

SHOP MANUAL

MASSEY-FERGUSON

MODELS
MF255 — MF265 — MF270 — MF275 — MF290

Tractor serial number is stamped on a name plate attached to the instrument console.
Engine serial number is stamped on the side of engine cylinder block.

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DUAL DIMENSIONS

This service manual provides specifications in both Metric (SI) and U.S. Customary systems of measurement. The first specification is given in the measuring system perceived by us to be the preferred system when servicing a particular component, while the second specification (given in parenthesis) is the converted measurement. For instance, a specification of "0.28mm (0.011 inch)" would indicate that we feel the preferred measurement is the metric system of measurement and the U.S. Customary equivalent of 0.28 mm is 0.011 inch.

CONDENSED SERVICE DATA

	MF255 Gasoline	MF255 Diesel	MF255 Diesel	MF265 Gasoline
GENERAL				
Engine Make	Perkins	Perkins	Perkins	Perkins
Engine Model	AG4.212	AD4.203	A4.236	AG4.236
Number of Cylinders	4	4	4	4
Bore	98.4 mm (3.875 in.)	91.5 mm (3.6 in.)	98.4 mm (3.875 in.)	98.4 mm (3.875 in.)
Stroke	114.3 mm (4.5 in.)	127 mm (5.0 in.)	127 mm (5.0 in.)	127 mm (5.0 in.)
Displacement	3.48 L (212 cu. in.)	3.33 L (203 cu. in.)	3.87 L (236 cu. in.)	3.87 L (236 cu. in.)
Electrical System	12 Volt, Negative Ground			
Forward Speeds	8 or 12			
Reverse Speeds	2 or 4			
TUNE-UP				
Firing Order	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2
Valve Clearance, Cold				
Intake .....	....	0.30 mm (0.012 in.)	0.30 mm (0.012 in.)	....
Exhaust .....	....	0.30 mm (0.012 in.)	0.30 mm (0.012 in.)	....
Valve Clearance, Hot				
Intake	0.30 mm (0.012 in.)	0.25 mm (0.010 in.)	0.25 mm (0.010 in.)	0.30 mm (0.012 in.)
Exhaust	0.38 mm (0.015 in.)	0.25 mm (0.010 in.)	0.25 mm (0.010 in.)	0.38 mm (0.015 in.)
Valve Face Angle	46°	45°	45°	46°
Valve Seat Angle	46°	45°	45°	46°
Injection Timing, Static .....	....	26° BTDC	23° BTDC	....
Injector Opening Pressure .....	....	17235 kPa (2500 psi)	17235 kPa (2500 psi)	....
Ignition Timing, Static	12° BTDC	....	....	11° BTDC
Breaker-Point Gap	0.56 mm (0.022 in.)	....	....	0.56 mm (0.022 in.)
Dwell Angle	31°-34°	....	....	31°-34°
Spark Plug Gap	0.63 mm (0.025 in.)	....	....	0.63 mm (0.025 in.)
Governed Speeds — Engine Rpm				
Low Idle	725-775	725-775	725-775	725-775
High Idle (no-load)	2225-2275	2185	2185	2225-2275
Rated (full load)	2000	2000	2000	2000
Power Rating at Pto				
Shaft	37.3 kW (50 hp)	37.3 kW (50 hp)	38.8 kW (52 hp)	44.7 kW (60 hp)
SIZES-CLEARANCES				
Crankshaft Main Journal				
Diameter	76.162-76.175 mm (2.9985-2.9990 in.)	69.81-69.82 mm (2.7485-2.7490 in.)	76.162-76.175 mm (2.9985-2.9990 in.)	76.162-76.175 mm (2.9985-2.9990 in.)
Bearing Clearance	0.064-0.114 mm (0.0025-0.0045 in.)	0.076-0.127 mm (0.003-0.005 in.)	0.05-0.10 mm (0.002-0.004 in.)	0.064-0.114 mm (0.0025-0.0045 in.)

DUAL DIMENSIONS

This service manual provides specifications in both Metric (SI) and U.S. Customary systems of measurement. The first specification is given in the measuring system perceived by us to be the preferred system when servicing a particular component, while the second specification (given in parenthesis) is the converted measurement. For instance, a specification of "0.28mm (0.011 inch)" would indicate that we feel the preferred measurement is the metric system of measurement and the U.S. Customary equivalent of 0.28 mm is 0.011 inch.

CONDENSED SERVICE DATA

	MF255 Gasoline	MF255 Diesel	MF255 Diesel	MF265 Gasoline
GENERAL				
Engine Make	Perkins	Perkins	Perkins	Perkins
Engine Model	AG4.212	AD4.203	A4.236	AG4.236
Number of Cylinders	4	4	4	4
Bore	98.4 mm (3.875 in.)	91.5 mm (3.6 in.)	98.4 mm (3.875 in.)	98.4 mm (3.875 in.)
Stroke	114.3 mm (4.5 in.)	127 mm (5.0 in.)	127 mm (5.0 in.)	127 mm (5.0 in.)
Displacement	3.48 L (212 cu. in.)	3.33 L (203 cu. in.)	3.87 L (236 cu. in.)	3.87 L (236 cu. in.)
Electrical System	12 Volt, Negative Ground			
Forward Speeds	8 or 12			
Reverse Speeds	2 or 4			
TUNE-UP				
Firing Order	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2
Valve Clearance, Cold				
Intake .....	....	0.30 mm (0.012 in.)	0.30 mm (0.012 in.)	....
Exhaust .....	....	0.30 mm (0.012 in.)	0.30 mm (0.012 in.)	....
Valve Clearance, Hot				
Intake	0.30 mm (0.012 in.)	0.25 mm (0.010 in.)	0.25 mm (0.010 in.)	0.30 mm (0.012 in.)
Exhaust	0.38 mm (0.015 in.)	0.25 mm (0.010 in.)	0.25 mm (0.010 in.)	0.38 mm (0.015 in.)
Valve Face Angle	46°	45°	45°	46°
Valve Seat Angle	46°	45°	45°	46°
Injection Timing, Static .....	....	26° BTDC	23° BTDC	....
Injector Opening Pressure .....	....	17235 kPa (2500 psi)	17235 kPa (2500 psi)	....
Ignition Timing, Static	12° BTDC	....	....	11° BTDC
Breaker-Point Gap	0.56 mm (0.022 in.)	....	....	0.56 mm (0.022 in.)
Dwell Angle	31°-34°	....	....	31°-34°
Spark Plug Gap	0.63 mm (0.025 in.)	....	....	0.63 mm (0.025 in.)
Governed Speeds — Engine Rpm				
Low Idle	725-775	725-775	725-775	725-775
High Idle (no-load)	2225-2275	2185	2185	2225-2275
Rated (full load)	2000	2000	2000	2000
Power Rating at Pto				
Shaft	37.3 kW (50 hp)	37.3 kW (50 hp)	38.8 kW (52 hp)	44.7 kW (60 hp)
SIZES-CLEARANCES				
Crankshaft Main Journal				
Diameter	76.162-76.175 mm (2.9985-2.9990 in.)	69.81-69.82 mm (2.7485-2.7490 in.)	76.162-76.175 mm (2.9985-2.9990 in.)	76.162-76.175 mm (2.9985-2.9990 in.)
Bearing Clearance	0.064-0.114 mm (0.0025-0.0045 in.)	0.076-0.127 mm (0.003-0.005 in.)	0.05-0.10 mm (0.002-0.004 in.)	0.064-0.114 mm (0.0025-0.0045 in.)

