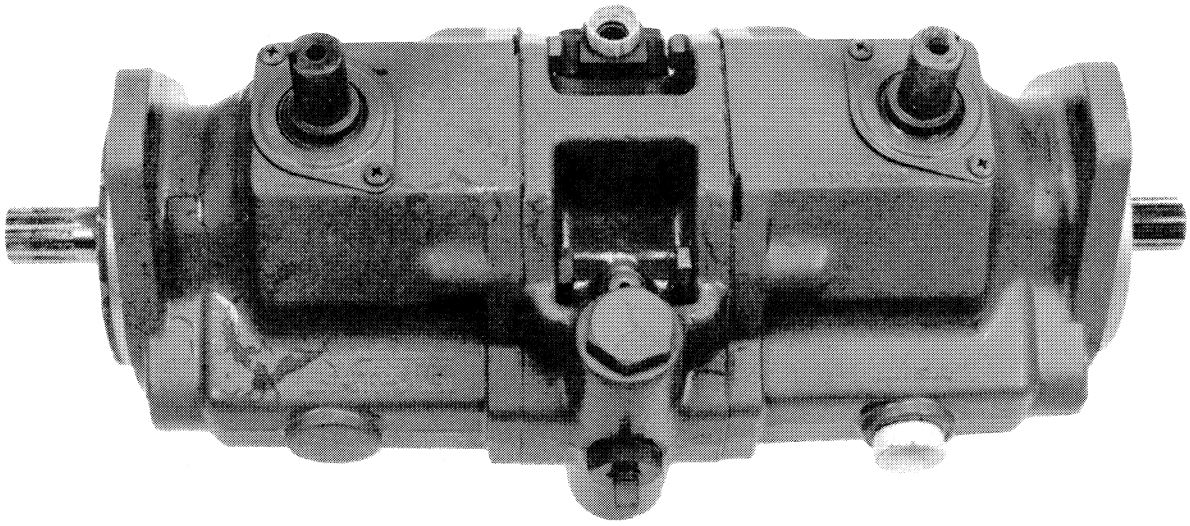
SERVICE MANUAL

SPEEDROWER® WINDROWER 912, 1100, 1112 and 1114 HAYBINE® MOWER-CONDITIONER 1495

CESSNA HYDROSTATIC TRANSMISSIONS

40841501

SPERRY NEW HOLLAND



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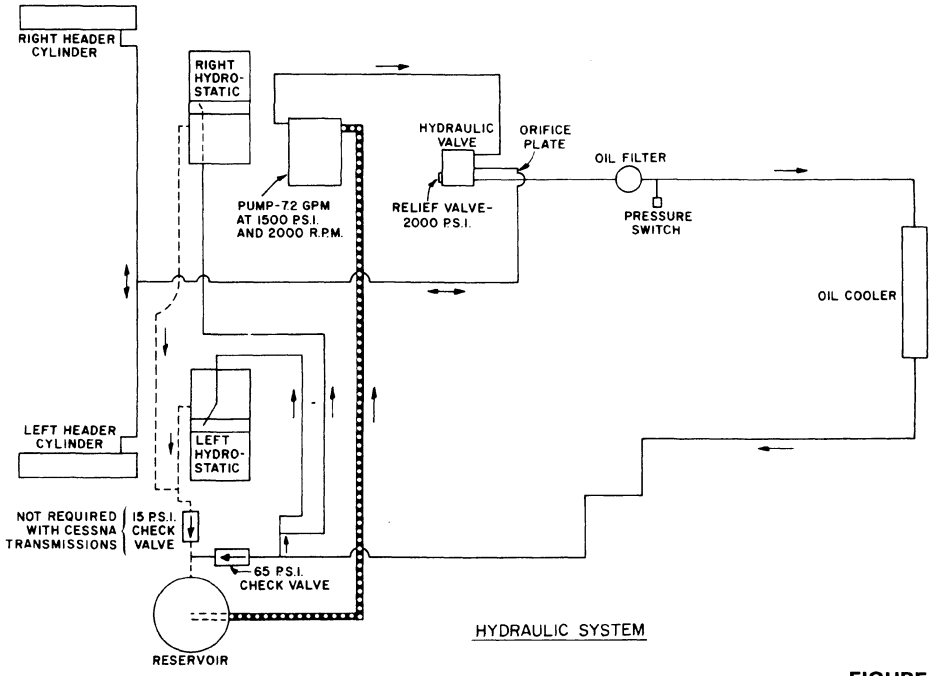
CAUTION!

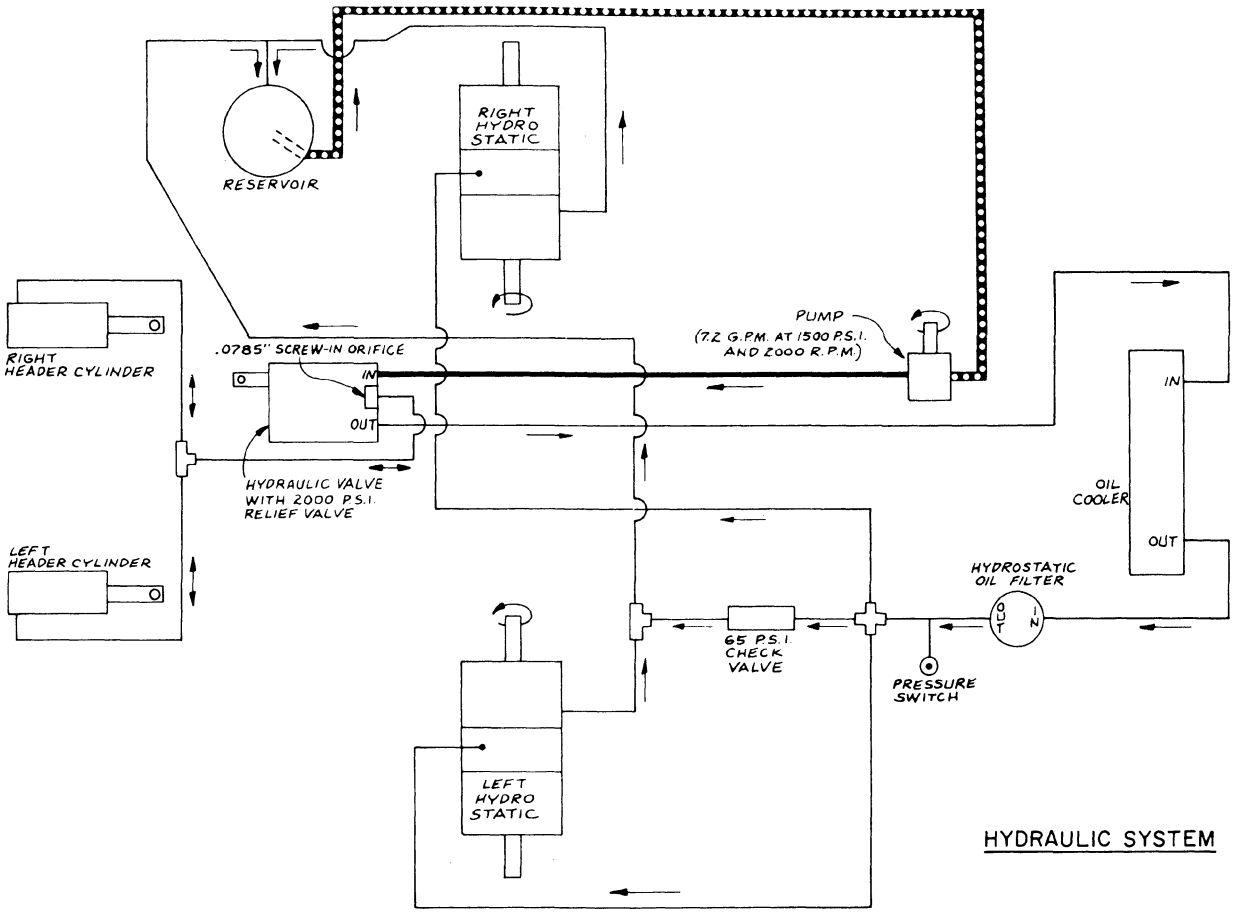
SOME PICTURES IN THIS MANUAL SHOW SAFETY SHIELDS REMOVED OR OPEN TO SHOW PARTS BEING SERVICED OR FOR CLARITY. ALL SHIELDS SHOULD BE CLOSED OR REPLACED PRIOR TO OPERATING THE MACHINE.

HYDRAULIC SYSTEM



MODEL 912, 1112, 1114 SPEEDROWER®

FIGURE 1



MODEL 1100 SPEEDROWER®
MODEL 1495 HAYBINE®

FIGURE 2

One reservoir is used for the hydraulic system and for the hydrostatic transmissions. Oil supplied by the hydraulic pump raises the header and also cools and refills the hydrostatic transmissions.

All oil from the pump goes to the hydraulic valve. If the valve spool (header lift pedal) is centered, all oil goes from the valve to the filter, oil cooler, and to the hydrostatic transmissions and reservoir.

If the back of the header lift pedal is pressed, the spool moves out of the valve body and all oil from the pump goes to the hydraulic cylinders to lift the header. During the lift cycle, no additional cooling and refilling oil goes to the hydrostatic transmissions. However, oil in the hoses and cooler will remain under some pressure for a short while so transmissions will not be damaged by normal use of the header lift system. *ATTENTION: If the valve spool (pedal) is held off-center by the operator, or by binding linkage, the oil may heat and the pump, valve or transmissions may be damaged.*

OIL FLOW IN THE TRANSMISSION

Figure 3 shows a complete Cessna hydrostatic transmission.

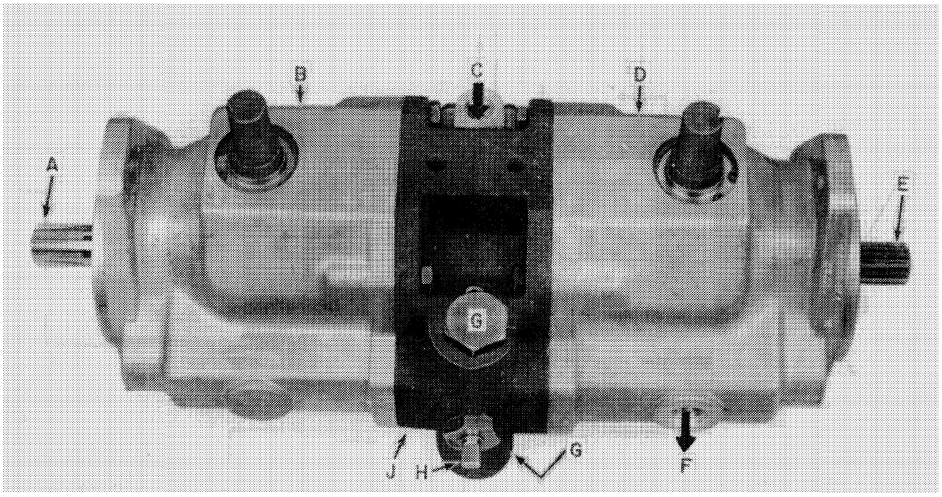


FIGURE 3

A. Motor shaft (tapered splines)
B. Motor housing (no drain port)
C. Charge port
D. Pump housing
E. Pump shaft (straight splines)
F. Case drain port
G. Relief valve and seat (two)
H. Winching valve
J. Valve plate

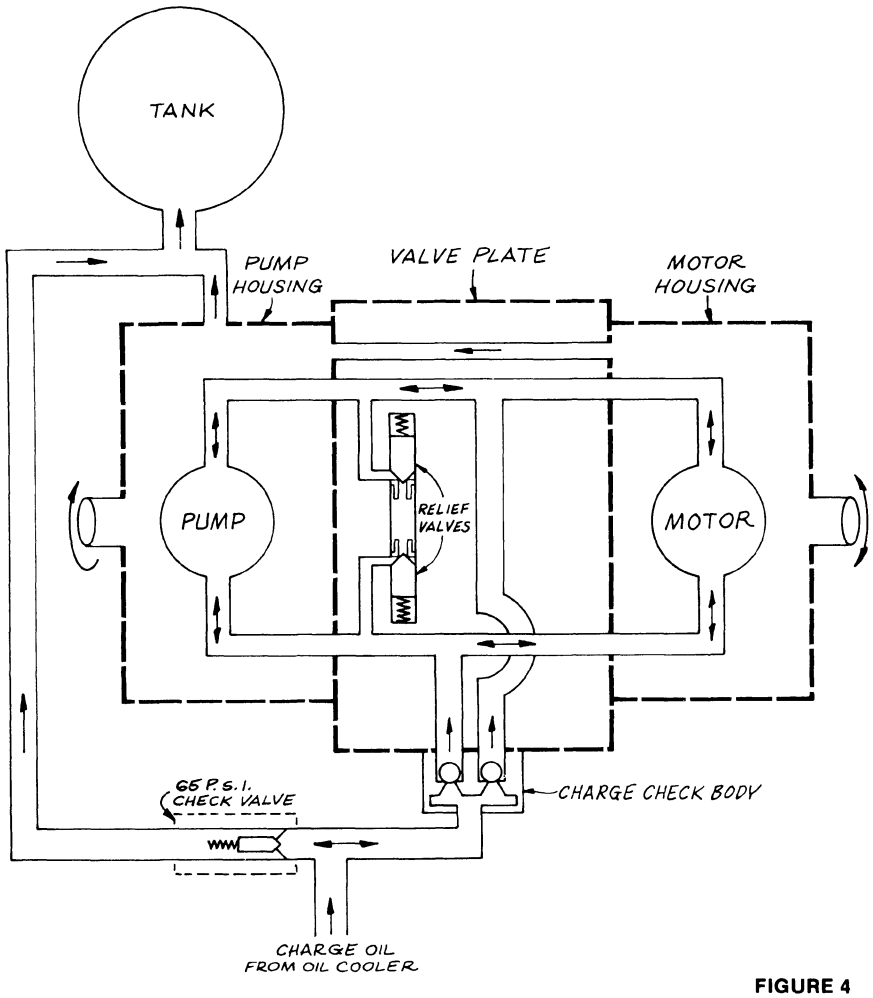


FIGURE 4

(a) The Closed Loop

Each transmission has a pump and a motor connected by a valve plate, shown by the heavy dotted lines in Figure 4. Valve plate oil passages (ports) carry **high** pressure oil from pump to motor. Other ports in the valve plate carry **low** pressure return oil from motor back to the pump, to complete the "closed loop" of oil flow in EACH transmission.

