

Assembly of Motor

1. Install a new "O" ring seal in the recess of the output shaft seal retainer.
2. Install the aluminum centering pilot on the output end of the motor end cap and retain with the two $\frac{1}{4}$ " cap screws.

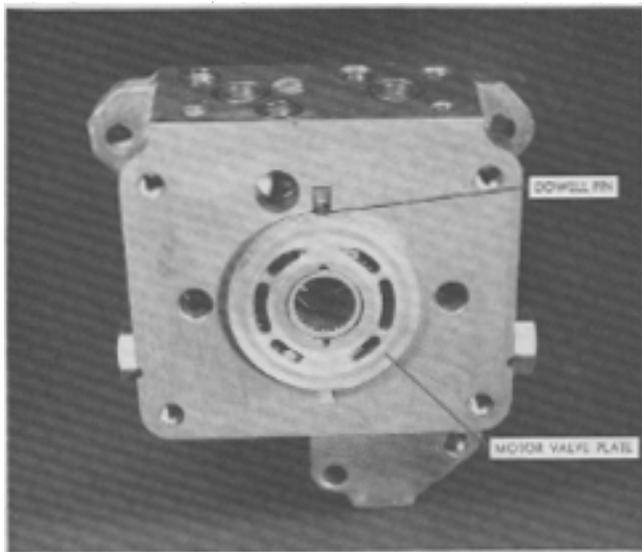


FIG. 83.

3. Install the valve plate with the steel side toward the motor end cap, making sure it is centered over the needle bearing and over the end cap dowel pin.
4. Apply 10W30 oil to the bearing surfaces of the shaft and install the motor shaft with the gear at the output end of the motor end cap.

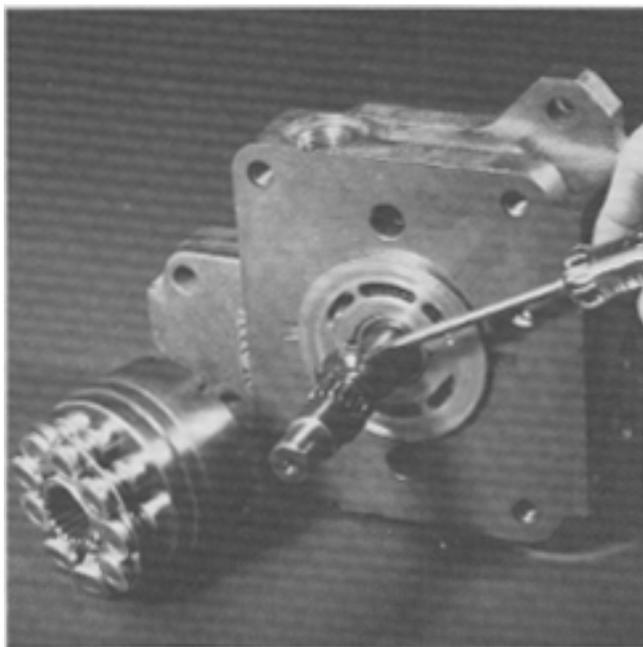


FIG. 84. Spring Retaining Clip

5. Install the motor shaft spring clip with the prongs toward the output gear.

6. Apply 10W30 oil on the valve plate surface, the cylinder block valving surface and through the valving ports into the cylinder bores.

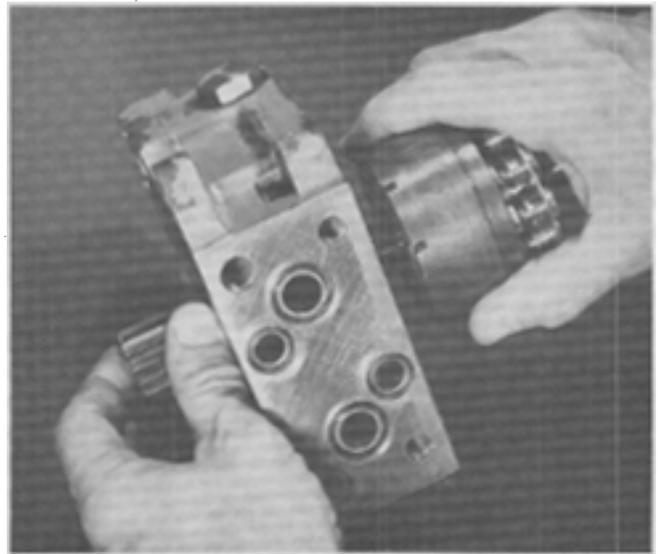


FIG. 85. Install Piston-Cylinder Block Assembly

7. Slide the cylinder block, pistons, slippers and slipper retainer assembly on the motor shaft. Push it in place until the spring retaining clip seats.
8. Install the ball bearing in the end of the aluminum housing with lettered end out.
9. Install the four $\frac{3}{8}$ -16 cap screws through the aluminum housing and install a new gasket over the bolts.
10. Install the thrust plate on the swash plate surface of the housing.
11. With the webbed side of the housing to the top, using the screws as a pilot, install the housing over the shaft and push it in enough to start the screws. Snug up the screws evenly until the housing is approximately $\frac{3}{16}$ " away from the end cap. Do not tighten at this time.
12. Install the bearing retaining ring on the end of the pump shaft.
13. Install the large "O" ring seal in the housing recess around the outside of the bearing.
14. Install the end cover and secure with the four Allen head screws and tighten evenly.
15. Push the housing up flush to seat against the end cap and tighten all four screws evenly.

DISASSEMBLY AND ASSEMBLY OF CYLINDER BLOCKS AND PISTON ASSEMBLIES

NOTE: Although the pump cylinder block and the motor cylinder block assemblies are similar, they are not alike.

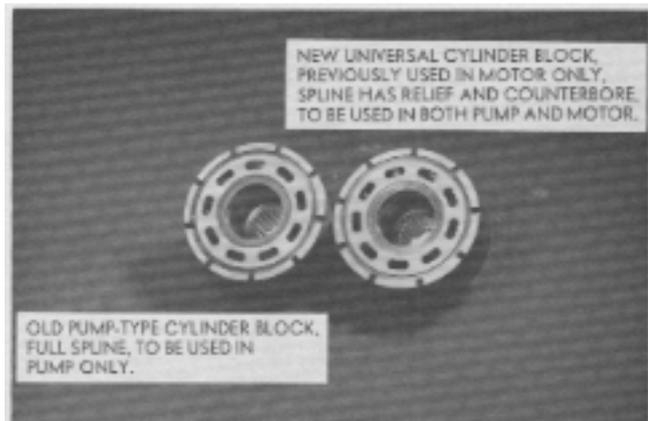


FIG. 86.

Cylinder blocks and pistons are serviced as a kit. However, they may be taken apart for cleaning and inspection. Note the position of each piston so that it may be returned to its original cylinder bore.

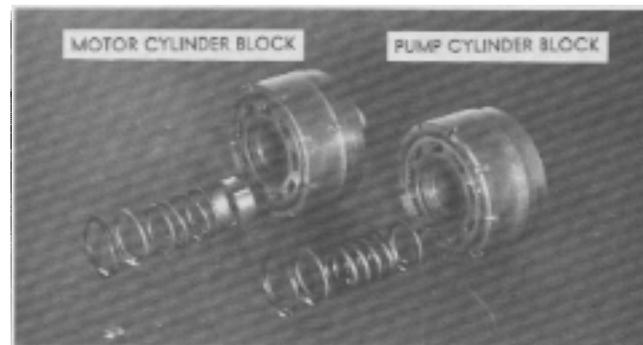


FIG. 87.

Cylinder Block Washers, Springs, and Spring Seats

Disassembly

1. Remove the pistons, slippers and slipper retainer assembly from the cylinder block. (See Fig. 88).
2. Make up a special spring compressor made from a $\frac{3}{8}$ " x 3" long hex head bolt, nut, $\frac{3}{8}$ SAE washer and a $\frac{3}{8}$ " I.D. x $\frac{15}{16}$ " O.D. washer.
3. Center the $\frac{15}{16}$ " O.D. washer on the cylinder block spring retainer. Insert the $\frac{3}{8}$ " x 3" bolt through the washer and on through the cylinder block. Place the $\frac{3}{8}$ SAE washer and nut on the end of the bolt and tighten the nut until the spring is compressed.
4. With the spring compressed, remove the spiroloc retaining ring.
5. Loosen and remove the compressor and remove the outside retaining washer, spring, and inside spring seat.

NOTE: The pump cylinder block incorporates a flat washer for the inside spring seat. The motor cylinder block incorporates a special spring seat retainer which also serves as the stop for the motor shaft spring clip.