CONDENSED SERVICE DATA (CONT.)

	MF255 Gasoline	MF255 Diesel	MF255 Diesel	MF265 Gasoline
SIZES-CLEARANCES (CONT.)				
Crankshaft Crankpin				
Diameter	63.475-63.487 mm (2.4990-2.4995 in.)	57.112-57.125 mm (2.2485-2.2490 in.)	63.475-63.487 mm (2.4990-2.4995 in.)	63.475-63.487 mm (2.4990-2.4995 in.)
Bearing Clearance	0.038-0.076 mm (0.0015-0.0030 in.)	0.064-0.102 mm (0.0025-0.0040 in.)	0.038-0.076 mm (0.0015-0.0030 in.)	0.038-0.076 mm (0.0015-0.0030 in.)
Crankshaft End Play	0.05-0.38 mm (0.002-0.015 in.)	0.05-0.35 mm (0.002-0.014 in.)	0.10-0.38 mm (0.004-0.015 in.)	0.05-0.38 mm (0.002-0.015 in.)
Camshaft Journal Diameter				
Front	50.71-50.74 mm (1.9965-1.9975 in.)	47.47-47.50 mm (1.869-1.870 in.)	50.71-50.74 mm (1.9965-1.9975 in.)	50.71-50.74 mm (1.9965-1.9975 in.)
Center	50.46-50.48 mm (1.9865-1.9875 in.)	47.22-47.24 mm (1.859-1.860 in.)	50.46-50.48 mm (1.9865-1.9875 in.)	50.46-50.48 mm (1.9865-1.9875 in.)
Rear	49.95-49.97 mm (1.9665-1.9675 in.)	46.71-46.74 mm (1.839-1.840 in.)	49.95-49.97 mm (1.9665-1.9675 in.)	49.95-49.97 mm (1.9665-1.9675 in.)
Camshaft Bearing Clearance				
Front	0.064-0.132 mm (0.0025-0.0052 in.)	0.102-0.203 mm (0.004-0.008 in.)	0.064-0.132 mm (0.0025-0.0052 in.)	0.064-0.132 mm (0.0025-0.0052 in.)
Center & Rear	0.064-0.140 mm (0.0025-0.0055 in.)	0.102-0.203 mm (0.004-0.008 in.)	0.064-0.140 mm (0.0025-0.0055 in.)	0.064-0.140 mm (0.0025-0.0055 in.)
Camshaft End Play	0.10-0.40 mm (0.004-0.016 in.)	....	0.10-0.40 mm (0.004-0.016 in.)	0.10-0.40 mm (0.004-0.016 in.)

CAPACITIES

Cooling System	10.4 L (11 U.S. qts.)	10.4 L (11 U.S. qts.)	10.4 L (11 U.S. qts.)	10.4 L (11 U.S. qts.)
Crankcase Oil	4.7 L* (5 U.S. qts.)	6.6 L* (7 U.S. qts.)	6.6 L* (7 U.S. qts.)	6.6 L* (7 U.S. qts.)
*Add 0.95 L (1 U.S. qt.) with filter change.				
Transmission, Differential and Hydraulic System				
With Dry Brakes	37.8 L (10 U.S. gals.)	37.8 L (10 U.S. gals.)	37.8 L (10 U.S. gals.)	37.8 L (10 U.S. gals.)
With Wet Brakes	41.6 L (11 U.S. gals.)	41.6 L (11 U.S. gals.)	41.6 L (11 U.S. gals.)	41.6 L (11 U.S. gals.)
Rear Axle Planetary (Each)	1.4 L (1.5 U.S. qts.)	1.4 L (1.5 U.S. qts.)	1.4 L (1.5 U.S. qts.)	1.4 L (1.5 U.S. qts.)
Power Steering	0.95 L (1 U.S. qt.)	0.95 L (1 U.S. qt.)	0.95 L (1 U.S. qt.)	0.95 L (1 U.S. qt.)

TIGHTENING TORQUES†

Cylinder Head	122-129 N·m (90-95 ft.-lbs.)	95-102 N·m (70-75 ft.-lbs.)	135 N·m (100 ft.-lbs.)	122-129 N·m (90-95 ft.-lbs.)
Main Bearing Caps	230-244 N·m (170-180 ft.-lbs.)	150-155 N·m (110-115 ft.-lbs.)	230-244 N·m (170-180 ft.-lbs.)	230-244 N·m (170-180 ft.-lbs.)
Connecting Rod Caps	Refer to Text			
Flywheel	100-108 N·m (74-80 ft.-lbs.)	100-108 N·m (74-80 ft.-lbs.)	108 N·m (80 ft.-lbs.)	100-108 N·m (74-80 ft.-lbs.)
Crankshaft Pulley	380-406 N·m (280-300 ft.-lbs.)	136-149 N·m (100-110 ft.-lbs.)	392 N·m (290 ft.-lbs.)	380-406 N·m (280-300 ft.-lbs.)
Rocker Shaft Supports	38-43 N·m (28-32 ft.-lbs.)	28-33 N·m (21-24 ft.-lbs.)	33 N·m (24 ft.-lbs.)	38-43 N·m (28-32 ft.-lbs.)
Intake Manifold	28-33 N·m (21-24 ft.-lbs.)	8-12 N·m (6-9 ft.-lbs.)	33 N·m (24 ft.-lbs.)	28-33 N·m (21-24 ft.-lbs.)
Exhaust Manifold	33-38 N·m (24-28 ft.-lbs.)	28-33 N·m (21-24 ft.-lbs.)	33 N·m (24 ft.-lbs.)	33-38 N·m (24-28 ft.-lbs.)
Camshaft Gear	61-68 N·m (45-50 ft.-lbs.)	26-28 N·m (19-21 ft.-lbs.)	65 N·m (48 ft.-lbs.)	61-68 N·m (45-50 ft.-lbs.)
Idle Gear Hub	27-33 N·m (20-24 ft.-lbs.)	26-28 N·m (19-21 ft.-lbs.)	41 N·m (30 ft.-lbs.)	26-28 N·m (20-24 ft.-lbs.)

