JOHN DEERE 400 HYDROSTATIC TRACTOR

Service Manual
SM-2103 (Jun-79)

TABLE OF CONTENTS

SECTION 10 - GENERAL
- Group 5 - Tractor Identification
- Group 10 - Specifications
- Group 15 - Fuel and Lubricants
- Group 20 - Tune-up and Adjustments

SECTION 20 - KOHLER ENGINE
- Group 5 - General Information
- Group 10 - Cylinder Head and Valves
- Group 15 - Engine Removal and Installation
- Group 20 - Internal Components
- Group 25 - Engine Lubrication System
- Group 30 - Specifications

SECTION 30 - FUEL SYSTEM
- Group 5 - General Information
- Group 10 - Carburetor and Anti-Dieseling Solenoid
- Group 15 - Governor
- Group 20 - Fuel Tank and Fuel Pump
- Group 25 - Air Cleaner

SECTION 40 - ELECTRICAL SYSTEM
- Group 5 - General Information
- Group 10 - Cranking System
- Group 15 - Ignition System
- Group 20 - Charging System
- Group 25 - Accessories

SECTION 50 - POWER TRAIN
- Group 5 - General Information
- Group 10 - Hydrostatic Transmission
- Group 15 - Hydrostatic Control Linkage
- Group 20 - Two Speed Rear Axle
- Group 25 - Brakes

SECTION 60 - HYDRAULIC SYSTEM
- Group 5 - General Information
- Group 10 - Implement Control Valve
- Group 15 - Rockshaft Cylinder
- Group 20 - Power Steering Control Valve
- Group 25 - Power Steering Cylinder
- Group 30 - Hydraulic Lines and Couplers

SECTION 70 - MISCELLANEOUS
- Group 5 - Front Axle and Steering Linkage
- Group 10 - Lift Linkage
- Group 15 - Front PTO

SECTION 80 - SPECIAL SERVICE TOOLS
- Group 5 - Engine Essential Service Tools
- Group 10 - Engine Convenience Service Tools
- Group 15 - Tractor Essential Service Tools
- Group 20 - Tractor Convenience Service Tools

SECTION 90 - TRACTOR ATTACHMENTS
- Group 5 - 50 Snow Thrower
- Group 10 - 35A Rotary Tiller
- Group 15 - 60 Rotary Mower

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Section 10
GENERAL
Group 5
TRACTOR IDENTIFICATION

TABLE OF CONTENTS

Page

GROUP 5 - TRACTOR IDENTIFICATION
Tractor Serial Number 5-2
Engine Serial Number 5-2
Transmission Serial Number 5-2
Rear Axle Serial Number 5-2

GROUP 10 - SPECIFICATIONS
Tractor Specifications 10-1
Bolt Torque Chart 10-2
Set Screw Seating Torque Chart 10-2

GROUP 15 - FUEL AND LUBRICANTS
Fuel 15-1
Lubricants 15-1
Capacities 15-2
Service Intervals 15-2
Checking Engine Crankcase Oil 15-2
Changing Engine Crankcase Oil 15-2
Changing Engine Oil Filter 15-3
Checking Transmission Fluid Level 15-3
Changing Transmission Fluid and Filter 15-4
Lubricating Grease Fittings 15-5

Page

GROUP 20 - TUNE-UP AND ADJUSTMENTS
Purpose of Instructions 20-1
Engine Tune-up 20-2
Tractor Adjustment 20-13

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Group 10
SPECIFICATIONS

TRACTOR SPECIFICATIONS

ENGINE
- Manufacturer ..... Kohler
- Model Number K532QS
- Cylinders 2
- Type ..... 4 Cycle-Air Cooled
- Bore ..... 3.375 in. (8.57 cm)
- Stroke ..... 3.000 in. (7.62 cm)
- Displacement ..... 53.7 cu. in. (880.14 cc)
- Horsepower ..... 19.9 (14.726 kw)
- Speeds
  - Idle ..... 1700-1900 rpm
  - High (No Load) ..... 3400-3500 rpm

POWER TRAIN
- Hydrostatic Transmission ..... Sundstrand 15 Series (In-line)
- Axle ..... Peerless (2-Speed) Model 2514
- Brakes ..... Individual Rear Wheel (Drum-Type)

HYDRAULICS
- Control Valve ..... 3-Spool (Open Center)
- Outlets ..... 2 Sets (Front)
- Rockshafts ..... Rear & Mid-Mounted (Both Operated by One Cylinder)
- Power Steering ..... Standard Equipment

ELECTRICAL SYSTEM
- Battery ..... 12-Volt (BCI Group 22F) (AM31186)
- Ignition ..... Battery-Coil
- Spark Plug ... Prestolite 14-L7B (AT17208)
  AC 45-L (AM1535T)
  Champion H-10 (AM514T)
  *Resistor-Type RH-10 (AM37129)
- Spark Plug Gap ..... 0.035 in. (0.8890 mm)
- Breaker Point Gap ..... 0.020 in. (0.508 mm)
- Charging Capacity ..... 15 Amps

CAPACITIES
- Fuel Tank ..... 4.5 U.S. Gallons (17.034 l)
- Crankcase ..... 6 U.S. Pints (2.838 l)
- Transmission ..... 11 U.S. Pints (5.17 l)

FUEL AND LUBRICANTS
- Fuel ..... Non-Leaded or Regular Grade (85 Octane or Higher)
- Crankcase ..... JD Torq-Gard Supreme
  (Summer-Above 32°F).. SAE 30 or Equivalent
  (Winter-Below 32°F) SAE 5W-20 or Equivalent
- Transmission ..... JD All-Weather Hydrostatic Fluid or Equivalent
- Grease Fittings ..... JD Multi-Purpose Lubricant or Equivalent

FILTERS
- Engine Oil Filter AM34770
- Engine Air Filter M47494
- Transmission Oil Filter AM35176

GROUND TRAVEL SPEEDS @ 3400 RPM
- Forward (Low) ..... Variable 0.5 to 5.6 mph (0.8 to 8.85 km/h)
- Forward (High) ..... Variable .5 to 10.8 mph (0.8 to 17.19 km/h)
- Reverse (Low) ..... Variable .5 to 2.1 mph (0.8 to 3.22 km/h
- Reverse (High) ..... Variable .5 to 4.0 mph (0.8 to 6.44 km/h

DIMENSIONS
- Wheelbase ..... 52 in. (132.08 cm)
- Over-All Length ..... 76 in. (193.04 cm)
- Over-All Height ..... 46 in. (116.84 cm)
- Over-All Width (Max.) ..... 49 in. (124.46 cm)
- Tread
  - Front ..... 35 in. (88.90 cm)
  - Rear (Wheels In) ..... 32 in. (81.28 cm)
  - Rear (Wheels Out) ..... 37 in. (93.98 cm)

TIRES
- Standard
  - Front ..... 18x8.50-8 High-Flotation
  - Rear (GT-12) ..... 26x12.00-12 High-Flotation
- Accessory (Field Installed)
  - Rear (GT-14) ..... 26x12.00-12 Traction Tire
- Tire Pressure*
  - Front (Std. Tire) ... 6 to 16 psi (41 to 110 kPa)
  - Rear ..... 5 to 10 psi (34 to 69 kPa)

WEIGHT
- Curb ..... 975 lbs. (442.25 kg)

Inflation will vary with attachment used.

In Canada, compliance with radio interference regulations certified. Replace spark plug with resistor spark plug only.