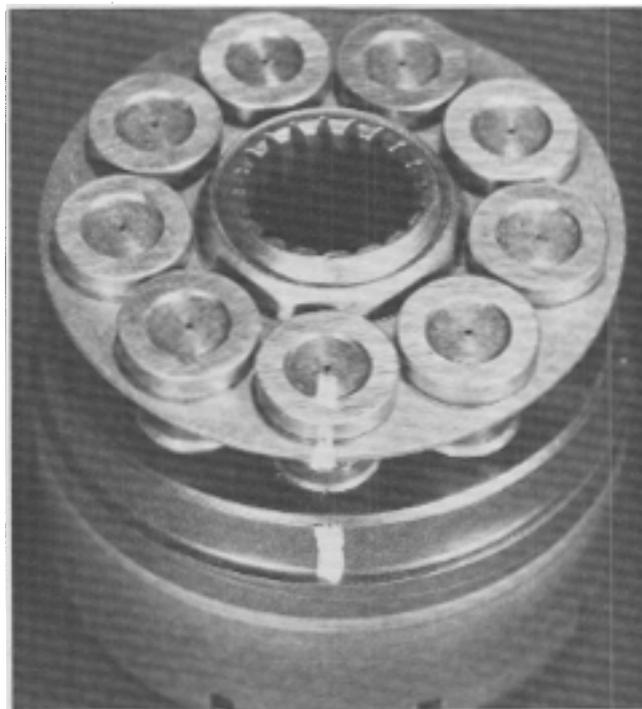


FIG. 88. Before removing Piston, Mark both Piston and Cylinder Bore with Tape

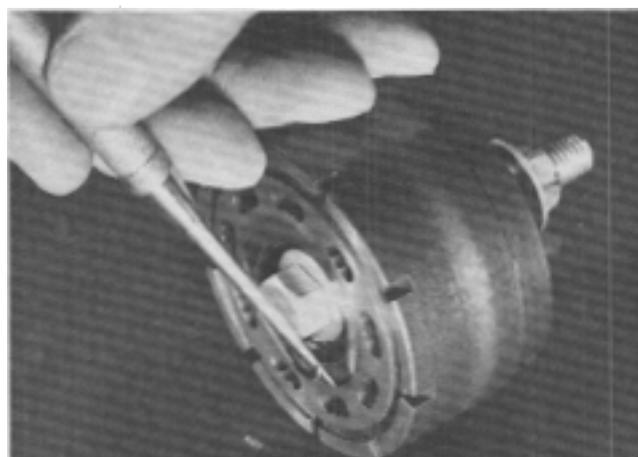


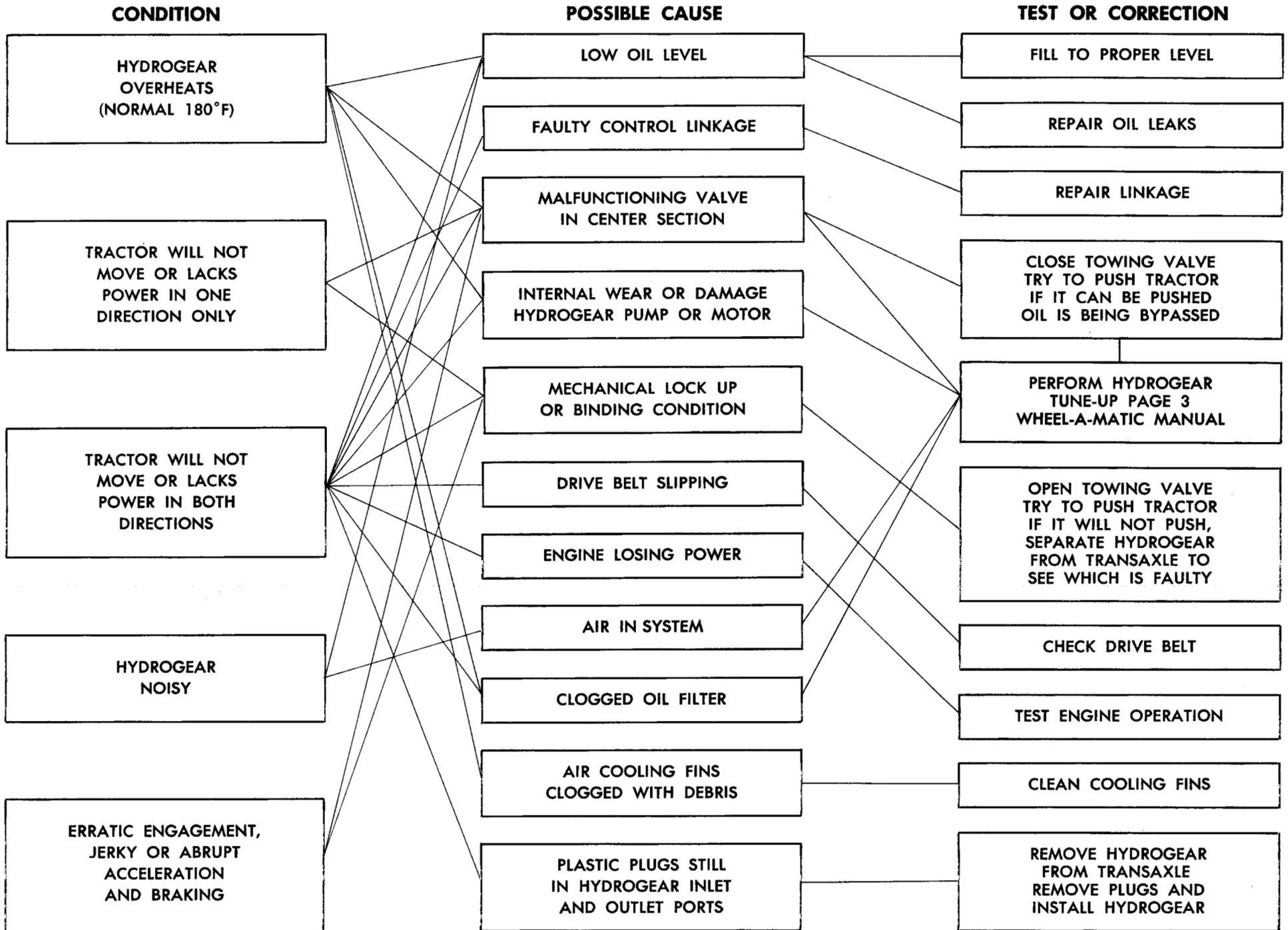
FIG. 89.

Remove Retaining Ring using special Compressor Tool Assembly

1. Install the inside spring retainer in the cylinder block (washer, if a pump cylinder block — special retainer if a motor cylinder block). When installing the special retainer in the motor cylinder block, make sure that the large end is placed toward the spring.
2. Install the spring in the bore of the cylinder block.
3. Place the outside retainer washer on the coil spring.
4. Using the special spring compressor tool, compress the spring and install the spiroloc retaining ring.

**HYDROGEAR
SECTION**

HYDROGEAR TROUBLE-SHOOTING CHART



TROUBLE SHOOTING GUIDE

This trouble shooting guide is designed to help determine if a Hydrogear can be repaired within the limits of authorized service procedures or if the assembly must be replaced.

First, listen carefully to the operator's description of the problem. Then operate the tractor to confirm the condition. Hydrogear transmission malfunctions usually show up in one of the following ways:

1. Tractor will not operate in either direction — includes conditions ranging from completely inoperative to lack or loss of power in both directions.
2. Tractor operates in one direction only — much the same as item 1, except that it applies to one direction only.
3. Erratic engagement — sharp, jerky, or abrupt acceleration and braking in one or both directions.
4. Transmission overheats — likely to accompany one of the other conditions listed. Normal temperature 180 degrees F.
5. Transmission noisy — noise may issue from either the Hydrogear or the transaxle.

PRELIMINARY CHECKS

Make it a practice in every case to perform the following preliminary checks. They will pinpoint some easily overlooked items and save the time and expense involved with unnecessary teardown.

1. Check oil level in reservoir and replenish if necessary.
2. Check control linkage to make sure it is properly connected and operates normally.
3. Close towing valve and try to push the tractor. If the tractor can be pushed, a malfunctioning valve is usually indicated.
4. Make sure the tractor can be pushed with the towing valve open. If it cannot be pushed, there may be a valve malfunction, seized gear motor, or transaxle failure.
5. Check drive belt condition and fit. Make sure parking brake operation is normal.
6. Check for oil leakage at operating shafts, gasketed joints, filter base, etc. Replace gaskets and seals as necessary.
7. Check and correct air cooling fins clogged with dirt or clippings, or other apparent damage or trouble causing condition.

The trouble shooting chart indicates possible causes and test or corrective procedures for the five trouble conditions listed above. The Hydrogear Tune-Up procedures are recommended as a correction in several cases.

HYDROGEAR TUNE-UP

CAUTION: Cleanliness is one of the most important considerations during every step of the Hydrogear tune-up. Instead of repeating a **cleanliness** precaution throughout these instructions, this note at the beginning is intended to emphasize its **importance**. Exercise the utmost care at all times to prevent the introduction of dirt, clippings or any other foreign matter into the hydraulic system.

Remove the fender and tool box assembly to expose the center section of the Hydrogear as shown in Fig. 90. Thoroughly clean the center section of all dirt, clippings, etc. with a solvent that is not harmful to paint. Remove the drain plug at the bottom of the transaxle case and drain the fluid. Remove the oil filter for replacement.

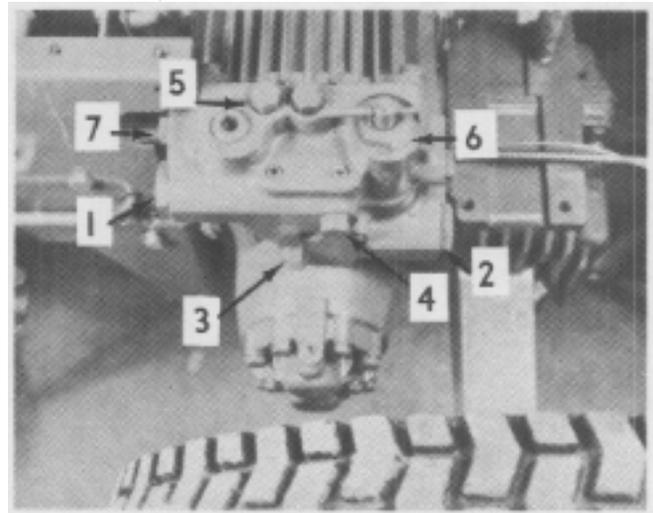


FIG. 90.

Prepare a clean work area for inspecting the highly polished surfaces of the valves to be serviced. The parts to be removed are manufactured to close tolerances and are very critical to the proper operation of the Hydrogear. Handle them with care to avoid damage to the sealing surfaces.