†Torque figures apply with threads clean and lightly oiled.

CONDENSED SERVICE DATA

	MF265 Diesel	MF270 Diesel	MF275 Diesel	MF290 Diesel
GENERAL				
Engine Make	Perkins	Perkins	Perkins	Perkins
Engine Model	A4.236	A4.236	A4.248	A4.248
Number of Cylinders	4	4	4	4
Bore	98.4 mm (3.875 in.)	98.4 mm (3.875 in.)	101 mm (3.975 in.)	101 mm (3.975 in.)
Stroke	127 mm (5.0 in.)	127 mm (5.0 in.)	127 mm (5.0 in.)	127 mm (5.0 in.)
Displacement	3.87 L (236 cu. in.)	3.87 L (236 cu. in.)	4.06 L (248 cu. in.)	4.06 L (248 cu. in.)
Electrical System	12 Volt, Negative Ground			
Forward Speeds	8 or 12			
Reverse Speeds	2 or 4			
TUNE-UP				
Firing Order	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2
Valve Clearance, Cold				
Intake and Exhaust	0.30 mm (0.012 in.)	0.30 mm (0.012 in.)	0.30 mm (0.012 in.)	0.30 mm (0.012 in.)
Valve Clearance, Hot				
Intake and Exhaust	0.25 mm (0.010 in.)	0.25 mm (0.010 in.)	0.25 mm (0.010 in.)	0.25 mm (0.010 in.)
Valve Face Angle	45°	45°	45°	45°
Valve Seat Angle	45°	45°	45°	45°
Injection Timing, Static	23° BTDC	23° BTDC	24° BTDC	24° BTDC
Injector Opening Pressure	17235 kPa (2500 psi)	17235 kPa (2500 psi)	17235 kPa (2500 psi)	17235 kPa (2500 psi)
Governed Speeds — Engine Rpm.				
Low Idle	725-775	725-775	725-775	725-775
High Idle (no-load)	2185	2185	2185	2380
Rated (full load)	2000	2000	2000	2200
Power Rating at Pto				
Shaft	44.7 kW (60 hp)	41.0 kW (55 hp)	50.0 kW (67 hp)	49.2 kW (66 hp)
SIZES-CLEARANCES				
Crankshaft Main Journal				
Diameter	76.162-76.175 mm (2.9985-2.9990 in.)	76.162-76.175 mm (2.9985-2.9990 in.)	76.162-76.175 mm (2.9985-2.9990 in.)	76.162-76.175 mm (2.9985-2.9990 in.)
Bearing Clearance	0.05-0.10 mm (0.002-0.004 in.)	0.05-0.10 mm (0.002-0.004 in.)	0.05-0.10 mm (0.002-0.004 in.)	0.05-0.10 mm (0.002-0.004 in.)
Crankshaft Crankpin				
Diameter	63.475-63.487 mm (2.4990-2.4995 in.)	63.475-63.487 mm (2.4990-2.4995 in.)	63.475-63.487 mm (2.4990-2.4995 in.)	63.475-63.487 mm (2.4990-2.4995 in.)
Bearing Clearance	0.038-0.076 mm (0.0015-0.0030 in.)	0.038-0.076 mm (0.0015-0.0030 in.)	0.038-0.076 mm (0.0015-0.0030 in.)	0.038-0.076 mm (0.0015-0.0030 in.)
Crankshaft End Play	0.10-0.38 mm (0.004-0.015 in.)	0.10-0.38 mm (0.004-0.015 in.)	0.10-0.38 mm (0.004-0.015 in.)	0.10-0.38 mm (0.004-0.015 in.)
Camshaft Journal Diameter				
Front	50.71-50.74 mm (1.9965-1.9975 in.)	50.71-50.74 mm (1.9965-1.9975 in.)	50.71-50.74 mm (1.9965-1.9975 in.)	50.71-50.74 mm (1.9965-1.9975 in.)
Center	50.46-50.48 mm (1.9865-1.9875 in.)	50.46-50.48 mm (1.9865-1.9875 in.)	50.46-50.48 mm (1.9865-1.9875 in.)	50.46-50.48 mm (1.9865-1.9875 in.)
Rear	49.95-49.97 mm (1.9665-1.9675 in.)	49.95-49.97 mm (1.9665-1.9675 in.)	49.95-49.97 mm (1.9665-1.9675 in.)	49.95-49.97 mm (1.9665-1.9675 in.)
Camshaft Bearing Clearance				
Front	0.064-0.132 mm (0.0025-0.0052 in.)	0.064-0.114 mm (0.0025-0.0045 in.)	0.64-0.132 mm (0.0025-0.0052 in.)	0.064-0.114 mm (0.0025-00.0045 in.)
Center & Rear	0.064-0.140 mm (0.0025-0.0055 in.)	0.064-0.140 mm (0.0025-0.0055 in.)	0.064-0.140 mm (0.0025-0.0055 in.)	0.064-0.140 mm (0.0025-0.0055 in.)
Camshaft End Play	0.10-0.40 mm (0.004-0.016 in.)	0.10-0.40 mm (0.004-0.016 in.)	0.10-0.40 mm (0.004-0.016 in.)	0.10-0.40 mm (0.004-0.016 in.)

CONDENSED SERVICE DATA (CONT.)

