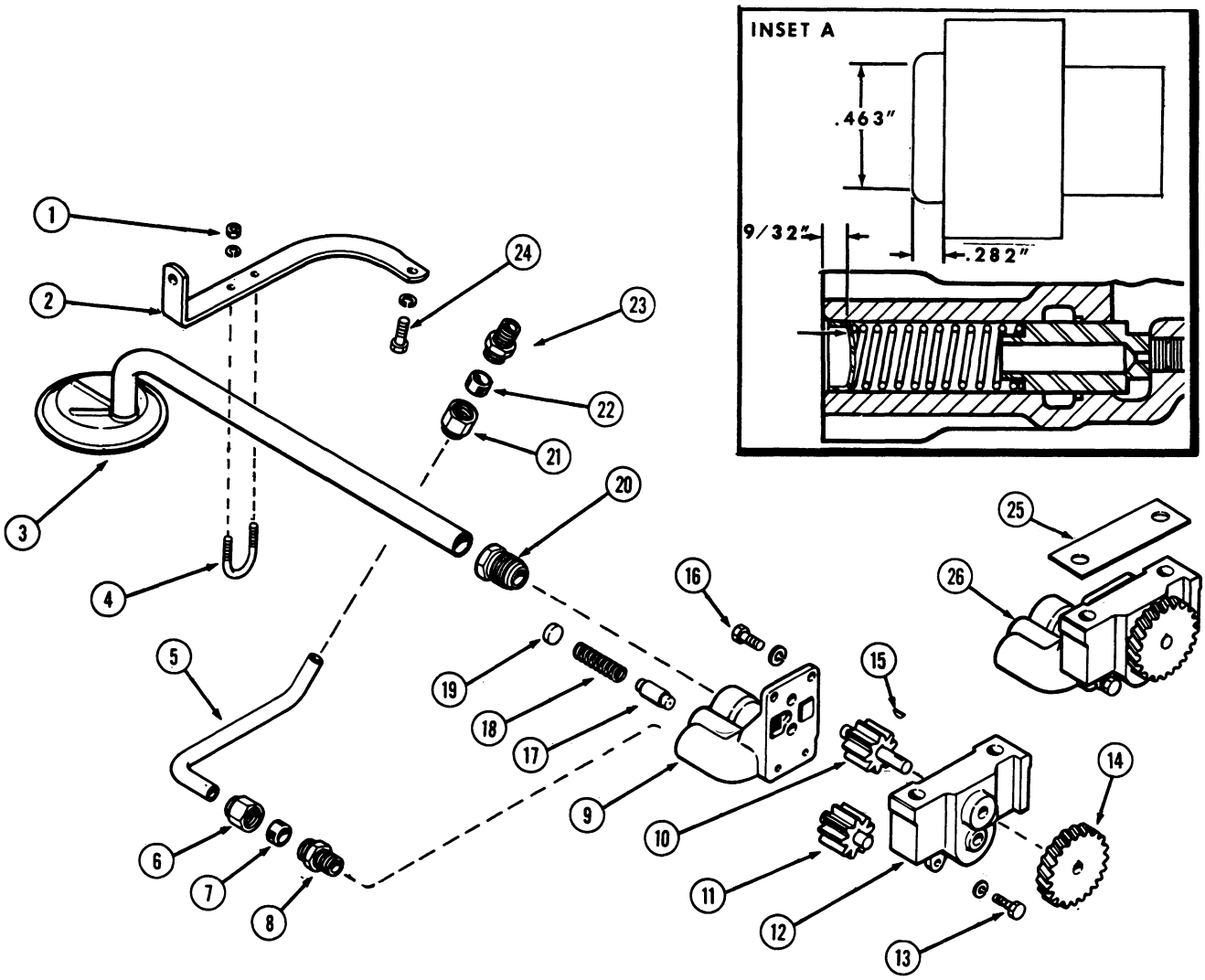

FUEL PUMP
"O" RING
SHAFT
HOUSING
BUSHING
THRUST WASHER
KEY
INJECTION PUMP DRIVE GEAR
SNAPRING
SPRING
THRUST PLUNGER

Figure M-52


INSET A
.463"
9/32"
.282"
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
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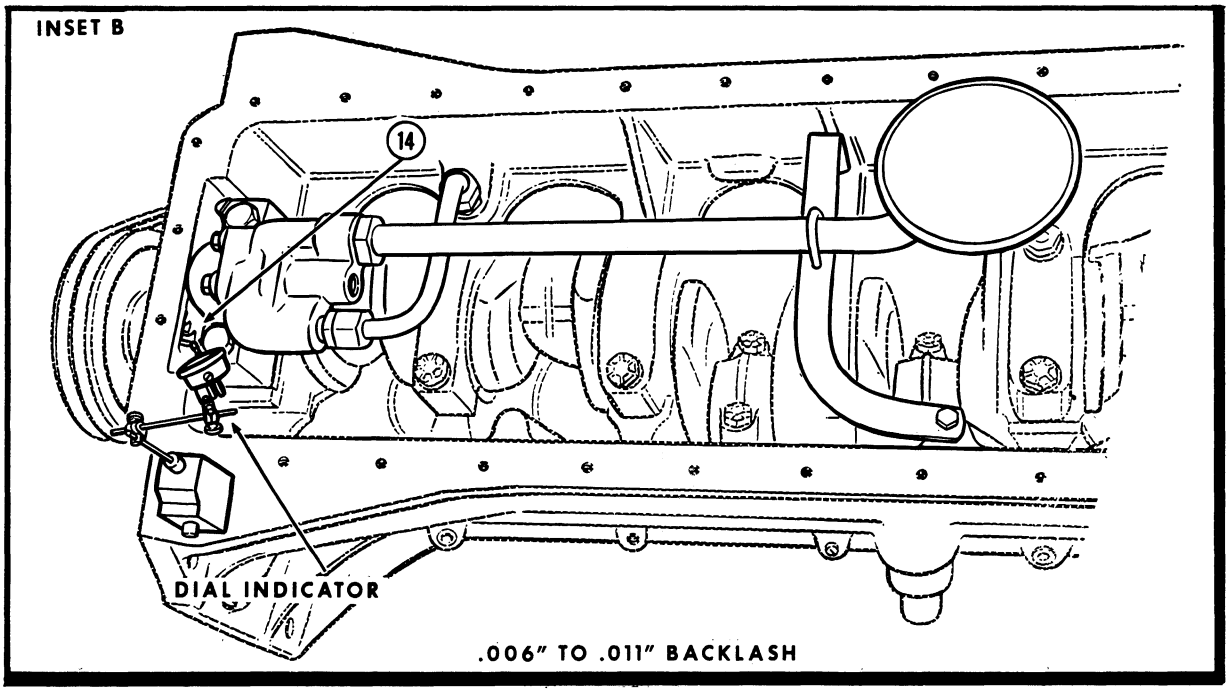

INSET B
14
DIAL INDICATOR
.006" TO .011" BACKLASH

Figure M-5

OIL PUMP AND BALANCER

Oil Pump Screen Removal and Installation

Tools Required-General Shop Service Tools

1. Drain the crankcase, and remove the oil pan.

2. Remove the screen from the balancer housing, Figure MM-8.

3. Clean the screen thoroughly in fuel. Blow it out with compressed air.

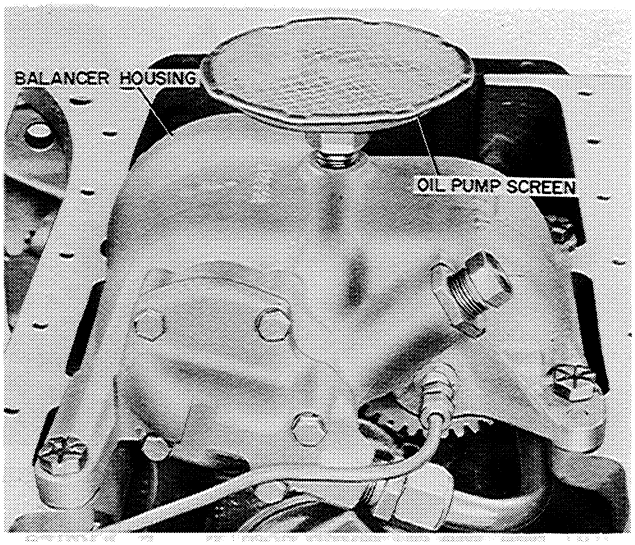


Figure MM-8. Oil Pump Screen

Oil Pump Cover Removal and Installation

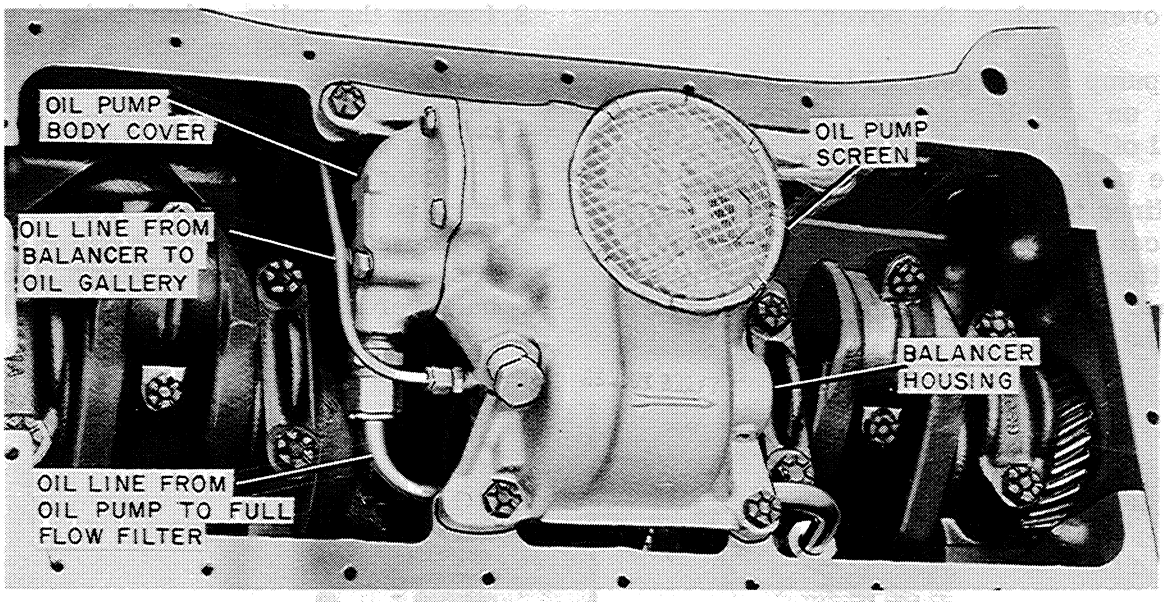


Figure MM-9

1. Drain the crankcase and remove the oil pan.

2. Remove the oil line from the oil pump to the full flow filter, Figure MM-9.

3. Remove the smaller oil line from the balancer to the oil gallery, Figure MM-9.

4. Remove the five capscrews from the oil pump body cover.

5. When the pump is installed, tighten the capscrews to 15 foot pounds.

Installing the Balancer in the Engine

NOTE

BEFORE INSTALLING THE BALANCER IN THE ENGINE - MAKE CERTAIN THAT THE COUNTERWEIGHTS CAN BE ROTATED FREELY.

To install the balancer, proceed as follows:

1. The balancer rotates at twice the speed of the crankshaft. There are two positions on the crankshaft drive gear that can be properly timed to the driven gear in the balancer. These two positions will be 180° apart on the crankshaft drive gear. Install the balancer on the mounting pads of the cylinder block with the proper timing marks meshed, Figure MM-33.

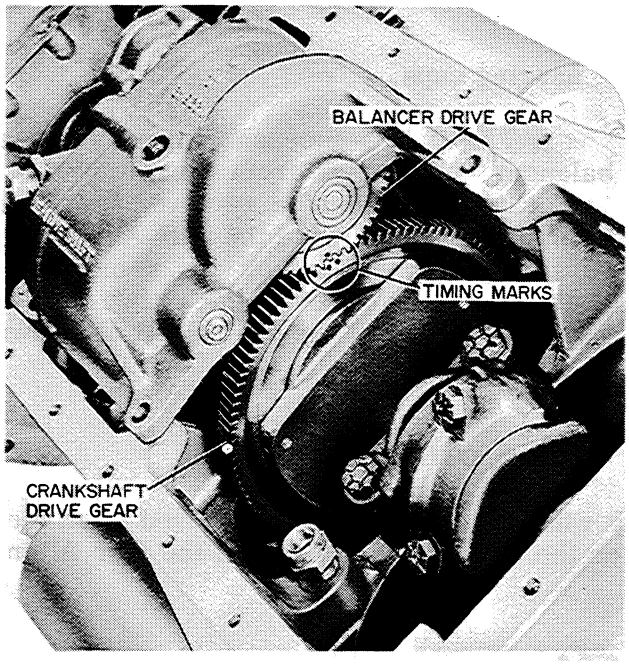


Figure MM-33

2. Shim all four mounting pads for proper backlash between the crankshaft drive gear and balancer gear. The proper backlash is from .008 inch to .013 inch and it should be checked with a dial indicator at three positions 120° apart on the crankshaft drive, Figure MM-34.

IMPORTANT CAUTION

VARIATION IN SHIM THICKNESS ON THE RIGHT HAND SIDE COMPARED TO THE LEFT HAND SIDE MUST NOT EXCEED .005 INCH. SHIM THICKNESS AT THE FRONT AND REAR BOLTS ON ONE SIDE OF THE BALANCER MUST BE EQUAL. SHIMS ARE AVAILABLE IN .005 AND .010 INCH THICKNESS.

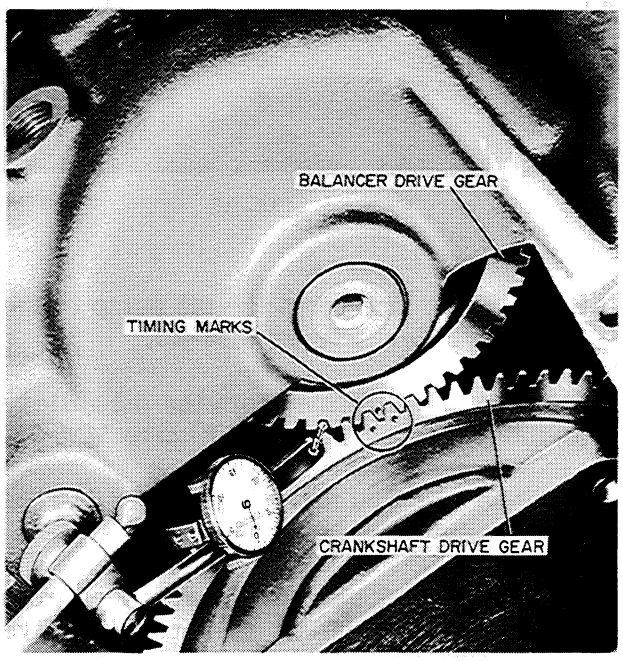


Figure MM-34

The contact point of the crankshaft gear and balancer gear is located approximately 2/3 of the distance from the mounting points on the right hand side and 1/3 the distance from the left side - therefore approximately a 2 to 1 variation in backlash can be obtained by installing a shim on one side instead of the other.

3. Install the oil line from the full flow filter and the oil line from the oil gallery.

CHECKING GOVERNOR ACTION

A governor in good condition will be very responsive to slight changes in load so that a uniform engine speed can be maintained.

Governor Surge (Under No Load)

An objectionable governor surge under no load will result from wear in the governor weight assembly. Check the entire governor assembly for wear or binding.

Check the carburetor adjustments also. Refer to Section N on Carburetor Service Instructions.

Governor Surge (Under Load)

If the governor surges constantly with the engine under load, check the governor lever adjustment. Refer to Governor Linkage Page. Form 9-77511 in this manual.

Check the governor linkage for wear or binding. Refer to Governor Linkage Page, Form 9-77511in this manual.

Check the governor weights, sleeves, fingers, etc., for wear as described on Page 4M-6. Replace all worn parts.

Check the carburetor adjustments also. Refer to Section N on Carburetor Service Instructions.

Sluggish Governor Action

A sluggish governor is evidenced by the engine speed dropping noticeably before the governor responds to a change in load.

Check the entire linkage assembly for wear or binding. Refer to Governor Linkage Page, Form 9-77511 in this manual.