Acceleration Relief Valves: Remove the forward dampening valve (item 2, Fig. 90) with a $1\frac{3}{16}$ " wrench on the hex head. Occasionally the acceleration valve piston and sleeve assembly (2 & 3, Fig. 91) remains on the dampening valve when removed. When this happens, separate them for inspection and cleaning.

If the piston and sleeve remained in the bore, remove the piston, (2, Fig. 91) two springs (4 & 5, Fig. 91), spring seat (6, Fig. 91), and relief valve cone (7, Fig. 91), using a small magnet to withdraw them from the bore.

The acceleration valve sleeve (3, Fig. 91), and relief valve seat (8, Fig. 91) may now be removed. This is best accomplished by inserting a stiff wire hook into the drain port in the side of the seat and pulling, (See Figs. 91, Fig. 11). The force necessary will depend on the radial press of the sealing "O" rings on the sleeve and seat.

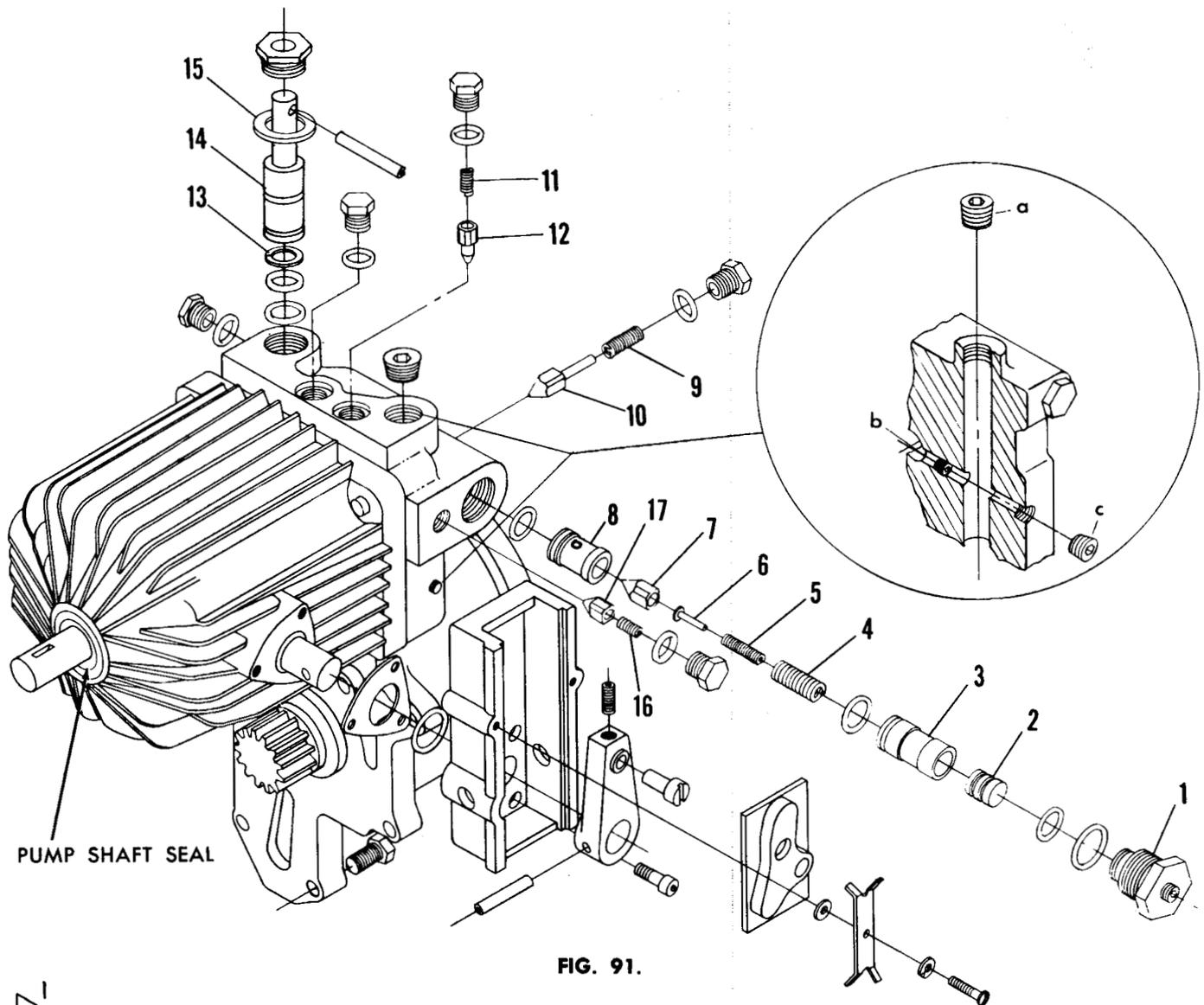
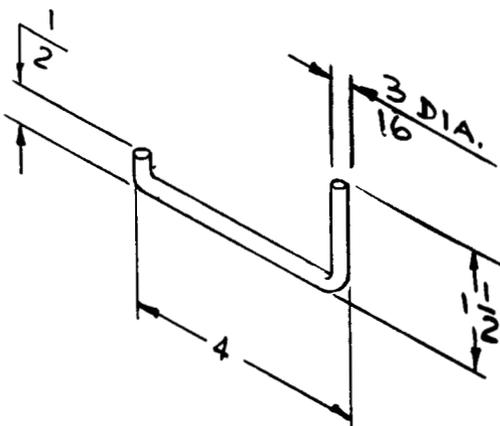


FIG. 91.



SEAT PULLER

FIGURE II

HYDROGEAR SERVICE NOTE

PROBLEM: Tractor will not operate in either direction. Problem usually occurs suddenly, with little or no warning.

CAUSE: Internal plug (b) is either loose, or has fallen completely out of position.

SOLUTION:

1. Remove the side socket head plug (c) using a $\frac{3}{16}$ " Allen wrench.
2. Insert the long arm of a $\frac{5}{32}$ " Allen wrench into the horizontal passage exposed in Step 1, across the large vertical passage, and determine if the internal plug is in place.
3. If the internal plug is in place but is loose, tighten it securely and replace the side plug.
4. If the internal plug is not in place, use a $\frac{3}{16}$ " Allen wrench to remove the top plug (a). The internal plug is usually found at the bottom of the large vertical passage. Retrieve it with a magnet.
5. Insert the internal plug through the horizontal passage, across the large vertical passage, and tighten it securely in place. Then reinstall both the side and top plugs.

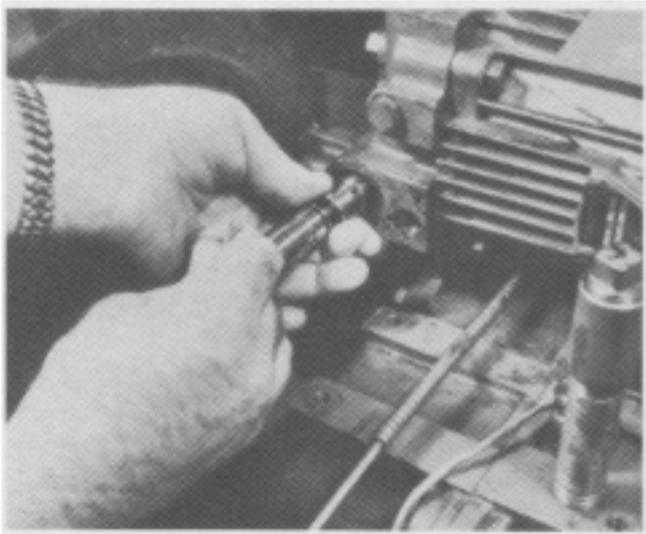


FIG. 92.

NOTE: A large amount of iron or brass filings on the valves and the passages usually indicates internal damage to the pump or motor section of the Hydrogear. This is also true if there is evidence of severe contamination from an outside source. Because complete disassembly would be necessary to repair such damage or to clean out the contaminate, replacement of the complete Hydrogear assembly is advised. Moderate contamination can be flushed out through the valve ports with solvent.

The most critical area of the acceleration relief valve is the dampening valve portion (1, Fig. 91). Remove the "O" rings and discard them. Clean the valve thoroughly with solvent, and inspect for visual damage. If there are indications of damage to the pin or ball, or if the valve rattles when shaken, replace the dampening valve assembly.

Inspect the relief valve cone (7, Fig. 91) and mating seat (8, Fig. 91) for damage. Check the cone for uniformity of sealing pattern. Normal cones will show a shiny unbroken circle of contact approximately $\frac{3}{32}$ " from the point. Similarly, the mating seat should be free of nicks or signs of erosion. If the pattern is broken or the seat damaged, the cone and seat should be replaced. Remove "O" ring from the seat and discard. Clean the parts thoroughly with solvent and let them air dry.

Next examine the acceleration valve sleeve (3, Fig. 91) and piston (2, Fig. 91) for scoring or sticky operation. If either part is severely scored, both must be replaced. They are serviced as a matched set. Sticky piston operation can be corrected by lightly polishing the piston and bore of the sleeve with Crocus cloth. The piston-to-bore clearance is extremely close; therefore, the piston may not pass through the sleeve under its own weight. Remove the "O" rings from the sleeve and discard them. Wash piston and sleeve with solvent and air dry them.

Inspect the springs (4 & 5, Fig. 91) and spring seat (6) for damage and replace if necessary. Clean with solvent and dry.

Coat new "O" rings with transmission fluid and lightly coat the valves with petroleum jelly. Install new "O" ring seals taking care to avoid nicking their sealing surfaces on screw threads or edges of the valve grooves.