	MF265 Diesel	MF270 Diesel	MF275 Diesel	MF290 Diesel
CAPACITIES				
Cooling System	10.4 L (11 U.S. qts.)	14.2 L (15 U.S. qts.)	11.3 L (12 U.S. qts.)	14.2 L (15 U.S. qts.)
Crankcase Oil	6.6 L* (7 U.S. qts.)	6.6 L* (7 U.S. qts.)	6.6 L* (7 U.S. qts.)	6.6 L* (7 U.S. qts.)
*Add 0.95 L (1 U.S. qt.) with filter change.				
Transmission, Differential and Hydraulic System				
With Dry Brakes	37.8 L (10 U.S. gals.)	....	37.8 L (10 U.S. gals.)	....
With Wet Brakes	41.6 L (11 U.S. gals.)	41.6 L (11 U.S. gals.)	41.6 L (11 U.S. gals.)	41.6 L (11 U.S. gals.)
Rear Axle Planetary (Each)	1.4 L (1.5 U.S. qts.)	1.4 L (1.5 U.S. qts.)	1.4 L (1.5 U.S. qts.)	1.4 L (1.5 U.S. qts.)
Power Steering	0.95 L (1 U.S. qt.)	1.1 L (1.2 U.S. qt.)	0.95 L (1 U.S. qt.)	1.1 L (1.2 U.S. qt.)
TIGHTENING TORQUES†				
Cylinder Head	135 N·m (100 ft.-lbs.)	135 N·m (100 ft.-lbs.)	135 N·m (100 ft.-lbs.)	135 N·m (100 ft.-lbs.)
Main Bearing Caps	244 N·m (180 ft.-lbs.)	244 N·m (180 ft.-lbs.)	244 N·m (180 ft.-lbs.)	244 N·m (180 ft.-lbs.)
Connecting Rod Caps	Refer to Text			
Flywheel	108 N·m (80 ft.-lbs.)	108 N·m (80 ft.-lbs.)	108 N·m (80 ft.-lbs.)	108 N·m (80 ft.-lbs.)
Crankshaft Pulley	392 N·m (290 ft.-lbs.)	392 N·m (290 ft.-lbs.)	392 N·m (290 ft.-lbs.)	392 N·m (290 ft.-lbs.)
Rocker Shaft Supports	33 N·m (24 ft.-lbs.)	33 N·m (24 ft.-lbs.)	33 N·m (24 ft.-lbs.)	33 N·m (24 ft.-lbs.)
Intake Manifold	33 N·m (24 ft.-lbs.)	33 N·m (24 ft.-lbs.)	33 N·m (24 ft.-lbs.)	33 N·m (24 ft.-lbs.)
Exhaust Manifold	33 N·m (24 ft.-lbs.)	33 N·m (24 ft.-lbs.)	33 N·m (24 ft.-lbs.)	33 N·m (24 ft.-lbs.)
Camshaft Gear	61-68 N·m (45-50 ft.-lbs.)	65 N·m (48 ft.-lbs.)	61-68 N·m (45-50 ft.-lbs.)	65 N·m (48 ft.-lbs.)
Idler Gear Hub	27-32 N·m (20-24 ft.-lbs.)	40 N·m (30 ft.-lbs.)	27-32 N·m (20-24 ft.-lbs.)	40 N·m (30 ft.-lbs.)

†Torque figures apply with threads clean and lightly oiled.

FRONT SYSTEM

AXLE ASSEMBLY

All Models

1. Refer to Fig. 1 for an exploded view of adjustable axle typical of unit used on all tractors. Recommended toe-in is 3.2 mm (1/8 inch) and is adjusted by turning right-hand tie rod end (E) into or out of tube (T).

To remove the axle assembly, first remove hood, grille, side panels, battery, battery support, shield and grille frame. Remove snap ring (5) and pull the center steering shaft (11) down out of arm (2) and support (1). Be careful not to lose shims (6) or damage seal (9). Support ax-

le and engine separately. Remove retaining clips, then remove retaining pin (14). Use a puller to withdraw pivot pin (16) out toward front. Fore and aft play of axle is adjusted by thickness of shims (15) and washer (19).

To remove axle support (1), first remove radiator and power steering cylinder. Remove mounting bolts, then lower support housing from tractor.

Inspect all parts for wear or damage and renew if necessary. Ream new bushings after installation to provide desired operating clearance.

To reinstall axle support and axle assembly, reverse the removal procedure. Tighten cap screws retaining axle support casting to 271 N·m (200

ft.-lbs.) torque. Add shims (15) as necessary to limit fore and aft play of axle to 0.08-0.25 mm (0.003-0.010 inch). Be sure shims are to the front and thrust washer (19) is to the rear.

SPINDLES AND WHEEL HUBS

All Models

2. It is recommended that front wheel bearings be cleaned, inspected and repacked with grease after every 500 hours of operation, or annually, whichever comes first. A good quality multipurpose lithium base grease is recommended for repacking bearings.

To remove spindle (22—Fig. 1), loosen

CONDENSED SERVICE DATA (CONT.)

	MF265 Diesel	MF270 Diesel	MF275 Diesel	MF290 Diesel
CAPACITIES				
Cooling System	10.4 L (11 U.S. qts.)	14.2 L (15 U.S. qts.)	11.3 L (12 U.S. qts.)	14.2 L (15 U.S. qts.)
Crankcase Oil	6.6 L* (7 U.S. qts.)	6.6 L* (7 U.S. qts.)	6.6 L* (7 U.S. qts.)	6.6 L* (7 U.S. qts.)
*Add 0.95 L (1 U.S. qt.) with filter change.				
Transmission, Differential and Hydraulic System				
With Dry Brakes	37.8 L (10 U.S. gals.)	....	37.8 L (10 U.S. gals.)	....
With Wet Brakes	41.6 L (11 U.S. gals.)	41.6 L (11 U.S. gals.)	41.6 L (11 U.S. gals.)	41.6 L (11 U.S. gals.)
Rear Axle Planetary (Each)	1.4 L (1.5 U.S. qts.)	1.4 L (1.5 U.S. qts.)	1.4 L (1.5 U.S. qts.)	1.4 L (1.5 U.S. qts.)
Power Steering	0.95 L (1 U.S. qt.)	1.1 L (1.2 U.S. qt.)	0.95 L (1 U.S. qt.)	1.1 L (1.2 U.S. qt.)
TIGHTENING TORQUES†				
Cylinder Head	135 N·m (100 ft.-lbs.)	135 N·m (100 ft.-lbs.)	135 N·m (100 ft.-lbs.)	135 N·m (100 ft.-lbs.)
Main Bearing Caps	244 N·m (180 ft.-lbs.)	244 N·m (180 ft.-lbs.)	244 N·m (180 ft.-lbs.)	244 N·m (180 ft.-lbs.)
Connecting Rod Caps	Refer to Text			
Flywheel	108 N·m (80 ft.-lbs.)	108 N·m (80 ft.-lbs.)	108 N·m (80 ft.-lbs.)	108 N·m (80 ft.-lbs.)
Crankshaft Pulley	392 N·m (290 ft.-lbs.)	392 N·m (290 ft.-lbs.)	392 N·m (290 ft.-lbs.)	392 N·m (290 ft.-lbs.)
Rocker Shaft Supports	33 N·m (24 ft.-lbs.)	33 N·m (24 ft.-lbs.)	33 N·m (24 ft.-lbs.)	33 N·m (24 ft.-lbs.)
Intake Manifold	33 N·m (24 ft.-lbs.)	33 N·m (24 ft.-lbs.)	33 N·m (24 ft.-lbs.)	33 N·m (24 ft.-lbs.)
Exhaust Manifold	33 N·m (24 ft.-lbs.)	33 N·m (24 ft.-lbs.)	33 N·m (24 ft.-lbs.)	33 N·m (24 ft.-lbs.)
Camshaft Gear	61-68 N·m (45-50 ft.-lbs.)	65 N·m (48 ft.-lbs.)	61-68 N·m (45-50 ft.-lbs.)	65 N·m (48 ft.-lbs.)
Idler Gear Hub	27-32 N·m (20-24 ft.-lbs.)	40 N·m (30 ft.-lbs.)	27-32 N·m (20-24 ft.-lbs.)	40 N·m (30 ft.-lbs.)