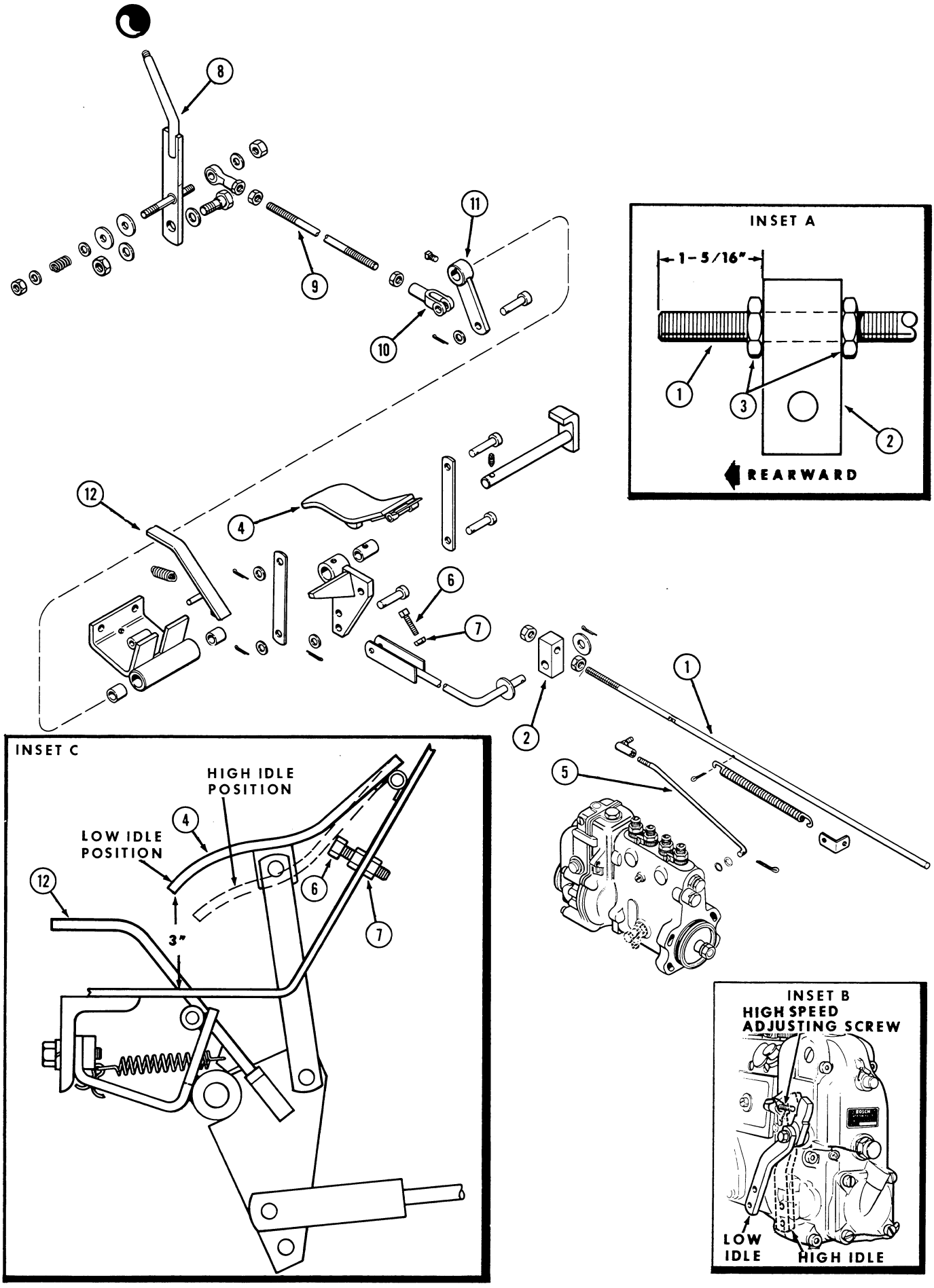
Check the governor lever setting. Refer to Governor Linkage Page, Form 9-77511 in this manual.

Inspect the governor weights, pins, fingers, sleeve etc., for wear or binding, Page 4M-6. Replace all worn parts.

Inspect the carburetor throttle shaft bushings. Refer to Sections N on Carburetor Service Instructions.

Governor Does Not Allow Engine to Reach High Idle

Wrong governor weight and spring combination being used. Refer to Page 4M-3.


INSET A
1-5/16"
REARWARD
INSET C
HIGH IDLE POSITION
LOW IDLE POSITION
3"
INSET B
HIGH SPEED ADJUSTING SCREW
LOW IDLE
HIGH IDLE

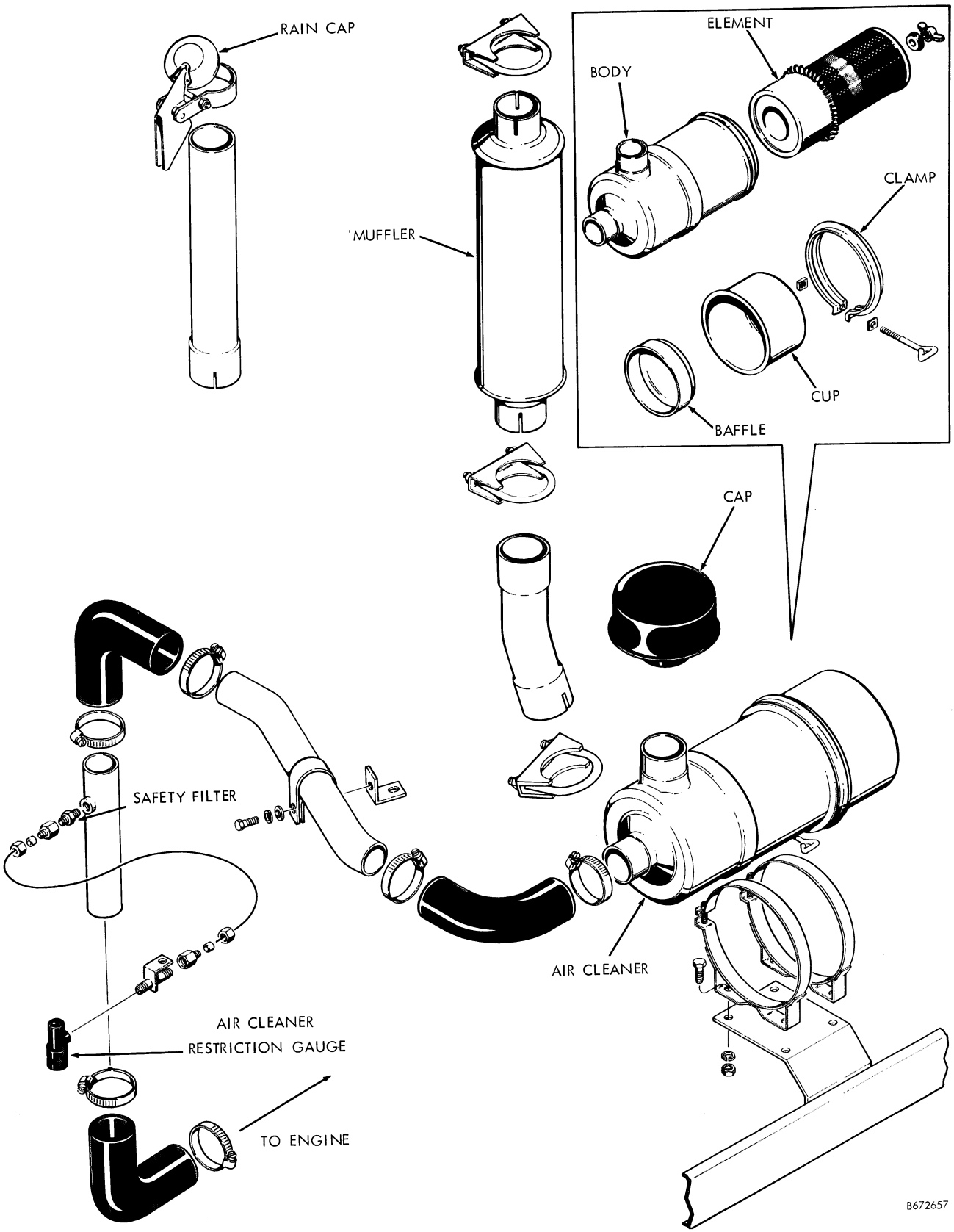
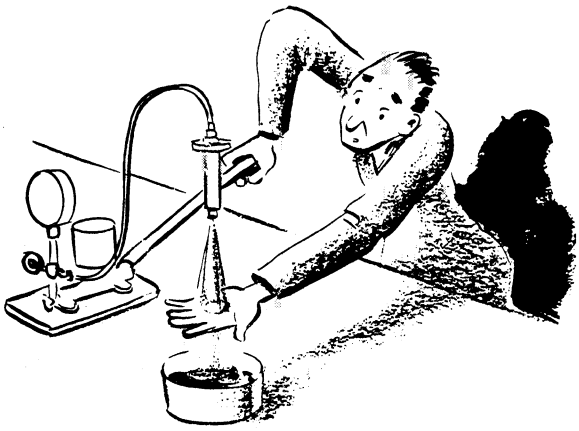


Figure 3 - Exploded View of Air Intake System And Exhaust System (Diesel Models)



WARNING

When testing or adjusting fuel injectors, do not place your hands or arms in front of the injector nozzle.

The fuel spray from an injector has sufficient penetrating power to puncture the flesh and destroy tissue. Should the fuel enter the blood stream, it may cause blood poisoning.

In the event the skin is punctured from the discharge of an injector, apply the following first aid immediately, then have the injury examined by a physician as quickly as possible.

Wash the injured part with boric acid solution, support the injured finger or hand with a splint and sling so the injured part will remain absolutely at rest until a physician can examine it.

PREPARING TEST STAND

1. After filling the test stand fuel tank, loosen the bleeder screw, Figure I-14.
2. When the oil flowing from the bleeder screw opening is free of air bubbles, retighten the screw.
3. Wash the connector tube in clean diesel fuel, blow it clean with filtered compressed air, and connect it securely to the test stand, as shown in Figure I-14. Operate the hand lever slowly until clean fuel flows from the tubing. Flush the tubing out thoroughly in this manner.
4. The test stand is now ready for use. ***NOTE*** Complete maintenance instructions are furnished with the test stand. Follow the directions carefully.

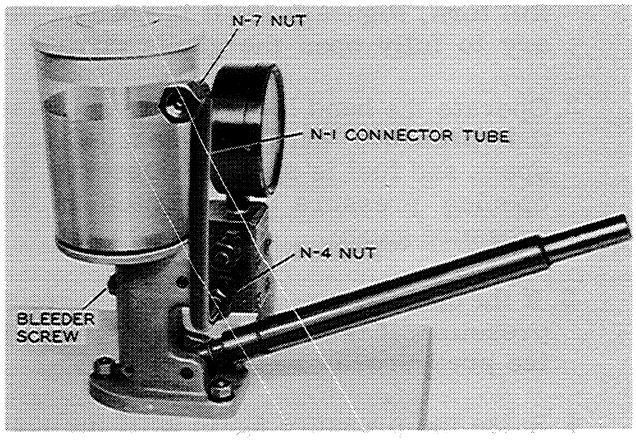


Figure I-14. Preparing Test Stand for Operation

TESTING INJECTOR

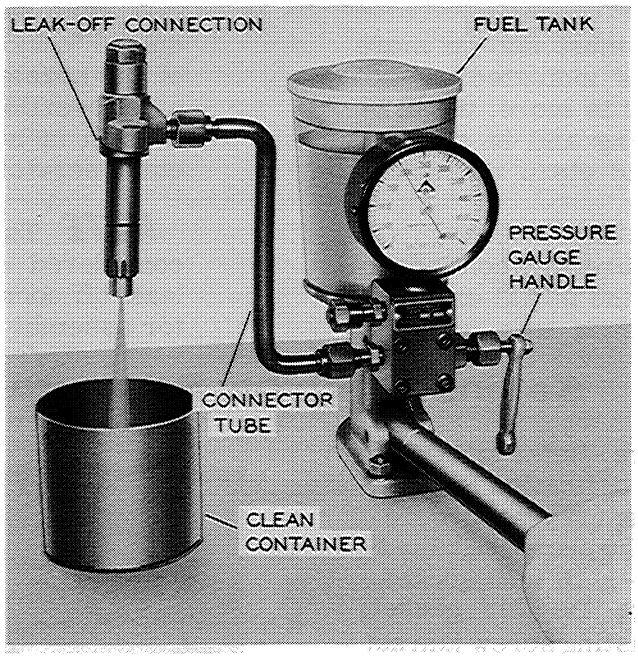


Figure I-15. Testing the Injector on a Bacharach Test Stand

CAUTION Do not place your hands or arms in front of the nozzle when testing an injector on the test stand. The fuel spray has sufficient penetrating power to puncture the flesh and destroy tissue. Refer to the "Warning" on Page I-3.

1. Remove the protective cap from the high pressure connection on the nozzle holder and from the nozzle end. Connect the injector to the test stand connector tube as shown in Figure I-15.

Aim the injector into a clean container. It is also advisable to place a clean lint-free rag over the container to prevent fuel bouncing back out of the container and making it difficult to determine the spray pattern. (Do not use laundered shop rags as they may contain tiny steel particles.)

2. Close the pressure gauge valve (turn it fully in) Figure I-15, and operate the hand lever reapidly for a few strokes to clear all air from the injector.

Installing Nozzle on the Holder

1. Clamp the nozzle holder in the vise, as shown in Figure I-40.

   NOTE If you are installing a new nozzle assembly, very carefully remove the protective wrapper and wash the nozzle body and valve in clean diesel fuel. This must be done to remove the rust preventive material with which the nozzle is coated for storage purposes.
2. Rinse the lapped surface at the end of the holder with clean diesel fuel. Rinse the nozzle valve and body in clean fuel and place the nozzle assembly in position on the holder.

   After the final rinse, do not touch the lapped surfaces with your hands as moisture from them is corrosive.
3. Very carefully place the nozzle cap nut over the nozzle. Be sure the stem of the valve is located in the hole in the holder body.

Robert Bosch Nozzle Cap Nuts Only

If a Robert Bosch nozzle cap nut is being installed, simply tighten the cap nut to 50-55 foot pounds.

Note: Robert Bosch cap nut can be identified by a centering step. Refer to inset, Figure I-40.

American Bosch Nozzle Cap Nuts Only

The nozzle must be exactly centered in the cap nut. To insure this, the Nozzle Centering Sleeve must always be used to install the American Bosch cap nut only. The centering sleeve is provided in both the CD500 and CD-800 Tool Kits. Wash the sleeve in clean diesel fuel before using it.

CAUTION

Do Not Use a centering sleeve to center the nozzle assembly in the cap nut when installing a Robert Bosch nozzle cap nut. The Robert Bosch cap nut is designed with a self centering step, Figure I-40 and if installed with a centering sleeve can cause damage to the nozzle assembly.

a. Carefully fit the centering sleeve over the nozzle body, as shown in Figure I-40. The tapered end centers the nozzle body within the cap nut bore.
b. With the centering sleeve in place, tighten the American Bosch Nozzle Cap Nut as much as possible with your fingers. Keep the sleeve free.

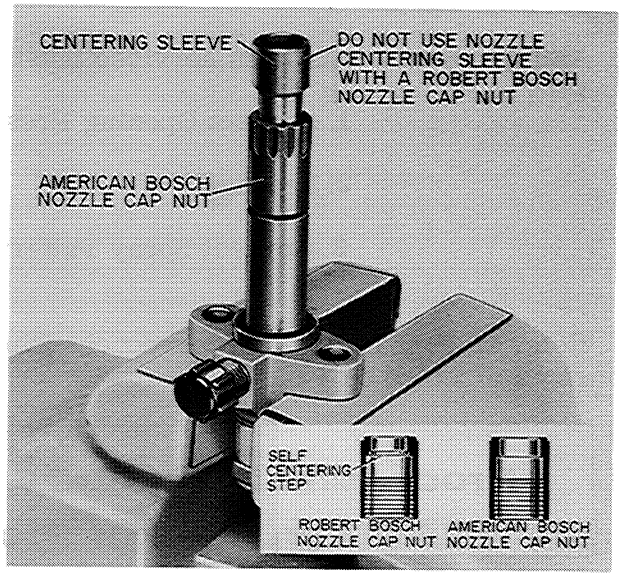


Figure I-40. Positioning Nozzle Body with Nozzle Centering Sleeve

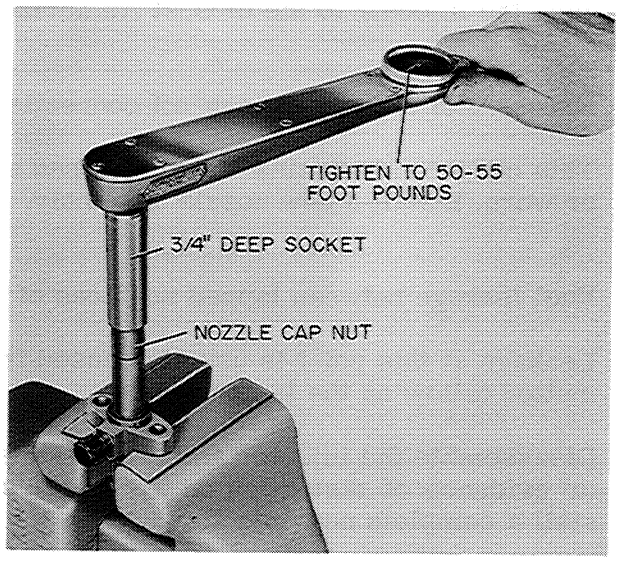


Figure I-41. Tightening Nozzle Clamp Nut with a Torque Wrench

c. Using a torque wrench and a 3/4 inch deep socket, carefully tighten the cap nut to 50 to 55 pounds, Figure I-41.

