SERVICE MANUAL

Loader

500
W5
W5A

9-76231

1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4

SERVICE MANUAL

Loader

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W5
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CYLINDER HEAD AND COMPONENTS (Continued)

188 AND 201

(Refer to Figure 6)

Disassembly

Remove the muffler and hood from the vehicle. Steam clean the entire engine area where service work is to be performed. Disconnect and remove the air cleaner system.

1. Drain the cooling system. **CAUTION:** If the engine is hot, do not remove the radiator cap until the coolant has had sufficient time to cool. Loosen the cap to the first stop carefully to relieve any excess pressure before removing it completely.

2. Remove the hose from the the thermostat housing (1). Remove the thermostat housing (1) and gasket (2). Discard the gasket. **NOTE;** If the thermostat is to be serviced, refer to Section 25.

3. Disconnect the linkage and fuel lines from the carburetor (3). Remove the carburetor assembly (3) and gasket (4). Discard the gasket. Disconnect the high tension wires from the spark plugs and remove the spark plugs (5) and gaskets (6).

4. Remove the bolts that connect the intake manifold (7) to the exhaust manifold (8). Remove the intake manifold (7) and exhaust manifold (8). Remove manifold gasket (9) and discard.

5. Remove the valve cover (10), gasket (11) and breather tube (12). Discard the gasket.

6. Remove the rocker arm bracket bolts (13). Remove the rocker arm assembly (19). See Page 16 and 17 for servicing of the rocker arm assembly.

7. Remove the push rods (15) and tag them so they can be installed in their proper location when reassembling.

8. Remove the cylinder head stud nuts (16) and the cylinder head (17). Remove the cylinder head gasket (18) and discard the gasket.

Inspection

1. Replace all gaskets and worn or defective parts.

2. Clean the top surface of the cylinder block and sleeve flange carefully. The top of the pistons may be cleaned with a power driven wire brush. **NOTE:** The pistons must be at top dead center when being cleaned. All traces of carbon and other deposits must be removed. During cleaning, the use of a clean lint free cloth dampened in solvent is recommended.

3. Clean all bolt and stud threads.

4. Clean and inspect the cylinder heads thoroughly. If evidence of fretting or erosion exists or if the head is warped more than .006", the head must be resurfaced or replaced.

5. Inspect the push rods for straightness, cracked or worn ends. Replace if necessary.

6. Clean the valve cover and flush out the breather tube.

7. Clean and check the spark plugs. If replacement is required, regap the spark plugs to .025 setting.

CYLINDER HEAD ASSEMBLY (Continued)

188 AND 201

(Refer to Figure 11)

Disassembly

1. Using a valve spring compressor, compress the spring (1) enough to remove the valve retainer locks (2). Release the spring compressor and remove the intake valve seal (3) intake valve retainers (4) and the exhaust valve rotators (5). Remove the springs (1) and valve spring seats (6).

2. Remove any carbon from the valve stems before they are removed from the cylinder head. Remove the intake valves (8) and the exhaust valves (7) from the cylinder head (9) and set them in a rack or holder. **NOTE:** Mark the valves on removal so they can be installed in their original location.

3. Remove the intake valve guides (10) and the exhaust valve guides (11) by driving them down through the cylinder head (9) using an arbor.

4. Remove the exhaust valve seats (12) from the cylinder head (9) using a special seat removing tool, Inset B. **NOTE:** Never attempt to remove a valve seat with a center punch, cold chisel or pry bar.

5. To remove the expansion plug (13) from the cylinder head (9) it must be drilled and pryed out.

NOTE: Refer to Inspection and Servicing on Pages 22,23, 24 and 25 prior to assembly.

Assembly

1. If the valve guides are being replaced, install new valve guides (10 & 11) into the cylinder head using an arbor. Press the guides into the head from the top of the cylinder head. The guides must protrude above the cylinder head (intake and exhaust) 1.000″, Inset A. After the guides have been pressed into place, they must be reamed to .3422″-.3432″, Inset A.

2. To install new exhaust valve seats (12), clean the recess in the cylinder head (9). Place the valve seats in dry ice to shrink them. Insert the valve seats in the head and press them in place, using a suitable press.

3. Lubricate the intake valves (8) and exhaust valves (7) with clean engine oil and install them in their original location.

4. Install the valve spring seats (6), valve springs (1) with closed coil end toward head, and the valve retainers (4) on the intake valves (8). Compress the valve spring so the intake valve seals (3) can be installed in the lower groove on the valve stems. Install the valve retainer locks (2) and remove the spring compressor carefully.

5. Install the valve spring seats (6), valve springs (1) and the exhaust valve rotators (5) on the exhaust valves (7). Compress the valve springs so that the valve retainer locks (2) can be installed. Remove the spring compressor carefully.

6. Install new expansion plug (13) if it was removed. The plug must be pressed in place and firmly seated against the retainer ridge in the cylinder head.

NOTE: When engine assembly is complete, a check of the operation of the rotators must be made. It is impossible to determine whether or not the rotator is turning without an identifying mark.

Place a dab of white paint on each of the rotators and note it's position. Start the engine and observe whether or not the rotator is turning. DO NOT attempt repairs on rotators.

There is not a set speed at which the rotators should turn. Some rotators will turn faster than others. As long as the rotator is turning the valve, it is functioning properly.

CYLINDER HEAD AND COMPONENTS

(Refer to Figure 4)

Disassembly

Remove the muffler and hood from vehicle. Disconnect the exhaust system and air cleaner from the manifolds. Loosen the alternator adjusting bolt and remove the fan belt. Remove the water pump and all stud nuts securing water manifold to cylinder head. Steam clean the entire area where service work is to be performed.

1. Drain the cooling system. **CAUTION:** If the engine is hot, do not remove the radiator cap until the coolant has had sufficient time to cool. Loosen the cap to the first stop carefully to relieve any excess pressure before removing it completely. Remove the upper radiator and water pump hoses.

2. Disconnect the high pressure fuel lines from injectors and the leak-off tubes. Cap them to prevent any foreign particles from entering. Remove the injectors as described in Section 3023 of the Service Manual.

3. Remove the breather tube (1).

4. Remove the intake elbow (2) and gasket (3), and discard the gasket.

5. Remove the intake manifold (4) and discard the gaskets (5).

6. Remove the exhaust stack (6) and gasket (7).

7. Remove the exhaust manifold (8) and discard the gaskets (9).

8. Remove the valve cover (10) and cover gasket (11). Discard gasket.

9. Remove the bolts and washers (12), and the rocker arm assembly (13). Remove the push rods (14) and tag them for proper reassembly.

10. Remove cylinder head bolts or nuts. Remove the cylinder head assembly (16), fire rings (17) and head gasket (18). Discard the fire rings and head gasket.

NOTE: Refer to Inspection and Servicing on Page 6 and 7 prior to assembly.

INSPECTION OF VALVES, GUIDES, HEAD AND SPRINGS

Clean the cylinder head completely. Remove all traces of carbon and other deposits. Check for cracks and any evidence of fretting or erosion existing in the area of fire ring contact. Check the head for evidence of warpage. If warpage exists and is more than .006″, the cylinder head must be resurfaced or replaced.

Valve springs should be checked for flat squared ends, broken coils and correct spring pressure. Use a Valve Spring Tester referring to the spring specifications below:

Free Length ---------- 2.375″
Total Coils ---------- 8.25″
Wire Diameter ---------- .162″

Valve Position	Compressed Height	Spring Pressure	Replace if Less than
Valve Open	1.521″	114 lbs.	110 lbs.
Valve Closed	1.875″	56 lbs.	53 lbs.

Remove all carbon from the bore of the valve guides with a fine wire brush and blow clean with compressed air. Valve guides can be checked for wear by using a bore gauge and micrometer, refer to Figure 10, Inset A. The valve guides should be checked at the top, middle and bottom of the guide bore for wear, Figure 10. If the diameter is greater than .3440″ at any point along the bore, the guide must be replaced. Use an arbor equal to the inside diameter of the valve guide to keep the guide from collapsing when pressed into place. Press in from the top of the head until the guide (Intake and Exhaust) protrudes a distance of .875″ above the head, refer to Figure 9, Inset A, Page 13. Replacement guides must be reamed after installation. Ream the guide .3429″ to .3439″ diameter.

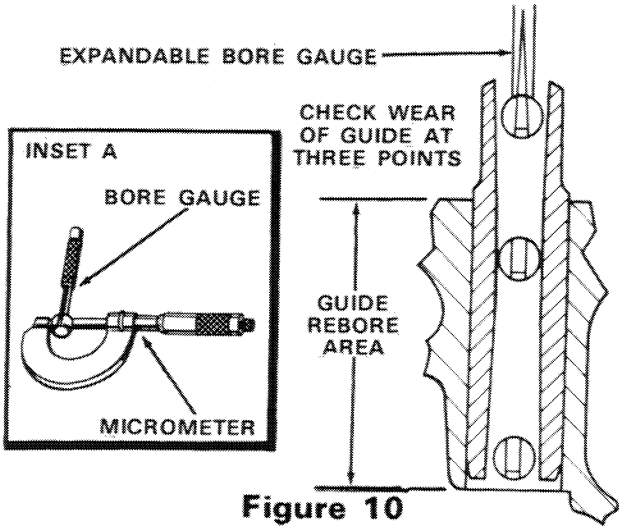


Figure 10

Clean the valves with a power driven fine wire brush, being very careful not to scratch the valve stems. Refer to Figure 11 for valve nomenclature.

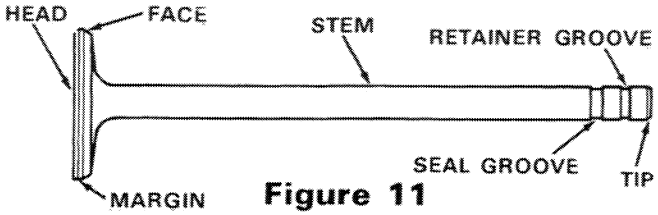


Figure 11

Inspect the valves for excessive wear or necked stems, Figure 12. This can be caused by lack of lubrication, plugged water passages or operating the engine under continuous overload at excessive engine RPM. Replace valves if this condition exists.