†Torque figures apply with threads clean and lightly oiled.

FRONT SYSTEM

AXLE ASSEMBLY

All Models

1. Refer to Fig. 1 for an exploded view of adjustable axle typical of unit used on all tractors. Recommended toe-in is 3.2 mm (1/8 inch) and is adjusted by turning right-hand tie rod end (E) into or out of tube (T).

To remove the axle assembly, first remove hood, grille, side panels, battery, battery support, shield and grille frame. Remove snap ring (5) and pull the center steering shaft (11) down out of arm (2) and support (1). Be careful not to lose shims (6) or damage seal (9). Support ax-

le and engine separately. Remove retaining clips, then remove retaining pin (14). Use a puller to withdraw pivot pin (16) out toward front. Fore and aft play of axle is adjusted by thickness of shims (15) and washer (19).

To remove axle support (1), first remove radiator and power steering cylinder. Remove mounting bolts, then lower support housing from tractor.

Inspect all parts for wear or damage and renew if necessary. Ream new bushings after installation to provide desired operating clearance.

To reinstall axle support and axle assembly, reverse the removal procedure. Tighten cap screws retaining axle support casting to 271 N·m (200

ft.-lbs.) torque. Add shims (15) as necessary to limit fore and aft play of axle to 0.08-0.25 mm (0.003-0.010 inch). Be sure shims are to the front and thrust washer (19) is to the rear.

SPINDLES AND WHEEL HUBS

All Models

2. It is recommended that front wheel bearings be cleaned, inspected and repacked with grease after every 500 hours of operation, or annually, whichever comes first. A good quality multipurpose lithium base grease is recommended for repacking bearings.

To remove spindle (22—Fig. 1), loosen

spindle arm (13) clamp bolt and pull the arm from spindle shaft. Remove key from spindle shaft, then lower spindle from axle extension (25).

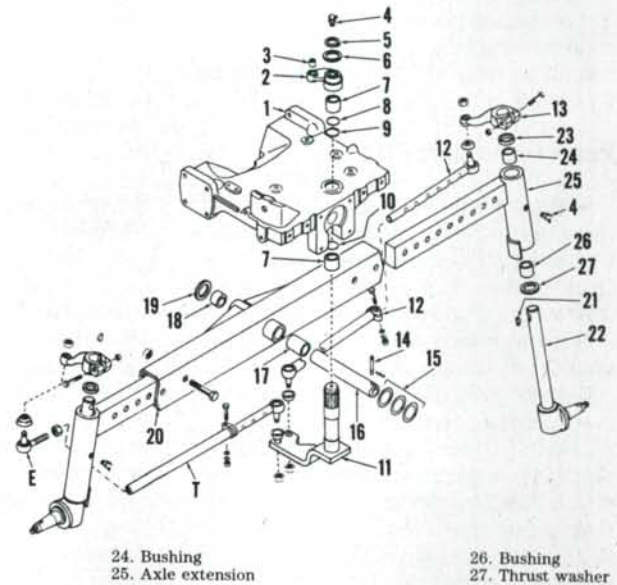
Inspect thrust bearing (27) and bushings (24 and 26) and renew if necessary. Spindle bushings must be reamed after installation to provide desired shaft to bushing clearance. Lubricate with multipurpose lithium base grease.

Reinstall spindle and arm with a new dust seal (23). Position arm on spindle so end play is less than 0.10 mm (0.004 inch), then tighten clamp bolt to 135 N·m (100 ft.- lbs.) torque.

To adjust wheel hub bearings, tighten wheel retaining nut to 80 N·m (60 ft.- lbs.) torque while rotating wheel hub. Back off castellated nut to align nearest slot with pin hole, then back off further to the next slot and install cotter pin.

Fig. 1—Exploded view of typical adjustable front axle assembly used on all models. A two-piece steering arm and shaft (11) is used on some models.

1. Front support
2. Arm
3. Bushing
4. Grease fittings
5. Snap ring
6. Shim
7. Bushings
8. "O" ring
9. Seal
10. "O" ring
11. Steering arm & shaft
12. Tie rod
13. Spindle arm
14. Retaining pin
15. Shims
16. Axle pivot pin
17. Bushing
18. Bushing
19. Washer
20. Axle
21. Woodruff key
22. Spindle
23. Seal



POWER STEERING SYSTEM

LUBRICATION AND BLEEDING

All Models

3. The hydrostatic power steering fluid reservoir is attached to the rear of the power steering hydraulic pump (Fig. 2). Massey-Ferguson Permatran 111 Oil is recommended for use in steering system.

On early models, an oil strainer screen is located on pump inlet pipe inside the reservoir. On late models, a renewable oil filter element is located within the reservoir. On all models, it is recommended that steering fluid be renewed and suction screen cleaned, or filter element replaced, after every 500 hours of operation, or annually, whichever comes first.

The steering system is self bleeding, but steering should be cycled and reservoir refilled as necessary until level stops dropping. To fill, stop engine and remove filler plug (F—Fig. 2). If steering cylinder has been disassembled or drained, fill reservoir then start and idle engine, adding fluid as level lowers until system is stabilized. Install filler plug loosely, cycle the system then recheck, adding fluid as necessary to maintain full reservoir. Tighten plug securely when fluid level ceases to drop.

OPERATING PRESSURE

All Models

4. To check power steering relief valve pressure, first start engine and actuate

steering until oil temperature is approximately 50° C (120° F). Disconnect pressure line (P—Fig. 2) and connect a 0-20000 kPa (0-3000 psi) pressure gage in pump outlet port. Start engine and operate at 2000 rpm. Relief pressure should not exceed 11375 kPa (1650 psi).