Press the acceleration valve sleeve (3, Fig. 91) over the "O" ring on the shoulder of the dampening valve (1, Fig. 91). **The "O" ring end of the sleeve should be away from the dampening valve.** Insert the piston (2, Fig. 91) closed end first, into the sleeve. Place the two springs (4 & 5, Fig. 91) in the open end of the piston and push the piston to the bottom of the sleeve. Insert the stem of the spring seat (6, Fig. 91) in the end of the springs. Place the cone (7, Fig. 91) in the relief valve seat (8, Fig. 91) and bring the open end of the seat and the open end of the acceleration valve sleeve together. Install all the parts into the bore of the center section at one time. See Fig. 93. Tighten dampening valve securely.

Repeat this operation on the reverse acceleration valve assembly (1, Fig. 90).

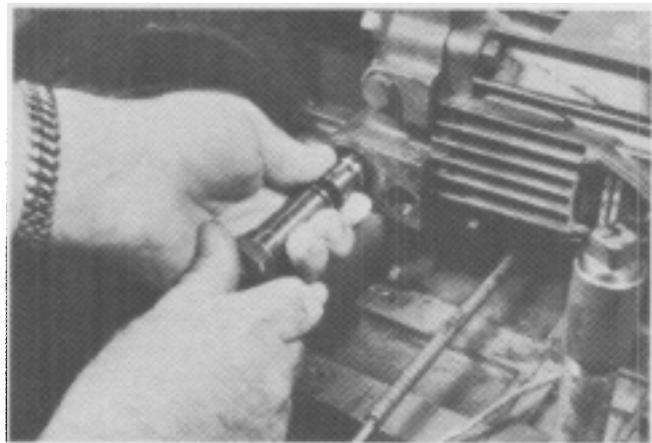


FIG. 93.

Check Valves (Forward and Reverse)

Remove the reverse check valve "O" ring plug (4, Fig. 90) with a wrench on the $\frac{5}{8}$ " hex head. Remove the spring (9, Fig. 91) and valve (10, Fig. 91) using a magnet or long nose pliers if needed. Check the spring for distortion. Replace it if damaged. Remove and discard the "O" ring from the plug.

Check the cone for uniformity of sealing pattern. A normal cone will have a shiny unbroken circle of contact approximately $\frac{3}{32}$ " from the point. The seat inside the center section should also be free of nicks or signs of erosion. If the contact pattern is broken, the cone should be replaced. If the seat is badly eroded, the Hydrogear assembly must be replaced.

Clean the parts in solvent and coat them with type "A" automatic transmission fluid. Install a new "O" ring on the plug (4, Fig. 90) using care not to damage the ring on the screw threads. Slip the spring over the shoulder of the valve and install the assembly into its bore in the center section. Install the hex head "O" ring plug and tighten securely.

Repeat this operation on the forward check valve assembly (3, Fig. 90).

Charge Relief Valve

Remove the $\frac{5}{8}$ " hex head "O" ring plug (5, Fig. 90). Remove the spring (11, Fig. 91) and valve (12, Fig. 91) using a magnet to withdraw them from the bore.

NOTE: There may be shims inside the plug to control valve spring tension. Take care not to lose them.

Remove and discard the "O" ring from the plug. Check the spring for distortion. Replace if damaged. Check the nose of the valve for continuous sealing pattern and replace it if damaged. Check the seat in the center section for nicks or signs of erosion. If it is badly eroded, the Hydrogear assembly must be replaced.

Clean the parts with solvent and coat them with type "A" automatic transmission fluid. Install a new "O" ring on the plug (5, Fig. 90) using care not to damage it on the screw threads. Install the spring in the valve and insert the assembly, valve first, into its bore on top of the center section. Install the hex head "O" ring plug and tighten securely.

Towing Valve (If applicable)

Back out the 1" hex shoulder plug (6, Fig. 90). Pull the valve assembly (14, Fig. 91) out of the bore. The force required will depend on the radial press of the sealing rings on the barrel of the valve.

Remove and discard the "O" rings and the Teflon back up ring (13, Fig. 91). Clean the valve with solvent, dry, and coat with type "A" automatic transmission fluid. Install the Teflon back up ring (13, Fig. 91) in the top groove of the valve. Install an "O" ring alongside the back up ring in the same groove on the side away from the valve stem. Install the second "O" ring in the bottom groove. From top to bottom of the valve, the rings stack up in this order: Teflon ring, "O" ring, "O" ring.

Place the washer (15, Fig. 91) around the bore in the center section and, with a twisting motion, insert the valve into the bore. Start the hex shoulder plug threads and rotate the valve while drawing it into place with the plug. Tighten the plug securely.

Implement Relief Valve (If so equipped)

Remove the $\frac{5}{8}$ " hex head "O" ring plug (7, Fig. 90). Remove the spring (16, Fig. 91) and valve (17, Fig. 91) using a magnet to withdraw them from the bore. Remove and discard the "O" ring from the plug. Check the spring for distortion. Replace if damaged.

Check the nose of the valve for continuous sealing pattern and replace if damaged. Check the seat in the center section for nicks or signs of erosion. If it is badly eroded, the Hydrogear assembly must be replaced.

Clean the parts with solvent and coat them with type "A" automatic transmission fluid. Install a new "O" ring on the plug (7, Fig. 90) using care not to damage it on the screw threads. Insert the spring in the valve and install the assembly, valve first, into its bore on the front of the center section. Install the hex head "O" ring plug and tighten securely.

Install new oil filter. Install the drain plug in the bottom of the transaxle. Fill to proper level with type "A" automatic transmission fluid. Approximately four quarts will be required.

Block the tractor up with the rear wheels off the ground. Run the engine at low speed and operate the Hydrogear in forward and reverse to circulate fluid through the system and to check for leaks. Recheck the fluid level and add as necessary.

Adjust neutral position. Lower rear wheels to the ground. Reinstall the fender and tool box assembly.

Run the tractor to thoroughly test operation of the Hydrogear.

HYDROGEAR

REMOVAL AND REPLACEMENT

Removal

If the transmission has been contaminated either with metal filings or other foreign matter, the fluid must be changed and the oil filter replaced. The transaxle must also be flushed thoroughly before a new Hydrogear assembly is installed.

Support rear of tractor with rear wheels off the floor. Remove the left rear wheel. If tractor has tail light, disconnect wire and bring it forward of the tool box. If the tractor has a hydraulic lift, disconnect the hoses from the Hydrogear and move them forward out of the way. Remove the instruction plate (located in front of the seat) by removing four mounting screws.

Remove the four tool box to transmission bolts and remove the fender, seat and tool box as an assembly.

NOTE: On 1965, 1966 and 1967 models it is also necessary to remove the fan guard. The 1968 and 1969 models will also require the removal of the two belt guard-to-tool box bolts.

Remove the belt guard and drive belt. To do this on 1968 and 1969 models, the R.H. foot rest must be removed. Remove the cooling fan from the drive pulley, if so equipped, and remove the pulley.

Clean all dirt and clippings off the Hydrogear and surrounding area with solvent and compressed air to keep the interior of the transaxle free of foreign matter when the Hydrogear is separated from the transaxle.

Place a drain pan beneath the Hydrogear.

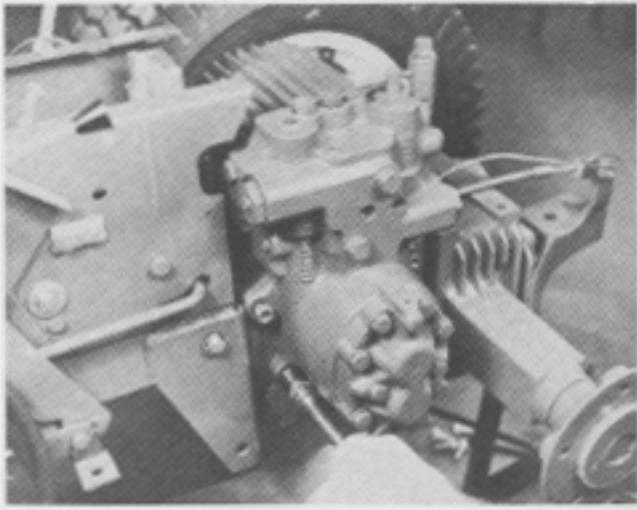


FIG. 94.

Remove three cap screws and two nuts which secure the Hydrogear to the transaxle (Fig. 94). Slide the Hydrogear rearward to disengage the cam block pin from the cam block and lift the assembly off the transaxle (Fig. 95).

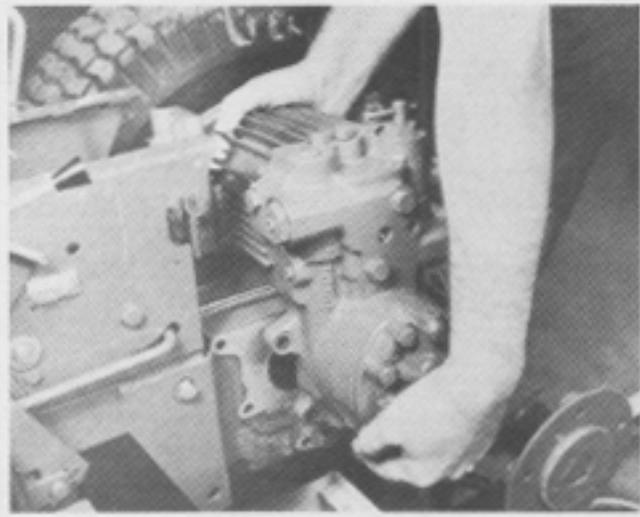


FIG. 95.

Remove the strainer (Fig. 96) and clean with solvent and compressed air. The strainer contains a magnet to retain metal particles circulated by the fluid.

Installation

Clean the gasket surface on the side of the transaxle. Make sure the strainer is in place in the transaxle. Coat the gasket surface with petroleum jelly to hold the gasket in place and position a new gasket on the Hydrogear.

If a new Hydrogear assembly is being installed, remove the plastic plugs from the inlet and outlet ports of the new unit.

