OPERATOR'S MANUAL

OM-U16340

JOHN DEERE

2010

FORK LIFT

TO THE PURCHASER

Your new John Deere 2010 Fork Lift was developed through years of design and test and built to the traditionally high standards of John Deere. This versatile unit meets today's exacting requirements.

Operating ease, outstanding economy and dependability, modern styling, and simplicity of service are all designed into this fork lift.

The 2010 Fork Lift was designed for the handling, lifting, and stacking of materials and products. When equipped with one of the numerous hydraulic attachments available, the unit becomes even more versatile.

At the time this fork lift was delivered, the John Deere industrial dealer discussed with you its safe operation and proper care. However, before putting the machine to work, read this manual. It contains complete instructions for operating the fork lift, maintaining it, and taking full advantage of its many time- and labor-saving features. After reading the manual, keep it in a convenient place for quick and easy reference if questions arise concerning operation, lubrication, or service.

The service policy which you received with your new unit certifies that it was properly inspected and prepared for delivery by your John Deere industrial dealer. Keep this policy in a safe place and present it to the dealer whenever services which it authorizes are required.

Your John Deere industrial dealer wants to help you get the most value from your new fork lift. His skilled servicemen can handle every job efficiently. These men are trained in modern service methods; they have all necessary tools and equipment. If new parts are needed, only genuine John Deere parts will be installed. These parts are exact duplicates of the originals, made from the same patterns and of the same high-quality materials.

When in need of new parts, be prepared to furnish the serial numbers found on both the engine and the mast.

IDENTIFICATION

Engine Serial No. . . . . .
Mast Serial No. . . . . .
Date Purchased . . . . . .

Price $2.10

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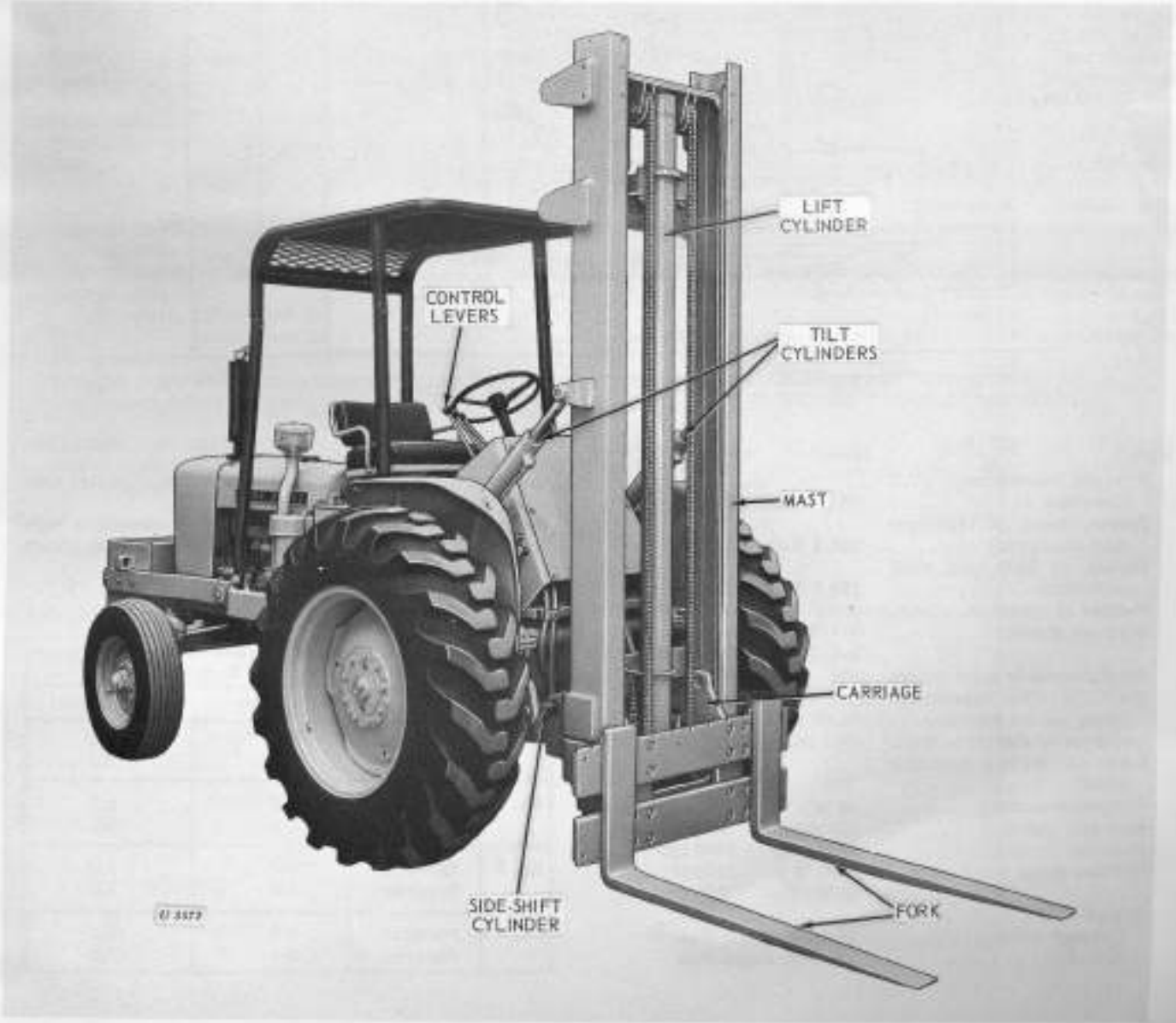
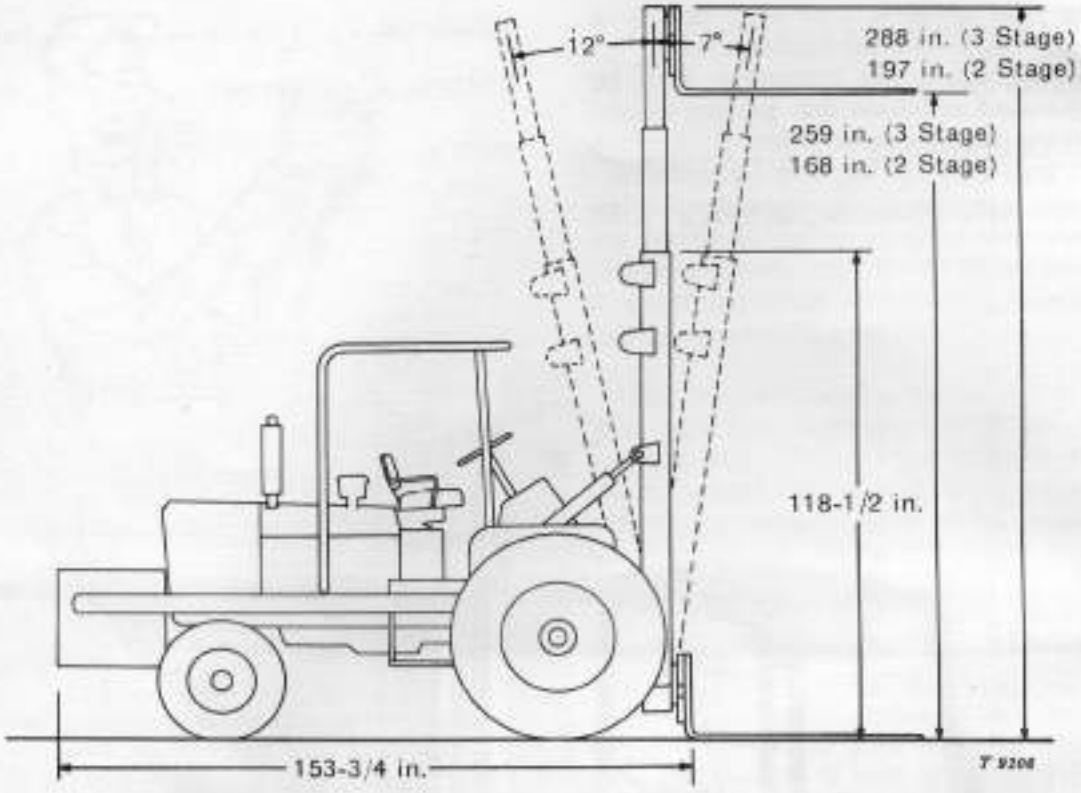


John Deere 2010 Fork Lift

SPECIFICATIONS



ENGINE	Diesel	Gasoline
Flywheel horsepower (SAE corrected)	52.0	52.0
Torque, max., at 1500 rpm (SAE corrected)	124.5 ft-lbs	119.0 ft-lbs
Torque, at 2500 rpm (SAE corrected)	109.3 ft-lbs	109.3 ft-lbs
Number of cylinders	4	4
Bore and stroke	3-7/8 x 3-1/2 in.	3-5/8 x 3-1/2 in.
Displacement in cubic inches	165	145
NACC or AMA horsepower rating for tax purposes	24.03	21.03
Intake valve clearance (cold)	.012 in.	.012 in.
Exhaust valve clearance (cold)	.018 in.	.018 in.
Compression ratio	19 to 1	7.9 to 1
Slow-idle (rpm)	800 rpm	600 rpm
Fast-idle (rpm)	2650 rpm	2700 rpm
Working speed range (rpm)	1500 to 2500 rpm	1500 to 2500 rpm
Engine clutch:		
Constant mesh	11-inch, single disk	
H-L-R	10-inch, single disk	

TRANSMISSION

Constant mesh - 4 speed range transmission shifted mechanically.

Hydraulic reversing - 4 speed range transmission with hydraulic actuated no-clutch direction reverser. Clutch provided for "inching" loads into place.

Travel Speeds:

MPH based on 14.9 x 28-inch rear tires, and zero slip.

Range	Gear	Engine Speed	
		1000 Rpm	2500 Rpm
No. 1	Forward	1.2	3.0
	Reverse	1.2	3.1
No. 2	Forward	2.0	5.1
	Reverse	2.2	5.4
No. 3	Forward	3.6	9.0
	Reverse	3.8	9.5
No. 4	Forward	6.0	15.0
	Reverse	6.3	15.8

CAPACITIES (U.S. Standard Measures)

Fuel tank	16 gal.
Cooling system	3 gal.
Engine crankcase (including filter)	5 qt.
14-foot fork lift hydraulic system	13 gal.
21-foot fork lift hydraulic system	14 gal.
Transmission:	
Constant mesh	32 qt.
Hydraulic reversing	27 qt.
Final drives, each	1 gal.

FINAL DRIVES

Induction hardened spur-gear type gears mounted on anti-friction type bearings.

Gear reduction ratio in first gear (engine to axle) (Hydraulic Reversing)	164.3 to 1
Gear reduction ratio in first gear (engine to axle) (Constant Mesh)	143 to 1
Gear reduction ratio in high gear (engine to axle) (Hydraulic Reversing)	22.7 to 1
Gear reduction ratio in high gear (engine to axle (Constant Mesh)	20 to 1

TIRES

Front	14.9 x 28-8 ply
Rear	7.50 x 16-10 ply

WHEEL TREADS

Front	62 in.
Rear	54 in.

DIMENSIONS

Over-all length (without forks)	153-3/4 in.
Over-all width	75-3/4 in.
Over-all height:	
Mast retracted	118-1/2 in.
Mast raised, 14-foot fork lift	197 in.
21-foot fork lift	268 in.
Wheel base	82 in.
Free lift (max. with forks in transport position and masts fully retracted)	10-1/4 in.

MAXIMUM LIFTING HEIGHT

14-foot fork lift	14 ft.
21-foot fork lift	21 ft. 7 in.

LOAD CAPACITY (AT FULL LIFT HEIGHTS AND 24-IN. LOAD CENTER)

14-foot fork lift	5000 lb.
21-foot fork lift	2500 lb.

TILT OF MAST

Forward	7 degrees
Rearward	12 degrees

SIDE-SHIFT OF MAST . . . . . 3 in. to right or left of center

RATE OF LIFT (2500 ENGINE RPM) . . . . . 70 fpm

RATE OF DROP

Maximum load	63-3/4 fpm
Empty	46-1/2 fpm

FORK LIFT HYDRAULIC SYSTEM

Fluid capacity:	
14-foot fork lift	13 gal.
21-foot fork lift	14 gal.
Filter	Dual micronic with wire mesh
Pump capacity	15 gpm @ 2500 rpm

STEERING

Steering ratio	3-1/4 turns
Turn clearance circle:	
with brakes	292-1/2 in.
without brakes	317 in.

ELECTRICAL SYSTEM

Battery (dry) voltage (nominal)	12 volts
Battery specific gravity (full charge)	1.250
Battery terminal grounded	Positive

SHIPPING WEIGHT (APPROX. WITHOUT COUNTER-WEIGHTS, FORKS, OR OTHER ATTACHMENTS)

	14-ft. lift	21-ft. lift
Diesel	8400 lb.	8675 lb.
Gasoline	8300 lb.	8575 lb.

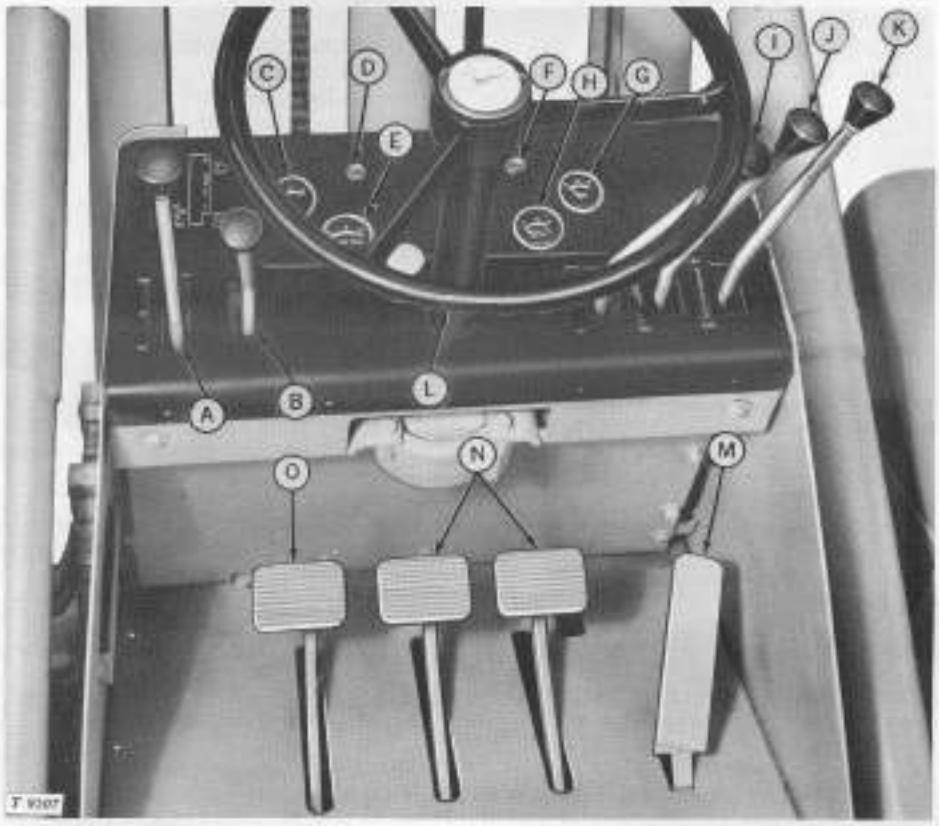
(Specifications and design subject to change without notice.)

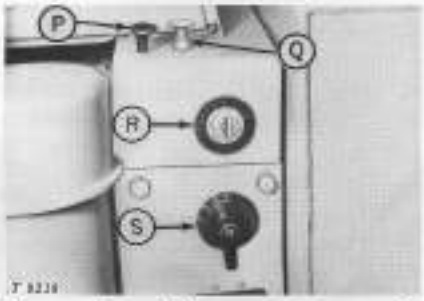
OPERATION

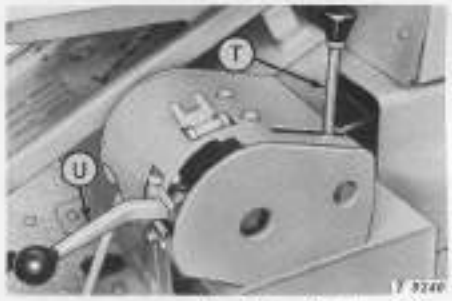
CONTROLS AND INSTRUMENTS

Most of the controls shown below are explained on other pages in this manual. Refer to the page number listed after each control.

NOTE: The location of the starter switch, light switch, and choke, or primer, of your fork lift may differ from those illustrated in this manual. The location of these parts does not affect operating instructions.



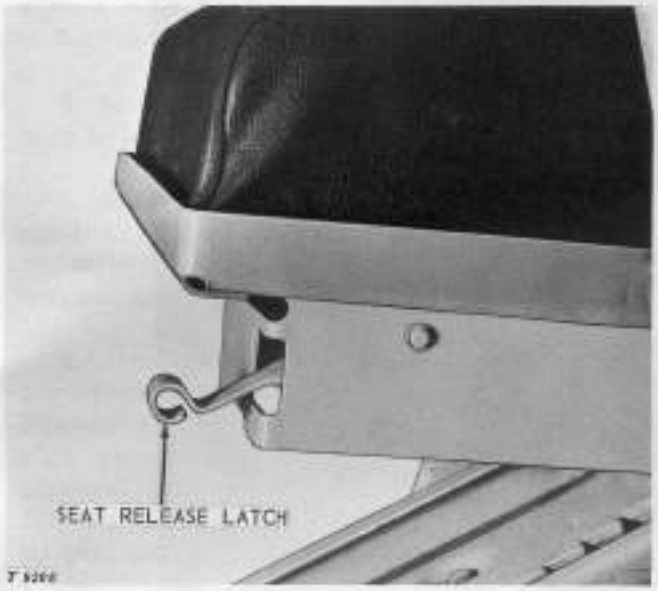




A – Reverser Lever (11)
B – Auxiliary Valve Lever (16)
C – Transmission Oil Pressure Gauge (Hydraulic Reversing Transmission)
D – Generator Indicator Light (7)
E – Water Temperature Gauge (4, 40)
F – Engine Oil Pressure Indicator Light (7)
G – Fuel Gauge
H – Transmission Oil Temperature Gauge (Hydraulic Reversing Transmission) (11)
I – Lift Lever (15)
J – Tilt Lever (15)
K – Side-Shift Lever (15)
L – Steering Wheel
M – Foot Throttle (9)
N – Brake Pedals (12)
O – Clutch Pedal (7, 11)
P – Choke (Gasoline) (7)
Q – Engine Primer (Diesel) (7)
R – Starter Switch (7, 9)
S – Light Switch (14)
T – Hand Throttle (9)
U – Shift Lever (11)

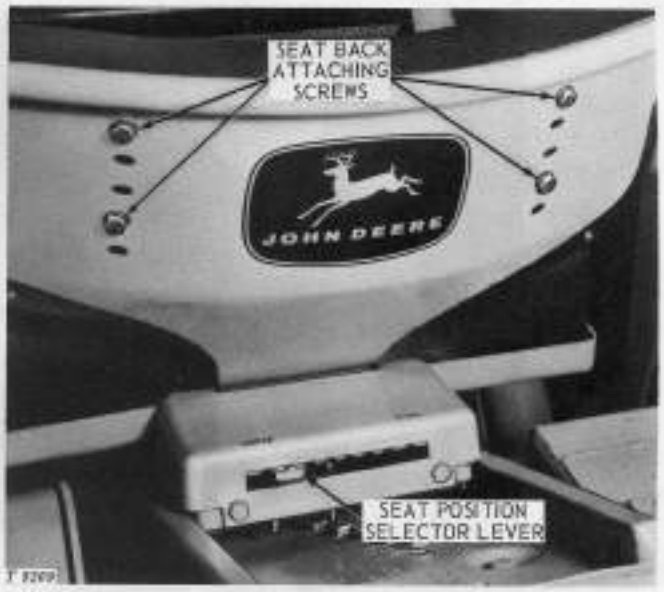
SEAT

MOVING SEAT TO UPPER REAR



Lift seat release latch and move seat to upper rear where it will latch. To return seat to normal preset position, lift latch and allow seat to slide forward.

