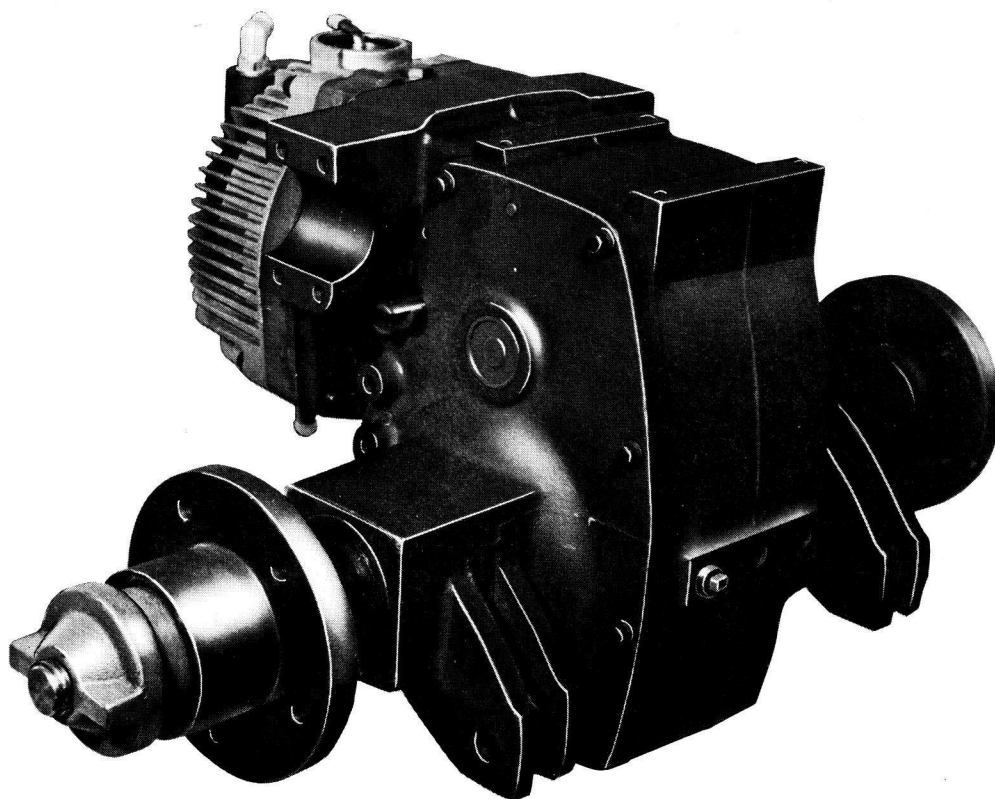


HUSKY TRACTOR

MODEL 10 HYDROSTATIC PACKAGE AND TRANSAXLE ASSEMBLY



service and maintenance instructions

MODEL 194
1256
1257



BOLENS

PORT WASHINGTON, WISCONSIN, U.S.A.

FORM NO. 552216 — REVISED

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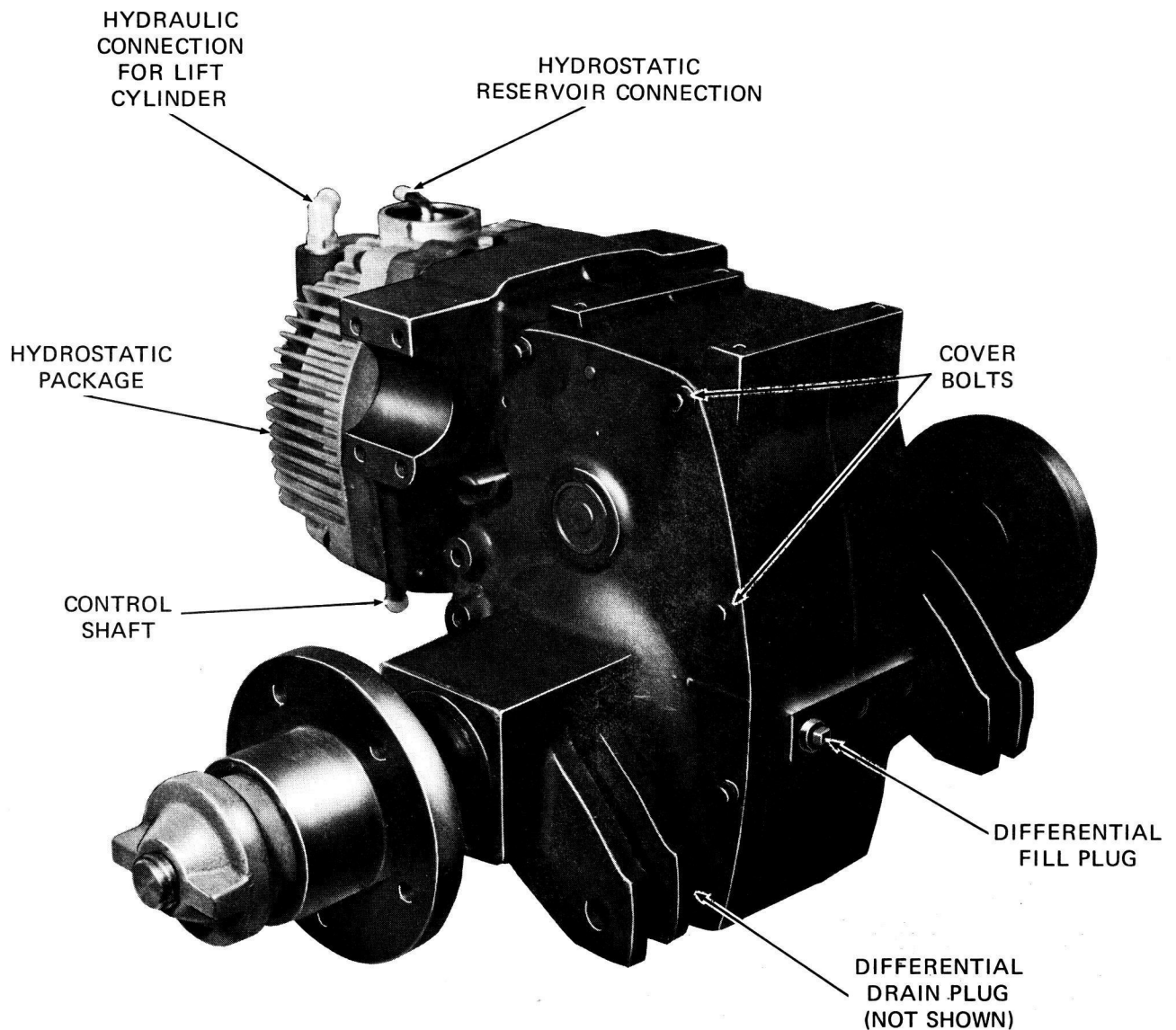