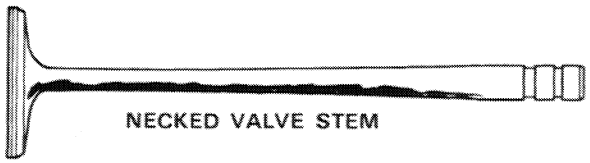


Figure 12

Inspect the valves for deep grooves in the face, Figure 13. This can be caused by abrasives entering the engine through the intake system or not servicing the air cleaner regularly. If grinding the valve face will not correct this condition, replace the valve.

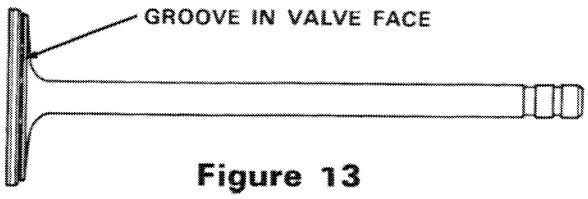


Figure 13

Inspect the valve face and stem for rust or pitting, Figure 14. Rust or pitting can usually be removed by grinding the valve face. If rust or pitting on the valve stem exists, replace the valve. These conditions can be caused by using poor quality engine oil or fuel that does not meet the specification given in Section 11 and by improper storing of the engine.

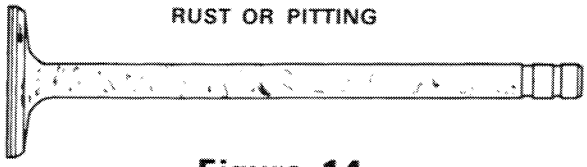


Figure 14

SPECIFICATIONS (Cont'd)

Piston Pin

		Maximum Limit Including Wear
Type	Full Floating	
O.D. of pin	1.2497 to 1.2498	
Fit in piston	.0002 to .0006	
Fit in rod bushing	.0002 to .0006	

Connecting Rod

Bushing	Replaceable Bronze	
Bushing I.D. installed (reamed to size)	1.2502 to 1.2504	.002
Bushing out-of-round		.0015
Bearing Liners	Replaceable	
Bearing Liner width	1.120 to 1.130	
Rod width at crank end	1.3035 to 1.3055	
Journal I.D. without bearing liners	2.1870 to 2.1875	
Bearing oil clearance	.0010 to .0035	.006
Undersize bearings for service	.002,.010,.020,.030	
Side clearance	.005 to .011	
Cap bolts	Self locking type	

Crankshaft

Type	Balanced	
Main bearing liners	Replaceable	
End play, center main bearing cap	.001 to .006	.012
Center main bearing thrust surface thickness	.1025 to .1045	
Connecting rod journal std. O.D.	2.0605 to 2.0615	
Grind to .010" O.D. undersize	2.0505 to 2.0515	
.020" O.D. undersize	2.0405 to 2.0415	
.030" O.D. undersize	2.0305 to 2.0315	
Connecting rod journal maximum taper		.002
Journals out-of-round	.001	
Main bearing liner width 1st	1.276 to 1.286	
Main bearing liner width 3rd	1.371 to 1.373	
Main bearing liner width 2nd and 4th	.950 to 1.000	

TIMING GEAR COVER, GEARS AND INTEGRAL WATER PUMP

(Refer to Figure 6)

Disassembly

1. Remove fan blade (1), pulley (2), water pump (3) and gasket (4).

2. Remove pump drive cover (5), gasket (6), plunger (7) and spring (8). Remove nut and lockwasher (9). Remove pump drive gear (10).

3. Remove lock plate pointer (11), thrust plate (12), shims (13), idler gear (14) and journal (15).

4. Remove bolts (16) and washers (17), bushings (18) and flexible coupler (if equipped). Remove pulley retainer nut (20), and pull the crankshaft pulley (21) with key (22).

5. Remove the timing gear cover (23) and gasket (24) and (30). Press the seal (25) from the timing gear cover.

6. Remove the nut (26) and lockwasher (27). Pull the camshaft gear (28) with key (29).

Inspection

Clean all parts thoroughly before inspecting

Inspect the gears for chipped teeth, burrs, or excessive wear. Light burrs and nicks can be removed with a hone or crocus cloth. Replace if damaged or worn.

Using an inside micrometer or a bore gauge and micrometer, check the inside diameter of the pump drive idler gear bushing. The maximum allowable inside diameter is 1.378″. Replace the entire idler gear if the bushing exceeds this dimension or is otherwise damaged.

Inspect the idler gear journal for a plugged oil hole. Blow out with compressed air.

Check the end of the thrust plunger for excessive wear. Make sure the plunger is free in the bore of the injection pump drive shaft. Replace if necessary.

Inspect the idler gear journal with a micrometer, as shown in Inset A. The minimum outside dimension is 1.374″. Replace the journal if this dimension is less.

Inspect the pump drive shaft for stripped or damaged threads, burrs, nicks or other damage. Rethread slightly damaged threads; burrs and nicks may be removed with a hone or crocus cloth.

Inspect the oil passage in the engine block which mates with pump drive idler gear journal oil groove. This passage must be free of dirt or other foreign particles.

Inspect the thrust spring for the following specifications:

Free length	1.22″
O.D.	.255″
Total coils	15
Wire diameter	.038″
Compressed to .950″	6 lbs. 4 oz.

Inspect the water pump for leaks or worn bearings. If these conditions exist, replace the pump assembly.

Check the fan pulley for wear and the fan blade for damage. Replace them if these conditions exist.

CAMSHAFT, BUSHINGS AND LIFTERS

(Refer to Figure 11)

Assembly

1. The camshaft bushing kits include a 1-7/32 inch wide rear camshaft bushing. The holes in the rear bushing are offset toward the chamfered edge of the bushing.

2. The 1-7/32 inch wide rear bushing must be installed with the chamfered edge into the block to a specified depth.

3. The two oil holes in the rear bushing must line up with the two oil holes in the block when the bushing is installed to a depth of 5/16 inch, Inset A.

4. The intermediate and center bushing oil holes must line up with the oil holes in the block, when installed, Inset D.

5. The front bushing is pressed 1/32 inch below the front face of block, Inset E.

6. Press new camshaft bushings into the camshaft bore using a pressing tool similar to that shown in Inset F.

7. Line ream the bushings 1.752 to 1.753 inches diameter.

8. Install the push rod lifters in their original locations using eight long, round sticks, slightly larger in diameter than the push rods used in removal. Force the tapered end into the inner bore of each push rod lifter. Raise the lifters as far as possible with the sticks and lock the sticks in place with cloths pins or other suitable devices.

9. Lubricate the bushings and camshaft with new engine oil and carefully install the camshaft (4) into place being careful not to damage the bushings.

10. Install the thrust plate (3). Rotate the camshaft to insure that it does not bind on the thrust plate. If it does, loosen the thrust plate bolts and re-center the plate. Torque the bolts 17 to 20 ft. lbs.

PISTONS, RINGS, SLEEVES AND CONNECTING RODS (Cont'd)

(Refer to Figure 24)

Assembly

16. Lubricate the cylinder sleeves and the piston assemblies with new engine oil. **IMPORTANT:** Rotate the piston rings so that the ring end gaps are staggered as illustrated in Inset A. **NOTE:** If three piece oil ring is used, place the expander in the oil ring groove. Install one rail 90^0 to the left of the expander gap and the other rail 90^0 to the right of the expander gap. **CAUTION:** Check to assure that the expander ends are not overlapped.

17. Place a ring compressor over the piston, Inset B. Make sure the piston rings are fully in the grooves before tightening the ring compressor. Tighten the ring compressor a little at a time, making sure the rings are free to compress.

18. Make sure the crankshaft rod journals are clean. Install the bearing liners (3) into the connecting rod and cap (2), Inset C, making sure that the bearing liner lock lines up with the groove in the rod and cap. Use a sliding movement when installing the bearing liners. **NOTE:** Never press on the center of the liner when installing.

19. The connecting rods and caps are stamped consecutively 1 thru 4 on the bearing end of the rods and caps. Number 1 connecting rod and cap must go in Number 1 cylinder (front). The number must be down and toward the camshaft side of the engine. The arrow stamped on top of the piston must point toward the fan.

20. Install the piston rod assembly into its right location and position in the block. With a block of wood and hammer, gently tap the piston down into the sleeve. Make sure the connecting rod lines up with the crankshaft journal.

21. Install the rod w/liner, keeping the same numbered cap with the same numbered rod. Install the retaining bolts (4) and nuts (5) and torque 45 to 55 ft. lbs.

Check the connecting rod side clearance which must be within .005" to .011", Inset D. If the side clearance exceeds .011" the rod may have to be replaced.

CHECKING BEARING CLEARANCE:

A plasti gauge material manufactured commercially can be used for checking connecting rod clearance.

1. Remove the connecting rod cap and wipe the oil from the bearing shell and crankshaft journal.

2. Place a piece of plasti gauge full width on the bearing liner, Inset E.

3. Torque the connecting rod cap bolts and nuts 45 to 55 ft. lbs.

4. Remove the rod cap. The flattened plasti gauge will be found either on the rod cap or crankshaft.

5. Compare the flattened gauge material at its widest point with the scale that is furnished, Inset F.

6. The number within the graduation indicates the clearance in thousandths of an inch. The rod bearings clearance should be .0010" to .0035".

LOCATING TOP DEAD CENTER

If timing marks are located on the crankshaft pulley, Figure 31, align the TDC mark on the pulley with the timing pointer.

If timing marks are on the flywheel, align the TDC mark, Figure 30, on the flywheel with the pointer in the flywheel housing. Then scribe a mark on the front crankshaft pulley and timing gear cover. This will be an aid when the flywheel has to be removed and installed. When the flywheel is installed, line up the TDC marks and the pointer.

Proceed as follows to check the top dead center location.