ADJUSTING FOR HEIGHT OF OPERATOR



First move seat to upper rear; then shift position selector lever right or left until pedals and levers can be operated easily when you are seated.

ADJUSTING SEAT BACK REST

Remove attaching screws (above) from seat backrest and move backrest up or down. Replace and tighten screws.

OPERATING THE ENGINE

BEFORE STARTING THE ENGINE

Before starting the engine for the first time each day, perform the following inspections and services:

(a) Check engine crankcase oil level—page 25.

(b) Check radiator coolant level—page 40.

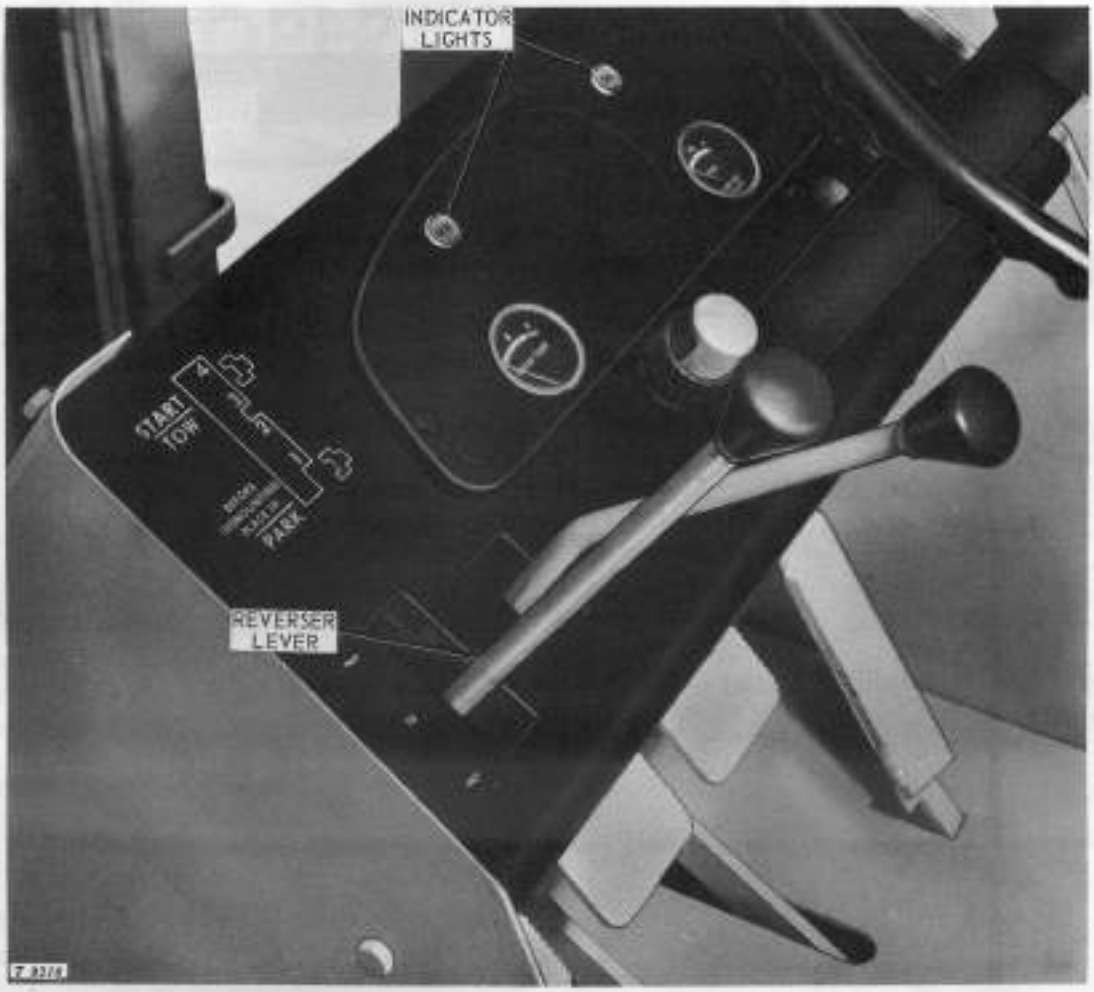
(c) Change air cleaner oil when dirt level exceeds 3/8-inch—page 25. Check pre-cleaner —page 25.

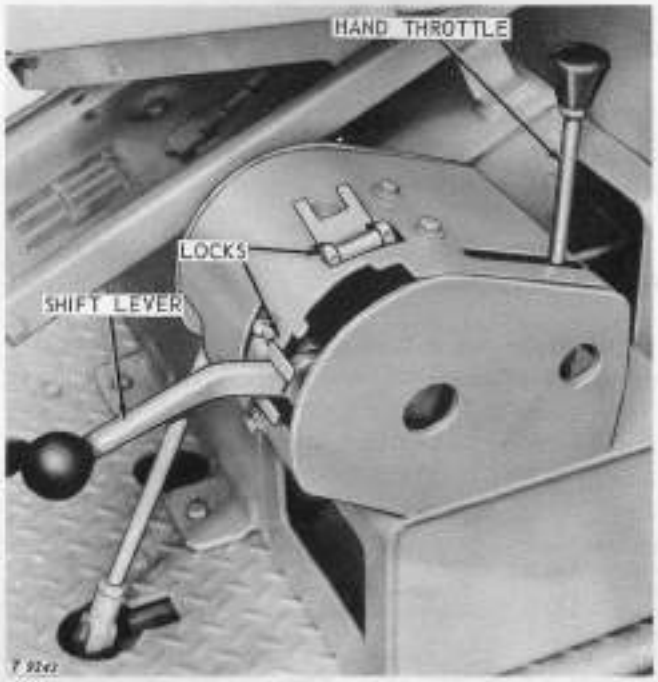
(d) Check fuel sediment bowl—page 38 (diesel) or 39 (gasoline).

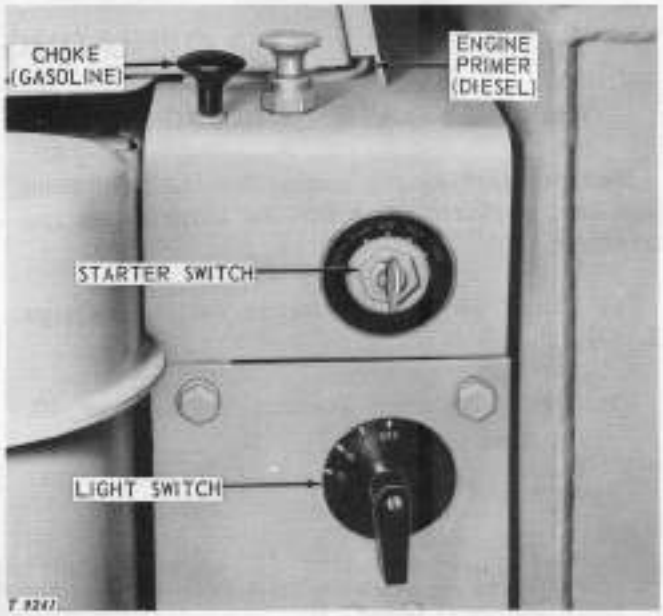
(e) Make sure fuel shut-off valve(s) is open —page 38 (diesel) or 39 (gasoline).

(f) Grease brake linkage—page 25.

STARTING CONTROLS







STARTING THE DIESEL ENGINE

1. Lock shift lever in "START." Place reverser lever in neutral and depress clutch pedal to decrease drag on engine.

2. Move hand throttle full open and then move back to half throttle.

3. Turn starter switch clockwise to first position. Indicator lights should glow. If either one fails to glow, turn off starter switch and determine the cause.

4. Turn starter switch one-eighth turn *counter-clockwise* and hold to actuate glow plugs. Preheat glow plugs for time listed below. If engine primer is also used, give it number of strokes listed while preheating glow plugs for shorter time listed. To pull primer, turn it until pin matches slot. *Always return primer to locked position after use.*

Temperature	Engines Without Primer	Engines with Primer	
	Preheat Time	Prime	Preheat Time
Warm engine	30 seconds	None	30 seconds
Above 32° F.	1 minute	2 strokes	30 seconds
32° F. to 0° F.	2 minutes	3 strokes	30 seconds
Below 0° F.	3 minutes	4 strokes*	30 seconds

**At 0° F. or below, prime one extra stroke while cranking engine.*

CAUTION: Do not use a quick starter to activate the glow plugs; this will quickly burn out the plugs.

5. Turn starter switch clockwise to start engine. (Do not crank engine for more than 30 seconds at a time. To do so may overheat starter. Wait a minute or two before trying again. Try reheating glow plugs.)

6. As soon as engine starts, reheat glow plugs until engine runs smoothly.

7. As soon as engine starts, release starter switch and adjust engine speed to about 1000 rpm. Oil pressure and generator indicator lights should now go out. If lights glow bright red after engine has been running 10 seconds, shut off engine and determine the cause.

8. Release clutch. In cold weather, warm engine and transmission for five minutes by operating engine at 1000 rpm. Do not operate engine at slow idle during warm-up. Observe gauges.

STARTING THE GASOLINE ENGINE

1. Lock shift lever in "START." Place reverser lever in neutral and depress clutch pedal to decrease drag on engine.

2. Advance hand throttle to half throttle.

3. Pull choke out full distance. (If engine is warm, try starting without choking.)

4. Turn starter switch clockwise to first position. Indicator lights should glow. If either one fails to glow, turn off starter switch and determine the cause.

5. Turn starter switch clockwise to start engine. (Do not crank engine for more than 30 seconds at a time. To do so may overheat starter. Wait a minute or two before trying again.)

6. After engine has started, or after it has turned 4 or 5 revolutions, push choke all the way in. During cold weather leave choke part way out the first few minutes.

7. With engine running and hand throttle advanced, oil pressure and generator indicator lights should go out. If lights glow bright red after engine has been running 10 seconds, turn off ignition at once and determine the cause.

8. Release clutch. In cold weather, warm engine and transmission for five minutes by operating engine at 1000 rpm. Do not operate engine at slow idle during warm-up. Observe gauges.

COLD WEATHER STARTING

The engine will start easier in cold weather if you follow these recommendations:

1. Use correct fuel for your area and season — page 20.
2. Use crankcase oil of proper viscosity — page 21.
3. Use oil of same viscosity in air cleaner as in crankcase. Do not dilute oil in air cleaner.
4. Make sure battery is at full charge so engine will crank fast—page 43. On diesels, use a booster battery (if needed) at temperatures below -10° F.
5. On diesel, preheat glow plugs for a longer interval. In below zero weather, also prime an extra stroke while cranking engine.

CAUTION: Do not use ether as a starting aid; it might damage engine or starter.

6. Disconnect hydraulic pump and clutch levers while starting (see below).

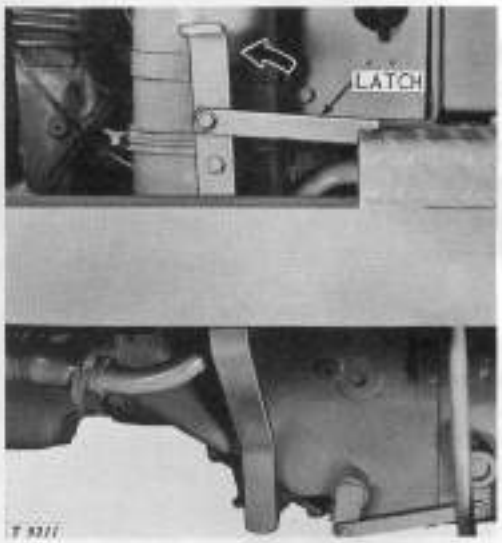
CAUTION: Never attempt to start a fork lift with hydraulic reversing transmission by towing or pushing. These units cannot be started by this method and the hydraulic reversing clutches and bearings may be damaged. On fork lifts with constant mesh transmissions, do not tow while starting at a speed greater than normal for the gear the unit is being started in. For safety, use higher gears at these times.

AUXILIARY PUMP DISENGAGING LEVER

To disengage the auxiliary pump for easier cold weather starting, rotate the lever down and to the rear.

As soon as the engine has started and is running smoothly, idle the engine. Then engage the pump by rotating the lever up and to the front.

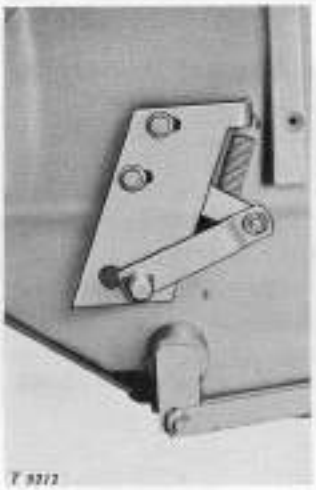
CLUTCH DISCONNECT LEVER
(Hydraulic Reversing Transmission)



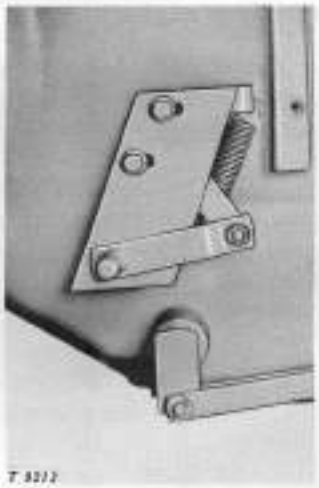
To disengage the clutch, push the disconnect lever forward and prop with latch (see above).

As soon as the engine has started and is running smoothly, idle the engine. Then pull up the latch and release the lever to engage the clutch.

HYDRAULIC PUMP DISENGAGING LEVER
(Constant Mesh Transmission)



Lever in Normal Position



Lever in Disengagement

Normally, the disengaging lever is carried as shown and is inoperative.

To disengage the hydraulic pump for easier cold weather starting, push forward on the lever

and push in to latch as shown. Then, with the reverser lever in neutral, push down on the clutch pedal. This will decrease drag on the engine.

As soon as the engine has started and is running smoothly, idle the engine. Then pull out and rearward on the disengaging lever to unlatch it.

FORK LIFT WARM-UP PERIOD

Before putting the fork lift under full load or into high gear, be sure it is warmed up. Oil will then circulate fully, preventing excessive wear on piston rings, cylinders, and bearings. Do not idle or race engine during warm up. Keep it at about 1000 rpm.

ENGINE IDLING

Avoid engine idling when possible. Prolonged idling may lower coolant temperature, resulting in crankcase oil dilution. Idling may also permit lacquer or gummy deposits to form on engine parts, and excess sludge to collect in the crankcase.

When the fork lift is idle for a time, stop the engine.

ENGINE SPEEDS

The engine is designed to work at speeds ranging from 1000 to 2500 rpm. Operate at any speed within this range which gives adequate power and best economy for your particular job. (See "Engine Speeds," page 32.) For maximum lift of forks, the engine should operate at full throttle.

USING HAND THROTTLE

Use the hand throttle to select the minimum engine operating speed. Push the hand throttle forward to speed up the engine; pull the hand throttle back to slow down the engine.

On diesel fork lifts, the hand throttle is also the engine shut-off (see "Stopping the Engine," at right).

USING FOOT THROTTLE

Use the foot throttle to determine the maximum engine operating speed during fork lift operation. When the pedal is released, the engine returns to the hand throttle setting.

STOPPING THE ENGINE

1. Place shift lever in "PARK." This will lock gears and hold fork lift in place.

2. Allow the engine to run at 600 rpm (gasoline) or 1500 rpm (diesel) for a short time. This permits engine to cool gradually. Sudden cooling of a hot engine causes extreme contraction of parts and may damage engine.

3. Turn starter switch key to vertical (off) position. On diesels pull hand throttle fully back to cut off fuel.

CAUTION: On diesels, do not attempt to stop engine by turning off fuel at shut-off valves. This will cause injection pump to run dry and damage internal parts.

4. Remove key from starter switch to prevent unauthorized operation of fork lift.

"BREAKING IN" THE FORK LIFT

The first 20 hours is the fork lift "break in" period. Special oil has been used at the factory to assure proper engine lubrication. During "break-in", observe these rules:

a. Operate fork lift under normal load.

b. Avoid light loads.