   Keep the sleeve free while tightening the nut.
d. After the cap nut is tight, pull the centering sleeve straight upward and out of the nozzle. If you have tightened the cap nut correctly, the sleeve will come out easily.
4. The injector is now reassembled and ready for checking on the Nozzle Test Stand.

ROBERT BOSCH MODEL PES MULTIPLE PLUNGER FUEL INJECTION PUMP
General Description

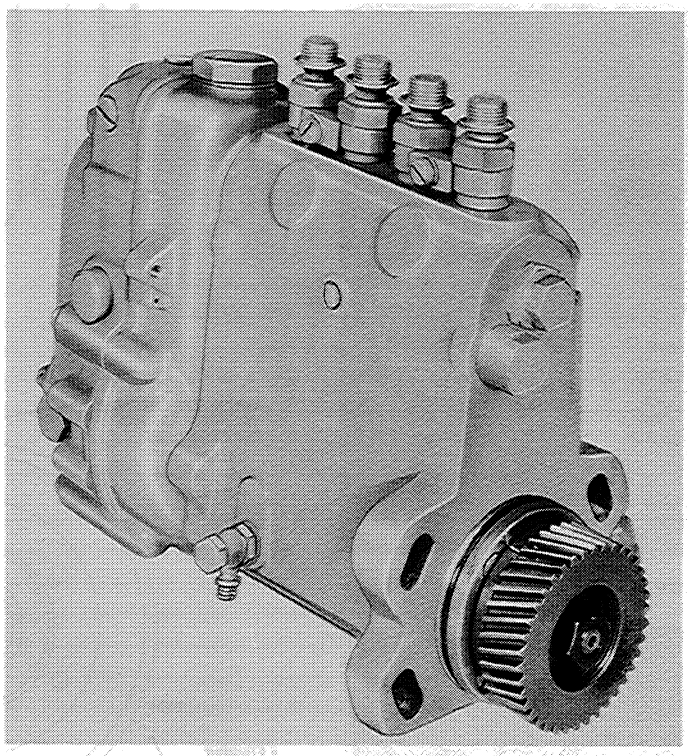


Figure I-53. Model PES Multiple Plunger (External Drive) Fuel Injection Pump

All Case Diesel Engines are equipped with a Robert Bosch Model PES Multiple Plunger (External Drive) Fuel Injection Pump. This is an extremely compact and precision unit into which is incorporated a high pressure injection pump a mechanical variable speed centrifugal type governor, a positive displacement plunger type fuel transfer pump, plus the required driving parts.

The function of the fuel injection pump is to deliver accurately metered quantities of fuel under high pressure to the injectors. This must be done with accurate timing in relation to the engine firing order and for a very definite period of time in relation to load and engine speed requirements.

To meet these rigid requirements, the Model PES Injection Pump is of necessity manufactured to unusually close tolerances. While the pump cannot be considered delicate, the precision with which it is constructed can be compared to that of a fine watch.

It is therefore doubly important that you take extra precautions against the entry of dust or similar abrasives when you perform any service work that involves the fuel injection pump or any other component of the fuel system.

Control Rack on Injection Pump

In some instances when an engine is hard to start and there is no exhaust smoke, it may be due to the Control Rack sticking in the stop position. The stop position on Robert Bosch Governors is always with the Control Rack toward the rear of the pump or governor.

The sticking of the Control Rack can be due to gum and varnish in the fuel. Instruct the customer to use a small quantity of "Case Diesel Fuel Conditioner" in the fuel tank daily as this will clean out the gum and varnish deposits already in the engine and will prevent these deposits from forming. Refer the customer to the Case Diesel Fuel Conditioners" in the "Fuel Specifications Section" of the Operator's Manual.

To free the control rack proceed as follows:

1. Loosen and remove the cap nut on the front of the injection pump, Figure I-70.

2. Place the throttle in the wide open position so the control rack will be toward the full load position.

3. Work the control rack from the cap nut end (by hand) a few times to relieve the sticking due to the gum and varnish.

4. Make sure the control rack works easily and smoothly before replacing and tightening the cap nut.

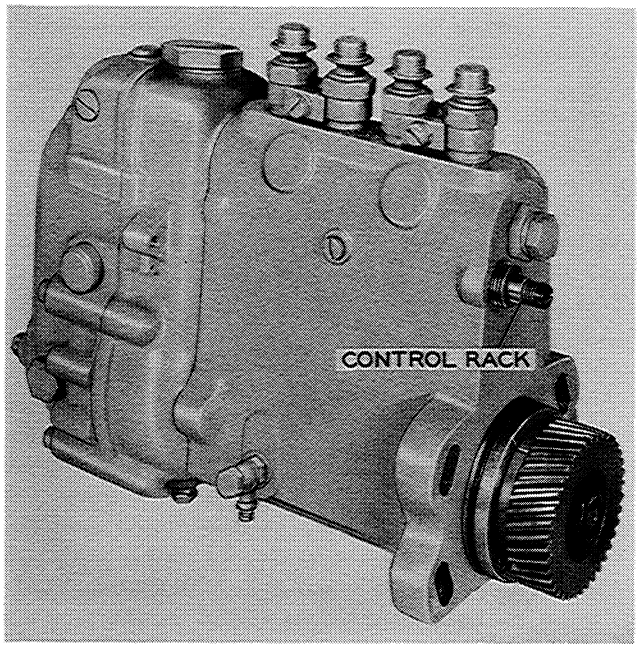


Figure I-70

NOTE: The CASE CORPORATION **reserves the right to make improvements in design or changes in specifications at any time without incurring any obligation to install them on units previously sold.**

THE POWER FUEL FEED SYSTEM

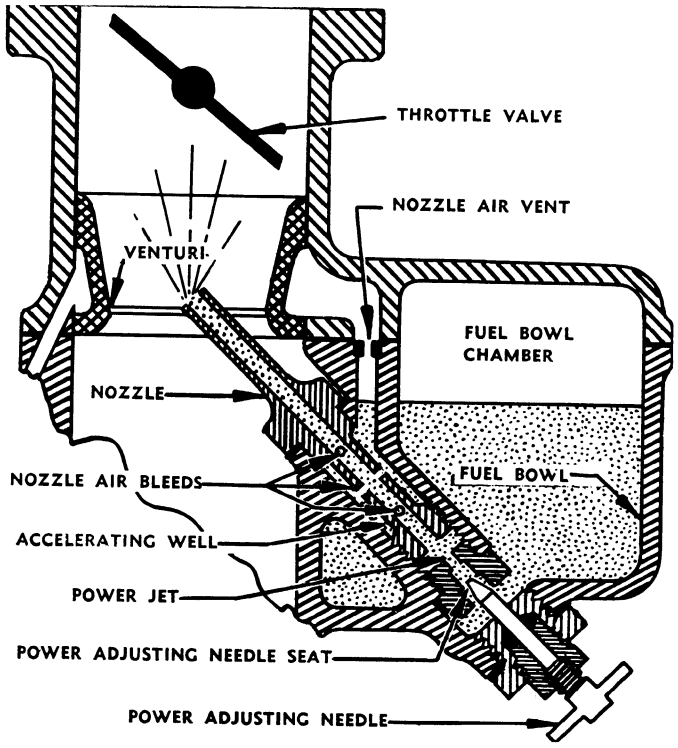


Figure N-5

With the throttle valve in slow or just off, slow idle position, fuel rises up through the nozzle and out of the nozzle air bleeds to fill the accelerating well to approximately the height of the fuel level in the fuel bowl.

As the engine speed is increased from the slow idle position the air flow through the venturi is gradually increased, and as the idle system begins to diminish, the velocity through the venturi is high enough to create a pressure at the tip of the nozzle slightly less than the pressure in the fuel bowl chamber and the accelerating well.

Fuel, therefore, feeds from the fuel bowl through the opening between the power (load) adjusting needle and the power adjusting needle seat through the power jet and out the nozzle to be discharged into the air stream at the venturi.

At the same time, the fuel that is stored in the accelerating well is also forced through the nozzle air bleeds into the nozzle. But because the size of the power jet and the position of the power adjusting needle restrict the amount of fuel which can enter the nozzle, the fuel in the accelerating well will soon be exhausted and air will then enter through the nozzle air bleeds to mix with the fuel passing through the nozzle. The amount of air that can enter into the nozzle is limited by the size of the nozzle air vent.

The result of air bleeding into the nozzle is: to help atomize or break up the fuel into finer particles; to regulate the quantity and the rate of discharge of the fuel fed from the accelerating well during acceleration; and to provide the correct mixture proportions for full throttle operation.

As the throttle valve is opened toward the wide open position the velocity through the ventrui continues to increase, lowering air pressure at the nozzle and resulting in additional fuel being supplied to the engine as the speed is increased.

When the throttle valve is opened suddenly from slow or just off slow idle position, the fuel stored in the accelerating well is forced out through the nozzle air bleeds very rapidly and serves to provide the extra richness required by the engine to meet the sudden load. When the throttle valve is closed, fuel again fills the accelerating well ready for the next acceleration.

MEASURING THE CARBURETOR NOZZLE AND SEATS

Refer to Page N-18 for correct hole sizes

A set of numbered drills as shown in Figure N-25 are used for measuring the various parts to make sure the correct parts are being used.

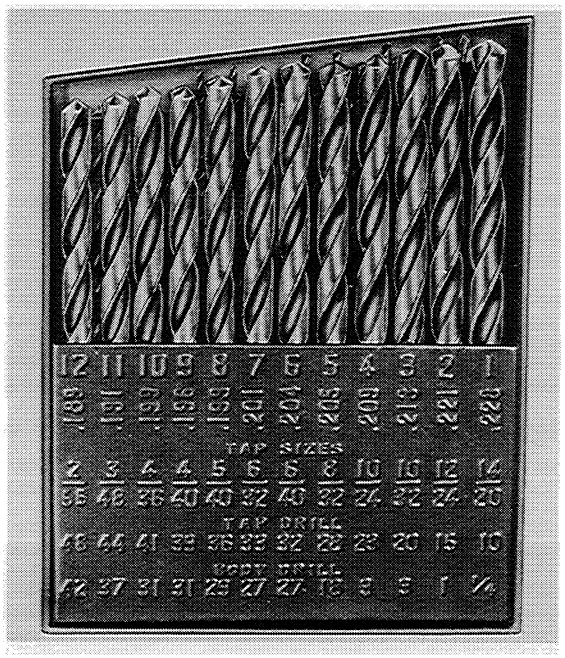


Figure N-25

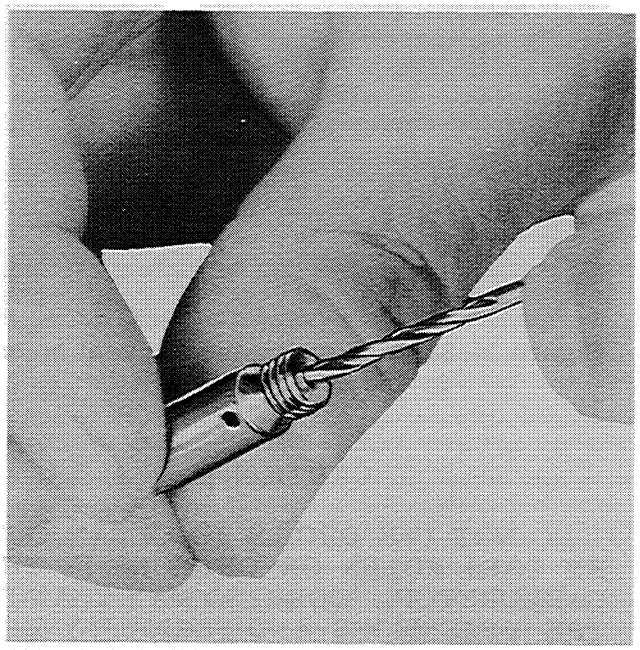


Figure N-26

Measuring the Main Adjusting Screw Seat.

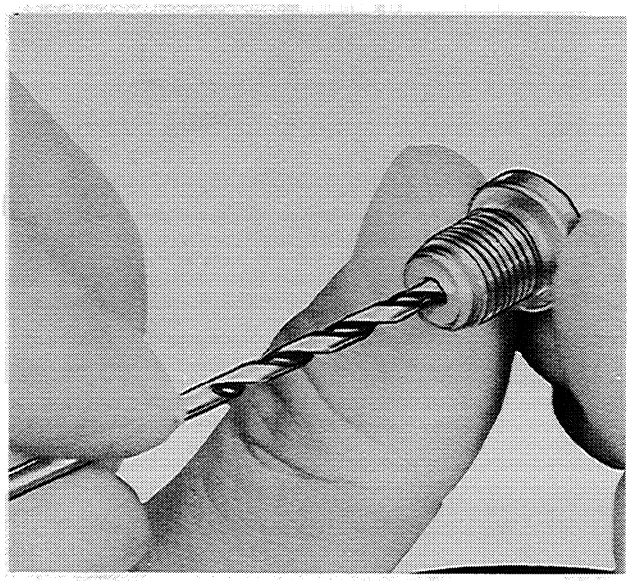


Figure N-27

Measuring the Needle Valve Seat.

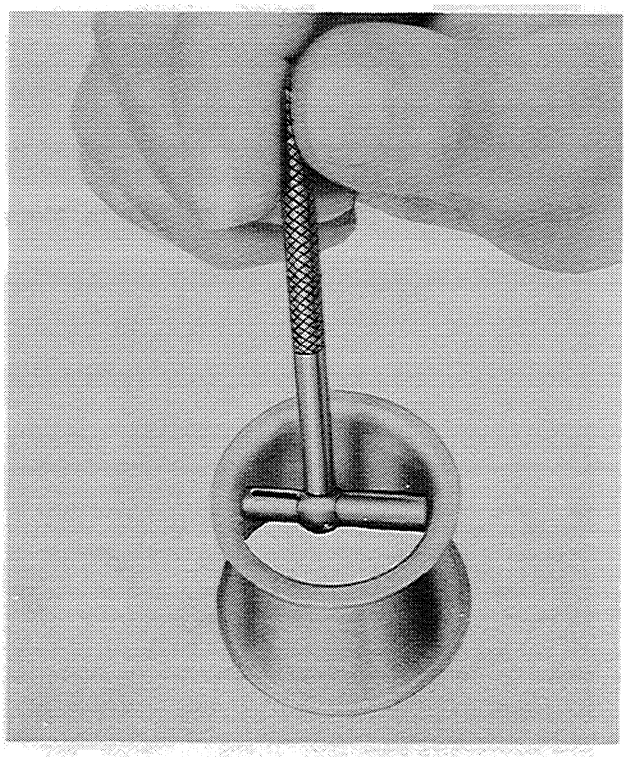


Figure N-28

Measuring the Venturi at its narrowest point, Figures N-28 and N-29.

SECTION

NN

SERVICING THE

BENDIX

ELECTRIC FUEL PUMP

PRINTED IN U.S.A.

the pressure on each and every component is increased and the leakage, if any, will also increase. The difference in flow through the flowmeter at "no load" and at a pressure just short of the main relief valve setting is the amount of leakage in the circuit.

As the flowmeter load valve is gradually closed, the point on the pressure gauge at which the flow through the flowmeter drops to zero is the main relief valve setting.

Valve leakage faults must be isolated by elimination. The information to follow under "Test Procedure" describes how to do this elimination process.

Cylinders must be tested for leaks in both the extended and retracted positions. This is because Case double acting cylinders are pressurized in both directions during normal operation.

How to Connect Flowmeter for "Tee Test"

1. Disconnect the hose at the point shown in Figure 4. Install a "tee" at this point.

2. Connect a high pressure hose from the "tee" to the inlet fitting on the flowmeter.

3. Connect another hose from the outlet of the flowmeter to the top of the reservoir.

NOTE!

As an alternate method, the high pressure hose to the flowmeter can be connected to the test port at the control valve inlet. For this, the floor plate must be removed.

