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MINNEAPOLIS-MOLINE, INC., Hopkins, Minnesota
A Subsidiary of WHITE MOTOR CORPORATION

PRINTED IN U.S.A.

PISTONS AND RINGS

Piston material	Aluminum alloy
Piston diameter (at bottom, 90° from pin)	4.619-4.618
Ring gap	.016-.031
Ring clearance -- Top groove	.0025-.004
# 2	.0025-.004
# 3	.002-.0035
Oil	.0005-.002
Piston pin	Full floating
Pin fit (in piston)	.0002-.0005 loose, at 70° F.
Pin to rod bushing clearance	.0004-.001
Oversize pistons and rings available	.020, .040, & .060
Oversize pins available	.005 & .010

CAMSHAFT

Material	Cast proferall metal
Number of bearings	4
Bearing clearance	.003-.006
End play	.008-.012
Tappet diameter	1.6073-1.6068
Timing (to crankshaft)	# 1 mark on camshaft gear

VALVE MECHANISM

Valve clearance		
Gasoline and LP-Gas	Intake	Exhaust
Cold	.012	.028
Warm idle	.010	.022
Diesel		
Cold	.012	.017
Warm idle	.010	.015
Valve angle (from stem)	46°	
Seat angle	45°	
Seat to stem concentricity	Within .0015" T.I.R.	
Allowable runout		
Head	.0015	
Stem	.001	
Recommended seat contact width	3/32	
Valve stem diameter	.4345-.4335	
Valve stem clearance (in guide)	.002-.004	
Minimum valve spring pressure		
Gasoline and LP-Gas	129 lbs at 2-7/16"	
Diesel	85 lbs at 2-1/2"	
Valve guide inside diameter (ream after assembly)	.4365-.4375	
Insert (exhaust valves only)	.005-.007 press	
	in head, approximately .010 below surface of combustion chamber	
Valve rotators (gasoline only)	Exhaust valves	

OILING SYSTEM

Oil pump	Submerged, gear type
Oil filter	Full flow
Intake screen	Float-O-Screen
Base pan capacity	10 qts
Oil filter capacity	3 qts
Lubrication	Full pressure (40-45 PSI)
Crankcase ventilation	Positive

Remove the bolts holding the steering gear housing to the side rails. Remove the breather from the top of the housing. Slide the housing forward and out of the rails. Place the housing on a bench in the inverted position (flange on vertical shaft on top).

Turn the vertical shaft to the straight-ahead position (front edge of vertical shaft flange parallel to front of housing). Mark the vertical shaft in relation to the bearing housing so the sector gear and piston can be properly "indexed" at reassembly. Also mark the bearing housing flange and steer housing. Remove the piston guide from the front of the housing.

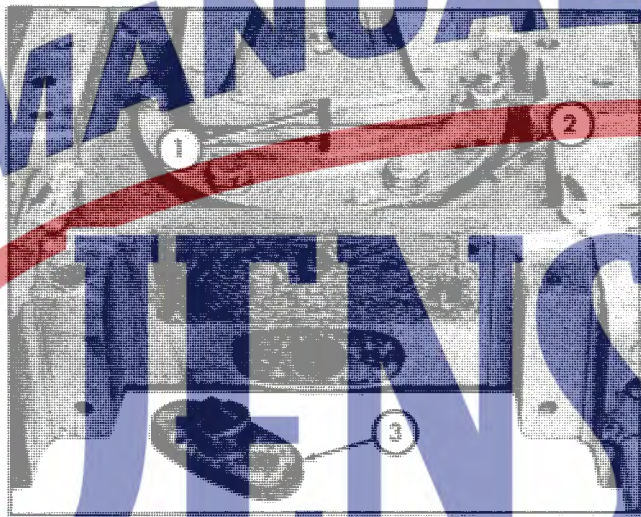


Fig. 4

1. Mark on flange and bearing housing
2. Mark on flange and steer housing
3. Piston guide removed

Remove the piston end caps and measure the distance from the end of the piston to the end of each sleeve. To have the dimensions convenient during reassembly, we recommend marking them directly on the housing. The distance from the right hand piston end to the sleeve end is greater than that on the left side.



Fig. 5

1. Measuring piston position

Remove the sector gear housing and bearing housing assembly from the steering gear housing. Note that the two 12 point cap screws are installed in the area traveled by the stop pin.

Tap the piston out of the sleeves with a wooden hammer handle. The one sleeve will probably come out of the housing as the piston is removed. Remove and discard the existing seals and wear rings.

2. REPAIR AND REASSEMBLY

Clean all the parts and examine them for wear or damage. If the piston or sleeves are scored or scratched, they must be replaced.

Before attempting to install the teflon seal rings and wear strips on the pistons, immerse them in hot water (110-120 degrees) for a few minutes to make them more pliable.