Position the Hydrogear assembly on the transaxle with the cam block pin engaged in the cam block. Start three cap screws and two nuts on the through bolts and tighten until snug. Then, in rotation, tighten the nuts and screws securely.

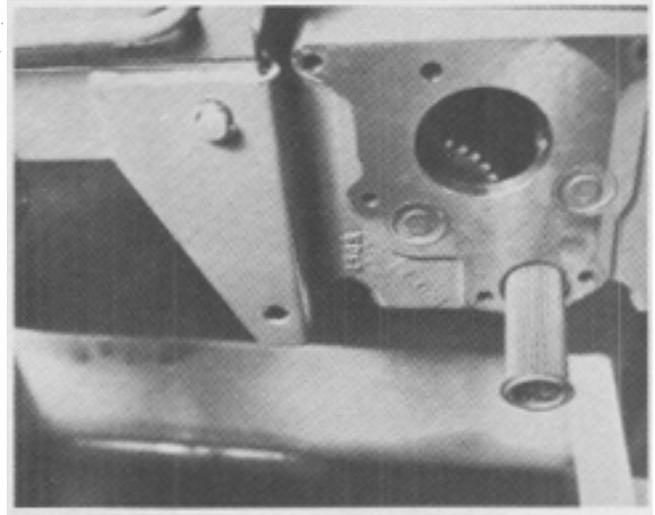


FIG. 96.

Reinstall and align the pulley, fan (if so equipped), and drive belt.

Fill the reservoir to proper level with fresh, type "A" automatic transmission fluid. Run the engine and Hydrogear at low speed to circulate fluid throughout the system and to check for leaks. Recheck the fluid level and add as necessary.

Install belt guard, R.H. foot rest (1968 and 1969 models), and the fender, seat, and tool box assembly. Connect tail light if so equipped.

NOTE: To facilitate installation of hydraulic lift hoses (see following paragraph) leave the tool box assembly loose enough to be shifted at this time.

If a new Hydrogear assembly is being installed on a tractor which is equipped with a hydraulic lift, transfer the implement relief valve from the replaced Hydrogear to the new assembly (Fig. 97), and connect the hydraulic hoses. Complete the tightening of tool box assembly.

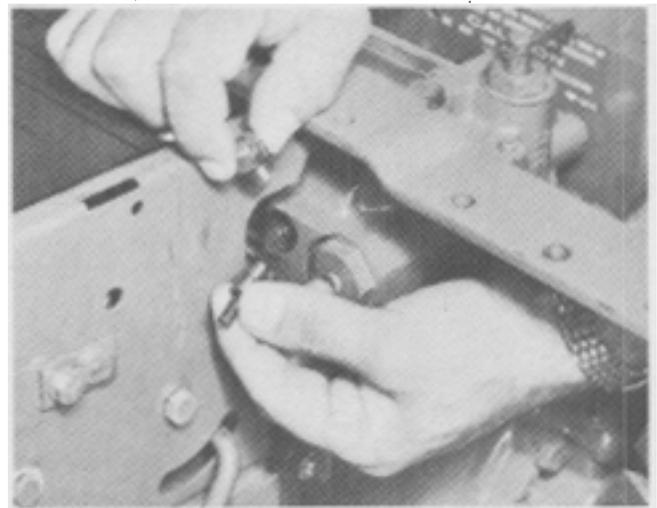
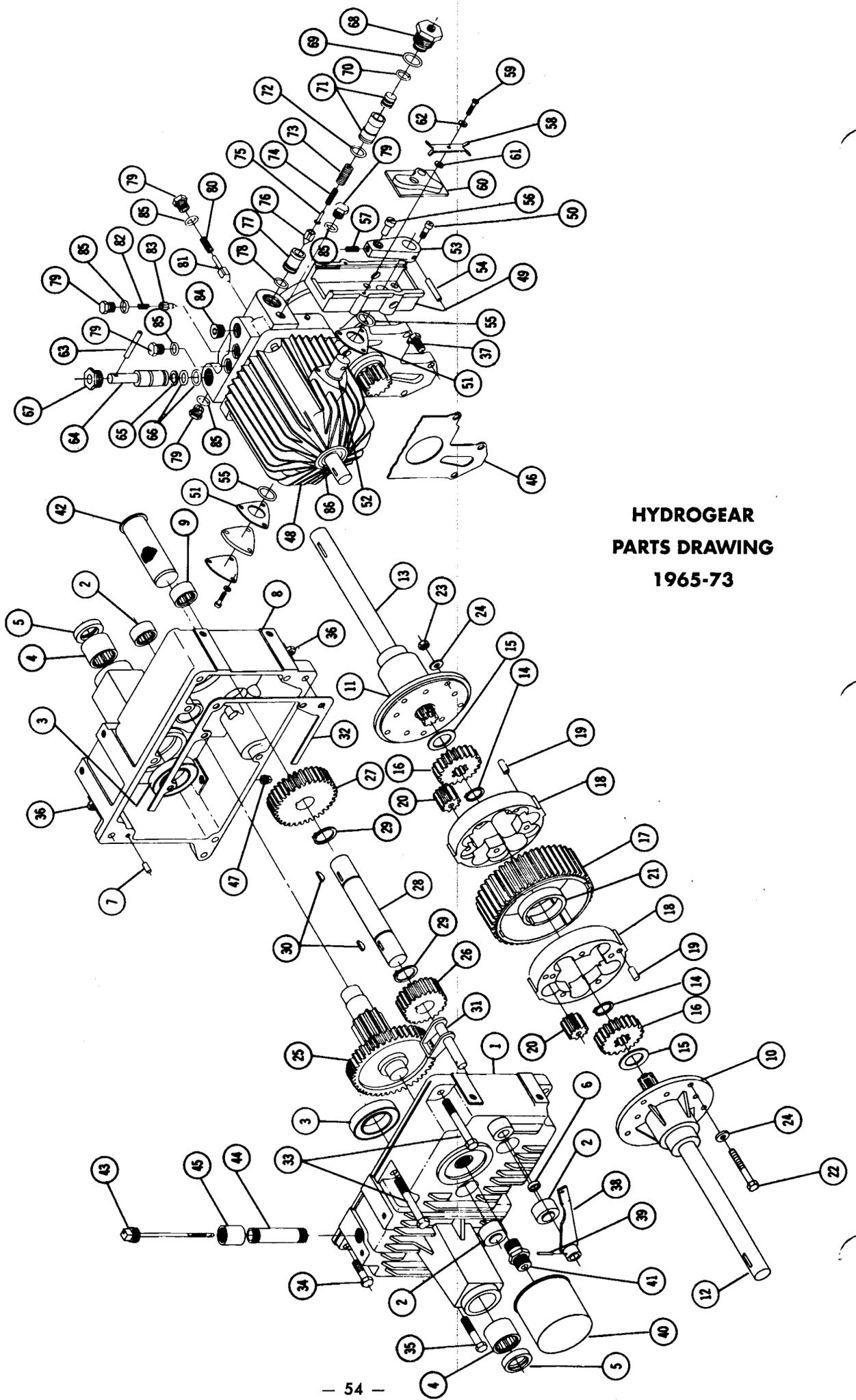


FIG. 97.

Install the left rear wheel, adjust neutral position at the cam block, and install the instruction plate.

Lower the rear of the tractor to the floor and test operation of the Hydrogear.



**HYDROGEAR
PARTS DRAWING
1965-73**

HYDROGEAR PARTS LIST 1965-73

Parts available only through Authorized Dealers.
When ordering parts always list Part No. and Description.
(Specifications subject to change without notice..)

ITEM NO.	PART NO.	DESCRIPTION	NO. REQ'D.
1	8046	Case R. H.	1
2	1532	Bearing — Needle 1" I. D.	3
3	1533	Bearing — Ball 1 1/2 I. D.	2
4	9416	Bearing — Needle 1 1/8 I. D.	2
5	6449	Seal 1 1/8 I. D.	2
6	5959	Seal Brake Shaft 1/2" I. D.	1
7	3915	Pin — Dowel	2
8	8047	Case L.H.	1
9	5960	Bearing Needle 1" I. D.	1
10	8050	End Cap R. H.	1
11	8051	End Cap L. H.	1
12	7202	Axle Rear R. H.	1
13	7203	Axle Rear L. H.	1
14	7169	Snap Ring	2
15	7199	Washer — Thrust	2
16	8053	Gear Axle	2
17	7196	Gear — Differential Ring	1
18	7200	Body	2
19	933209	Roll Pin 1/4 x 1/2	2
20	8056	Gear — Differential Pinion	10
21	7235	Spring — Cylindrical	1
22	908138	Bolt 3/8-16 x 3/4	5
23	915663	Nut — Elastic Stop 3/8-16	5
24	920009	Washer — Flat 3/8 SAE	10
25	6452	Gear — 44 Teeth — 11 Teeth	1
26	5963	Gear — 22 Teeth	1
27	5964	Gear — 33 Teeth	1
28	5965	Shaft 1 " Dia.	1
29	936131	Snap Ring 1" Shaft.	2
30	937014	Key #9 Woodruff	2
31	5966	Assembly — Park Brake	1
32	5999	Gasket — Case	1
33	908143	Bolt Hex 3/8-16 x 5	2
34	908038	Bolt Hex 3/8-16 x 2	3
35	908043	Bolt Hex 3/8-16 X 3 1/2	1
36	915113	Nut Nylok 3/8-16	6
37	908034	Bolt Hex Nylok 3/8-16 x 1	3
38	5969	Assembly Lever — Brake	1
39	933152	Roll Pin 1/8 x 3/4	1
40	5990	Assembly — Filter	1
41	5991	Fitting	1
42	5992	Strainer	1
43	6155	Assembly Dipstick & Filter	1
44	943346	Nipple 1/2" Pipe x 3 1/2"	1
45	943004	Coupling 1/2" Pipe	1
46	5955	Gasket — Pump	1
47	943460	Plug 1/4" Pipe	1
48	7880	Assembly Hydrogear Unit (Complete)	1
49	5993	Support — Cam Block	1
50	911037	Screw — Socket Head 1/4-20 x 1/2	3
51	6826	Shim	2
52	972116	"O" Ring	1
53	5994	Arm — Cam Follower	1
54	933215	Roll Pin 1/4 x 1 1/4	1
55	970026	"O" Ring	2
56	5995	Eccentric — Cam Follower	1
57	909849	Set Screw Nylok 1/4-20 x 5/16	1

HYDROGEAR PARTS LIST

Parts available only through Authorized Dealers.