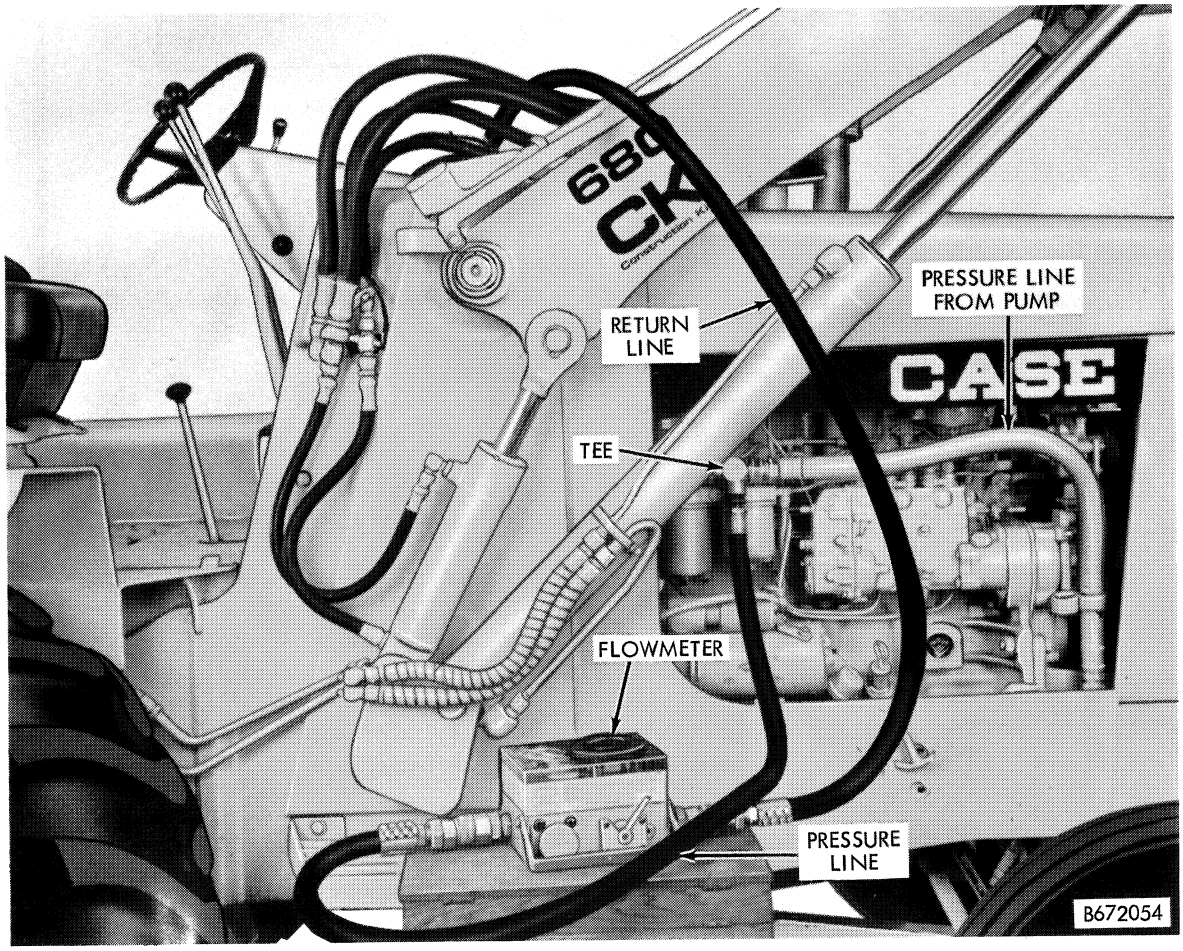


Figure 4 - Hookup for "Tee Test"

Backhoe Test Points

Disconnect the following hoses at any convenient point between the control valve and cylinder. Install the hand pump and make pressure check as described on page 18.

1. Hoses from both ports of bucket section to bucket cylinder. Hand pump should read 2100-2500 P.S.I. at both ports.

2. Hoses both from ports of crowd section to crowd (dipper) cylinder. Hand pump should read 2100-2500 P.S.I. at both ports.

3. Hoses from both ports of swing section to swing cylinders. Install plug in opposite port. Hand pump should read 2100-2500 P.S.I. at both ports.

4. Use pressure gauge as described on page 18 for the swing criss-cross relief valves.

5. Use pressure gauge as described on page 18 for the boom down "low pressure" relief valve.

6. Hose from "B" (lower) port of boom section to rod end of boom cylinder. Hand pump should read 2100-2500 P.S.I.

LOADER RELIEF VALVES

	Cylinder	Hand Pump Specification (P.S.I.)	Full Flow Specification (P.S.I.)
1	Tilt, port "A"	2000-2400	2500, range 2400-2600 @ 10 G.P.M.
2	Tilt, port "B"	2000-2400	2500, range 2400-2600 @ 10 G.P.M.
3.	Lift, port "B"	1700-2100	2200, range 2100-2300 @ 10 G.P.M.

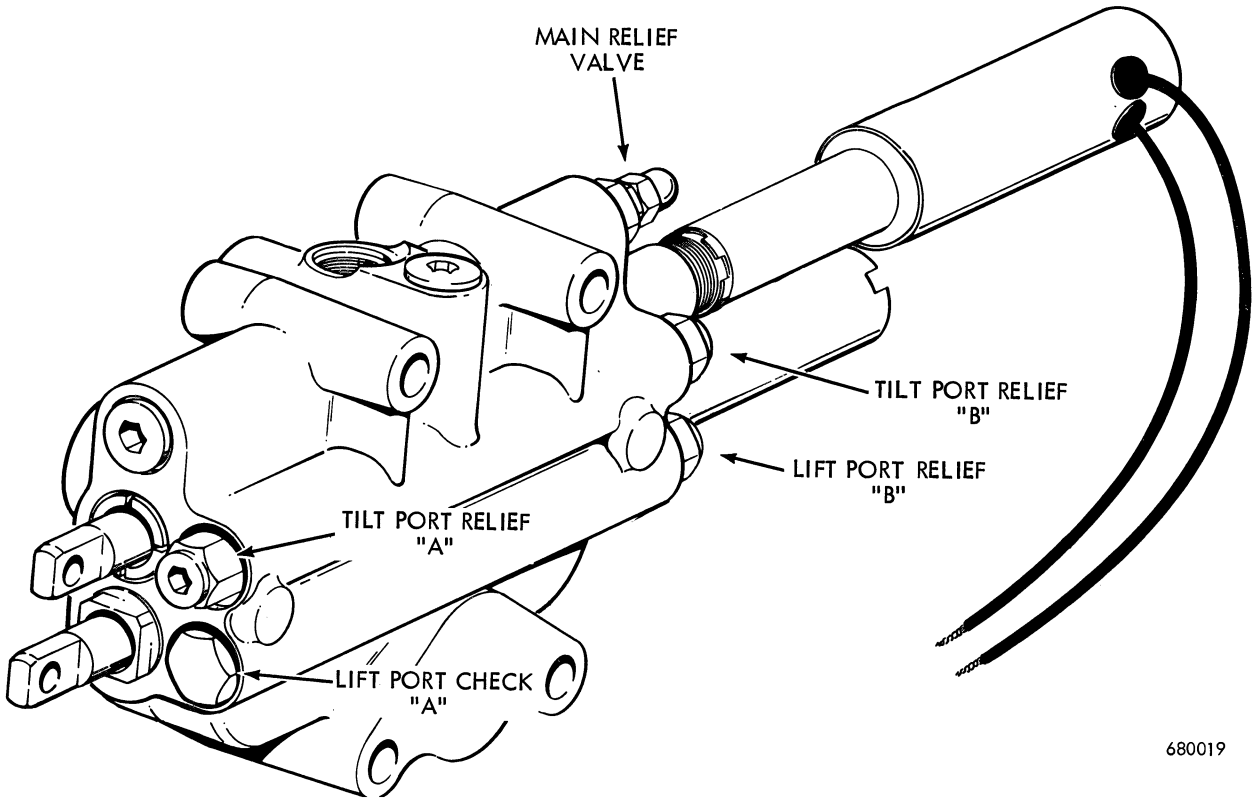


Figure 9 - Loader Control Valve

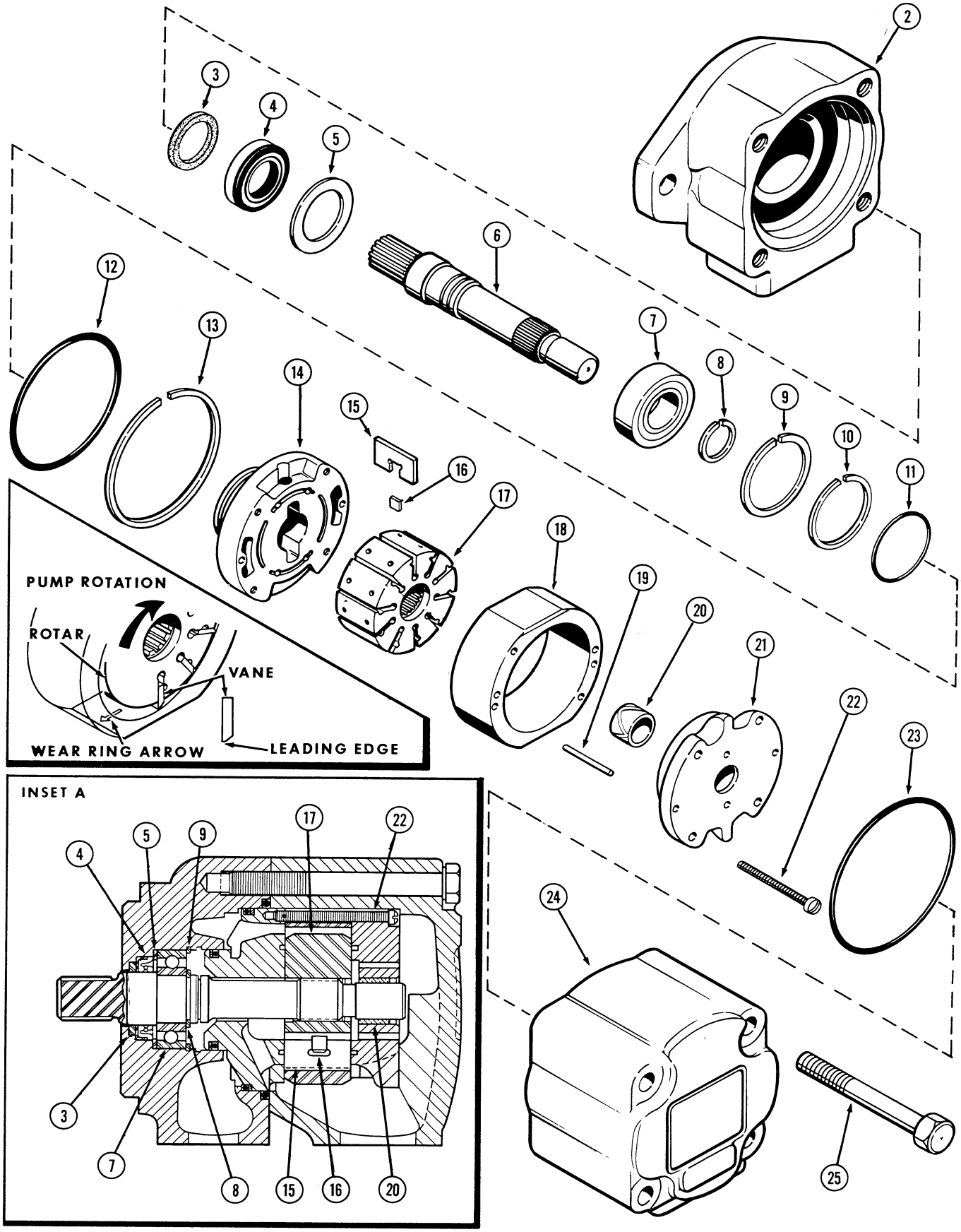

PUMP ROTATION
ROTAR
VANE
WEAR RING ARROW
LEADING EDGE
INSET A

Figure DD-1

IMPORTANT!

The drain sleeve should go in the valve body far enough to expose two or three full threads of the bore into which the plug is screwed. When the plug is installed and tightened, the seat sleeve will then be at the proper depth.

3. Install the poppet assembly so that the plunger shaft points toward the seat sleeve. Install the large spring in the inner diameter of the poppet assembly.

4. Assemble the cartridge: Install new pilot plunger seat, if removed. Insert the pilot plunger, followed by the spring. Install the adjusting screw and secure with a washer, jam nut, another washer, and acorn cap. Install lubricated "O"rings and backup ring on outside of cartridge.

5. Thread the adjusting screw in only a few turns—final adjustment should be made after the valve has been installed on the tractor.

6. Install the cartridge in the valve body and tighten securely.

Secondary Relief Valves

Refer to Figures 3 and 4.

Three secondary relief valves (sometimes called "overload" or "knockout" valves) are placed at both tilt cylinder ports and at the "B" port of the lift spool. A check valve is also a part of the relief valve assembly.

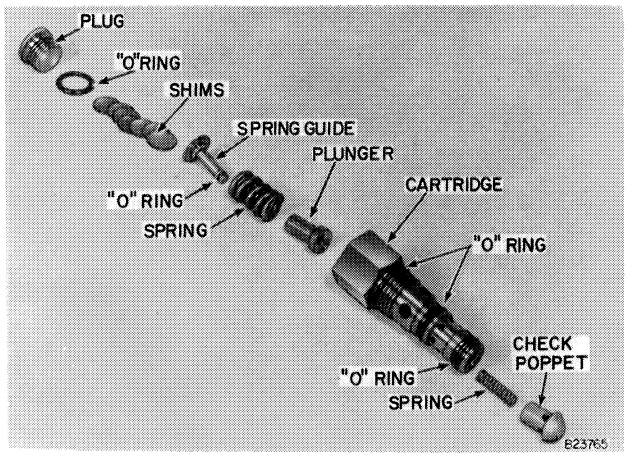


Figure 7 - Relief Valve Disassembled

1. With a wrench, remove the relief valve assembly from the control valve housing.

2. Retrieve the check valve poppet and spring from the bore in the housing. Do not remove the check valve seat unless it is to be replaced. Use a suitable puller to remove.

3. Disassemble the valve. Remove the plug from the top of the cartridge and take out the shims, spring guide, spring, and plunger. The latter three parts may come out as an assembly—they are easily pulled apart. Examine all parts and replace as necessary. Carefully check the condition of the "O"rings and backup rings.

4. The plunger seat is pressed into the cartridge. Do not attempt to remove it unless it is to be replaced. Use a suitable puller to remove. Take care not to damage cartridge during removal.

5. Clean all parts and reassemble the valve as follows: Press in a new plunger seat, if removed. Install the plunger, followed by the spring, spring guide, shims, and plug. Install as many shims as were removed. The pressure setting will have to be checked and adjusted when the control valve is installed on the tractor.

NOTE

Small nicks and grooves can be removed from the poppet seating face in the body by lapping the poppet in the body seat with a fine grain grinding compound. Lap seat sufficiently to remove all defects. Clean seat thoroughly to remove all traces of grinding compound. Extreme care should be exercised to keep poppet square with the bore when lapping in seat face.

6. Press new check valve seat into valve body, if removed. Drop the check valve poppet and spring into valve body as an assembly. Install the cartridge in the valve housing and tighten securely.