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TORQUE CHARTS

Bolt Torque Chart

AVERAGE TIGHTENING TORQUE FOR BOLTS (BASED ON 85% OF YIELD)

BOLT SIZE	A17B			A17D			A17F		
	lb-in	lb-ft	Nm	lb-in	lb-ft	Nm	lb-in	lb-ft	Nm
1/4	72	6	8	120	10	13.5	168	14	19
5/16	156	13	17.6	240	20	27	360	30	40.7
3/8	276	23	31.2	420	35	47.5	600	50	67.8
7/16	420	35	47.5	660	55	74.6	960	80	108.5
1/2	660	55	74.6	1020	85	115.2	1440	120	162.7
9/16	900	75	101.7	1560	130	176.3	2100	175	237.3
5/8	1260	105	142.4	2040	170	230.5	2880	240	325.4
3/4	2220	185	250.8	3600	300	406.7	5100	425	576.2
7/8	1920	160	216.9	5340	445	603.3	8220	685	928.7
1	3000	250	339	8040	670	908.4	12360	1030	1396.5
1-1/8	3960	330	447.4	10920	910	1233.8	17520	1460	1979.5
1-1/4	5760	480	650.8	15000	1250	1694.8	24720	2060	2793

B grade bolts larger than 3/4 are sometimes formed hot rather than cold, which accounts for the lower mean tightening torque.

Set Screw Seating Torque Charts

Screw Size	Seating Torque	
	Inch-Pounds	Newton Meters (Nm)
#5	9	1.0
#6	9	1.0
#8	20	2.3
#10	33	3.7
1/4	87	9.8
5/16	165	18.6
3/8	290	32.8
7/16	430	48.6
1/2	620	70.1
9/16	620	70.1
5/8	1225	138.4
3/4	2125	240.1

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CAPACITIES

Fuel Tank ..... 4.5 U.S. gal. (17.034 l)

Crankcase ..... 6 U.S. pt. (2.838 l)
(with filter - 7 U.S. pt. (3.308 l)

Transmission ..... Approx. 11 U.S. pt. (5.17 l)

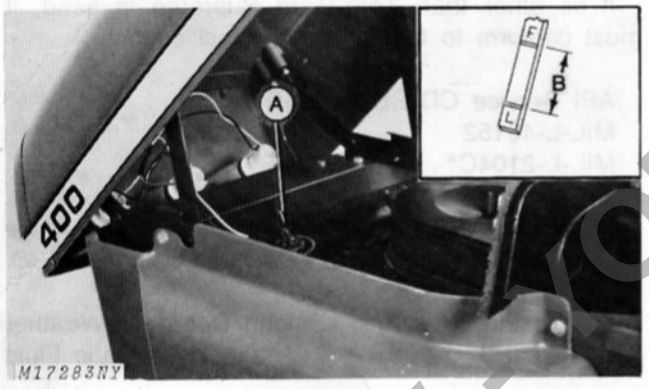
SERVICE INTERVALS

Crankcase (Oil Change)
- Break-in ..... First 5 hours
- Regular ..... Every 50 hours
- Dusty Conditions ..... Every 8 hours

Transmission
- Filter Change ..... 100 hours
- Fluid Change ..... 500 hours

Tractor Grease Fittings ..... Spring and Fall

CHECKING ENGINE CRANKCASE OIL LEVEL



A—Dipstick **B—Safe Range**

Fig. 1-Checking Crankcase Oil Level

Park tractor on a level surface.

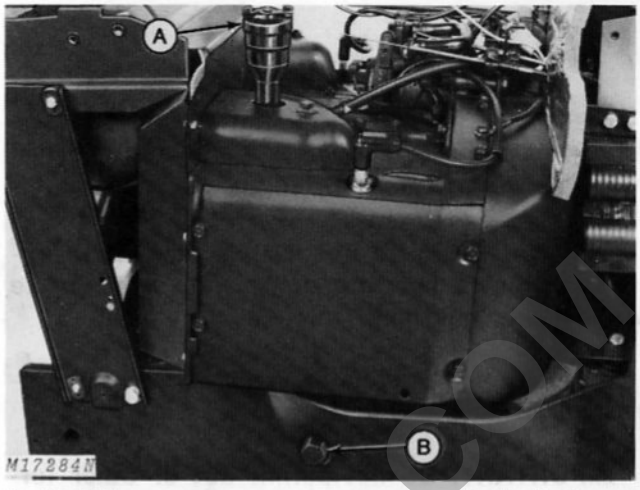
Stop engine and raise hood.

Wipe dust and dirt from around dipstick (A).

Remove dipstick (A), Fig. 1.

Check that oil level is within the safe range (B) on the dipstick when the dipstick is installed all the way.

CHANGING ENGINE CRANKCASE OIL



A—Dipstick **B—Drain Cap or Drain Valve**

Fig. 2-Changing Crankcase Oil

Park tractor on a level surface.

Stop engine and raise hood.

Remove dipstick (A), Fig. 2.

On 400 Tractors (Serial No. 30001-55000), remove drain cap (B). Drain oil into a container. Replace drain cap after all oil is drained.

On 400 Tractors (Serial No. 55001 and Up) turn drain valve (B) counterclockwise and drain oil into a container. Turn drain valve clockwise until snug after oil has drained.

IMPORTANT: Do not tighten drain valve too tight with a wrench. Otherwise drain valve will be damaged.

Fill crankcase with oil of the proper viscosity through dipstick opening. See chart, page 10-15-1. Fill crankcase until oil level is within safe range on dipstick (see inset, Fig. 1), (6 U.S. pints [2.838 l] without filter; 7 U.S. pints [3.308 l] with filter). Do not overfill crankcase.

IMPORTANT: Check dipstick reading before pouring in the last 1/2 pint (0.2366 l). Fill only to "SAFE" range on dipstick, (B, Fig. 1). Overfilling can cause engine over-heating, resulting in loss of power and permanent engine damage.

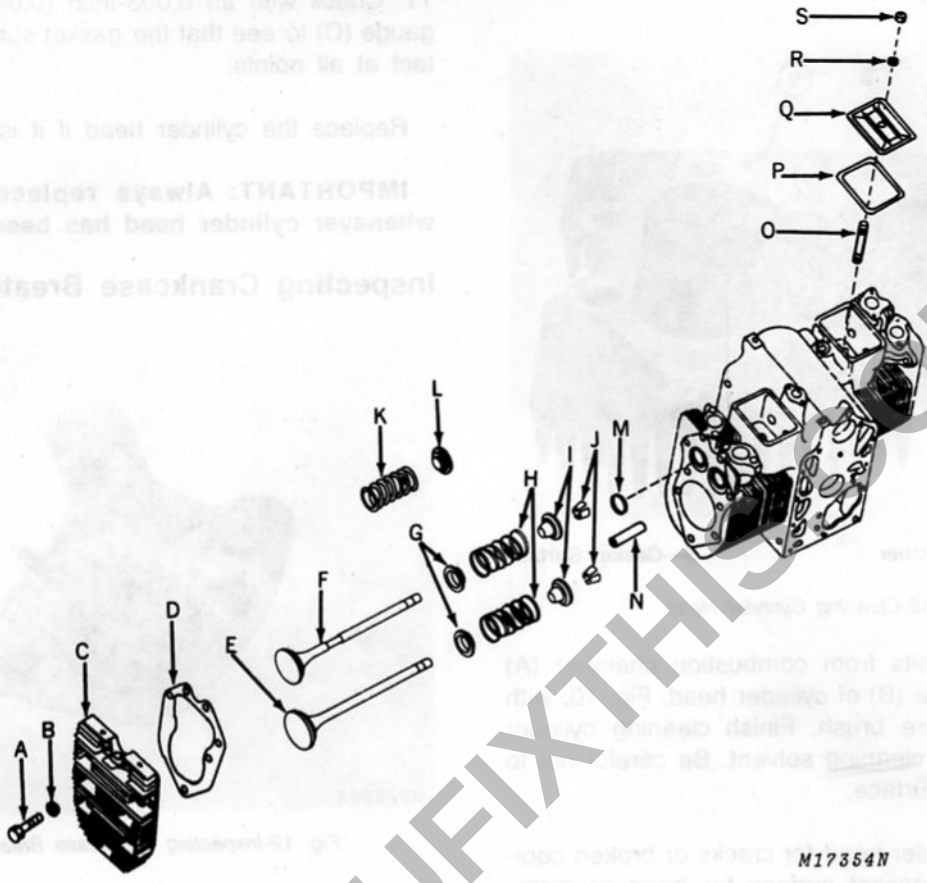
Replace dipstick in oil fill tube.