1. Crank the engine until the 20° BTDC mark on the flywheel or crankshaft pulley is aligned with the timing pointer.

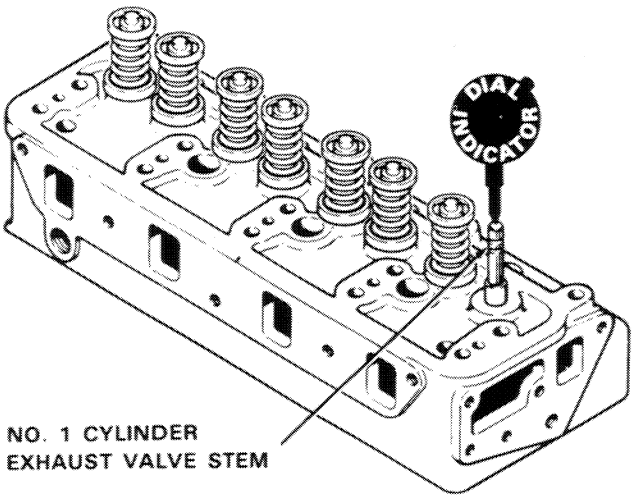


Figure 29

2. Remove the valve cover.
3. Compress the exhaust valve spring on the No. 1 cylinder and remove the keepers, valve retainer or valve rotator, spring and retainer. This will allow the valve to follow the movement of the No. 1 piston.
4. Install a dial indicator so the indicator finger is under slight pressure on the top end of the exhaust valve stem of No. 1 cylinder, Figure 29.
5. Crank the engine slowly clockwise until the dial indicator hand stops moving. Reset the dial indicator to zero.
6. Crank the engine clockwise (3 or 4 degrees) until a reading of .010" shows on the dial indicator.
7. Scribe a mark on the flywheel or crankshaft pulley in line with the timing pointer.

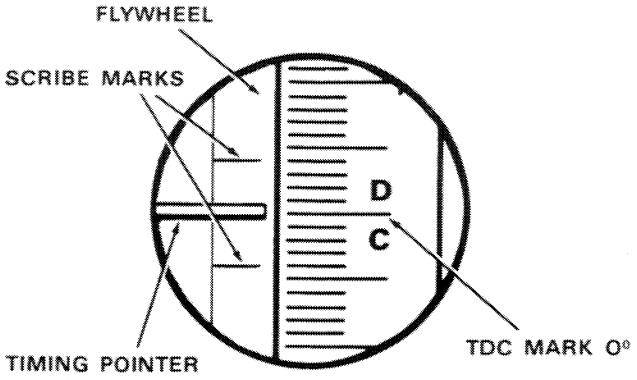


Figure 30

8. Crank the engine counter-clockwise (3 or 4 degrees) past the zero mark of the dial indicator, until a reading of .010" shows on the indicator. Again scribe a mark on the flywheel or crankshaft pulley in line with the timing pointer.
9. Half the distance between these two marks on the flywheel or crankshaft pulley will be the Top Dead Center mark.
10. The timing pointer, Figure 30, used with the timing marks on the flywheel should then be adjusted so it lines up with the TDC mark.

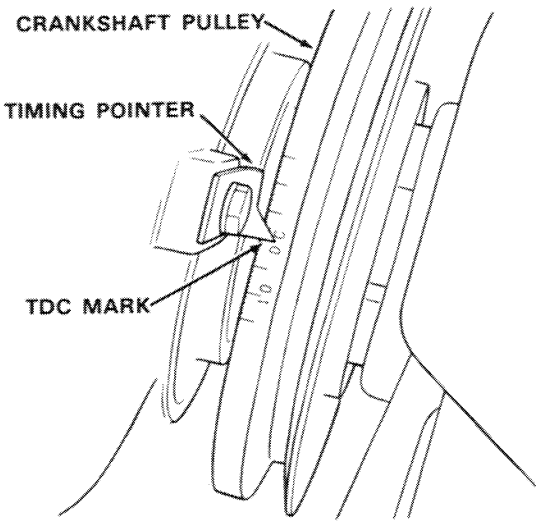


Figure 31

Correcting Opening Pressure and Leakage

1. Open the gauge valve approximately one full turn, Figure I-10. It is not necessary to fully open the gauge valve.
2. Operate the hand lever slowly and raise the pressure until the nozzle valve opens and fuel is sprayed. Observe the opening pressure as indicated on the pressure gauge.
3. If the opening pressure is as specified in the "Specification" Section, it is not necessary to reset the pressure.

   NOTE When testing more than one injector out of a set in one engine, there must not be more than 100 pounds difference in pressure between any of the injectors. If there is, reset the opening pressure on the injector or injectors that are closest to being above or below the recommended range.
4. Raise the pressure again until the nozzle valve opens. The instant the valve opens and fuel is sprayed, the pressure will drop sharply. This is the initial drop and is caused by the nozzle valve opening and closing.

   The initial drop must not be less than 6 seconds at a temperature of 50 to 70°F. At a higher temperature, a somewhat lower figure will be obtained.

   NOTE The pressure will continue to lower slowly after the initial drop. Be careful not to confuse this with the sharp initial drop.
5. Allow the pressure to drop and then slowly operate the hand lever again. Hold the pressure 100 pounds lower then specified range and observe the end of the nozzle.

   The nozzle must remain dry at a pressure approximately 100 pounds lower than the recommended opening pressure. If a drop of fuel is observed forming at the nozzle valve projection, the valve is leaking.
6. While you are checking the opening pressure and the valve for leakage, observe the amount of fuel that comes out of the leak-off connection on the holder body, Figure I-10.

   A very small amount of fuel is required to lubricate the lapped surfaces of the nozzle valve and body. If excessive overflow from the leak-off connection is noted, the injector will require servicing.

   NOTE To determine what would be considered an excess flow from the leak-off connection, check a new injector assembly on the test stand.

Setting Opening Pressure

Refer to "Specification" Section for correct opening pressure.

To adjust the nozzle opening pressure, remove the cap that seals the pressure adjusting screw from dust (1-1/16 inch socket).

Do not lose or damge the gasket.

Loosen the pressure adjusting screw jam nut (9/16 inch wrench) and turn the adjusting screw in --clockwise -- to increase pressure; counter-clockwise to decrease pressure, Figure I-11.

NOTE Although the opening pressure may be set within the specified range, there must not be more than 100 pounds pressure difference between any of the four injectors in one engine.

Before replacing the pressure adjusting screw protective cap, inspect the gasket. If it is damaged, install a new one. Tighten the cap, then back it off and retighten it to obtain a good seat with the gasket.

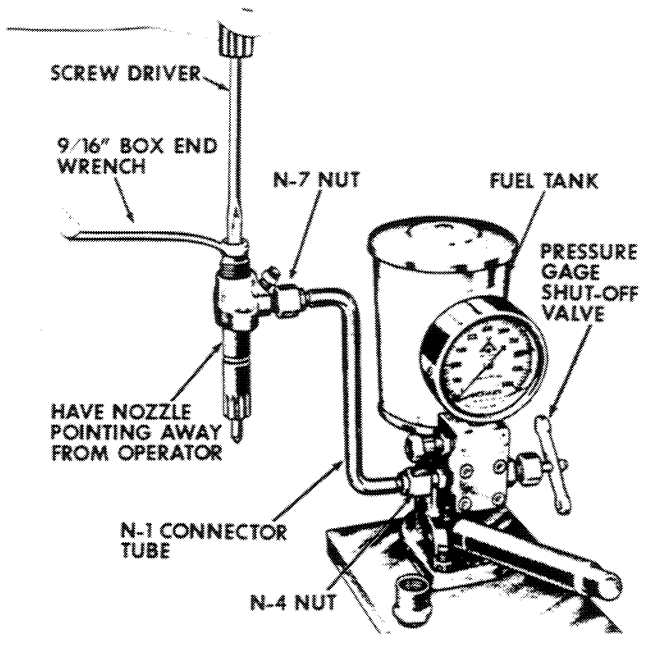


Figure I-11

IDLING SPEED AND MIXTURE ADJUSTMENT
(Refer to Figure N-5)

Adjustments for idling speed and idling mixture can best be made together when the engine is running at the proper operating temperature. The accelerator pedals must not be depressed or the engine accelerated to make this adjustment.

Idling Speed Adjustment

Idling Speed Adjustment is made at the locking joint which determines how far the carburetor throttle valve will close when the engine is idling. The idling speed adjustment should be set so the engine operates at a speed of approximately 600 RPM.

Idling Mixture Adjustment

Idling Speed Mixture Adjustment is determined by turning the adjustment screw out until the engine operates roughly, then turn the screw in until the engine idles smoothly. The correct adjustment is:

Approximately 1-1/4 turns open

LOAD ADJUSTMENT

To obtain a starting point, operate the engine under no load at full governed engine speed. Be sure the engine is up to the correct operating temperature. Turn the load adjustment screw in (clockwise) until the engine misfires and power falls off; then turn it out (counter-clockwise) until the engine runs smoothly. Turning the adjustment out produces a richer mixture. While turning it in produces a leaner mixture. The correct setting is:

Approximately 1-1/2 turns open

After the preliminary load adjustment has been made however, it may be necessary to slightly readjust the carburetor load setting when the engine is under load.

Place the engine under load and carefully observe how it reacts. If there is backfiring through the carburetor, loss of power, or the engine tends to stall when the load is applied, it indicates the setting is too lean. Turn the load adjustment screw out (Counter-clockwise) not more than 1/8 of a turn and again try the engine under load, Continue to do this until the engine pulls smoothly when the load is applied.

NOTE

Avoid the use of lean mixtures. Operating the engine with too lean a carburetor load mixture causes loss of power and high valve temperatures.

Although it is not necessary or advisable to constantly readjust the carburetor settings, they could be reset when the load conditions or the fuel quality is changed radically. Operating an engine under light loads with an overly rich carburetor setting not only wastes fuel, but may cause undue wear and damage from dilution. Operating under heavy loads with a too lean carburetor setting will cause general engine overheating, loss of power and excessive valve temperatures that will burn the valves seriously.

GENERATORS
Specifications at 80° F

Specification listed per the manufacturing number on the name plate.