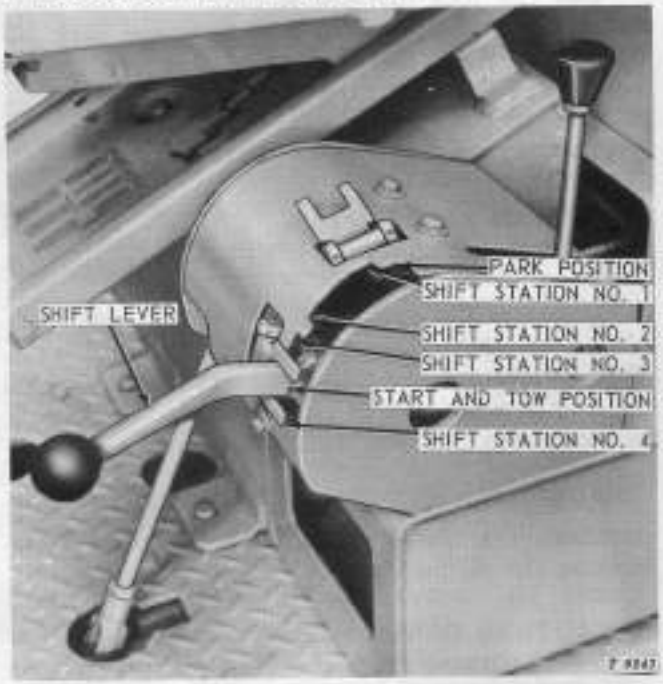
c. Avoid prolonged engine idling.

d. Check crankcase oil level periodically. (If oil is needed during "break-in," use either SAE 10W or SW-20.)

After the 20-hour "break-in," drain the crankcase, replace the crankcase oil filter, and fill the crankcase with oil of the proper viscosity and quality (see pages 21 and 28). At the end of the first 50 hours, service the hydraulic reversing transmission oil filter (page 30). At the end of the first 200 hours, service the transmission hydraulic system oil filter (page 32).

DRIVING THE FORK LIFT

SELECTING TRAVEL SPEED



The shift lever (above), located at the left of the seat, has four shift stations. These stations correspond to the four ranges provided with both the hydraulic reversing and constant-mesh transmission. Within each of these ranges are forward and reverse gears which are selected by the reverser lever. The reverser lever is located on the left side of the instrument panel (above).

With the constant-mesh transmission, stop the fork lift and disengage the clutch when using the reverser lever. With the hydraulic reversing transmission, it is not necessary to disengage the clutch when changing direction of travel.

Use range appropriate to the type of work being done.

Use a low range when approaching or backing away from the pickup area.

Use a low range for operation on ramps, in tight places, over rough ground, and for inching a load into proper position.

Use a higher range for transporting on smooth, open ground and in long aisleways. Carry fork low and—BE CAREFUL. Fast driving is the cause of many accidents.

Avoid sudden starts or stops with the fork loaded.

Examples of travel speeds in the four ranges are shown in the table below. Engine working speeds may be varied between 1500 rpm and 2500 rpm.

FORK LIFT TRAVEL SPEEDS

NOTE: The travel speeds shown in this chart are given in miles per hour and are based on 14.9 x 28 rear tires with zero slip.

Range	Engine Speed	
	1000 Rpm	2500 Rpm
No. 1		
Fwd. Gear	1.2	3.0
Rev. Gear	1.2	3.1
No. 2		
Fwd. Gear	2.0	5.1
Rev. Gear	2.2	5.4
No. 3		
Fwd. Gear	3.6	9.0
Rev. Gear	3.8	9.5
No. 4		
Fwd. Gear	6.0	15.0
Rev. Gear	6.3	15.8

SHIFTING GEARS

The shifting pattern for the shift lever is shown on a decal on the instrument panel (see page 10). Note that the four ranges are selected by using these four shift stations.

The reverser lever is used to shift into forward or reverse gear within the range set by the shift lever. Note the shift pattern on page 6.

SHIFTING FROM START OR PARK POSITIONS

1. Depress clutch pedal.

2. Move shift lever fully into slot for range desired. Then use reverser lever to select forward or reverse gear.

3. Gradually release clutch pedal to take up load smoothly.

SHIFTING IN THE SAME RANGE

Use the reverser lever to change direction. With hydraulic reversing transmissions, you need not disengage the clutch to change direction. With constant-mesh transmissions, stop the fork lift and disengage the clutch to change direction.

SHIFTING TO ANOTHER RANGE

1. Stop fork lift.

2. Depress clutch pedal.

3. Move shift lever fully into slot for new range. Then use reverser lever to select direction of travel.

4. Gradually release clutch pedal to take up load smoothly.

HYDRAULIC REVERSING TRANSMISSION OIL TEMPERATURE

If the hydraulic reversing transmission oil should overheat, the oil temperature gauge (page 4) will register in the red "H" zone. If this happens, stop the fork lift and run the engine at fast idle until oil temperature returns to the white "N" zone.

If transmission oil keeps overheating, check for dirt or trash at the oil cooler screen on the radiator. Also check for proper transmission oil level (see page 29). If this does not correct the problem, see your John Deere dealer.

PARKING THE FORK LIFT

Lock the shift lever in "PARK" position any time the fork lift is stopped for parking or for holding it on an incline. This automatically locks the fork lift in place. Shifting from "PARK" to "START," or any of the four ranges, releases the braking action.

TOWING THE FORK LIFT

When towing the fork lift, always lock the shift lever in the "TOW" position. This will prevent undue wear on transmission parts during towing.

CAUTION: The fork lift should never be towed at a speed greater than 20 miles per hour. Never tow the fork lift in any gear except "TOW" position.

BRAKES

Using Brake to Make a Sharp Left-Hand Turn

The individual brakes can be used when making sharp turns. Use the left pedal to turn left, the right pedal to turn right.

Using Brakes to Stop the Fork Lift

When stopping the fork lift, press down on both brake pedals.

When using brakes to slow the fork lift, do not depress the clutch pedal except at very slow speeds. When you depress the clutch pedal you lose the braking effect of the engine which helps slow the fork lift.

TIRES

Under-inflated tires break easily and wear out rapidly. Over-inflated tires reduce traction and increase wheel slippage. Correct tire inflation is given below.

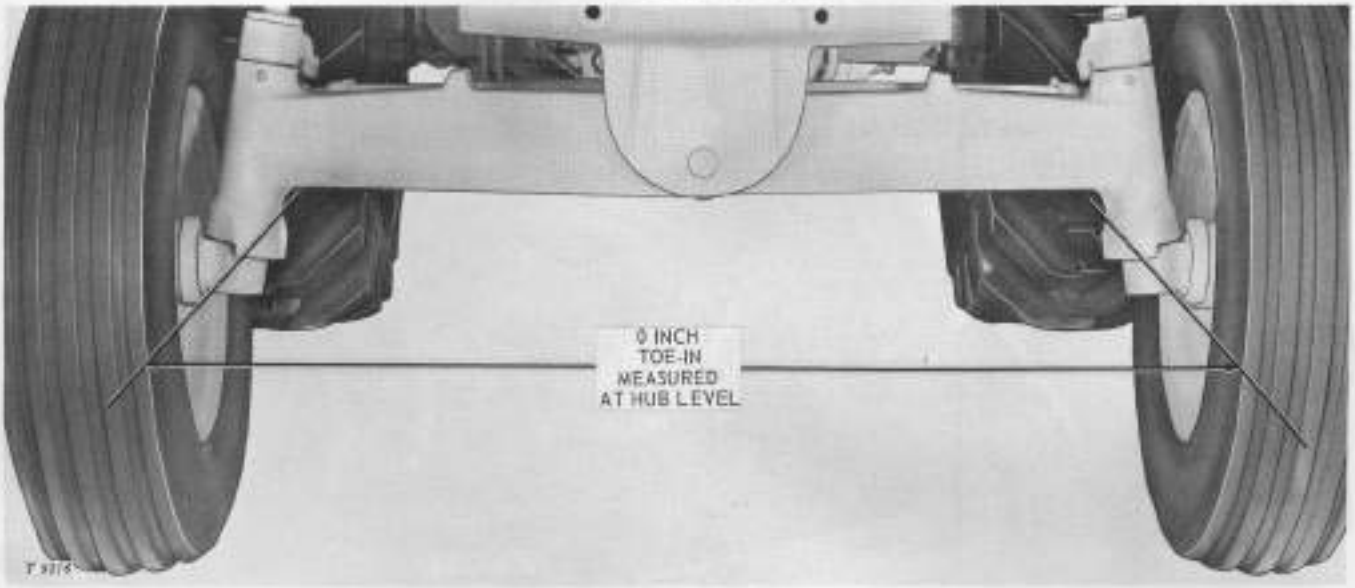
Tire Size		Ply	Inflation Pressure
Front	14.9 x 28	8	24 lbs.
Rear	7.50 x 16	10	56 lbs.

BALLAST

A counterweight box is mounted on the rear of the fork lift to provide a place for the proper amount of ballast.

The weight of counterweight blocks or other type of ballast must total 1800 pounds.

REAR WHEEL TOE-IN ADJUSTMENT



The solid rear axle has a fixed tread of 54 inches. Check and adjust toe-in periodically as follows:

1. Drive fork lift straight ahead for a short distance and stop.

2. Measure rear wheel tread at front and rear of wheels at hub height. Measurement should be the same at both locations.

3. Adjust if necessary by loosening clamps on inner and outer ends of tie rods (see at right) and turning each tie rod an equal amount until toe-in is correct. Tighten clamps securely.

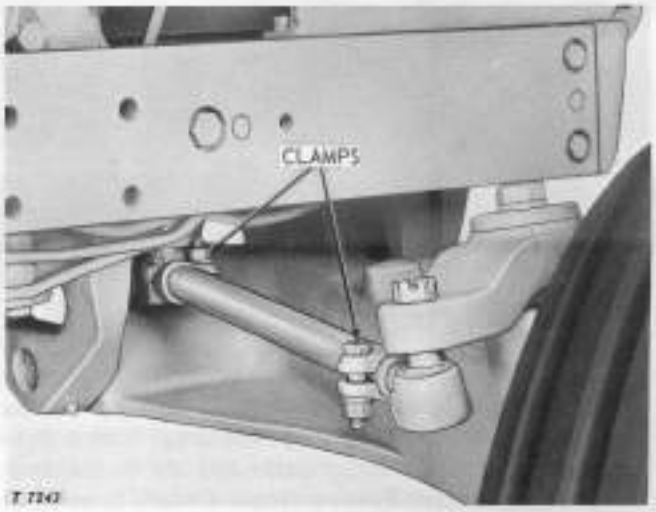
4. Check tie rod clamps to be sure they do not bind when wheels are turned. Correct clamp positions are as follows:

Both left tie rod clamps — behind rod with nut at top.

Right tie rod outer clamp — behind rod with nut at bottom.

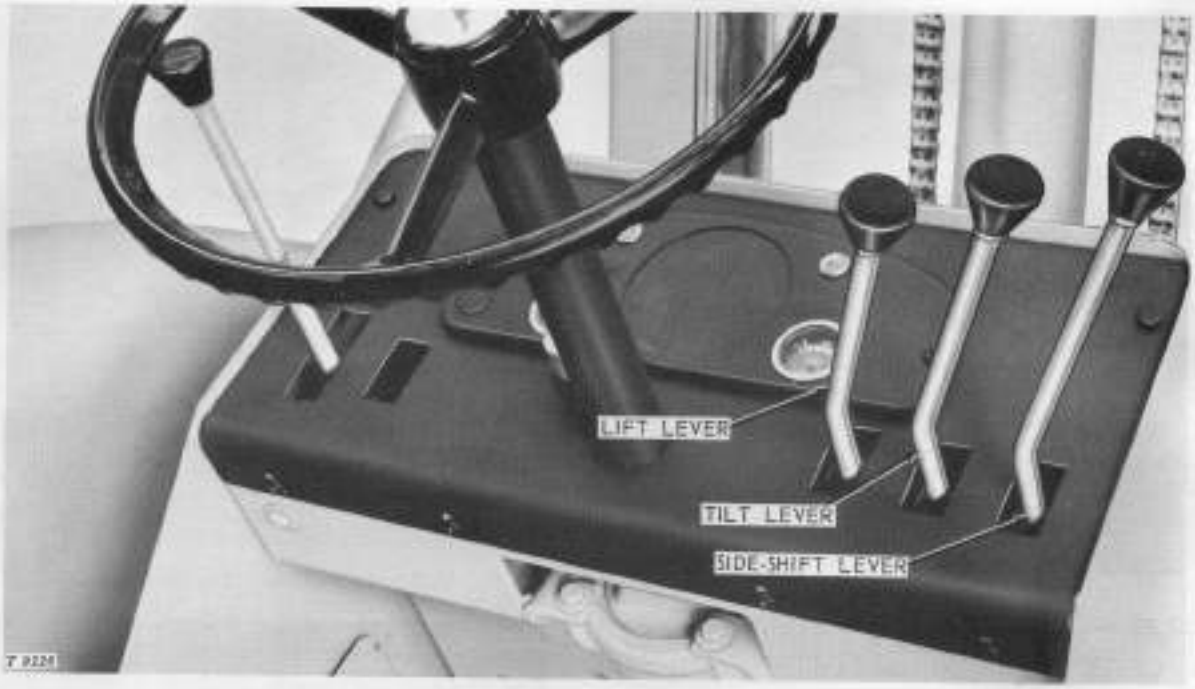
Right tie rod inner clamp — in front of rod with nut at top.

NOTE: Tie rods must be equal in length. Never screw out tie rods too far. Be sure that not more than one inch of thread is showing.



Rear Axle Tie Rod Adjustment

OPERATING FORK LIFT MAST



CONTROL LEVERS FOR FORK LIFT MAST

The mast of the 2010 Fork Lift is controlled hydraulically by three levers located on the right side of the dash panel. These levers raise and lower the fork on the mast, tilt the mast, and shift the mast either right or left.

A ball-type relief valve is built into each control valve housing to protect the hydraulic system from excessive pressure. When cylinders have been fully extended or retracted, return the control levers immediately to neutral to prevent oil from being forced through the relief valves and becoming overheated.

RAISING OR LOWERING FORK

The fork is operated by moving the lift lever either forward or rearward.

Raise the fork by pulling the lift lever rearward.

Lower the fork by pushing the lift lever forward.

TILTING THE MAST

The mast can be tilted forward or rearward by moving the tilt lever either forward or rearward.

Push the tilt lever forward to tilt the mast forward.

Pull the tilt lever rearward to tilt the mast back.

SHIFTING THE MAST

The mast can be shifted either right or left by moving the side-shift lever either forward or rearward.

Pull the side shift lever rearward to shift the mast to the right.

Push the side shift lever forward to shift the mast to the left.

If the fork lift is not equipped with a side-shift cylinder, this lever may be used (in lieu of the attachment control lever, page 15) to control the operation of hydraulic attachments shown under "Extra Equipment."

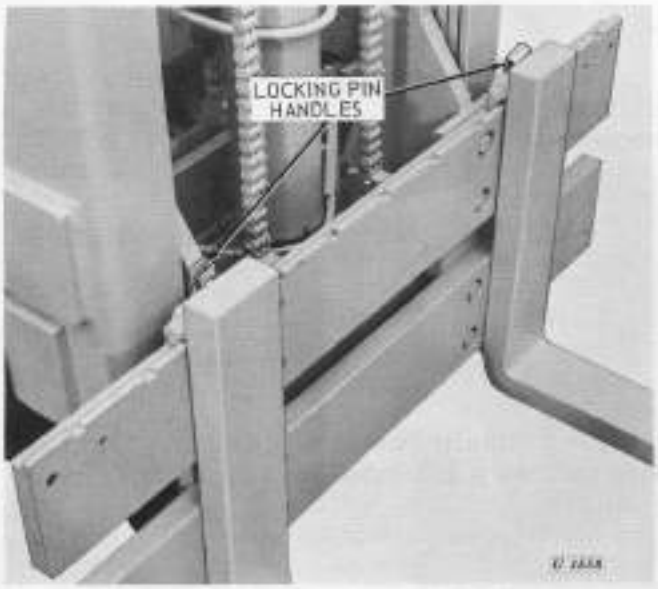
NEUTRAL POSITION

If a control lever is released at any time during operation, it will automatically return to neutral, holding the fork or mast in the position reached at that time.

ATTACHMENT CONTROL LEVER

A control lever for an auxiliary valve may be mounted on the left side of the instrument panel. The auxiliary valve is mounted within the console. This lever controls the operation of the hydraulic attachments shown under "Extra Equipment".

ADJUSTING FORK



The upper rail of the fork lift carriage is notched to provide eleven different fork section positions, each four inches apart.

To change positions, raise the locking pin handle on the back of each fork section and move the fork section to the desired spacing. Lower the locking pin handle to lock the fork section in place.

OIL FILTER INDICATOR

An indicator on the outside of the reservoir shows the operator when the filter element is plugged. When the indicator rises to the mark, replace filter element immediately (see page 31).

NOTE: If the oil is extremely cold, increased viscosity may cause the indicator to rise to the mark. As soon as oil reaches operating temperature, the indicator should drop back to its normal position.

On a new fork lift, replace the micronic oil filter after the first 50 hours of operation. Thereafter, replace it every 600 hours of operation or when the indicator on the outside of the reservoir stays at or above the mark.

OPERATING POINTERS

Maximum lift is achieved by operating the engine at full throttle; however, operating at less than full throttle may eliminate the need to "jockey" the load into proper position.

Speed does not always save time in fork lift operation. Accuracy in approaching or handling a load will reduce unnecessary movements and make up for any loss of speed due to lower engine rpm.

Use a low range for operation on ramps, in tight places, over rough ground, and for inching a load into position. Use a higher gear for transporting on smooth, open ground and in long aisleways.

When stacking pallets side by side, move toward the row at an angle. This will prevent material being moved from catching on stationary pallets. When the pallet is almost in line with the row, turn the fork lift toward the row to swing the pallet into proper place.

When stacking or unloading pallets, always raise the top pallets slightly to keep them from catching on lower ones.

EXTRA EQUIPMENT

SIDE-SHIFT CYLINDER

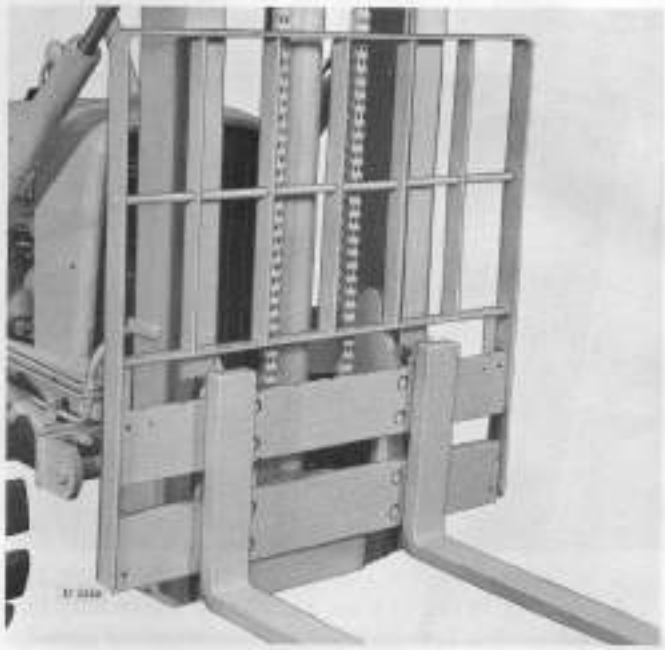
A side-shift cylinder that attaches to the mast allows the operator to shift the mast 3 inches to the left or right of center for fine positioning of the load. This operation is controlled by the side-shift lever (see page 14.)