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INSPECTION AND REPAIR



A—Cylinder Head Bolt (18 used)
B—Washer (18 used)
C—Cylinder Head (2 used)
D—Cylinder Head Gasket (2 used)
E—Intake Valve (2 used)
F—Exhaust Valve (2 used)
G—Upper Retainer (4 used)
H—Valve Spring (4 used)
I —Lower Retainer (4 used)
J —Keepers (8 used)
K—Valve Spring*
L —Rotator*
M—Valve Seat (4 used)
N—Valve Guide (4 used)
O—Stud (2 used)
P—Gasket (2 used)
Q—Valve Cover (2 used)
R—Washer (2 used)
S—Nut (2 used)

***Valve spring and rotator are service only.**

Fig. 9-Exploded View of Cylinder Head and Valves

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ENGINE TROUBLE SHOOTING GUIDE

PROBLEM	FUEL SYSTEM CAUSES			IGNITION SYSTEM CAUSES		OTHER CAUSES						
	No Fuel	Improper Fuel	Improper Fuel Mix.	No Spark	Poor Ignition	Insuffi-cient Cooling	Improper Lubri-cation	Low Com-pression	Valve Problems	Carbon Build-Up	Faulty Governor	Engine Over-loaded
Will Not Start	X			X				X	X			
Hard Starting		X	X		X			X	X			
Engine Stops Running	X			X								
Lacks Power		X	X		X	X		X	X	X		X
Runs Erratically		X	X		X						X	
Knocks or Pings		X	X			X				X		X
Skips or Misfires			X		X							
Backfires			X		X				X			
Overheats			X		X	X	X		X			X
Idles Poorly			X		X							
Engine Quits Suddenly	X			X			X		X			

Fuel System Causes

No Fuel

1. Fuel tank empty.
2. Fuel valve shut off.
3. Filler cap vent plugged.
4. Filter or lines clogged.
5. Fuel pump faulty.

Improper Fuel

1. Stale fuel.
2. Water in fuel.
3. Fuel octane too low.

Improper Fuel Mixture

1. Overchoking - flooded.
2. Air intake restricted.
3. Carburetor set wrong.
4. Intake manifold gaskets leaking.
5. Fuel pump weak.
6. Carburetor faulty.

Ignition System Causes

No Spark

1. Ignition switch off or faulty.
2. Leads disconnected or broken.
3. Spark plug bad.
4. Breaker points stuck or oxidized.
5. Coil or condenser faulty.

Poor Ignition

1. Plug gap excessive.
2. Plug wet or fouled.
3. Wrong plug.
4. Points dirty or pitted.
5. Timing wrong.
6. Weak condenser or coil.

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DESCRIPTION
400 Tractors (Serial No. 30,001-70,000)

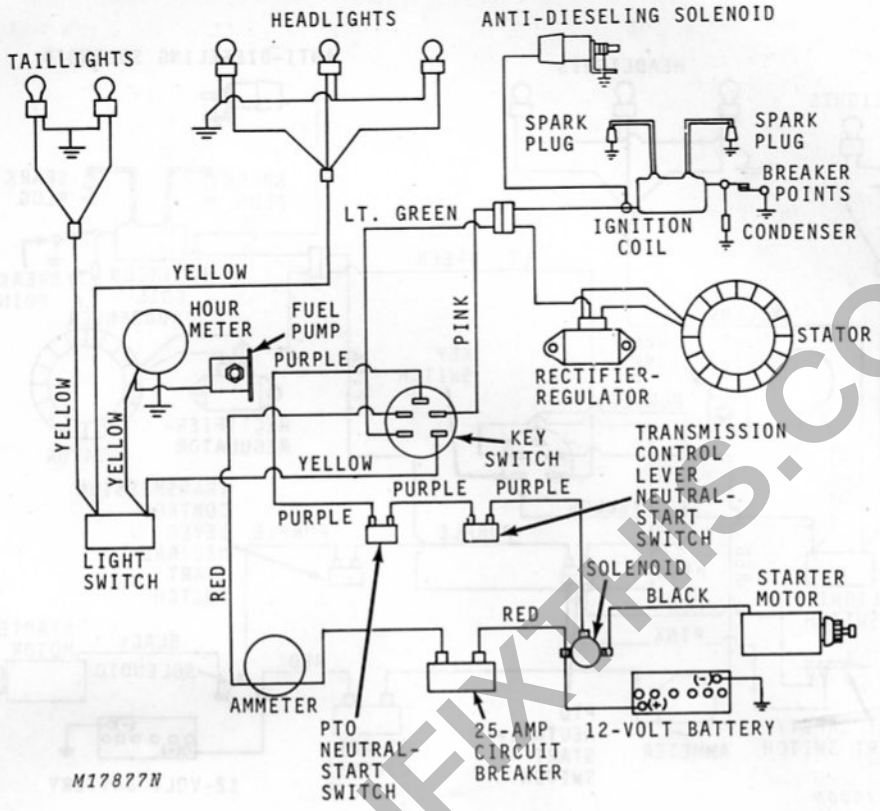


Fig. 1-Wiring Diagram for 400 Tractor (Serial No. 30,001-70,000)

The 400 Tractor (Serial No. 30,001-70,000), electrical system, Fig. 1, consists of four systems: cranking, ignition, charging and accessory.

The cranking system consists of a 12-volt battery, 25-amp. circuit breaker, ammeter, key switch, PTO neutral-start switch, control lever neutral-start switch, solenoid and starting motor.

The ignition system includes a 12-volt battery, 25-amp. circuit breaker, ammeter, key switch, ignition coil, condenser, breaker points and two spark plugs.

The charging system includes a 12-volt battery, 25-amp. circuit breaker, ammeter, key switch, rectifier-regulator and stator.

The accessory system consists of a 12-volt battery, 25-amp. circuit breaker, ammeter, key switch, light switch, headlights, taillights, hourmeter and fuel pump.