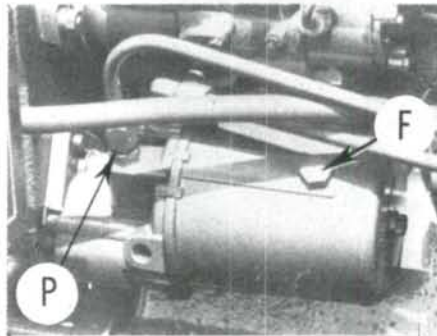


Fig. 2—The power steering reservoir is filled through hole for plug (F). Pump pressure line is shown at (P).

Relief valve pressure setting can be adjusted by turning relief valve adjusting screw (Fig. 3, 4 or 5) clockwise to increase pressure or counterclockwise to reduce pressure. On early style pump (Fig. 3) reservoir (14) must be removed for access to relief valve. On late style pumps (Fig. 4 or 5), relief valve is located on outside of pump body. Recommended pressure setting is 10345-11030 kPa (1500-1600 psi).

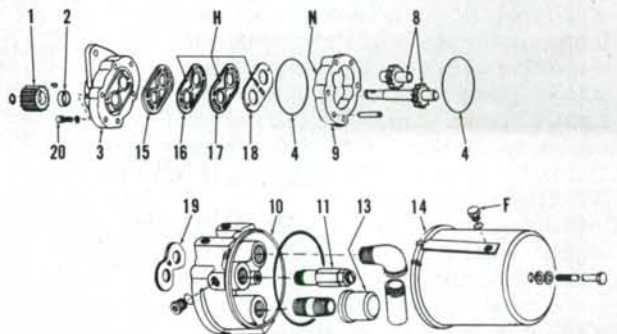
If specified relief pressure cannot be obtained, service relief valve and pump as outlined in appropriate paragraph 5, 6 or 7.

POWER STEERING PUMP

Three different types of power steering pumps have been used; Parker-Hannifin, Sundstrand and Aero-Quip. See Figs. 3, 4 and 5 for exploded view of each pump. The gear type steering pump is attached to rear of engine tim-

Fig. 3—Exploded view of Parker-Hannifin power steering pump. Refer to text for assembly notes.

1. Drive gear
2. Seal
3. Front cover
4. Seals
8. Pumping gears
9. Pump body
10. Rear cover
11. Relief valve
13. Filter
14. Reservoir
15. "V" seal
16. Gasket
17. Shield
18. Wear plate
19. Thrust plate
20. Screws



spindle arm (13) clamp bolt and pull the arm from spindle shaft. Remove key from spindle shaft, then lower spindle from axle extension (25).

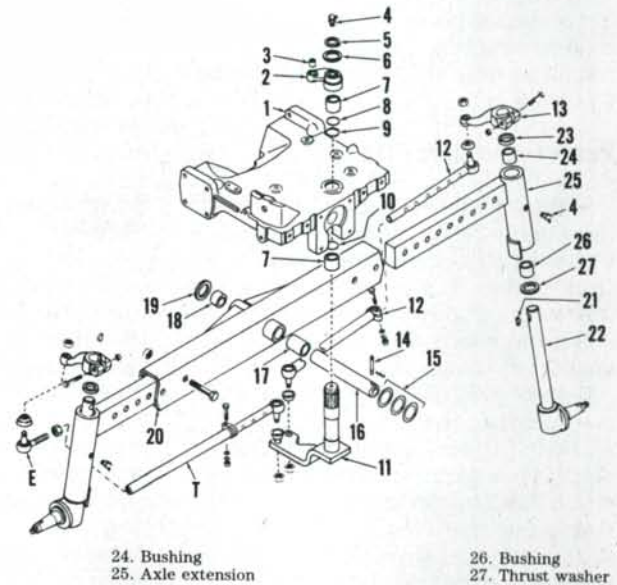
Inspect thrust bearing (27) and bushings (24 and 26) and renew if necessary. Spindle bushings must be reamed after installation to provide desired shaft to bushing clearance. Lubricate with multipurpose lithium base grease.

Reinstall spindle and arm with a new dust seal (23). Position arm on spindle so end play is less than 0.10 mm (0.004 inch), then tighten clamp bolt to 135 N·m (100 ft.- lbs.) torque.

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2. Arm
3. Bushing
4. Grease fittings
5. Snap ring
6. Shim
7. Bushings
8. "O" ring
9. Seal
10. "O" ring
11. Steering arm & shaft
12. Tie rod
13. Spindle arm
14. Retaining pin
15. Shims
16. Axle pivot pin
17. Bushing
18. Bushing
19. Washer
20. Axle
21. Woodruff key
22. Spindle
23. Seal



POWER STEERING SYSTEM

LUBRICATION AND BLEEDING

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OPERATING PRESSURE

All Models

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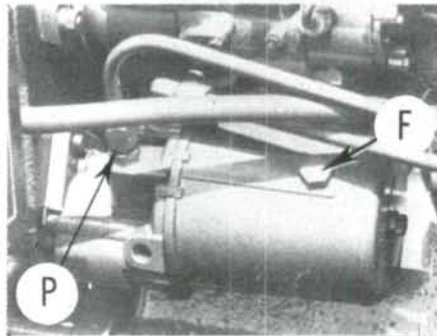


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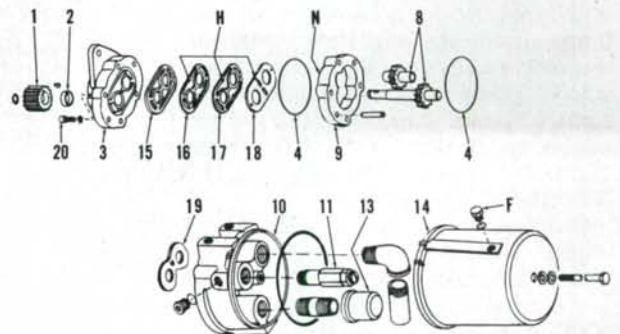
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POWER STEERING PUMP

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Fig. 3—Exploded view of Parker-Hannifin power steering pump. Refer to text for assembly notes.

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2. Seal
3. Front cover
4. Seals
8. Pumping gears
9. Pump body
10. Rear cover
11. Relief valve
13. Filter
14. Reservoir
15. "V" seal
16. Gasket
17. Shield
18. Wear plate
19. Thrust plate
20. Screws



ing gear case, on either the left-hand or right-hand side of engine (depending on tractor model), and is driven by the timing gears.

Parker-Hannifin Pump

5. R&R AND OVERHAUL. Be sure to thoroughly clean outside of pump and hydraulic lines before removing pump from engine. The pump mounting cap screws enter pump housing from the front and heads are located on timing gear front cover.

