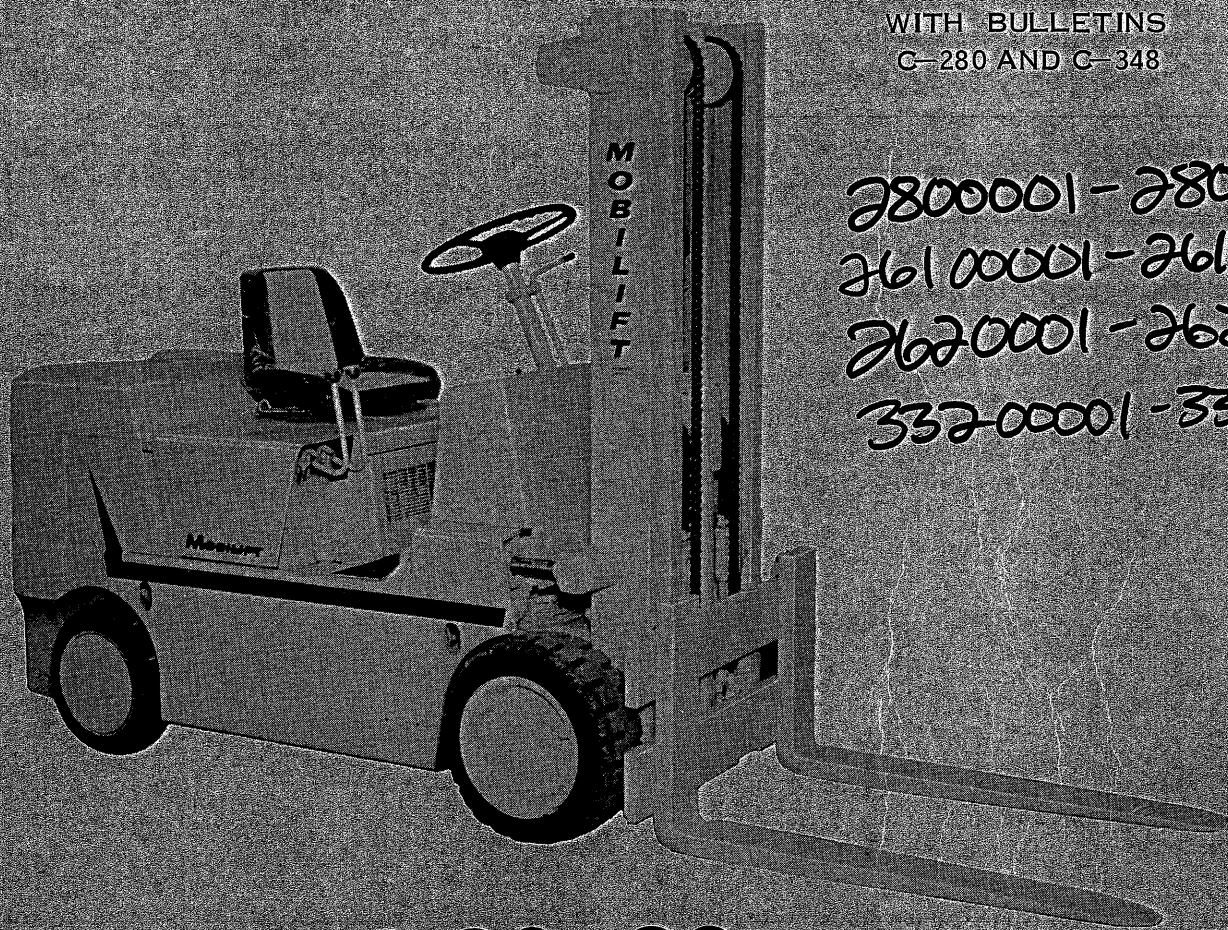


S-345A

PARTS, OPERATION, AND MAINTENANCE MANUAL

WITH BULLETINS
C-280 AND C-348



2800001 - 2800384
26100001 - 26101392
2620001 - 26200418
33200001 - 33200127

MA 30, 30^{II}

MA 40, 40^{II}

MA 50, 50^{II}

FORK LIFT TRUCKS


WHITE INDUSTRIAL DIVISION
WHITE MOTOR CORPORATION
HOPKINS, MINNESOTA



SUPPLEMENT TO MANUAL S-345A

MA SERIES FORK LIFT TRUCKS

SUPPLEMENT INCLUDES CHANGES IN MAINTENANCE INSTRUCTIONS, SERIAL NUMBERS, AND REPAIR PARTS

REFER TO PAGE 1-35:

Change items 3 and 4 under paragraph C to read as follows:

3. Insert axle (30) in gear (31). Hold axle stationary and rotate cage. It must require a torque between 5 and 15 foot pounds to turn cage.
4. If torque required to rotate cage is over 15 foot pounds, reduce number of shims (use thinner ones) and repeat procedure in "2" and "3". If torque required is below 5 foot pounds, increase the number of shims and re-check torque.

THESE TORQUE SPECIFICATIONS ARE APPLICABLE TO DIFFERENTIAL CAGES THAT HAVE FOUR PINIONS.

REFER TO PAGE 1-39:

Add note:

CAUTION: THE PRESSURE REGULATOR VALVE (35A 9200) USED ON LATER MODEL TRUCKS MUST NOT BE INSTALLED ON ANY TRUCK WITH A 2 PINION DIFFERENTIAL, OR TRUCKS THAT HAVE A 39A2240 REPAIR DIFFERENTIAL INSTALLED. EARLY TRUCKS WITH 2 PINION DIFFERENTIALS OR 39A2240 REPAIR DIFFERENTIALS CAN BE IDENTIFIED BY THE DESIGN OF THE DIFFERENTIAL CASE. THE DIFFERENTIAL CASE (35A - 5180) USED ON EARLY MODEL TRUCKS DO NOT HAVE THE LARGE PLUG IN THE TOP OF THE CASE AS DO THE CASES (35A 7816) USED ON LATER TRUCKS.

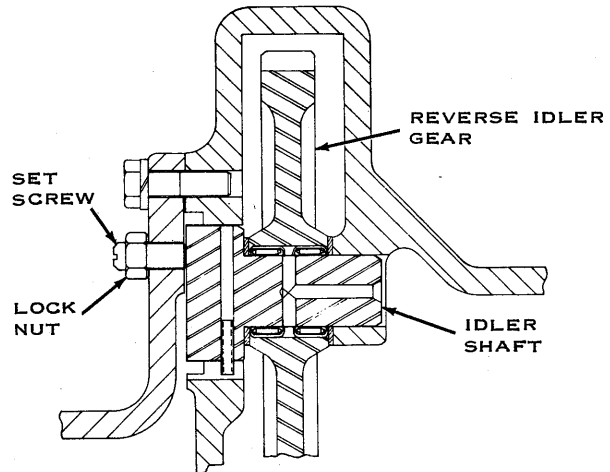
Disregard test pressures given under Fig. 1-39 and use Fig. 1-36 and test pressures listed below it.

ADD TO SERVICING DIFFERENTIAL AND TRANSMISSION:

A set screw and lock nut have been added to adjust the position of the shaft for the reverse idler gear in the transmission. The set screw is located in the upper rear flange of the differential case.

If the set screw has been removed from the differential case during service work, apply Permatex or Locktite thread sealant to the threads in the hole and on the set screw before reinstalling the screw.

Turn in the screw until the idler shaft bottoms, then back out the screw 25 to 40 degrees (1/8 turn or less) and secure with the lock nut. This sets the proper end clearance on the reverse idler gear.



Before reinstalling the bearings (35A 7752) for the drive axles, they must be repacked with grease. Use an automotive type, multi-purpose, lithium base grease, containing a moly-disulfide additive.

CASCADE TRIPLEX MAST

(See Figs. 2-37 and 2-38 in Manual S-345A.)

If the crosshead wear shoes (10, fig. 2-37) become loose, it can cause failure of the interlocking latches and mating latch points. If the wear shoes are worn excessively, they must be replaced.

The side clearance between the wear shoes and mating channel members must be kept snug. This can be accomplished by using shims (13) between the shoes and shoe supports (14). Shims should be used on both sides of the crosshead to keep it square in the channels.

Check the side clearance every 150 hours of operation and lubricate the sliding channels, using a graphite base grease.

The bolts that secure the side rollers (5, Fig. 2-38) to the carriage may become loose after the lift truck has been in service for some time. This will allow the side roller to move out of position and can cause failure of the latches and mating latch points. Check these attaching bolts and nuts every 100 hours of operation to be sure they are tight.

Excessive side movement of the carriage can be removed with the adjusting screws (8). Loosen the lock nuts and tighten the four adjusting screws equally until the side play is reduced to a minimum.

Ref. No.	Part No.	DESCRIPTION	No. Pcs.
		SERIAL NUMBER CHANGES IN S-345A	
		Refer to the following pages: 2-4, 2-8, 2-32, 2-36, 2-54, 2-79, 2-81, 2-86, and 2-88, and make the following changes: Change serial number on MA 30 from 28000125 to 28000111. Change serial number on MA 40 from 26100543 to 26100568. Change serial number on MA 50 from 26200185 to 26200169.	
		Refer to the following pages: 2-6, 2-8, 2-14, 2-34, 2-36, 2-79, 2-81, 2-86, and 2-88, and make the following changes: Change serial number on MA 30 from 28000126 to 28000112. Change serial number on MA 40 from 26100544 to 26100569. Change serial number on MA 50 from 26200186 to 26200170.	
		Refer to the following pages: 2-42, 2-44, 2-56, 2-64, and 2-66, and make the following changes: Change serial number on MA 30 from 28000145 to 28000121. Change serial number on MA 40 from 26100628 to 26100626. Change serial number on MA 50 from 26200205 to 26200184.	
		Refer to the following pages: 2-42, 2-44, 2-56, 2-68, and 2-70, and make the following changes: Change serial number on MA 30 II from 28000146 to 28000122. Change serial number on MA 40 II from 26100629 to 26100627. Change serial number on MA 50 II from 26200206 to 26200185.	
Page 2-8		Change Ref. No. 16 - F600I-302 to F601I-302 and F600I-301 to F601I-301 corr.	
Page 2-46		Add to description on 35A690 spool (Ref. No. 6), 1/2" O.D. x 2" long. Add to description on 35A7766 spring (Ref. No. 8), 1/2" O.D. x 1-11/16" long. Add to description on 35A375 spool (Ref. No. 19), x 2" long. Change description on 35A5177 block (Ref. No. 31 and 45), from 15/16" to 1-1/16". Change description on 35A5187 block (Ref. No. 32 and 49), from 5/8" to 3/4". Add to description on 35A7364 spring (Ref. No. 43), 2-41/64" long. Add to description on 35A7365 spring (Ref. No. 44), 1-13/16" long.	
Page 2-48		Omit Group II line and add the following: Group II Used on MA 30 Lift Trucks to No. 28000121, Inc. Used on MA 40 Lift Trucks to No. 26100626, Inc. Used on MA 50 Lift Trucks to No. 26200184, Inc. Change description on 35A690 spool (Ref. No. 6), from 1-5/8" to 1/2" O.D. x 2". Add to description on 35A8027 spring (Ref. No. 43), 1/2" O.D. x 1-5/8" long. Add to description on 35A375 spool (Ref. No. 19), x 2" long. Add to description on 35A1248 spring (Ref. No. 23), 1-17/32" long. Add to description on 35A390 spring (Ref. No. 27), 2-1/8" long. Change description on 35A5177 block (Ref. No. 31 and 45), from 15/16" to 1-1/16". Change description on 35A5187 block (Ref. No. 32, 39, and 49) from 5/8" to 3/4". Add to description on 35A7364 spring (Ref. No. 43), 2-41/64" long. Add to description on 35A7365 spring (Ref. No. 44), 1-13/16" long.	