SERVICING MODEL 34 BACKHOE CONTROL VALVE

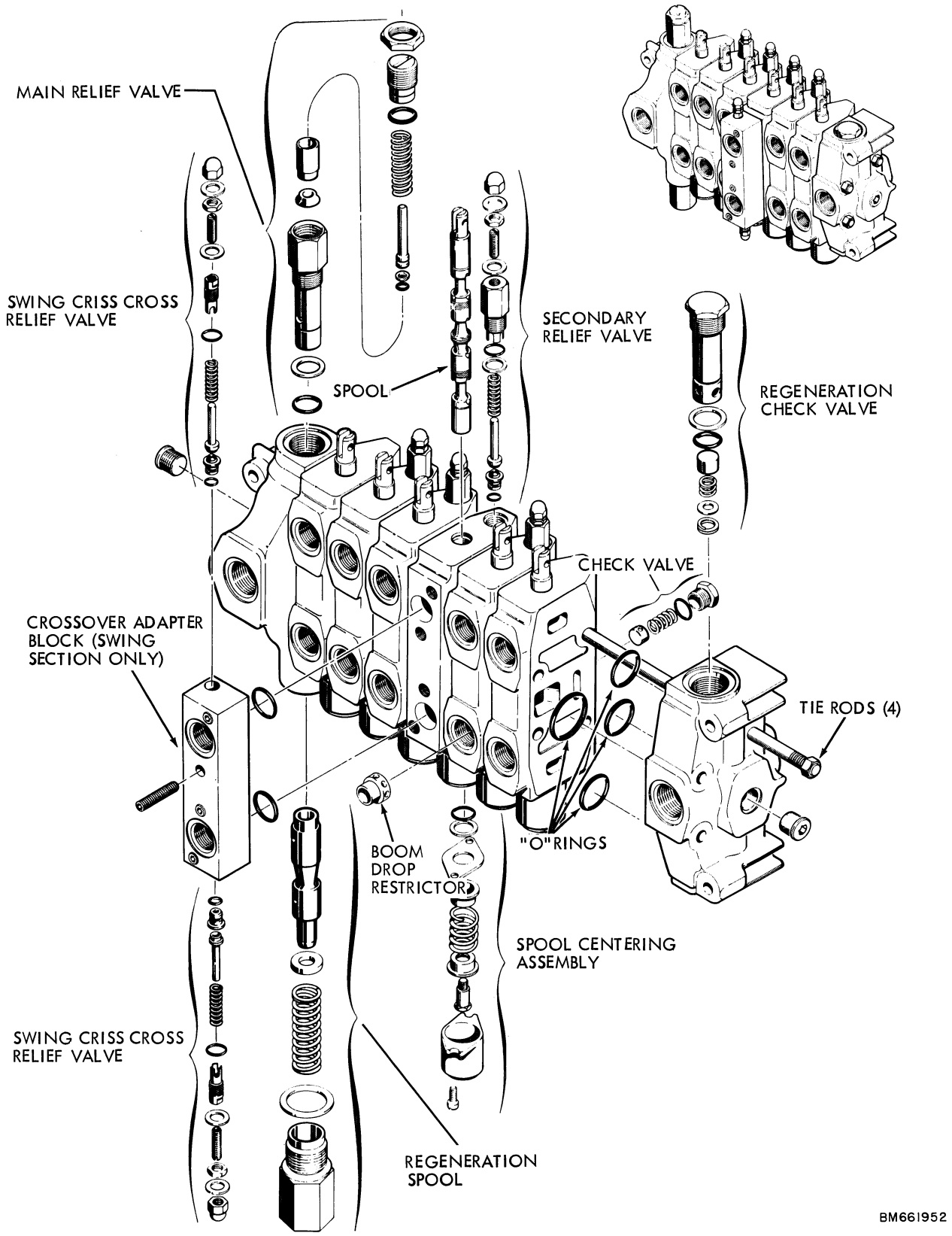


Figure 16 - Exploded View of Backhoe Control Valve

HYDRAULIC CYLINDERS

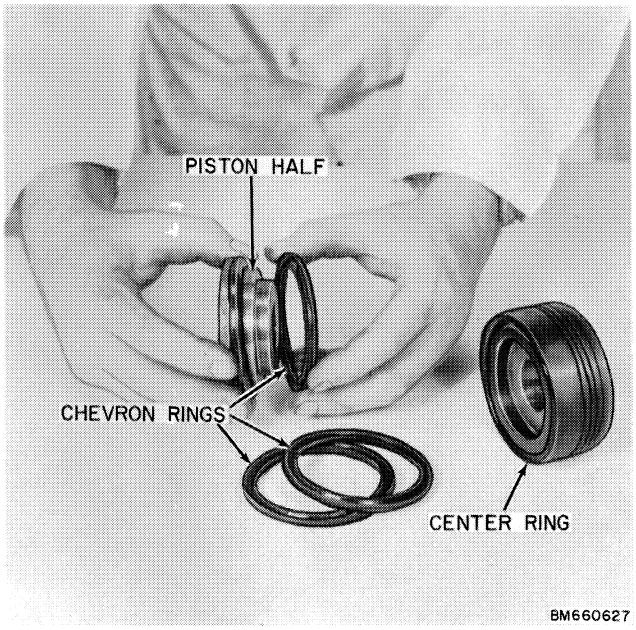


Figure 13 - Assembling the Piston Packing

2. Secure the piston packing assembly to the piston rod with a washer and self-locking capscrew. Torque the capscrew to the specification listed on page 3.

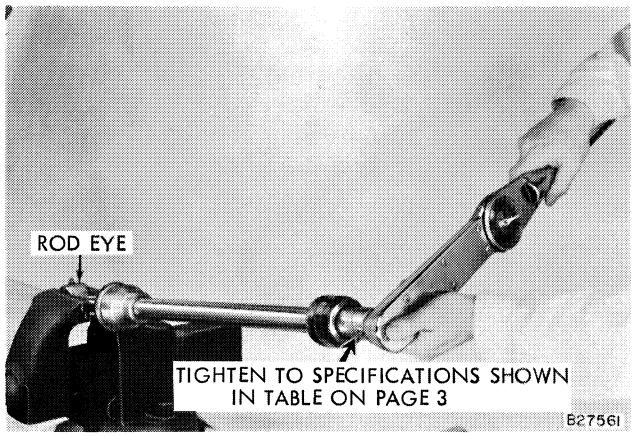


Figure 14 - Torquing Rod Capscrew

Installing Piston Rod

1. Lubricate the cylinder tube and piston packing thoroughly and install as shown. After the packing has started in the smooth surface of the tube, slide the gland into position. Place a rod in the piston rod eye and work the piston rod assembly farther into the tube. Keep piston rod in a straight line with the cylinder tube at all times.

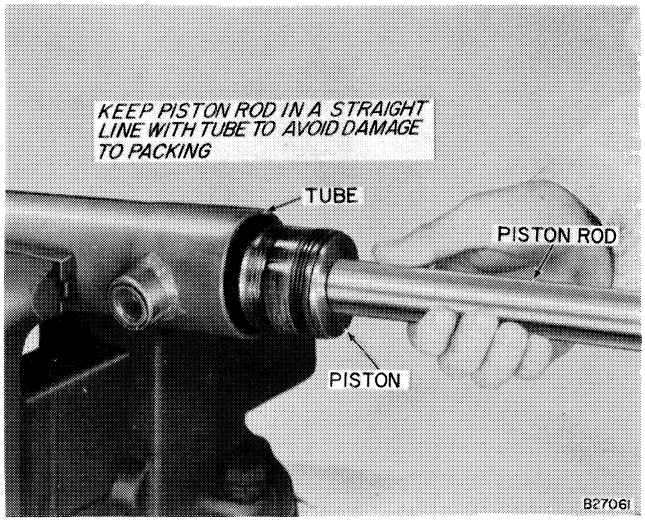


Figure 15 - Installing Piston Rod

2. Screw the gland into the tube and tighten with a spanner wrench. Torque 100-200 ft. lbs. Make sure the torque wrench is parallel with the spanner wrench.

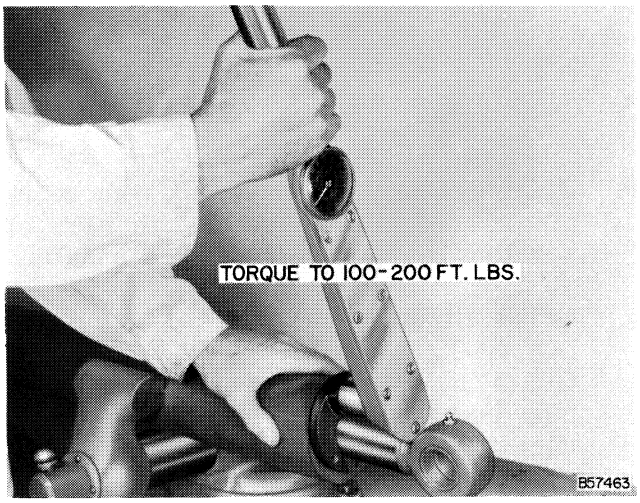


Figure 16 - Tightening Gland

3. Tighten until the specified torque is reached and the self-tapping screw holes line up. Install the self-tapping screw. If a new gland or tube is being used, drill a new hole for the self-tapping screw, half in the tube and half in the gland. Do not drill in line with spanner wrench holes. Use a No. 26 drill and drill approximately 5/16" deep.

Installation

See page 26.

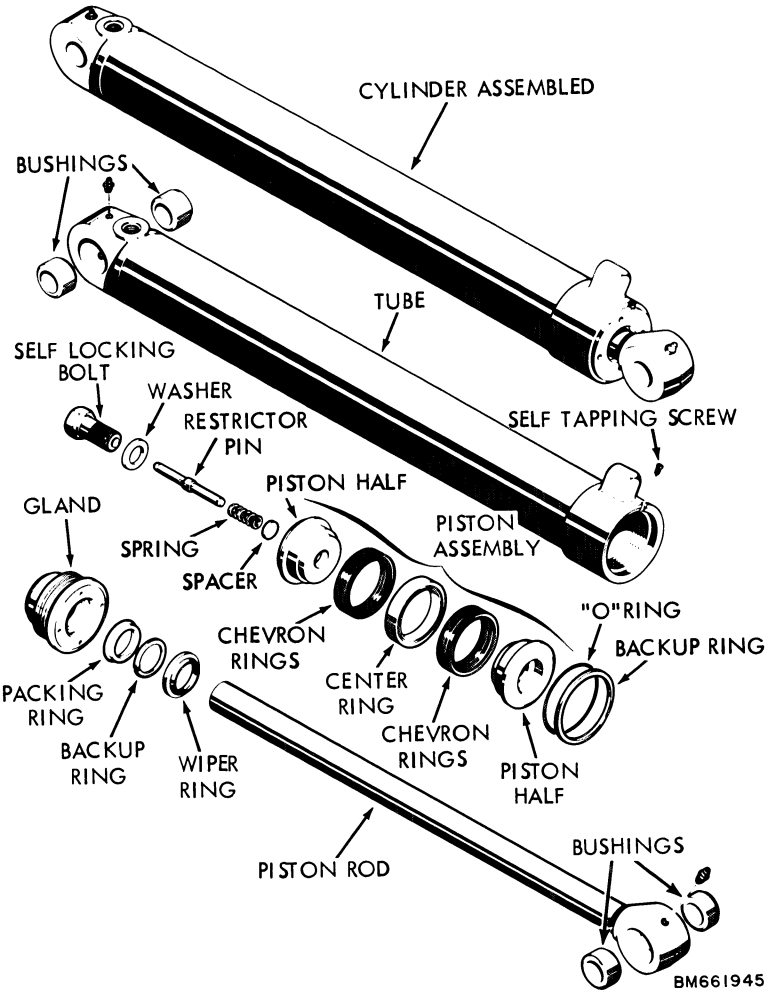


Figure 26 - Exploded View of Boom Cylinder

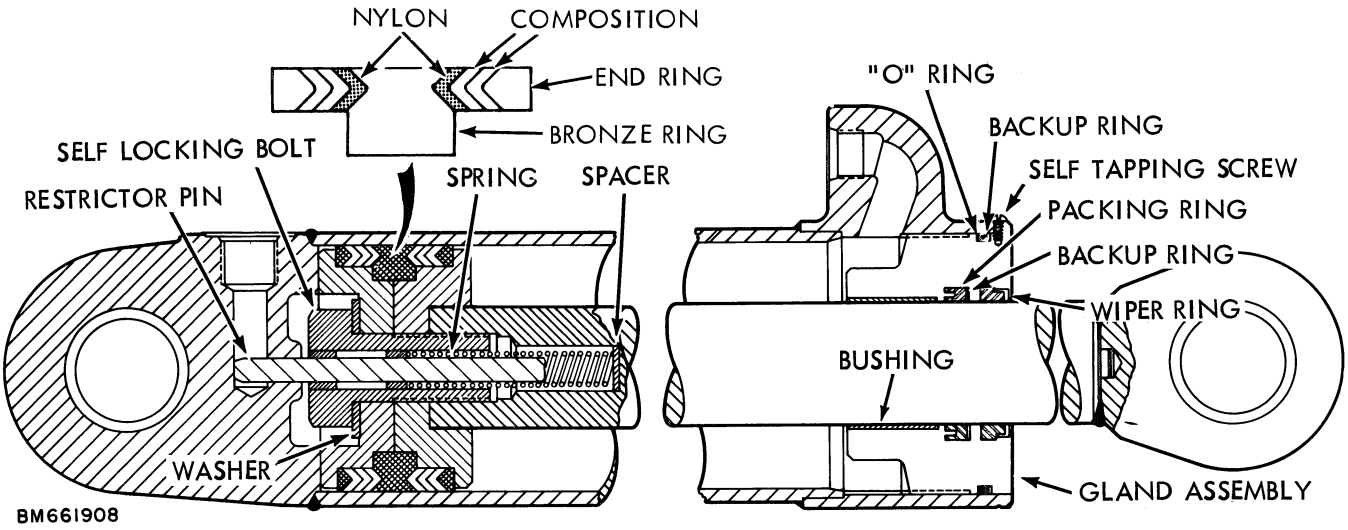


Figure 27 - Cross Section of Boom Cylinder

SPECIFICATIONS

Power Steering Pump	6.35 to 7.0 G.P.M. at 1100 to 1250 P.S.I. at 1500 R.P.M. Engine Speed (170° F. oil temperature)
Manual Pump	14.8 cu. in. displacement per one steering wheel revolution
Pump Reservoir Capacity	1 Quart
System Capacity - Total	2.5 Quarts
Type of Oil	Case Hi-Lo TCH
Steering Cylinder	9" Stroke, 1-3/4" Cylinder I.D., 11/16" Cylinder Rod O.D.

INTRODUCTION

General

The hydrostatic steering system consists of the engine driven power steering pump, hydraulic reservoir, manual steering pump and directional hydraulic cylinders.

ENGINE DRIVEN POWER STEERING PUMP

The roll type power steering pump is a positive displacement pump driven by a belt from the engine crankcase pulley. Therefore, the pump operates continuously when the engine is running. The major components of the pump are the pumping element which consists of the cam, carrier, and six rolls, the drive shaft, and a combination flow control and pressure relief valve. These parts are contained in suitable body and cover castings.

The oil reservoir is attached directly to the pump. The reservoir contains a large capacity filter which filters all of the oil that is moving through the power steering system when the oil is returned to the reservoir.

MANUAL STEERING PUMP

The manual steering pump consists of three groups - control column, control section, and metering section.

Control Column - includes the steering wheel drive shaft and housing.

Control Section - contains the sleeve and spool assembly. Oil is directed by this assembly either to the reservoir or to the metering section depending on the position and movement of the steering wheel.

Metering Section - transmits the correct amount of oil to each cylinder.

STEERING CYLINDERS

The steering cylinders are double acting. Pressure acting on one side of the piston in each cylinder, moves both wheels in the desired direction. The resultant movement of each piston also forces oil to return to the reservoir.

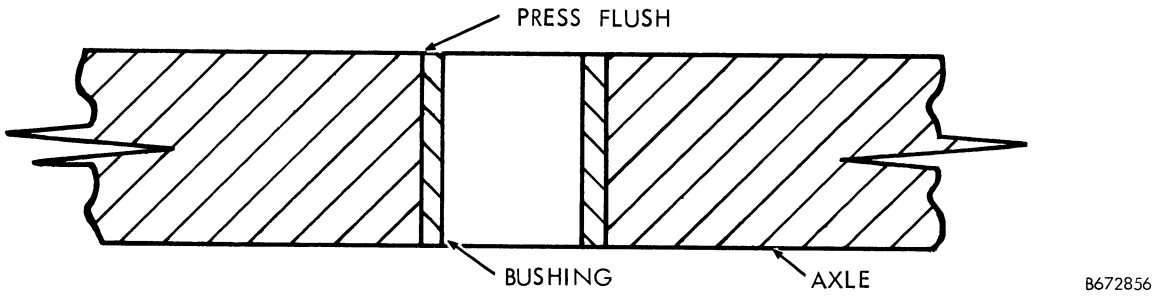


Figure 9 - Replacing The Axle Pivotal Bushing

Assembly

1. Press in new bushings. See Figure 10.
2. Reassemble parts in reverse of disassembly.
3. If cylinders were removed, start the engine and turn steering wheel both ways to remove air from the steering hydraulic system. Do not turn wheels into the stops during air removal.
4. Check the power steering reservoir level and add oil if required.
5. Check the wheel alignment and toe in toe out adjustment after replacing king pins and bushings.