Figure 1

DESCRIPTION

The Husky tractor hydrostatic transmission converts mechanical energy at the input shaft into pressure in a nearly incompressible working fluid, and then reconverts it into mechanical energy at the output shaft. The purpose of this transformation is to provide a means of varying the output torque, speed. In operation, the pressure within the hydrostatic transmission is variable and will

increase and decrease automatically as the draw-bar load of the tractor increases and decreases.

The hydrostatic transmission is composed of three major parts - a ball piston pump; ball piston motor; a system of valves located between the pump and motor. By varying the displacement of the pump, an infinite number of speeds are available within a range of 8 miles per hour in forward and 4 miles per hour in reverse at full engine R.P.M.

MARSHALLMATIC HYDROSTATIC FLOW DIAGRAM

MODEL 10

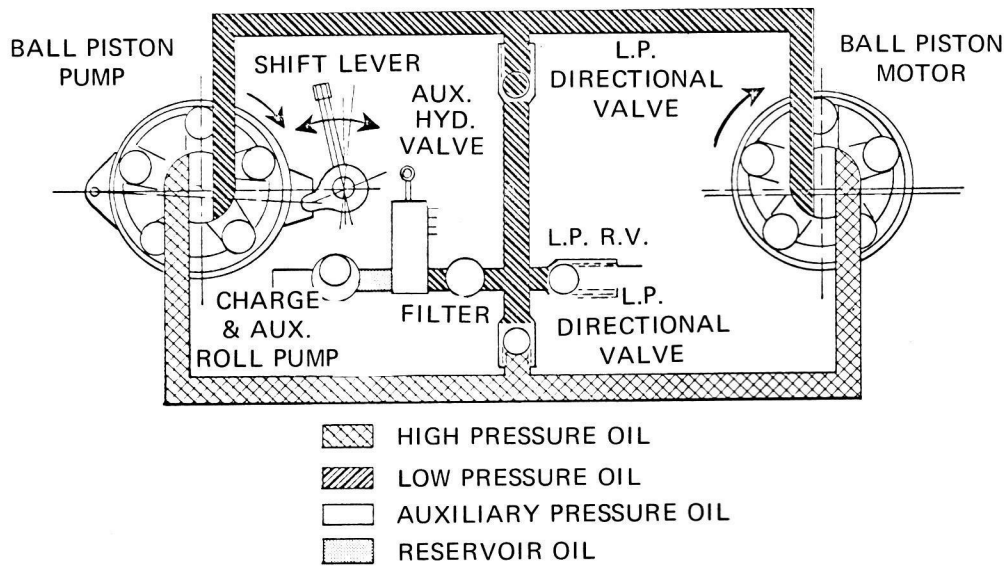


Figure 2

FLOW DIAGRAM

In operation, the pump produces a flow of oil through internal channeling forming a closed loop between the pump and the motor. The oil flow produced by the pump is represented on the chart by the checked area and that flow returning from the motor to the pump is the crossed area.

Vehicle speed regulation is achieved by changing the oil delivery of the ball piston pump. When the lever is moved in the forward (clockwise) direction, the cam ring is moved off center and oil immediately begins to flow through the circuit. Moving the position of the travel pedal in the forward direction will vary the flow of oil, which in turn will vary the speed of the tractor. Then the travel pedal is moved in the reverse direction (counterclockwise), the flow of oil is reversed and the tractor will also reverse its direction. It should be kept in mind that since the circuit is a closed-loop and that oil is relatively incompressible, whatever flow reaches the ball piston motor will immediately be transmitted into a certain speed, depending on the volume and direction of the flow.

In order to better understand the circuit, refer to the white channeling on the flow diagram at the charge or auxiliary roll-pump. This pump serves

as the inlet for the hydrostatic transmission circuit. The roll pump or charge pump performs three functions:

1. Maintains flow and pressure in auxiliary hydraulic circuit,
2. Maintains some pressure on the low-pressure side of the hydrostatic circuit so as to supercharge the variable displacement pump and,
3. Supplies oil lost due to internal leakage in the hydrostatic circuit.