Coat the new "O" ring seals with Lubriplate and install the rings in the outer grooves in each end of the piston. The "O" rings serve as back-up rings for the seal rings.

Apply Lubriplate to the seal grooves and the area of the piston from the groove to the end. Start the seal ring in the groove on one side of the piston and carefully work the seal around the piston and into the groove. Avoid stretching the seal ring excessively during installation.

NOTE: BE SURE THE SEAL RINGS SEAT SQUARELY IN THE GROOVES AND ARE NOT TWISTED OR OTHERWISE DISTORTED.



Fig. 6

1. Installing seal ring
2. "O" ring installed in groove

Before installing the piston, place the wear strips in the piston grooves to check the length. With the strip firmly compressed all the way around the piston, there must be a 1/8" gap between the strip ends. If the length of the strip is excessive, remove the necessary material to obtain the proper end gap.



Fig. 26

1. Bolts
2. Springs
3. Jam nut

control lever is slowly moved within the temporary raise range. (The temporary raise range is between the float range and the draft control range.)

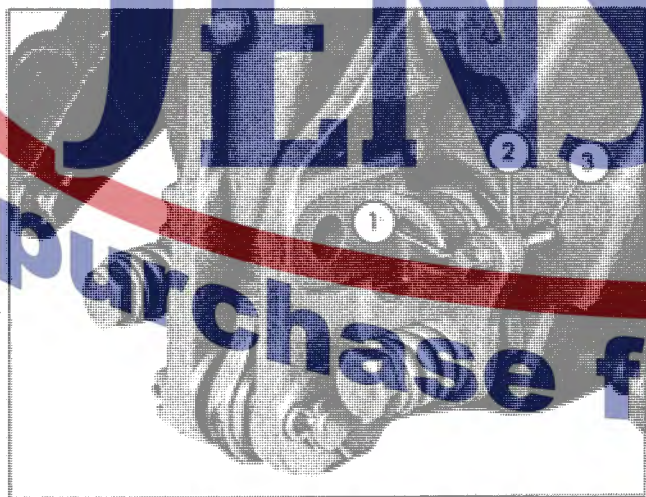


Fig. 27

1. Adjusting screw
2. Lock nut
3. Draft control button

Now, with the lift control lever in the temporary raise range, slowly turn in the adjusting bolt until the lift arms just start to raise, and the total length of the temporary raise range on the quadrant is approximately 1/8 inch.

After obtaining approximately a 1/8 inch range of temporary raise, turn in the adjusting bolt 1-1/2 to 2 turns (3/16 inch) and secure with the lock nut.

With the adjusting bolt locked in the position indicated, the length of the temporary raise range on the quadrant should be approximately 2 inches.

3 POINT LIFT SENSITIVITY

To check the sensitivity of the lift, first be sure the draft control button is properly adjusted as described under the previous heading. Set the stop for the 3 point control lever on the quadrant so the lever will be in the minimum draft position (just below temporary raise range).

Start the tractor and operate the engine at 1500 rpm. Move the 3 point control lever down against the stop on the quadrant. Insert a .025-.035 inch feeler gage between the draft control button and adjusting screw (the feeler gage can be forced into place between the button and screw without loosening the screw). With the feeler gage in place, the lift arms should raise.



Fig. 28

1. Feeler gage between button and screw

If the lift arms do not raise with the feeler gage installed between the draft control button and adjusting screw, the lift does not have the proper sensitivity. If this is the case, first check the pressure setting of the regulator valve as described on page 3-19.

If the regulator valve pressure is within the specified range and the lift sensitivity is not correct, it will be necessary to remove and disassemble the lift and check all components of the draft control assembly, including the restrictor connector for the power piston oil line, the draft linkage tube, cap, and spring, and the power piston and housing. See page 3-27.

DASH POT CHECK AND ADJUSTMENT

To check the operation of the dash pot, first mount an implement on the 3-point hitch. Place the rate and cycle levers in their fast positions. Operate the tractor engine at 1500 rpm and raise the implement to the fully raised position. Allow the lift arms to remain in the fully raised position for 5 seconds, then move the 3-point control lever down into the lower part of the temporary raise range as established in the previous adjustment.

1. REMOVAL AND DISASSEMBLY

Drain the crankcase oil. Remove the large plug containing the oil pressure regulator screw from the left side of the crankcase. Fig. 1. Remove the oil filter cover and filter. Remove the two screws holding the filter can in place and withdraw the can far enough to escape the oil tubes in the oil pump.

Support the base pan on a floor jack and remove the bolts holding the base pan to the crankcase and transmission case. There are no bolts inside the base pan that have to be removed. The base pan is heavy so use care when removing it.