When ordering parts always list Part No. and Description.

(Specifications subject to change without notice.)

ITEM NO.	PART NO.	DESCRIPTION	NO. REQ'D.
58	5998	Plate Tension	2
59	909000	Screw Round Head #8-32 x 1/2	2
60	5996	Cam	1
61	920229	Washer	2
62	920078	Lockwasher #8	2
63	933196	Roll Pin 3/16 x 2	1
64	7266	Valve	1
65	7268	Ring — Back Up	1
66	971113	"O" Ring	2
67	7267	Plug	1
68	6444	Assembly Dampening Valve (with "O" Rings)	2
69	970118	"O" Ring	2
70	971015	"O" Ring	2
71	7054	Assembly Piston & Sleeve (Matched Assembly)	2
72	971018	"O" Ring	2
73	7264	Spring — Relief Valve	2
74	7052	Spring — Relief Valve	2
75	7051	Seat — Spring	2
76	7050	Cone — Relief Valve	2
77	7049	Sleeve	2
78	971017	"O" Ring	2
79	7752	Plug	7
80	7753	Spring — Check Valve	2
81	7754	Valve — Check Valve	2
82	7755	Spring — Charge Pump Relief Valve	1
83	7756	Cone — Relief Valve	1
84	943462	Plug — Pipe Hex Socket 1/2-14	1
85	973310	"O" Ring	7
86	7877	Seal	1

PUMP SHAFT SEAL REPLACEMENT

Replacement of the pump shaft seal (Fig. 91), is accomplished without removing the Hydrogear assembly from the tractor.

Raise the seat. Remove the fan guard and fan on 1965, 1966, and 1967 models. On 1968 and 1969 models, remove the belt guard. To do this it will also be necessary to remove the R.H. foot rest on these models.

Loosen the belt tension by setting the parking brake, and remove the belt from the shaft pulley. Remove the pulley and Woodruff key from the input shaft.

NOTE: It is extremely important not to damage the shaft or the soft aluminum housing. The following steps should be done very carefully.

Slide a small hook tool or screw driver along the shaft into the lip seal. Tip the tool until it contacts the outer metal edge of the seal and pry outward

gently. Change position of the tool and repeat the process until the seal has been worked out of the housing. Discard the seal.

Inspect the shaft and polish out any nicks or burrs that could cut or damage a new seal. Do not let any particles enter the pump.

Coat the sealing lip with automatic transmission fluid and slide the seal over the shaft. Align the seal to the aluminum housing. A thin coat of gasket shellac on the seal O.D. will aid in sealing the steel seal to the pump housing.

Place a tool approximately the size of the seal O.D. over the metal face of the seal (the input pulley hub can be used) and press the seal into the housing until the seal is flush with the edge of the housing.

Check oil level and replenish as necessary.

Align and install the pulley, belt, and fan if so equipped. Install the belt guard or fan guard depending on model.

Test operation and check for leaks.

END OF HYDROGEAR SECTION

THE TRANSAXLE

This section is written in general terms to cover all automatic transmissions currently being used by Wheel Horse.

REMOVAL OF TRANSAXLE COMPLETE WITH HYDROSTATIC UNIT

Jack the tractor up and place jack stands under the frame. Remove both rear wheel and tire assemblies. Remove the tractor seat and fender assembly by removing the hardware holding it to the transaxle. Remove the drive belt from the transmission. Remove any access plates. Drain the transmission oil through the transaxle drain plug if desired.

Place a jack under the transaxle and remove the cap screws holding it to the frame. Lower the jack and remove the entire transaxle assembly.

REMOVAL OF HYDROSTATIC UNIT FROM THE TRANSAXLE

If the transmission oil has not been drained, place the entire assembly in an oil drain pan. Remove the two $\frac{3}{8}$ " top corner motor-to-case bolts and nuts, and the two lower cap screws that thread into the case.

Carefully remove the hydrostatic unit from the transaxle allowing the oil to drain as it is removed. Make certain that the control cam comes free from the cam pin (ball stud). Now the magnetic strainer is accessible.

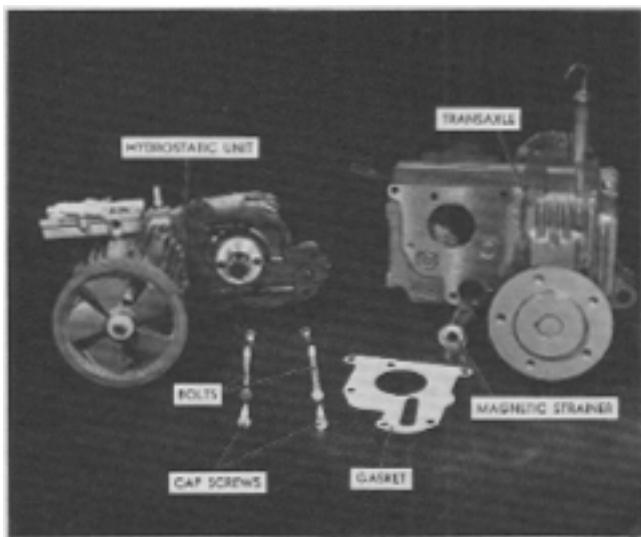


FIG. 98.

Hydrostatic Unit, Gasket, Strainer and Transaxle

Remove the strainer and wash with solvent whenever servicing the transaxle. Check the magnet at the end of the strainer for metal particles.

If metal particles are found, carefully inspect the internal parts of the hydrostatic unit for damage.

TRANSAXLE DISASSEMBLY

The transmission case is held together with six bolts.

Disassembly may be made from either side, leaving the gears intact in the opposite side. **NOTE:** It is not necessary to remove the hydrostatic unit if only the transaxle is being serviced.

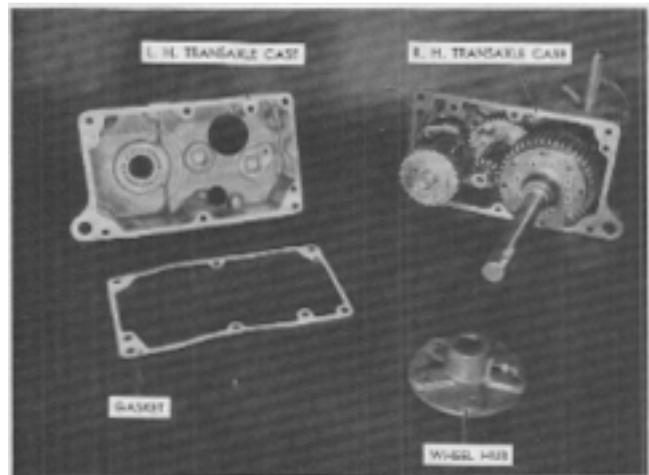


FIG. 99. Split Transaxle and Gasket

1. Remove both wheel hubs by loosening the lock nuts and set screws. Slide the hubs from the axle. A special wheel puller may be required.

2. Remove the woodruff keys and file any rough edges from the key slots and the ends of the axle.

3. Remove the six bolts holding the transmission case halves together.

4. Lightly tap the half to be removed with a plastic or rawhide mallet to break the seal. Slide the case-half off the axle carefully to avoid damaging the oil seals.