Controls on the operator's platform can be used to adjust volume (gallons per minute) and direction of oil flow between pump and motor. These adjustments provide forward, neutral, and reverse and continuous adjustment of the motor shafts and machine drive wheels speeds.

(b) Charge Oil

Normal working clearances between moving parts in the pump and in the motor allow a **small** amount of oil from the closed loop to leak into the pump and motor housings. This lost oil flows from motor housing to pump housing, through the case drain port in the pump housing, and back to the reservoir.

Oil lost from the closed loop must be replaced by adding charge oil to the transmissions. See Figure 4. Low pressure oil from the oil cooler flows through charge hoses to the charge check body on the valve plate of each transmission. When oil pressure in the top or bottom half of the closed loop falls below the charge pressure, a ball check valve opens and charge oil enters the **low pressure side** of the closed loop. When charge and low side pressures are equal, extra charge oil will open the 65 psi check valve and return to the reservoir (tank). The 65 psi check valve insures that both pump and motor are filled with oil and protected from wear.

Special shuttle valves in the Cessna valve plates allow some extra oil to drain from the **low pressure side** of the closed loop. This oil is replaced by additional charge oil from the cooler to keep the closed loop oil temperatures down within limits.

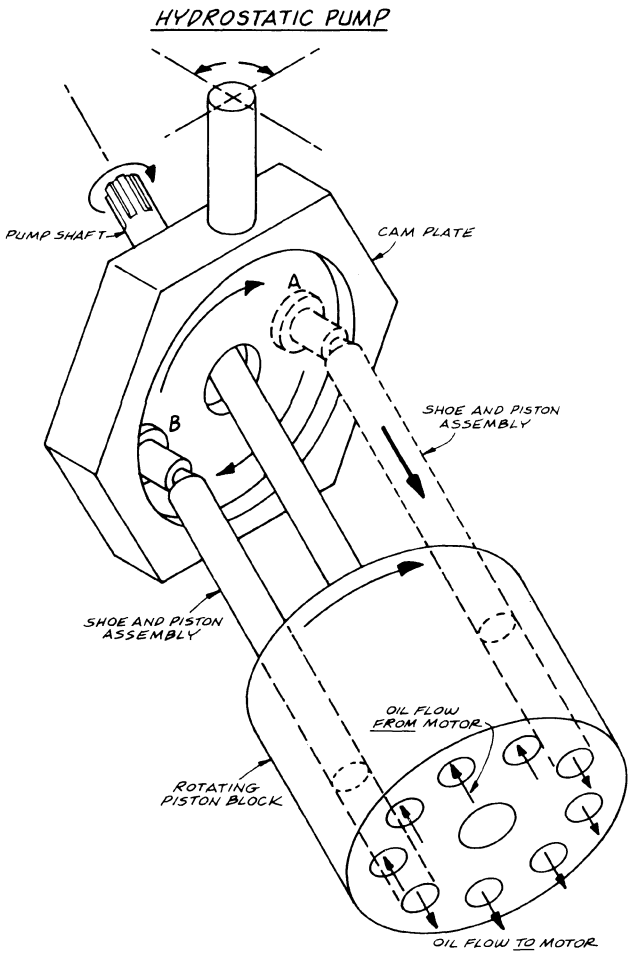


FIGURE 5

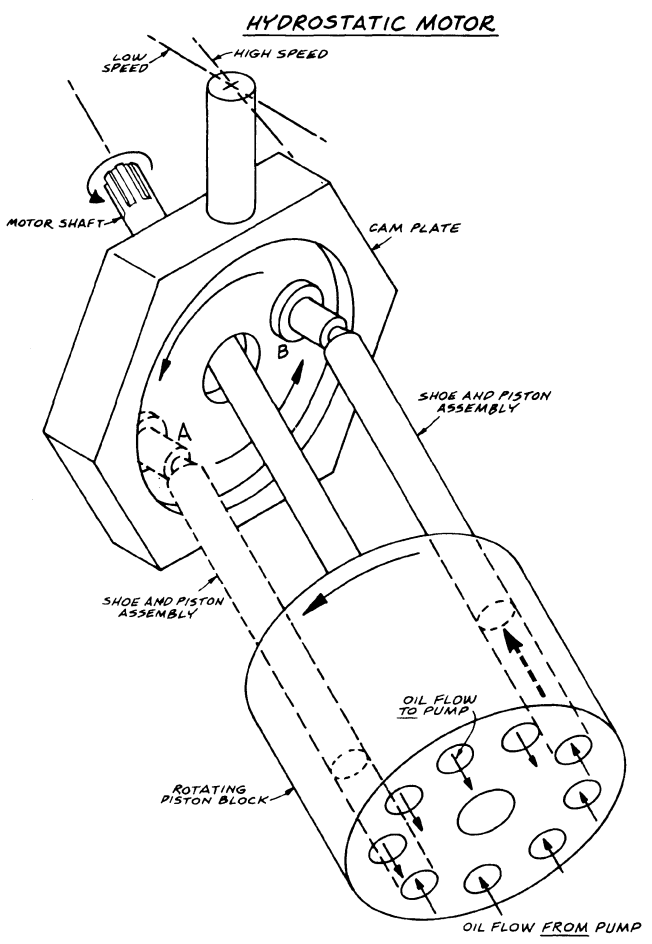


FIGURE 6

(c) Relief Valves

Figure 4 shows two relief valves which connect the top and bottom halves of the closed loop. If the drive wheels are loaded down (as in soft fields), pressure in one side of the closed loop increases. When this pressure increases enough, the relief valve on this high pressure side opens. Then **high** pressure oil flows through the valve plate and opens the other valve and seat and returns to the pump intake (low pressure side of closed loop). When the relief valves are open, the motor stalls and the wheel stops turning. The relief valves close when pressure in the **high** pressure side of the closed loop drops below the relief valve pressure setting.

OIL FLOW IN THE HYDROSTATIC PUMP (Figure 5)

When the engine is running, the pump shaft, rotating block, and nine shoe and piston assemblies rotate as one unit. The shoes rest on the flat surface of the cam plate. If the cam plate surface is at a right angle to the pump shaft, the pistons will not move in and out of the rotating block. No oil will be pumped to the motor. The transmission is in **neutral**, and there is no power to turn the drive wheels.

The operator can turn the cam plate so it is at an angle to the pump shaft, Figure 5. As pump shaft and rotating block turn, shoes move from A to B, Figure 5. The angle of the cam plate forces the shoes and pistons toward the rotating block, and oil is forced out of the bottom cylinders in the rotating block to the motor. Oil from the motor returns through the closed loop and fills the cylinders in the top half of the rotating block.

If the cam plate is turned to the opposite angle to the pump shaft, oil will be forced out of the top cylinders in the rotating block. The hydrostatic motor and drive wheel will reverse.

As the angle between cam plate and pump shaft increases, shoes and pistons move farther in the rotating block. More oil flows from pump to motor, and the motor shaft and drive wheel turn faster.

OIL FLOW IN THE HYDROSTATIC MOTOR (Figure 6)

Oil from the hydrostatic pump flows through the high pressure side of the closed loop to reach the motor. Oil forces the pistons and shoes out of the rotating block. If oil enters the bottom cylinders, the angle of the cam plate causes the shoe and piston to move from A to B, Figure 6. The rotating body and motor shaft turn in the direction of the arrows.

Reversing the flow of oil from the pump causes the motor shaft to reverse direction.

If the cam plate is moved to be more nearly square with the motor shaft, pistons will not move as far in the rotating body. Less oil will be displaced with each piston stroke. Then motor speed will increase even though flow (gpm) from the pump does not change. The transmission will be in high range.

The motor cam plate will always be at an angle to the motor shaft.

OIL FLOW IN THE VALVE PLATE

(a) Charging the Transmission

(1) Two curved oil passages through the valve plate connect the cylinders in the rotating piston block of the pump with those in the motor block. These passages are called kidney ports. See Figure 7. Each kidney port is also open to a shuttle valve, relief valve, and charge check valve. When the machine is moving, one of the kidney ports will be in the **high** pressure side of the closed loop. The other kidney port will be in the **low** pressure side.

(2) When the engine and main hydraulic pump are running, charge oil can enter the charge port and charge check valves. If the transmission is in neutral, the charge oil can flow into the kidney ports and cylinders in the rotating piston blocks. After the kidney ports and cylinders are filled and pressure in both sides of the closed loop reaches 65 psi, excess charge oil will open the 65 psi check valve and return to the reservoir. See Figures 1, 2 and 4.

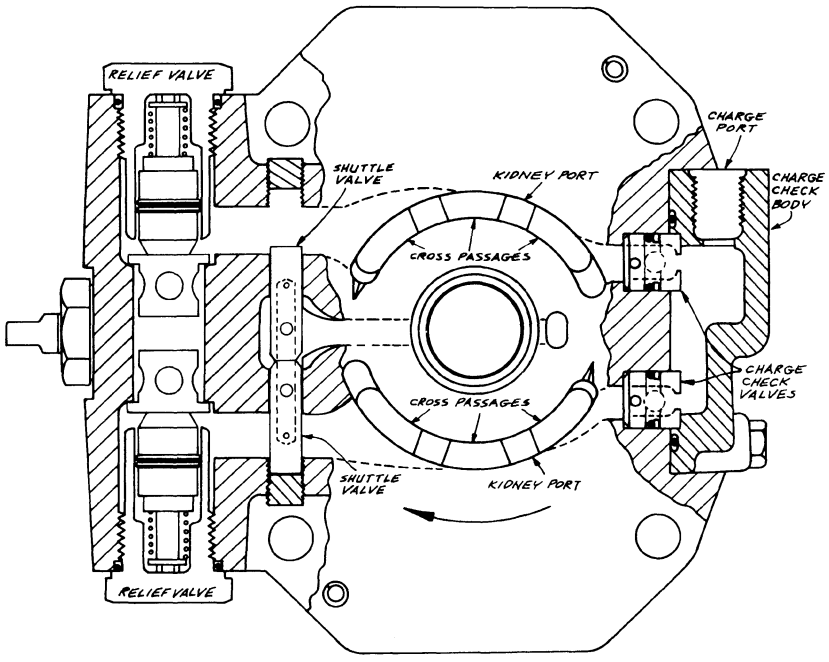


FIGURE 7

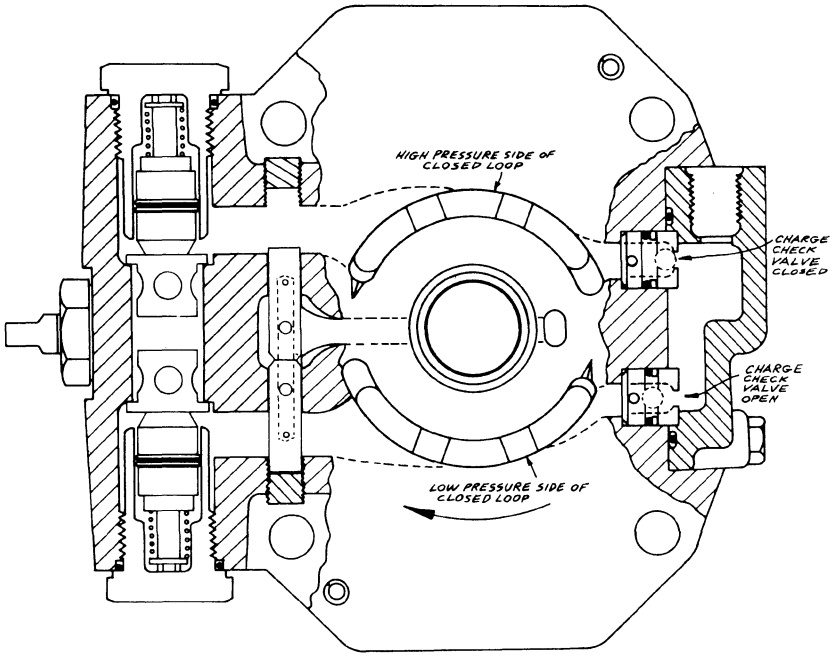


FIGURE 8

(3) When the operator moves the controls to turn the pump cam plate, pressure builds up in one side of the closed loop. The charge check valve on that side closes. Charge oil will enter the other charge valve and maintain the 65 psi pressure in the **low** pressure side of the closed loop. See Figure 8.

(4) If the operator moves the controls (pump cam plate) in the other direction, the opposite side of the closed loop becomes the high pressure side. The other check valve can open to charge oil to keep the closed loop filled. See Figure 9.