Following the circuit from this point, the dotted channeling denotes the auxiliary pressure, established by a valve in the auxiliary hydraulic valve block. Next, the oil flows through a filter which removes particles of dirt and other foreign matter. The oil then flows to a pair of directional check valves and the low pressure relief valve. At this point there is more oil available than is needed to make up losses, so oil must circulate past the low pressure relief valve back into the reservoir. The directional valves are pressure dependent and the lower directional valve on the flow diagram is closed due to the high pressure oil behind it, therefore, the make-up oil enters the upper or low-pressure side of the circuit. In reverse, the make-up oil enters through the lower directional valve.

OPERATING OF VEHICLE

For optimum control and power, the Husky tractor should be operated at constant **FULL-THROTTLE ENGINE SPEED**. Complete control of the vehicle is accomplished through the use of the travel pedal. When operating the vehicle under varying load conditions, there will be a noticeable change in ground speed. It should be noted that when ground speed is reduced due to greatly increased loads, the travel pedal should be directed toward the neutral position in order to increase the torque to the rear wheels. For example, if the engine starts to "lug" down while attempting to maintain a given speed when encountering a hill or other increased load, it is important to move the travel pedal toward neutral rather than toward full speed. This is the same as shifting down to a lower gear with a typical mechanical transmission.

Prolonged lugging or full travel-pedal operation that exceeds maximum engine output will raise engine and oil temperatures. If the vehicle has been performing under the previously mentioned condition, allow it to operate at a lower ground speed (lighter load but at **FULL ENGINE R.P.M.**), then normal operating temperatures will again be established. 160°-170°F. is the normal operating temperature. These temperatures will feel hot "to the touch."

IMPORTANT

OPERATOR MUST KEEP FOOT ON THE TRAVEL-PEDAL FOR MAXIMUM CONTROL OF TRACTOR. MOVING TRAVEL-PEDAL MANUALLY TO NEUTRAL OR BEYOND TO OBTAIN DESIRED DECELERATION BY MEANS OF DYNAMIC BRAKING IS THE METHOD INTENDED IN HYDROSTATIC DESIGN.

FUNCTION OF THE BOLENS TRACTOR TRANSMISSION LEVER



Figure 3

The Husky tractor hydrostatic transmission has a closed hydraulic circuit, therefore, the vehicle cannot be pushed manually unless the transmission lever is in **DRIVE** position and the drive belt

idler is locked out by hooking over the raised hex head capscrew provided on the side of the frame. This lock out operates in conjunction with the travel pedal being held in full forward position.

When the transmission lever is in the **DRIVE** position, the forward and reverse motion of the vehicle is controlled entirely with the travel pedal.

Placing the transmission lever in **PARK** position locks the travel pedal in its centered or neutral position and locks the gear train. The vehicle should not be pushed with transmission locked under any circumstances because of possible damage to the parking lock, or transmission.

CAUTION

DO NOT PLACE TRANSMISSION LEVER INTO PARK POSITION WHILE TRACTOR IS IN MOTION. PREMATURE SHIFTING INTO PARK MAY RESULT IN SERIOUS DAMAGE TO THE TRANSAXLE.

TRAVEL PEDAL

The "Travel Pedal" was adjusted at the factory with tip of the pedal approximately 45° forward of the verticle center line. If the operator would prefer to either increase or decrease this angle for his personal comfort the pedal can be adjusted as follows. Refer to figure 4. Loosen hex nut "A." Remove lock nut, lock washer and cap screw "B." Turn rod end "C" onto rod "D" to increase the pedal angle. Turn rod-end off towards pedal end to decrease the pedal angle. After adjustment has been made, reinstall cap screw, lock washer and hex nut "B." Lock hex nut "A" securely against rod end "C."

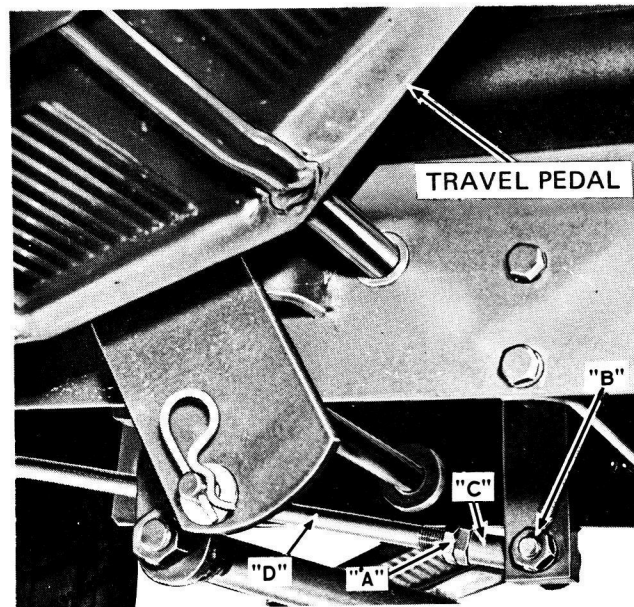


Figure 4

GENERAL MAINTENANCE

OIL LEVEL

The hydrostatic should be checked after every eight hours of operation and should always be maintained between the add and full lines on the dipstick. If it is necessary to add oil, only type A transmission fluid or special oil available from Bolens should be used.

The differential oil level should be checked by removing the plug at rear. If necessary to add oil, use SAE #90 only. SEE FIG. 1.

IMPORTANT

BEFORE CHECKING OIL ALWAYS THOROUGHLY CLEAN AREA AROUND DIPSTICK PLUG TO AVOID DIRT OR OTHER CONTAMINATION FROM ENTERING RESERVOIR TANK. ALWAYS WATCH FOR OIL LEAKS AT HOSES, SEALS AND FITTINGS. LOW LEVEL OR INADEQUATE OIL WILL RESULT IN PERMANENT DAMAGE TO HYDRAULIC SYSTEM.