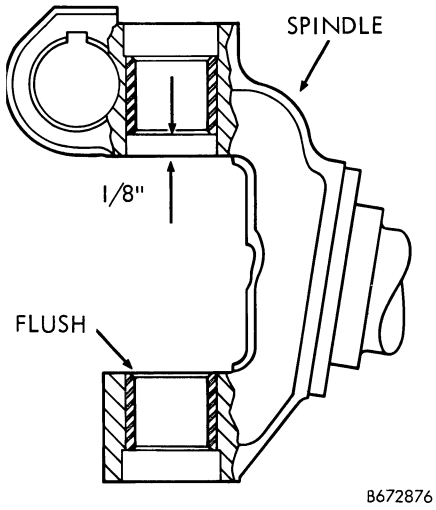


Figure 10 - Pressing New Bushings

new by-pass "O"ring (29) in counterbores of body face. Be sure "O"rings fit down into counterbores evenly.

11. Assemble cover (36) onto pump.

12. Install two body-to-cover bolts (19) and one body-to-cover should stud (28) leaving the lower two holes open. Tighten to 25-30 ft. lbs. torque.

13. Carefully clamp the pump assembly in a bench vise across the two lower bolt holes.

14. Install the valve assembly (37) flow control valve spring (38), new valve cap "O"ring (39), and valve cap (40). Valve assembly should move freely and smoothly in valve bore. Tighten valve cap to 30-35 ft. lbs. torque.

15. Install two new small body-to-reservoir gaskets (17) and two new large body-to-reservoir gaskets (15) in the counterbores on top of the pump body.

16. Position reservoir (14) using the venturi tube (16) as a locator and line up the four holes.

17. Install the reinforcement plate (13) into the reservoir and secure with the two 5/16-18 reservoir bolts (12). Tighten to 10-15 ft. lbs. torque.

18. Position the filter support (11) around the end of the return line tube in the reservoir and secure with reservoir hold down bolt. Tighten to 30-35 ft. lbs. torque.

19. Install long reservoir stud (10) into hold down bolt. Tighten snug.

20. Install new filter cartridge (9), filter valve (8), and filter spring (7).

21. Carefully position reservoir cover (5) and secure with new small gasket (3), washer (2), and wing nut (1). Tighten wing nut to 15-25 lbs. in. torque.

NOTE

It is seldom necessary to replace the reservoir cover gasket (6) which is glued into reservoir cover.

22. Remove the pump assembly from the bench vise and install the two remaining body to cover studs (28). Tighten to 25-30 ft. lbs. torque.

23. Install pulley Woodruff key (23) in shaft.

24. Assemble pulley (24) being sure that the Woodruff key has remained in its correct position. Secure pulley with flat washer (25) and bolt and washer (26, 27). Tighten to 15-20 ft. lbs. torque. This is important.

25. The pump assembly can now be installed on the venicle. Connect the discharge hose and return line securely prior to assembling pump to engine mounting bracket. Adjust belt tension according to information on page 24.

OIL FLOW AND PRESSURE CHECKS

Flowmeter

FLOW CHECK

1. Connect the flowmeter in series with the engine driven power steering pump. See Figure 30.
2. Move the volume range selector to "Low Range".
3. Fully open the load valve.
4. Start the engine and allow the unit to come up to operating temperature. Check and add oil if necessary.
5. At 1500 R.P.M. engine speed the flowmeter should indicate 6.35 to 7 G.P.M. at 1100 to 1250 P.S.I.

RELIEF VALVE CHECK

1. Complete above steps 1 to 4.
2. At 1500 R.P.M. engine speed, screw in "Load Valve" until the oil pressure rises sharply. Record the pressure as the rise begins. If the pressure is not within 1100 to 1250 P.S.I. Replace the relief valve.

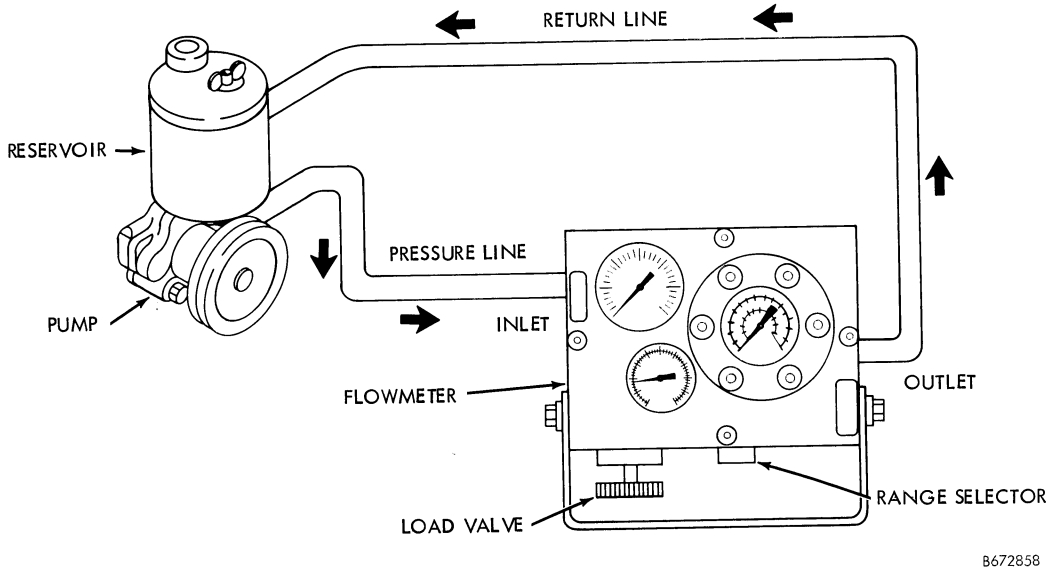


Figure 30 - Connecting Flowmeter

MANUAL PUMP FLOW CHECK

1. Check oil level in power steering reservoir.
2. Block up front end of unit so the wheels turn freely, stop to stop.
3. Obtain a graduated 1 pint container.
4. Start engine and turn steering wheel left to stop. Back off 1/4 turn. Stop the engine.
5. Disconnect the front hose. See Figure 31.
6. Hold hose in 1 pint container and start engine. Turn steering wheel two full turns and shut off engine. The pump is acceptable if it can deliver 75% of one pint. If not, see page 26 for removal and inspection.
7. Reconnect hose to cylinder.
8. Refill and check oil level before restarting.

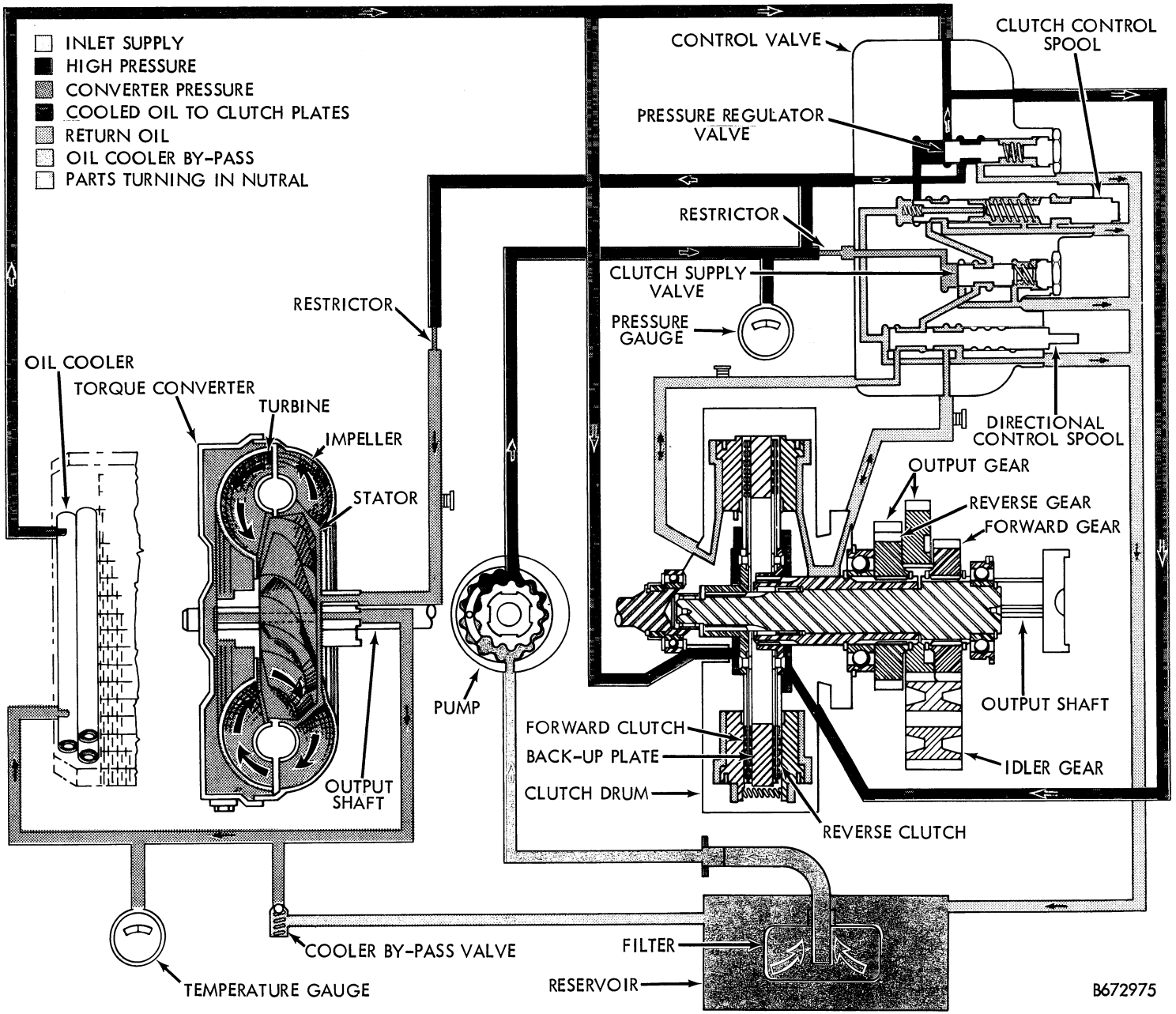


Figure 3 - Transmission in Forward Position (Automatic Clutch Disconnect Engaged)

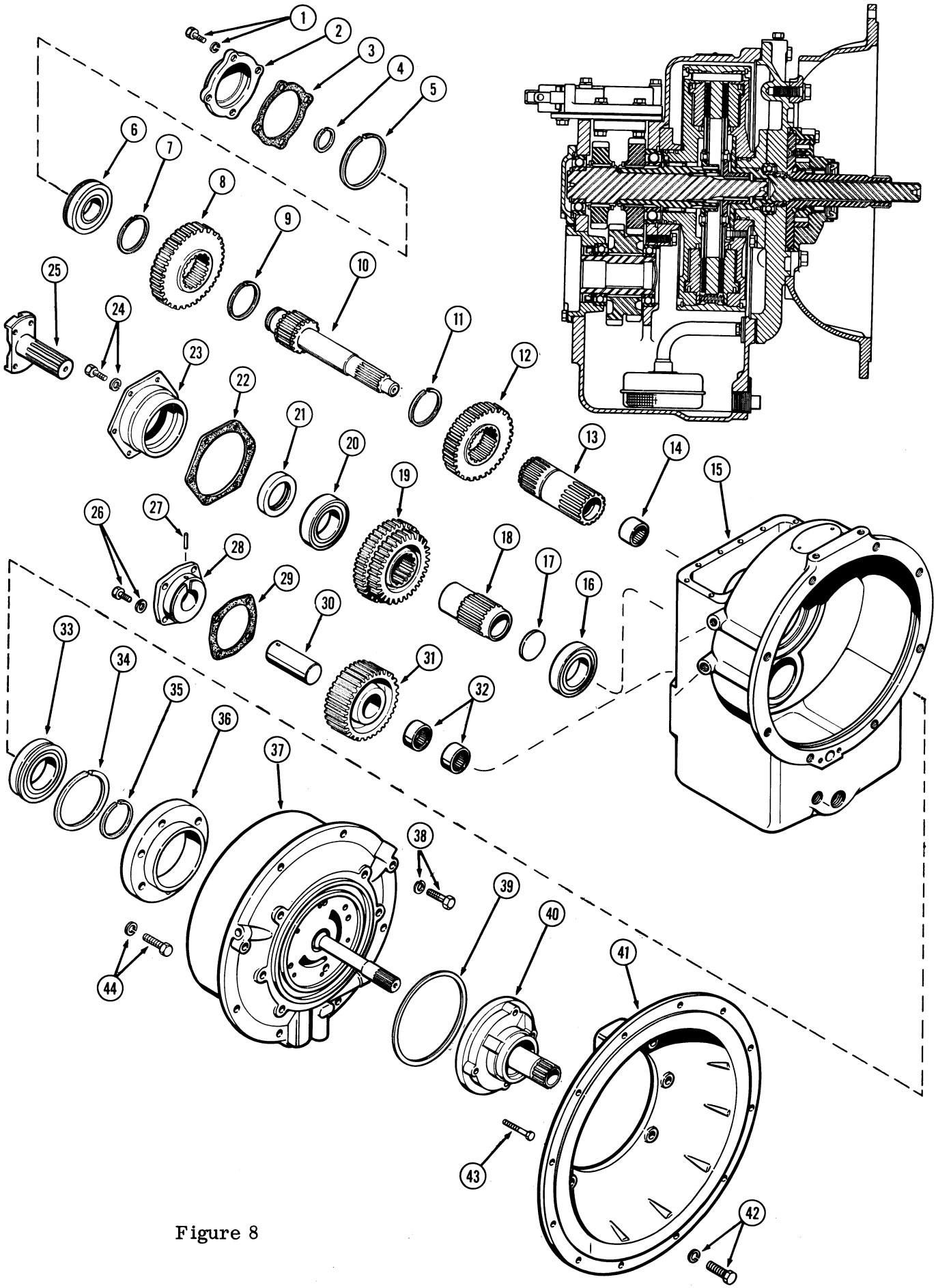

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Figure 8

7. Shut off the engine.

Test No. 2 - Torque Converter And Cooler Bypass Valve

1. Remove the temperature sending unit from Point B, Figure 1. Install pressure gauge in tee.

2. Disconnect oil cooler hose from left side of radiator. Install a plug into the hose. Close opening at radiator with a clean caplug.

3. Set the parking brake. Start the engine and shift the four-speed transmission into 4th.

4. Set engine speed at 1000 rpm. Shift the power shuttle into forward. Read the pressure gauge and record the reading.

5. Increase engine speed to 2000 rpm. Read the pressure gauge and record the reading. Shut off the engine.

CAUTION: The converter can overheat if operated extensively with the cooler blocked out of the system.