DELCO NO.	CASE NO.	BRUSH MIN. TENSION OZ.	FIELD AMPS	FIELD VOLTS	OUTPUT AMPS	OUTPUT VOLTS	GEN RPM
1100443	A36563	28 oz.	1.58-1.67	12.0	25	14.0	3040
1100385	G44877	28 oz.	1.58-1.67	12.0	20	14.0	2300
PRESTO-LITE NO.							
GJT-7403A	A36195	18-36 oz.	1.6-1.7	10.0	25	15.0	2200
GJT-7104A	G44879	18-36 oz.	1.6-1.7	10.0	25	15.0	2200
GJT-7403SN	A41452	18-36 oz.	1.6-1.7	10.0	25	15.0	2200

Preventive Maintenance

To obtain maximum service life, a regular generator inspection and maintenance procedure should be followed. Proper lubrication, inspection of the brushes and commutator, checking brush spring tension are essentials. Proper belt tension is very important.

Lubrication

The generators that are supplied with oil cups should be lubricated with 6 to 8 drops of medium engine oil every 60 hours of operation.

Never lubricate a generator while it is in operation as it will only result in overlubrication.

CAUTION

DO NOT OVER LUBRICATE THE GENERATOR

Excess lubrication can only cause difficulty. Excessive oil forces its way out on to the commutator. Such a condition results in reduced or no generator output and increased commutator and brush wear.

BELT ADJUSTMENT

The generator drive belts should be checked for excessive looseness and wear every 60 hours of operation. The proper belt adjustment will give a deflection of 1/2 of an inch(or 50 to 60 pounds) between the fan and generator pulley, Figure F-12. When the tension is too tight, the generator and water pump bearings and fan belt will wear excessively. When belt tension is too loose it will permit excessive belt wear and slippage, also low or no generator output.

The most accurate method of checking belt tension is with a Belt Tension Gauge, Figure F-12.

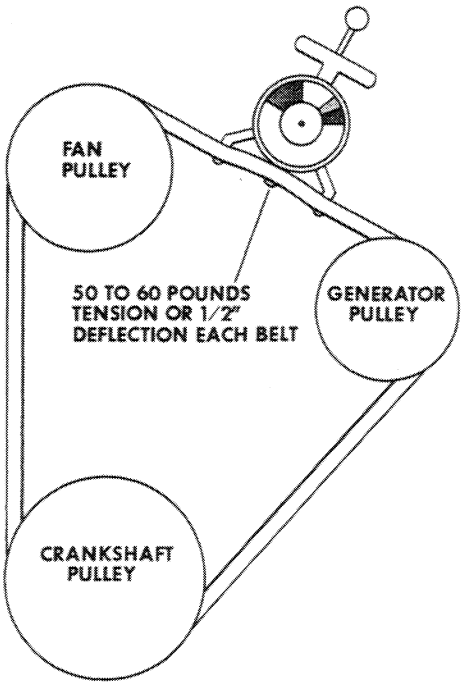


Figure F-12

Medium or Normal Heat Range Spark Plugs

The medium length insulator nose cools normally and is not subjected to constant high or low temperatures or constant light or heavy loads. This medium range plug represents a compromise to cover the widest range of operating conditions.

If hot plugs are installed in an engine for light loads or cold weather operation, it is very important that they be replaced by colder plugs when engine is operated at sustained heavy loads in hot weather. Using too hot a plug for sustained heavy load operation may result in the spark plugs becoming over heated, causing pre-ignition, cracking of the plug insulator and serious engine damage.

Electrodes

Examine the spark plug electrodes to determine if the plug is the proper heat range. Deposits on the electrodes will give some indication of the condition of the engine.

Oil Fouled Spark Plugs

Oil fouled spark plugs will have wet oily deposits on the electrode and the bottom of the shell.

Oil fouling indicates an excess amount of crankcase oil is getting into the compression chamber as a result of worn piston rings, cylinder sleeves or valve guides.

A hotter spark plug will temporarily relieve oil fouling of the plugs, but the permanent cure is to eliminate the cause of the oil getting into the compression chamber.

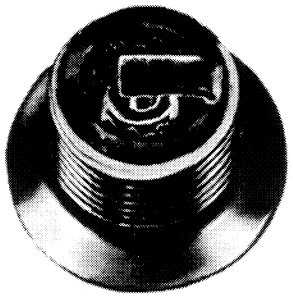


Figure F-28

Burned or Overheated Spark Plugs

Burned or overheated spark plugs will have a dry shiny white glazed, or badly cracked insulation nose. This can be caused by anyone of the following:

1. Too lean a fuel air mixture
2. Improper ignition timing
3. Too hot a spark plug for the type of engine service
4. Burned or sticking valves
5. Engine cooling system not operating properly

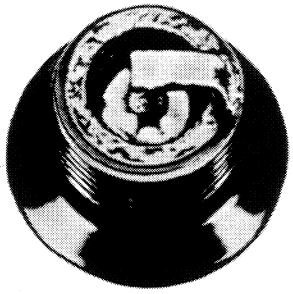


Figure F-29

Fuel Fouled Spark Plugs

A fouled spark plug has a dry black deposit on the electrode and bottom of the shell. It can be caused by any of the following:

1. Excessive use of the choke by the operator
2. Too rich an air fuel mixture
3. Prolonged engine idling
4. The use of too cold a spark plug for the type of engine service
5. Clogged air cleaner
6. Poor ignition output
7. Normally worn out spark plugs

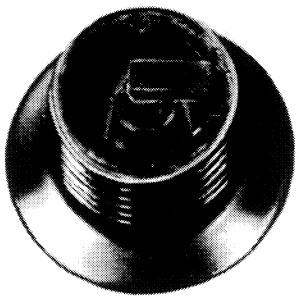


Figure F-30

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NOTE: 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.**

STEERING CYLINDERS

Assembly

(Refer to Figure O-5)

1. If the seal components have been removed because of leakage a new cylinder seal kit must be installed. Refer to inset A. Install the "O" ring (16) seal (5) and bushing (4) and then press the dust seal into the cylinder housing.

2. Install the scraper washer (3) and snap ring (2) using a No. 1 Truarc internal snap ring pliers.

3. Screw the check valve (13) into the control valve housing until it bottoms. Install the check valve plug (12) with "O" ring (11).

4. If the flared tube seats have been removed because they were scored or cracked, press new tube seats into the control valve housing until they bottom.

5. Install the valve spool (10) in the control valve housing making sure it is installed in the same position end for end as it was removed.

6. Install the "O" rings (8) and bushings (7) at both ends of the spool, using care not to cut or damage the "O" rings. Install new "O" rings (17) in the valve housing ports to the cylinder.

7. To assemble the actuator, slide one ball stud seat (27) into the inner sleeve (26) and slide the inner sleeve (26) into the outer sleeve (24). Install the ball (28) stud and other ball stud seat (29).

8. Install the ball stud spring (30), valve spool bolt (21), spring stop (31) and stc screw (20).

9. Turn the stop screw (20) down solid, unt it bottoms against the inner sleeve (26) an then back the screw off until the holes lin up with the slot in the inner sleeve

10. Slide the ball stud forward and insert th stop screw lock pin (22), rotating th spool bolt until the slot in the bolt hea (21) lines up with the pin (22).

IMPORTANT

THE LOCK PIN MUST NOT BE ALLOWEI TO SLIP OUT OF ITS SLOT INTO THI FLANGE CAVITY. IF IT DOES IT WIL] NOT ALLOW THE BALL STUD AND IN NER SLEEVE TO TRAVEL ITS FULI STROKE.

11. Install the dust shield (23) and greas fitting.

12. Install the valve housing to flange plat (19).

13. Assemble the valve housing (18) to the actuator by inserting the spool bolt thr the hole in the spool. The locknut (9 should be tightened 75 inch pounds an then backed off 1/6 turn. The nut must b snug against the spool, but not tight.

14. Connect the actuator ball stud, outer sleeve and valve assembly to the cylinder assembly using three lockwashers and capscrews (25).

ADJUSTMENT

Refer to Section OO for all steering linkage adjustments.

STEERING GEAR BOX

Removal

1. Remove the horn button, retainer nut and steering wheel.

2. Disconnect the horn wire.

3. Remove the drop arm from the steering cross shaft.

4. Remove the steering column support bracket.

5. Remove the steering gear mounting studs and gear box assembly.

Disassembly

(Refer to Figure OO-6)

1. To disassemble the gear box, loosen the locknut and adjusting screw (18) on the side cover (17). This is done to relieve the pressure from the cam and lever shaft.

2. Remove the capscrews and washers (20), cover (17) and gasket (16).

3. Remove the lever shaft (15) from the housing (11).

CAUTION

MAKE SURE THE SPLINED END OF THE LEVER SHAFT IS FREE OF ANY BURRS WHICH MAY DAMAGE THE HOUSING BUSHINGS AS THE LEVER SHAFT IS WITHDRAWN.

4. Remove the upper housing cover capscrews (8), cover (6) and steering tube (4).

IMPORTANT

REMOVE THE ADJUSTING SHIMS (7) AND KEEP THE SHIM PACK TOGETHER FOR REASSEMBLY.

5. If the upper bearing indicates wear or there is side play in the steering wheel, pull the bearing with OTC No. 954-2 Puller or equivalent.

6. Remove the cam and shaft assembly (14) from the housing (11).

CAUTION

WHEN REMOVING THE CAM AND SHAFT ASSEMBLY, DO NOT REMOVE THE CUP RETAINER AT EITHER END OF THE CAM. IF THE RETAINERS ARE REMOVED IT WILL LOOSEN THE BALL CUPS AND THE BALL BEARINGS WILL FALL OUT.

7. Whenever the gear box (11) is disassembled, always replace the lever shaft oil seal (9) by pulling the seal with OTC No. 954-2 Puller or equivalent.

8. If inspection of the lever shaft bushings (10) in the gear housing (11) show wear or score marks, press the bushings out of the housing.

9. If the lower end cover (21) is leaking, use Permatex around the edges of the cover. If the leak persists, remove the cover by tapping it out of the housing and replacing the cover with a new one.

10. If the steering shaft tube (4) is bent or interferes with the steering alignment in any way, replace the tube.

POWER STEERING PUMP RELIEF VALVE PRESSURE CHECK

The pressure relief valve in the power steering pump used on Case 2 Wheel Drive Uni Loaders has a 1050 - 1150 PSI opening pressure. The valve is not replaceable but it can be adjusted by the use of washers behind the relief valve spring. Refer to Page 2.