OIL FILTER (Fig. 5)

The Husky tractor hydrostatic is equipped with a replaceable oil filter which can be removed by turning it counterclockwise. Oil filter change:

Home Owners: Once a year or 500 hours. Industrial or Commercial: Once every three months or whenever dipstick check indicates dirty oil.

COOLING

To maintain proper cooling, the hydrostatic exterior should be kept free of dirt, oil and grass, particularly the finned area behind the fan.

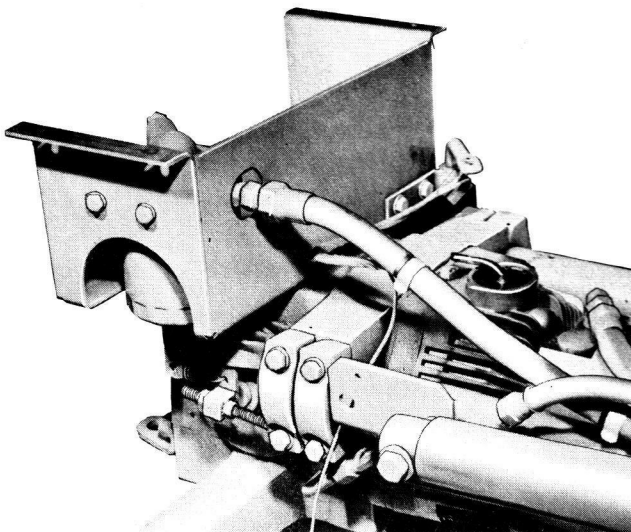


Figure 5

TROUBLESHOOTING

IMPORTANT

A TEMPORARY PROCEDURE TO AID IN QUICKLY CHECKING OUT GENERAL ENGINE AND TRANSAXLE PERFORMANCE.

Observe general engine performance, such as engine miss, carburetor adjustments, governor action, etc.

If engine performance appears to be normal and a thorough inspection of linkage connections, adjustments, etc., has been carried out, then proceed as follows for a transaxle check:

1. Remove cover plate.

CAUTION

TRANSAXLE DRIVE-LINE FAN IS EXPOSED, IF AN ATTEMPT IS MADE TO TEMPORARILY RUN THE ENGINE, BE EVER AWARE OF SPINNING FAN BLADES WHILE ENGINE IS RUNNING.

2. Observe all mechanical linkage; free up, tighten or correct if necessary.
3. Recheck all hydraulic connections and seals for leakage.
4. Block up rear end of tractor with rear wheels slightly off the ground. Slowly work speed control pedal back and forth to remove air out of hydraulic system.

LOSS OF MOTION:

1. Oil level in transmission below level.
2. Inoperative hydrostatic package.

NOTICE IMPORTANT: — DUE TO THE SELECT FITS IN THE HYDROSTATIC IT IS A PACKAGE EXCHANGE ITEM. IT SHALL NOT BE TAKEN APART UNDER ANY CIRCUMSTANCES OR WARRANTY ON IT WOULD BE VOID.

LOSS OF OIL:

1. Leaking or damaged parts.
2. Axle Oil Seals.
3. Gasket between transmission and differential housing.
4. Leaking Lift Valve
5. Leaking Lift Cylinder.
6. Ruptured or loose hydraulic lift hoses and fittings.

LIFT VALVE AND CYLINDER WILL NOT LIFT OR HOLD:

1. Lift valve out of adjustment.
2. Inoperative or leaking lift valve.
3. Leaking lift cylinder.
4. Hydraulic lift hoses crossed at transmission outlet ports.
5. Plugged or kinked hydraulic hoses.
6. Air lock in hydrostatic lines.

NOTICE IMPORTANT: — DUE TO THE SELECT FITS IN THE HYDROSTATIC IT IS A PACKAGE EXCHANGE ITEM. IT SHALL NOT BE TAKEN APART UNDER ANY CIRCUMSTANCES OR WARRANTY ON IT WOULD BE VOID.

REMOVAL OF COMPLETE TRANSAXLE ASSEMBLY FROM TRACTOR

Cleanliness is the first order. Clean the transmission prior to disassembly.

1. Disconnect taillight wire.
2. Remove plastic hose from expansion tank and plug tank end and hose end.
3. Remove fender and seat assembly.
4. Remove cover plate.
5. Remove wires from interlock switch.
6. Remove complete control rod.
7. Remove both hoses from Hydrostatic, plug all ends, and mark hose to insure reconnecting to their proper ports.
8. Block tractor frame. Mark tube VS. clamp location before loosening clamps.
9. Remove complete transaxle assembly by rolling it off of frame.

REMOVAL OF HYDROSTATIC PACKAGE FROM TRANSAXLE

1. Remove the filter tube from the Hydrostatic Package and block ends.
2. Remove linkage from bottom of Hydrostatic Package.
3. Remove the four (4) 12 point bolts that hold Hydrostatic Package to transaxle. Separate package from transaxle.

IMPORTANT: Do not use a bar or screw driver to pry package out of transaxle housing. Damage to the sealing surfaces would occur. Nicks or burrs must be removed.

4. Remove drive gear and plastic hose from Hydrostatic Package.

CAUTION

CAREFULLY BLOCK TRANSAXLE WHILE REMOVING THE HYDROSTATIC PACKAGE, TO AVOID ACCIDENTAL INJURY OR HYDROSTATIC DAMAGE.