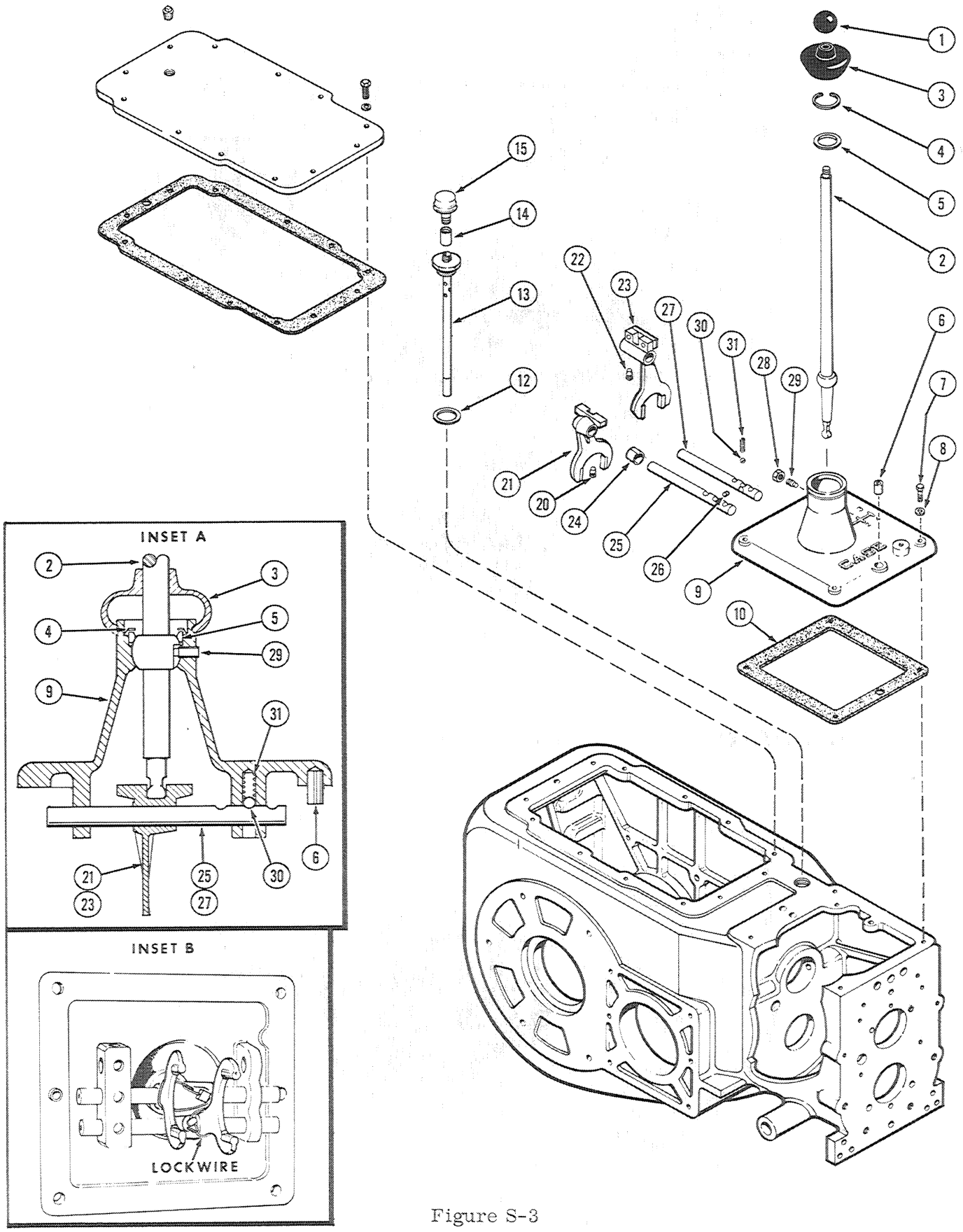
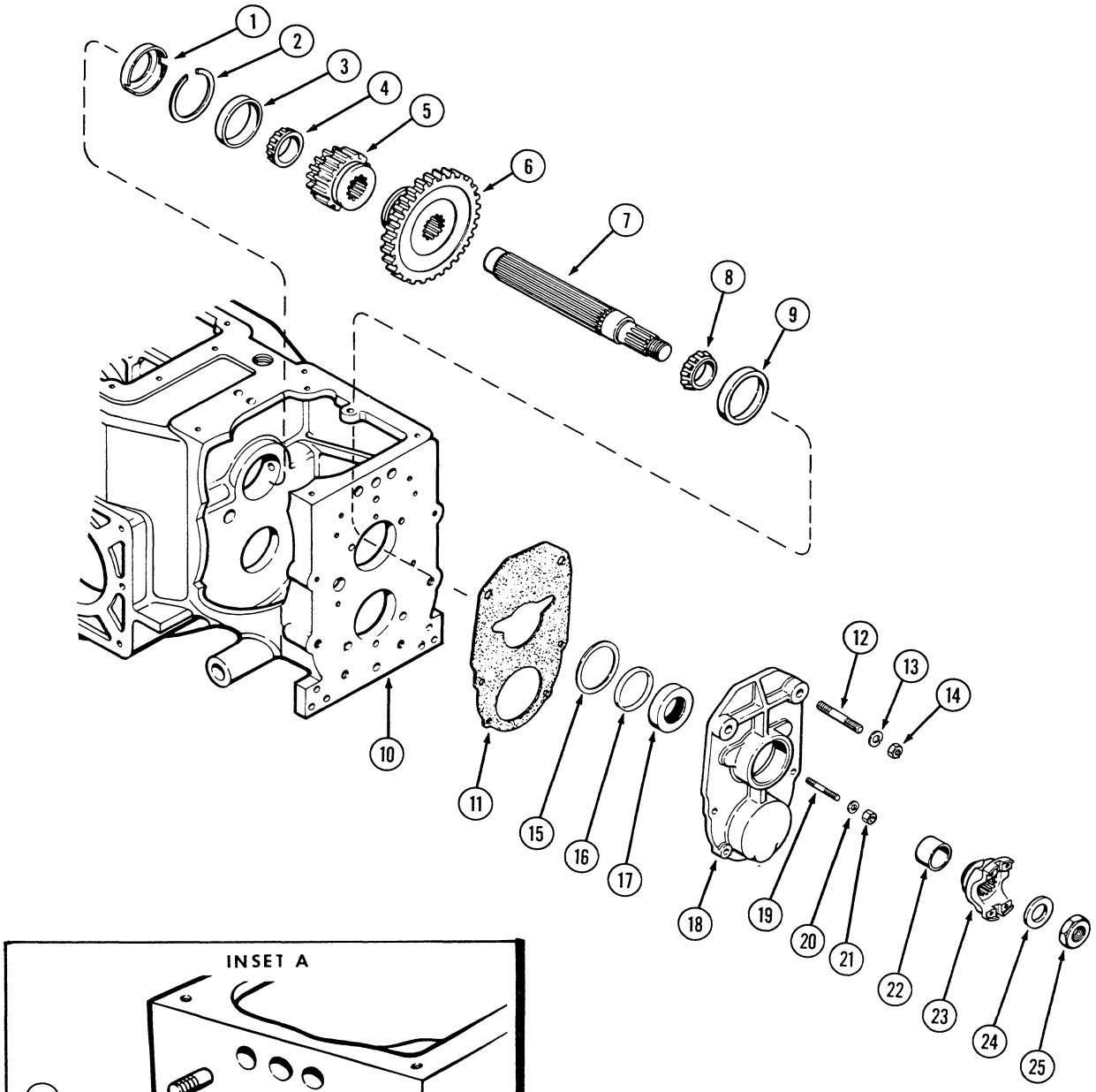


Figure S-3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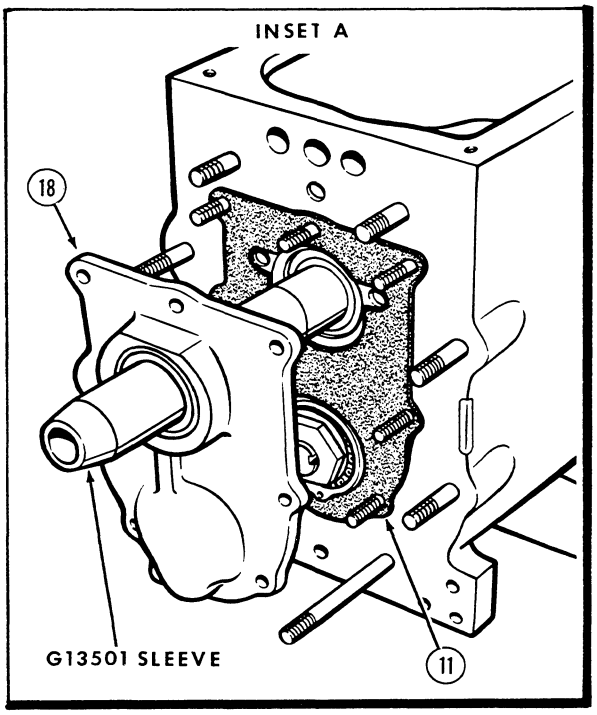
INSET A
18
G13501 SLEEVE
11

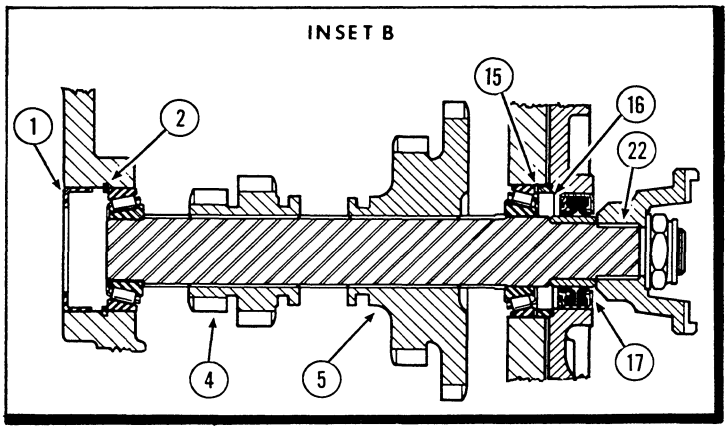
INSET B
1
2
15
16
22
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Figure S-11

WIRING DIAGRAMS

Rac. Form 9-77251

Individual Battery Cell Check

Place a light load on the battery by cranking engine (do not start engine) for 3 seconds. Turn on headlights, after one minute proceed with check. Using a 4 volt voltmeter check the voltage of each cell, refer to Figure 4.

If cell voltage varies more than .05 volts replace battery. If cell voltage is below 1.95 volts, charge battery and recheck the cell voltage. If cell voltage is still below 1.95 volts or varies .05 volts replace battery.

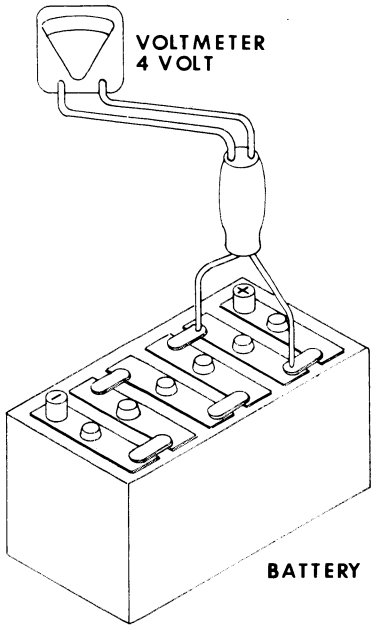

Figure 4 - Cell Check

Battery Cranking Voltage Check

To perform the cranking voltage check:

NOTE On Spark Ignition engines remove the center coil wire to prevent engine from starting. On Diesel engines depress the fuel stop pedal to prevent the engine from starting.

1. Connect a volt meter (12 volt) between the positive and negative posts of the batteries, Figure 5.

   Crank the engine for 15 seconds and record voltage.

2. Connect voltmeter (12 volt) between the cranking motor terminal and ground on cranking motor, Figure 5.

   Crank the engine and record voltage. If voltage is not the same or varies more than .5 volt, check the battery cables, clean and tighten connections.

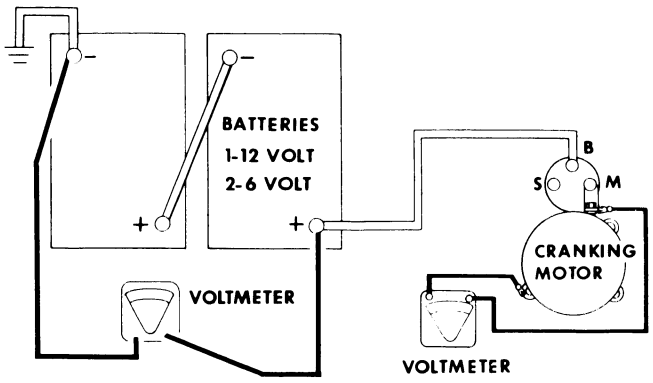

Figure 5 - Cranking Check

Battery Bench Load Test

When batteries are removed from the tractor, connect a volt meter (12 volt) between the negative and positive post, Figure 6.

A load of 270 amps. (12 volt battery) or 450 amp (6 volt battery) is connected between the positive and negative posts and after 15 seconds, check the volt meter reading. ***NOTE*** The amperage load used to test a battery should be equal to three times the battery amp hour rating.

If it is less than 4.5 volts (6 volt battery) 9.5 volts (12 volt battery) recharge and retest).

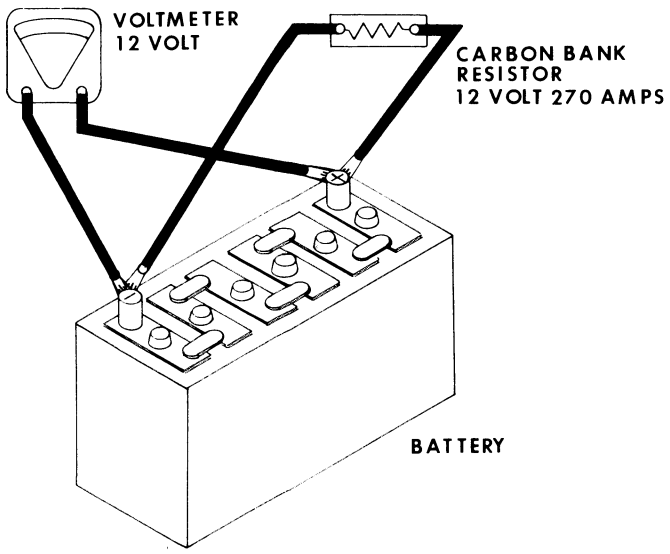

Figure 6 - Bench Load Test

DISTRIBUTOR CAP

Wipe the inside of the cap with a clean cloth and check for the following:

1. Cracks or carbonized paths which allow high tension leakage to ground. If this has been taking place, replace cap.

2. If corroded or burned brass inserts in the cap will not clean up by lightly filing them, replace cap.

3. Inspect the two vent holes in the cap. Some Auto-Lite caps have a rubber plug in one hole. Do not remove it. Be sure they are open and clean.

4. Inspect the carbon brush and spring for free movement. Replace if carbon is worn excessively.

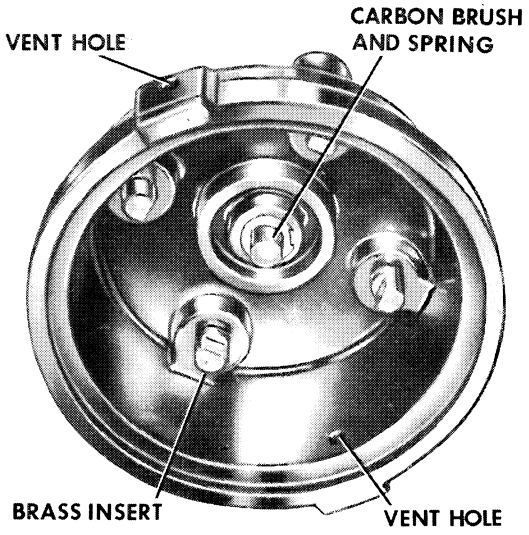

Figure 19 - Distributor Cap

DISTRIBUTOR ROTOR

1. Check for cracks and carbonized paths which cause high tension leakage to ground. Replace rotor if this is found.
2. Check rotor for black deposits at the spark end. This can be removed with a greaseless type cleaner such as carbon tetrachloride. Remove any corrosion from the rotor tip by filing with a point file. If this does not clean the rotor it should be replaced.

COIL POLARITY

In a negative grounded system the negative or primary terminal marked with a (-) should be connected to the distributor terminal. In a positive grounded system the positive or (+) terminal should go to the distributor terminal. Coil polarity refers to the direction of high tension current flow and should always be negative at the spark plugs. Reversed coil polarity is almost always traced to reversed leads at the coil. A simple way to check coil polarity is to remove one spark plug wire at the plug and hold it about 1/4 of an inch away from the spark plug while the engine is idling. Insert the point of a wood lead pencil between the wire end and spark plug, Figures 20 and 21.

If the spark flares or feathers and has a slight orange color on the plug side of the pencil coil polarity is correct. If this occurs on the wire side of the pencil coil polarity is reversed. Reverse wires at the coil.