To check the relief valve pressure, proceed as follows:

1. Remove the pressure hose and adapter, then insert the male end of a 53-F Imperial fitting into the pump as shown in Figure P-1.

2. Install a 3/8" to 1/4" P.T. reducer into the 53-F Imperial Fitting.

3. Install the 4501AA or A22791 Gauge, Figure P-1.

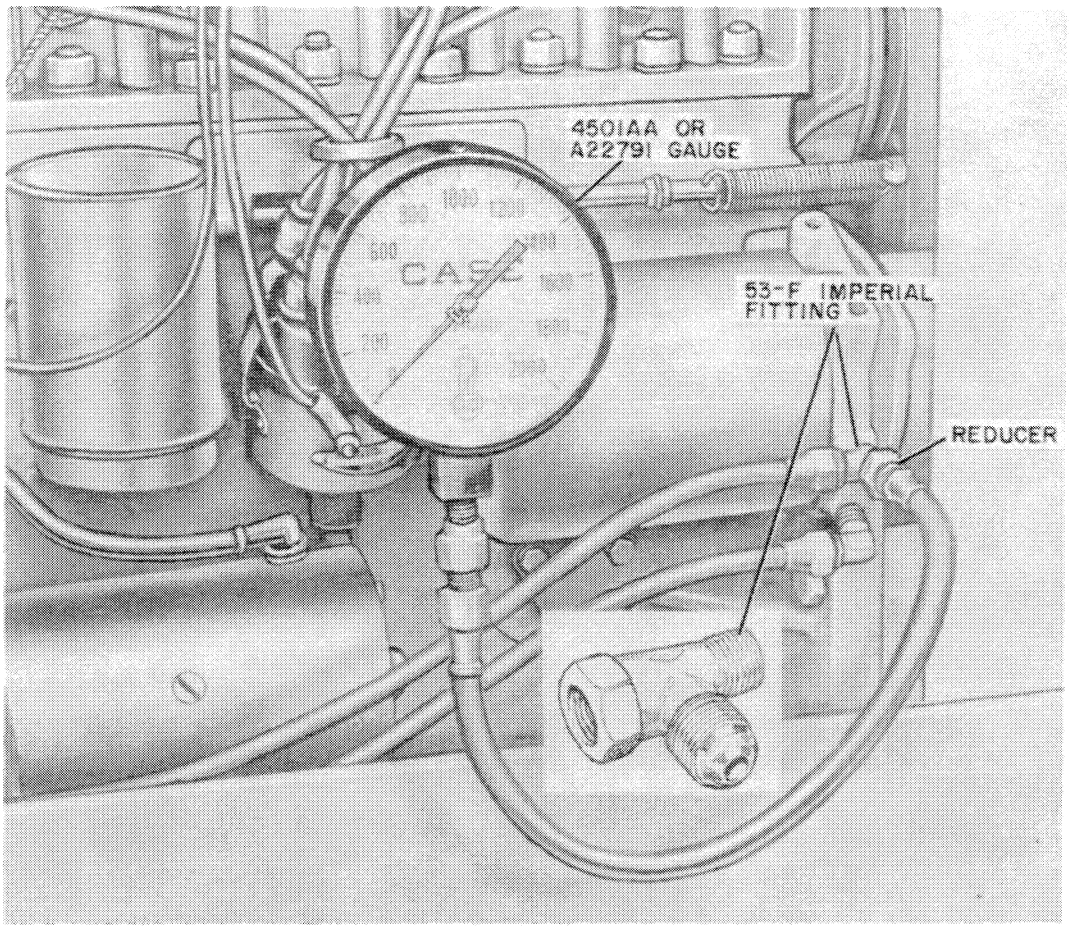


Figure P-1

NOTE

The 4501AA or the A22791 Pressure Gauge can be used on all Case Unit Loaders and can be purchased through the Central Service Division. Case Co , Racine, Wisconsin.

4. Start the loader engine and operate it at approximately 2200 RPM.

The limitation of a standard gear type transmission is that if, in trying to balance the load with the engine, the operator is too slow or guesses wrong, the engine will lug down and stall because it is a mechanical connection that must be manually balanced, Figure S-6.

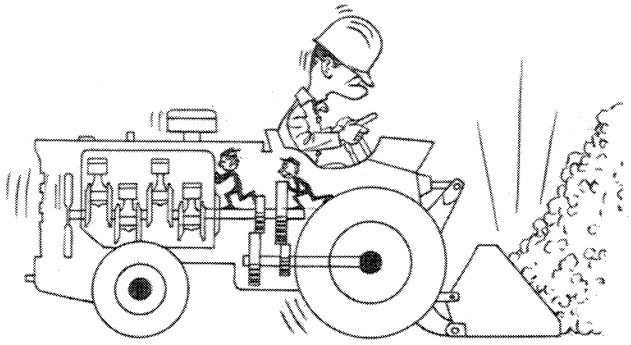


Figure S-6

Now let's add a Torque Converter between the engine and gear type transmission, Figure S-7.

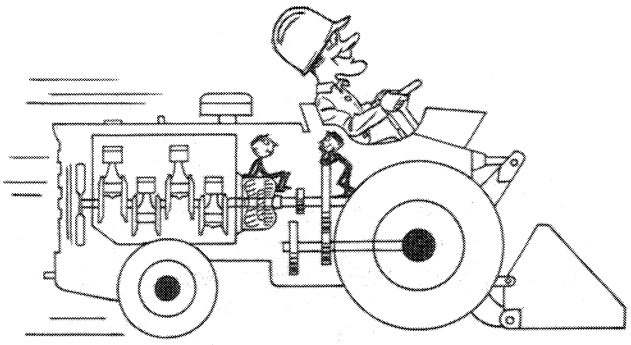


Figure S-7

With a Torque Converter between the engine and Transmission the engine turns a hydraulic pump (the impeller) which forces oil through a passage (the torus) against a paddle wheel (the turbines) causing the paddle wheel to rotate. The paddle wheel is connected to the transmission, thus the transmission and drive wheels also rotate, Figure S-8.

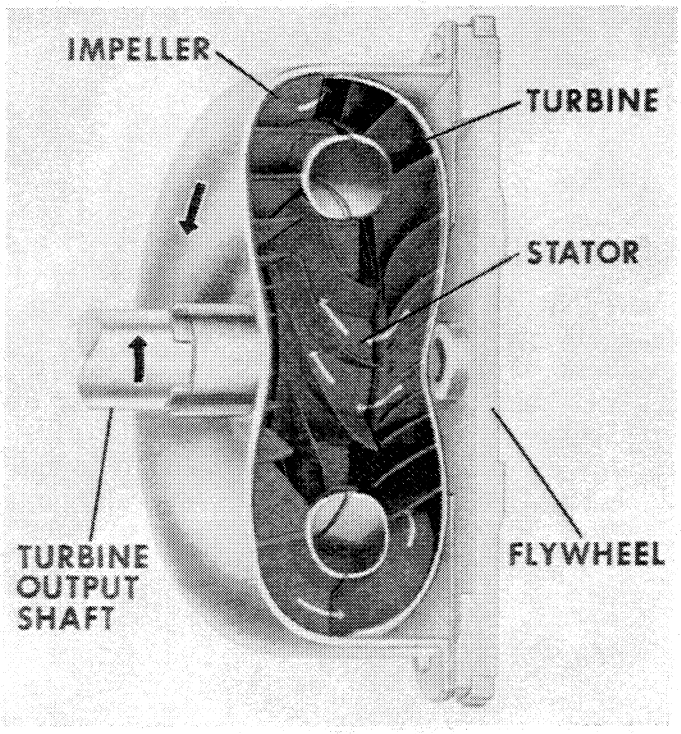


Figure S-8

LINKAGE ADJUSTMENT

To adjust the clutch control spool and brake linkage proceed as follows:

1. Install a pressure gauge in the forward clutch pressure port, Figure S-16, Page S-18. The purpose of installing the pressure gauge is to determine when the clutch is fully engaged or disengaged. When the clutch is fully engaged the forward clutch pressure must be 77 to 95 PSI at 1500 engine RPM. When the clutch is fully disengaged there must be no pressure indicated on the gauge.

2. With the brake pedal fully released and the selector lever in neutral, there must be absolutely no pressure indicated on the pressure gauge, the control link pin must be located in the position on the cam as illustrated in the No. 1 inset, Figure S-15. There must also be 1/16" clearance between the clutch control spool and the clutch control finger, when the spool is held fully in (bottomed) by hand.

3. If pressure remains on the gauge when the brake pedal is released first check the location of the cam on the control link pin. If the cam is not in the position on the pin as illustrated in No. 1 inset on Figure S-15 - it will be necessary to lengthen or shorten the clutch control rod by means of the adjusting yoke, Figure S-15. The clutch control rod is the correct length when the cam is in the position on the control link pin as illustrated in inset No. 1, Figure S-15, when the brake is released.

   Once the control rod length is properly adjusted - hold the clutch control valve spool all of the way in by hand. There must be 1/16" clearance between the spool and clutch control finger as illustrated in inset No. 1, Figure S-15. If there is not 1/16" clearance - the adjusting screw on the end of the control spool must be moved in or out until the 1/16" clearance is obtained.

4. Recheck the clutch pressure as described in No. 1 above if the clutch control spool - brake linkage is properly adjusted, the gauge will indicate 77 to 95 PSI at 1500 Engine RPM when the clutch is engaged (brake released) and absolutely no pressure when the clutch is disengaged (brake applied).

Removal Of The Reverse And Idler Gears

NOTE: The reverse gear shaft and idler gears can be removed without removal of the converter or clutch assemblies.