Remove the two bolts holding the pump in the crankcase and pull the pump down and out of the case. Clean the pump assembly in solvent before beginning disassembly.

Remove the cotter pin to disassemble the screen from the pump. Remove the cover and gasket from the pump bottom. The idler gear can now be removed.

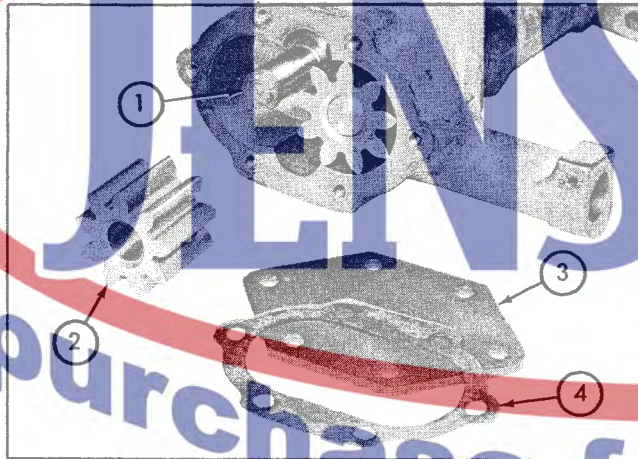


Fig. 3

1. Stub shaft
2. Idler gear
3. Cover
4. Gasket

The pump gear and drive pinion are a press-fit on the drive shaft. To remove the pump gear, place the pump in a press in an inverted position. Apply pressure to the shaft to press it out of the gear. Remove the gear and shaft. Fig. 4.

If the drive pinion is worn or damaged, it must be pressed or driven off the shaft. Use care to avoid damaging the drive bushing for the tachometer that is pressed into the end of the pump drive shaft.

Remove the snap ring from the side of the pump body and remove the spring retainer, spring, and oil pressure regulator piston. Fig. 5.

To remove the filter by-pass valve, pull the groove pin out far enough to release the valve assembly, and remove the piston and spring from the bottom of the pump.



Fig. 4



Fig. 5

1. Retainer
2. Spring
3. Pressure regulator piston

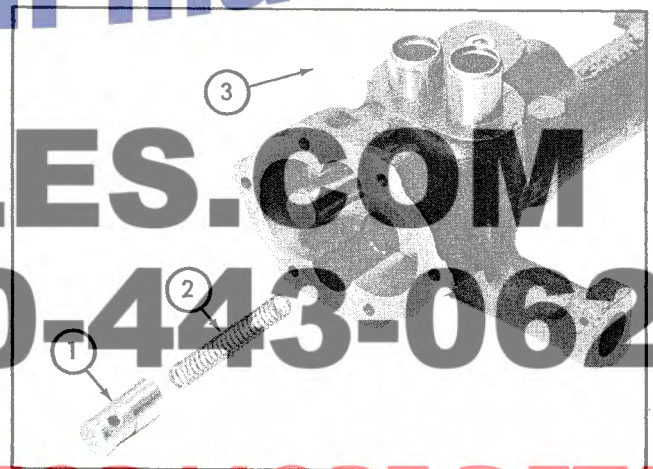


Fig. 6

1. By-pass valve
2. Spring
3. Groove pin partially removed

and reinstall the nut. Coat the seal with gear oil. See Fig. 22.



Fig. 20

1. Suction tube
2. Pump drive shaft
3. Tube



Fig. 21

1. Tighten 3/8" bolts to 33-37 ft.-lbs.
2. Tighten 1/2" bolts to 75-85 ft.-lbs.

Loosen the bearing adjusting nuts in the cover. Install the 540 RPM shaft, and the idler gear and shaft assembly in the cover. Turn the idler shaft so the roll pin is up and turn the thrust washer so the tang is up and away from the gear (see Fig. 9). Coat both gasket surfaces with Presstite, Loctite, or an equivalent sealer. Use a new gasket and install the cover on the plate, using sleeves, cellophane tape, or some other means to protect the seals. The 5 inch bolt is used in the top hole. Torque the bolts evenly and gradually to 33 to 37 ft.-lbs.



Fig. 22

1. Seal
2. "O" ring

Rotate the shafts and tap them lightly to properly seat the bearings. Tighten the upper adjusting nut to allow .001 to .008 inch end play on the 1000 RPM shaft.

Tighten the lower nut to allow .001 to .008 inch end play on the 540 RPM shaft.



Fig. 23

1. 5 inch bolt
2. .001 to .008" end play on both shafts

Secure the bearing nuts with the lock.

If the lube pump is to be disassembled, loosen the lock nut and back out the adjusting screw. Remove the check valve and "O" ring, and remove the check valve, spring, and retainer.

Clean out all passages thoroughly. Check the condition of the components, including the check valve seat.