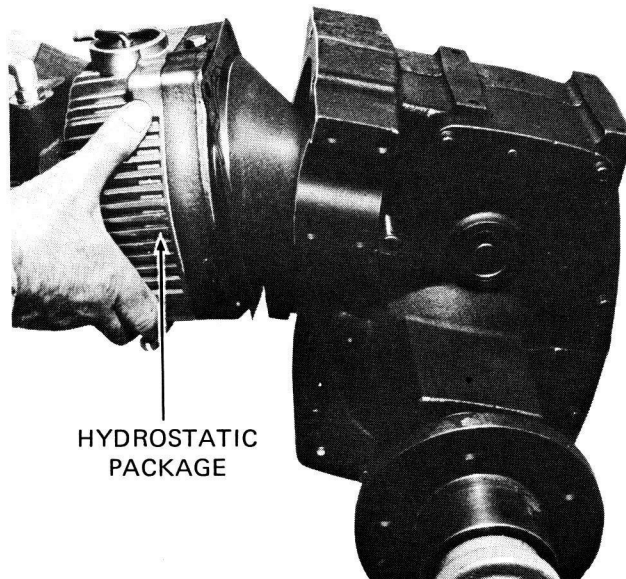


Figure 6

INSTALLATION OF THE HYDROSTATIC PACKAGE TO TRANSAXLE

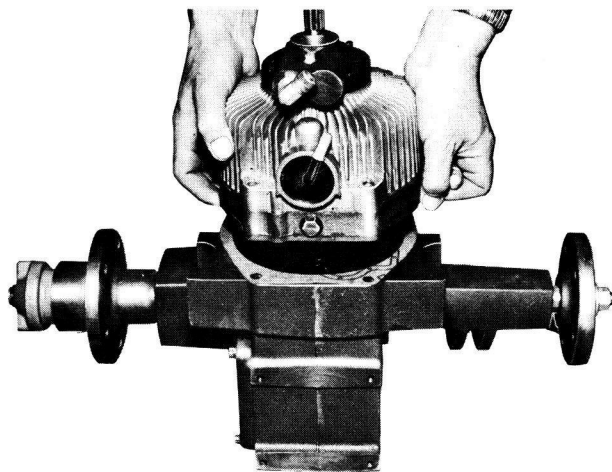


Figure 7

1. Install drive gear and secure with retainer ring on new replacement package and install package into transaxle using new gasket. Torque the four (4) 12 point bolts to 240 inch pounds.
2. Install linkage to bottom of Hydrostatic Package.
3. Install plastic hose to hydrostatic package.

INSTALLATION OF COMPLETE TRANSAXLE ASSEMBLY TO TRACTOR

1. Grease splined shaft on Hydrostatic Package and roll transaxle assembly into proper position on frame.
2. Move transaxle to its original position, then tighten right hand side first, then left hand side.
3. Remove blocking from under frame and install control rod.
4. Install all hoses and filter tube to new package taking care not to loose oil from the Hydrostatic Package or hoses.
5. Replace interlock switch wires.
6. Check travel pedal for neutral position.
7. Install cover plate, fender and seat assembly.
8. Attach plastic hose to expansion tank.
9. Connect taillight wires.
10. Operate lift cylinder through several cycles.

NOTE

Oil level should be checked at this point in both hydrostatic and transaxle.

REAR AXLE AND DIFFERENTIAL DISASSEMBLY

NOTE

Rear Axle and differential gears can be replaced without removing transaxle assembly from the tractor.

1. Drain out transmission oil.
2. Safely block up rear of tractor at the frame and remove left rear wheel.
3. Remove retaining ring (18) hand adjusting hub (19) spring washer (22), and retaining ring (20).
4. Remove the remaining parts of the controlled differential and left hand wheel.
5. Remove transaxle side cover (52).
6. Remove lock nut (50) and seal (46). The axle assembly can be removed from the gear case by pulling it straight out.
7. Differential gears can now be removed from axle.

NOTE

Hydrostatic unit must be removed from transmission if upper shaft assembly is to be removed.