Ref. No.	Part No.	DESCRIPTION	No. Pcs.
Page 2-50, 2-51		Omit entire Group III and add new Group III.	
Page 2-56		Change 50A3730 nut following (Ref. No. 6) to GM120368 jam nut. Change 50A1900 nut following (Ref. No. 7) to 50A3742 jam nut.	
Page 2-64		Change 35A5453 stud to 50A5038 and length to 1-3/4". Change 35A5150 cap (Ref. No. 10) to 35A8244 (35A5150).	
Page 2-68		Add the following hardware to follow 35A7816 case: 50A4139 - Set Screw, slotted head, for idler shaft, 3/8"-16 x 1" 50A1900 - Nut, hex., 3/8"-16	1 1
Page 2-70		Add "O" ring to follow 35A8245 shaft: 50A5170 - "O" Ring - axle flange to housing..... Change 50A3680 bolt to 50A1164 bolt housing, 12 pt.	2
Page 2-74		Change 50A4284 clevis (Ref. No. 9) to 50A4279.	
Page 2-84		Change description on 35A8293 knob from tilt to lift.	
Page 2-86		Change 35A6139 hose (Ref. No. 28) to 35A9168 and size from 3/8" to 1/4" (35A6139). Change 35A6140 hose (Ref. No. 29) to 35A9169 and size from 3/8" to 1/4" (35A6140). NOTE: When replacing old hose, replace in pairs with new hoses.	
Page 2-91		Add roller pin 35A5523 for repairs as part of inner rail (Ref. No. 4) and carriage (Ref. No. 11). Change quantity on 35A3698 cap (Ref. No. 38) from 1 to 2. Change quantity on 35A3697 plunger (Ref. No. 39) from 1 to 2. Change quantity on 35A3696 spring (Ref. No. 40) from 1 to 2. Add to description on 35A3698, 35A3697, and 35A3696, on outer rail and carriage block.	
Page 2-118		On cylinder assembly, MA 30 change 35A6740 thru 35A6769 to 35A7952 thru 35A7981. On cylinder assembly, MA 40-50, change 35A5232 thru 35A5261 to 35A7922 thru 35A7951. New cylinders have 3/4" lock nut.	

MOBILIFT - MA SERIES LIFT TRUCKS

Ref. No.	Part No.	DESCRIPTION	No. Pcs.
		TRANSMISSION CONTROL VALVE AND REGULATOR	
		Group III. Used on Lift Trucks with Mechanical Inching. Used on MA 30 II Lift Trucks No. 28000122 and after. Used on MA 40 II Lift Trucks No. 26100627 and after. Used on MA 50 II Lift Trucks No. 26200185 and after.	
	39C1545	Valve - control, complete	1
		Includes the following 42 parts:	
1	35A8012	Body - valve	1
		50A3668 - Bolt, hex., 3/8"-16 x 1-1/2"	2
		50A3672 - Bolt, hex., 3/8"-16 x 2-3/4"	2
		* 50A1829 - Stat-o-seal, bolts, 3/8"	4
2	35A5848	Spool - directional, 8-7/32" long	1
3		50A4265 - Ball, steel, 5/16"	1
		50A4445 - Plug, pipe, hex. socket, 1/8"-27	3
4	35A6088	Spring - spool ball, 23/32" long	1
5	10A16329	Seal - oil, lever spool, 3/4" I.D., 1/4" wide	2
6	35A690	Spool - inching, 1/2" O.D. x 2" long	1
7	35A689	Spring - centering, inching spool, 3/4" long	1
8	35A8027	Spring - inching spool, 1/2" O.D. x 1-5/8" long	1
9	35B8000	Inching Spool - assembly, complete, mechanical inching	1
15		50A196 - Snap ring, sleeve retainer	1
16	35A8008	Seal - inching spool in valve housing	1
19	35A375	Spool - pressure reducer, 3/4" O.D. x 2" long	1
20	35A374	Spring - pressure spool, 1-3/4" long	1
21	35A1250	Valve - relief	1
22	35A1249	Piston - relief valve	1
23	35A1248	Spring - relief valve, 1-17/32" long	1
24	10A6329	"O" Ring - relief valve	2
25	35A392	Spool - priority valve, 15/16" long	1
26	35A391	Guide - priority valve	1
27	35A390	Spring - priority valve, 2-1/8" long	1
28	35A377	Valve - lube relief	1
29		50A4266 - Ball, steel, 3/8"	1
30	10A18105	Spring - lube relief valve, 1" long	1
31	35A5177	Block - valve, 1-1/16" long	3
32	35A5187	Block - valve, 3/4" long	3
33	10A6329	"O" Ring - valve blocks, 9/16" I.D.	6
34	10A6330	Ring - snap, valve blocks	6
35	35A7687	Switch - neutral starting, with slip type terminals	1
36	35A7304	*Gasket - body to transmission case	1
37	35A9200	Body - pressure regulator valve	1
		50A1926 - Bolt, hex., 3/8"-16 x 3-1/4"	1
		50A1927 - Bolt, hex., cad., 3/8"-16 x 3-1/2"	1
		50A2249 - Bolt, hex., cad., 3/8"-16 x 4-3/8"	1
		* 50A1829 - Stat-o-seal, bolts, 3/8"	3
		NOTE: Parts with single asterisk () are part of 35R83.	
38	35A690	Spool - pressure regulator	1
39	35A5187	Block - spool, 3/4" long	1
40	10A6329	"O" Ring - block	1
41	10A6330	Snap Ring - spool	1
42	35A7323	Piston - regulator valve	1
43	35A7364	Spring - piston, regulator valve, outer, 2-41/64" long	1
44	35A7365	Spring - piston to spool, inner, 1-13/16" long	1
45	35A5177	Block - piston, 1-1/16" long	1
46	10A6329	"O" Ring - piston, block	1
47	10A6330	Snap Ring - piston block	1
48	35A7366	Orifice - regulator valve	1
49	35A5187	Block - orifice, 3/4" long	1
50	10A6329	"O" Ring - orifice and block	2

Page 2-50

MOBILIFT - MA SERIES LIFT TRUCKS

Ref. No.	Part No.	DESCRIPTION	No. Pcs.
TRANSMISSION CONTROL VALVE AND REGULATOR (Cont'd)			
51	10A6330	Snap Ring - block	1
52	35A7367	Screen - orifice	1
53	50A2879	Snap Ring, orifice	1
54	50A4265	Ball, steel, 5/16"	3
55	50A5031	Pin, dowel, 1/8" x 11/16"	1
56	50A4445	Plug, pipe, ctsk., 1/8"-27	2
57	50A2878	"O" Ring, regulator valve	5

Page 2-51

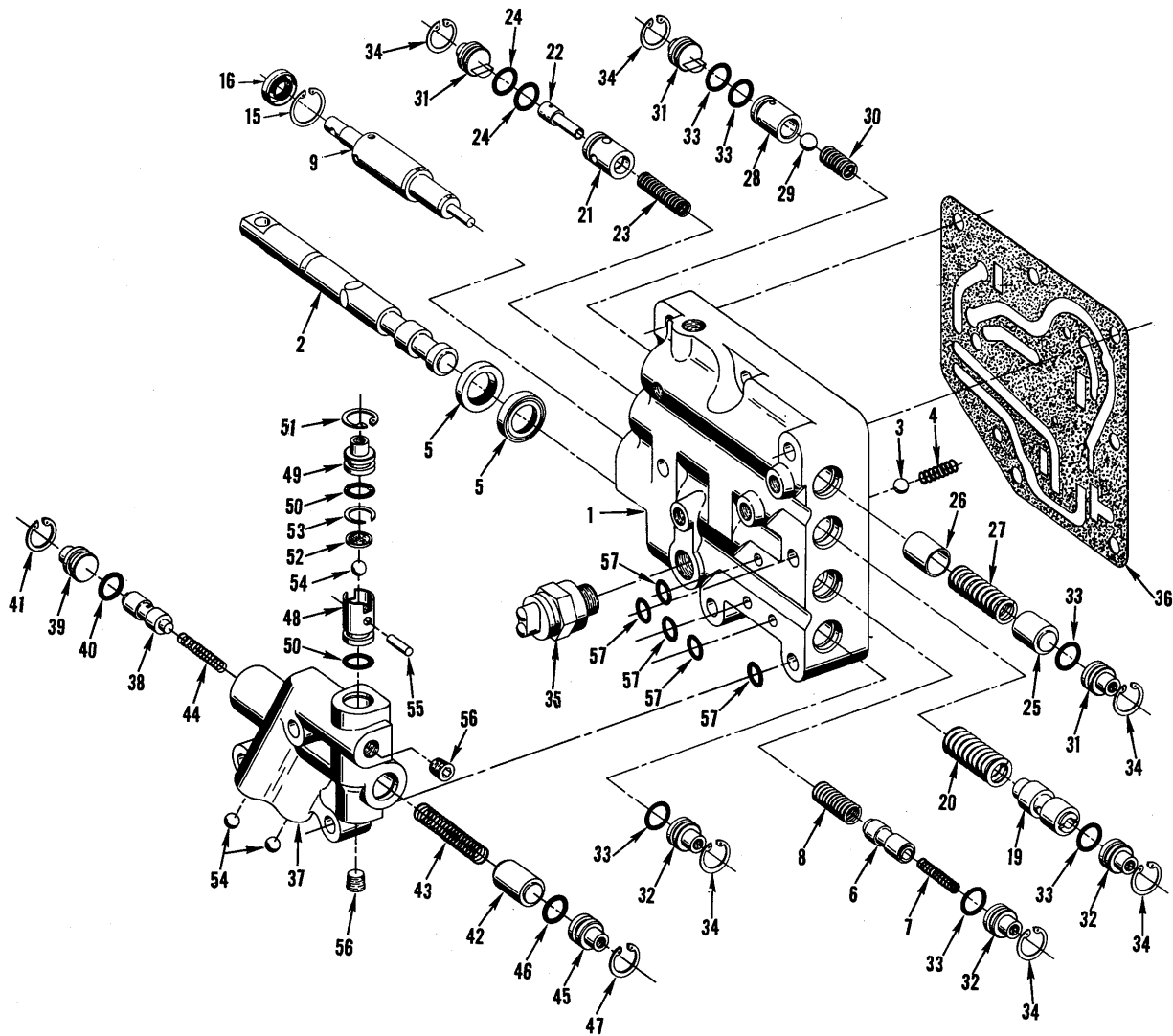


FIG. 2-17B - TRANSMISSION CONTROL VALVE AND REGULATOR

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Technical Publications
10-4-65

C-348

SUPPLEMENT TO MANUAL S-345A

AND SUPPLEMENT C-280

FOR

MA SERIES FORK LIFT TRUCKS

INCLUDING MA 60

**WHITE
MOBILIFT**


WHITE INDUSTRIAL DIVISION

WHITE MOTOR CORPORATION

HOPKINS, MINNESOTA



This supplement covers changes and improvements that have been incorporated into the latest production of MA Series Lift Trucks, and includes the MA 60 Lift Truck. Use this supplement in conjunction with manual S-345A and Supplement C-280.