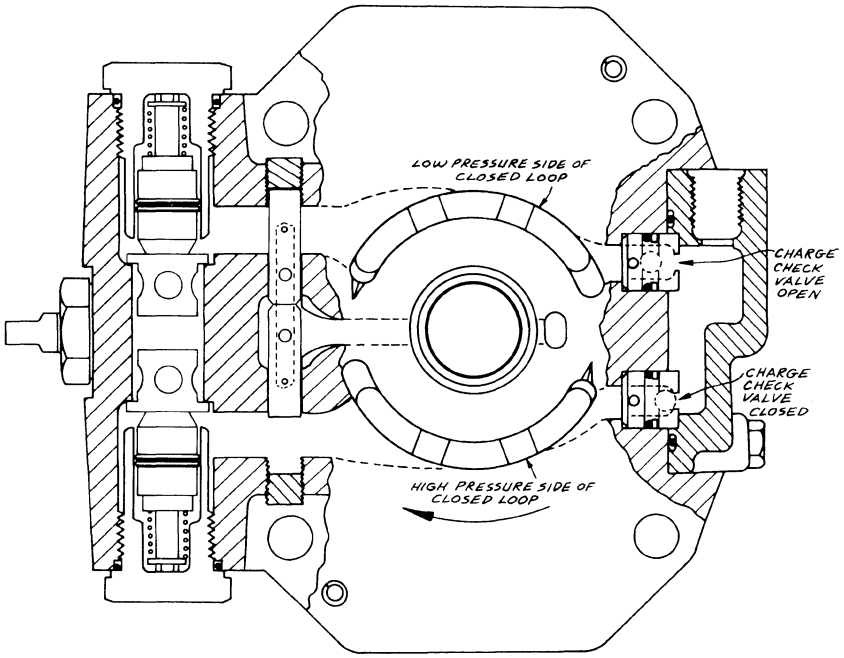


FIGURE 9

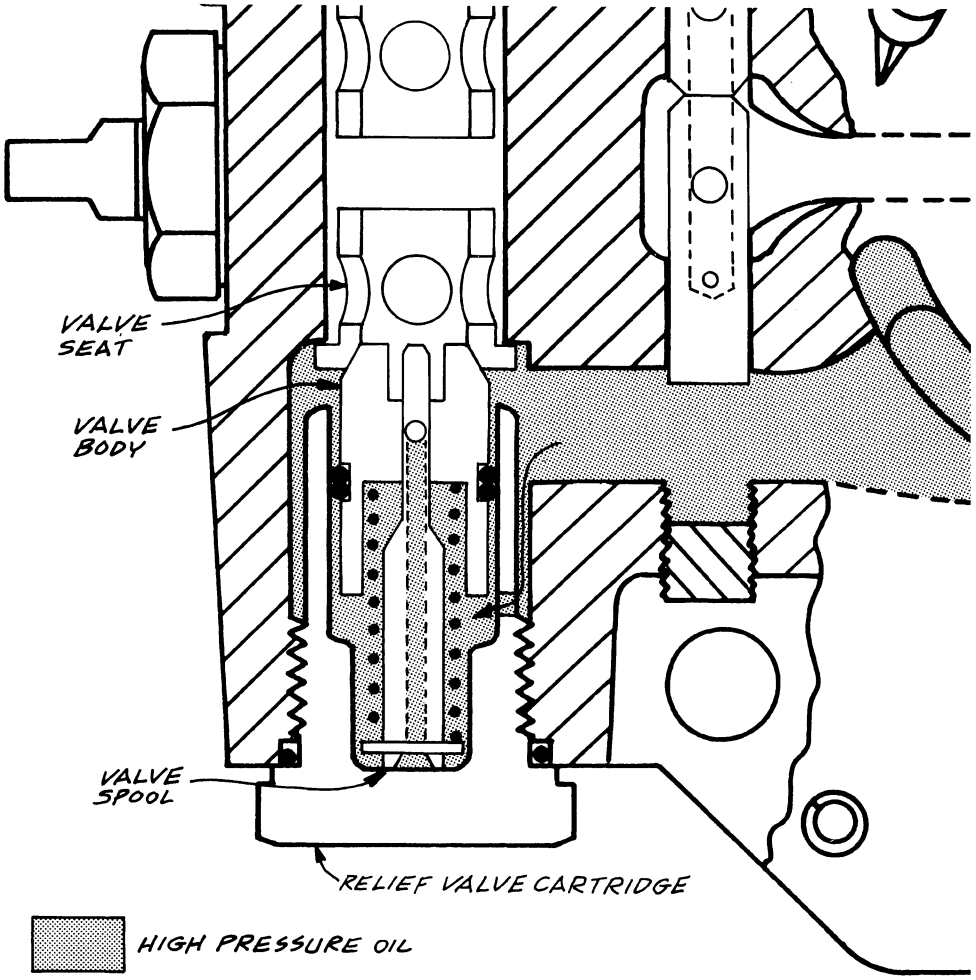


FIGURE 10

(b) Relief Valve Operation

(1) When the machine goes onto soft ground, up grade, or over obstacles, pressure will increase above normal in the **high** pressure side of the closed loop.

(2) Oil from the closed loop enters the relief valve cartridge through a small hole at the end of the threads. This internal oil exerts pressure on the relief valve body and spool, Figure 10. Pressure of this **internal** oil (plus force of the valve spring) balances the pressure of oil on the **outside** of the valve. The body is held against the seat in normal operation.

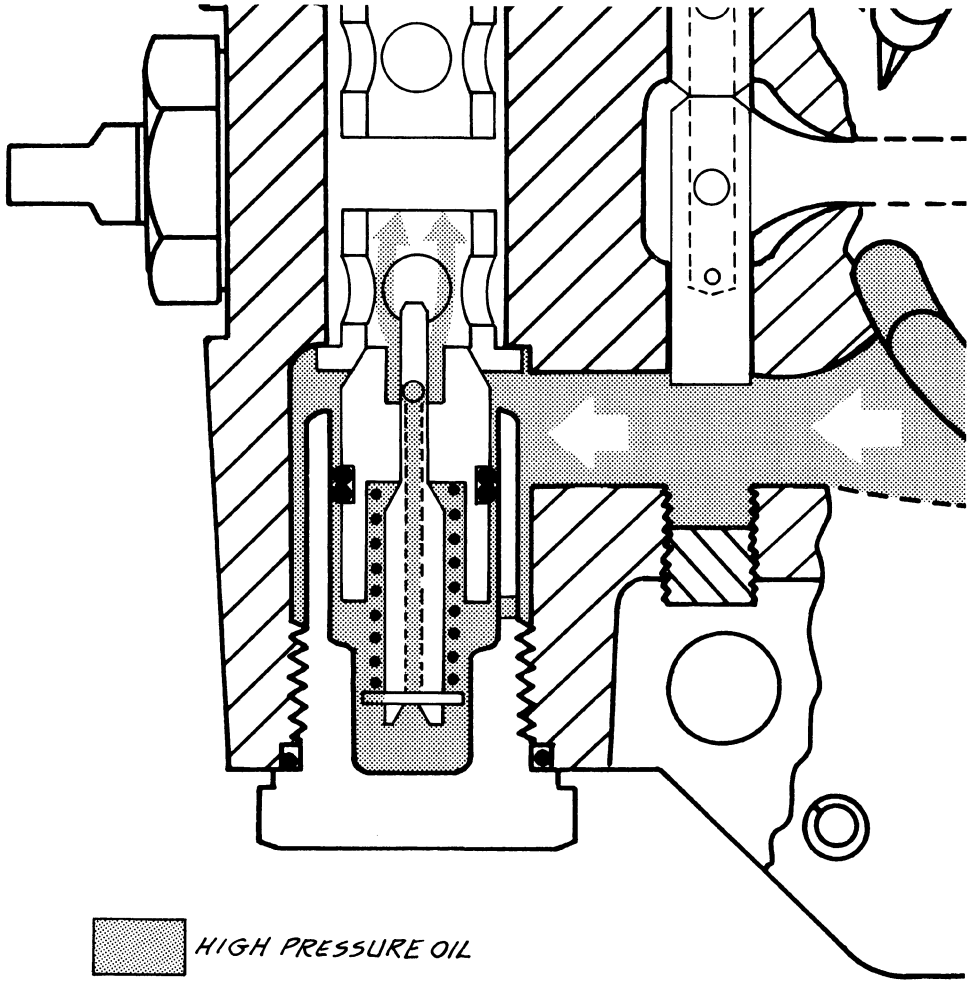


FIGURE 11

(3) As pressure increases in the **high** side of the closed loop, the valve spool is forced in toward the seat, Figure 11. If pressure in the high side equals or exceeds the relief valve setting (4,350 psi), a small port in the spool opens. This hole is **larger** than the hole in the cartridge.

Oil will flow out of the interior of the valve spool faster than it can flow in through the small cartridge hole. This reduces pressure **inside** the valve to less than the pressure in the **high** side of the closed loop.

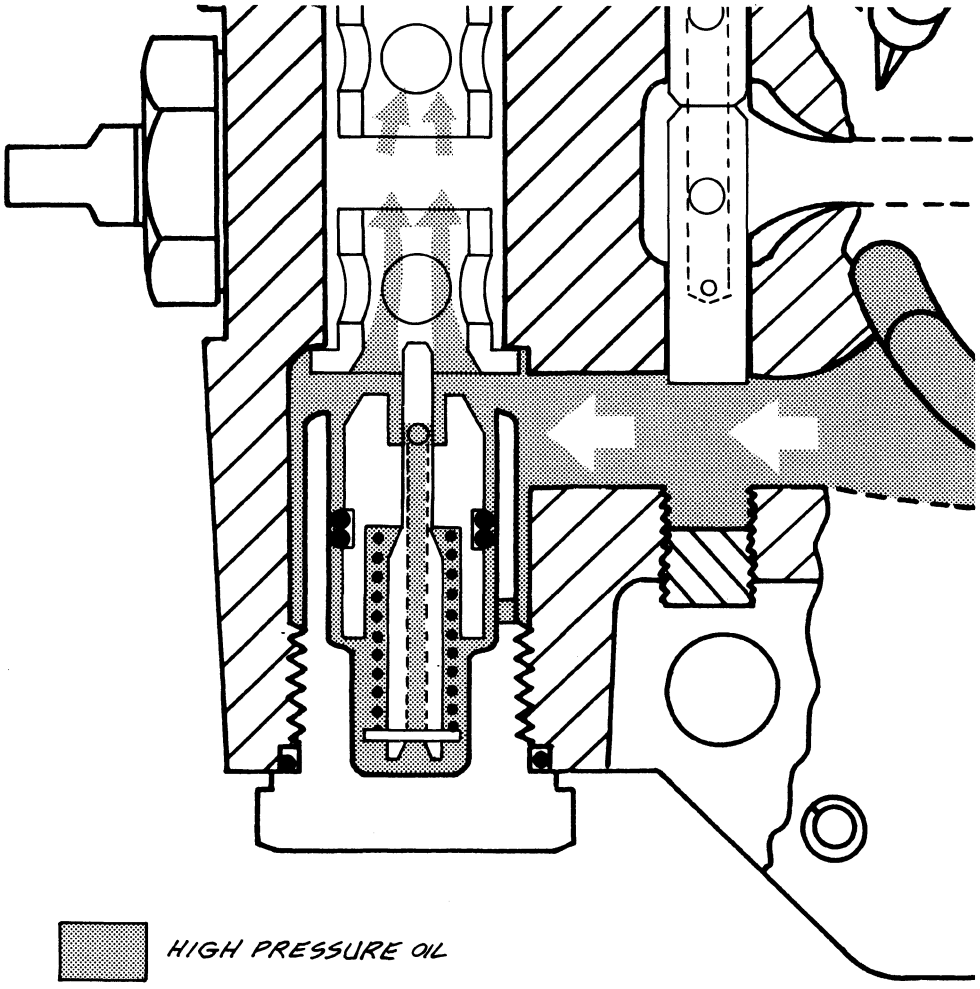


FIGURE 12

(4) High pressure oil in the closed loop forces the valve body off the seat, Figure 12.

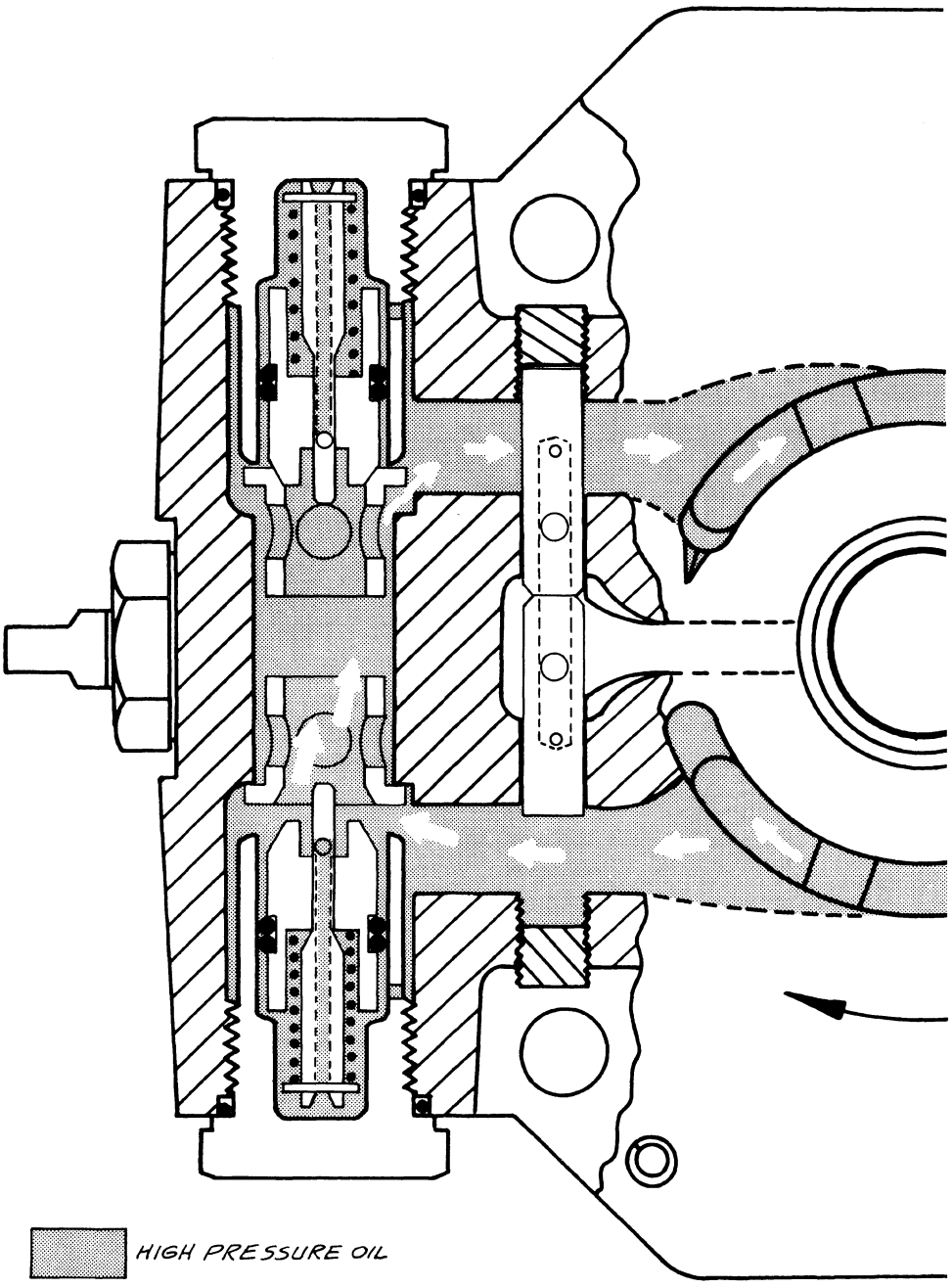


FIGURE 13

(5) Oil flows through the relief valve passage and lifts the opposite seat and valve, Figure 13.

(6) High pressure oil flows through both relief valves and enters the low pressure side of the closed loop. Oil will continue to flow from pump to valve block and back to pump, without turning the motor, until the high pressure is reduced. (Reducing load on the drive wheels or moving the pump cam plate to neutral will reduce pressure so the relief valves can close.)