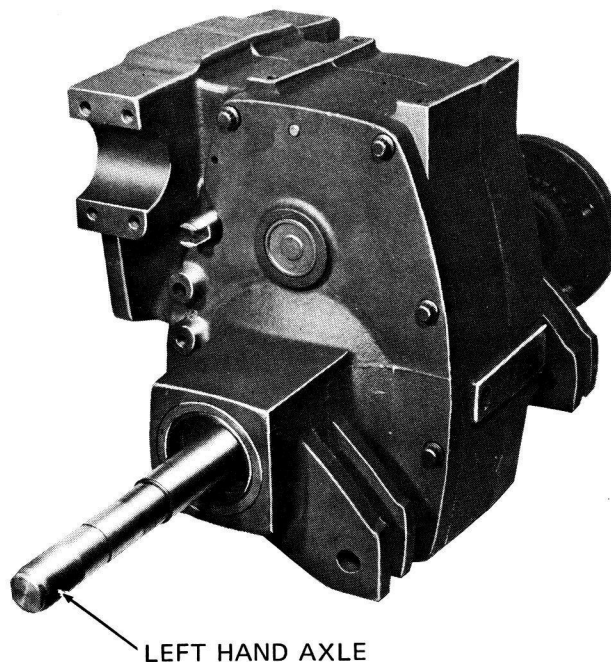


Figure 8

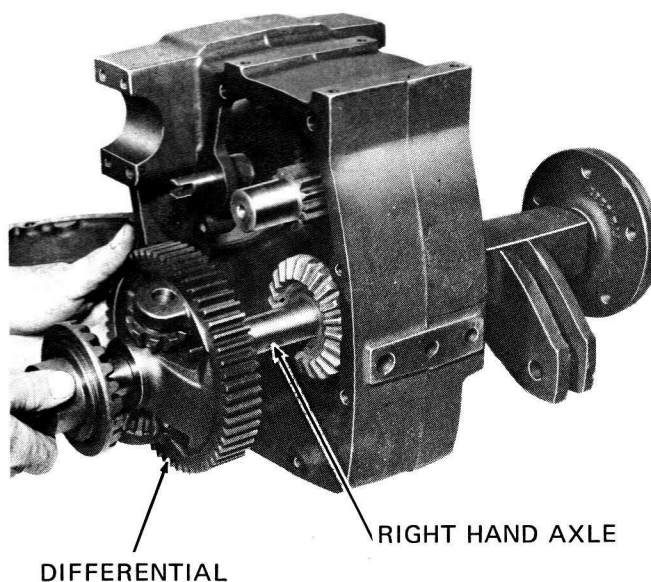
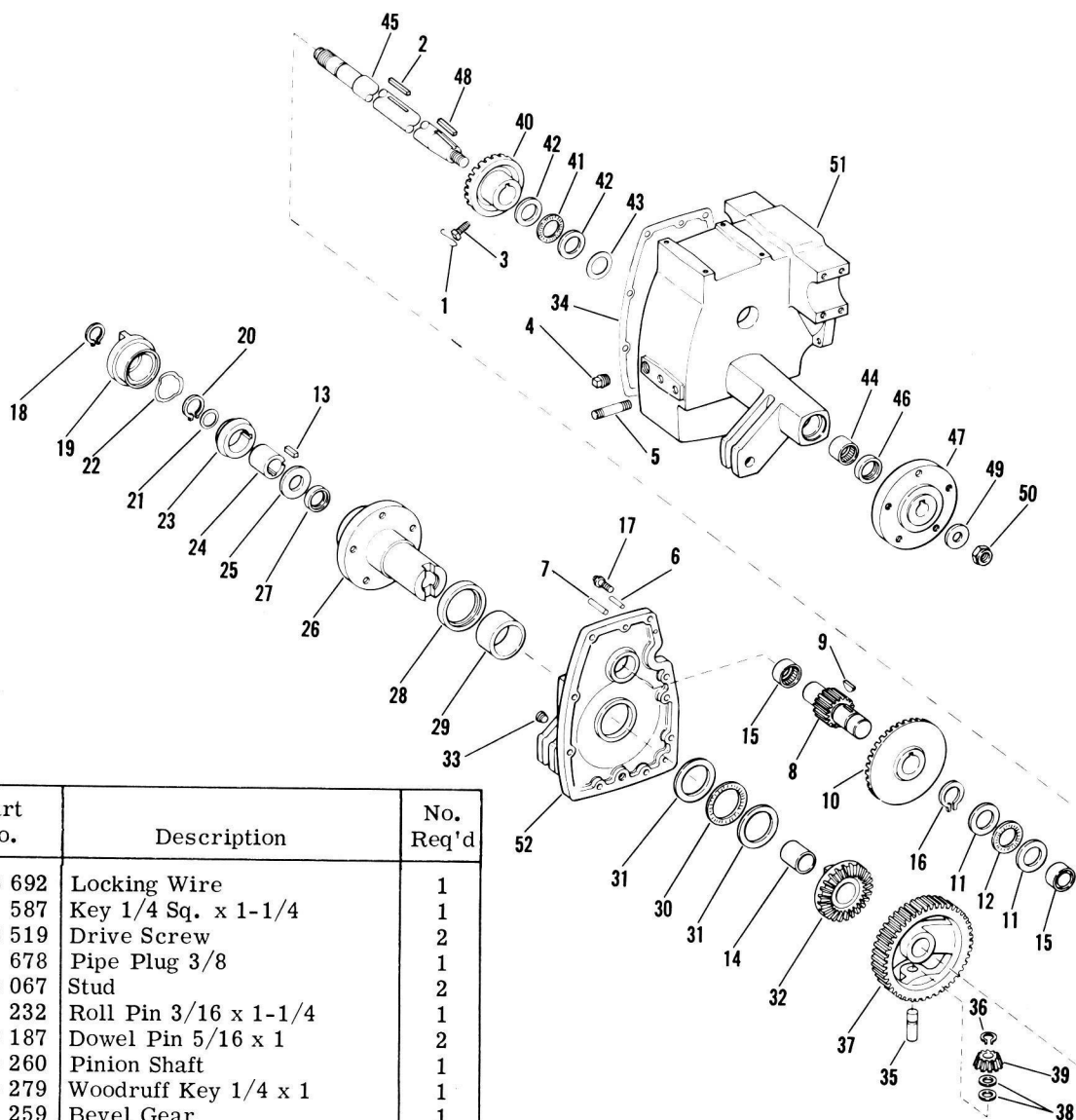