SPECIFICATIONS (MA60)

The capacity of the MA 60 Lift Truck is 6000 pounds at a 24-inch load center. A Continental engine, Model F163-8026 supplies power for the lift truck. Specifications covering this engine are given below and reference must be made to these specs when performing an engine tune-up.

Governed Speed (No Load)	2650 RPM
Idle Speed	500 RPM
Converter Stall Speed	1600 RPM
Spark Plug Gap	Gasoline .025"
.....	LP Gas .015"
Breaker Point Gap020"
Timing Advance	2° ATDC @ 500 RPM
.....	6° BTDC @ 880 RPM
.....	14° BTDC @ 2400 RPM
Firing Order	1-3-4-2
Valve Clearance (Hot)	Intake .014"
.....	Exhaust .014"

HYDRAULIC SYSTEM RELIEF PRESSURES

REFER TO PAGE 1-5, FIG. 1-3 AND ADD:

POWER STEERING RELIEF (MA 60) 1200 ± 50 PSI

NOTE: LIFT SYSTEM RELIEF PRESSURE FOR MA 60 LIFT TRUCKS IS THE SAME AS FOR MA 30 (1950 PSI).

LUBRICATION

Refer to page 1-12, paragraph headings "HYDRAULIC OIL TANK" and "TRANSMISSION, DIFFERENTIAL, AND CONVERTER".

Delete Texaco 1808 and insert Texaco Texamatic Fluid.

ZENITH CARBURETOR ADJUSTMENTS (MA60)

Refer to page 1-13: Carburetor adjustments given in paragraph 3-16 are satisfactory for Zenith gasoline carburetor used on MA 60 lift trucks. Fig. 1 shows Zenith carburetor.

GOVERNOR ADJUSTMENTS (MA 60)

Start engine and allow it to warm up to operating temperature. While engine is warming, back out surge (bumper) screw (4, fig. 1A) so it will have no effect.

IMPORTANT: BE SURE CARBURETOR IS PROPERLY ADJUSTED AND LINKAGE IS FREE OF BINDS BEFORE ADJUSTING GOVERNOR.

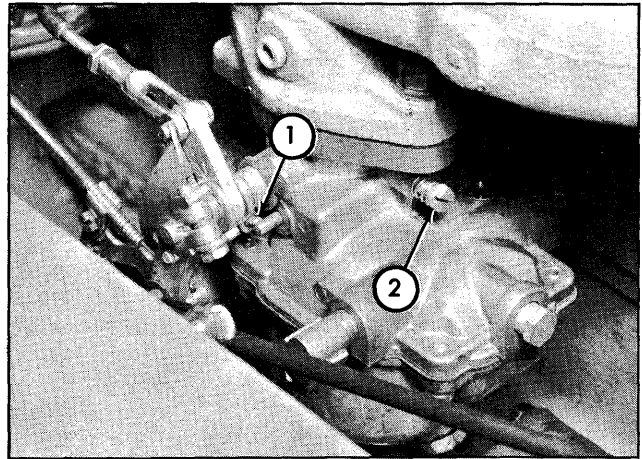


Fig. 1

1. Throttle stop screw
2. Idle adjusting needle

Depress accelerator to operate engine at full throttle, no-load. Turn nuts on speed adjusting screw (1, fig. 1A) to obtain a no-load speed of 2650 RPM. Shortening screw, placing more tension on spring, will increase engine speed.

If governor surges at no-load, turn in surge (bumper) screw (4, fig. 1A) one turn at a time until surge is eliminated. Do not turn screw in far enough to increase no-load speed more than a few RPM, if any.

Governor sensitivity (governor action between load and no-load RPM) is regulated by adjusting screw (3, fig. 1A) in flange bracket. Lengthening adjusting screw (moving speed adjusting screw forward) will alter pull on spring to broaden range of governor and produce more stable governor action. Shortening screw will narrow range and increase governor sensitivity. Maintain a dimension of 1-13/32" between centerline of speed adjusting screw and front edge of bracket for sensitivity adjusting screw for best results.

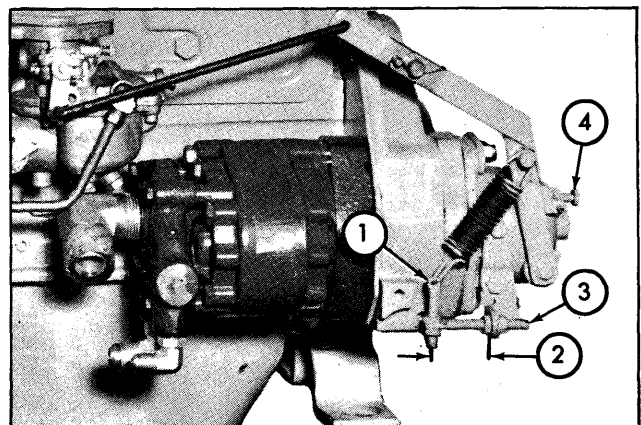


Fig. 1A

1. Speed adjusting screw
2. 1-13/32 inch
3. Sensitivity adjusting screw
4. Surge (bumper) screw

ENGINE TIMING

Follow procedure outlined in paragraph 3-19 on page 1-14 when timing engine, except use timing pointer and mark on crankshaft pulley. Fig. 2. A dab of white paint placed in pulley notch will make notch more legible under timing light.

Make a mark on pointer, 2 degrees AFTER top dead center. Operate engine at an idle speed of 500 rpm or less so automatic advance of distributor is completely retarded. Engine is in correct time when notch in pulley is lined up with mark on pointer that is 2° AFTER top dead center.

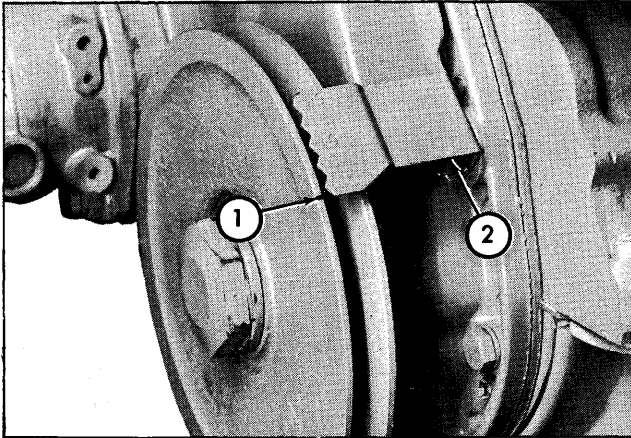


Fig. 2

1. Notch in pulley
2. Timing pointer

NOTE: FIG. 2 SHOWS TIMING POINTER WITH ENGINE REMOVED FROM LIFT TRUCK. POINTER IS LOCATED ON ALTERNATOR SIDE OF ENGINE.

REFER TO PAGE 1-29, PARAGRAPH 4-78C.

Insert the following timing advance for distributors used on MA 60 Lift Trucks with Model F163-8026 engines.

2° ATDC @ 500 RPM
6° BTDC @ 880 RPM
14° BTDC @ 2400 RPM

ALTERNATOR

The alternator and voltage regulator control the amount of electrical energy supplied to the battery and also maintain battery in fully charged condition.

IMPORTANT: IF IT BECOMES NECESSARY TO DISCONNECT WIRES FROM ALTERNATOR, BE SURE TO IDENTIFY WIRES ATTACHED TO "BAT" AND "GRD" TERMINALS SO THEY CAN BE RECONNECTED TO PROPER TERMINALS. IF WIRES ARE CROSSED WHEN RECONNECTED, JUST A MOMENTARY TOUCH TO ALTERNATOR TERMINALS COULD BE ENOUGH TO DAMAGE ALTERNATOR.

THE FOLLOWING PRECAUTIONS SHOULD BE OBSERVED TO PREVENT SERIOUS DAMAGE TO ELECTRICAL EQUIPMENT.

WHEN INSTALLING A BATTERY, MAKE ABSOLUTELY SURE THE GROUND POLARITY OF THE BATTERY AND THE ALTERNATOR ARE THE SAME. THE ELECTRICAL SYSTEM HAS A NEGATIVE GROUND.

WHEN CONNECTING A BOOSTER BATTERY, MAKE CERTAIN TO CONNECT THE NEGATIVE BATTERY TERMINALS TOGETHER AND THE POSITIVE BATTERY TERMINALS TOGETHER.

WHEN CONNECTING A CHARGER TO THE BATTERY, CONNECT THE CHARGER POSITIVE LEAD TO THE BATTERY POSITIVE TERMINAL AND THE CHARGER NEGATIVE LEAD TO THE BATTERY NEGATIVE TERMINAL.

DO NOT OPERATE THE ALTERNATOR ON OPEN CIRCUIT (NO BATTERY IN CIRCUIT). MAKE ABSOLUTELY CERTAIN ALL CONNECTIONS, INCLUDING BATTERY CABLES, ARE SECURE.

DO NOT SHORT ACROSS OR GROUND ANY OF THE TERMINALS ON THE ALTERNATOR OR REGULATOR.

DO NOT ATTEMPT TO POLARIZE THE ALTERNATOR.

If difficulty is experienced with the alternator or voltage regulator, see your local Delco-Remy dealer or United Motor Service as they have the facilities for repairing and testing this equipment.

A booklet covering general maintenance of Delco-Remy electrical systems is available from Delco-Remy, Anderson, Indiana. The number of this booklet is DR 5221 and the price is 25 cents.

Maintain proper tension on the fan and alternator drive belt by means of the adjusting bar. The belt has the correct tension when it deflects about 1/4 to 1/2 inch when approximately 10 pounds pressure is applied midway on the belt span.

STEERING GEAR (HYDRAULIC)

REFER TO PAGE 1-23, PARAGRAPH 4-30, a.

Add to follow paragraph "a":

Assemble worm to rack and align ball return guide holes with worm groove. Load 16 balls into guide hole nearest piston ring while slowly rotating worm counterclockwise to feed balls through circuit. Alternate black balls with standard balls.

Fill one ball return guide with remaining 6 balls. Place other guide over balls and plug ends of guide with heavy grease to prevent balls from falling out when guide is installed in rack.

HYDRALIZER REPAIR

ADD TO PAGE 1-25, PARAGRAPH 4-39, REPAIR.

- d. Check condition of bushing (20) on piston (19). If original bushing is damaged or worn, it must be re-

placed. The outside diameter of bushing must be machined to a dimension of 4.996-4.997" after installation on piston.

ADJUSTING STEERING LINKAGE (MA60)

Park lift truck on level surface. Turn steering wheel to place steering housing in straight-ahead position and adjust tie rods if necessary, to place steer wheels in straight-ahead position. Detach booster cylinder from steering housing.

Turn steering wheel to extreme in both directions and adjust stop bolts on frame and steering fork to allow an 83 degree angle of inner steer wheel to side of frame (inner wheel in relation to direction of turn).

With wheel held in 83 degree turn position, tighten stop bolts on center frame against steer housing arm and secure with lock nuts. Tighten stop bolts in steering fork against stop on frame, back out screw 1/4 to 1/2 turn and secure with lock nut.

NOTE: ADJUSTMENT OF STOP BOLTS ON STEERING FORKS MUST BE ACCOMPLISHED ON BOTH FORKS FOR EACH DIRECTION OF TURN.