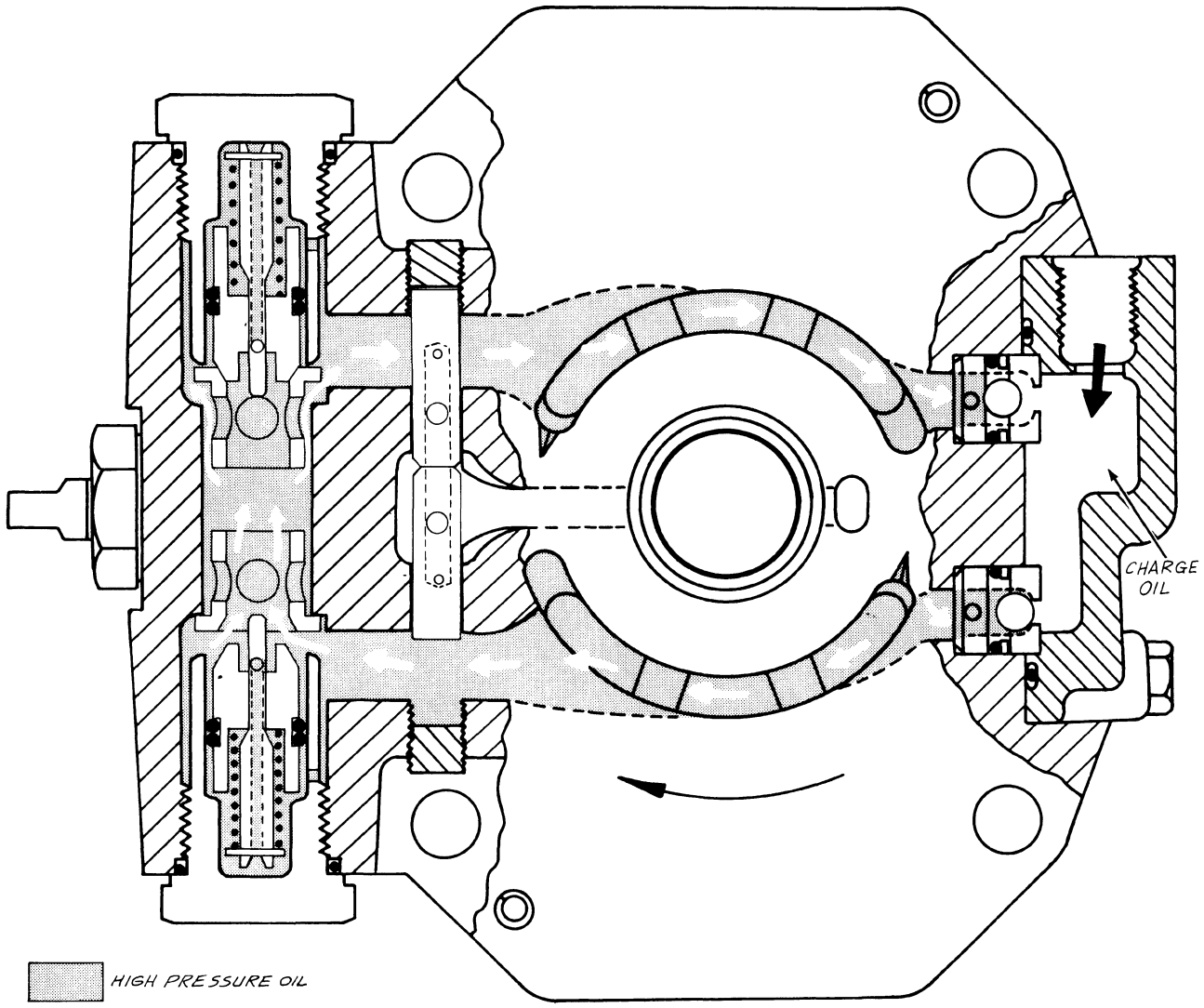


FIGURE 14

(7) Charge oil can still enter the closed loop to keep it filled and cause cooling, Figure 14. Bypassing the relief valve for long periods can overheat and damage the transmissions.

Additional information is shown in Test 5A, "Check Relief Valves", in another section of this manual.

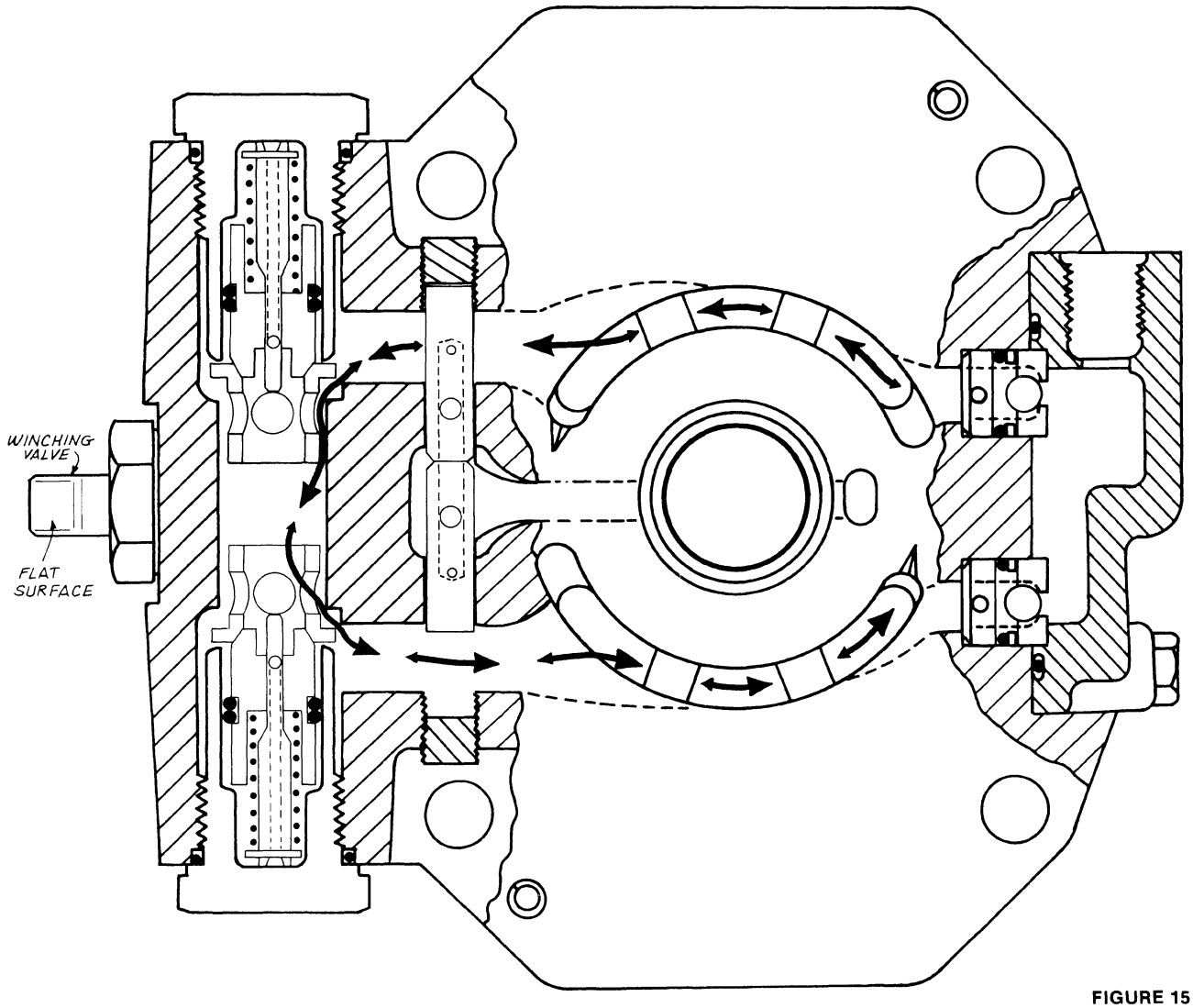


FIGURE 15

(c) Winching Valve Operation (Figure 15)

The winching valve on the front or back of the valve plate opens both relief valves so a machine can be loaded on a truck or trailer without the engine running. The valves could also be used when moving the machine into or out of the shop.

ATTENTION: The winching valve must never be used to provide free-wheeling for towing the machine on the highway. Overheating or major damage to the transmission will result.

DANGER: THE WINCHING VALVE MUST NEVER BE TURNED WITH THE ENGINE RUNNING.

With engine shut off and parking brake engaged, use a wrench or pliers to turn the winching valve so the flat surfaces are vertical. See Figure 15. Release the parking brake.

With both relief valves unseated, oil pressure cannot build up in the closed loop when the hydrostatic motor is turned by the wheels.

DANGER: BE SURE THE ENGINE IS SHUT OFF BEFORE TURNING THE WINCHING VALVES TO THE HORIZONTAL POSITION.

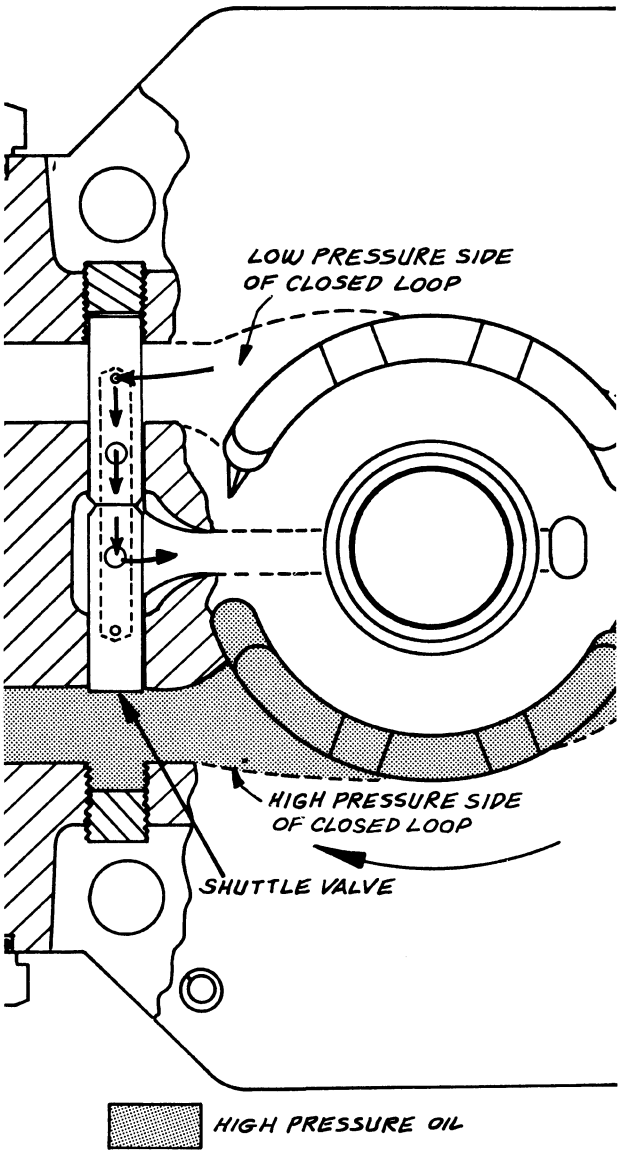


FIGURE 16

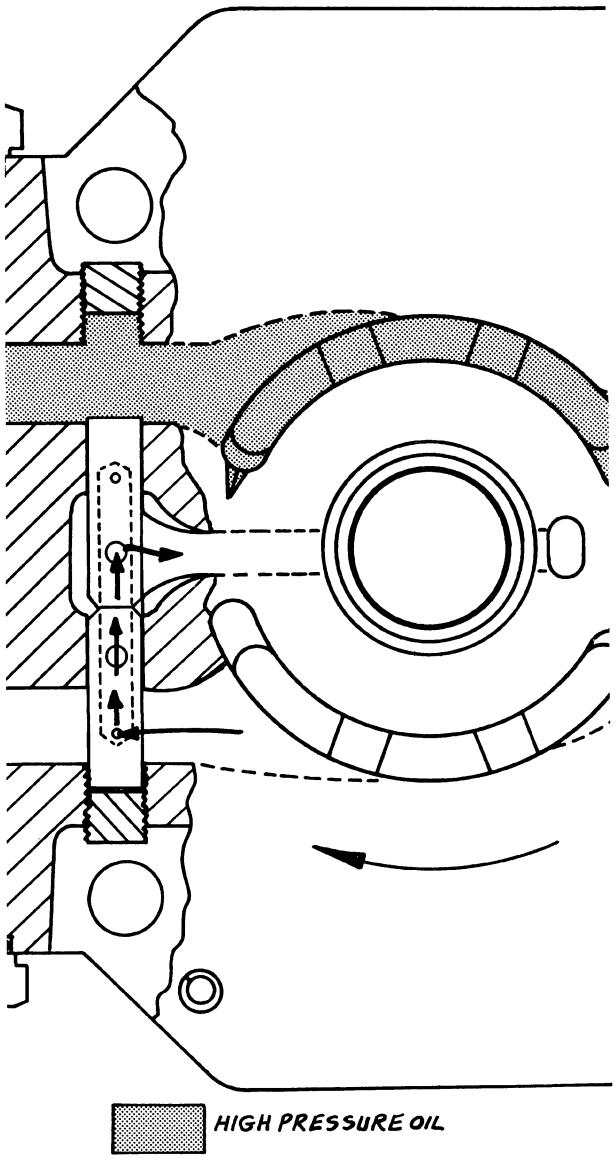


FIGURE 17

(d) Shuttle Valve Operation

High pressure oil in the closed loop causes the shuttle valves to shift up or down in the valve plate. If the valves shift **up**, the small port in the **upper** valve is opened. A small quantity of oil from the **low** pressure side flows through this port into a passage that opens to the pump and motor housings, the case drain port, and to the reservoir. See Figure 16.

If the transmission is running in the opposite direction, the shuttle valves move down and some low pressure oil drains through the lower shuttle valve for cooling. See Figure 17.

Shuttle valves in older windrower transmissions move only by hydrostatic pressure. If these valves do not shift promptly, the transmissions may not shift smoothly from neutral to forward or reverse.