Figure 9

TRANSAXLE ASSEMBLY MODLE 194-01 ASSEMBLY PART NO. 1720350

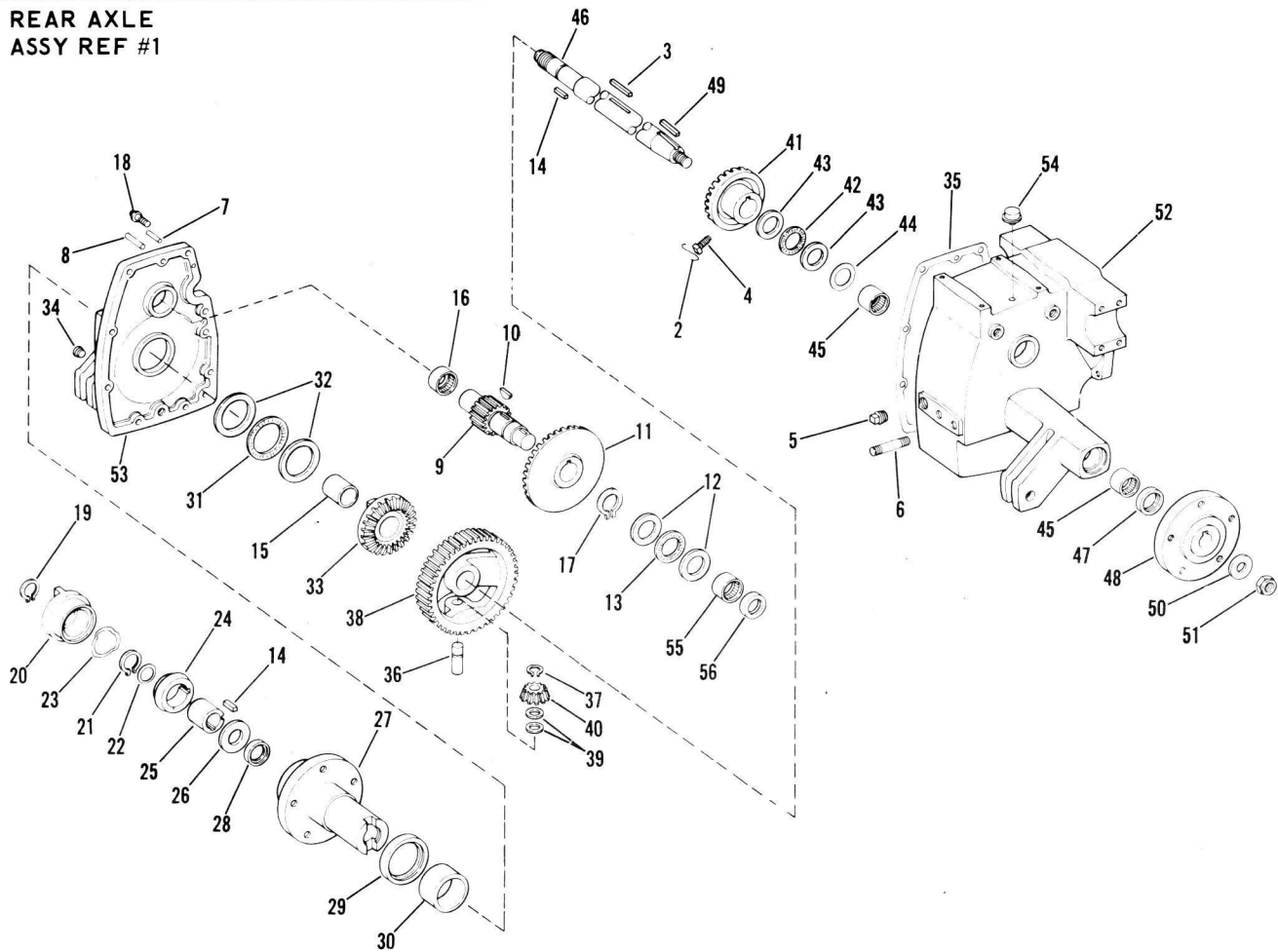


Ref. No.	Part No.	Description	No. Req'd
1	1716 692	Locking Wire	1
2	1721 587	Key 1/4 Sq. x 1-1/4	1
3	1716 519	Drive Screw	2
4	1105 678	Pipe Plug 3/8	1
5	1718 067	Stud	2
6	1185 232	Roll Pin 3/16 x 1-1/4	1
7	1110 187	Dowel Pin 5/16 x 1	2
8	1720 260	Pinion Shaft	1
9	1100 279	Woodruff Key 1/4 x 1	1
10	1720 259	Bevel Gear	1
11	1185 767	Thrust Race	2
12	1185 764	Thrust Bearing	1
13	1104 336	Key 1/4 Sq. x 1	2
14	1185 832	Bearing	1
15	1185 774	Needle Bearing	2
16	1185 303	Retaining Ring	1
17	1185 771	Ferry Screw 3/8-16 x 1	7
18	1180 025	Retaining Ring	1
19	1714 564	Adjusting Nut	1
20	1185 689	Retaining Ring	1
21	1800 338	Shim	AR
22	1721 357	Spring Washer	2
23	1714 562	Cone	1
24	1714 561	Coupling	1
25	1713 468	Thrust Washer	1
26	1720 266	LH Wheel Hub	1
27	1185 295	Oil Seal	1
28	1185 769	Oil Seal	1
29	1185 770	Bearing	1
30	1185 768	Thrust Bearing	1
31	1185 765	Thrust Race	2
32	1720 264	Bevel Gear	1
33	1105 640	Countersunk Pipe Plug	1
34	1720 257	Gasket	1