FORKS

Either 42 or 48-inch fork sections are available for normal lifting jobs.

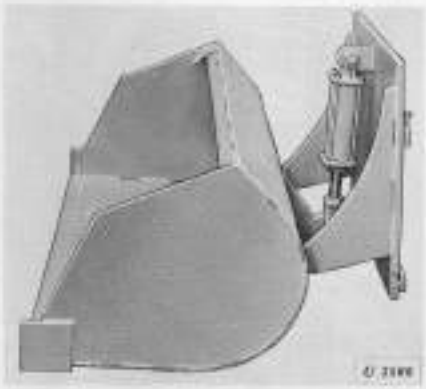
Six concrete block fork sections also will mount on the carriage enabling the operator to lift a load of blocks three wide, six deep, and approximately three high. (The total weight of the blocks must not exceed the lifting capacity of this machine. (See page 3).

LOAD GUARD



A guard can be bolted to the carriage to keep small packages from falling back into the lift chains.

HYDRAULIC BUCKET

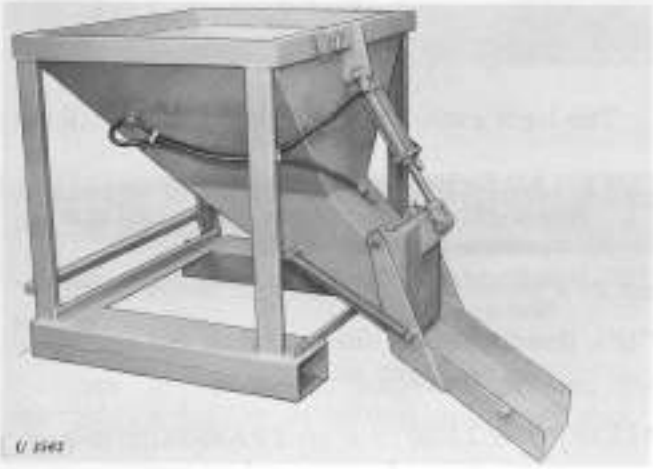


This hydraulic bucket attachment is 59 inches wide and has a 1/2 cubic yard capacity.

HOSE REEL

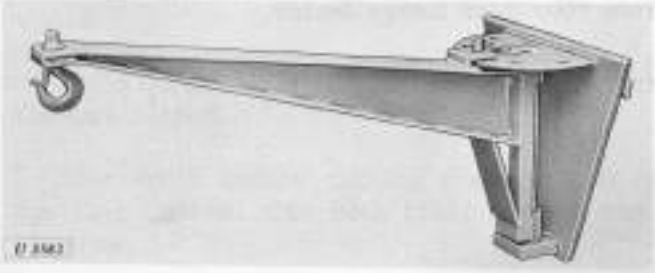
A hydraulic hose reel is necessary when any of the hydraulically-operated attachments are mounted on the fork lift.

MORTAR HOPPER



A half cubic yard of mortar, or similar building material, can be raised and dumped hydraulically with this attachment.

SWING BOOM

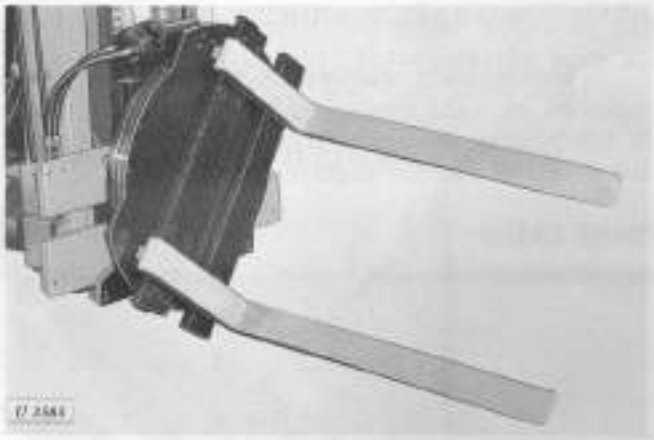


A swing boom attachment will allow the fork to lift weights up to 3,000 pounds.

BLADE

An 84-inch scraper blade can be attached to the fork lift carriage. The blade will angle both left and right.

ROTATOR



With this attachment, the operator can pick up pallets resting on uneven ground and dump pallet boxes into hoppers or trucks.

LIGHTS

HEADLIGHTS

Sealed-beam headlights may be mounted on the fenders as shown.

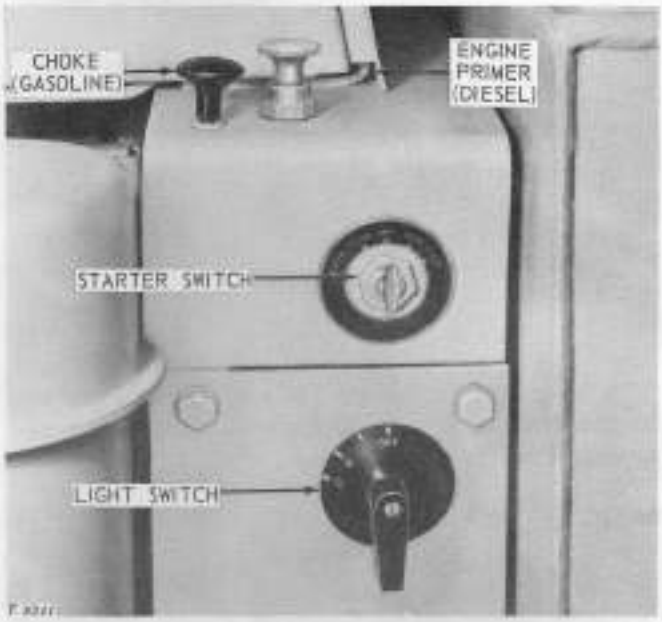
REAR COMBINATION LIGHT

A combination red-white taillight may be mounted on each fender or the left fender only. It illuminates an area to the rear of the fork lift or glows red for night road travel.

DASH LAMP

The dash lamp has an adjustable opening and illuminates the fork lift instrument panel. It turns on when the light switch is moved from "OFF" to any position.

LIGHT SWITCH



The light switch has four positions as follows:

"OFF" All lights turned off.
"L" Headlights on bright and white half of combination light on.
"B" Headlights on bright; warning and combination red light on.
"D" Headlights on dim; warning and combination red light on.

ACCESSORY LIGHTS FOR TRANSPORTING

When equipment is transported on road or highway at night or during the day, use accessory lights and devices for adequate warning to the operators of other vehicles. In this regard, check local government regulations. Various safety lights and devices are available from your John Deere dealer.

SAFETY RULES

A great many accidents are caused by careless operators and their failure to observe a few basic safety rules.

Study the rules given in this section carefully. Enforce them on the job.

U 1471

Always lower the fork to the ground before leaving the operator seat.

Never leave the machine unattended with the engine running.

When in operation, only one person, the operator, should be permitted on the machine.

Never allow anyone to ride on the fork.

Never operate the fork lift without the minimum recommended amount of rear weight. (See page 12.)

Never allow the load to obstruct forward vision.

Avoid quick starts and stops, especially with the fork raised.

Slow down before making a sharp turn or applying brakes. Use both brake pedals when stopping.

When moving a heavy load down a steep ramp, keep the load close to the ground and move at a slow speed.

Always keep fork lift in gear when going down steep grades.

Travel slowly when moving over rough terrain.

Do not overload the fork lift. (See specifications page 3.)

Always disconnect battery cables before adjusting engine or electrical system to prevent fire hazards or accidental starting.

Escaping hydraulic oil under pressure can cause personal injury; therefore, be sure all connections are tight and that lines and hoses are not damaged. Before disconnecting lines, be sure to relieve all hydraulic pressure.

R 3924

Shut off the engine before refueling. Never smoke while filling the fuel tank.

Add coolant only with the engine stopped or idling. Turn radiator cap slowly to relieve pressure before removing.

Do not oil, grease, or adjust the machine while it is in motion.

FUELS AND LUBRICANTS

FUELS

The quality of fuel used is a dominating factor in obtaining satisfactory engine life. Suitable fuels must be clean, completely distilled, well-refined, and non-corrosive to fuel system parts. Be sure to use fuel of known quality.

DIESEL FUEL SPECIFICATIONS

Either Grade No. 1-D or Grade No. 2-D fuel, as defined by ASTM Designation D 975-60T for diesel fuel oils, may be used in your tractor. The Grade No. 2-D fuel, which is heavier and will produce more work per gallon, is generally recommended for service when the prevailing air temperature is 32° F. or higher. The Grade No. 1-D fuel is generally recommended when the air temperature is less than 32° F. When other than normal engine service is encountered, use the following chart to select fuel:

Diesel Fuel Selection Chart

Type of Engine Service	Ambient Air Temperature	Diesel Fuel Grade No.
Wide variation in load and speed, considerable idling.	Below 0°F.	1-D
	Above 0°F.	1-D
	Above +40°F.	1-D
	Above +80°F.	2-D
Intermediate load and speed, minimum idling.	Below 0°F.	1-D
	Above 0°F.	1-D
	Above +40°F.	2-D
	Above +80°F.	2-D
Heavy load and high speed, minimum idling.	Below 0°F.	1-D
	Above 0°F.	2-D
	Above +40°F.	2-D
	Above +80°F.	2-D
At altitudes above 5,000 feet.	All	1-D

Insist on Grade No. 1-D or Grade No. 2-D diesel fuel with the following general specifications:

Flash Point—100° F. minimum.

Pour Point—For cold weather operation, the pour point should be 10° F. below the temperature at which the engine is to be operated.

Distillation Temperature—90 per cent recovered at 675° F. maximum.

Viscosity at 100° F.—Saybolt Universal 30.0 minimum, 45.0 maximum.

Cetane Number—40 minimum. Low atmospheric temperature, as well as high-altitude operation, may require use of a fuel with a higher cetane number.

Sulphur Content—As low as possible, preferably less than 0.5 per cent and in no case over 1.0 per cent.

Sediment and Water—0.10 per cent maximum.

GASOLINE FUEL SPECIFICATIONS

The gasoline engine is designed to operate economically on regular grade gasoline as defined by ASTM Designation 439-60T. The gasoline should have a minimum octane number rating of 80 (Motor Method) or 86 (Research Method). The distillation range or volatility is adjusted by the petroleum producers for local climatic conditions and also for seasonal variations. Avoid carrying over gasoline purchased in one season's work. For example, gasoline furnished for summer use is less volatile than that sold in the winter season and attempts to use the summer gasoline in cold weather can result in poor starting of the engine.

FILLING FUEL TANK

The fuel tank is located directly over the engine and is enclosed and protected by the hood. The fuel tank cap is located at the rear center of the hood and can be recognized by its distinctive red color.

Fill the fuel tank at the end of each day's operation. This will help to prevent moisture from collecting and freezing in the fuel tank and other parts of the fuel system during cold weather and, at the same time, will assure an adequate fuel supply for the next day's operation. Capacity of the fuel tank is 16 U.S. gallons.

Use caution in handling any type of fuel. Never refuel when the engine is hot or running. Do not smoke while filling the fuel tank.

LUBRICANTS

GREASES

SAE multipurpose-type grease is recommended for all grease fittings and hand packing points on your fork lift and its optional equipment.

LUBRICATING OILS

Lubricating oils are available in single and multi-viscosity, in various grades and for various types of engine service. Follow the recommendations given below in selecting oil viscosity and service classifications.

Gasoline Engines

It is recommended that oil used for gasoline engine be suitable for Services MM or MS.

Diesel Engines

It is recommended that oil used for diesel engines be suitable for Service DM or DS.

Use Service DM type oil for average service to severe conditions when the fuel contains less than 0.5% sulphur. Use Service DS type oil for exceptionally severe service, low temperature start-and-stop service, high temperature-heavy load service, or when the fuel contains more than 0.5% sulphur.

Never use Service DG type oil in your diesel engine.

Be sure to select the oil you will use both by viscosity and by type of expected engine service; for example—SAE 20W, Service DS.

ENGINE CRANKCASE AND AIR CLEANER OIL SPECIFICATIONS

Depending upon the prevailing air temperature, use the following viscosity of oil in the engine crankcase and air cleaner.

Air Temperature	Single Viscosity Oil	Multi-Viscosity Oil
Above 90°F.	SAE 30	SAE 20W-40
32°F. to 90°F.	SAE 20W	SAE 10W-30
-10°F. to 32°F.	SAE 10W	SAE 10W-30
Below -10°F.	SAE 5W*	SAE 5W-20

**Use of SAE 5W oil may cause some increase in oil consumption. Check oil level more often when using this oil.*

FORK LIFT HYDRAULIC SYSTEM OIL SPECIFICATIONS

Depending upon the prevailing air temperature, use one of the oils specified in the chart below in the fork lift hydraulic system:

TEMPERATURE—OIL VISCOSITY CHART (Fork Lift Hydraulic System)

Air Temperature	Preferred Oil		Accepted Oil		
	John Deere Type 303 Special Purpose Oil	Automatic Transmission Fluid, Type "A"	SAE 20-20W Motor Oil	SAE 10W-30 Motor Oil	**SAE 5W-20 Motor Oil
Above 90°F.	X	..	X	..	..
60° to 90°F.	X	X	X	X	..
32° to 60°F.	X	X	X	X	X
-10° to 32°F.	X	X	..	X	X
Below -10°F.	..	X	..	..	X

**Use only oils with API service designations MS, DG, DM or DS. Never use oils with ML designation.*
***Never use 5W-20 oil for warm weather operation.*

LUBRICATION AND PERIODIC SERVICE

Effective lubrication is the most important step toward low upkeep cost, long life, and satisfactory service. Without oil and grease you can ruin important working parts of your fork lift in a very short time.

The intervals at which the various working parts of your fork lift should be checked, lubricated, serviced, or adjusted are based on hours of operation.

Electric Hour Meter

Use the electric hour meter attachment to determine when periodic services are required. The hour meter, which operates whenever the key switch is turned on, shows the accumulated hours of operation.

LUBRICATION AND SERVICE INTERVALS

The lubrication and service periods are daily or every 10 hours, every 50 hours, every 200 hours, every 600 hours, every 1200 hours, and every spring and fall. These intervals are based on operation under normal conditions. When operating under unusual conditions, such as excessive heat, cold, or dust, the fork lift should be checked and serviced at more frequent intervals.

The chart on the following pages is a condensed list of components to be serviced at each interval and the service to be performed. Detailed instructions for performing each service are given on the pages which follow the chart. Each item in the chart is numbered; the corresponding detailed procedure bears the same number.

BREAK-IN PERIOD

During break-in, after 20 hours of operation, replace crankcase oil and filter element (items 16 and 17, page 28). After 50 hours of operation, replace the reversing transmission oil filter (item 30, page 30). After 200 hours of operation, clean the transmission hydraulic oil filter (item 45, page 33).

EVERY 10 HOURS

Item	Component	Description of Service	Capacity or Measurement	Description of Lubricant
1	Engine Crankcase	Check oil level with filler gauge	To "FULL" mark	Oil types: DM or DS (Diesel); MM or MS (Gasoline) Above 90° F: SAE 30 or 20W-40. 32° F. to 90° F.: SAE 20W or 10W-30. -10° F. to 32° F.: SAE 10W or 10W-30. Below -10° F.: SAE 5W or 5W-20.
2	Air Cleaner	Check dirt and oil level in cup	To "OIL LEVEL" line	Same viscosity as Item No. 1
3	Pre-Cleaner	Clean out trash	. . . . .	. . . . .
4	Brake Linkage	Lubricate two fittings	Several strokes of grease gun	SAE multipurpose grease
5	Radiator	Check coolant level	To midway between core and filler neck	. . . . .
6	Fuel Sediment Bowl (Diesel)	Check for water or dirt	. . . . .	. . . . .

EVERY 10 HOURS—Continued

Item	Component	Description of Service	Capacity or Measurement	Description of Lubricant
7	Fork Lift Hydraulic System	Check oil level with bayonet gauge	To "FULL MARK"	Above 10° F.: John Deere Type 303 Special Purpose Oil or automatic transmission fluid type "A" Below -10° F.: Automatic transmission fluid type "A"
8	Chain Rollers and Sequence Latch	Lubricate grease fittings	Several strokes of grease gun	SAE multipurpose grease
9	Carriage Rollers	Lubricate grease fittings	Several strokes of grease gun	SAE multipurpose grease
10	Side-Shift Cylinder	Lubricate grease fittings	Several strokes of grease gun	SAE multipurpose grease
11	Tilt Cylinders	Lubricate grease fittings	Several strokes of grease gun	SAE multipurpose grease

EVERY 50 HOURS

12	Engine Clutch Throw-Out Bearing (Constant Mesh Transmission)	Lubricate grease fitting	Two strokes of grease gun	SAE multipurpose grease
13	Control Lever	Lubricate	. . . . .	Same as Item No. 1
14	Carriage Chains	Lubricate with brush	. . . . .	Same as Item No. 1
15	Mast Channels	Lubricate with brush	. . . . .	SAE multipurpose grease

EVERY 200 HOURS

16	Engine Crankcase	Drain and refill	5 U.S. Quarts including filter	Same as Item No. 1
17	Crankcase Oil Filter	Change filter element	. . . . .	. . . . .
18	Air Cleaner	Drain, clean, and refill	To "OIL LEVEL" line	Same as Item No. 1
19	Tires	Check air pressure	See page 12	. . . . .
20	Transmission-Hydraulic System	Check oil level	To mark	John Deere Type 303 Special Oil
21	Carriage Chains	Check tension	. . . . .	. . . . .
22	Final Drives	Check oil level	To level of filler hole	SAE 80 multipurpose lubricant or John Deere Type 303 Special Purpose Oil
23	Rear Axle	Lubricate grease fittings	Several strokes of grease gun	SAE multipurpose grease
24	Clutch Pedal (Constant Mesh Transmission)	Check pedal free travel	1-inch	. . . . .
25	Generator	Fill oil cups	. . . . .	SAE 10W or 5W-20 oil
26	Battery	Check level of electrolyte	Fill each cell to level above plates	Distilled water
27	Generator Belt	Check tension	See page 45	. . . . .
28	Distributor (Gasoline) Points	Set gap	.022-inch	. . . . .
	Timing	Check timing*	. . . . .	. . . . .
29	Reservoir Breather	Clean and rinse in diesel fuel	. . . . .	. . . . .
30	Transmission Oil Filter (Hydraulic Reversing Transmission)	Change element	. . . . .	. . . . .