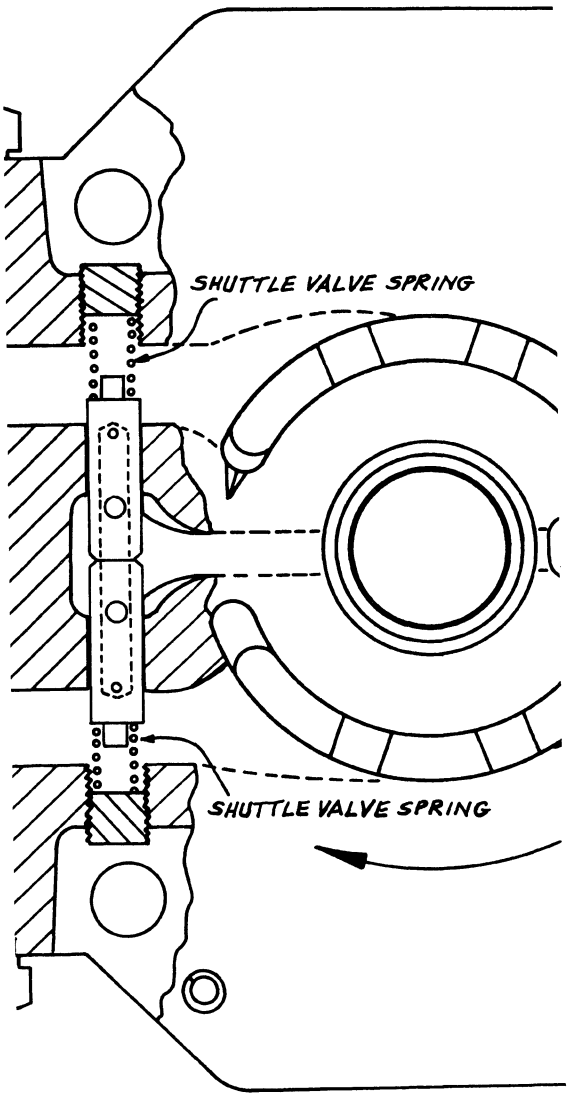


FIGURE 18

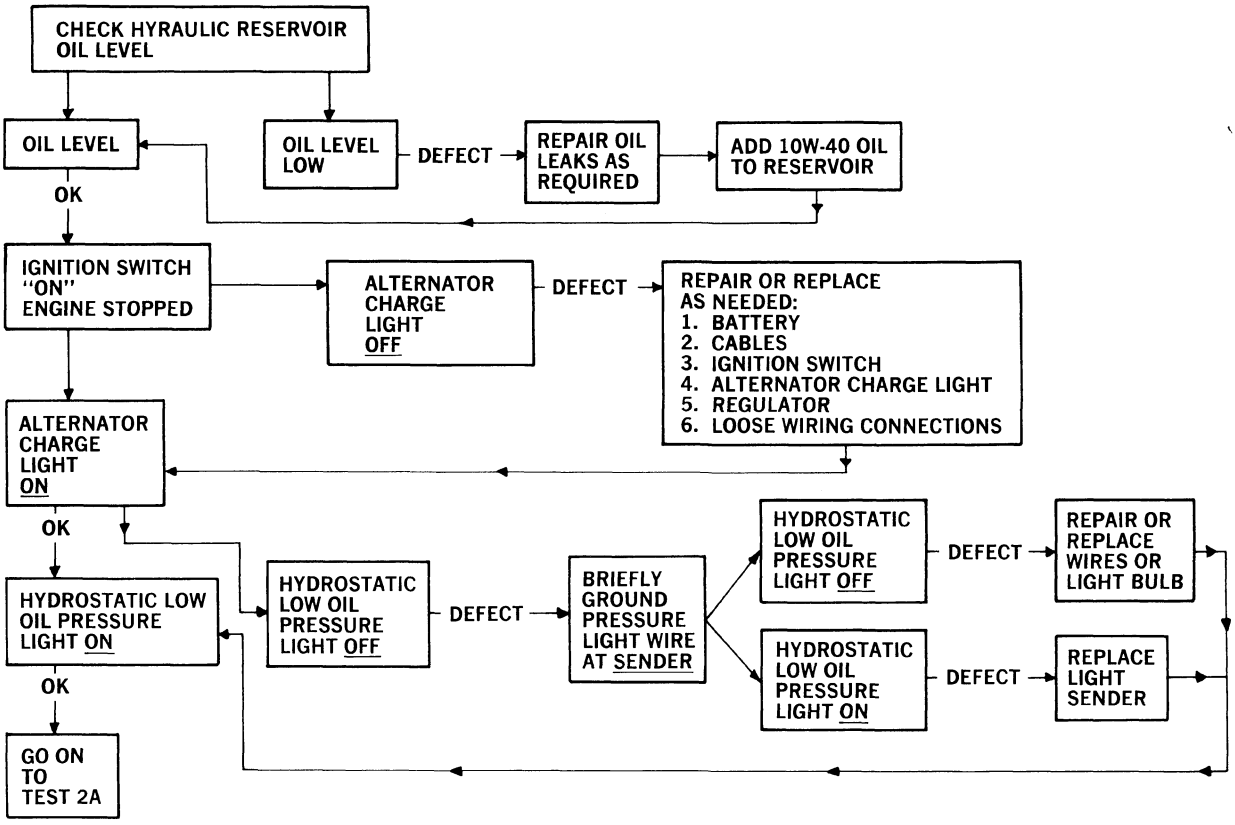
Later windrower and mower-conditioner transmissions have one or both shuttle valves spring-loaded for smooth transmission action near neutral. See Figure 18, which shows a newer transmission in neutral. With no high pressure in either side of the closed loop, the valves are centered by spring pressure.

Additional information is included in the section "Shuttle Valve Plug Leak" in another part of this manual. Also refer to Figures 34 and 35.

TROUBLESHOOTING

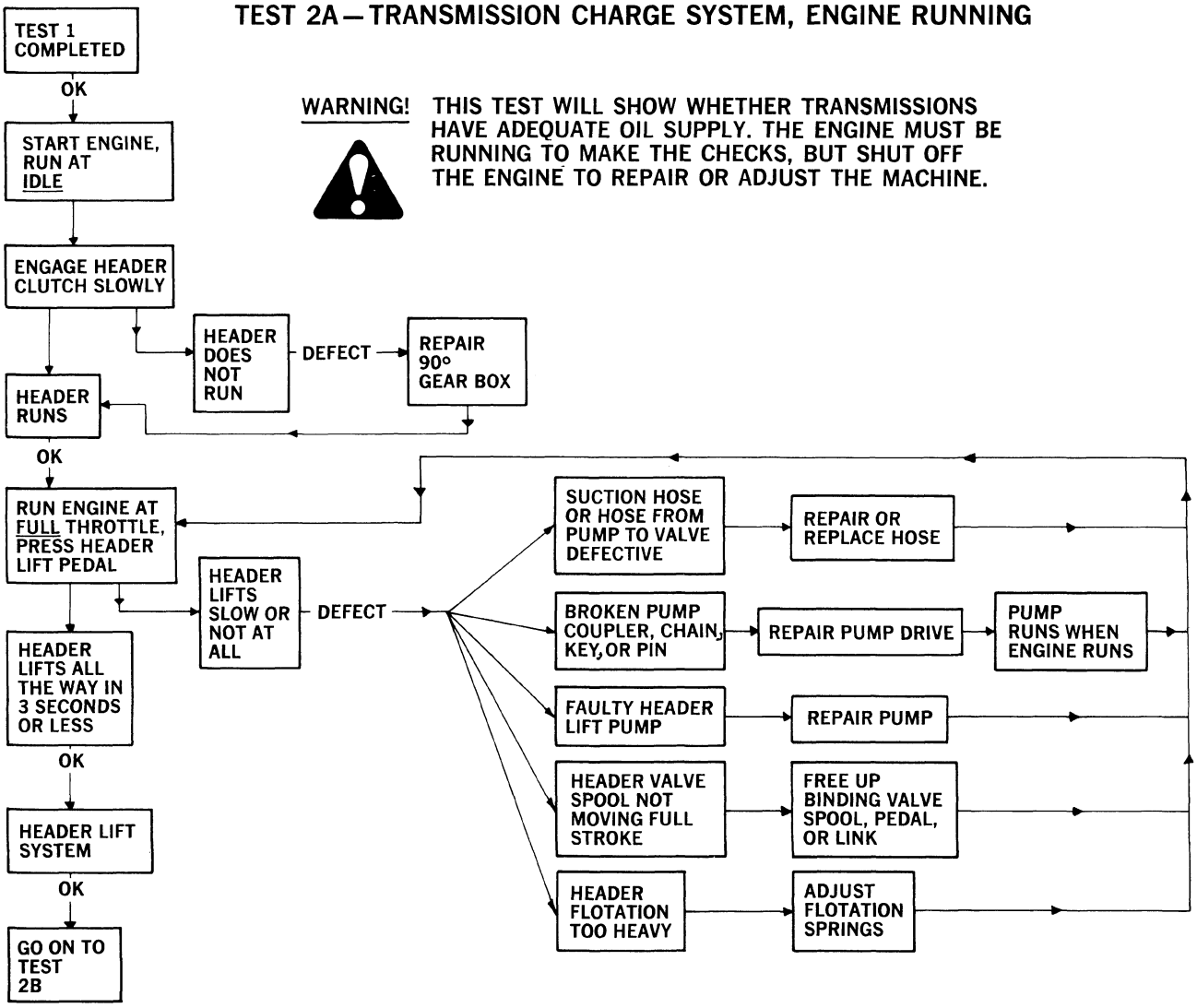
Use the six tests on the following pages to determine whether the transmissions are operating normally. Be sure to make the tests in numerical order. Performing Tests 1, 2A, and 2B first may prevent lack of charge oil from causing additional damage to the transmissions. The tests can be made very quickly if there are no defects.

TEST 1 — CHECK TRANSMISSION CHARGE SYSTEM, ENGINE NOT RUNNING

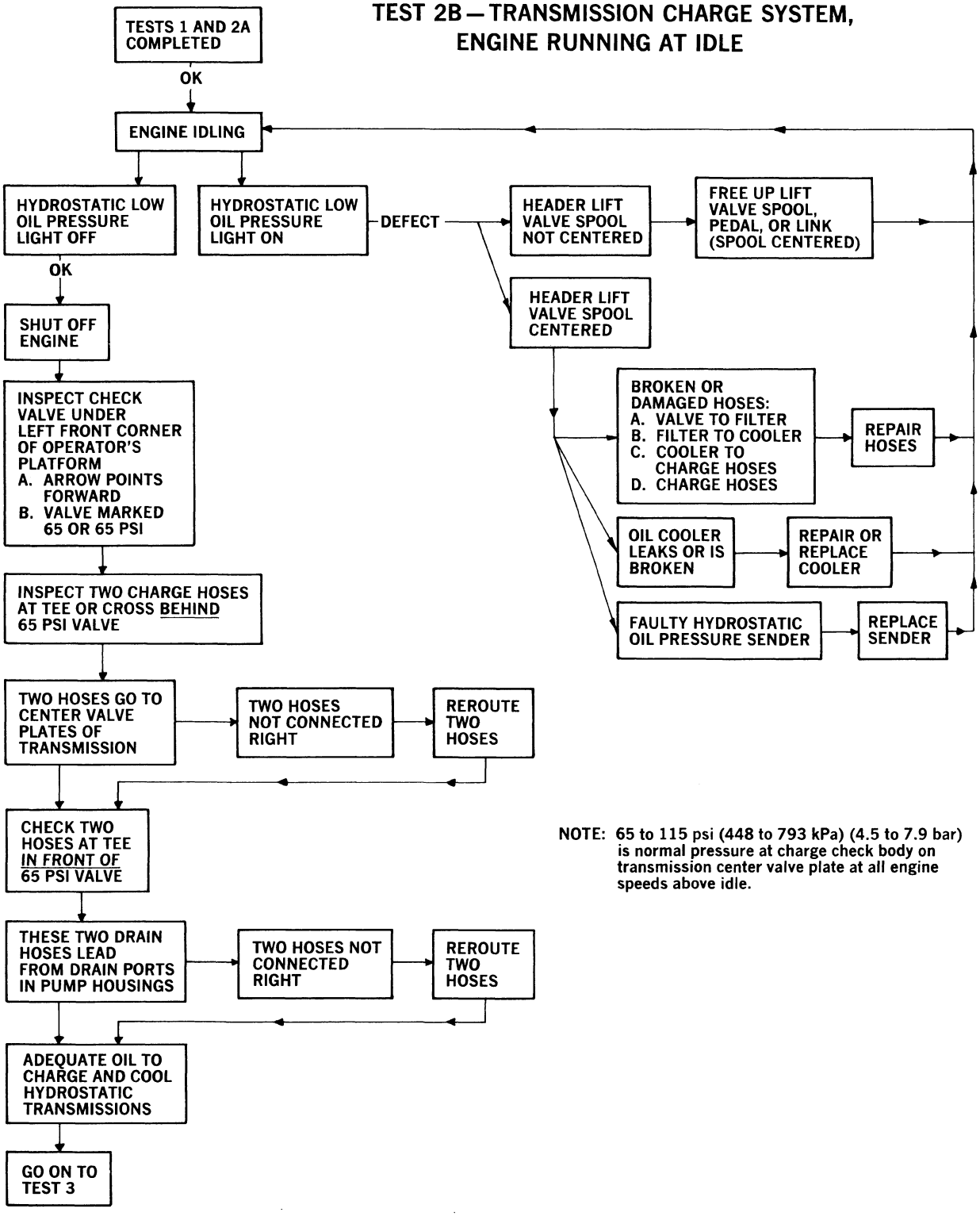


TEST 2A—TRANSMISSION CHARGE SYSTEM, ENGINE RUNNING

WARNING! THIS TEST WILL SHOW WHETHER TRANSMISSIONS HAVE ADEQUATE OIL SUPPLY. THE ENGINE MUST BE RUNNING TO MAKE THE CHECKS, BUT SHUT OFF THE ENGINE TO REPAIR OR ADJUST THE MACHINE.



TEST 2B—TRANSMISSION CHARGE SYSTEM, ENGINE RUNNING AT IDLE



NOTE: 65 to 115 psi (448 to 793 kPa) (4.5 to 7.9 bar) is normal pressure at charge check body on transmission center valve plate at all engine speeds above idle.

TEST 3 - HYDROSTATIC LINKAGE

A. To avoid damage to transmissions, check charge systems (Tests 1, 2A and 2B).

B. Check for the following defects. Repair as needed to keep linkage adjustments from changing under load.

1. Square keys missing from pintle arm clamp blocks (912, 1112, 1114-six keys; 1100, 1495-four keys).
2. Bolts loose in pintle arm clamp blocks. **(NOTE: 912, 1112, 1114 use three clamp bolts on LEFT pump pintle shaft.)**
3. Flat washers missing or loose bolts in slotted holes in linkage shaft bearings. (912, 1112, 1114-five bearings; 1100, 1495-four bearings)
4. Loose nuts on ball joint studs.
5. Loose jam nuts at ball joint housings.
6. Broken welds in hydrostatic linkage (EXAMPLE: Pintle shaft arms).