5. Remove the old gasket and carefully clean the sealing surfaces.

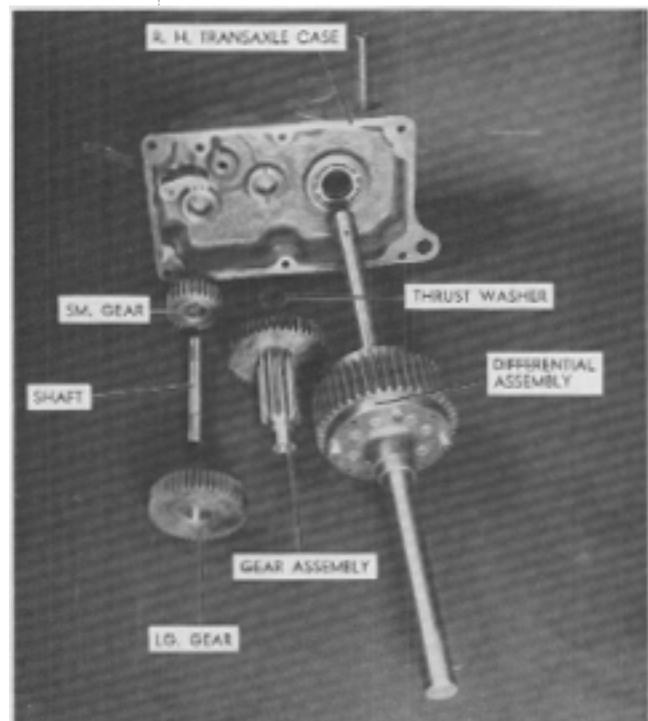


FIG. 100. Disassembled Transaxle

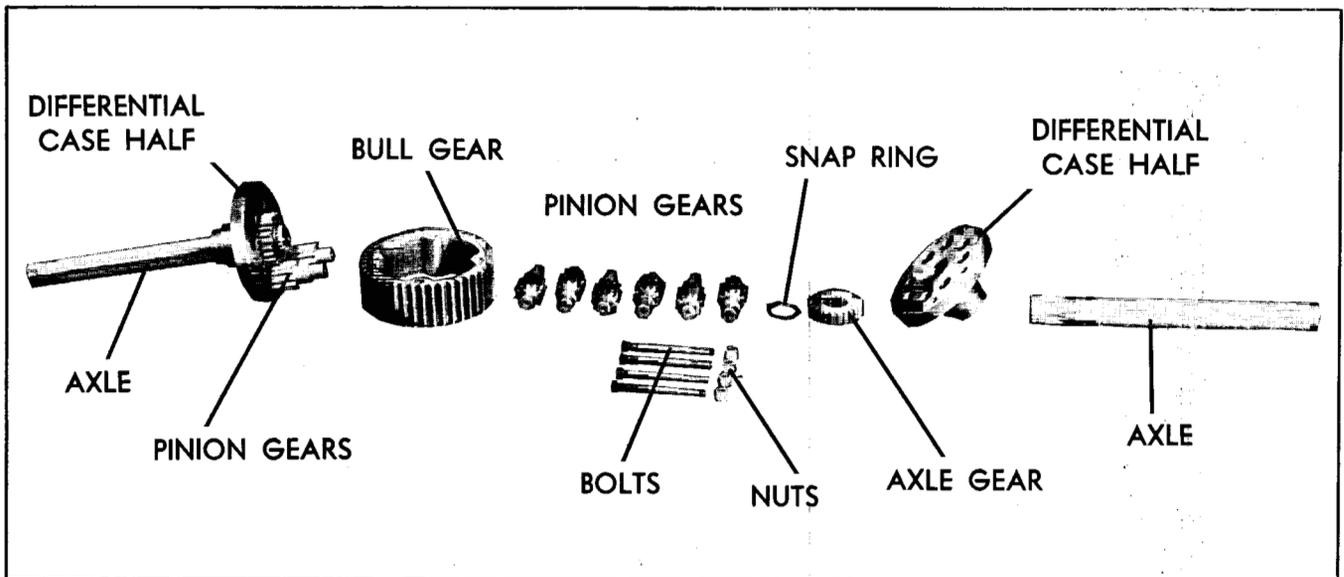


FIG. 101. Disassembled Differential

6. Carefully slide the differential assembly out of the case.

7. Remove gear assembly consisting of Nos. 103395, 101887 and 102781. Also remove large gear No. 101885 intact.

8. Slide gears off of the No. 5965 shaft.

9. Remove the four nuts and bolts from the differential assembly. The unit may now be separated allowing the replacement of the bull gear, pins, pinion gears or the differential cases. Note the position of the pinion gears. Adjacent pinions are installed in opposite directions (teeth up or teeth down). Therefore, the positions of diagonally opposite pinions are the same (see photo).

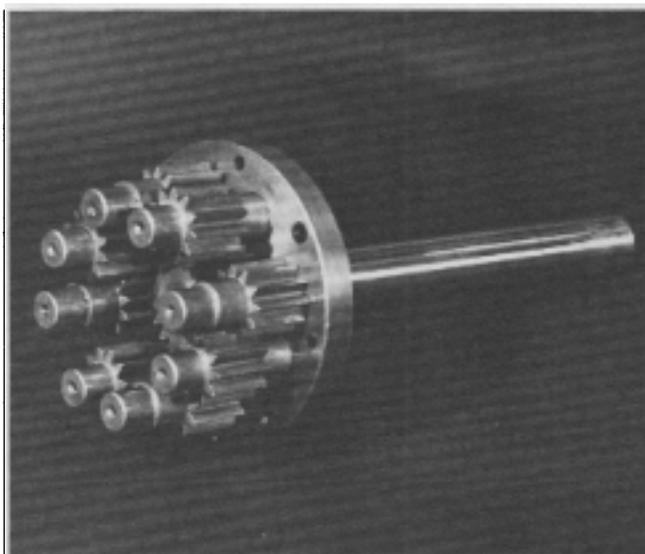


FIG. 102. Pinion Gear Placement

10. The axle gears may be separated from the axle by removing the snap ring. **NOTE:** During re-assembly, tighten all bolts securely in sequence.

PARKING BRAKE AND OIL FILTER

1. To replace the oil filter, remove by turning counter-clockwise. This throw-away filter should be replaced every year, or every 100 operating hours.

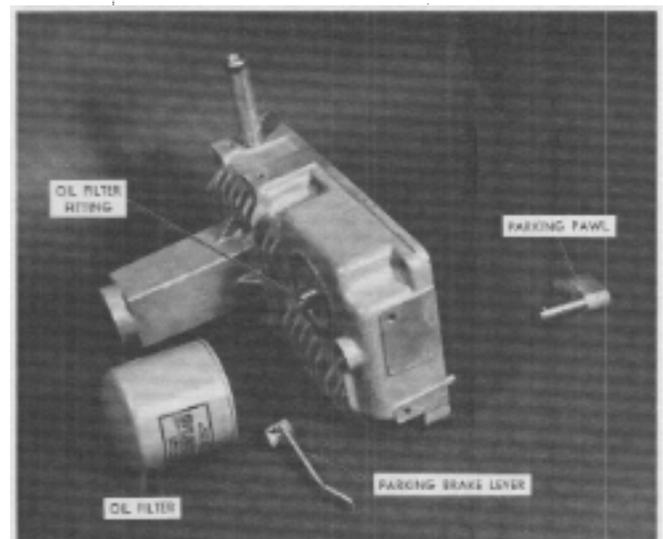


FIG. 103. Side View Showing Filter and Parking Brake

2. To remove the parking brake lever, drive out the roll pin using a $\frac{1}{8}$ " punch. Slip the brake lever off the shaft.

3. Remove the parking pawl from inside the transmission case. **NOTE:** During reassembly the parking pawl should be pointing toward the rear and the parking brake lever toward the front when installing the roll pin.

CAUTION

For proper operation it is vitally important to keep the interior of the transmission as free of dirt and foreign matter as possible.

Exercise caution when servicing the unit to prevent damage to oil seals, bearings, and other internal parts.

Transmission oil capacity is a total of five quarts on most tractors, six quarts on "D" series tractors. Normally, one quart is retained in the hydrostatic unit, leaving four quarts to be added. Run the tractor for a minute, then check oil level. Add oil if necessary. Use only 10W30 automotive engine quality oil.

TRANSAXLE GASKET INSTALLATION

1. Block the tractor under the frame.
2. Loosen the lock nut and set screw on the **right hand** side and remove the entire tire, wheel and hub assembly. Remove the woodruff key and file any rough edges from the key slot and the end of the axle.
3. Remove the tractor seat and fender assembly by removing the hardware holding it to the transaxle. Remove the footrest bracket and the belt guard assembly, and remove the drive belt from the transmission. Remove any access plates.
4. Disengage the spring from the parking brake. Remove the rear hitch.
5. Remove the two cap screws holding the right half of the transmission case to the frame.
6. Remove the six nuts from the bolts holding the transmission halves together. **Do not** remove the bolts securing the hydrostatic unit.