EVERY 600 HOURS

Item	Component	Description of Service	Capacity or Measurement	Description of Lubricant
31	Crankcase Vent Tube	Swab out tube	. . . . .	. . . . .
32	Reservoir Micronic Filter	Replace filter	. . . . .	. . . . .
33	Fuel Filter (Diesel)	Change element	. . . . .	. . . . .
34	Transmission-Hydraulic System	Clean filter element	. . . . .	. . . . .
35	Fuel Sediment Bowl (Gasoline)	Clean bowl and strainer	. . . . .	. . . . .
36	Spark Plugs (Gasoline)	Clean and set gaps	.025-inch	. . . . .
37	Carburetor (Gasoline)	Clean inlet strainer	. . . . .	. . . . .
38	Air Intake Hoses	Check connections for leaks	. . . . .	. . . . .
39	Injection Pump (Diesel)	Check timing*	. . . . .	. . . . .
40	Engine Valve Tappets	Adjust clearance*	. . . . .	. . . . .
41	Brakes	Adjust pedal free travel	1-1/2-inch	. . . . .
42	Engine Speeds	Check idle speeds	. . . . .	. . . . .

EVERY 1200 HOURS

43	Starter (Diesel) (Delco-Remy Only)	Fill reservoirs	Saturate wicks	SAE 10W or 5W-20 Oil
44	Final Drives	Drain and refill to level of filler hole	1 U.S. Gallon each	Same as Item No. 13
45	Transmission-Hydraulic System	Drain and refill.	27 U.S. Quarts (Hydraulic Reversing 32 U.S. Quarts (Constant Mesh)	John Deere Type 303 Special Oil
46	Fork Lift Hydraulic System	Drain and refill	13 U.S. Gallons for 14 ft. mast 14 U.S. Gallons for 21 ft. mast	Same as Item No. 7
47	Wheel Bearings	Clean and repack bearings	. . . . .	SAE multipurpose grease

EVERY SPRING AND FALL SEASON

48	Cooling System	Drain, flush, and refill	3 U.S. Gallons	. . . . .
49	Engine Crankcase	Drain and refill with seasonal oil. Replace filter	5 U.S. Quarts including filter	Same as Item No. 1

**See your John Deere dealer for these services.*

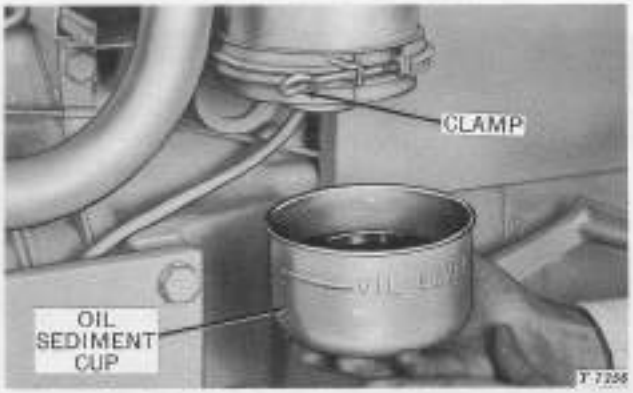
DETAILED PERIODIC SERVICES

EVERY 10 HOURS

1. ENGINE CRANKCASE

Check crankcase oil level. If oil level is below "ADD ONE QT." mark on filler gauge, add oil as specified on page 21, to bring level up to "FULL" mark. Do not operate with oil level below "ADD ONE QT." mark. Always check level of oil immediately after stopping engine.

2. AIR CLEANER



Check oil in air cleaner sediment cup. If dirt accumulation in cup exceeds 3/8-inch or if oil is too thick with suspended dirt to flow freely, clean out cup. Wash cup in diesel fuel. Refill with new oil to "OIL LEVEL" line on cup. Use oil of same viscosity as used in crankcase. See specifications on page 21.

If oil appears clean but oil level is below line, add new oil to bring level up to line.

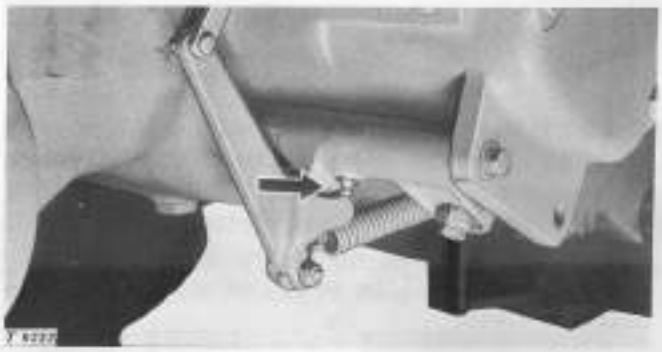
CAUTION: Do not overfill cup. If oil is above level mark on cup, oil will be drawn from air cleaner up into engine.

NOTE: Never service air cleaner with engine running.

3. PRE-CLEANER

Check pre-cleaner. If dirt and trash in pre-cleaner is up to mark on bowl, empty it.

4. BRAKE LINKAGE

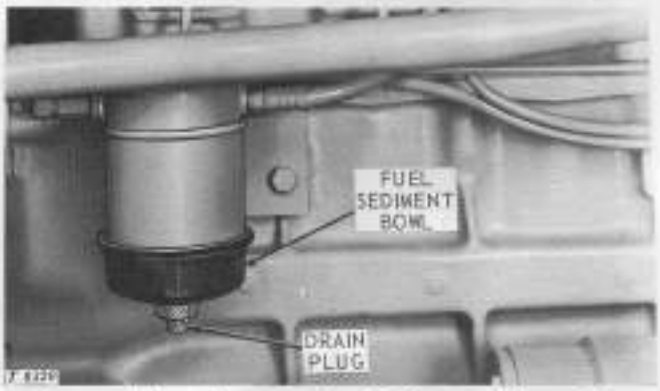


Lubricate two fittings on brake levers with several strokes of SAE multipurpose grease.

5. RADIATOR

Check coolant level. See page 40.

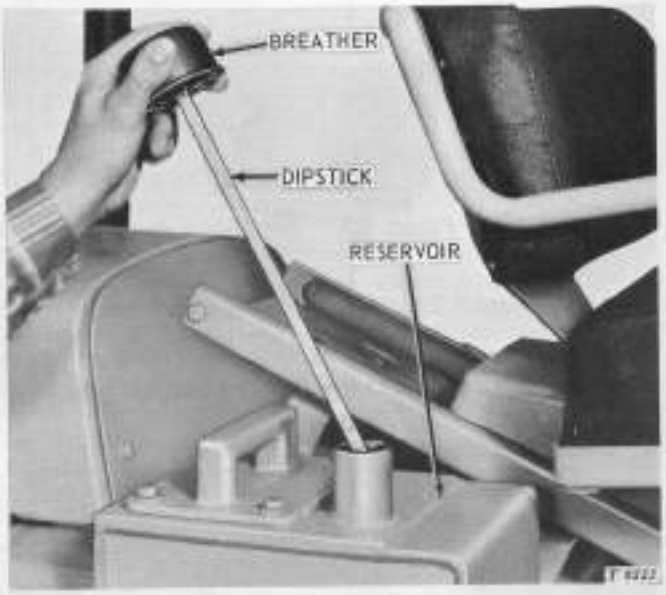
6. FUEL SEDIMENT BOWL (DIESEL)



Inspect bowl under fuel filter daily. If any water or dirt deposits are found, loosen small plug under bowl until deposits are drained out. Then retighten plug until finger tight.

EVERY 10 HOURS—Continued

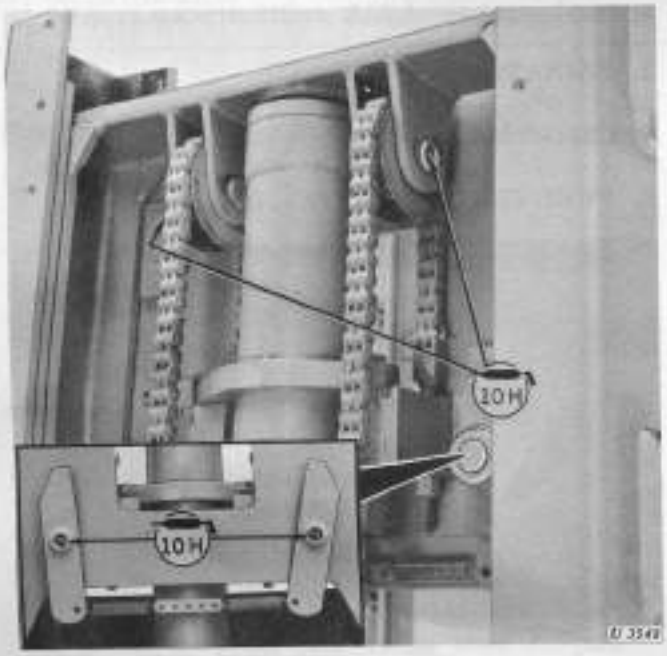
7. FORK LIFT HYDRAULIC SYSTEM



Check the oil level daily. Add oil, if necessary, to bring the oil level up to the full mark on the dipstick. Check the oil level with the fork on the ground and the mast vertical.

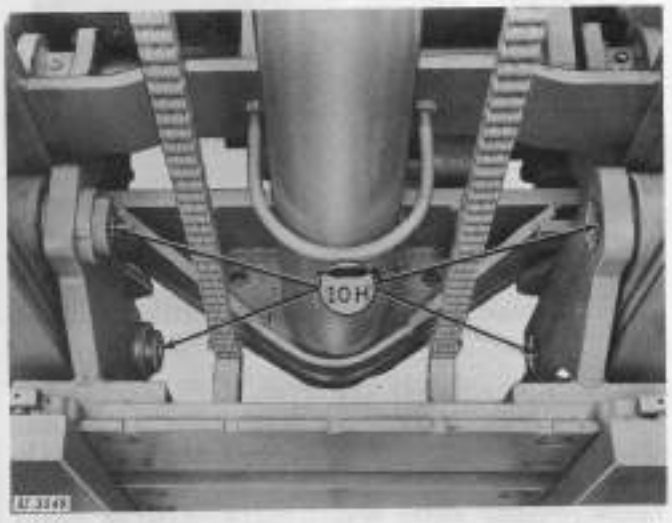
When adding oil, be sure containers and funnels are clean.

8. CHAIN ROLLERS AND SEQUENCE LATCH



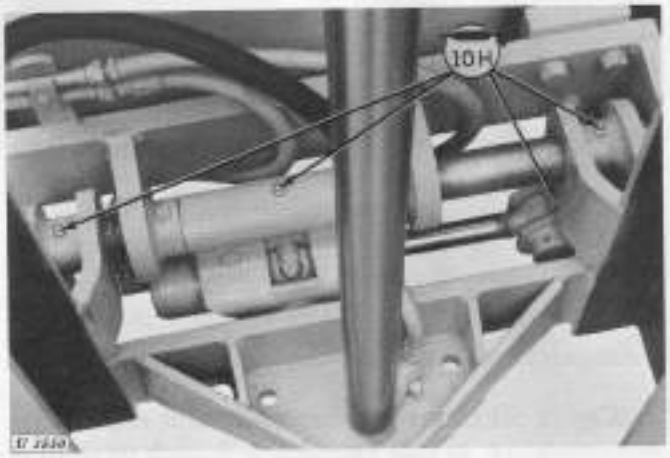
Lubricate the two fittings on the chain rollers and the two fittings on the sequence latch with several strokes of SAE multipurpose grease.

9. CARRIAGE ROLLERS



Lubricate the four grease fittings on the carriage rollers with several strokes of SAE multipurpose grease.

10. SIDE-SHIFT CYLINDER



Lubricate the four grease fittings for the side-shift cylinder with several strokes of SAE multipurpose grease.

CAUTION: Do not lubricate or adjust the fork lift while the engine is running unless specifically recommended.

EVERY 10 HOURS—Continued

11. TILT CYLINDERS

Lubricate the grease fitting in both the rod and barrel ends of each tilt cylinder with several strokes of SAE multipurpose grease.

EVERY 50 HOURS

12. ENGINE CLUTCH THROW-OUT BEARING (Constant Mesh Transmission)

Lubricate clutch throw-out bearing grease fitting with two strokes of SAE multipurpose grease.

NOTE: On units with hydraulic reversing transmissions, no lubrication of the clutch throw-out bearing is necessary except at times of tractor overhaul.

13. CONTROL LEVER LINKAGE

Lubricate control lever linkage with same oil as used for engine.

14. CHAIN

Paint chains with a brush using same oil as used for engine as shown below.

Chains

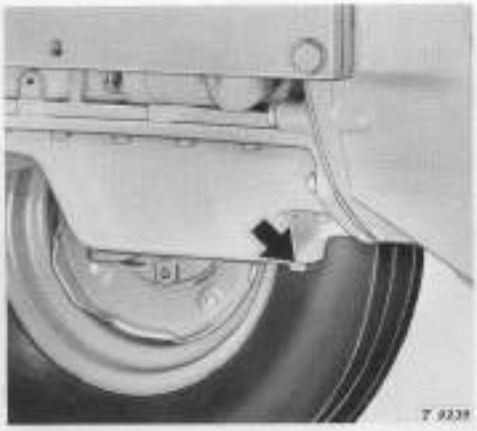
Mast Channels

15. MAST CHANNELS

Paint mast channels with a brush using SAE multipurpose grease as shown above.

EVERY 200 HOURS

16. ENGINE CRANKCASE



Crankcase Drain Plug

Draining Crankcase

Remove drain plug from bottom of crankcase and drain oil. If there is evidence of sludge, flush crankcase (see below).

NOTE: Drain crankcase after a day's operation while oil is still hot and foreign material is suspended.

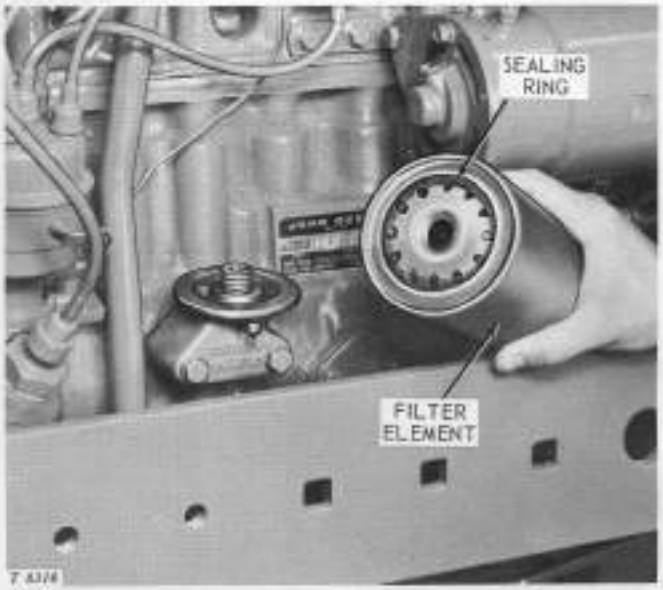
Flushing Crankcase

After oil has drained, replace plug and pour 4 quarts of diesel fuel into the crankcase. Run engine only for a few seconds. Then drain fuel and replace filter element before refilling with oil (see Item 17).

Filling Crankcase

After all oil has drained from crankcase, replace drain plug and fill crankcase with 5 quarts of new oil of the proper seasonal viscosity. See specifications on page 21. Oil level will now show about one quart above "FULL" mark. However, after engine has run a short time the extra oil will be pumped into filter and oil passages. Recheck oil immediately after stopping engine.

17. CRANKCASE FILTER ELEMENT



Remove oil filter element by turning it counter-clockwise. Install new element, making sure new sealing ring is inserted in bottom of element. Apply a thin film of oil to sealing ring. Screw element down by hand until tight.

With oil in crankcase, start engine and check for leaks around filter element. Retighten if necessary.

CAUTION: The element has a special bypass valve. Replace with a genuine John Deere filter element supplied by your John Deere dealer.

18. AIR CLEANER

Drain air cleaner cup and clean it with diesel fuel. Clean and inspect lower air cleaner screen. Swab out air intake tube (running through center of air cleaner) with a cloth wrapped around a stick.

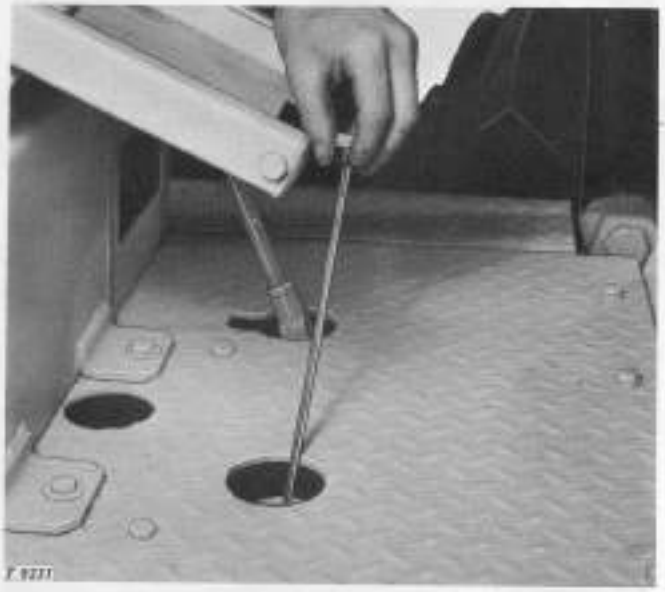
Fill air cleaner cup to "OIL LEVEL" line with same viscosity oil as used in crankcase. See specifications on page 21.

19. TIRES

Check air pressure. See page 12.