TEST 4 - TRANSMISSION POWER OUTPUT

CAUTION: BEFORE STARTING THIS TEST, ALLOW ROOM FOR THE MACHINE TO TURN. BEFORE STARTING THE ENGINE MAKE SURE NO ONE IS STANDING NEAR THE MACHINE. IF EITHER TRANSMISSION IS WORN OR LOW ON POWER, THE MACHINE WILL TRY TO TURN TO THAT SIDE AS THE LOAD INCREASES. BE PREPARED TO STOP.

A. Run the test with:

1. High-low range lever latched down in low.
2. Engine running full throttle.
3. Parking brake off.
4. Speed control lever moved forward and steering wheel turned as needed to go straight ahead.

B. Load the transmissions by:

1. Driving up a short, steep grade.

OR

2. Placing 4" (100 mm) high blocks tight against the front of the drive wheels. Try to drive up onto the blocks. **NOTE: If the header is installed, 6" (150 mm) blocks may be too high, and the relief valves will open before the machine will move up on the blocks.**

C. Repeat step B, backing up the grade or over the blocks.

D. If either transmission (drive wheel) has no power in either forward or reverse, check as follows:

1. Models 912, 1112, 1114: If the drive wheel does not turn when the hydrostatic motor U-joint turns, the problem is in the final drive.
2. Models 1100, 1495: If the parking brake drum on the final drive turns, but the drive wheel does not, the problem is in the final drive.

E. If either transmission lacks power in forward or reverse, see "Check Relief Valves", Test 5A. Check the final drives for oil leaks, unusual noise, binding gears or chains, to be sure the final drives are not putting excessive loads on the hydrostatic transmissions.

F. **NOTE: Some worn transmissions may have adequate power in reverse but not in forward. The speed control lever may be at the end of the reverse slot before early model windrowers develop full reverse power.**

TEST 5A - CHECK RELIEF VALVES

CESSNA HYDROSTATIC TRANSMISSION RELIEF VALVE LOCATION

	Models 912, 1112, 1114	Model 1100, 1495	Skid-Steer Loader Models L-35, L-775 L-778, and L-779
Top relief valve	Reverse	Forward	Forward
Bottom relief valve	Forward	Reverse	Reverse

ATTENTION: The ports in the transmissions are not suitable for installing a pressure gauge to check the relief valves. Usually these valves work correctly, or else not at all.

A. If Test 4 shows that either transmission lacks power, check relief valves before overhauling transmissions.

B. Two relief valves in each transmission limit pressure in the high side of the closed loop to 4250 to 4350 psi (29,304 to 29,993 kPa) (300 bar). See Figures 3 and 19. One relief valve is for forward. The other is for reverse.

C. *ATTENTION: Cessna transmission relief valves are sold and must only be serviced as a matched set of valve and seat. If a valve is removed, the seat must be removed and kept with the valve. When installing a new relief valve, install the new seat with it. See Figure 19.*

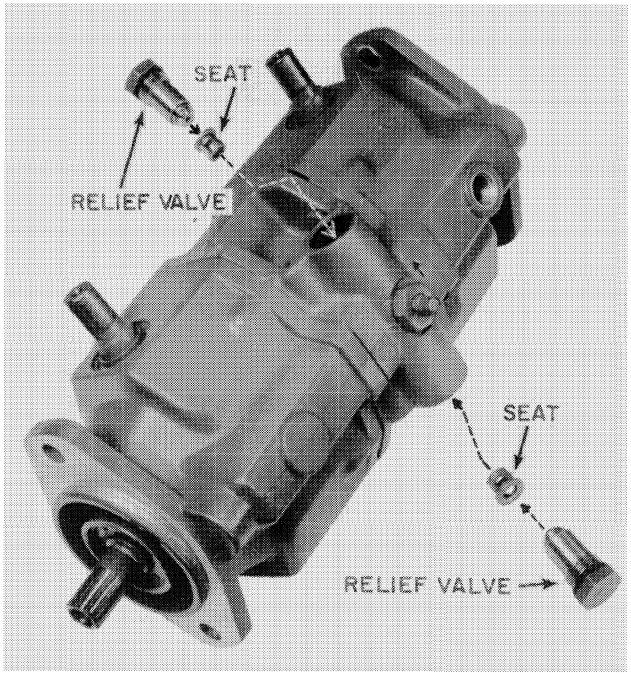


FIGURE 19

CAUTION: IF TRANSMISSIONS HAVE BEEN UNDER LOAD OR BYPASSING, THE OIL MAY BE QUITE HOT. USE CAUTION WHEN REMOVING VALVES.

Relief valve pressure is factory-set. Do not readjust or tamper with it.

Clean outside of transmissions before removing valves. A small amount of oil will be lost when replacing valves. Add oil to the reservoir as needed.

D. 1. If Test 4 shows one transmission with low power output in **one** direction, switch top and bottom relief valves (with seats) in that transmission.

2. Repeat Test 4. If symptoms are reversed, one relief valve is not working right.

EXAMPLE:

(a) Model 1112 windrower, no forward power on left side, normal reverse power on left side.

(b) Switch top and bottom relief valves (and seats) in left transmission.

(c) Repeat Test 4. Have normal forward power on left side, but now have no reverse power on left side.

(d) Probably the left reverse relief valve (top side) is not working properly. Inspect and service (or replace) that relief valve as detailed in Test 5B.

Usually only one relief valve out of four will cause problems at one time.

(e) Repeat Test 4.

(f) If the transmission still has no power output in forward or reverse, overhaul transmission.

NOTE: Dealer Adjustment Requests must list transmission numbers and date codes. Refer to the section of this manual, "Transmission Overhaul".

TEST 5B - RELIEF VALVE SERVICE

Relief valve operation is described in "Oil Flow in the Transmission (c)" and "Oil Flow in the Valve Plate (b)". *IMPORTANT: Relief valves can be easily checked (Test 5A) and serviced (Test B) with transmissions in the machine.*

Figure 20 shows an older style relief valve with a snap ring on the valve spool. This relief valve is replaced by a newer relief valve for production and service of older transmission. The newer relief valve uses a spool WITHOUT a groove and snap ring, Figure 21.

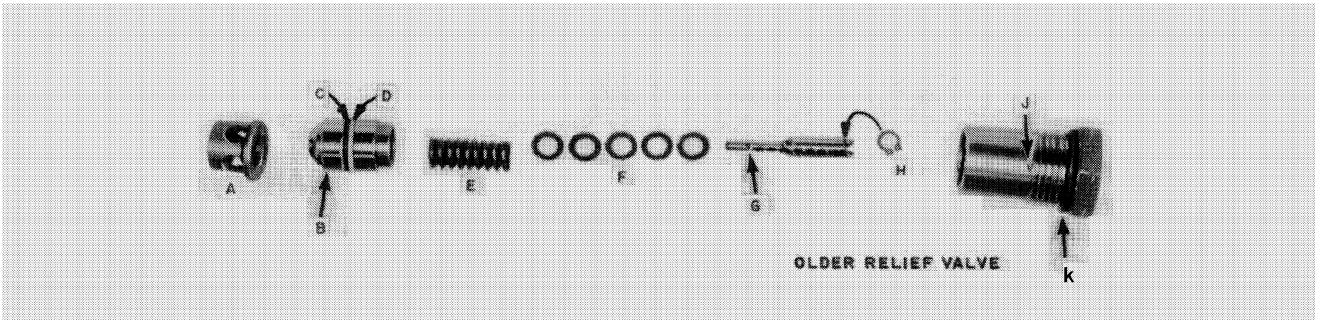


FIGURE 20

A. Valve seat
B. Valve body
C. O-ring
D. Back-up washer
E. Spring
F. Shim washers (As required. Must use at least one.) Do not add or remove shims.
G. Valve spool. Arrow points to oil port. Newer valve uses spool with large head in place of snap ring.
H. Snap ring for large end of spool in older relief valves.
J. Cartridge (arrow points to small oil port)
K. O-ring

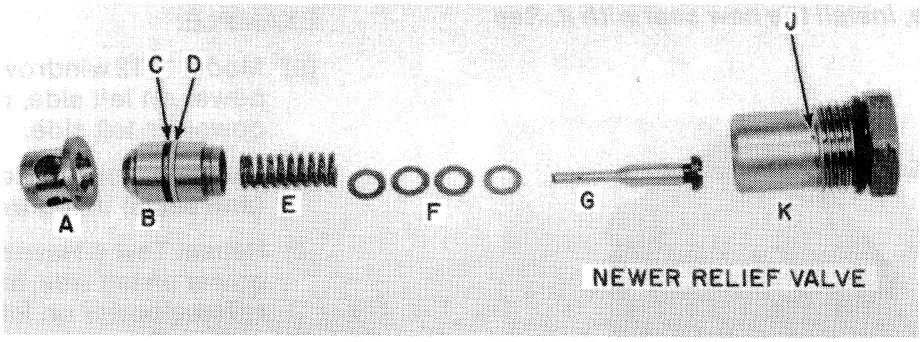


FIGURE 21

INSPECTION

Replace relief valve and seat if any parts are damaged.

1. Seat and valve assemblies must be kept together as matched sets or else pressure settings may change. Mating surfaces of seat and body should not be scratched or burred.
2. Check valve body for damaged O-ring or back-up washer.
3. Number of shims is factory-set. Do not change quantity or try to change pressure setting of valve.
4. Be sure snap ring is seated in spool groove of older relief valves. If the snap ring is out of place, do not try to replace it. Replace the relief valve with the newer style #616015 relief valve. The newer relief valve does not use a snap ring.
5. Make sure passage and small port in valve spool are not plugged. See dotted line, Figure 20.
6. O-rings, K, may be cut when valves are removed from valve plates, but ordinarily they can be reused without leaking.

TEST 6 - CHECK CONTROLS

NOTE: These quick checks will show if the transmissions are adjusted correctly. If they are not, adjust them as detailed in the operator's manual.

A. TEST NEUTRAL SWITCH

1. Turn steering wheel halfway between full left and full right. One spoke of the wheel should point straight back.
2. Place speed control lever in neutral. **NOTE: 1100, 1495: To close the neutral switch, rotate steering wheel slightly so speed control lever moves to right side of neutral slot and neutral switch closes.**
3. Turn on ignition switch. Crank engine. **NOTE: 912, 1112, 1114: Move steering wheel and speed control lever slightly to close the neutral switch. Try cranking again.**
4. **Defect:** Neutral switch will not close. Engine will not crank. Check wiring in neutral switch circuit. Adjust transmission control linkage.

B. TEST NEUTRAL

1. Speed control lever in neutral slot. Steering wheel centered. Engine cranking or running at any speed.

   Defects:

   (a) Front wheels move.

   (b) Transmissions make noise. On machines without neutral lock, turn steering wheel slightly or move speed control lever slightly in neutral slot so wheels do not turn and transmissions are as quiet as possible. Re-check neutral switch setting.

C. CHECK FOR BINDING HYDROSTATIC CONTROLS

1. Drive the machine carefully in low range at half throttle. Defect: Linkage binds. **NOTE: 1100, 1495: To prevent very short, high-speed turns in reverse, the speed control lever cannot move to the back of the reverse slot unless the steering wheel is nearly centered.**

D. CHECK CONTROLS WHEN SPEED IS CHANGED. MODEL 912, 1112, 1114

If the speed control lever is moved forward, the machine will turn slightly to the right. This slight turning is less noticeable on machines with neutral lock. With the speed control lever in the front notch, the steering wheel may have to be turned 30° left to travel straight. When slowing down, turn the wheel back to center. The slight turn is less noticeable if the machine has neutral lock.

E. CHECK SLOW-DOWN WHEN TURNING

The ground speed should decrease if the steering wheel is turned when traveling forward. The wheel on the outside of the turn slows down at a slower rate than the inside wheel. Depending on where the speed control lever is set, the front wheels may even stop or back up if the steering wheel is turned far enough.

F. CHECK TURNING, LEFT AND RIGHT

1. Place speed control lever in fourth notch.
2. Turn steering wheel to **left**, until **left** drive wheel stops. Note position of steering wheel spokes.
3. Turn steering wheel same amount to **right**. If **right** drive wheel does not stop, readjust the hydrostatic linkage.

SPEED CONTROL LEVER VIBRATES (SHAKES)

(MODEL 912, 1112, or 1114 WINDROWER)

PROBLEM

The speed control lever may shake hard enough to jump out of the forward notches. This usually happens at normal cutting speeds during, or just after, a turn.

The operator slows the engine to stop the shaking and then speeds up and continues cutting.

Forces from the transmission pintle shafts move the linkage, causing the lever to shake.

The forces are affected by changing transmission loads, engine or pump speed, and flow of charge oil.

CORRECTION

1. Check hydrostatic charge system by performing Tests 1, 2A and 2B in another section of this manual.
2. Check hydrostatic linkage ball joints. Replace any that are extremely loose.
3. Remove the back cover from the steering column. Check for clearance between the #189233 steering weld assembly and the #181473 steering column. See Figure 22.
4. Install shims as shown to remove as much of the clearance as possible without causing binding when the speed control lever is moved.

   The shims are held in place with the bolts that hold the angles for the neutral switch.
5. Readjust the neutral switch. Replace the back cover.