1. Remove the reverse drive shaft bearing retainer capscrews and retainer, Figure S-41.

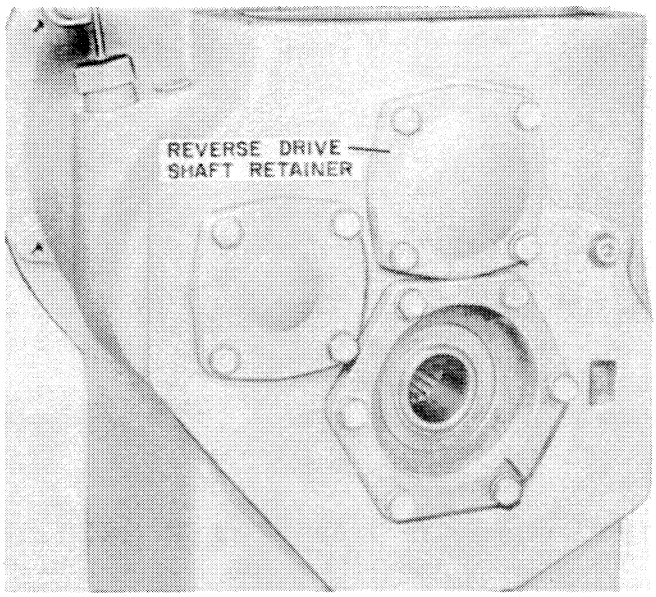


Figure S-41

2. To remove the reverse drive gear and drive shaft assembly, first remove the reverse drive shaft inner snap ring, Figure S-42.

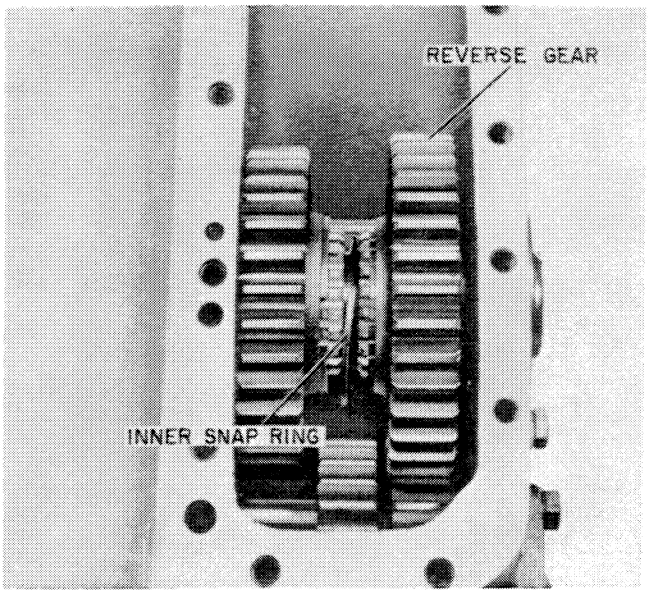


Figure S-42

3. Now hold the reverse gear with one hand and pull the reverse drive shaft assembly out of the gear box, Figure S-43.

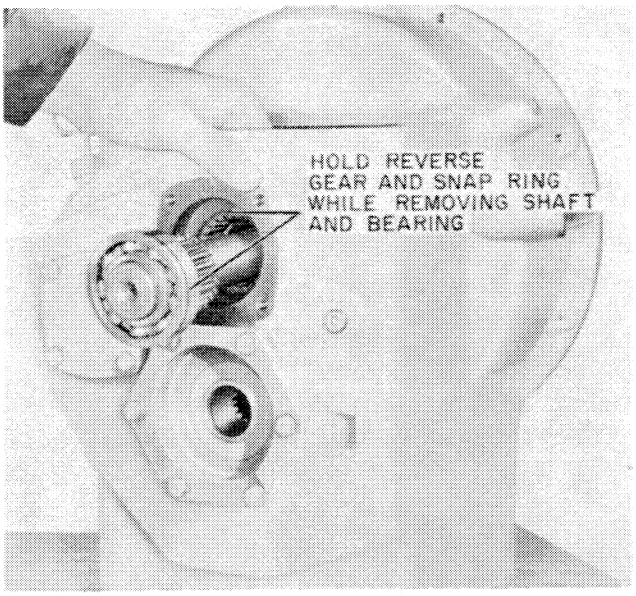


Figure S-43

4. Now remove the capscrews from the reverse idler bearing retainer, Figure S-44.

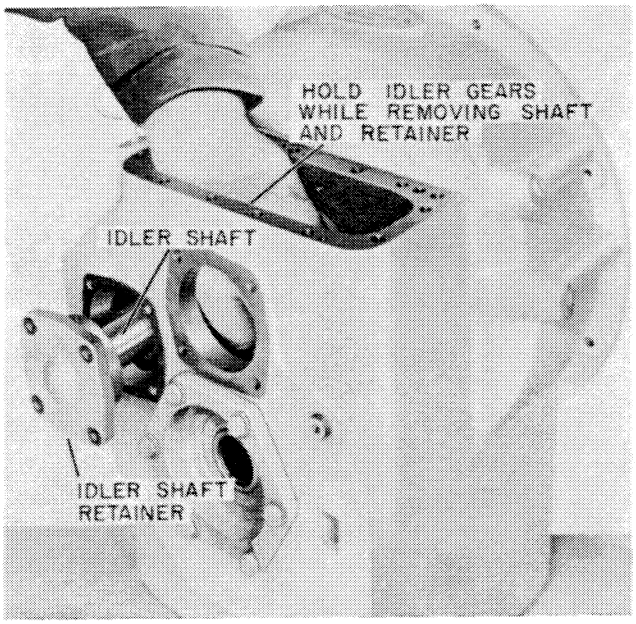


Figure S-44

Then while holding the idler gears, remove the idler shaft and retainer, Figure S-44.

Assembly And Installation Of The Forward And Reverse Clutches

ASSEMBLY OF THE FORWARD CLUTCH

1. Assemble the one large diameter ring seal onto the forward piston, Figure S-67. Then assemble the small ring seal onto the inner hub of the forward cylinder. Now install the forward piston into the forward cylinder, Figure S-67.

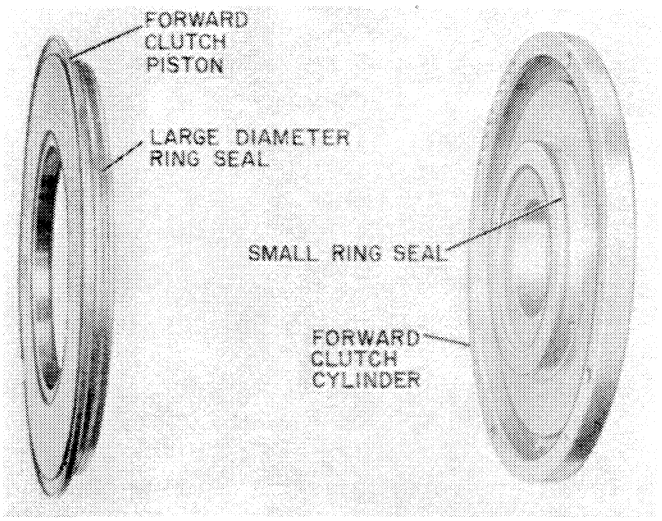


Figure S-67

2. Now install the forward clutch plate, cylinder and piston into the pressure plate and housing, Figure S-68 making sure the holes in the cylinder and piston are assembled onto the locating dowels in the housing.

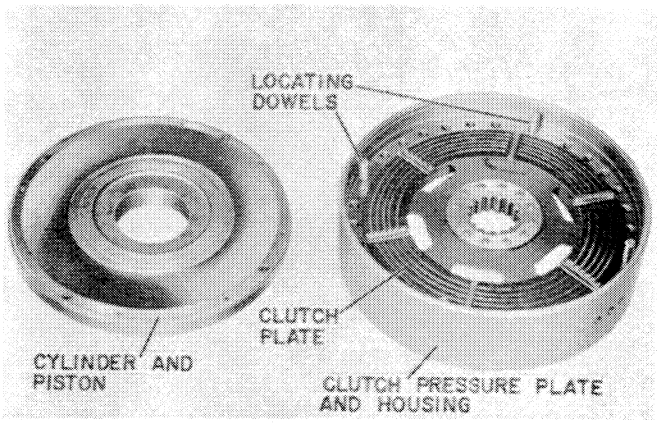


Figure S-68

3. Install the forward clutch cylinder snap ring into the groove in the clutch housing, Figure S-69.

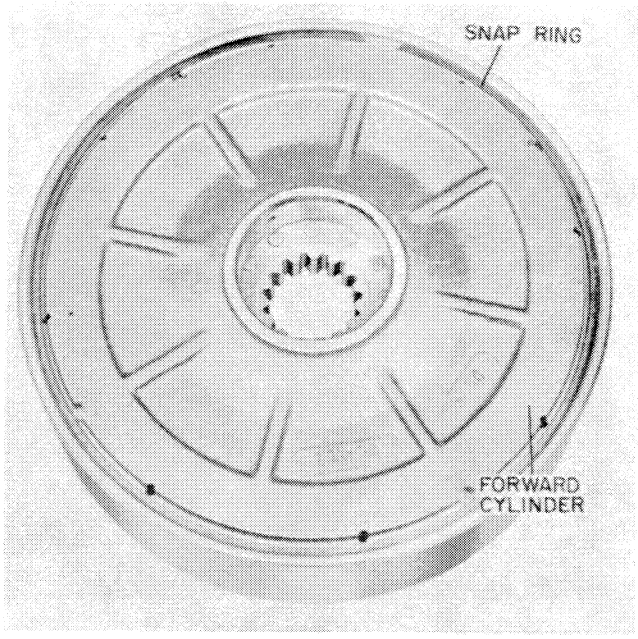


Figure S-69

IMPORTANT

Care must be taken when installing the forward cylinder snap ring. Make sure the snap ring is properly seated in the housing groove. If it is not properly seated, it may come out causing serious damage to the clutch housing. The symptoms of this snap ring coming out of the groove is locking up of the hydraulic power shuttle, while still maintaining clutch pressure.

SERVICE SUGGESTIONS

External Oil Leakage

CAUSE	REMEDY
1. Oil leakage between the control valve and shuttle housing.	1. Remove the control valve and install a new gasket. Refer to Page S-41.
2. Oil leakage between the converter housing and shuttle housing.	2. Remove the converter housing and install a new gasket.
3. Oil leakage between the converter housing and the flywheel housing.	3. Check the shuttle oil pump seal, also the engine rear oil seal, camshaft welch plug and oil gallery pipe plug.
4. Oil leakage around the transmission output shaft.	4. Remove the output shaft retainer and install a new oil seal. Refer to Page S-32.
5. Oil leakage around the spools in the control valve.	5. Install new oil seals on the spools. Refer to Page S-40.