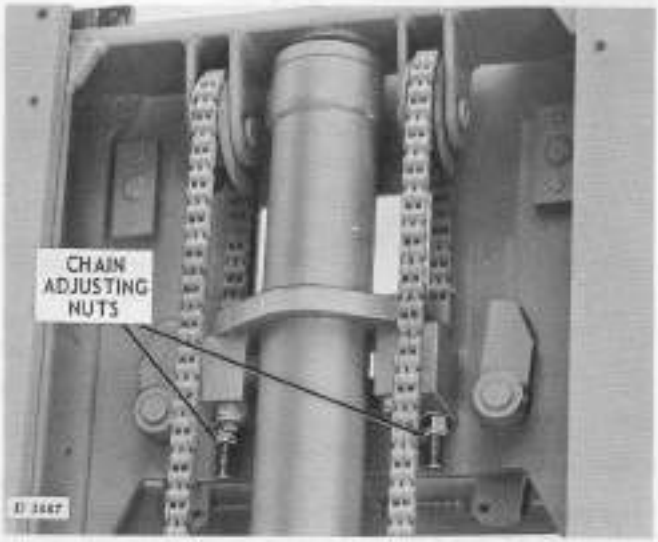
EVERY 200 HOURS—Continued

20. TRANSMISSION—HYDRAULIC SYSTEM



Remove dipstick and wipe it. Then take oil level reading inserting dipstick in hole so that it rests on the top of threads. If oil is down to the "ADD" level, add sufficient John Deere Type 303 Special Oil to bring oil up to the "SAFE" area. Do not overfill.

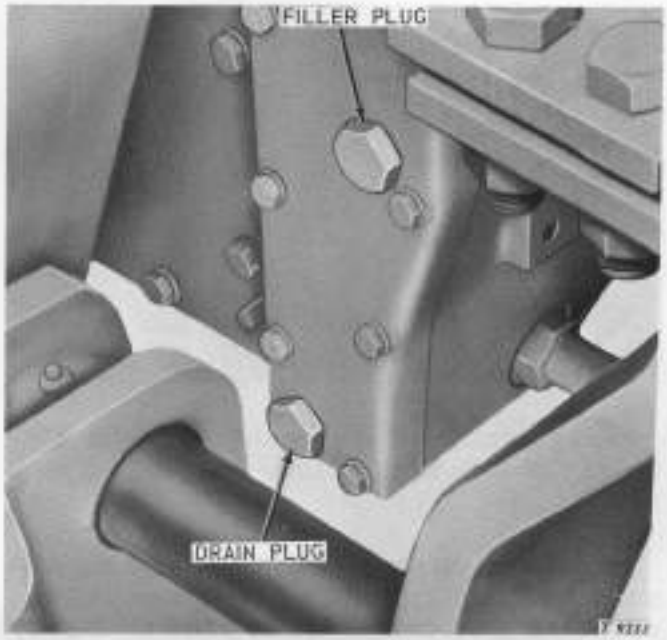
21. CARRIAGE CHAINS



Check carriage chain tension after each 200 hours of operation. Tension of the two chains must be uniform.

If chain tension is not uniform, tighten the adjusting nut on the loose chain until tension on both chains is equal.

22. FINAL DRIVES



Remove filler plug from each final drive. Oil should be up to level of filler holes. If not, add SAE 80 multipurpose lubricant or John Deere Type 303 Special Purpose Oil.

23. REAR AXLE

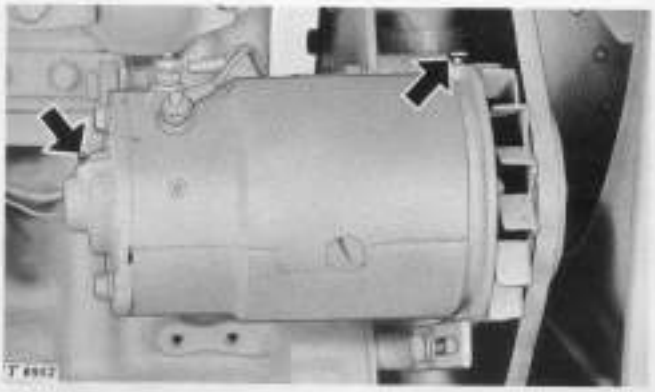
Lubricate fittings on rear axle spindles and pivot shaft with several strokes of SAE multipurpose grease.

24. CLUTCH PEDAL
(Constant Mesh Transmission)

Check clutch pedal for one inch free travel. See page 46 for adjustment.

EVERY 200 HOURS—Continued

25. GENERATOR



Fill generator oil cups with SAE 10W or 5W-20 oil. Be sure to stop engine while oiling generator.

CAUTION: Never overlubricate any electrical unit on your fork lift. More damage to these parts has been caused by too much oil than by lack of oil.

26. BATTERY

Clean battery and check electrolyte level in each cell. See page 43.

27. GENERATOR BELT

Check belt tension. See page 44.

28. DISTRIBUTOR (Gasoline)

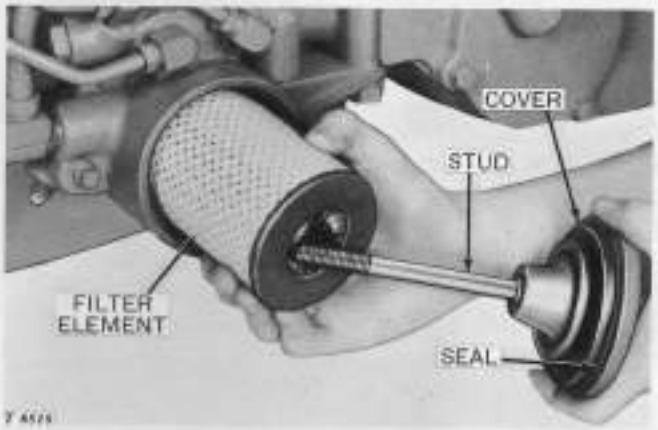
Set Distributor Point Gap. Correct gap is .022-inch. See page 42.

Check Distributor Timing. If timing seems erratic, have your John Deere dealer check it with a timing light and adjust if necessary.

29. RESERVOIR BREATHER CAP

The dipstick cap acts as a breather for the reservoir (page 26). It should be cleaned occasionally by washing in diesel fuel.

30. TRANSMISSION OIL FILTER
(Hydraulic Reversing Transmission)



Replace hydraulic reversing transmission oil filter element by loosening stud and removing cover from right wall of transmission case. Remove and discard old filter element. Install a new element and seal. Reinstall cover and tighten stud.

NOTE: It is not necessary to drain oil to replace filter element (except at specified 1200-hour intervals). If new element is installed quickly, little oil will be lost.

EVERY 600 HOURS

31. CRANKCASE VENT TUBE

Gasoline Engine

Diesel Engine

Remove vent tube from engine rocker arm cover. Swab out tube with a cloth wrapped around a stick.

EVERY 600 HOURS—Continued

32. FORK LIFT HYDRAULIC SYSTEM MICRONIC FILTER

The fork lift filtering unit consists of a micronic filter element that filters oil as it returns to the reservoir, and a wire mesh filter that filters the suction oil as it goes to the pump.

If the micronic filter becomes plugged, a valve at the top of the reservoir will allow oil to bypass the filter and enter the reservoir.

As the oil rises to allow oil to bypass the filter, an indicator on the outside of the reservoir shows the operator that the filter element is plugged and should be replaced.

To prevent damage to the hydraulic system, it is extremely important that the filtering system be serviced as soon as the pointer indicates a dirty filter.

NOTE: If the oil is extremely cold, increased viscosity may cause the indicator to rise to the mark. As soon as oil reaches operating temperature, the indicator should drop back to its normal position.

To remove the filter assembly, remove the four cap screws holding the filter cap and filters to the reservoir.

1 – Cap Screws
2 – Reservoir Cap
3 – Spacer
4 – Micronic Filter
5 – Baffle
6 – O-Ring
7 – Flat Washer
8 – Spring
9 – Wire Mesh Filter
10 – O-Ring (Suction Line)
11 – Flat Washer
12 – Machine Bolt

Remove the filters from the filter cap by unscrewing the bolt inside the wire mesh filter.

Replace the micronic filter when the indicator on the outside of the reservoir stays at or above the dirty filter mark.

Wash the wire mesh filter in a solvent such as diesel fuel and, with compressed air, blow out the impurities lodged in the screen.

Place a new micronic filter element in the filter cap and replace the spacers, baffle, O-ring, flat washer, spring and wire mesh filter.

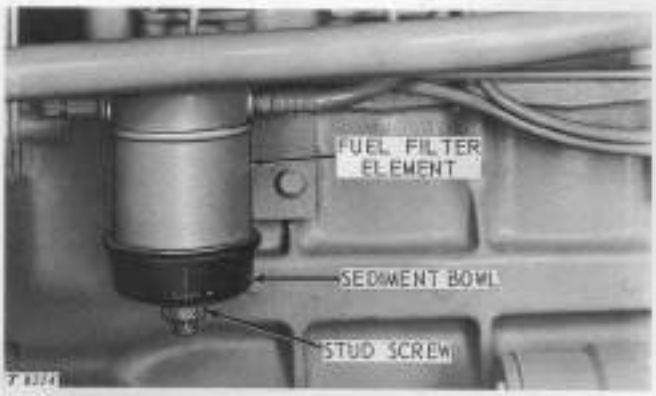
Secure with a 3/8-inch machine bolt.

Replace the O-rings at the return oil and suction parts and beneath the filter baffle if necessary.

Replace the filter cap and filter assembly in the reservoir, making sure that it fits over the suction and return tubes properly. Bolt the filter cap to the reservoir with four cap screws and lock washers.

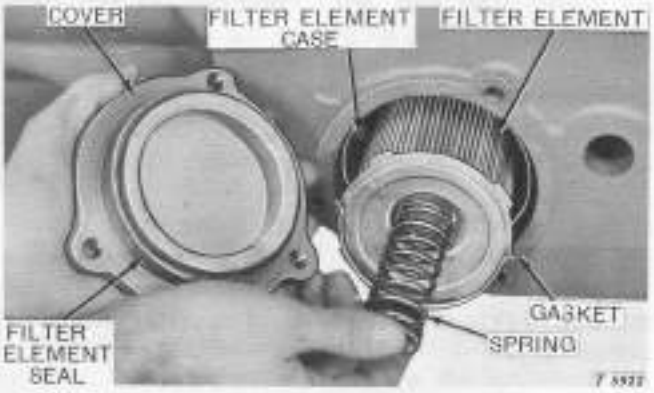
EVERY 600 HOURS—Continued

33. FUEL FILTER (Diesel)



Back off large stud screw under fuel filter and remove screw and sediment bowl. Remove and discard filter element and gaskets. Wash out sediment bowl in diesel fuel and dry it. Place new gaskets on shoulders of new filter element. Slip element under filter head. Reinstall screw and bowl under filter element. Be sure gaskets are not crimped, then tighten screw until snug. Also be sure drain plug under screw is tightened snugly.

34. TRANSMISSION-HYDRAULIC SYSTEM



Service the transmission-hydraulic system as follows: Warm up engine. Stop engine, remove two drain plugs (see Item 45) and drain oil into a clean container.

Remove cover from right front wall of transmission case and pull out filter assembly. Wash filter element in diesel fuel, using a bristle brush (not a wire brush). Rinse in clean diesel fuel and flush with water under pressure, and dry with compressed air. Check seal on end of filter for wear or damage. If seal is leaking or if element is damaged, replace filter. Reinstall element, seal inward. Hold spring in cup of filter and install cover with new gasket and seal. Secure with three cap screws.

NOTE: Transmission-hydraulic oil may be reused at the end of the 600 hour filter element cleaning unless oil is extremely dirty. Oil should be changed every 1200 hours (see Item 45.)

Reinstall drain plugs and refill system. Check oil level (see Item 20) and add sufficient John Deere Type 303 Special Oil to bring oil up to the "SAFE" area. After filling system, operate fork lift and all hydraulic equipment, then recheck oil level. Do not overfill.

35. FUEL SEDIMENT BOWL (Gasoline)

Close fuel shut-off valves. Remove sediment bowl. Clean bowl and screen. See page 39.

36. SPARK PLUGS (Gasoline)

Clean spark plugs and set gaps. See page 42.

37. CARBURETOR (Gasoline)

Clean inlet strainer. See page 39.

38. AIR INTAKE HOSES

Check clamps on hoses between air cleaner and engine. Tighten hose clamps where necessary to prevent dirt from entering engine. Inspect hoses for cracks or rotting.

39. INJECTION PUMP (Diesel)

Timing the injection pump and fuel injectors is also vital for efficient fuel injection. See your John Deere dealer for this service.

40. ENGINE VALVE TAPPETS

Have your John Deere dealer check valve tappet clearance.

41. BRAKES

Check brake pedals for 1-1/2-inch free travel. See page 46 for adjustment.

EVERY 600 HOURS—Continued

42. ENGINE SPEEDS

Warm up engine and use a tachometer to check engine speeds:

Diesel Engines

Throttle Positions	Load Speed	No Load Idle Speed
Minimum	. . . . .	800 rpm
Maximum	2500 rpm	2650 rpm

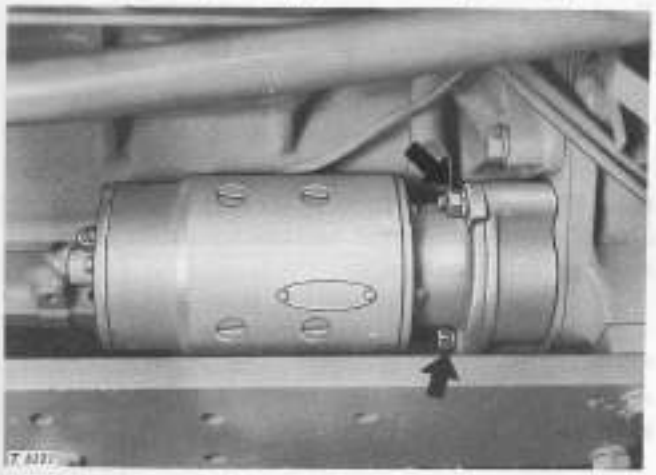
Gasoline Engines

Throttle Positions	Load Speed	No Load Idle Speed
Minimum	. . . . .	600 rpm
Maximum	2500 rpm	2700 rpm

If engine speeds need adjustment or if you doubt the accuracy of the tachometer, consult your John Deere dealer.

EVERY 1200 HOURS

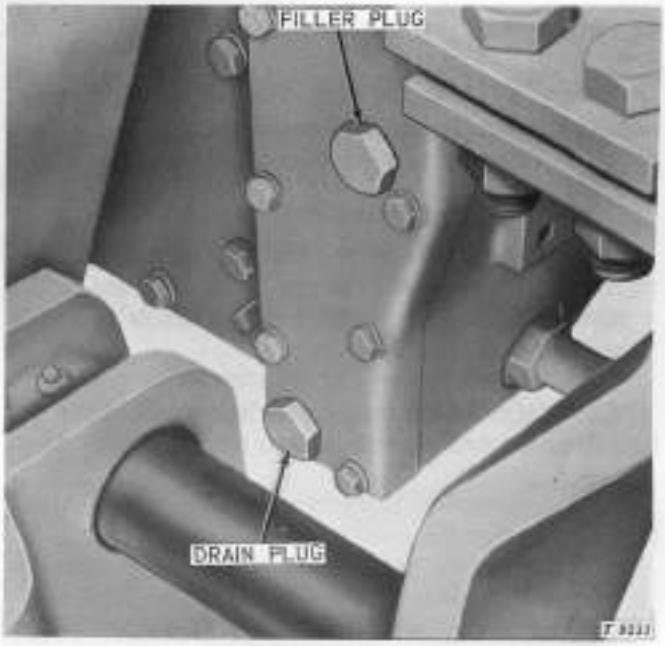
43. STARTER (Diesel) (Delco-Remy Only)



Starter Attaching Studs

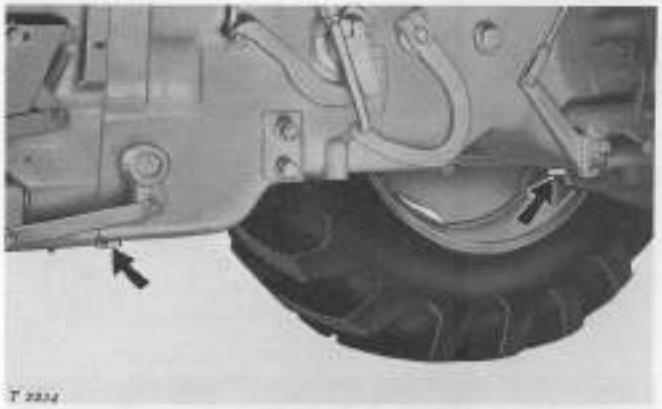
Every 1200 hours, disconnect wires and cable from starter. Remove attaching hex. nuts and pull starter from studs. Remove slotted plugs from front and rear of starter. Saturate wicks with SAE 10W or 5W-20 oil. Replace starter.

44. FINAL DRIVES



Remove drain plugs and drain oil from final drive cases. Refill each final drive with one U.S. gallon of SAE 80 multipurpose lubricant or John Deere Type 303 Special Purpose oil. Oil should then be to level of filler holes.

45 TRANSMISSION-HYDRAULIC SYSTEM



Service the transmission-hydraulic system as follows: Warm up fork lift. Stop engine, remove the two drain plugs (shown above) and drain oil. Before refilling system with oil, clean the filter. (See Item 34).

Refill system with new John Deere Type 303 Special oil. Fill to "SAFE" mark on dipstick (27 U.S. quarts for hydraulic reversing transmission, 32 U.S. quarts for constant-mesh transmission). Do not overfill. After filling system, operate fork lift and then recheck oil level.

EVERY 1200 HOURS—Continued

46. FORK LIFT HYDRAULIC SYSTEM

Every 1200 hours or at least once a year, drain the oil from the reservoir at the drain plug to remove any sludge that may have accumulated.

With the carriage resting on the ground, remove the reservoir drain plug and start the engine, allowing it to idle while oil is draining from the system.

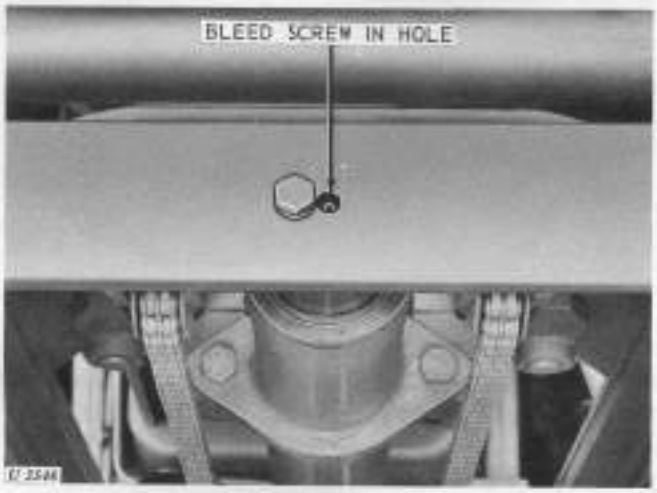
CAUTION: Stop engine as soon as all the oil has drained from the system.