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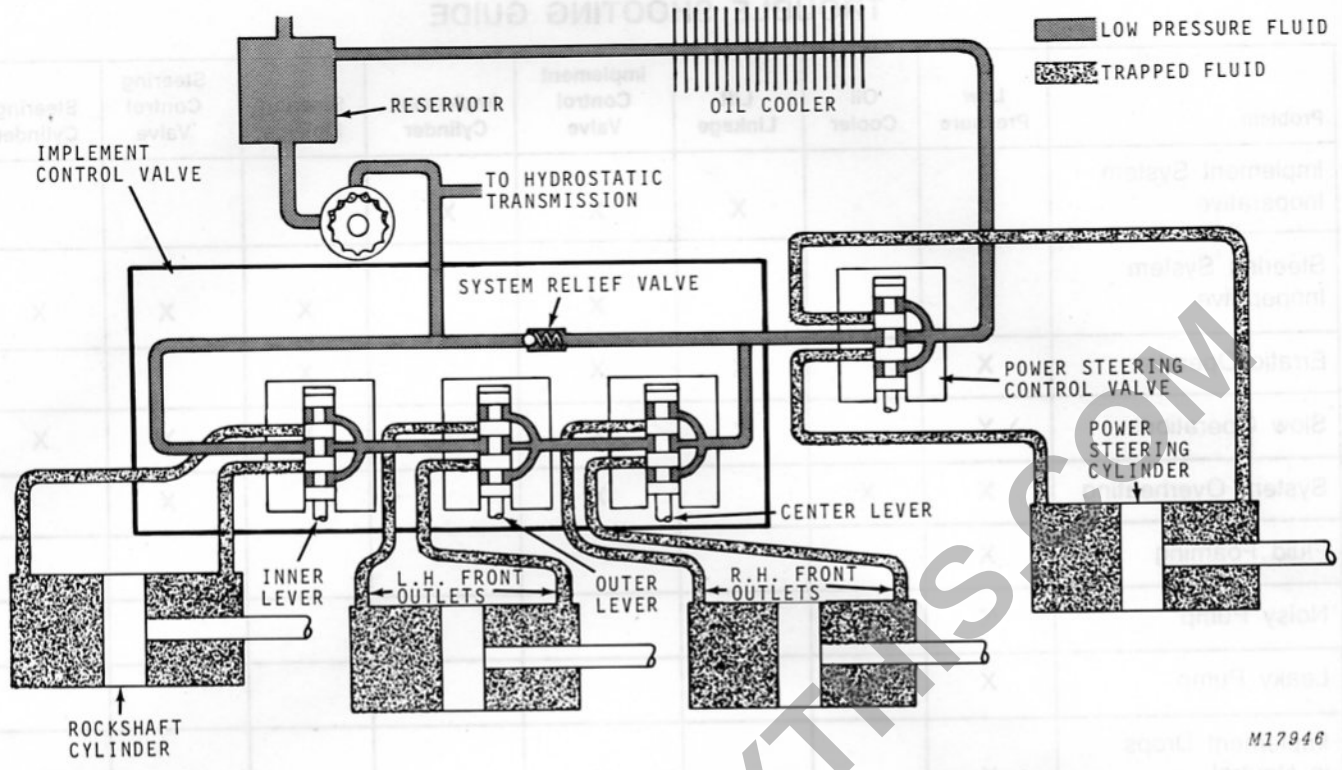


Fig. 2-Schematic Drawing of Hydraulic System (Implement and Steering Valves Open)

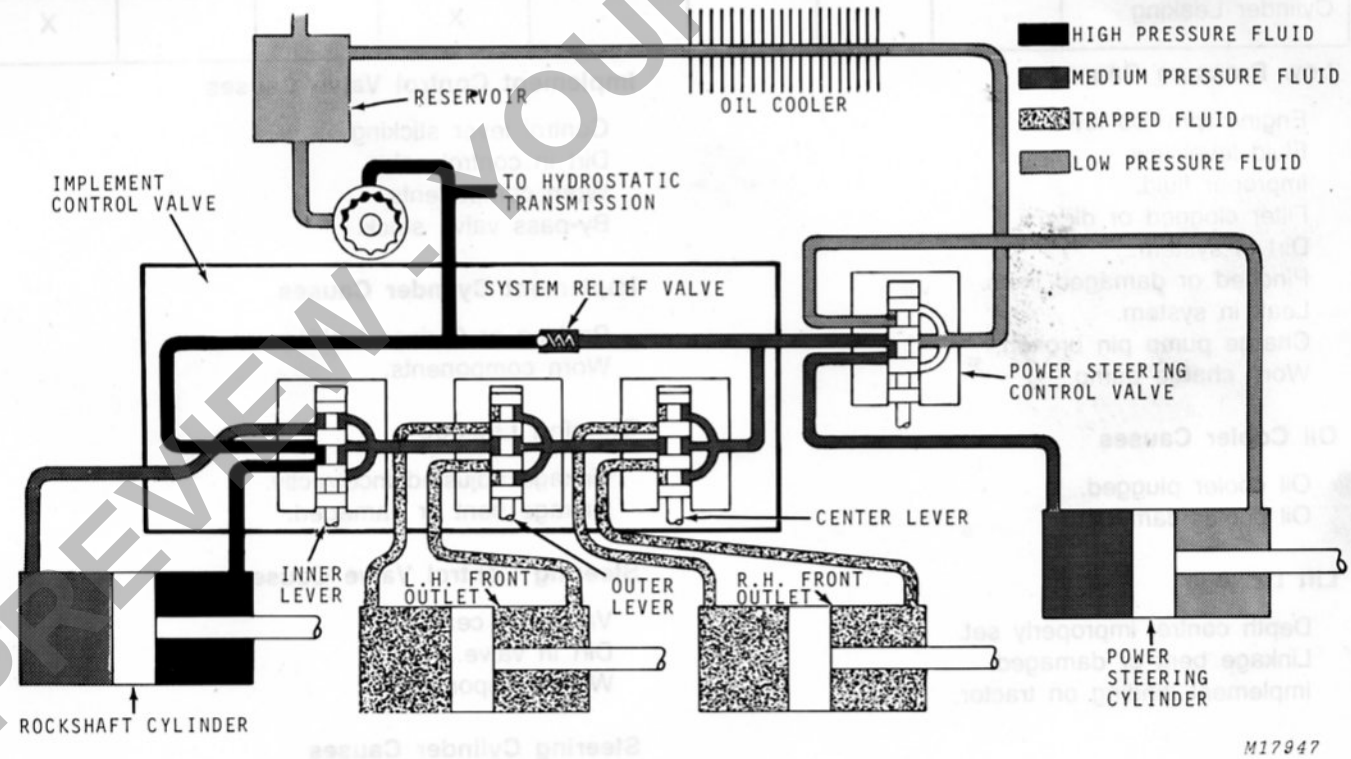


Fig. 3-Schematic Drawing of Hydraulic System (Rockshaft Spool of Implement Valve and Steering Valve Actuated)

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TRACTOR SERIAL NUMBER

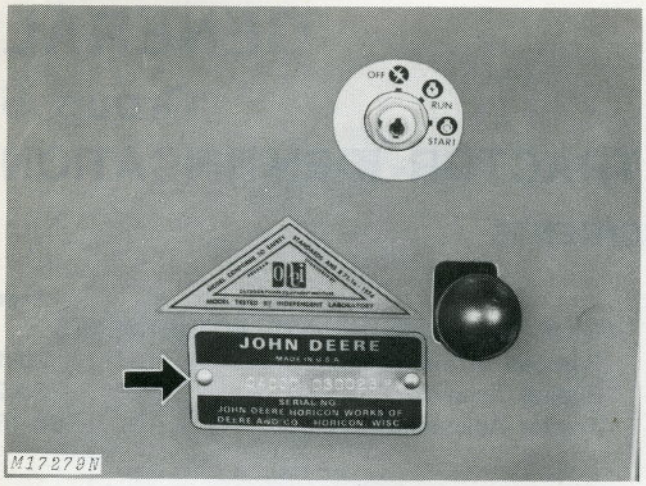


Fig. 1-Tractor Serial Number

The tractor serial number plate is located just below the key switch on the pedestal, Fig. 1.

ENGINE SERIAL NUMBER



Fig. 2-Engine Serial Number

The engine serial number is located on the right-hand cylinder head shroud, Fig. 2.

TRANSMISSION SERIAL NUMBER

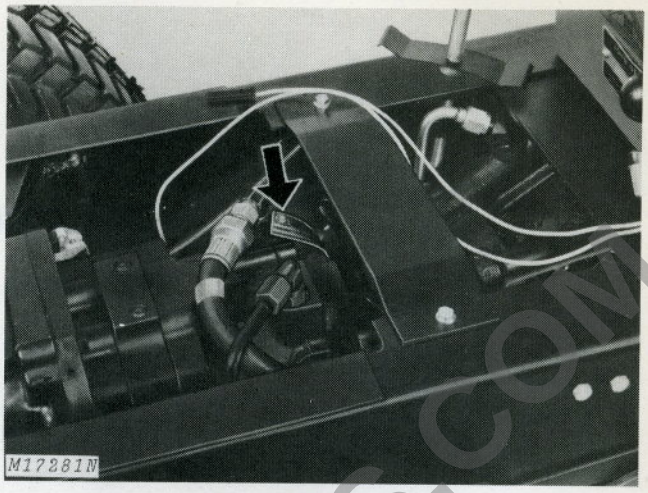


Fig. 3-Transmission Serial Number

The transmission serial number is stamped on a tag attached to the transmission, Fig. 3.