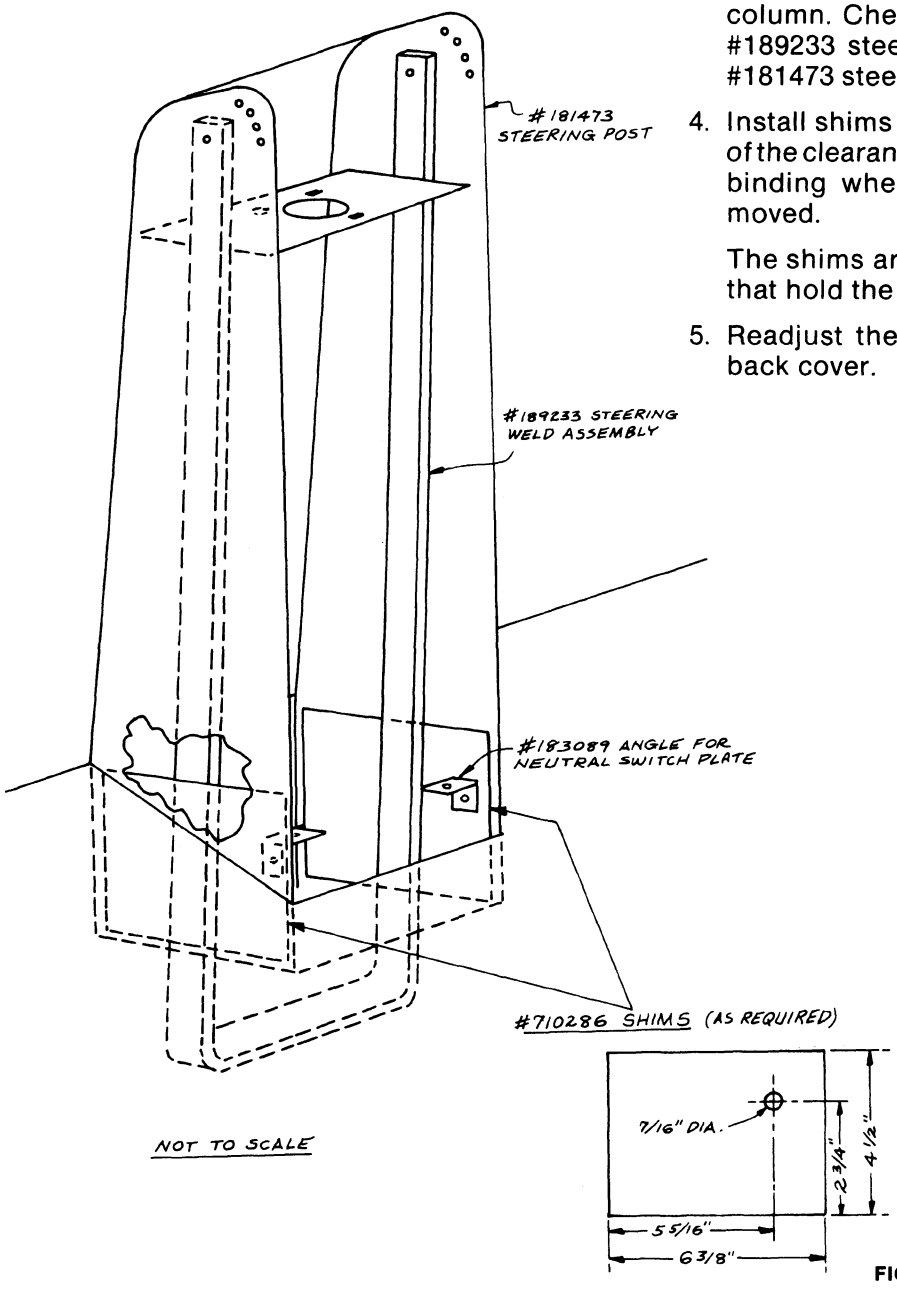


FIGURE 22

REPAIRING TRANSMISSION OIL LEAKS

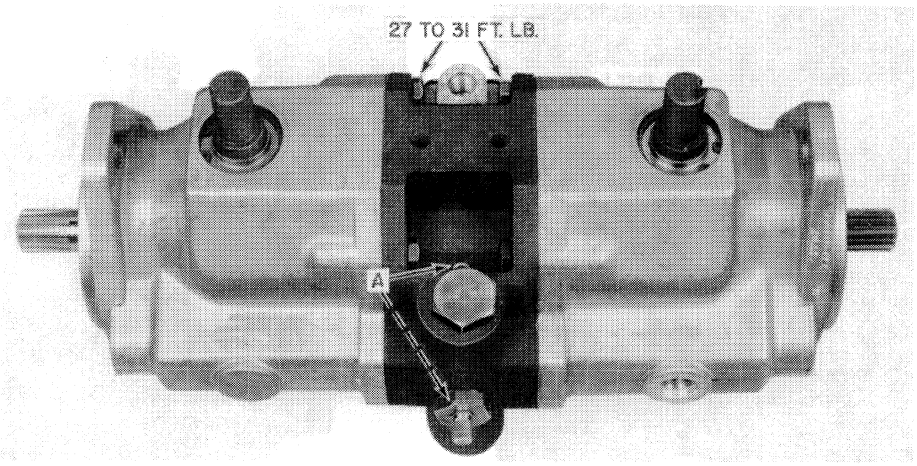


FIGURE 23

A. GASKET LEAK

Oil is leaking between valve plate and motor housing (or pump housing). See Figure 23. Tighten eight bolts in valve plate to 27 to 31 ft. lbs. (37 to 42 N·m). If this does not correct the problem, the transmission must be removed and new gaskets installed. Refer to "Transmission Overhaul" section of this manual.

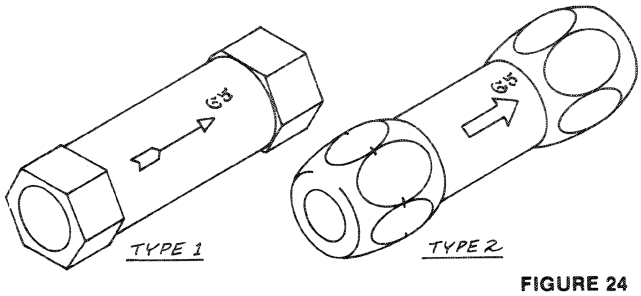


FIGURE 24

B. PINTLE SHAFT LEAK

1. Inspect hydraulic system check valves.
   (a) 65 psi check valve: No. 65 on outside of body indicates valve pressure rating. See Figure 24. On Type 1 valves, only the arrow shows direction of free flow. Type 2 check valves have these arrows and notches on the hex flats at the inlet end.

ATTENTION: All Model 912's, 1112's, 1114's, 1100's and 1495's must have a 65 psi check valve in the system. This valve is below the left front corner of the operator's platform. The arrow on this valve must point forward so oil can flow toward the tank. Figures 25 and 26 show the location of this 65 psi valve in the Models 912 and 1112/1114 respectively.

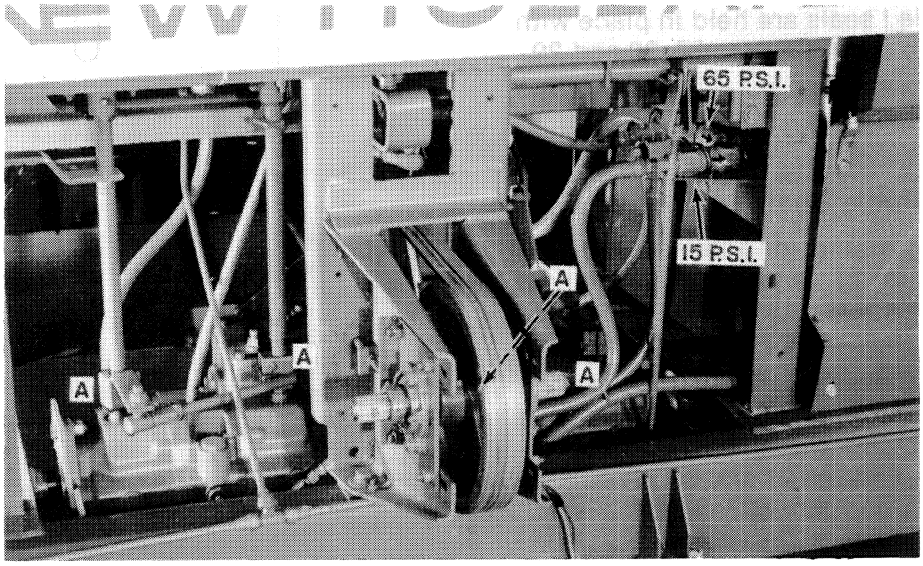


FIGURE 25

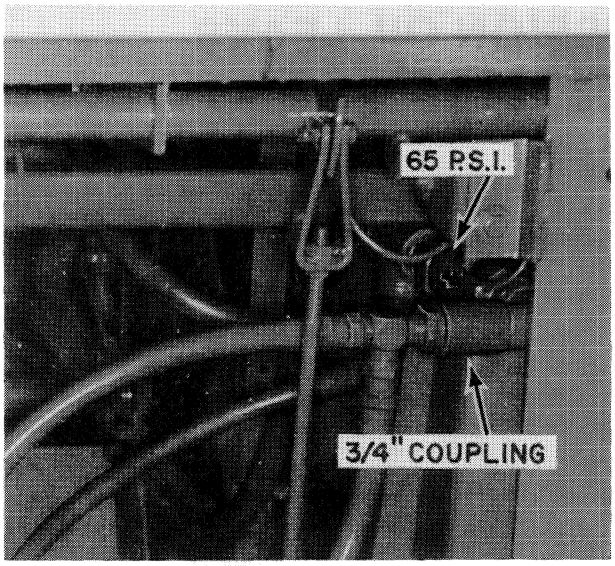


FIGURE 26

SHIELDS SHOWN REMOVED FOR CLARITY.

(b) Model 912's, 1112's and 1114's with Cessna transmissions do not require the 15 psi check valves shown in Figure 24. If Cessna transmissions leak at the pintle shafts on 912's or 1112's, remove the 15 psi valve, Figure 25, and replace it with a ¾" pipe coupling, Figure 26.

2. Replace pintle shaft seals.

(a) Pintle shaft seals can be replaced without removing the transmissions from the machine. Remove pintle arms, A, Figure 25, 37 or 38, as required. Clean the top of the transmission thoroughly.

(b) Two different style pintle shaft seals have been used on Cessna transmissions.

Style I seals are held in place with snap rings, Figures 27, 28 and 29.

Style II seals are held in place by metal covers, Figures 30 through 33.

Style I Pintle Shaft Seals

(c) Remove snap ring and sleeve cover, Figures 27, 28 and 29. Use channel lock pliers to rotate and lift the sleeve cover off the pintle shaft.

(d) An O-ring tool, available from an auto supply store, is helpful in removing the quad-ring and O-ring, Figures 27 and 28.

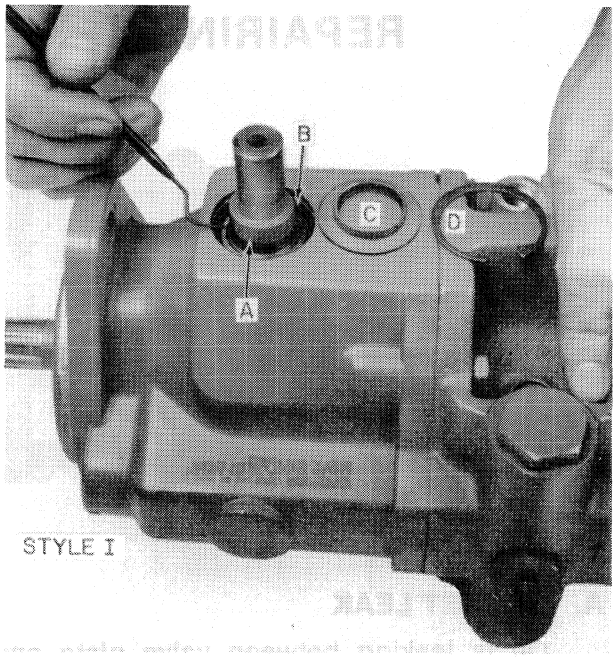


FIGURE 27

A. Quad-ring
B. O-ring
C. Sleeve cover
D. Snap ring

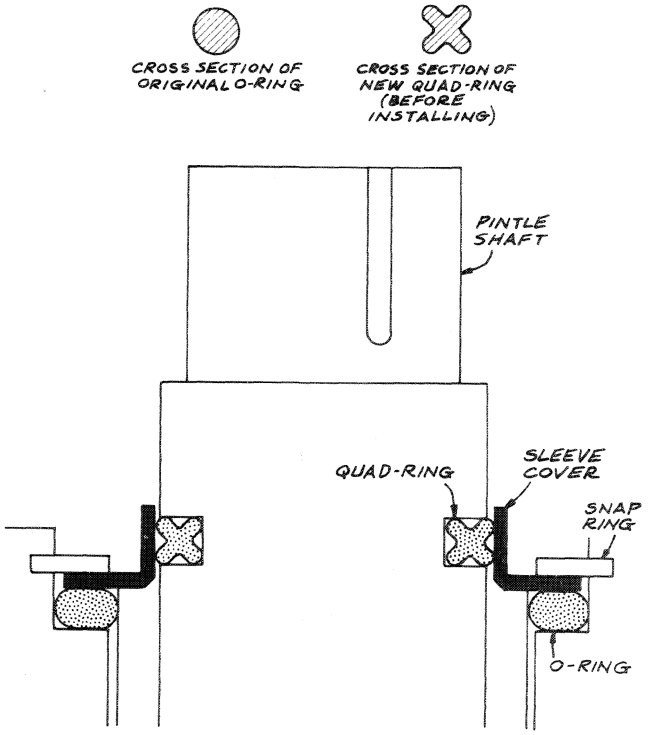


FIGURE 28

(e) Apply oil to O-ring and quad-ring. Install the O-ring, Figure 27. Use the O-ring tool to install the quad-ring. Be sure the quad-ring is not turned or twisted.

(f) Use pliers to rotate the sleeve cover while pressing it down over the quad-ring, Figure 29.

(g) Install the snap ring.

ATTENTION: It will be necessary to use a hammer and small punch to tap the snap ring down. The O-ring must be compressed into an oval shape, Figure 28, to stop oil leaks. If the snap ring fits into place without forcing it down, a new or larger O-ring may be needed, or the housing may have to be replaced if the leak continues.

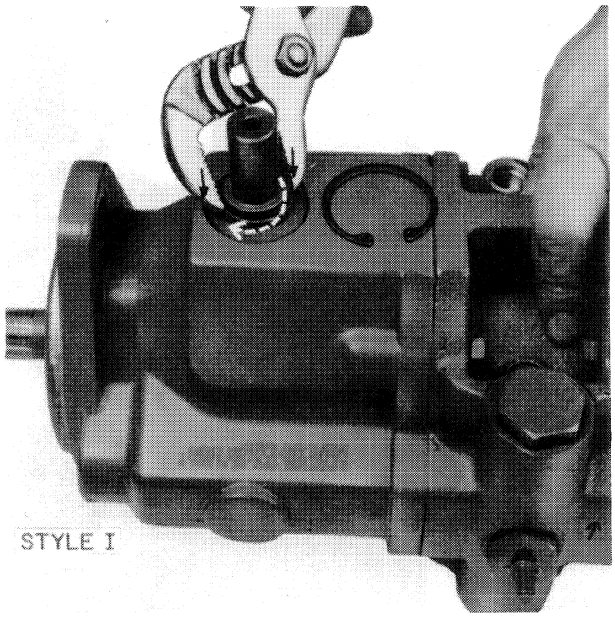


FIGURE 29

Style II Pintle Shaft Seals

(h) Style II pintle shaft seals have covers held in place by two Phillips-head or Torx-head thread-forming screws, A, Figure 30. These Torx-head screws require use of a Torx T-30 bit.