Ref. No.	Part No.	Description	No. Req'd
35	1713 467	Differential Pinion Shaft	2
36	1185 561	Retaining Ring	2
37	1720 268	Gear and Carrier	1
38	1712 763	Thrust Washer	4
39	1713 466	Bevel Pinion	2
40	1720 271	Bevel Gear	1
41	1185 763	Thrust Bearing	1
42	1185 766	Thrust Race	2
43	1720 299	Shim	AR
44	1185 645	Needle Bearing	2
45	1720 269	Axle	1
46	1185 642	Oil Seal	1
47	1720 293	Wheel Hub	1
48	1108 848	Key 5/16 Sq. x 1-1/4	1
49	1185 847	Special Flat Washer	1
50	1110 297	Lock Nut 5/8-18	1
51	1720 249	Gear Case Housing	1
52	1720 252	Cover	1

TRANSAXLE ASSEMBLY MODEL 1256-01 & 1257-01 **ASSEMBLY PART NO. 1722476**

**REAR AXLE
 ASSY REF #1**



Ref. No.	Part No.	Description	No. Req'd
1	1722 476	Rear Axle Assy (Inc Ref 2-56) See page 6 for Illust.	1
2	1716 692	Locking Wire	1
3	1721 587	Key 1/4 Sq x 1-1/4	1
4	1716 519	Drive Screw	2
5	1105 678	Pipe Plug 3/8	1
6	1718 067	Stud	2
7	1185 232	Roll Pin 3/16 x 1-1/4	1
8	1110 187	Dowel Pin 5/16 x 1	2
9	1722 137	Pinion Shaft	1
10	1100 279	Woodruff Key 1/4 x 1	1
11	1720 259	Bevel Gear	1
12	1185 767	Thrust Race	2
13	1185 764	Thrust Bearing	1
14	1104 336	Key 1/4 Sq x 1	2
15	1185 832	Bearing	1
16	1185 774	Needle Bearing	1
17	1185 303	Retaining Ring	1
18	1185 771	Ferry Screw 3/8-16 x 1	7
19	1180 025	Retaining Ring	1
20	1714 564	Adjusting Nut	1
21	1185 689	Retaining Ring	1
22	1800 338	Shim	AR
23	1721 357	Spring Washer	2
24	1714 562	Cone	1
25	1714 561	Coupling	1
26	1713 468	Thrust Washer	1
27	1720 266	LH Wheel Hub	1
28	1185 295	Oil Seal	1

Ref. No.	Part No.	Description	No. Req'd
29	1185 769	Oil Seal	1
30	1185 770	Bearing	1
31	1185 768	Thrust Bearing	1
32	1185 765	Thrust Race	2
33	1720 264	Bevel Gear	1
34	1105 640	Countersunk Pipe Plug	1
35	1720 257	Gasket	1
36	1713 467	Differential Pinion Shaft	2
37	1185 561	Retaining Ring	2
38	1720 268	Gear and Carrier	1
39	1712 763	Thrust Washer	4
40	1713 466	Bevel Pinion	2
41	1720 271	Bevel Gear	1
42	1185 763	Thrust Bearing	1
43	1185 766	Thrust Race	2
44	1720 299	Shim	AR
45	1185 645	Needle Bearing	2
46	1720 269	Axle	1
47	1185 642	Oil Seal	1
48	1720 293	Wheel Hub	1
49	1108 848	Key 5/16 Sq x 1-1/4	1
50	1185 847	Special Flat Washer	1
51	1110 297	Lock Nut 5/8-18	1
52	1722 136	Gear Case Housing	1
53	1720 252	Cover	1
54	1826 82	Breather	1
55	1185 088	Needle Bearing	1
56	1185 882	Oil Seal	1

REAR AXLE AND DIFFERENTIAL ASSEMBLY

1. Install the closed end bearings flush with the outside in the case and the cover. Install bronze bearing and large diameter oil seal in the cover.
2. Install the two (2) needle bearings into the case using the 171-6804 bearings installation tool. Make certain that needle bearing is below shoulder.
3. Install upper shaft assembly into case.
4. Install the gear and differential carrier assembly onto the axle shaft. Make certain that the drive screws are installed properly and fit into the counter sunk portion of the axle shaft. Tighten drive screws and install wire keeper.
5. Install the small diameter Torrington Thrust bearings onto the Axle shaft and the large diameter Torrington Thrust bearing onto the differential side gear. Install axle in case and bolt cover on using the gasket.
6. In order to shim for proper clearance of two to fourteen thousandths between the differential gear assembly and the gear case it will be necessary to proceed as follows:
 - A. Push the axle towards the right hand side and take a reading on the left hand side from the end of the case to the shoulder of the shaft.

B. Pull the axle assembly towards the left hand side and take another reading from the end of the axle housing to the shoulder of the shaft. The difference between these two readings will then give you the clearance at the present time. Now remove the cover and the axle assembly and install shims between the small Torrington Thrust bearing washer and the Transmission case.

EXAMPLE: If the difference between the two readings was .035 then install two shims of .0125 a piece for a total of .025 this will leave .010 clearance.

7. Install the left hand drive hub on axle assembly. Install seal using 171-8438 sleeve and 171-8439 driver. Install remaining parts of the controlled differential. Install the snap ring on the left hand shaft and measure for end play of axle assembly between bevel gear and axle retaining ring. Measurement can be accomplished by doing the following:

A. Push on left hand axle assembly and measure between the axle coupling and the retaining ring. Allow for two to sixteen thousandths of end play at this point. Shim accordingly.

8. Install spring washers, hand adjusting hub and retaining ring. Install seal on right hand axle using the 171-8441 sleeve then the 171-8442 seal driver.

9. Refill with SAE #90 transmission oil.

SPECIAL NOTES



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