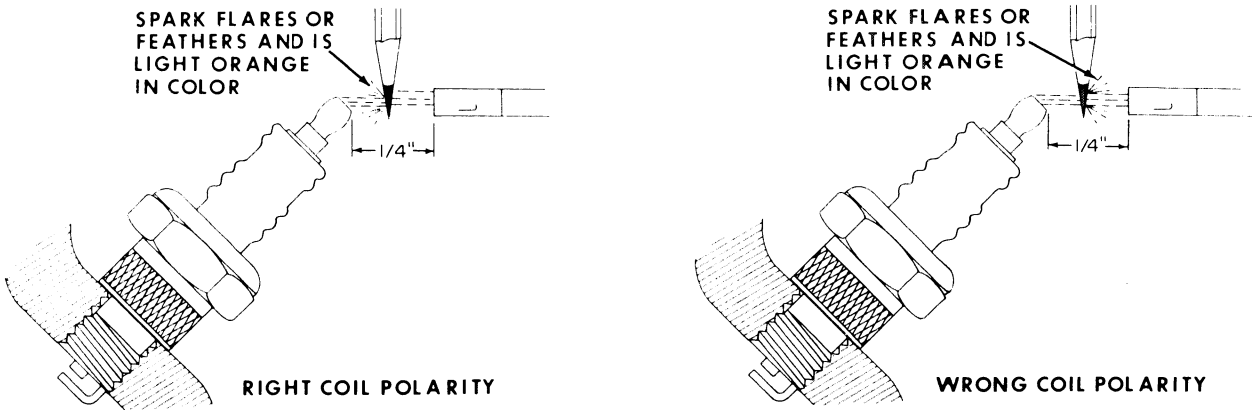

Figure 20 - Checking Coil Polarity

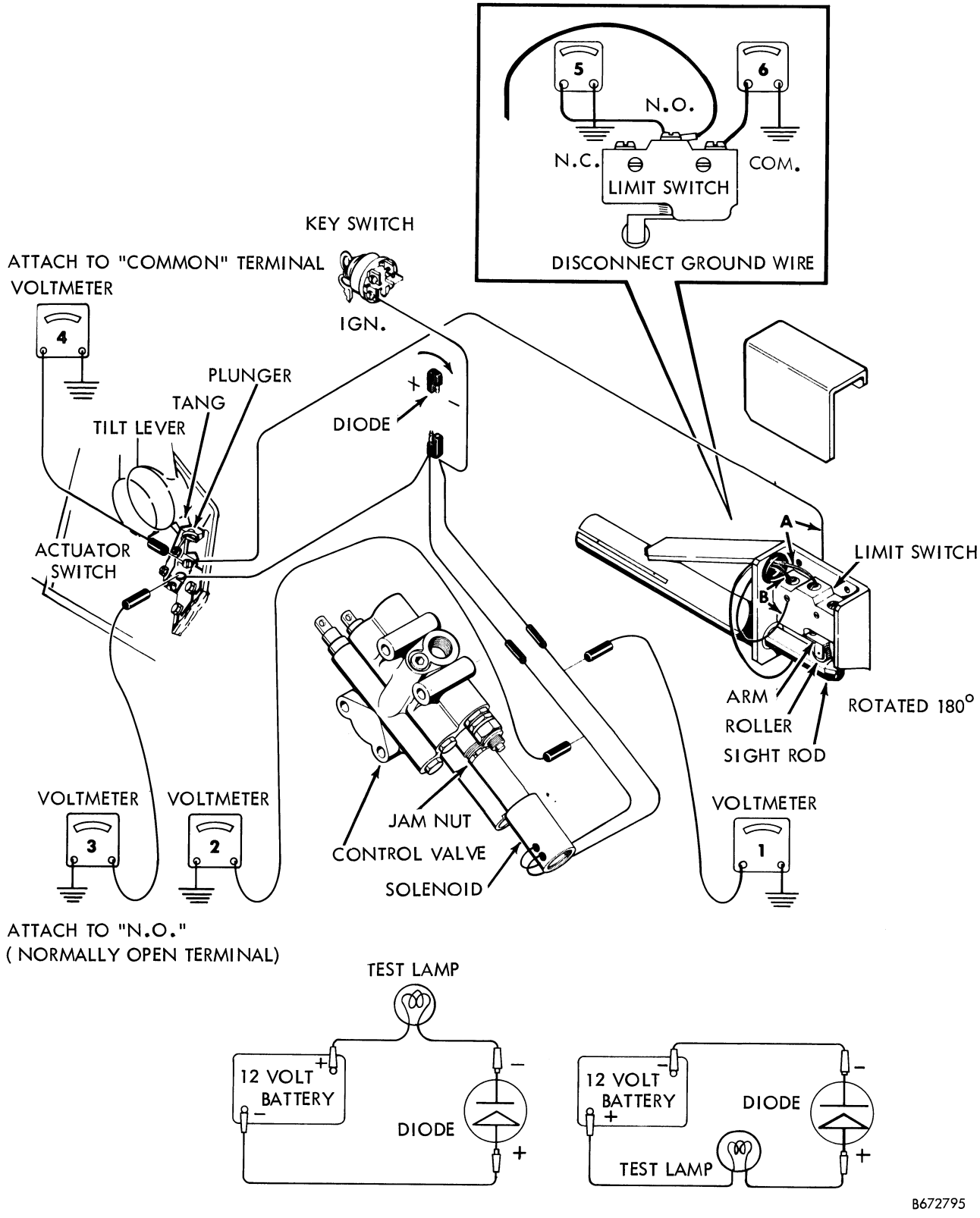

Figure 31 - Checking Return-To-Dig

LIFT CYLINDER HYDRAULICS

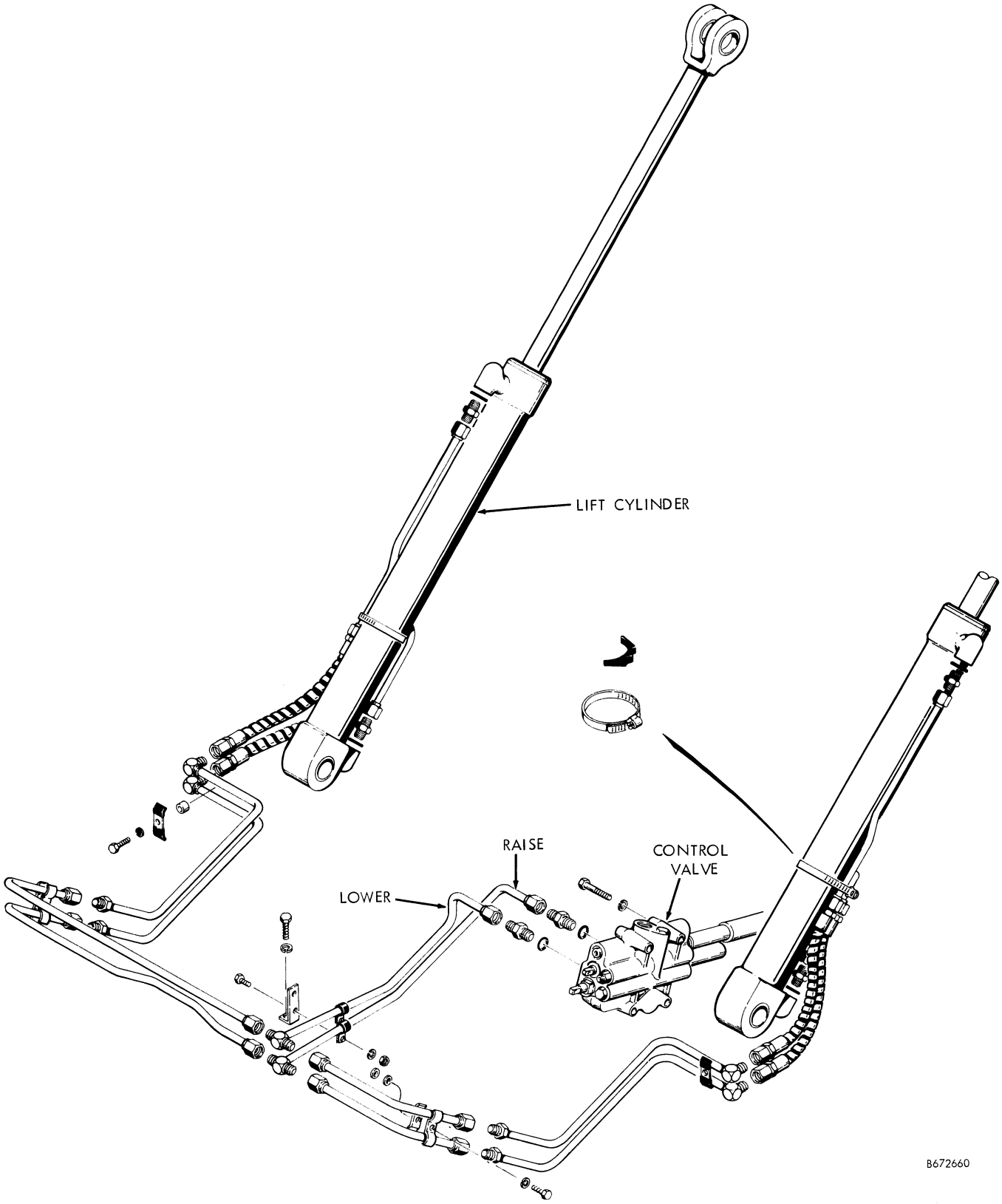

Figure 5 - Lift Cylinder Hydraulics

SERVICING BUCKET CUTTING EDGES AND TEETH ON CONVENTIONAL STYLE BUCKETS

The cutting edge on the 1-1/4 and 1-3/4 cu. yd. buckets is replaceable. Bucket teeth, optional on the 1-1/4 cu. yd. bucket, are replaceable and available for field installation.

Replacing Cutting Edge - 1-1/4 Cu. Yd. Bucket

REMOVING CUTTING EDGE

1. Refer to Figure 14. Remove the teeth and shanks, if so equipped.

2. Remove the ends of the wrap around cutting edge with a gouge tip or cut off tip.

3. Lay a straightedge in the bucket so that it lines up with the front edge of the bucket sheet. Guide the cutting torch along the straightedge to cut through both the old weld and the cutting edge at the front lip of the bucket sheet.

4. Partially grind out the weld at the back of the cutting edge to form a breaking score.

5. Drive a cold chisel or wedge between the bucket sheet and cutting edge to break the back weld. Remove the cutting edge.

6. Grind the remaining weld off the bucket to form an even surface for installing the new cutting edge.

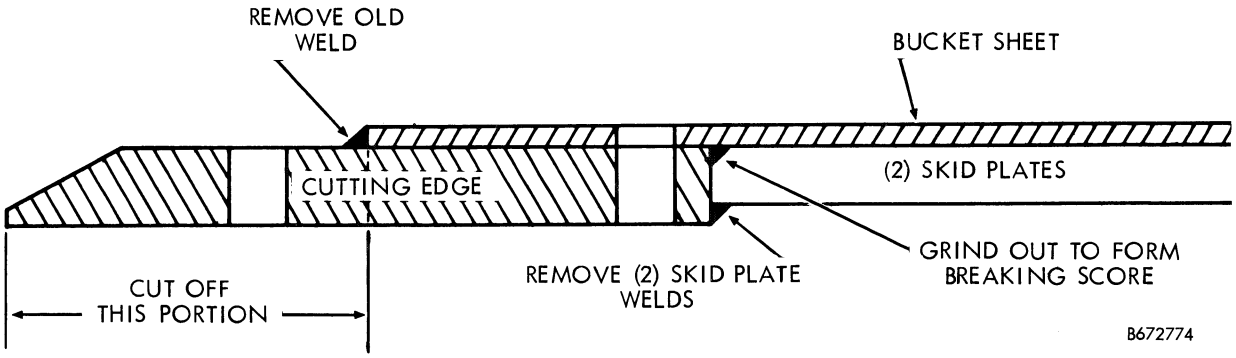

Figure 14 - Removing Cutting Edge

INSTALLING CUTTING EDGE

1. Refer to Figure 15. Use a weld rod (electrode) meeting A.W.S. specification E-7018.

2. Position the new cutting edge on the bucket so the bolt holes in the cutting edge and the bucket sheet line up. Clamp the cutting edge to the bucket and tack weld the ends of the cutting edge.

3. Follow the welding directions in Figure 15.

4. Install teeth and shanks. See page 22.

LUBRICATION

(MODEL 34 BACKHOE)

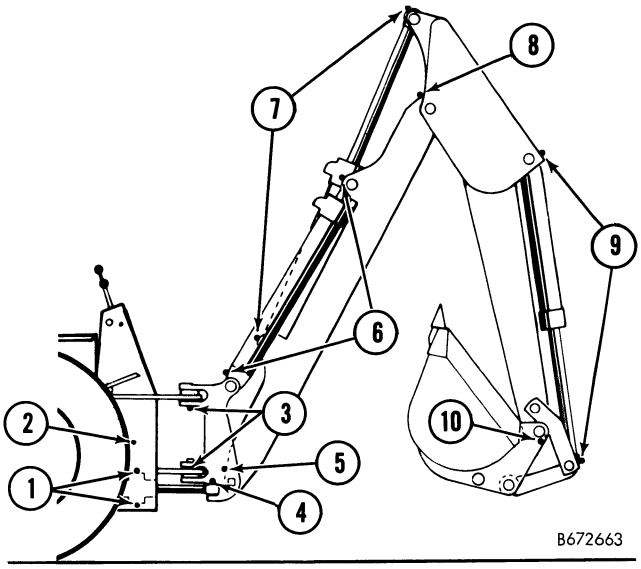

Figure 4 - Lubrication Points

CHART OF ILLUSTRATED FITTINGS

1.	Swing Cylinder Trunnion	2 each side
2.	Stabilizer Cylinder	1 upper end each side
3.	Tower Swing Pins	(1 top, 1 bottom)
4.	Swing Cylinder Yokes	1 each side
5.	Boom Pivot Pin	1
6.	Boom Cylinder	1 each end
7.	Crowd Cylinder	1 each end
8.	Dipper Pivot Pin	1
9.	Bucket Cylinder	1 each end
10.	Bucket Pivot Pin	1

RECOMMENDED LUBRICANT

Type . . . . . Lithium "soap -base" grease

Grade Recommendations

Below 32° F.	No. 1
32° F. to 90° F.	No. 2
Above 90° F.	No. 3

PROCEDURE

1. Before applying a grease gun to the pressure fittings, wipe all accumulated dirt from each tip. Lubricate until clean grease runs out.

2. Lubricate all fittings illustrated every 10 hours.

3. If the backhoe is operated in mud or water, lubricate the immersed fittings more often.

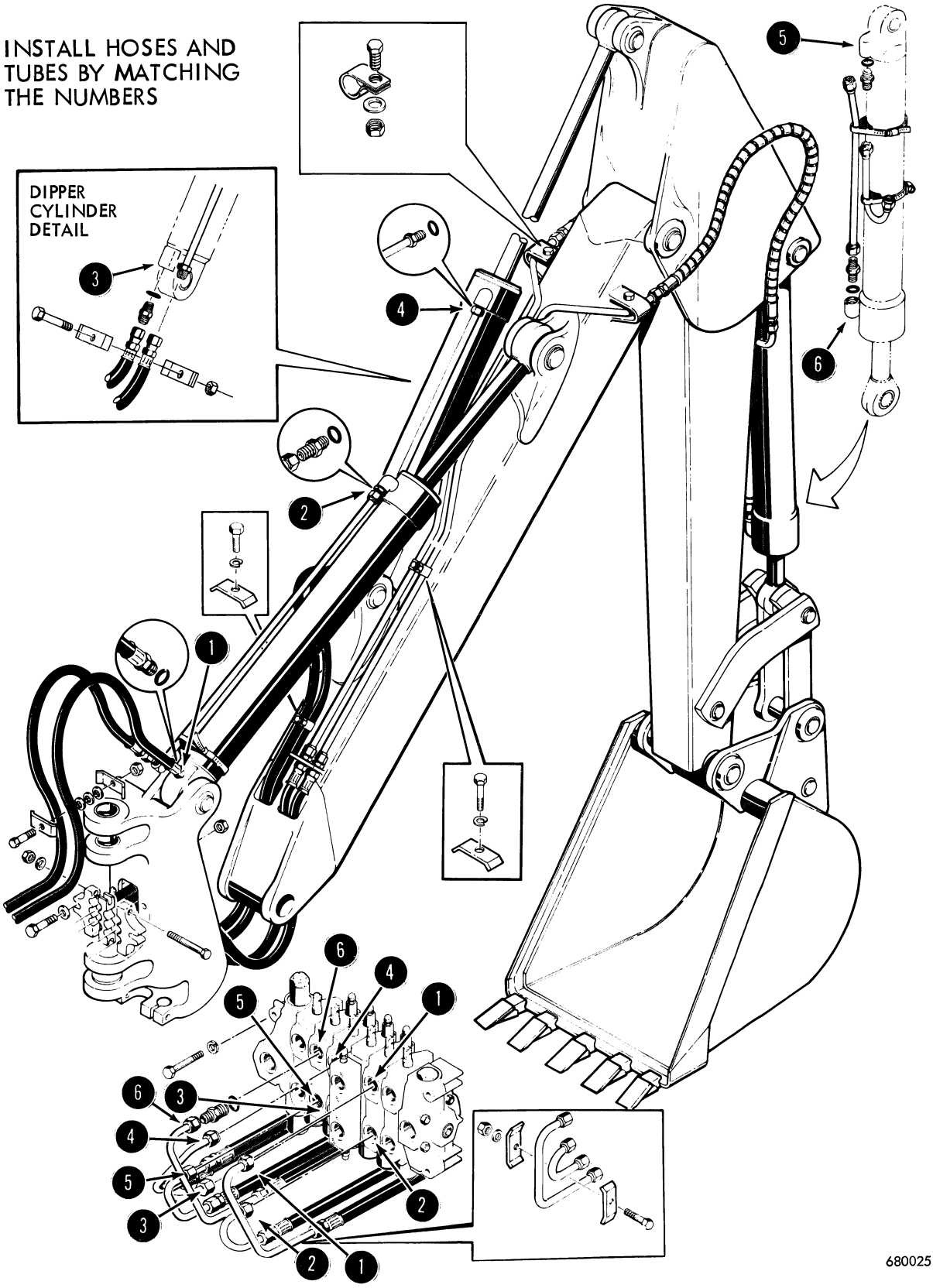

Figure 13 - Hydraulics for Boom, Dipper, and Bucket Cylinders