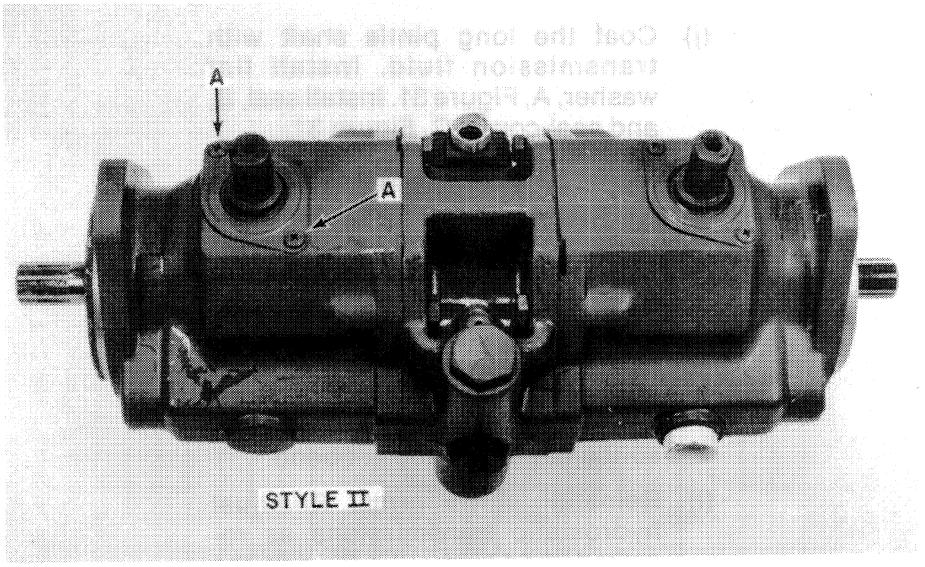


FIGURE 30

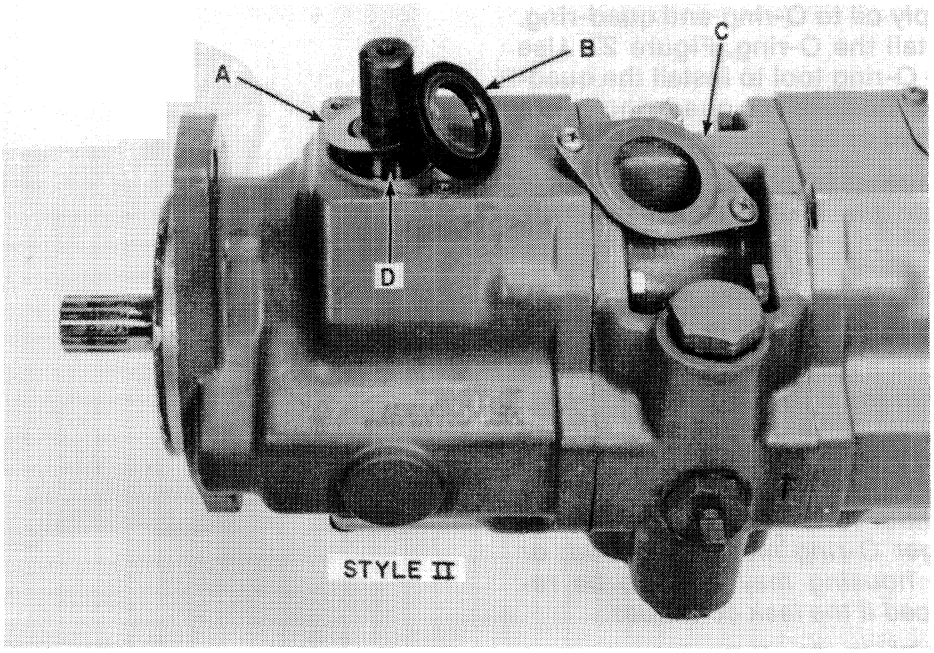


FIGURE 31

A. Flat washer
B. Pintle shaft seal
C. Seal cover
D. Needle bearing

(j) Coat the long pintle shaft with transmission fluid. Install flat washer, A, Figure 31. Install seal, B, and seal cover, C, Figure 31.

(k) Figure 32 shows Type II seal for the short pintle shaft. Install flat washer, D, and O-ring, C, Figure 33. Install O-ring cover, C, and flat cover, A. Be sure the O-ring cover is centered on the O-ring. Hold the flat cover parallel to the bottom of the transmission and install the screws. Tighten the two screws alternately so the flat cover doesn't bend.

(l) Reinstall pintle arms. Readjust hydrostatic transmissions as required. Add hydraulic fluid to the reservoir as required.

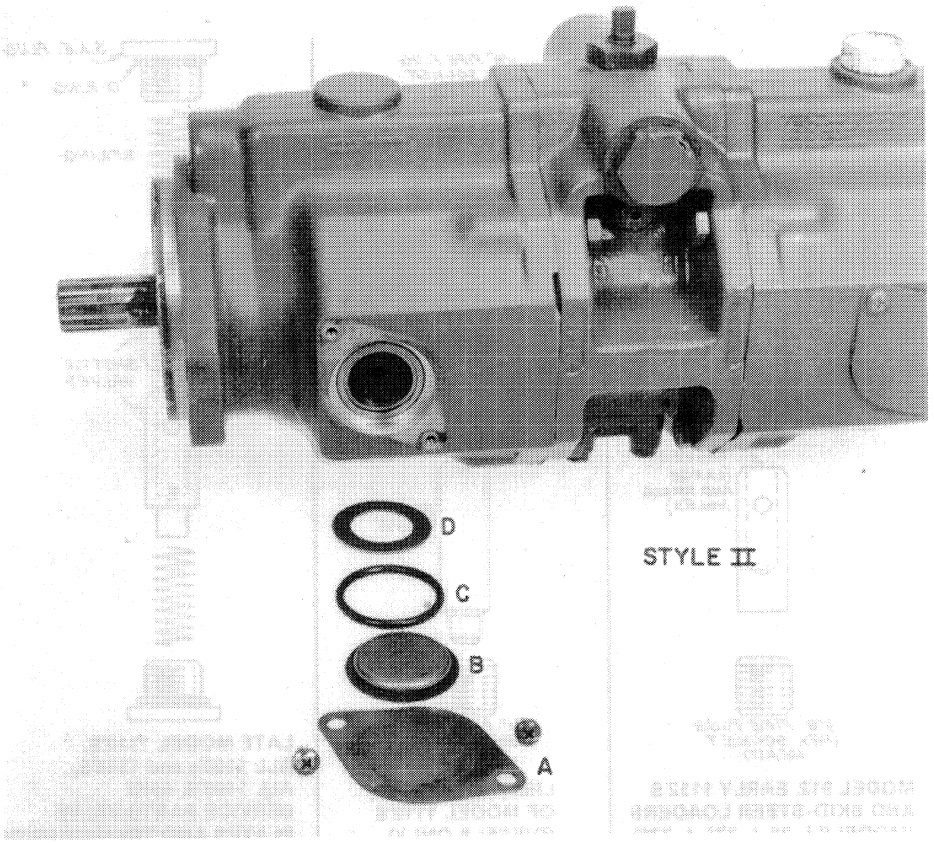


FIGURE 32

A. Flat cover
B. O-ring cover
C. O-ring
D. Flat washer

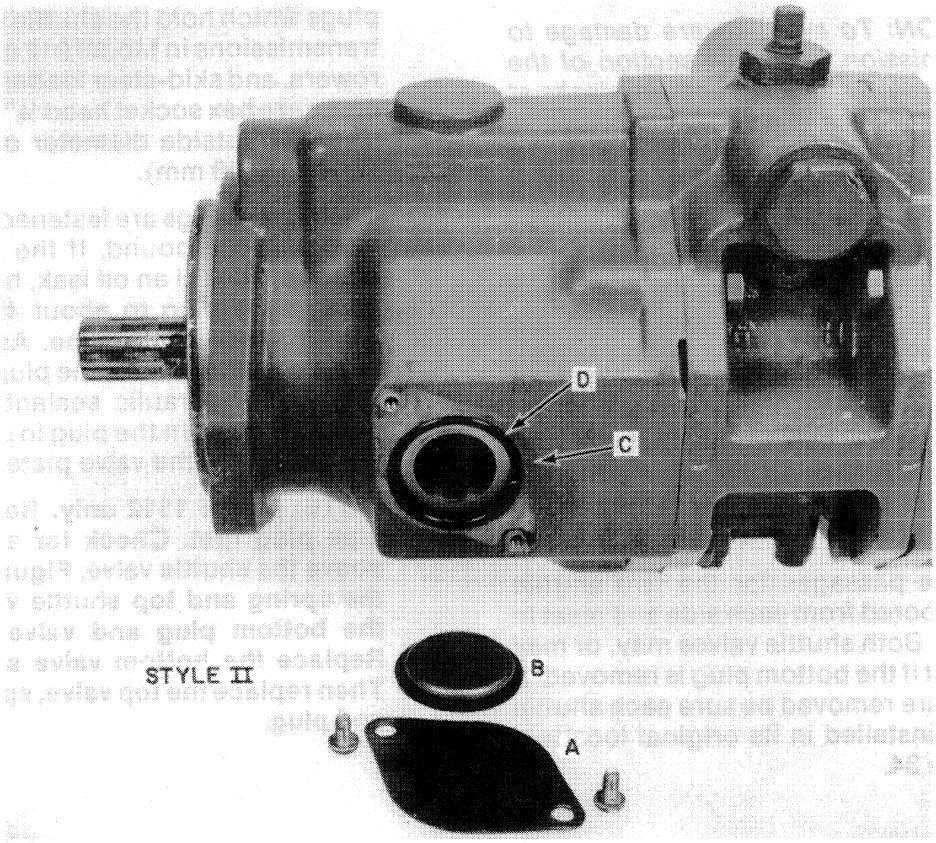
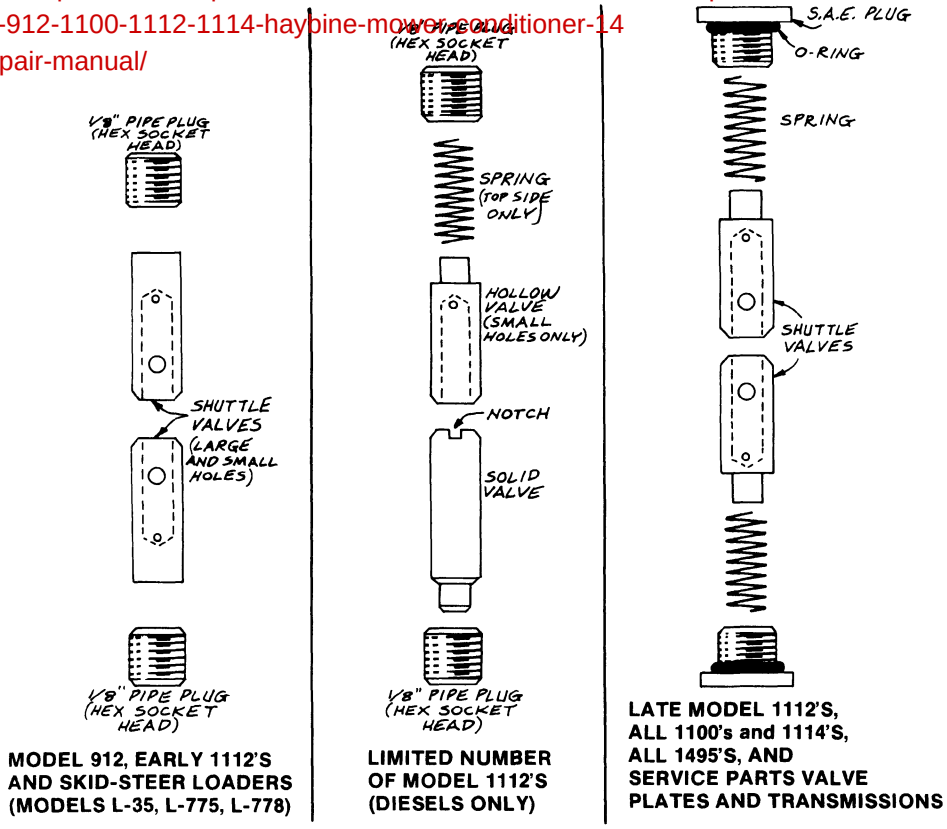


FIGURE 33



MODEL 912, EARLY 1112'S AND SKID-STEER LOADERS (MODELS L-35, L-775, L-778)

LIMITED NUMBER OF MODEL 1112'S (DIESELS ONLY)

LATE MODEL 1112'S, ALL 1100's and 1114'S, ALL 1495'S, AND SERVICE PARTS VALVE PLATES AND TRANSMISSIONS

FIGURE 34

C. SHUTTLE VALVE PLUG LEAK

ATTENTION: To avoid severe damage to the transmission, read this section of the manual carefully, before repairing leaks at the shuttle valves. Each shuttle valve is matched to fit the hole in the valve plate, so shuttle valves are not available separately.

NOTE: #277400 shuttle valve kit is available from Service Parts. This kit contains two pipe plugs (for older transmissions), two springs and six shuttle valves. There are two standard diameter valves (no markings), two first oversized valves (marked O), and two second oversized valves (marked 2). Install the largest valve spool that will shift smoothly under spring pressure. "Shuttle Valve Operation" is explained in the section "Oil Flow in the Valve Plate (d).

Valve plate passages for the two shuttle valves are bored from each side and meet in the center. Both shuttle valves may, or may not, fall out if the bottom plug is removed. If the plugs are removed be sure each shuttle valve is reinstalled in its original location. See Figure 34.

A, Figure 23, shows the location of two plugs which hold the shuttle valves in older transmissions in Model 912 and 1112 windrowers, and skid-steer loaders. These older plugs are hex socket head ⅛" National Pipe Thread. Outside diameter of the plugs is about ⅜" (10 mm).

These pipe plugs are fastened with Loctite® retaining compound. If the plug must be removed to seal an oil leak, heat the socket hole in the plug to about 400°F (200°C) with a small torch flame. As soon as the Loctite melts, remove the plug. Replace the plug with hydraulic sealant. Tighten the plug. Do not turn the plug in past flush with the outside of the valve plate casting.

NOTE: Model 1112 only. Remove the top pipe plug first. Check for a small spring above the shuttle valve, Figure 34. Remove the spring and top shuttle valve. Remove the bottom plug and valve as required. Replace the bottom valve and plug first. Then replace the top valve, spring (if used), and plug.