Replace drain plug and refill system according to the following instructions.

Fill the reservoir with oil as recommended on page 21. Be sure the oil is clean. Start the engine and operate the fork lift. Raise the carriage to its full height. Tilt the mast forward and rearward, shift it to the right and left, and lower the carriage to the ground.

Repeat this cycle four times to make sure no air is in the system.

NOTE: It may be necessary to bleed trapped air from the lift cylinder after filling the system with oil.



Loosen the bleed screw in the top end of the cylinder rod and raise the carriage.

When all air has been eliminated from the cylinder, tighten the bleed screw.

With the fork resting on the ground and the engine shut off, check the oil level with the reservoir dipstick. Add oil, if necessary, to bring it up to the "FULL" mark on the dipstick.

47. REAR WHEEL BEARINGS

Every 1200 hours, remove rear wheels and clean hubs and spindles to remove dirt and old grease. Pack rear wheel bearings with SAE multipurpose grease and install rear wheels on fork lift. Adjust rear wheel bearings (see page 47).

EVERY SPRING AND FALL SEASON

48. COOLING SYSTEM

Drain, flush, and refill cooling system with proper coolant. See page 41.

49. ENGINE CRANKCASE

Drain, flush, and refill crankcase with new oil of the proper type and viscosity for expected air temperatures (see Item 1 in chart, page 22). Replace crankcase filter element (see Item 17, page 28). Crankcase capacity is 5 U.S. Quarts.

DEALER SERVICES

Your John Deere dealer offers complete service. His men are factory-trained in servicing John Deere equipment and use accurate, detailed service information.

For several of the services given in this manual, you will need to consult your dealer. Among the special services he is equipped to give you:

(1) Engine tune-up.
(2) Injection pump and nozzle service.
(3) Ignition and electrical system checks.
(4) Engine clutch adjustments.
(5) Hydraulic system service.
(6) Fuel system service.
(7) Cooling system service.
(8) Tire repair.
(9) Parts service.

SERVICE

This portion of your operator's manual contains instructions which will help keep the fork lift performing economically and efficiently. Use this part of the manual as a reference for servicing the fork lift. For additional service and genuine John Deere parts, see your John Deere dealer.

REMOVING HOOD

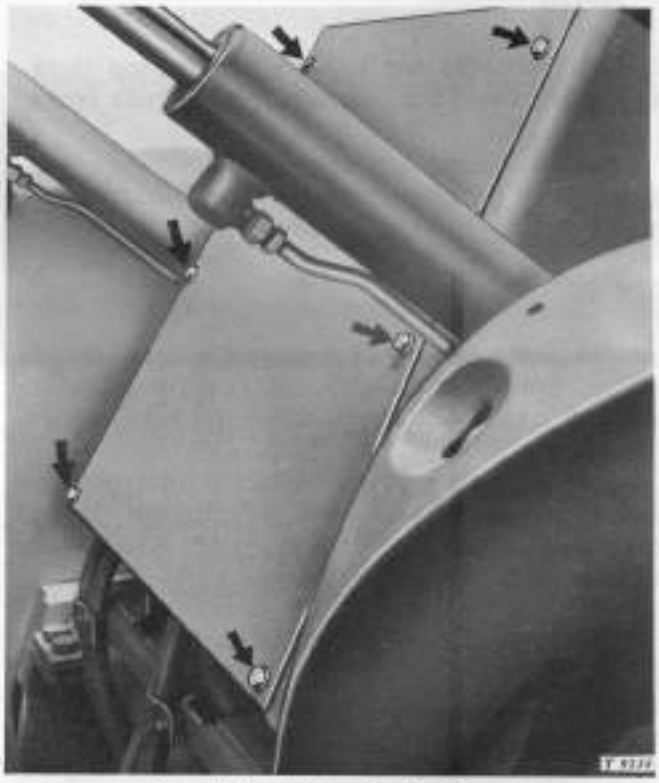
It may be necessary to remove the hood to perform some of the service procedures explained on the following pages.

Hood Attaching Cap Screws

Remove muffler and fuel tank cap. Detach heat shield from hood. Loosen eyebolts at front corners of hood and pull out of brackets. Remove cap screws at rear corners of hood. Lift off hood.

REMOVING CONSOLE COVER

It may be necessary to remove the cover from the console to perform some of the service procedures explained on the following pages.



Console Cover Attaching Cap Screws

To remove the console cover, remove the six cap screws and lock washers shown above. Lift cover out.

FORK LIFT HYDRAULIC SYSTEM

OIL LINES AND HOSES

Check all oil lines, hoses and connections periodically for leaks and dents. Oil leaks in the pressure side of the system can be located by carefully inspecting the external area of the hoses and fittings.

Check the suction side of the system for leaks by examining the oil in the reservoir. If air is being drawn into the system, the oil will contain air bubbles and appear to foam.

When tightening connections, always use two wrenches.

CAUTION: Do not tighten fittings too tight. Make them just tight enough to eliminate leaks.

Dented tubing can cause oil foaming, heat, faulty fork lift operation, or pump failure. Replace damaged tubing immediately.

CONTROL VALVE

The control valve is equipped with two double acting spools for the side-shift and tilt cylinders and one single-acting spool for the lift cylinder.

A relief valve is built into the control valve and is factory set at 2450 psi. Do not attempt to adjust relief valve. See your John Deere dealer.

Restrictors are located in each of the valve ports connected to the side-shift and tilt cylinders. These restrictors prevent too rapid movement of the load as it is shifted or tilted.

CAUTION: Do not remove restrictors. Rapid movement of the loaded fork can be dangerous, especially when raised to full height.

After servicing the control valve, reinstall the restrictors with the legs up so that return oil to the cylinders is restricted.

Checking Valve for Leakage

After long use, the valve spools may become worn, allowing oil to leak past them. Check the valve for leakage as follows:

With the fork raised and tilted slightly forward, remove the return oil line from the control valve and cover it to prevent loss of oil and to prevent dirt from entering the system. (Weight on the fork may be required to make test.)

If the fork settles or the mast tilts forward and oil leaks from the open return port, the control valve is leaking and should be repaired or replaced. Replace the return line and lower fork to the ground.

NOTE: Examine relief valve spring and ball for signs of fatigue or pitting. A leaking relief valve should cause the fork to settle.

If oil does not leak from the control valve, check the cylinders for leaks (see page 37).

Removing Valve From Fork Lift

Remove the six cap screws which hold the cover to the control console and remove cover.

Disconnect all hoses from the control valve and cover the ends to prevent loss of oil and to prevent dirt from entering the system.

Loosen the jam nuts and unscrew the control levers from the handle pivots.

Remove three bolts and nuts holding the control valve to the console, and remove the control valve.

See your John Deere dealer for control valve service.

CYLINDERS

The two tilt cylinders and the side-shift cylinder are double-acting. The lift cylinder is single-acting.

Leaks in the lift cylinder will be apparent when oil runs down the outside of the cylinder barrel and rods. Examine the cylinder carefully for the source of the leak and repair the leak.

After servicing single-acting cylinder, it will be necessary to bleed trapped air.

Loosen the bleed screw in the top end of the cylinder rod and raise the carriage. (See illustration on page 34). When all the air has been eliminated from the cylinder, tighten the bleed screw.

Internal leaks in double-acting cylinder can be found as follows:

Check each of the cylinders individually to determine which one is leaking.

Fully extend or retract the cylinder to be checked and remove a hydraulic hose from one end of the cylinder. (With cylinder extended, remove hose on rod end; with cylinder retracted, remove hose on head end.) Cap the hose to the valve and continue to operate the cylinder. (Oil will unseat the relief valve.)

CAUTION: To prevent oil from being discharged from the cylinder, be sure to operate cylinder in the same direction as chosen in the preceding paragraph.

Examine the open port on the cylinder. If any oil is leaking from the port, cylinder packings are defective and should be replaced.

Be sure to replace any oil lost during each test.

Removing Cylinder

CAUTION: Be sure fork lift engine is stopped and the fork is resting on the ground before attempting to remove cylinders.

Remove the hydraulic lines from the cylinder and plug them to prevent loss of oil and to prevent dirt from entering the system.

To remove a double-acting cylinder, remove the roll pins and pins which hold it in place, and then remove the cylinder from the fork lift.

To remove the single-acting lift cylinder, remove a cap screw from each end of the cylinder, the U-bolt around the cylinder barrel, and two bolts in the cylinder mount.

See your John Deere dealer for cylinder repairs.

Flow Regulator

A flow regulator valve, located in the lower end of the lift cylinder, regulates the speed at which the fork will lower.

If this valve becomes dirty, fork may not lower, or may lower very slowly. If this valve sticks open, fork may lower quite rapidly.

Always keep flow regulator valve in good operating condition. See your John Deere dealer.

DIESEL FUEL SYSTEM

FILTER AND SEDIMENT BOWL

Diesel fuel is filtered by a combination fuel filter and sediment bowl on the left side of the engine. The filter is a replaceable paper-type element. (A fuel strainer is also located at the injection pump inlet.) Use only clean fuel and keep the filter and strainer clean. Most dirt and water will collect in the sediment bowl. *Check this bowl often.*

Servicing Fuel Sediment Bowl

Check the sediment bowl daily for water or dirt and drain if necessary (see page 25). Also wash out bowl when fuel filter element is replaced (see page 30). Bleed the fuel system before operating the engine (see at right).

Servicing Fuel Filter

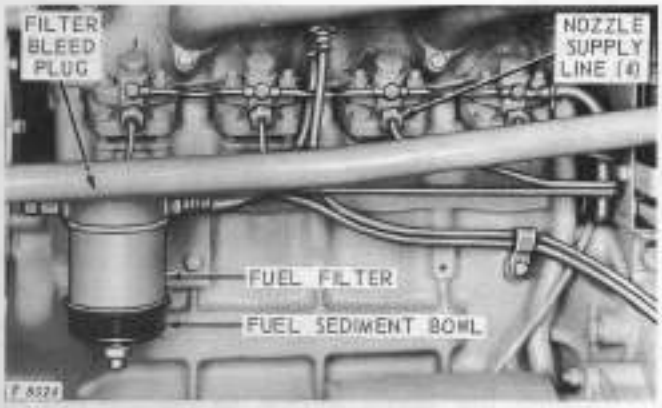
Replace the fuel filter element every 600 hours of engine operation (see page 30). Bleed the fuel system before operating the engine (see at right).

SERVICING FUEL TANK VENT TUBE

Regularly inspect the fuel tank vent tube opening (below front end support) for clogging or bends. If this tube becomes plugged, the fuel system can become air locked.

SERVICING FUEL INJECTION PUMP

Every 600 hours, have your John Deere dealer check the injection pump timing. Also see your dealer for cleaning and repair of the pump and injector nozzles.



Diesel Fuel System Components

BLEEDING THE FUEL SYSTEM

If the engine has been idle for a long period or if the fuel system has been opened or has run dry, you must bleed the entire fuel system before operation to remove air. Do this as follows:

1. Fill tank with No. 1-D or No. 2-D diesel fuel (see table on page 20).
2. Open fuel shut-off valves at outlets under tank.
3. Loosen bleed plug on top of fuel filter. Let fuel flow until free of air bubbles. Tighten plug.
4. Loosen fuel supply line at each injector nozzle. Crank engine until fuel begins to slowly flow around connections and then retighten to 15 to 20 ft-lbs.

CAUTION: Loosen injection lines only one turn to avoid excessive spray.

NOTE: If engine is running, loosen only one injector line at a time. Retighten to 15 to 20 ft-lbs before going on to the next one.

GASOLINE FUEL SYSTEM

The gasoline fuel system should be periodically inspected and cleaned.

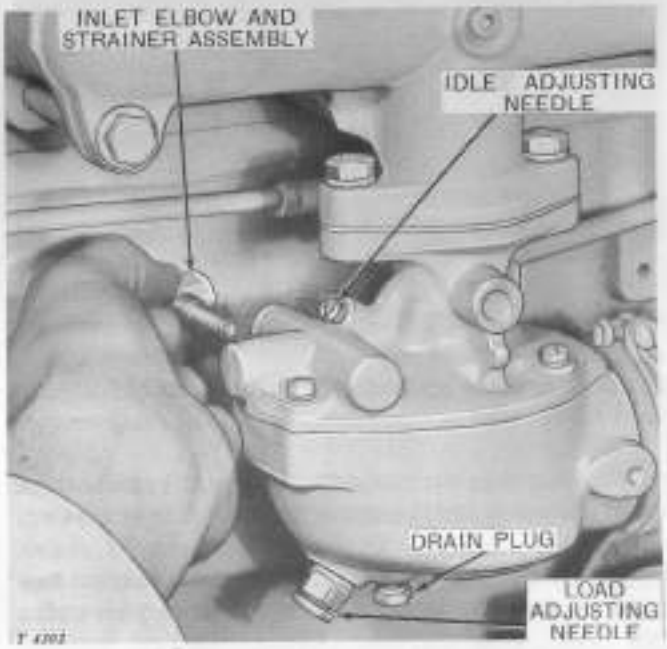
CLEANING FUEL SEDIMENT BOWL AND STRAINER

Every 600 hours of operation, clean the fuel sediment bowl and strainer. Close shut-off valve (above) by screwing in on needle until finger tight. Loosen jam nut on sediment bowl and remove bowl and screen. Clean thoroughly. Replace screen if damaged. With bowl removed, open shut-off valve and see if fuel flows freely from tank. If not, tank must be cleaned. When replacing sediment bowl, be sure cork gasket between bowl and screen is not damaged. Before tightening jam nut, open shut-off and let fuel overflow bowl. This will prevent an air lock in bowl.

CLEANING CARBURETOR

Every 600 hours of operation, clean the carburetor. Unscrew inlet line from elbow at back of carburetor. Remove inlet elbow; strainer is attached (see at right above). Be careful to avoid damage to strainer. Flush strainer with gasoline to remove dirt which may have worked through screen. Install inlet elbow and carefully tighten line into elbow.

Remove hex. drain plug from bottom of carburetor and drain out any water (moisture in fuel may condense here). Install drain plug.



Carburetor

ADJUSTING CARBURETOR

The carburetor mixes gasoline and air to form a vaporized fuel. Carburetor adjustments are for smooth engine operation, fuel economy, and maximum power.

SLOW IDLE ADJUSTMENT

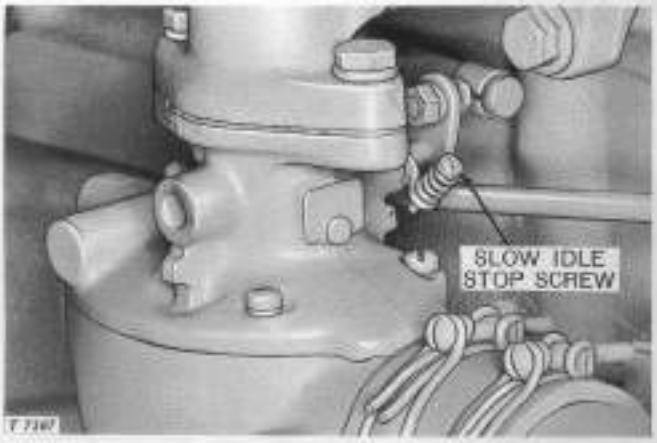
1. Warm up engine and place hand throttle in slow idle.

2. Adjust slow idle stop screw behind carburetor (see next page) until engine idles at 600 rpm. Check speed with tachometer.

3. Adjust slow idle fuel mixture by turning idle adjusting needle on top front of carburetor (see above). Set to best idling position.

4. Recheck engine slow idle speed. If necessary, readjust slow idle stop screw behind carburetor for 600 rpm.

5. If it was necessary to readjust slow idle stop in step 4, again adjust idle needle for best idling.



LOAD ADJUSTMENT

1. Warm up engine and place hand throttle in fast idle.

2. Screw in on load adjusting needle on bottom of carburetor until engine begins to lose power.

3. Screw out on load needle until engine begins to run smoothly. Then screw out an extra one turn.

4. Check engine under load and readjust if necessary.

NOTE: If governor "cuts off" throttle or if it "surges" under load, see your John Deere dealer for proper adjustment of governor linkage.

CHECKING AIR HOSE CONNECTIONS

Inspect air intake hoses. If they show signs of rotting or cracking, replace them. Be sure hose clamps are in position and are tight. This will prevent engine from breathing dirt and grit into cylinders from air leaks instead of pure air from the air cleaner.

FUEL TANK VENT TUBE

Inspect fuel tank vent tube opening (below front end support) for clogging or bends. If this tube clogs, fuel system can become air locked.

COOLING SYSTEM

The cooling system must be kept under pressure for good circulation and cooling. Keep the radiator filler cap tightened. Watch for any trouble signs at the filler cap, thermostat, water pump, or hose connections. If these parts become faulty, the system can lose coolant by loss of pressure, by overheating, or through leaks.

The thermostat in the water outlet manifold should keep coolant temperature in the "NORMAL" zone on the temperature gauge. A bypass line from the manifold to the water pump assures fast engine warm-up and keeps a more uniform coolant temperature throughout the cylinder block.

The radiator filler cap protects the cooling system against excess pressure. The cap is set to release at 6-1/4 to 7-1/2 pounds. Check the radiator cap occasionally for proper action.

Radiator Cap

CAUTION: Do not remove radiator filler cap until coolant temperature is below its boiling point. Then loosen cap slightly to the stop to relieve any excess pressure before removing.

NOTE: Keep the system tightly sealed. Save your coolant.

CLEANING THE COOLING SYSTEM

For good circulation and tight seals, clean the cooling system, particularly at seasonal changes when antifreeze solution is added or removed. Use a good radiator cleaning compound to flush the system.

Cylinder Block Drain Cock

Draining the System

Open both drain cocks—one at bottom of radiator and one at left front of engine (see above).

Testing the Radiator Cap

You can test the cap when draining the system. Before opening drain cocks, be sure the cap is installed tightly and that the system is sealed. Warm up the engine. Then open the radiator drain cock. Coolant flow should stop shortly. If not, the cap is faulty and should be replaced.

Inspecting the Radiator

For a thorough cleaning, remove the grille so that you can examine all air passages in the radiator core; remove all chaff and dirt and straighten any bent fins.