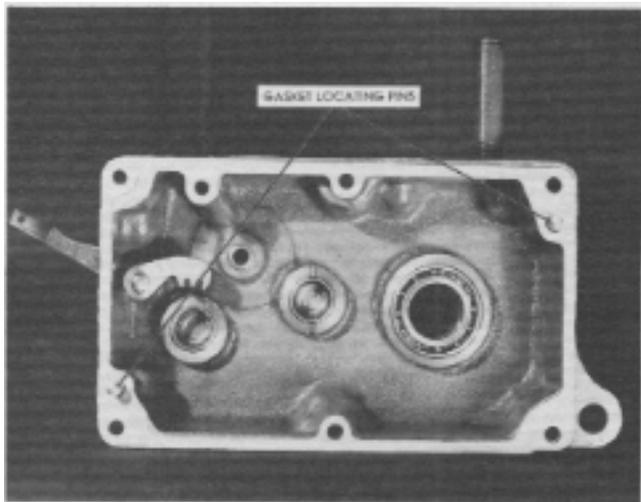


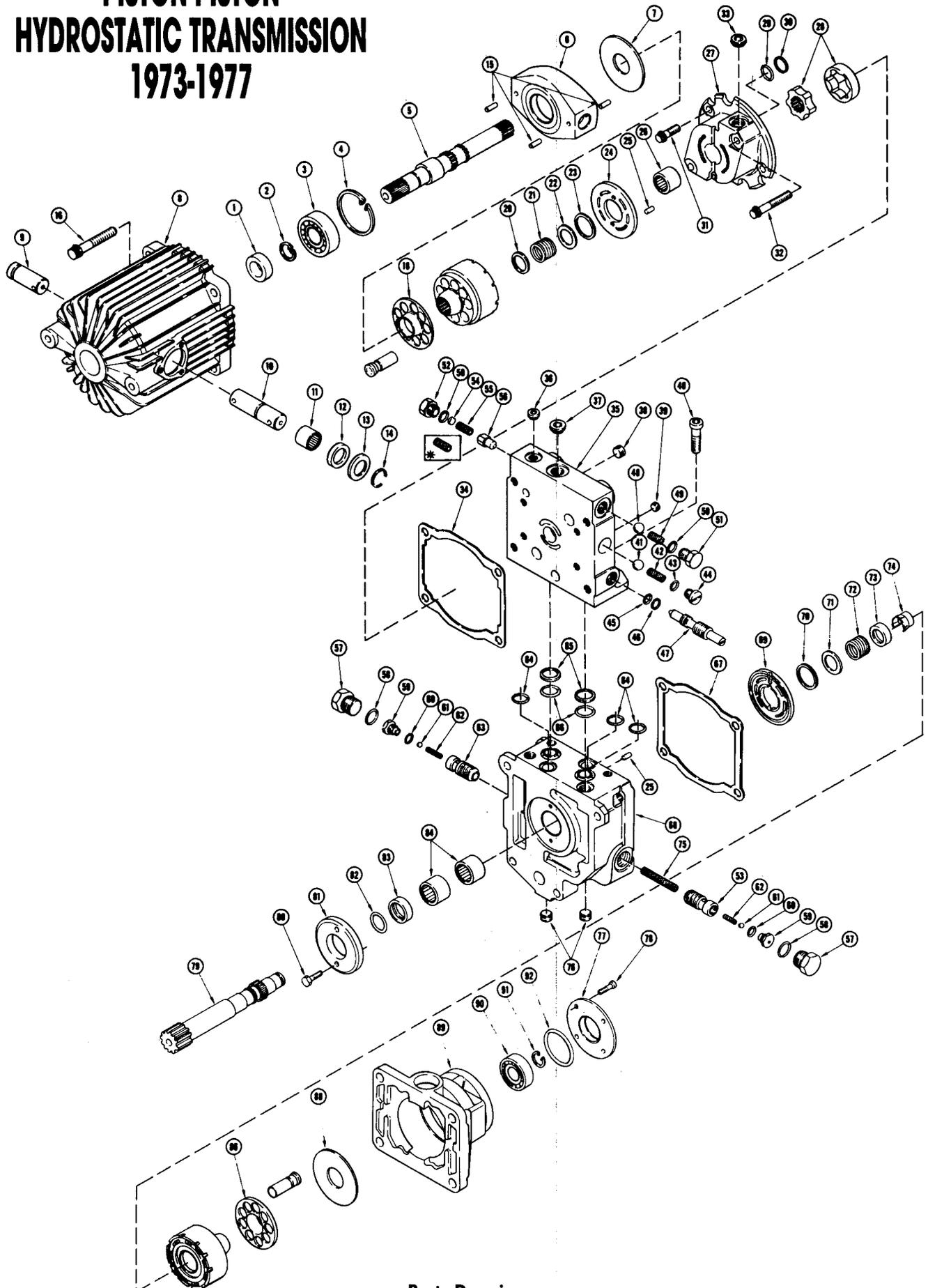
FIG. 104. Transmission Half and New Gasket

7. Slide the transmission half off the axle. Carefully clean all machined surfaces of dirt. Take care to keep any foreign matter from entering the system. Replace the gasket.

8. Carefully reinstall the transmission half to prevent damage to the axle seal. Tighten all nuts securely in rotation.

NOTES:

PISTON-PISTON HYDROSTATIC TRANSMISSION 1973-1977



Parts Drawing

PARTS LIST 1973-1977*
PISTON-PISTON HYDROSTATIC TRANSMISSION

Parts available only through Authorized Dealers.
 When ordering parts always list Part No. and Description.
(Specifications subject to change without notice.)

ITEM NO.	PART NO.	DESCRIPTION	NO. REQ'D.
1	7877	Pump Shaft Seal	1
2	83-3870	Snap Ring (Formerly 200229)	1
3	200214	Ball Bearing	1
4	200215	Snap Ring	1
5	200213	Pump Shaft	1
6	200217	Variable Swash Plate	1
7	83-3750	Thrust Plate (Formerly 200188)	1
8	200216	Pump Housing	1
9	83-3900	Stub Trunnion Shaft (Formerly 200236)	1
10	83-3890	Control Trunnion Shaft (Formerly 200235)	1
11	83-3910	Needle Bearing (Formerly 200237)	2
12	103461	Seal	2
13	103462	Washer	2
14	103463	Retaining Ring	2
15	83-3880	Spirol Pin (Formerly 200234)	3
16	200239	Cap Screw	4
	200219	Cylinder Block Kit— Consists of nine pistons and a cylinder block (not available separately) plus the correct number of items 18, 20, 21, 22 & 23.	
18	200212	Slipper Retainer	1
20	83-3920	Washer (Formerly 200243)	1
21	200244	Spring	1
22	200245	Front Washer	1
23	200208	Retaining Ring	1
24	200220	Valve Plate	1
25	83-3820	Locating Pin (Formerly 200198)	2
26	200222	Needle Bearing	1
27	200224	Charge Pump Housing	1
28	83-3860	Gerotor Assembly (Formerly 200225)	1
29	971018	O-Ring, Large	2
30	103184	Back Up Ring	2
31	200231	Cap Screw, Short	2
32	200230	Cap Screw, Long	2
33	200226	Socket Head Plug	2
34	83-3850	Pump Gasket (Formerly 200223)	1
35	200238	Pump End Cap	1
36	200241	Socket Head Plug	1
37	200226	Socket Head Plug	1
38	200227	Pipe Plug	1
39	83-3830	Pipe Plug, 1/4" (Formerly 200199)	2
40	83-3730	Cap Screw, Short (Formerly 200184)	2
41	103216	Ball	2
42	103457	Check Valve Spring	2
43	973310	O-Ring	2
44	103458	Check Valve Plug	2
45	971012	O-Ring	1
46	103459	Back Up Ring	1
47	103460	Push Valve	1

* Refer to specific tractor parts manual to determine replacement parts information for 1978-1980 tractors.

PARTS LIST 1973-1977
PISTON-PISTON HYDROSTATIC TRANSMISSION

Parts available only through Authorized Dealers.
 When ordering parts always list Part No. and Description.
(Specifications subject to change without notice.)

ITEM NO.	PART NO.	DESCRIPTION	NO. REQ'D.
48	103216	Ball	1
49	103455	Charge Relief Valve Spring	1
50	973310	O-Ring	2
51	7752	Plug	1
52	103465	Plug	1
53	103588	Acceleration Valve Body	1
54	103574	Shim Set	1
55	103464	Implement Relief Valve Spring	1
56	6632	Relief Valve Cone	1
57	103593	Hex Plug	1
58	973500	O-Ring	2
59	103591	Metering Plug	2
60	973190	O-Ring	2
61	103590	Ball	2
62	103589	Spring	2
63	103588	Acceleration Valve Assembly	2
64	971015	O-Ring	3
65	103184	Back Up Ring	2
66	971018	O-Ring	2
67	83-3760	Motor Gasket (Formerly 200191)	1
68	200193	Motor End Cap	1
69	200203	Valve Plate	1
	200190	Cylinder Block Kit – Consists of nine pistons and a cylinder block (not available separately) plus the correct number of items 70, 71, 72, 73 & 86.	
70	200208	Retaining Ring	1
71	200209	Washer	1
72	200210	Spring	1
73	200211	Retainer	1
74	200204	Retaining Clip	1
75	103592	Acceleration Valve Spring	1
76	83-3830	Pipe Plug (Formerly 200199)	2
77	103840	Motor Cover Plate	1
78	200200	Cap Screw	4
79	105124	Motor Shaft (Formerly 200197)	1
80	83-3790	CapScrew (Formerly 200195)	2
81	83-3780	Centering Pilot (Formerly 200194)	1
82	200205	O-Ring	1
83	83-3800	Seal Retainer With O-Ring (Formerly 200196)	1
84	83-3770	Needle Bearing (Formerly 200192)	2
86	200212	Slipper Retainer	1
88	83-3750	Thrust Plate (Formerly 200188)	1
89	200189	Motor Housing	1
90	200187	Ball Bearing	1
91	200206	Retaining Ring	1
92	970132	O-Ring	1
93	200185	Copper Washer	1
94	83-3740	Socket Head Cap Screw (Formerly 200186)	2
95	200202	Hex Head Cap Screw	4

* Tractors not equipped with a hydraulic lift use spring No. 103455 here, and only the plug (item 51) and o-ring (50) on the opposite side.

SERVICE BULLETIN RECORD

Bulletin No.	Date Issued	Topic or Part Involved
Hydrogear Bulletins		
62	3/65	Hydrogear - Transaxle Gasket Replacement
64	4/65	Hydrogear - Kit 6059, for use with Sickle Bar mower.
67	7/65	Hydrogear - Oil leak due to loose slide casting.
68	9/65	Hydrogear - Kit 6066, for correcting oil leak at cam block trunnion support casting or serial number plate.
80	12/66	Hydrogear - Transmission/Transaxle usage and interchangeability 1967 and prior.
83	1/67	Hydrogear - New relief valve spring 7264; relates to tiller installation on earlier units.
84	2/67	Hydrogear - Oil and filter change recommendation. (Note Dexron II is present equivalent to Type A Automatic Transmission fluid).
101	7/68	Hydrogear - Replacement unit installation information.
118	12/69	Hydrogear - Securing hydraulic valve hoses.
437	3/89	Hydrogear - Sundstrand rebuilding service.
Piston - Piston Bulletins		
172	4/75	Piston-Piston - Use of rust preventative on axles.
174	5/75	Piston-Piston - Differential bolt diameter change.
195	12/76	Piston-Piston - Motor snap ring failure, 1975 and prior tractors; S/A 105124
217	2/78	Piston-Piston - Driven coupling installation on D-Series tractors, 1977 and prior: S/A 105147. Also see SB 305.
252	11/79	Piston-Piston - Conversion of limited slip to 8-pinion differential, 1968-73 tractors; S/A 105173/Gear 101523.
273	5/80	Piston-Piston - Differential end cap nut 108881.
305	4/81	Piston-Piston - Driven coupling repair procedure, D-Series tractors.
437	3/89	Piston-Piston - Sundstrand rebuilding service.

NOTE: Service Bulletin information is for repair reference purposes. Parts and assemblies covered by bulletin may no longer be available. Warranty coverage has expired for all Sundstrand-equipped products.