Before disassembling, scribe alignment marks across front cover (3—Fig. 3), body (9), rear cover (10) and reservoir (14). Separate reservoir from rear cover. Remove drive gear (1) and key from pump shaft. Remove tie bolts, then tap end of pump drive shaft to separate rear cover from front cover. Place alignment marks on teeth of pump gears so original contact pattern of gear teeth can be maintained if original gears are reinstalled. Remove gears, thrust plate (19) and wear plate (18) from pump body. Remove shield (17), gasket (16), "V" seal (15) and drive shaft seal (2) from front cover.

If relief valve (11) is to be disassembled, count the number of turns required to remove the adjusting plug so plug can be reinstalled to its original setting. Check relief pressure as outlined in paragraph 4 after pump is reinstalled and adjust if necessary.

Inspect all parts for evidence of wear or damage. If pump body (9) is excessively worn, pump assembly should be renewed. Renew all seals, gaskets, thrust plate, wear plate and "O" rings.

To reassemble, reverse the disassembly procedure while noting the following special instructions: Lip of oil seal (2) should face inward in front cover. The "V" groove of seal (15) should be downward (facing away from gasket) in front cover. The 1.5 mm (1/16 inch) hole (H) in gasket (16), shield (17) and wear plate (18) must be positioned upward (toward pressure side of pump) with bronze side of wear plate toward gear faces. Notch (N) on flat surface of pump body must be over holes (H). Bronze side of thrust plate (19) must be toward gears with large cut-out section toward inlet (bottom) side of pump. Make certain all assembly marks on pump gears and outside of pump body are aligned, then tighten pump assembly cap screws evenly to 27 N·m (20 ft.-lbs.) torque. Tighten reservoir mounting bolt to 11.3 N·m (100 in.-lbs.) torque.

If pump is mounted on left side of engine, counterbore on drive gear (1) should face away from pump. If pump is mounted on right side of engine, install gear with counterbore toward

pump. Reinstall pump and connect hydraulic lines. Fill reservoir with oil, start engine and cycle steering from side to side several times to purge air from system. Check relief valve pressure setting as outlined in paragraph 4.

Sundstrand Pump

6. R&R AND OVERHAUL. Thoroughly clean exterior of pump and surrounding area before removing. Disconnect hydraulic lines, remove attaching cap screws and withdraw pump assembly.

Prior to disassembly, scribe alignment marks across pump body, end plates and reservoir. Remove reservoir (15—Fig. 4) and filter element (14). Remove drive gear and key from pump drive shaft. Remove tie bolts, then carefully separate end plates (3 and 12) from pump body (9). Remove pump gears (7 and 8) and bearings (6). Remove seal rings (4 and 5) and shaft oil seal (2). Remove relief valve assembly (11).

Inspect all parts for evidence of wear or damage and renew as necessary. Note that the pump gears are loaded toward inlet side of pump body (9) due to hydraulic pressure within pump, thus gears will normally cut a track on inlet side of pump body if pump gear shafts and/or bearings are worn. If depth of wear track exceeds 0.10 mm (0.004 inch), pump assembly should be renewed. Overall thickness of gears and bearings should be 0.10-0.20 mm (0.004-0.008 inch) less than thickness of pump body.

Use new seals and "O" rings when reassembling. Be sure that relieved side of bearings (6) is located on outlet side of pump. Tighten body retaining bolts evenly to 41 N·m (30 ft.-lbs.) torque. Be sure scribe marks made prior to disassembly are aligned.

Reinstall pump and tighten mounting cap screws to 27 N·m (20 ft.-lbs.) torque. Connect hydraulic lines, refill reservoir and check relief valve pressure as outlined in paragraph 4.

Aero-Quip Pump

7. R&R AND OVERHAUL. To remove pump, first thoroughly clean exterior of pump and surrounding area. Disconnect hydraulic lines, remove attaching cap screws and withdraw pump assembly.

Before disassembling pump, scribe alignment marks across pump body, end plates and reservoir to ensure correct reassembly. Remove reservoir (17—Fig. 5) and filter element (16). Remove drive gear (2) and Woodruff key from pump drive shaft. Remove tie bolts, then carefully separate end plates (5 and 14) from pump body (13). Remove pump gears (8) and bearings (9). Remove relief valve assembly (19).

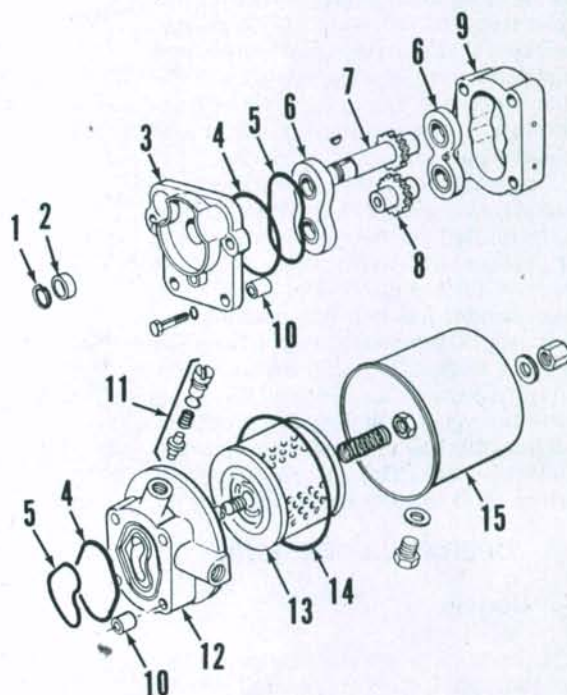
Inspect all parts for evidence of wear or damage and renew if necessary. A seal repair kit is available for renewal of all seals and "O" rings.

To reassemble, reverse the disassembly procedure. Tighten body retaining bolts evenly while making certain that pump drive shaft turns freely.

Reinstall pump and tighten mounting

Fig. 4—Exploded view of Sundstrand power steering pump used on some models.

1. Snap ring
2. Oil seal
3. Front cover
4. "O" ring
5. Seal ring
6. Bearings
7. Drive gear
8. Driven gear
9. Pump body
10. Spacers
11. Relief valve assy.
12. Rear cover
13. Filter element
14. "O" ring
15. Reservoir tank



cap screws to 27 N·m (20 ft.-lbs). Connect hydraulic lines, refill reservoir and check relief valve pressure as outlined in paragraph 4.

HYDROSTATIC HAND PUMP

Early Models

8. R&R AND OVERHAUL. Remove cover from left-hand side of instrument panel. Disconnect the hydraulic lines from hydrostatic hand pump and plug all openings to prevent entry of dirt. Remove the four cap screws attaching hand pump to mounting bracket and steering column, then withdraw unit from splined end of steering shaft (Fig. 7).