REAR AXLE SERIAL NUMBER

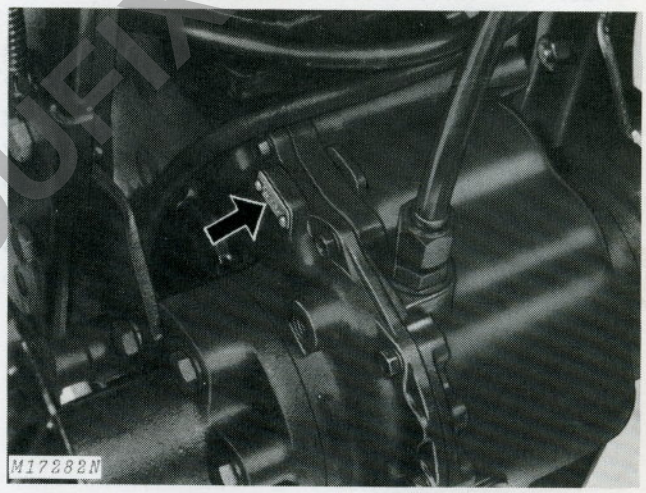


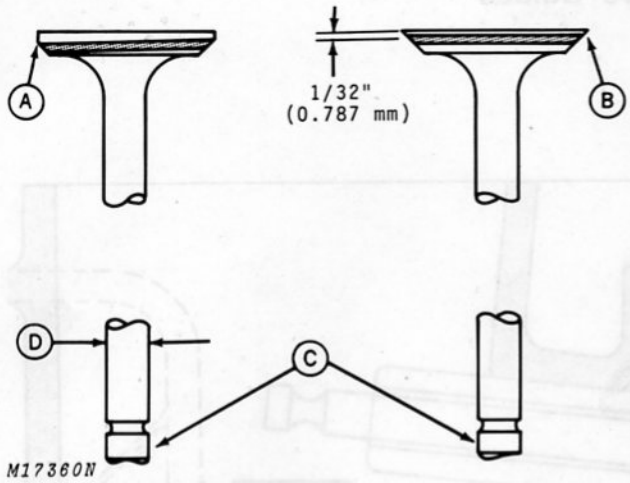
Fig. 4-Rear Axle Serial Number

The rear axle serial number is stamped on a tag attached to the rear axle, Fig. 4.

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A—Warped Head
B—No Margin
C—Worn or Improperly Ground Valve Stems
D—Valve Stem Diameter

Fig. 19-Faulty Valves

Check valve faces, heads and stems for defects or excessive corrosion and pitting.

Replace valves with a warped head (A), Fig. 19.

Recondition or replace valves with less than 1/32 inch (0.787 mm) margin (B).

Valve stem ends (C) should be ground square before checking valve tappet clearance.

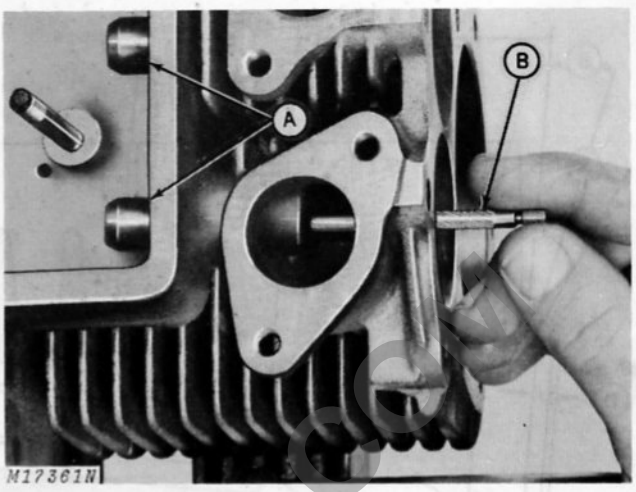
Measure valve stem diameter (D). See "Specifications", Group 30, for intake and exhaust valve stem diameter dimensions.

Inspecting Valve Seats

Carefully inspect valve seats for cracks or pitting. If valve seats are warped or distorted beyond reconditioning, replace the valve seat.

If pitted or worn, valve seats can be refaced. Lap valves to seat after refacing to assure a gas-tight fit.

Inspecting Valve Guides



A—Valve Guide
B—Telescoping Gauge

Fig. 20-Measuring Valve Guides

Clean valve guide with a valve guide cleaner.

Measure inside diameter of valve guide (A) with a gauge (B) from telescoping gauge set JDM-61. See "Specifications", Group 30, for valve guide inside diameter dimensions. Replace valve guide if necessary.

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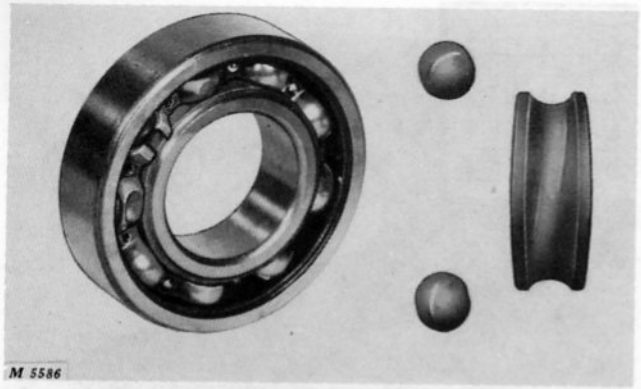


Fig. 59-Bearing Wear, Caused by Misalignment

Misaligned bearings cause undue wear, heat by friction and eventual failure, Fig. 59.

Note the crooked ball paths in the raceways and the oval appearance of the balls and wear on the separator caused by rubbing against the race.

Inspecting Camshaft and Bearings

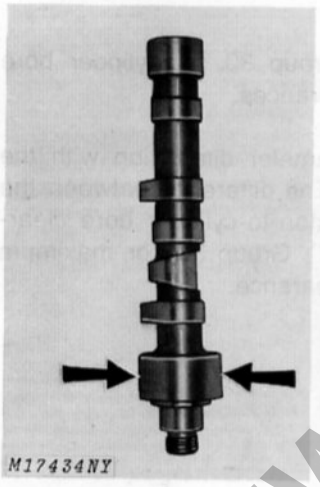


Fig. 60-Measuring Front Bearing Journal



Fig. 61-Measuring Front Sleeve Bearing

Measure camshaft front sleeve bearing journal, Fig. 60, with a dial caliper, JDM-57.

Measure camshaft front sleeve bearing, Fig. 61, with a gauge from telescoping gauge set JDM-16.

The difference between the two dimensions is the camshaft bearing running clearance. See "Specifications", Group 30, for the correct clearance.

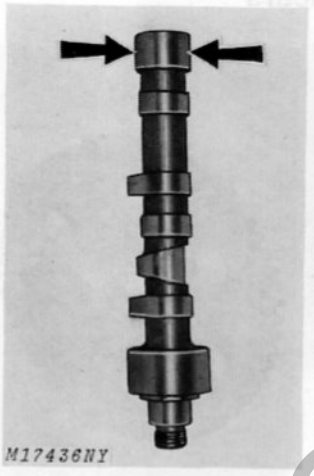


Fig. 62-Measuring Rear Bearing Journal

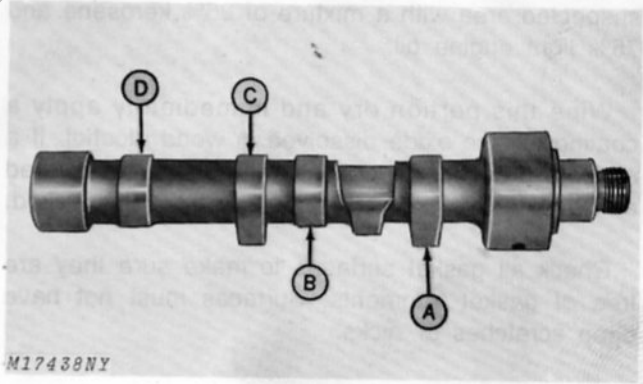


Fig. 63-Measuring Rear Sleeve Bearing

Measure camshaft rear sleeve bearing journal, Fig. 62, with a dial caliper, JDM-57.