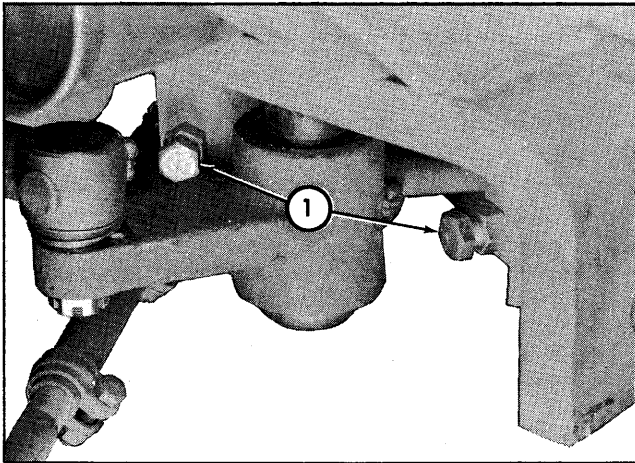


Fig. 3

1. Stop bolts on center frame

Return steer wheels to straight-ahead position and adjust position of socket on steering booster so socket end can be installed in housing without moving housing from straight-ahead position. Recheck steering adjustments with drag link connected to be sure it allows full turn in both directions.

POWER STEERING HYDRAMOTOR (MA60)

REMOVAL AND DISASSEMBLY

Disconnect and cap oil lines connected to hydramotor. Identify lines so they can be properly reconnected. Disconnect transmission control rod by driving pin out of joint. Loosen hydramotor pivot bolts sufficiently to allow hydramotor to escape support brackets. Remove entire assembly, including steering wheel and transmission shift lever.

Remove horn button assembly as described in paragraph 4-21 on page 1-22. Remove nut from steering shaft and remove steering wheel. Loosen nuts on column clamp and remove column, noting its position on steering assembly.

Loosen large nut on shaft near hydramotor, turning it until it is almost flush against hydramotor. Nut is staked so it will be tight at first. Loosen taper ring by tapping it toward hydramotor.

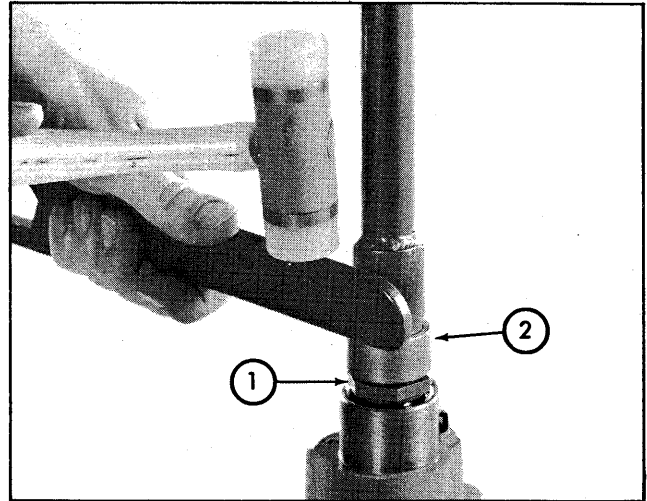


Fig. 4

1. Nut
2. Taper ring

Rotate taper ring until locking ball is exposed in hole. Tilt assembly so ball will fall out of hole. It may be necessary to tap taper ring lightly to dislodge ball. With ball removed, pull steering shaft off stub shaft.

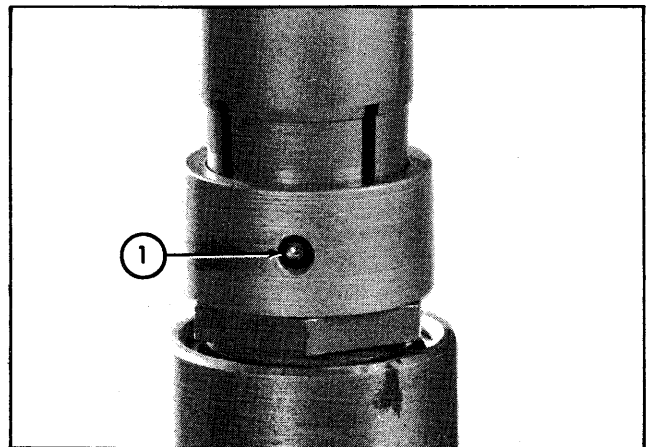


Fig. 5

1. Ball

Remove large retaining ring that holds lower housing cover. Tap ring around until one end is near small hole in cover. Insert punch in hole, tap punch to dislodge ring and pry ring out with screwdriver. When ring reaches anti-rotation lug, grasp ring firmly and pull it around and out from under lug.

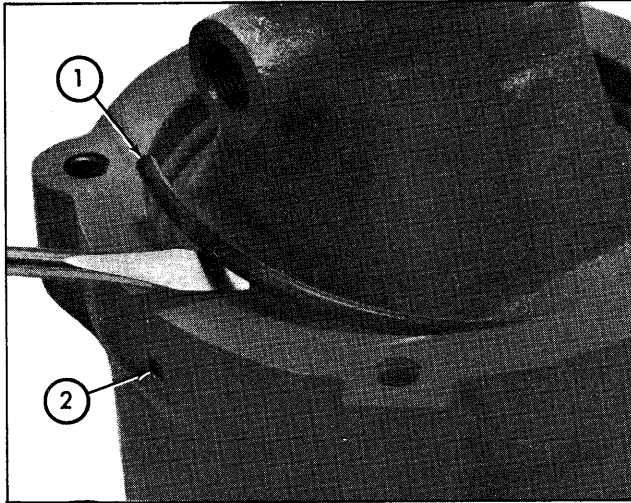


Fig. 6

1. Retaining ring
2. Small hole for punch

Housing cover is spring-loaded and should come off when ring is removed. However, during operation, a small burr may be raised on main housing in contact with ring. If cover does not come off housing, rap mounting lugs with non-metallic mallet to loosen it.

Place unit in vise and remove cover by pulling it upward with a rotating motion. Remove spring from pressure plate. Remove "O" ring and back-up ring from groove in cover.

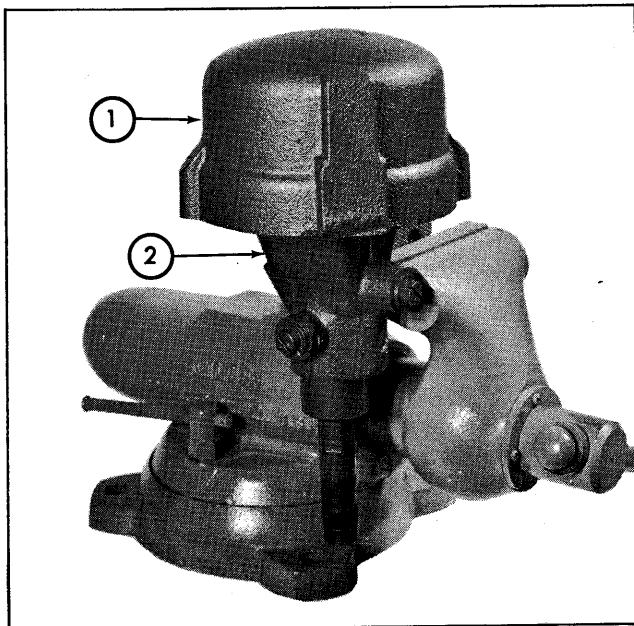


Fig. 7

1. Cover
2. Housing

Grasp pressure plate with both hands and carefully pull it off housing. Remove dowel pins.

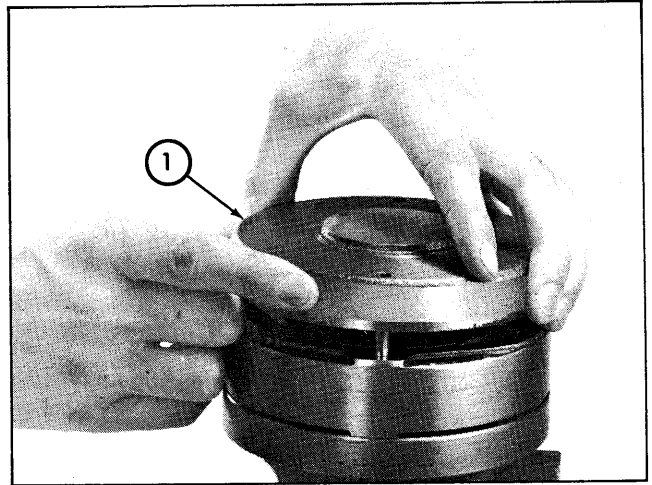


Fig. 8

1. Pressure plate

Spread retaining ring for rotor and pry ring away from shaft with screwdriver.

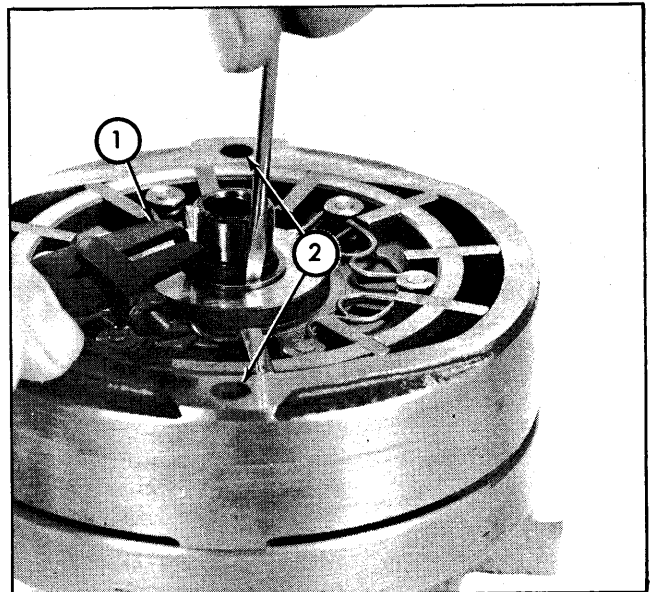


Fig. 9

1. Removing rotor retaining ring
2. Dowel pins removed

Remove ring and rotor assembly by pulling upward on ring with slight rocking motion. If rotor sticks, rock ring and rotor until complete assembly can be removed.

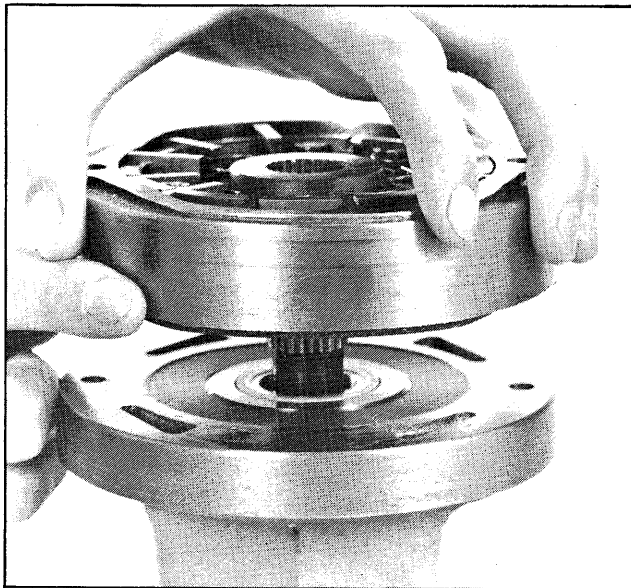


Fig. 10

Slip rotor out of ring and remove vanes. **USE CAUTION** when removing vanes as they are spring-loaded against ring.