To disassemble, first thoroughly clean exterior of control unit. Remove cap screws attaching metering pump to bottom of housing, then remove end cap (22—Fig. 6), rotor assembly (21), spacer plate (20) and drive link (18) from valve body. Remove screws retaining top cover (7) and lift off cover. Use a brass rod with one end bent 90° to push check valve plug from valve body as shown in Fig. 8. Remove check valve seat using an Allen wrench, then remove check valve ball and spring (Fig. 9). Carefully push control valve spool and sleeve assembly out bottom of housing as shown in Fig. 10.

NOTE: Be careful valve unit does not bind. Parts are fit to extremely close tolerance and a twisting motion may be required for withdrawal.

Fig. 6—Exploded view of hydrostatic steering hand pump and control valve assembly used on some early model tractors.

1. Snap ring
2. Snap rings
3. Bearing
4. Steering wheel shaft
5. Steering column
6. Oil seal
7. End cover
8. Locator bushing
9. Bushing
10. Thrust bearing assy.
11. "O" ring
12. Valve spool
13. Valve sleeve
14. Drive pin
15. Centering springs
16. Check valve assy.
17. Valve body
18. Drive link
19. Disc
20. Spacer plate
21. Rotor assy.
22. End cap

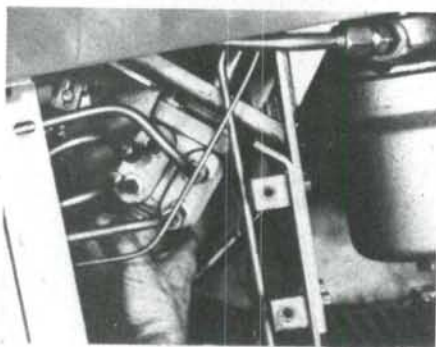
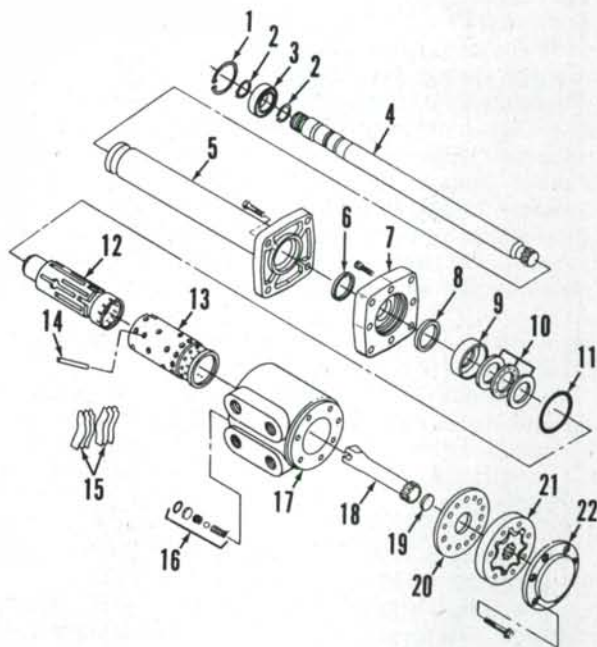


Fig. 7—Left side panel removed showing removal of hydrostatic hand pump.

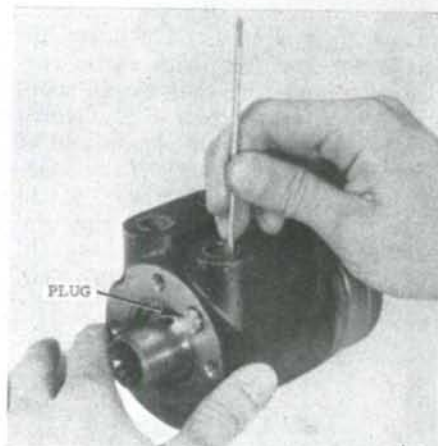


Fig. 8—Use a brass welding rod with a 90° bend in one end to form a leg about 8 mm (5/16 inch) long to push check valve plug from valve body as shown.

Fig. 5—Exploded view of Aero-Quip power steering pump used on some models.

1. Snap ring
2. Drive gear
3. Snap ring
4. Oil seal
5. Front cover
6. Thrust washer
7. "O" ring
8. Pump gears
9. Bearings
10. Centering pin
11. Seal ring
12. "O" ring
13. Pump body
14. Rear cover
15. "O" ring
16. Filter element
17. Reservoir tank
18. Breather assy.
19. Relief valve assy.
20. Adjusting screw
21. Port plate

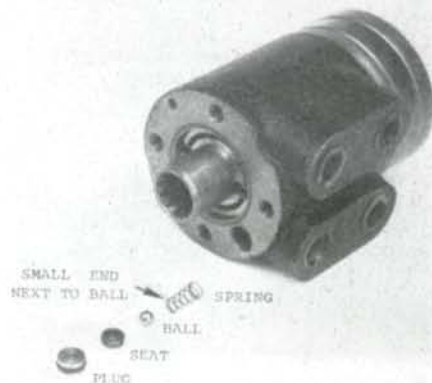
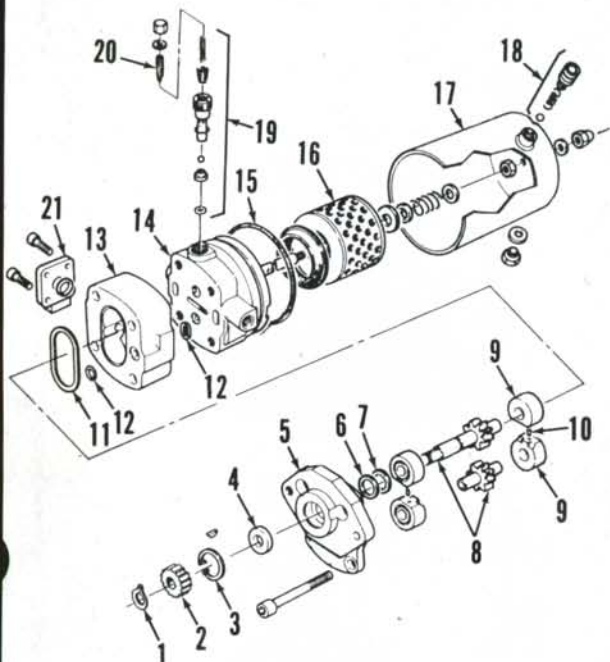


Fig. 9—View of check valve components removed from valve body.

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