Measure camshaft rear sleeve bearing, Fig. 63, with a gauge from telescoping gauge set JDM-61.

The difference between the two dimensions is the camshaft bearing running clearance. See "Specifications", Group 30, for the correct clearance.



A—L.H. Intake Valve Lobe
B—L.H. Exhaust Valve Lobe
C—R.H. Intake Valve Lobe
D—R.H. Exhaust Valve Lobe

Fig. 64-Inspecting Camshaft Lobes

Inspect camshaft lobes for damage, Fig. 64.

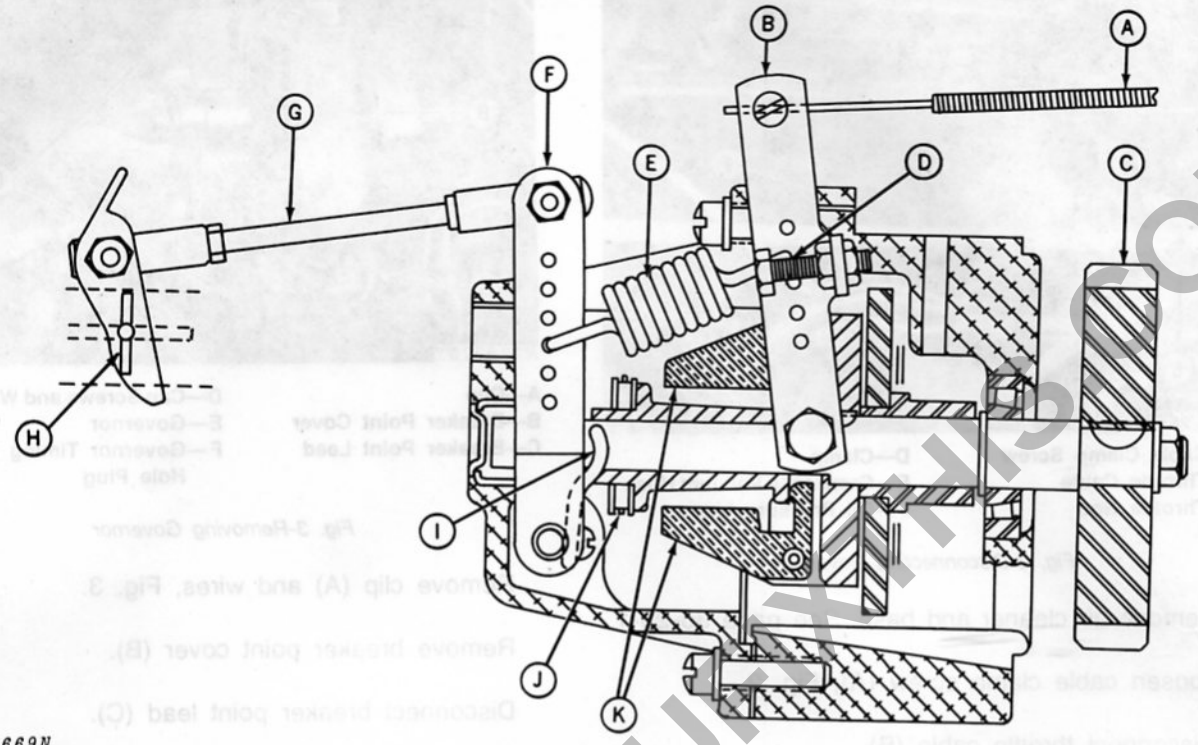
To inspect lobes for wear, measure the valve lift. See page 20-30-2 for specification.

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Group 15
GOVERNOR

PRINCIPLE OF OPERATION



A—Throttle Cable
B—Speed Control Lever
C—Governor Gear
D—High-Speed Stop Screw
E—Governor Spring
F—Governor Lever
G—Throttle Rod
H—Throttle Valve
I —Governor Lever Arm
J—Plunger
K—Flyweights

Fig. 1-Governor (Shown with Carburetor Throttle Valve Closed)

The governor, Fig. 1, has the governor gear (C) meshed with the camshaft timing gear.

As the throttle lever (on dash) is raised to increase engine speed, the throttle cable (A) pulls the speed control lever (B).

Tension from the governor spring (E) pulls the governor lever (F) and throttle rod (G) which opens the throttle valve (H) in the carburetor.

This increases the fuel-air mixture to the engine.

As engine speed increases, the flyweights (K) spread, forcing the plunger (J) against the governor lever arm (I), pushing the governor lever (F) and throttle rod (G), closing the throttle valve (H). The flyweights have enough force to overcome governor spring tension.

The flyweights and governor spring continuously overcome each other. The two actions happen so fast that the changes are hardly noticeable. These two actions maintain constant speed under load and limit high-speed (top governed rpm). The top governed rpm is set by adjusting the high-speed stop screw (D) which rests against a bracket on the engine when the throttle lever (on dash) is in the "FAST" position.

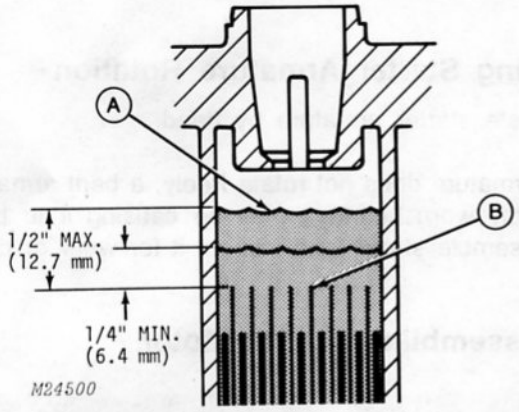
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Activating New Battery

When activating a new battery, remove it from the tractor before filling it with electrolyte. This will prevent damage to the tractor in case electrolyte spills.



A—Electrolyte Level **B—Plates**

Fig. 7-Proper Level of Electrolyte in Battery Cells

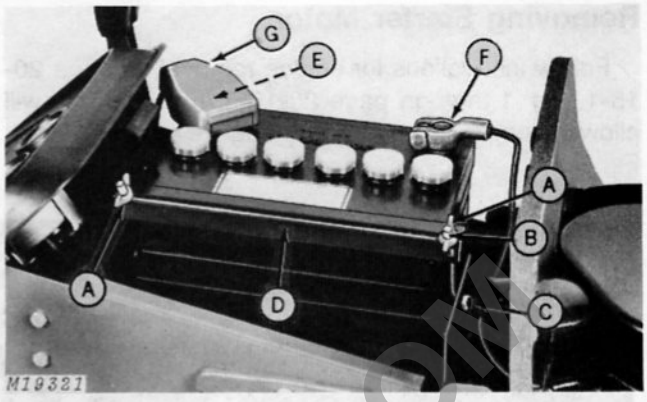
Add electrolyte until it is 1/4 to 1/2 inch (6.4 to 12.7 mm) above plates (B), Fig. 7. Then charge at 30 to 40 amps. for 10 minutes or 15 amps. for 30 minutes.

IMPORTANT: The electrolyte level (A), Fig. 7, should never be over 1/4 to 1/2 inch (6.4 to 12.7 mm) above top of plates (B).

Charging the battery will increase battery temperature and raise the electrolyte level. If electrolyte level (A) is above dimension shown in Fig. 7, drain off enough electrolyte until it is at specified level.

⚠ CAUTION: After the battery is activated, hydrogen and oxygen gases in the battery are very explosive. Therefore, keep open flames and sparks away from battery.