Slow or No Forward Motion Only

CAUSE	REMEDY
LOW FORWARD CLUTCH PRESSURE:	CHECK FORWARD CLUTCH PRESSURE AS DESCRIBED ON PAGE S-18.
1. Oil leakage around forward piston.	1. Remove the hydraulic power shuttle and inspect the forward piston and ring seal. Refer to Page S-30.
2. Forward clutch oil passages plugged.	2. Remove the shuttle, disassemble and clean all oil passages.
3. Clutch plate worn.	3. Remove the shuttle and check the forward clutch plate. Replace if worn.

Slow or No Reverse Motion Only

CAUSE	REMEDY
LOW REVERSE CLUTCH PRESSURE:	CHECK REVERSE CLUTCH PRESSURE AS DESCRIBED ON PAGE S-18.
1. Oil leakage around reverse piston.	1. Remove the shuttle and inspect the reverse piston and ring seals. Refer to Page S-30.
2. Reverse clutch oil passages plugged.	2. Remove the shuttle, disassemble and clean all oil passages.
3. Clutch plate worn.	3. Remove the shuttle and check the reverse clutch plate. Replace if necessary.

GEAR SHIFT (CONT'D)

(Refer to Figure SS-4)

Assembly and Installation

1. Press a new roll pin (6) into the shift cover (9).

2. Install interlock plugs (26), lock springs (31), and balls (30), into cover (9), then press shift rails (25 and 27) into one side of the cover. Add spacer (24) and fork (21) to shift rail (25) and fork (23) to shift rail (27). Press the rails into the other side of the cover.

3. Line up the setscrew (20 and 22) holes in forks (21 and 23) with the setscrew holes in shift rails (25 and 27), then assemble and tighten the setscrews.

4. Lockwire the shift fork setscrews (20 and 22) as shown in Inset B.

5. If necessary, press a new shift lever socket seat (5) into the cover.

6. Install the assembled cover (9) onto the transmission case with a new gasket (10). Torque capscrews (7) to the value specified in the Specification Section.

7. Assemble lever-retaining screw (29) and jam nut (28) into cover (9).

8. After the transmission has been assembled to the machine, install the shift lever (2) into the cover (9) and secure with snap ring (4).

9. Tighten the lever-retaining screw (29) until a slight bind is felt when moving the shift lever. Back off the screw until the lever moves freely, then tighten jam nut (28).

10. Slip the dust cover (3) over the shift cover (9).

DIFFERENTIAL GEAR SHAFT ASSEMBLY (CONT'D)

(Refer to Figure SS-13)

Assembly and Installation

1. Replace pinion gears (4), shafts (5), and roll pins (2) in centerwheel (3).

2. Assemble ring gear (1) to centerwheel (3). Torque bolts (6) to the value specified in the Specification Section. Lockwire adjacent bolts, two per wire.

3. Press differential shaft (7) into centerwheel (3) from the side opposite the ring gear (1). Recessed shoulder of shaft should seat firmly against centerwheel.

4. Install a new expansion plug (11) into side gear (10).

5. Press a new oil seal (19) into bearing carrier (17) using a Case G15027 plug. The oil seal lip should be to the inside of the case (12).

6. Press bearing race (14) into bearing carrier (17) until it bottoms completely.

NOTE

The bearing race bores in the RH and LH carriers are different. The RH carrier maybe distinguished from the LH carrier by its slightly smaller bearing race bore.

7. Press bearing (13) onto side gear (10).

8. Place side gear on differential shaft and determine correct backlash according to the instructions given on Page SS-28.

9. Place ring gear and shaft assembly into the case with the gear teeth to the left side of the case.

10. Place composition washers (8) and shims (9, if required - see step 8 above) on shaft (7), then install the side gears (10) through the sides of case (12).

11. Place a new "O" ring (15) on bearing carrier (17) and, using a Case G15035 sleeve to protect oil seal (19), install shims (16) and the carrier.

12. When installing bearing carriers (17), set correct bearing preload with shims (16) according to the instructions given on Page SS-28.

13. Torque capscrews (18) to the value specified in the Specification Section.

14. Replace differential brakes. Refer to Page SS-24.

15. Replace front top transmission cover (17, Figure SS-3). Torque the capscrews to the value specified in the Specification Section.

16. Replace the front axles and final drive. Refer to Page SS-12.

17. Reassemble the transmission to the machine. Refer to Page SS-4.

18. Replace oil according to the directions given in the Operator's Manual.

3. DIFFERENTIAL GEAR BEARING PRELOAD - Adjust differential gear bearings for correct preload. Preload should be from zero to .003".

Using Case Tool No. A37083, a rotational torque check can be used to arrive at the correct preload. With the countershaft pinion gear locked against rotation, and using a large torque wrench, measure the rotational torque of the differential side gears. Rotational torque should be from 10 to 25 foot-pounds. Add or subtract right-hand differential bearing carrier shims until correct bearing preload is obtained.

4. DIFFERENTIAL GEAR AND COUNTERSHAFT PINION GEAR BACKLASH - Set correct differential shaft bearing and countershaft bearing preloads before checking differential gear and countershaft pinion gear backlash. Refer to paragraphs 2 and 3 above.

Locate a dial indicator on the transmission case as shown in Figure SS-22.

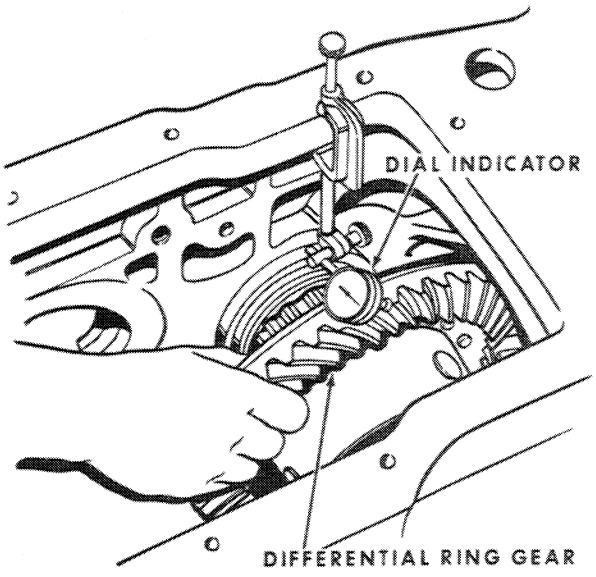


Figure SS-22

Position the gauge carefully so that the dial will not skip on the tooth and so sufficient pressure is on the tip to move the indicator needle.

Take up the slack in both gears by holding the countershaft and rotating the differential gear as far as possible in one direction without moving the countershaft. Set the dial indicator to zero.

Hold the countershaft and rotate the differential gear as far as possible in one direction without moving the countershaft.

Read the dial indicator for the backlash between gears. Correct backlash is .005" to .009".

If backlash is too great, move the necessary shims from the left-hand differential bearing carrier to the right-hand bearing carrier. Retorque the bearing carrier mounting bolts to the value specified in the Specification Section.

If backlash is insufficient move the necessary shims from the right-hand differential bearing carrier to the left-hand bearing carrier. Retorque the bearing carrier mounting bolts to the value specified in the Specification Section.

Recheck backlash according to the above procedures after each shim change.

5. DIFFERENTIAL SIDE GEAR AND PINION BACKLASH - Stand the differential gear on a work bench with its pinion gears up.

Place a composition thrust washer on the shaft (refer to Figure SS-13), then install the side gear.

Using a dial indicator and approximately the same procedures outlined in paragraph 4 above, check for correct side gear backlash. Backlash should be .008" to .020". Add shims (9, Figure 13) as necessary.

LIFT CONTROL LEVER IN RAISE
TILT CONTROL LEVER IN NEUTRAL
(Refer to Figure A-3)

To raise the bucket, the lift control lever is moved rearward to the position shown. As the lift control lever moves, the lift spool moves within the control valve, opening the valve ports leading to the lift cylinders.

A demand is created in the hydraulic system for pressurized hydraulic oil, to raise the bucket when the lift control is moved to the position shown. The pump reacts to this demand for pressurized oil by drawing hydraulic oil from the reservoir. The amount of oil drawn from the reservoir and the speed at which the pump supplies this volume of oil to the hydraulic system are determined by the engine RPM. The pump forces this volume of oil into the hydraulic system, where, upon encountering the external resistance of the bucket, working or high pressure is created. High pressure is indicated by the red color coding.

This pressurized hydraulic oil flows from the pump through the hydraulic line to the inlet side of the control valve. The pressurized oil is guided by the passages in the control valve body to the front valve port. The valve port is open due to the lift spool being in the raise position, so the pressurized oil passes through the hydraulic lines and into the rearward ends of the lift cylinders.

The force of the pressurized hydraulic oil in the lift cylinders is exerted against the lift cylinder pistons. Assuming the resistance of the bucket on the lift cylinder piston rods is not sufficient to cause the pressure relief valve in the control valve to open, the force of the pressurized oil in the lift cylinders, will move the pistons forward. As the pistons move forward in the lift cylinders, the piston rods are extended. The piston rods are linked to the bottom of the lift arms and as the piston rods extend, the lift arms are pushed forward, raising the lift arms.

As the pistons move forward, the hydraulic oil in the forward ends of the lift cylinders is displaced and flows out of the front cylinder ports, back through the hydraulic lines to the rear valve port. The rear valve port is open due to the position of the lift spool, so the hydraulic oil flows through the hollow portion of the lift spool and out of the control valve outlet. The hydraulic oil is then directed by the hydraulic lines back through the filter and into the reservoir.

The tilt control lever is in the neutral position, therefore the tilt spool blocks any hydraulic oil from flowing to or from the tilt cylinders. The hydraulic oil locked in the tilt cylinder circuit creates sufficient static pressure on the tilt cylinder pistons to hold them in place in the tilt cylinders, preventing the bucket from tilting up or down. Static pressure is indicated by the dark green color coding and is characterized by no oil flow.