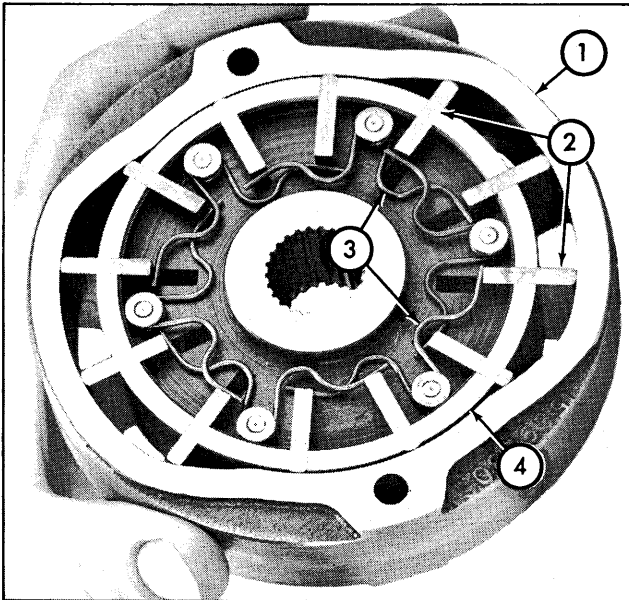


Fig. 11

1. Ring
2. Vanes
3. Vane springs
4. Rotor

Tap end of drive shaft to dislodge bearing support from housing. Remove bearing support.

Withdraw drive shaft from housing. **DO NOT USE FORCE TO REMOVE SHAFT.** Spool and spool bore tolerances are very close and internal components may be damaged if spool is forced out of housing. If spool jams

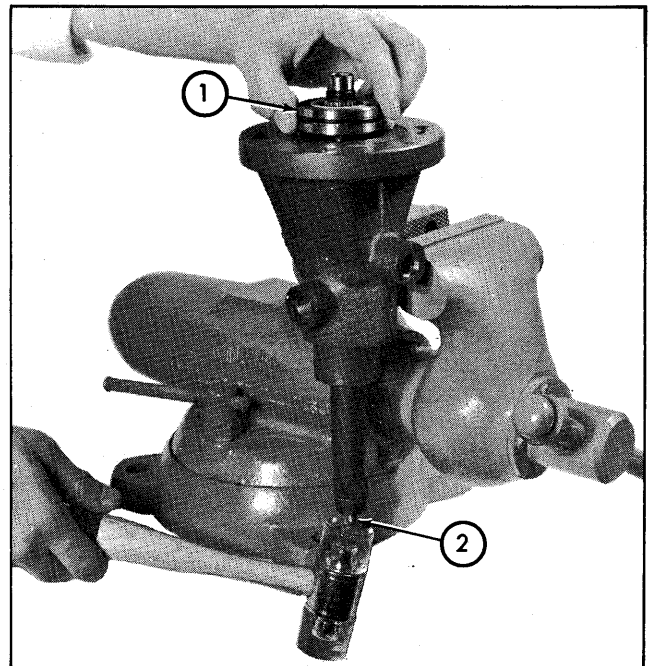


Fig. 12

1. Bearing support
2. Tap end of shaft

in bore, push assembly back into housing and again attempt removal.

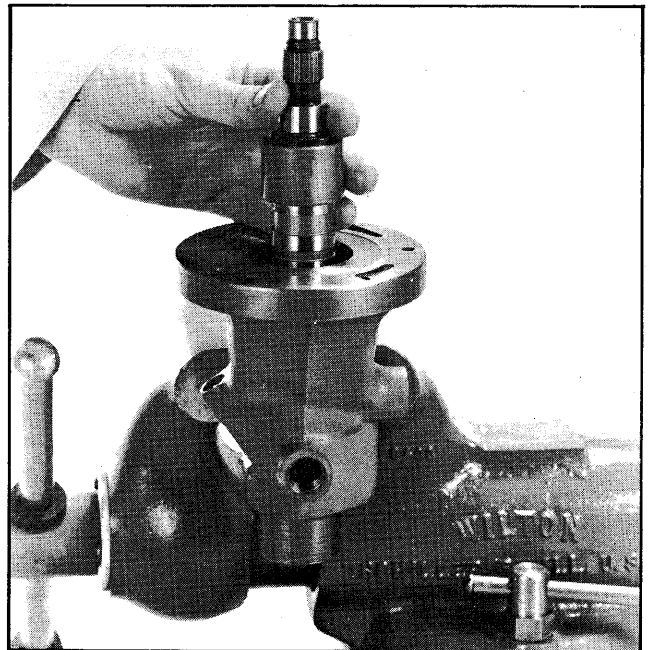


Fig. 13

NOTE: COMPONENTS OF DRIVE SHAFT (ACTUATOR, SPOOL, STUB SHAFT, ETC.) ARE SELECTIVELY FITTED AND FACTORY BALANCED, SO FURTHER DISASSEMBLY IS NOT RECOMMENDED. IF ASSEMBLY IS FUNCTIONALLY DAMAGED, IT WILL BE NECESSARY TO REPLACE ENTIRE UNIT.

Remove seal retaining ring from housing and remove dust shield and oil seal.

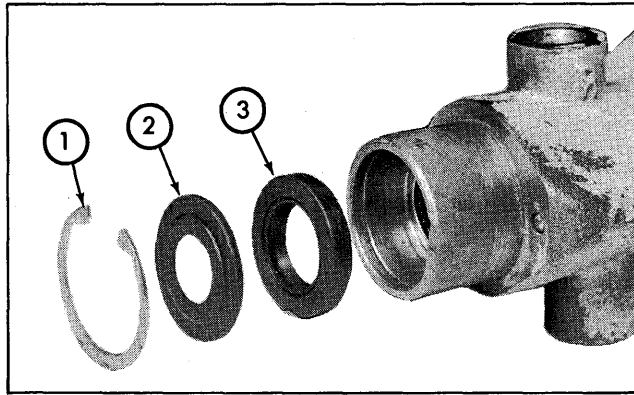


Fig. 14

1. Retaining ring
2. Dust shield
3. Oil seal

REPAIR AND REASSEMBLY

Clean all parts in a petroleum base solvent and blow dry with compressed air. Inspect all parts for wear or damage. Use extreme care when handling parts to avoid nicking or scratching machined surfaces.

Renew all seals when reassembling unit. To remove rotor seal and back-up "O" ring from pressure plate and bearing support, pry parts out with a small screwdriver as shown in Figs. 15 and 16. Use a new "O" ring seal in groove around bearing support.

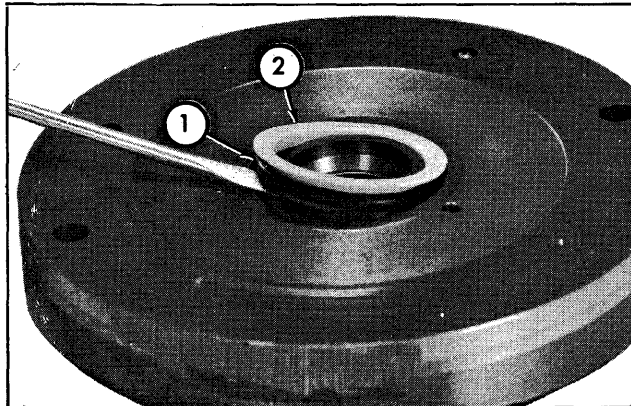


Fig. 15

1. Back-up "O" ring
2. Rotor seal in pressure plate

Check needle bearings in pressure plate and bearing support. Also, check condition of needle bearing in housing. Replace any bearing that is badly worn or damaged. When installing new needle bearings, always press against end of bearing on which number appears.

Install needle bearings in various components as follows:

Press needle bearing into pressure plate until it "bottoms".

Press needle bearing into bearing support until it is .010-.020" under flush with surface of bearing support that is opposite rotor seal cavity.

Press needle bearing into housing until it is flush to .020" under flush with surface of bearing bore in housing that is nearest small end of housing.

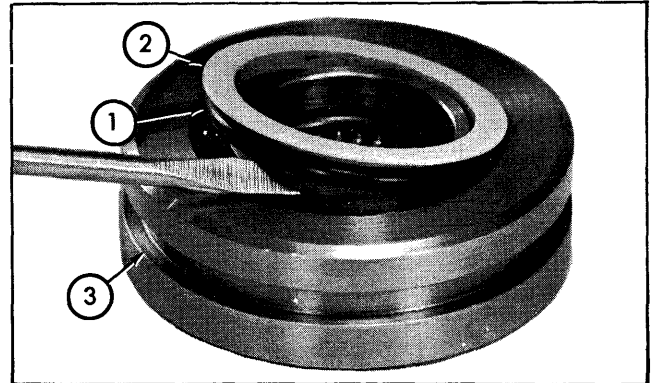


Fig. 16

1. Back-up "O" ring
2. Rotor seal in bearing support
3. Use new "O" ring in groove

Check all bearing surfaces on drive shaft and stub shaft for excessive wear. Check spool drive pin in actuator. If any components are worn or damaged, entire valve and housing assembly must be replaced.

Check fit of valve spool in housing bore. The spool must slide in freely without binding or catching. A small burr on spool or housing bore can usually be removed with a very fine hone. Extreme care must be taken not to cock or jam spool in housing bore when checking spool fit.

Check to be sure spool drive pin is properly engaged. This can be done by pulling spool away from actuator as shown in Fig. 17. If spool does not move axially away from actuator, pin is engaged. If, however, spool does move away from actuator, pin should be relocated in spool by letting spool come back against actuator and inserting pin into either one of two holes in base of spool.

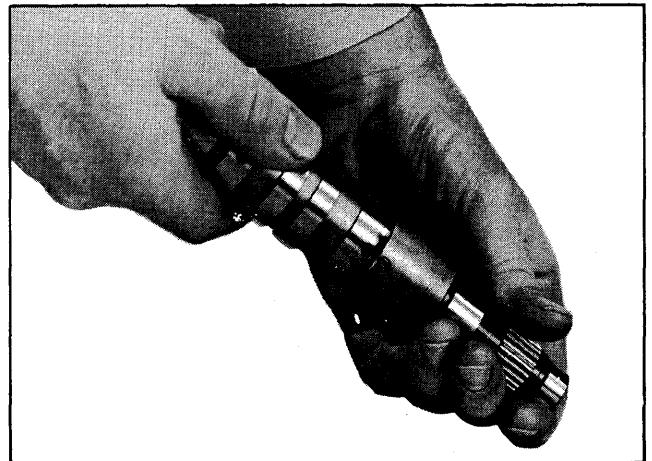


Fig. 17

Check valve spool bore in housing for scoring or nicks. If any defects are found, it will be necessary to renew entire valve and housing assembly. If housing is in serviceable condition, renew oil and dust seals in housing. The spring-loaded lip of oil seal must face to inside of housing, lip on dust seal must face to outside.

Examine face of pressure plate for heavy score marks or other unusual wear patterns. In normal service, pressure plate face will have a polished surface with symmetrical shallow scratch marks resulting from contact with vanes, rotors, and vane springs. Discard pressure plate if it is badly worn or scored.

Check bore of rotor ring to see that it is not deeply scratched or grooved. A highly polished finish should be present on this surface. Slight irregularities in ring bore can be removed with crocus cloth.

Inspect vanes and rotor for excessive wear. The faces of rotor and all surfaces of vanes usually have a highly polished finish. A circular wear pattern from rotor seals may be present around splined hole.

IMPORTANT: IF ANY PARTS OF ROTOR SET ARE FOUND TO BE DEFECTIVE, THEY MUST BE REPLACED ONLY AS A COMPLETE SET AS SHOWN IN FIG. 18.