Installing Battery



A—Wing Nuts
B—Rods
C—Slots
D—Battery Hold-Down Strap
E—Positive (+) Terminal
F—Negative (−) Terminal
G—Battery Terminal Cover

Fig. 8-Installing Battery

Place battery in tractor, Fig. 8.

Install battery hold-down (D). Tighten wing nuts (A).

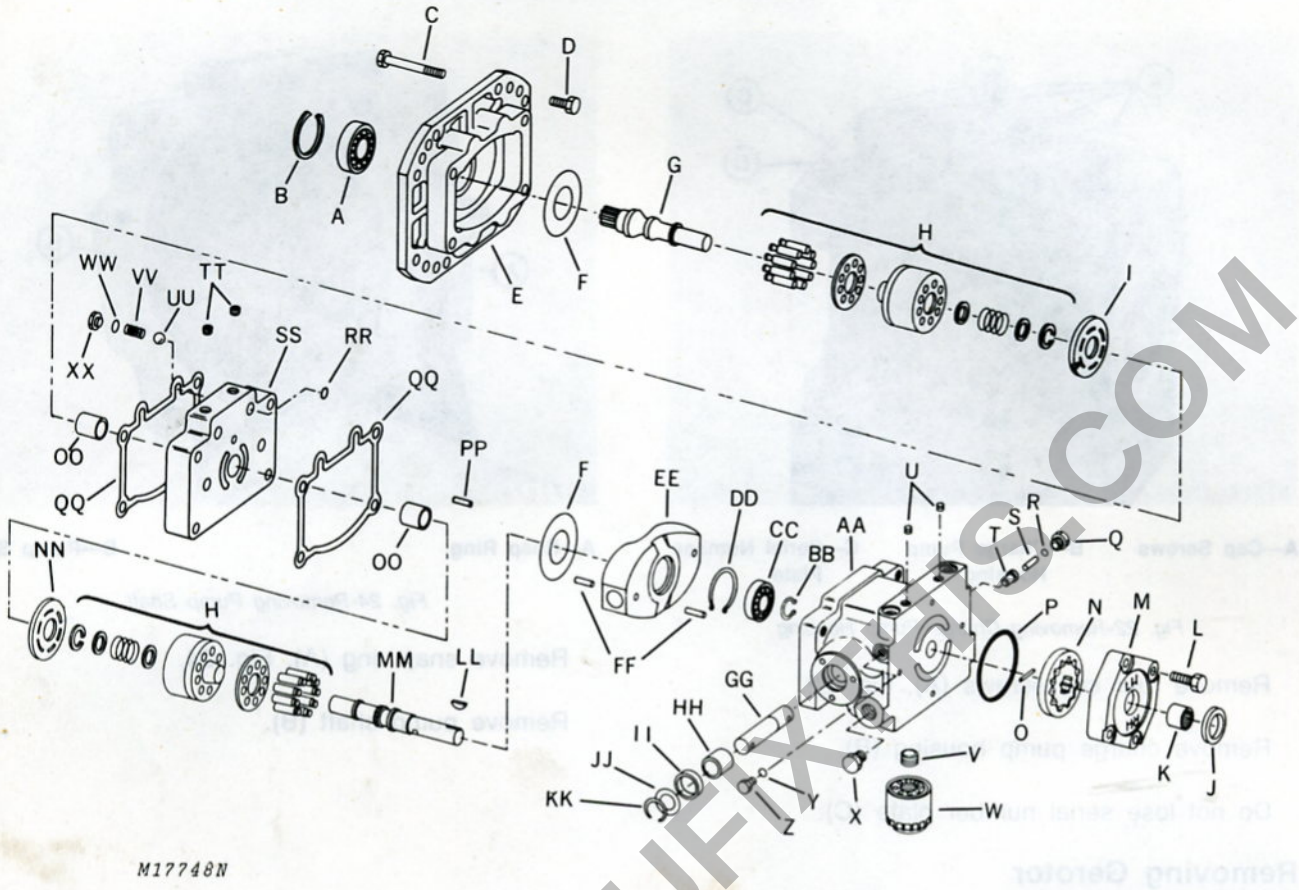
Connect positive battery cable (E) to positive (+) terminal of battery. Cover terminal with battery terminal cover (G).

Connect negative battery cable (F) to negative (−) terminal of battery.

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INSPECTION AND REPAIR



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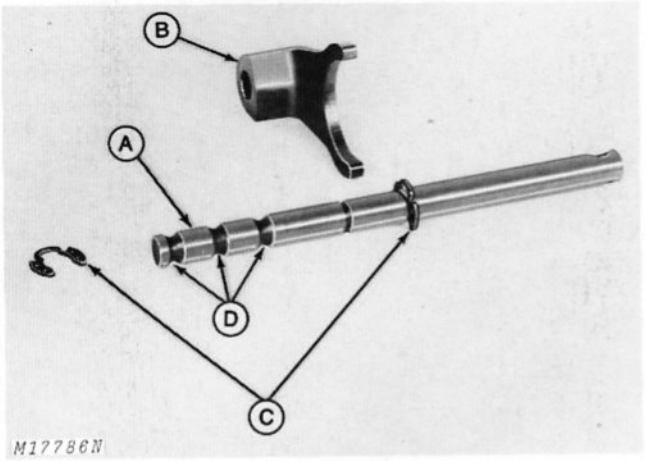
A—Bearing
B—Retaining Ring
C—3/8" x 3-1/4" Cap Screw (4 used)
D—3/8" x 1-1/2" Cap Screw (4 used)
E—Motor Case
F—Thrust Plate
G—Motor Shaft
H—Cylinder Block
I —Motor Valve Plate
J —Seal
K—Bearing
L—5/16" x 1-1/4" Cap Screw (4 used)
M—Charge Pump Housing
N—Gerotor Assembly
O—Pin
P—O-Ring
Q—Plug
R—O-Ring
S—Plug (Service Only)
T—Cone
U—Pipe Plug (2 used)
V—Union
W—Filter
X—Plug
Y—O-Ring
Z—Plug
AA—Pump Case
BB—Retaining Ring
CC—Bearing
DD—Retaining Ring
EE—Swash Plate
FF—Spring Pin (4 used)
GG—Trunnion Shaft (2 used)
HH—Bearing (2 used)
II —Seal (2 used)
JJ —Washer (2 used)
KK—Retaining Ring (2 used)
LL—3/16" x 5/8" Woodruff Key
MM—Pump Shaft
NN—Pump Valve Plate
OO—Bearing (2 used)
PP—Pin (2 used)
QQ—Gasket (2 used)
RR—O-Ring (2 used)
SS—Center Section
TT—Pipe Plug (2 used)
UU—Ball (2 used)
VV—Spring (2 used)
WW—O-Ring
XX—Check Valve Plug (2 used)

Fig. 25-Exploded View of Transmission

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Inspecting Shifter Assembly



A—Shifter Rod
B—Shifter Fork
C—Retaining Rings
D—Grooves

Fig. 31-Inspecting Shifter Assembly

Inspect shifter rod (A) for being bent, Fig. 31.

Inspect shifter fork (B) for being bent.

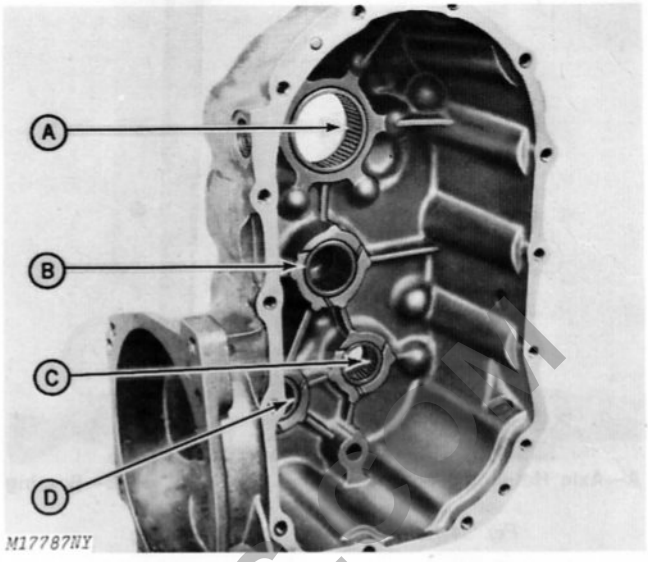
Inspect grooves (D) on shifter rod and shifter detent ball for damage. Inspect detent ball spring for being weak or damaged.