The leveling links are connected to the lift arm bell cranks and pivot on the chassis. The leveling links work with the lift arm to provide the bucket with self-leveling action. This self-leveling action aids in overcoming bucket spillage by maintaining the bucket angle constant during the entire raising or lowering cycle, without the operator using the tilt control lever.

LIFT CONTROL LEVER IN RETAINED FLOAT
TILT CONTROL LEVER IN TILT BACK

(Refer to Figure A-8)

The operator, after emptying the bucket into a truck or onto a stockpile, can place the lift control lever in the retained float position and allow the bucket to lower by itself while he operates the tilt control lever to tilt the bucket back.

The weight of the bucket on the lift arms creates enough resistance on the lift cylinder piston rods to retract them into the lift cylinders at a controlled speed. The speed at which the bucket will lower in float is determined by the volume of hydraulic oil flowing out of the lift cylinders and back through the controlled restrictions in the hollow lift spool.

The lift arms will descend at approximately the same speed when the lift control lever is in either the retained float position or the lower position, so no time is lost in the work cycle when the bucket is lowered by the float feature.

The tilt reaction of the tilt cylinder piston rods is faster than the float reaction of the lift cylinder piston rods, therefore the bucket will be at the correct angle for the next phase of the work cycle before the lift arms reach the required height.

The oil flow in the tilt cylinder circuit is the same as described on Page A-12.

LIFT CYLINDERS

(Refer to Figure A-13)

Removal

1. Rest the bucket flat on the ground or floor-shut off the engine and move both hydraulic levers fully forward and rearward to relieve all pressure in the hydraulic system.

2. Disconnect the hydraulic lines and cap the tubes to prevent foreign particles from entering the hydraulic system.

NOTE Block the cylinders prior to removal to prevent serious injury if the cylinder should drop.

3. Remove the pivot pin lock plate capscrews and plates.

4. Remove the pivot pins and cylinder assembly.

Installation

1. Place the cylinder in the rear pivot bracket (grease fitting up) and install the pivot pin, lock plate and capscrews.

2. Place the cylinder in the lift arm pivot bracket and install the pivot pin, lock plate and capscrews.

3. Remove the protective cap from the hydraulic tubes and connect the hydraulic hoses.

4. Start the engine and cycle the hydraulic system thru several cycles (raise, dump, retract and lower) to bleed the system.

TILT CYLINDERS

(Refer to Figure A-13)

Removal

1. Rest the bucket flat on the ground or floor-shut off the engine and move both hydraulic levers fully forward and rearward to relieve all pressure in the hydraulic system.

2. Disconnect the hydraulic lines and cap the tubes to prevent foreign particles from entering the hydraulic system.

NOTE Block the cylinders prior to removal to prevent serious injury if the cylinder should drop.

3. Remove the pivot pin lock plate capscrews and plates.

4. Remove the pivot pins and cylinder assembly.

Installation

1. Place the cylinder in the rear pivot bracket (grease fitting down) and install the pivot pin, lock plate and capscrews.

2. Place the cylinder in the quadrant pivot bracket and install the pivot pin, lock plate and capscrews.

3. Remove the protective cap from the hydraulic tubes and connect the hydraulic hoses.

4. Start the engine and cycle the hydraulic system thru several cycles (raise, dump, retract and lower) to bleed the system.

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CONTROL VALVE

(Refer to Figure D-6)

Prior to reassembly of the hydraulic control valve, make certain that the bench tools and all valve parts are clean. If necessary, rewash all parts before assembly. Coat all the valve parts with hydraulic oil before installing them in the valve body.

Assembly

1. To reassemble the tilt spool, (39) place a retainer plate (6), spring retainer (33), spring (32), spring retainer (31), and retainer plate (6), over the end of the spool. Compress the spring and install a new snap ring (30). Make sure the snap ring is fully seated in the groove. Then carefully remove the spring compressing device. Remove the spool from the vise and place an "O" ring retainer (34), and "O" ring (37), over the eye end of the spool. Care must be taken to prevent cutting the "O" ring during installation.

2. Insert the tilt spool assembly into the body and install the spool cap (29). Tighten the spool cap until it bottoms.

3. Install the "O" ring (36), retainer (4), wiper (5), and retainer plate (6), over the eye end of the spool. Install the retainer plate (6), screws (7), and washers.

4. Assemble the float lift spool (38), by first applying Lock-Tite to either the internal threads in the end of the spool or to the external threads on the detent sleeve. Then install an "O" ring (36), seal retainer (35), "O" ring (46), seal retainer (45), spring retainer (44), spring (43), spring retainer (42), and detent sleeve (41), onto the end of the spool (38).

5. Install the spool into the valve body and install the inner cap (40).

6. Install the six detent balls (48), and retainer (49), into the inner sleeve (40).

   NOTE A small amount of vasoline applied to the detent balls will help hold them in place during assembly.

7. Install the outer cap spring (50), and cap (51).

8. Place a new "O" ring (3), over the eye end of the spool and into the recess in the valve body.

9. Then install the seal retainer (4), wiper (5), and retainer plate (6), over the eye end of the spool.

10. Now screw the retainer plate to the valve body with the screws (7), and lockwashers.

11. Place a new "O" ring (23) on the relief valve plug (24), and install the plug in the control valve body.

12. Install the relief valve plunger seat (15), using a wooden dowel to tap in place.

13. Now insert the plunger (14), and spring (13), in the body bore.

14. Install the plunger (21), spring (20), adjusting screw (19), washer (17), jam nut (18), washer (17), and acorn nut (16), in the cap (8).

15. Install new "O" rings (12 and 10) and a back up ring (11) onto the cap assembly and install the cap assembly into the valve body.

16. When installing the check valves be sure they are installed in the same bores they were removed from in the valve body. Slide the valve poppet (25) down through the bore until it is seated against the body seat and install the spring (26). Now place a new "O" ring (27) on the poppet cap (28) and screw the cap into the valve body until the cap bottoms.

3. Remove the pump mounting stud nuts and lock washers that hold the pump to the engine rear support, Figure R-7.

4. Then pull the pump off the studs and out through the grille casting.

NOTE:

After the hydraulic pump is removed from the loader, cover the inlet and outlet oil lines to prevent dirt from entering the hydraulic system.

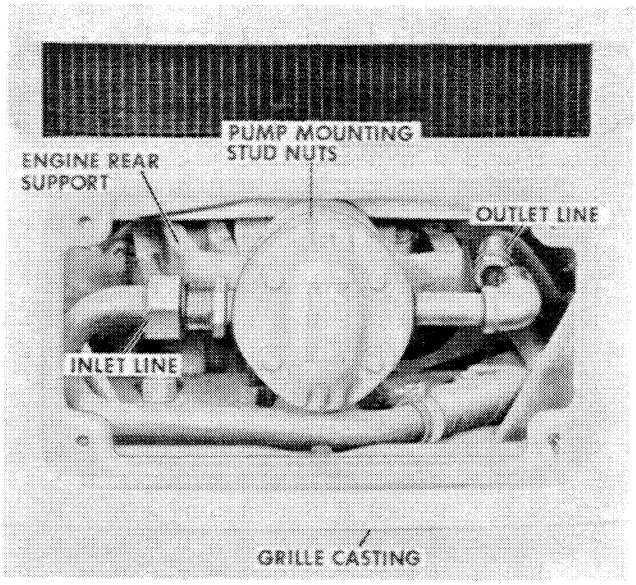


Figure R-7

DISASSEMBLY OF THE HYDRAULIC PUMP

General

With the hydraulic pump removed from the loader, the pump can easily be disassembled, cleaned, inspected and serviced. Before starting to disassemble the hydraulic pump make sure the exterior of the pump body is clean and the area in which the pump is to be disassembled is clean.

Disassembly Procedure

1. To facilitate servicing the pump, a bench plate as shown in Figure R-8, can be made for use in disassembly and assembly.

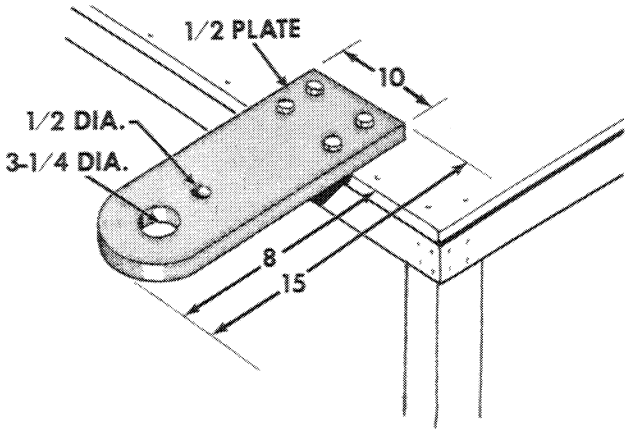


Figure R-8

2. Remove the four Allen head cover capscrews, Figure R-9.

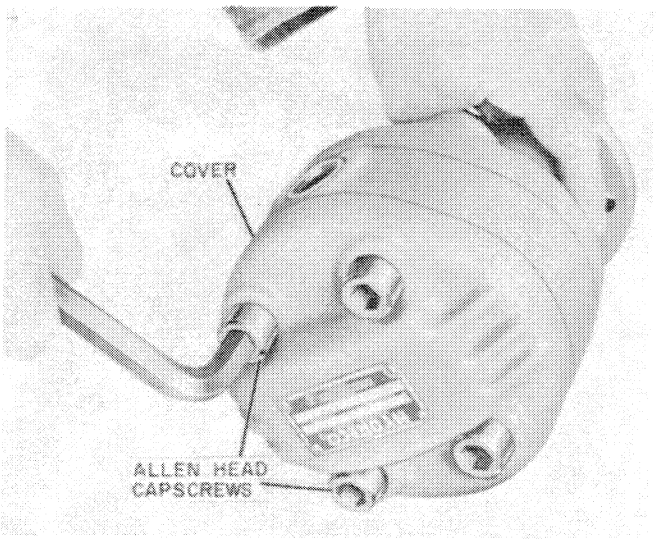


Figure R-9

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