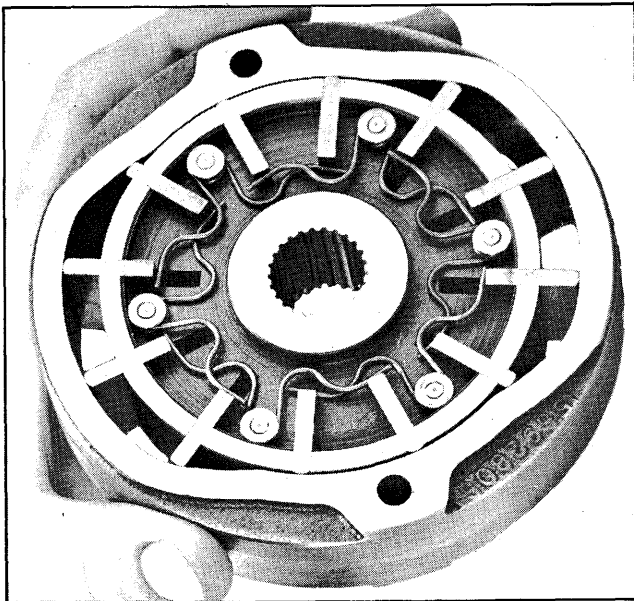


Fig. 18

Begin reassembly of hydramotor by clamping housing in a vise as shown in Fig. 19. Apply a film of grease to inside diameter of oil seal in housing. Insert drive shaft and valve spool assembly in housing from top. Push assembly into housing slowly and evenly with a slight oscillating motion until spool is seated.

CAUTION: BECAUSE OF EXTREMELY CLOSE TOLERANCES BETWEEN SPOOL AND HOUSING BORE, CARE MUST BE TAKEN WHEN INSTALLING VALVE SPOOL ASSEMBLY.

Place bearing support over end of drive shaft with rotor seal facing up. Push shaft upward until bearing is engaged on drive shaft.

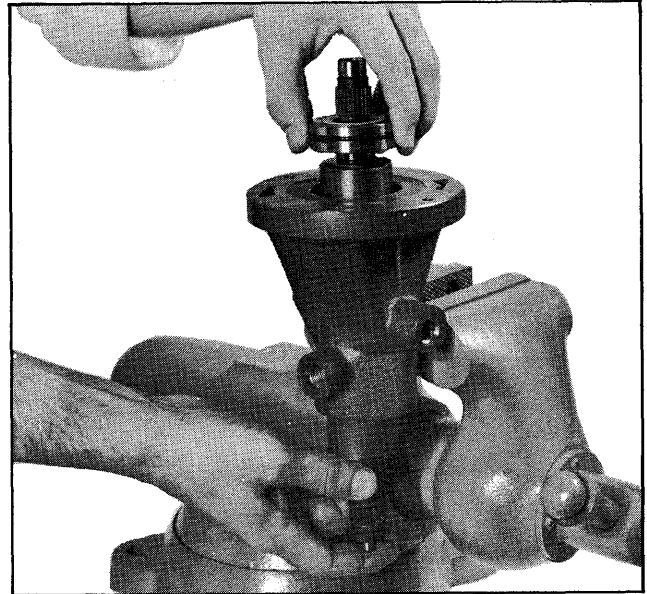


Fig. 19

Apply a light film of grease to "O" ring seal around bearing support and push assembly downward into housing. Be careful not to cock bearing support when applying downward pressure as this could damage "O" ring. Push down on bearing support until it is bottomed.

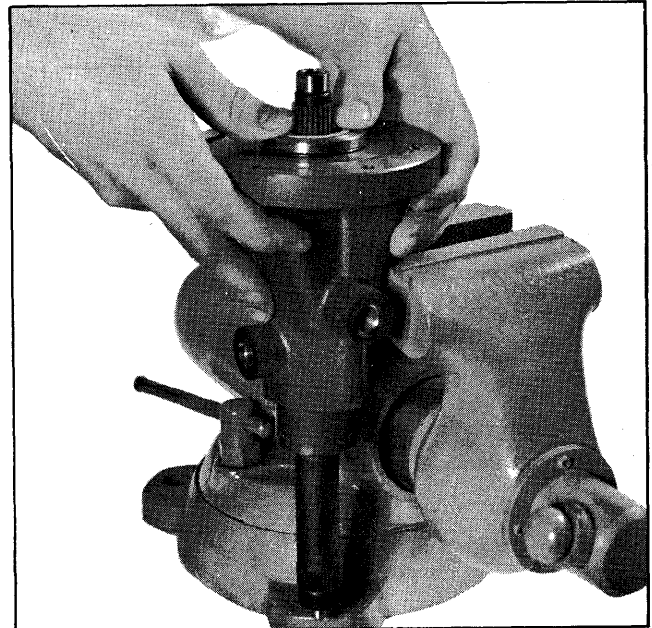


Fig. 20

IMPORTANT: MAINTAIN CLEAN WORKING CONDITIONS TO AVOID GETTING ANY FOREIGN MATERIAL INTO UNIT. CAREFUL THOUGHT TO CLEANLINESS WHILE SERVICING COMPONENTS OF POWER STEERING SYSTEM WILL PREVENT FUTURE TROUBLE.

If rotor ring, rotor, and vanes are found to be in a re-usable condition, assemble components of rotor set before attempting to reinstall assembly to hydramotor unit.

Lay rotor ring on a clean, flat surface and place rotor in ring. Assemble vanes in rotor slots in each major diameter of rotor ring as shown in Fig. 21. Be sure rounded side of vanes are to outside (against the pump ring).

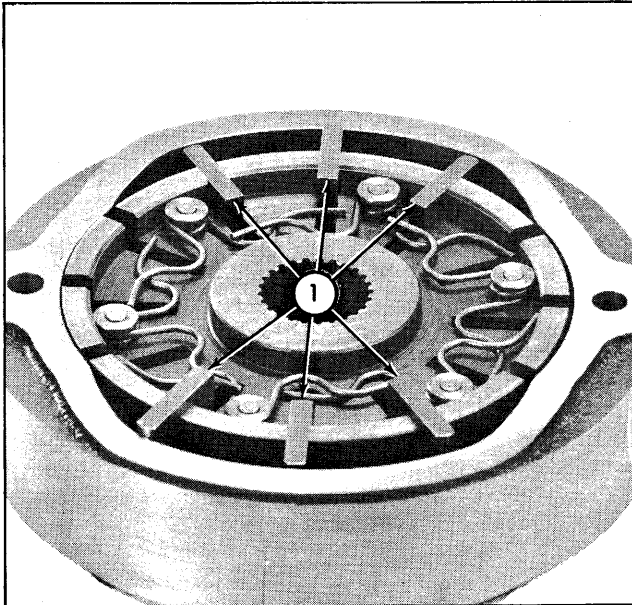


Fig. 21

1. Vanes installed in major diameter

Turn rotor 90 degrees and install remaining six vanes. To aid in installing last six vanes, compress vane springs with a screwdriver.

After all vane springs are engaged with vanes on one side of rotor, turn rotor and ring assembly over and engage springs to vanes on this side.

IMPORTANT: AFTER ALL VANES ARE INSTALLED, CHECK TO BE SURE ALL VANE SPRINGS ARE ENGAGED AND DO NOT PROTRUDE ABOVE SURFACE OF ROTOR.

Align marks made on the rotor ring and housing at disassembly and install ring and rotor assembly. If only one edge of rotor ring O.D. has a chamfer, install ring so chamfer is up, away from housing. The chamfer is most prominent in dowel pin area of ring.

Install dowel pins through ring and into housing. Install a new retaining ring for rotor. Spread ring with a snap ring pliers and work ring into groove with a screwdriver.

Install pressure plate on dowel pins and push plate down onto ring and rotor assembly. Special care must be taken so rotor seal does not drop out of its cavity when pressure plate is installed. Set pressure plate spring in place so it engages hub on pressure plate.

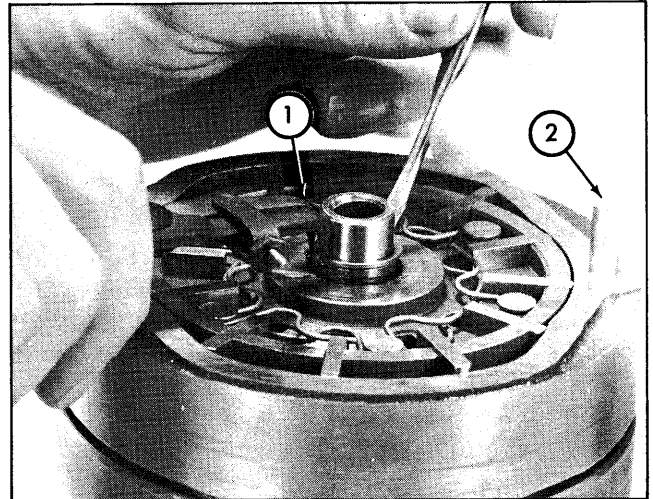


Fig. 22

1. Installing retaining ring
2. Dowel pins installed (1 shown)

Install a new "O" ring and back-up ring in housing cover. Stretch "O" ring before installing. Flat back-up ring must be installed so it is nearest open end of cover. Apply a coat of grease to back-up ring and seal to facilitate installing cover.

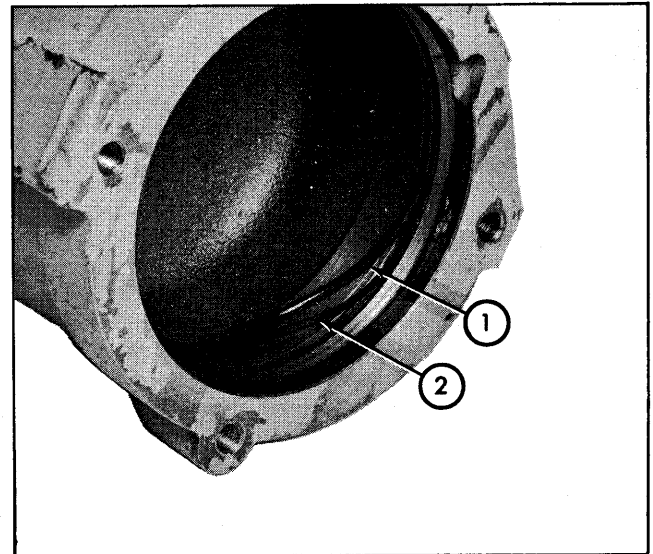


Fig. 23

1. "O" ring (inner)
2. Back-up ring

Carefully place cover on unit, lining up notch in cover with lug on housing. A slight binding of cover can be felt as cover seal engages O.D. of rotor ring. To start seal onto ring, rotate cover back and forth while exerting downward pressure. Keep notch and lug lined up.

CAUTION: BE SURE COVER DOES NOT COCK OR JAM DURING INSTALLATION AS THIS COULD RESULT IN DAMAGE TO SEAL.

Push cover down until pressure plate spring prevents it from being pushed any further. Remove unit from vise and place it in an arbor press. Handle unit carefully to prevent cover from slipping off housing.

Place cover retaining ring on housing, and place a sleeve on housing as shown in Fig. 24. Use a sleeve of sufficient length so that when ram on arbor press is brought down it will not contact drive shaft.

CAUTION: A SLEEVE MUST BE USED TO MOVE HOUSING DOWN INTO COVER. DO NOT APPLY PRESSURE TO SHAFT AS THIS WILL DISLodge INTERNAL COMPONENTS.