If shifter fork is being replaced, make sure sharp edges on the retaining rings (C) are away from the shifter fork (B).

Inspecting and Replacing Bearings

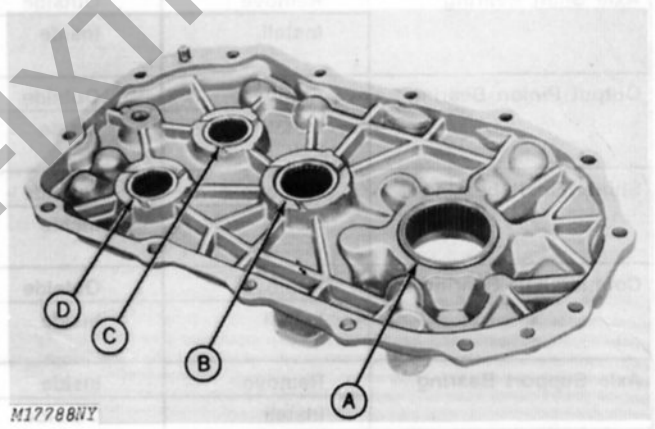
Check all bearings in case, Fig. 32, cover, Fig. 33 and axle housings, Fig. 34, for wear or corrosion. Make sure bearings turn freely.

To replace bearings use the correct driver and pilot as shown in the chart on page 50-20-14.



A—Axle Shaft Bearing
B—Output Pinion Bearing
C—Shifter Shaft Bearing
D—Countershaft Bearing

Fig. 32-Rear Axle Case Bearings



A—Axle Shaft Bearing
B—Output Pinion Bearing
C—Shifter Shaft Bearing
D—Countershaft Bearing

Fig. 33-Rear Axle Cover Bearings

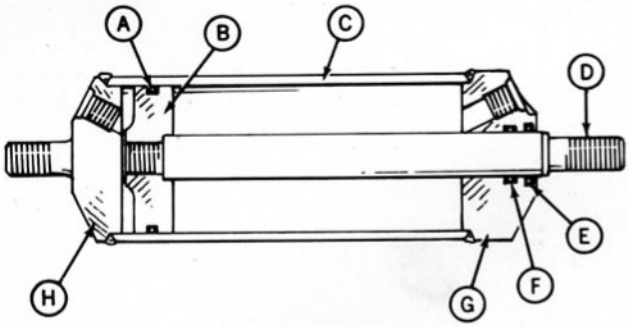
IMPORTANT: Place shims under cover until it is level when pressing bearings from the inside.

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Group 25
POWER STEERING CYLINDER

PRINCIPLE OF OPERATION



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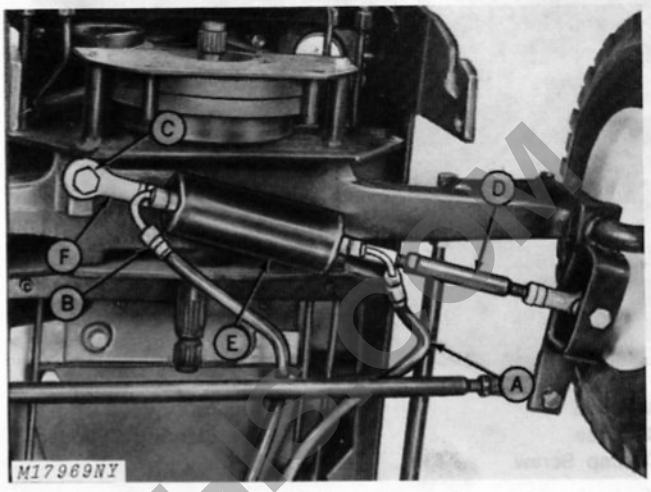
A—O-Ring
B—Piston
C—Barrel
D—Piston Rod
E—Seal
F—O-Ring
G—Bearing
H—Head

Fig. 1-Cutaway View of Power Steering Cylinder

The power steering cylinder, Fig. 1, is connected to the front axle and the left-hand spindle. When the steering wheel is turned in either direction, the power steering valve routes pressure fluid to the power steering cylinder which extends or retracts the piston rod. Turning left extends the piston rod (D) and turning right retracts the piston rod.

The power steering cylinder is a welded assembly and is not serviceable. A new cylinder must be installed if the old one is defective.

TESTING



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A—Hose
B—Hose
C—Cap Screw
D—Extension
E—Power Steering Cylinder
F—Rod End

Fig. 2-Testing Power Steering Cylinder

Turn steering wheel all the way to the left.

Disconnect hose (A) from power steering cylinder (E), Fig. 2. Place end of hose in a clean container.

With engine running, hold steering wheel to the left. After initial flow of fluid stops, there should be no more flow into container. Continuous flow indicates oil leaking past piston O-ring (A, Fig. 1). Replace cylinder if leakage occurs.

REMOVAL

Thoroughly clean power steering cylinder and hose fittings.

Disconnect hose (A) and hose (B), Fig. 2. Cap or plug hoses and cylinder ports.

Remove cap screw (C).

Remove power steering cylinder (E) from extension (D).

Remove rod end (F) and lock nut from power steering cylinder.

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REPLACING SHEAR BOLT

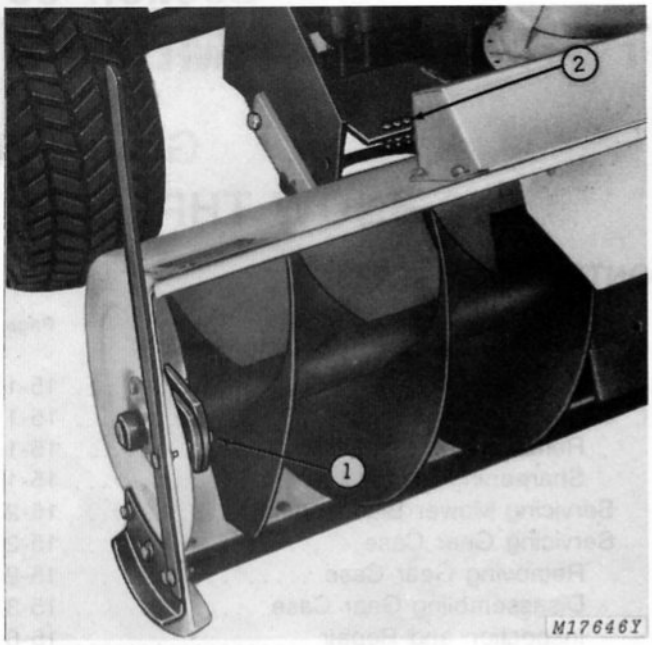


Fig. 1-Replacing Shear Bolt

1. Remove sheared bolt, Fig. 1. Rotate rotor to align holes in rotor shaft arms.

2. Remove one of the extra shear bolts and install it in hole of rotor shaft arms. Tighten nut snug. DO NOT overtighten nut.

REVERSING OR REPLACING SCRAPER BLADE



A—Scraper Blade **B—Carriage Bolts**

Fig. 2-Reversing or Replacing Scraper Blade

When edge of scraper blade (A), Fig. 2, becomes rough or bent, remove carriage bolts (B).

Reverse scraper blade and reinstall carriage bolts.

If scraper blade is broken or bent badly, replace it.

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