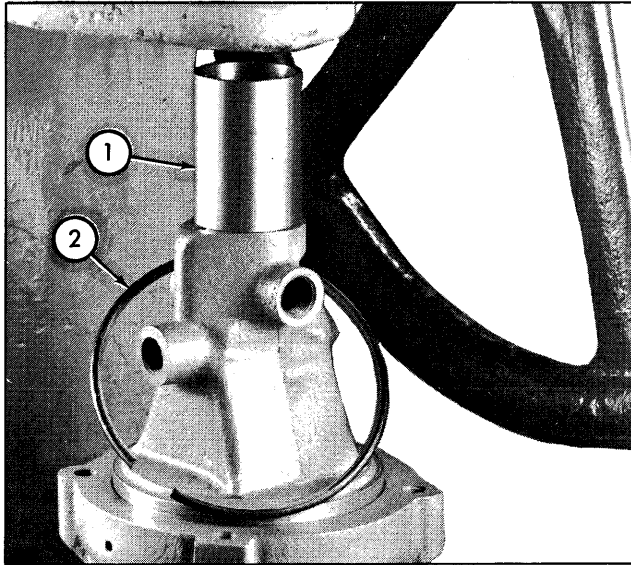


Fig. 24

1. Sleeve
2. Cover retaining ring

Apply pressure to housing to push it down into cover until retaining ring groove is exposed. Be sure housing is pushed squarely into cover. DO NOT USE FORCE. Light taps with a soft mallet, around edge of cover will aid in aligning housing and cover during installation.

Install cover retaining ring, placing one end of ring under anti-rotation lug to begin with. Work ring around cover until it is solidly seated in ring groove. Remove unit from press.

Place taper ring on steering shaft so holes for locking ball are aligned. Install nut on steering shaft so a few threads are engaged.

Install steering shaft on stub shaft so holes in shaft and taper ring are aligned with groove in stub shaft. Hole must not be located above flat on stub shaft since ball will not lock shaft in this position. Locate hole 90 degrees from flat on stub shaft.

Place lock ball in hole, allowing it to fall into place in stub shaft groove. If necessary, push ball into place with a punch. Rotate taper ring 1/4 turn so ball is locked in place.

Tighten steering shaft nut until taper ring is pushed up tightly on steering shaft (40-50 ft. lbs. torque). Stake nut to slot in steering shaft.

Reinstall steering column, placing clamp bolt 180 degrees from anti-rotation lug on hydramotor. Tighten nuts on column clamp to 10-15 ft. lbs.

Reinstall steering wheel and tighten nut to 35-40 ft. lbs. Reassemble horn button in reverse order of disassembly as described in paragraph 4-21 on page 1-22.

Install new "O" rings on elbows for hydraulic lines if there was evidence of oil leakage. When removing an elbow, note its position so it can be reinstalled in its original position.

Dip new "O" ring in hydraulic oil, or coat with Lubriplate, and install on elbow. Be sure there are no twists in "O" ring after it is installed. Screw elbow part way into housing, then tuck "O" ring into recess in housing. Tighten elbow until it points in its original direction, then tighten down lock nut.

CAUTION: DO NOT ATTEMPT TO RELOCATE ELBOW AFTER LOCK NUT IS TIGHTENED, AS DOING SO WILL DAMAGE SEAL. IF IT IS NECESSARY TO REPOSITION ELBOW, FIRST LOOSEN LOCK NUT.

Reinstall hydramotor in its original position. Tighten pivot bolt to hold hydramotor in place and secure bolt with lock nut. Reconnect transmission control rod and reconnect oil lines to hydramotor.

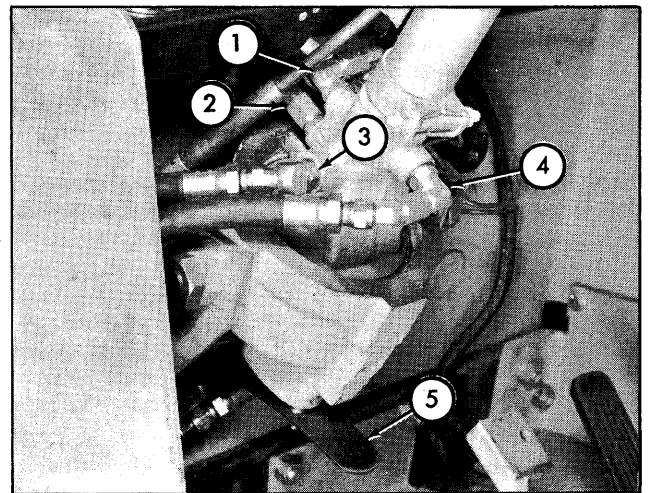


Fig. 25

1. Tube to cylinder - right turn
2. Tube to cylinder - left turn
3. Pressure tube from pump
4. Return tube to pump
5. Latch for steer wheel position

Fig. 25 shows latch that holds steering wheel in one of two positions. Depress latch with foot to tilt steering wheel forward or back.

POWER STEERING BOOSTER (MA60)

REMOVAL (See figure on page 31 of supplement).

Disconnect and cap oil lines (25) attached to booster (10). Identify oil lines so they can be reconnected to original ports. Remove nut (12) and detach socket (11) from steering housing. Remove nut (19) from stud (18) and remove stud from frame bracket. Remove booster.

DISASSEMBLY (See figure on page 34 of supplement).

Remove socket from piston rod, noting its location on rod. Drain oil from booster by moving piston rod back and forth in booster.

Remove 3 slotted head screws and remove end plate (17). Remove rings (13 and 16). Pull out piston and rod assembly (1) to dislodge bearing (7) from housing.

Remove bearing from piston rod and remove items 8 through 12 from bearing. Remove "O" ring (14) and back-up ring (15) from bearing. Remove piston ring (6) and seal (5) from piston.

REPAIR AND REASSEMBLY

Clean all parts in solvent and inspect for wear or damage. Check piston and barrel bore to be sure they are not scratched or scored. Renew any faulty components.

Replace all seals and "O" rings during reassembly. Apply a coat of Lubriplate or clean hydraulic oil to all seals and "O" rings to facilitate installation and prevent seal or "O" ring damage.

Carefully install seal (6) in piston groove, checking to be sure seal was not cut or twisted. Install piston ring (5) in groove, on top of seal.

NOTE: IF NEW PISTON IS INSTALLED ON ROD, TIGHTEN PISTON ROD NUT TO 50 FT. LBS.

Install piston and rod assembly in tube, using care not to damage piston ring.

Install "O" ring (14) and back-up ring (15) on piston rod bearing so "O" ring (14) will enter cylinder tube first at assembly. Install assembly in tube and secure with ring (16).

Install "O" ring (8) over threads and notches in piston rod, being careful not to twist or cut ring. Tuck ring into place in bearing housing. Install back-up ring (9), retainer ring (10), seal retainer (11). Secure parts in bearing housing with ring (13). Reinstall cylinder end plate (17).

Reinstall socket on piston rod in approximately its original position. Reinstall booster in lift truck and reconnect hydraulic lines. Bleed air from cylinder. Check and adjust steering linkage as outlined on page 4 of this supplement.

BLEEDING POWER STEERING SYSTEM

Any time power steering system is opened for service, it will be necessary to bleed system to remove air. Be sure oil in hydraulic reservoir is up to specified level.

Start engine and run at idle speed. Rotate steering wheel as rapidly as possible to unseat control valve spool in hydramotor. Valve spool must be actuated off-center to start oil flowing from hydraulic pump to hydramotor.

Keep valve spool actuated by rotating steering wheel from one stop position to the other. Air will bleed out only at reservoir, therefore, rotate steering wheel rapidly from one stop position to the other to circulate oil repeatedly in both directions.

Oil in lines to steering cylinder does not flow in a circuit, but simply moves back and forth in lines. Oil pumped to cylinder with hydramotor during bleeding operation reaches a "dead end" at piston, so any air in these lines will be slow to move out of system. Large air bubbles in system will allow steering wheel to "free-spin" as air enters hydramotor; small bubbles will cause a spongy feel at steering wheel.

SERVICE BRAKES (BENDIX)

REMOVAL (See figure 2-22A.)

Jack up front of truck and remove drive wheel. Brake drum is an integral part of wheel center.

Remove two flat head screws from axle flange. Thread two 3/8" cap screws evenly and gradually into tapped holes in flange. This will force axle shaft out of housing.

Remove retainer ring (44) and pull bearing housing (40) with items 41 through 45 from housing (35).

DISASSEMBLY (See figure on page 37 of supplement)

Unhook shoe return springs (14 and 15) from wheel cylinder bolt (23) and remove springs.

Move lever (12) for automatic adjuster to obtain slack in cable (16). Unhook cable from cylinder bolt and adjuster lever. Remove lever and spring (13). Remove brake adjusting screw assembly (8 thru 11).

Press down on spring retainer (7) and turn it 90° to remove it from pin (4). Hold pin if necessary to keep it from turning. Remove spring (6) and inner retainer (5). Remove shoes (3).

Remove retainer (31) from parking brake cam (28) and remove cable guide (29) and retainer clip (30). Unhook cable (27) from parking brake levers (24). Levers may be removed by removing retainers (26).

IMPORTANT: IF PARKING BRAKE LEVER (32) OR CAM (28) IS TO BE REMOVED, MAKE A CHISEL MARK ON LEVER AND CAM SO PARTS CAN BE INSTALLED IN SAME RELATIVE POSITION.

Slip rubber dust cups from wheel cylinder body and withdraw pistons. Press in on edge of cup in cylinder to tip cup sideways and remove cups and springs.

To remove wheel cylinder body, disconnect oil line and remove mounting bolts and screws. Backing plate (2) can now be removed if desired.

REPAIR

Discard brake shoes with linings and rubber parts used in wheel cylinder. Check all springs for fatigue cracks. Examine fittings on ends of cables to be sure they are securely attached.

IMPORTANT: CHECK CABLE (16) FOR IDENTIFICATION MARK "A" STAMPED ON ONE EYELET. IF NO IDENTIFYING MARK CAN BE FOUND, AND BRAKE SHOES ARE TO BE REPLACED, A CABLE 35P2194, IDENTIFIED WITH AN "A" ON ONE EYELET, MUST BE USED.

Wipe wheel cylinder bore absolutely clean. Check bore for pits or corrosion. Remove any rough spots with fine crocus cloth.

REASSEMBLY

Reassemble in reverse order of disassembly. Tighten cap screws in backing plates to 115-120 ft. lbs. Tighten cap screws and allen head screws securing wheel cylinder to backing plate to 400-450 inch pounds.

Coat bores in wheel cylinder with clean brake fluid. Install new boots (in kit 35P2200) on pistons. Boots must be installed on pistons so they will engage grooves in cylinder housing when installed.

Coat rubber cups with clean brake fluid, and, with spring centered in cup, install spring and cup in cylinder. Use care to prevent damage to lip on cup.

Install piston in cylinder and slip boot in place in groove around cylinder housing.

If parking brake lever and cam were removed, reinstall them, using marks made at disassembly to be sure they are properly reassembled.

Reinstall parking brake levers on pins in backing plate. Hang retainer clip for parking brake cable on parking brake cam, slip cable in groove in cable guide and install guide on cam. Secure with retainer ring. Attach cable to parking brake lever.

Apply a thin coat of light grease to area of backing plate that shoes rub on. Install brake shoes. Primary shoe does not have cable guide and attaches to forward

position on backing plate. Secure shoes with hold-down parts.

Install brake adjuster screw between shoes so star wheel is nearest secondary (rear) shoe. Attach adjuster cable to wheel cylinder bolt and place cable around guide on secondary shoe.

Reinstall spring between primary shoe and adjuster lever. Connect cable to adjuster lever then pull lever toward lower end of secondary shoe and hook lever in hole in secondary shoe. Install return springs at upper ends of shoes. Fig. 26 shows brake assembly installed.

NOTE: A SPECIAL TOOL FOR INSTALLING SHOE RETURN SPRINGS IS AVAILABLE FROM BENDIX CORPORATION, SOUTH BEND, INDIANA, UNDER THEIR PART NUMBER BPD41938F4.

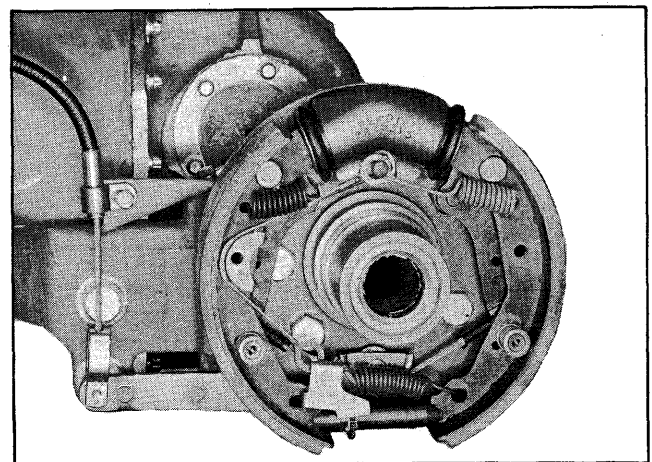


Fig. 26

Reinstall bearing housing and axle in reverse order of disassembly. If bearing adjustment is not correct, refer to revised information found on page 13 of this supplement for procedures to follow for obtaining correct end play and bearing adjustment.

Bleed wheel cylinders after installation is complete. Be sure master cylinder is full before bleeding. Always use a bleeder hose to prevent brake fluid from running down back plate and entering brake drum. Apply foot pressure to brake pedal and hold pedal down while loosening bleed screw. Allow air to escape from wheel cylinder and line. Tighten bleed screw before releasing brake pedal. Replenish fluid in master cylinder if necessary.

Apply brake pedal and hold pressure in system. Check for signs of fluid leaks if pedal slowly travels to floor.

Operate lift truck at slow forward speed to determine that brakes stop truck evenly and quickly.

If pedal travels an excessive amount before braking action begins, it may be due to brake shoes not being adjusted to drums. A series of stops with lift truck traveling in reverse direction will help adjust brakes.

DRIVE WHEEL BEARINGS AND SEALS

THE FOLLOWING INSTRUCTIONS SUPERSEDE THOSE GIVEN IN MANUAL S-345A REGARDING SERVICE OF DRIVE WHEEL BEARINGS AND SEALS.

DISASSEMBLY (See figure 2-22A.)

If a wheel hub must be removed to correct an oil leak, remove drive wheel and axle shaft. If red transmission fluid is noted in wheel hub, axle seal (38) is leaking and requires replacement. Hub seal (41) must be replaced if oil or grease is found on brake drum or outside of hub.

After drive wheel and axle shaft have been removed, drive outer bearing cone inward (away from bearing retaining ring) as far as it will go. Measure clearance between ring and bearing cone with feeler gage. If bearing-to-ring clearance is in excess of .002", a bearing adjustment will be necessary at reassembly. (The recommended end play for wheel bearing cones is zero to .002" loose-zero preferred).

Record measured clearance (if in excess of .002") between snap ring and bearing so, if reassembly is made with original bearing cones and retaining ring, a bearing spacer that is the measured amount thicker than original spacer will result in correct bearing adjustment.

Remove snap ring and wheel hub (bearing housing) containing bearings and seals.

REASSEMBLY

When reassembling seals for axle housing, apply sealant to seal bores. The recommended sealant to use is a silicone-rubber adhesive-sealer manufactured by either Dow-Corning, Inc. (RTV-732), or General Electric Corporation (RTV102). This sealant is generally available in hardware stores. It requires approximately 10 minutes to set after exposure to air.

Use sealant between axle flange and wheel hub on lift trucks that do not use an "O" ring at this location.

Apply a thin, continuous line of sealant on seal bore prior to pressing new seal 35A8629 into place. Install seal with lipped edge to inside, using a seal driver large enough to contact outside shell of seal. Use care to avoid cocking seal. Be sure seal is squarely seated against shoulder after installation, but do not apply excessive pressure as shell may buckle.

Install inner bearing cup in housing. Use original cup if possible to minimize bearing adjustment.

Prepare an assembly of wheel bearing cones, shim washer, and snap ring. If new components are being used, it will be necessary to determine correct shim washer to use between bearing cones to obtain a zero to .002" bearing end play.

To determine correct shim washer to use, measure distance between bearing shoulder and OUTER edge of snap ring groove in axle housing. Stack two bearing cones and snap ring and select shim washer so measurement over cones, shim washer, and retainer ring equals dimension obtained from axle housing.

A gauge (tool) for determining correct stack height of cones, shim, and ring can be made by filing a small rod so its length exactly equals distance between bearing shoulder and outer edge of snap ring groove in axle housing. Use gauge, together with straight edge, to determine correct stack height.

NOTE: A NEW GAUGE MUST BE MADE FOR EACH AXLE HOUSING THAT IS SERVICED.

After determining correct shim, pack bearing cones with an automotive-type, multi-purpose, lithium base grease, containing a moly-disulfide additive. Work grease into bearing so spaces around rollers are filled with grease.

Install hub on axle housing, being careful not to damage seal in hub. Install inner bearing cone, selected shim, outer cone, outer cup, and snap ring.

Install axle shaft less shims that are ordinarily used between axle flange and bearing housing. Install countersunk head screws and tighten until they are just snug. Rotate wheel hub several turns and measure space between axle flange and hub at both screws. Adjust screws so space between flange and hub at screws, and 90 degrees from each screw is equal. Tap axle shaft sharply several times and again rotate hub and retighten screws evenly. Repeat until no further take-up is obtained. Do not apply pressure with screws.

Wrap a stout string around outside of wheel studs and attach a spring scale. Record pounds pull required to rotate hub.

Prepare a shim pack .002" thinner than space between axle flange and hub. Remove axle, install shim pack and axle, and tighten countersunk screws. Again obtain a rolling torque reading and vary shim pack as necessary so assembled rolling torque is 2 to 4 pounds greater than reading obtained without shims.

Remove axle shaft. Apply sealant to seal bore in axle housing and carefully install seal with lipped edge toward inside. Install collar with flat side toward seal and drive into bore until it contacts seal. The collar serves as a guide when axle shaft is installed to prevent damage to seal.

If no "O" ring is used between axle flange and wheel hub, coat flange on axle shaft that extends into wheel hub with same sealant specified for seal bores before axle is installed. Secure axle with 2 countersunk screws.

ZENITH CARBURETOR (MA60)

REMOVAL AND DISASSEMBLY

Detach air cleaner hose from carburetor and remove air cleaner and mounting bracket. Flow divider must be removed from hydraulic pump before carburetor can be removed. Detach accelerator and governor linkages, choke cable, and fuel line, and remove carburetor from manifold.

Identify or mark relationship of carburetor components as carburetor is disassembled so parts can be reassembled in original position.

Disassembly of carburetor is complete upon removal of all attaching parts of each component.

REPAIR AND REASSEMBLY (See illustration on page 22 of supplement.)

Clean all parts in cleaning solution and dry, using compressed air. Carefully examine all parts for wear or damage.

NOTE: If throttle shaft bushings are found to be badly worn, carburetor throttle body should be taken to a Zenith Service Shop for installation of new bushings. Bushings must be line-reamed after installation and economizer restriction passage and channel from body bore into throttle shaft bore must be redrilled.

Reassemble carburetor in reverse order of disassembly, using parts found in repair kit. Use marks made at disassembly to insure that various components are reinstalled in original position.

The float controls fuel level in carburetor bowl. After float is installed, turn throttle body upside down and measure distance from float bodies to machined surface on body (no gasket). The correct dimension is 1-5/32" plus or minus 1/32". If dimension is incorrect, bend float arms to obtain correct dimension.

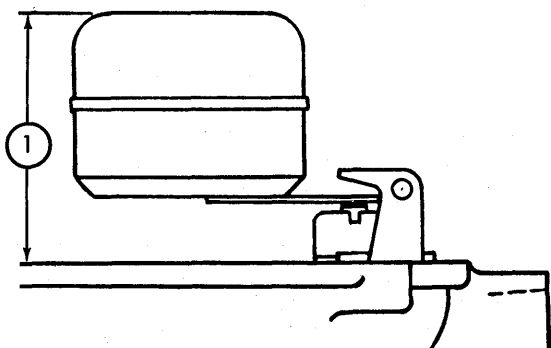


Fig. 27

1. 1-5/32" ± 1/32"

Reassemble remaining carburetor components and re-install carburetor on engine. Adjust carburetor as explained in paragraph 3-16 on page 1-13 of Manual S-345A.

HYDRAULIC PUMP (MA60)

REMOVAL AND DISASSEMBLY (See figure on page 41.)

Drain hydraulic oil reservoir. Disconnect and cap oil lines connected to pump. Remove lower pump mounting bolt. Remove nut from long bolt that passes through pump and governor, allow pump to tip down and remove long bolt. Withdraw pump from engine.

Remove nut from pump shaft and remove gear (34) and Woodruff key. Remove screws securing adapter (9) to pump. Remove adapter and "O" ring (10).

Mark flow divider body (24) and pump so flow divider can be reinstalled in its original position. Remove flow divider and "O" rings (33).

Scratch a line on side of pump cover (3) gear plate (16), and body (2) so gear plate, if re-usable, can be reinstalled in its original position. Loosen cover-to-body bolts a few turns and tap screws with a soft mallet to separate cover, plate, and body. Remove bolts and carefully lift off cover.

IMPORTANT: DO NOT PRY COVER OFF WITH A SCREWDRIVER OR OTHER SHARP INSTRUMENT AS THIS WILL DAMAGE MACHINED SURFACES OF GEAR PLATE AND COVER.

Remove wear plate (19), noting that bronze-plated side of plate is toward pump gears and that two small holes on one side of plate are toward small (pressure) port in cover.

Before removing gears (6 and 15), check clearance between gears and gear plate as shown in Fig. 28. If clearance exceeds .005 inch, a new gear plate must be used. Remove gears, gear plate, and wear plate (18).

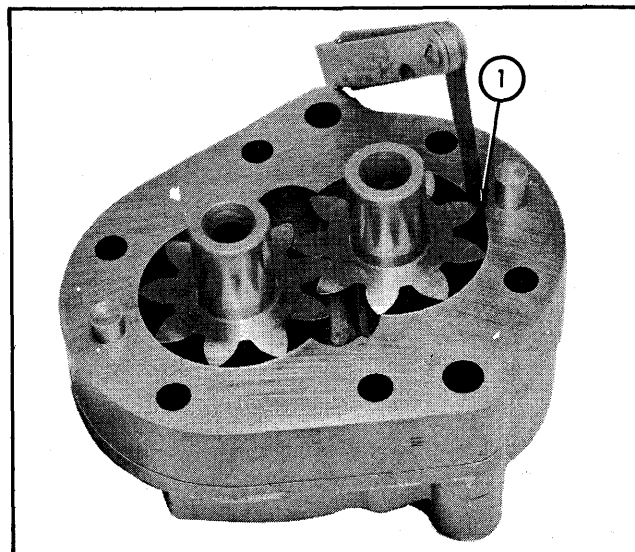


Fig. 28

1. Clearance must not exceed .005"