Flushing the System

Follow instructions on the cleaning compound package.

Refilling the System

Use soft water when available. Well water contains lime and other minerals. These may eventually clog the radiator core and reduce cooling efficiency. Add a reliable rust inhibitor. Fill radiator with coolant to level midway between core and bottom of filler neck.

PREPARING FOR COLD WEATHER

Before cold weather, be sure to drain, flush, and refill the cooling system using an antifreeze solution.

Diesel Engines. Ethylene glycol (permanent type) antifreeze must be used. This type has a much higher boiling point than others and will not evaporate.

Gasoline Engines. Use either ethylene glycol (permanent type) or methanol antifreeze. However, if you use methanol, be sure the engine has a 160° thermostat. Also check the methanol often to be sure you have good protection. Permanent type antifreeze gives longer protection; it has a higher boiling point and will not evaporate.

After adding antifreeze solution, run the engine for a few minutes until warmed up. This will allow the thermostat to open and let the solution circulate through the entire cooling system.

Recheck the cooling system for leaks after antifreeze solution has been added. Condition the system with a known brand of radiator sealer.

CAUTION: Never pour hot water into a cold engine or cold water into a hot engine. You may crack the head or the cylinder block. Do not operate the fork lift without water for even a few minutes.

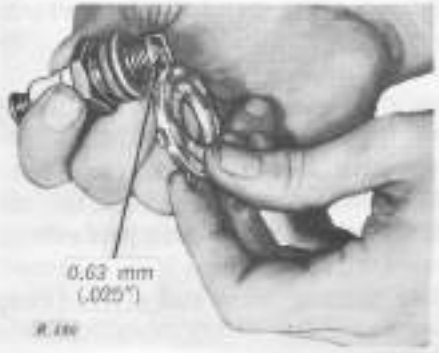
IGNITION SYSTEM—GASOLINE ENGINES

Check the ignition system periodically and, if necessary (1) clean and adjust spark plugs (2) inspect coil and spark plug cables for breaks or shorts and (3) hone and adjust distributor points.

SPARK PLUGS

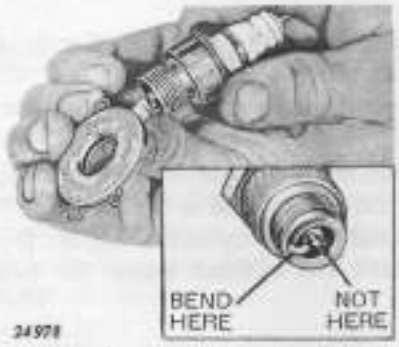
Two things will cause spark plugs to short out — excessive fouling or cracked insulators. If plugs are fouled, have them cleaned by the blast method. If porcelain insulators are cracked, plugs must be replaced.

Setting Electrode Gap



Checking Spark Plug Point Gap

Check electrode gap with a round wire-type feeler gauge for .025-inch clearance.



Adjusting Spark Plug Point Gap

When adjusting gap, bend only the outer electrode.

To prolong life of spark plugs, use new gaskets and tighten plugs to 35 foot-pounds. Use only plugs recommended by your John Deere dealer.

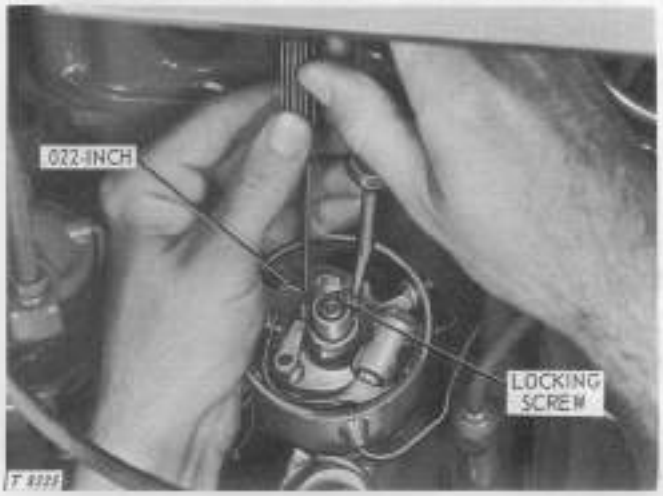
COIL AND SPARK PLUG CABLES

Keep cables clean to prevent shorting. If cables are hard or cracked, replace. Terminals and nipples must fit snugly.

DISTRIBUTOR

If fork lift ignition is faulty, first check spark plugs and cables. If these are in good condition, remove distributor cap and check distributor.

Wipe out distributor cap with a clean cloth. Inspect cap for cracks; replace if damaged.



Adjusting Distributor Gap (Delco-Remy Illustrated)

Remove rotor and cover plate from shaft by lifting straight up; then wipe rotor and cam clean. If breaker points are rough, pitted or burned, hone each point to a smooth flat surface using a flexible contact point stone.

CAUTION: Never use emery cloth or sandpaper since particles of emery or sand will embed in points and cause them to burn. (If points are badly worn or pitted, replace them with a set of new points available at your John Deere dealer's.)

Adjusting Distributor Points

Turn engine flywheel until a high lobe on distributor cam holds the points at their widest opening. Loosen contact support locking screw; then adjust the gap to .022 inch (see above). Tighten locking screw and recheck gap.

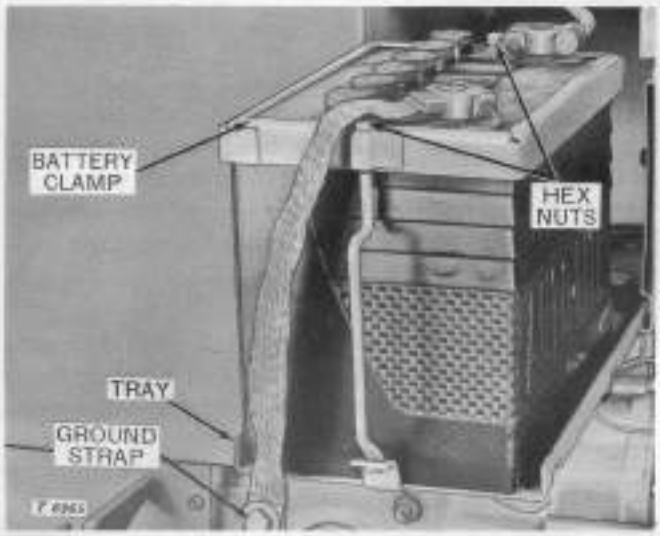
Reinstall cover plate, rotor, distributor cap, and cables. (Engine firing order is 1-3-4-2.)

Replacing Distributor Points

Remove old points and install new ones. See that points are in alignment with each other. If not, use a regular point alignment tool or a needle nosed pliers to bend lower contact support.

ELECTRICAL SYSTEM

BATTERY



Recommended battery types are:

Diesel Units. Use only a 12-volt high level, 90-plate, SAE 9H9 tractor-type battery with a minimum capacity of 91 ampere-hours. The AABM group symbol for this battery is 30H.

Gasoline Units. Use only a 12-volt high level, 66-plate, SAE 2SHB tractor-type battery with a minimum capacity of 56 ampere-hours. The AABM group symbol for this battery is 24H.

Removing Battery

Back out cap screw attaching battery ground strap; this frees battery tray. Slide battery on trap out of box. Loosen hex. nuts and free clamp to remove battery. Also disconnect cables.

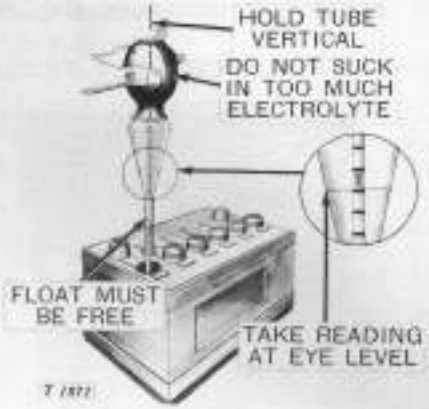
Cleaning Battery (Every 200 hours)

Wipe battery with a damp cloth. If terminals are corroded, use a stiff brush and wash with an ammonia solution or a solution of baking soda (1/4 pound added to a quart of water). Keep vent plugs tight while washing. After washing, flush battery and compartment with clear water. Then coat terminals with petroleum jelly to protect against corrosion. Be sure vent holes are open.

Checking Electrolyte Level (Every 200 hours)

Slide out battery and check electrolyte level in each cell. Proper level is to bottom of filler neck. Always add distilled water if available. If not, use clean soft water. Avoid hard water.

Checking Specific Gravity



Before adding water to a battery cell, check specific gravity with an accurate hydrometer. If liquid level is too low to check, add water, run engine for a few minutes to let water and electrolyte mix, then check. Never allow specific gravity to drop below 1.225 or half charge. Full charge reading is 1.240 to 1.260. (On batteries in tropical areas, use a 1.210 to 1.230 charge reading. In cold regions, use a 1.270 to 1.290 full-charge reading.)

Dangers with Batteries

To avoid injury from a spark or short circuit, *disconnect the battery ground cable* when working on any part of the electrical system or engine. This will also prevent accidental starting.

CAUTION: Battery electrolyte is flammable: keep away from all sparks or fires.

Cold Weather Battery Service

Batteries fail more often in cold weather. They carry a heavier load in starting the engine; they can freeze if not serviced. To avoid these dangers (1) keep battery cells filled (2) keep battery at full charge. Check more often in winter.

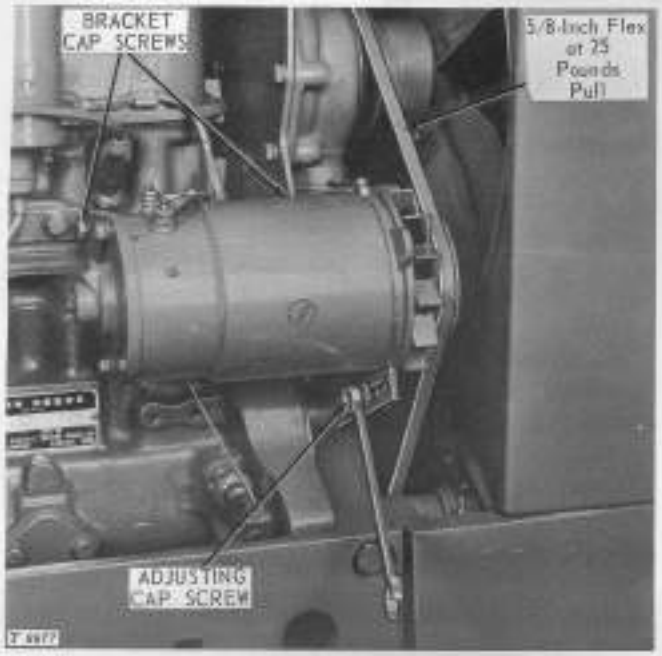
Installing Battery

Place battery on tray. Position case over battery and hook clamps on tray. Tighten clamp nuts securely. Do not tighten clamps too much. This can buckle case and crack battery cells. Connect cable and ground strap to battery terminals (ground strap goes on "+" terminal). Side battery and tray into box. Secure ground strap to tray and box with cap screw and large washer.

GENERATOR

The generator (shown below) produces electrical current to charge the battery and to supply the other electrical needs of the fork lift.

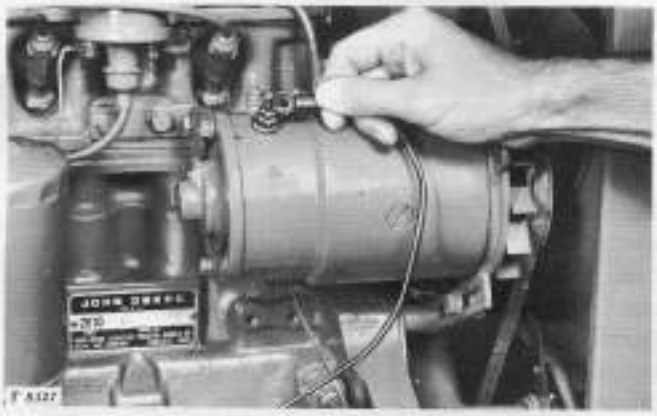
ADJUSTING GENERATOR BELT TENSION



Check the generator belt tension every 200 hours. Loosen the generator bracket and adjusting cap screws. Then force the generator away from the engine until the belt has 5/8-inch flex at 25 pounds pull. Tighten cap screws.

POLARIZING THE GENERATOR

Be sure to polarize the generator after connecting the generator, regulator, starter, or battery. Do this before starting the engine. This will avoid reversing polarity, which can cause burned-out regulator points, a run-down battery, or a burned-out generator.



Polarizing The Generator

Polarize generator as follows: Hook a jumper lead to battery cable terminal on starter. Then briefly touch other end of lead to "A" terminal on generator as shown at left below.

STARTER

The engine is cranked by a 12-volt electrical starter located on the left side of the engine. This starter will carry a big load for a short period of time. A solenoid switch on top of the starter makes the supply connection with the storage battery.

CAUTION: When starting the engine, never crank for more than 30 seconds at a time. To do so may overheat the starter. Always wait a minute or two before cranking again. Be sure to pause a few seconds after a false start to allow the starter to stop rotating before trying again.

If the starter "kicks off" when the switch is turned, it is probably in good condition. However, check the starter and its electrical connections from time to time.

CHECKING CAUSES OF OR SLUGGISH STARTER OPERATION

If the starter fails or operates sluggishly, look for:

(1) A run-down battery. Check specific gravity. Inspect for loose or corroded connections.

(2) Loose or corroded connections at starter or regulator. These create high resistance and cut voltage to the starter; they also permit arcing which quickly burns and pits connections.

(3) Too-heavy oil in crankcase. Use crankcase oil of proper seasonal viscosity. Cold weather always puts an extra load on the starter.

If the above checks fail to improve starter operation, see your John Deere dealer.

SAFETY GREEN CROSS FOR SAFETY® FIRST

LIGHTS

If a sealed beam headlight burns out or any other lighting fails, see your John Deere dealer for replacement parts.

The headlights and rear work light contain sealed beam units. All other lamps are rated as follows:

Location	Contact	Color	Volts	Candle Power
Tail-light	Single	White	12	6
Rear Warning Lights	Single	White	12	21
Dash Light	Single	White	12	6
Instrument Lights	Single	Red	12	2

DIESEL GLOW PLUGS

These electrical heating elements mount in the turbulence chambers and preheat the combustion chambers for easier starting.

If engine fails to start, test glow plugs with an ammeter. Remove leads from all four glow plugs and connect ammeter in series between glow plug terminal and lead wire. If amperage is less than 7 amperes or above 11 amperes, replace the glow plug.

Check each glow plug by this method. If all four glow plugs check out evenly and below 7 amperes, the fault is probably in the wiring.

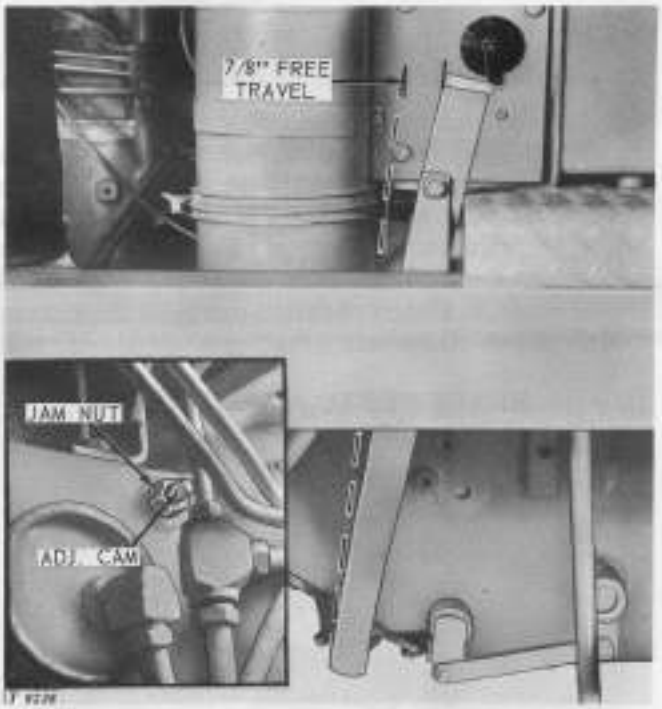
Use a deep socket wrench to replace faulty glow plugs. Tighten to 11 ft-lbs.

CIRCUIT BREAKER

The wiring for the lights is protected by a 12-volt circuit breaker. If the circuit becomes overloaded, the circuit breaker will open preventing operation.

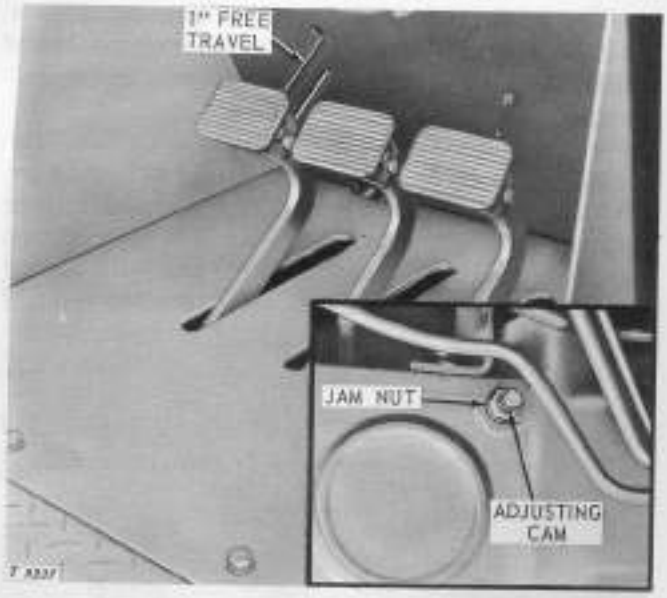
If the lights go out while the light switch is on, turn off the light switch and wait for one minute before turning the switch back on. The circuit breaker will reset itself. See your John Deere dealer if the lights fail to operate after the one minute interval or if the lights fail intermittently.

CLUTCH DISCONNECT LEVER ADJUSTMENT (Hydraulic Reversing Transmission)



Check free travel of clutch disconnect lever periodically. Correct free travel is 7/8-inch at upper end of lever (see above). To adjust, loosen jam nut on adjusting cam at right side of clutch housing (see inset above). Then turn adjusting cam until free travel at lever is 7/8-inch. Hold cam and tighten jam nut. Recheck free travel.

ENGINE CLUTCH PEDAL ADJUSTMENT
(Constant Mesh Transmission)



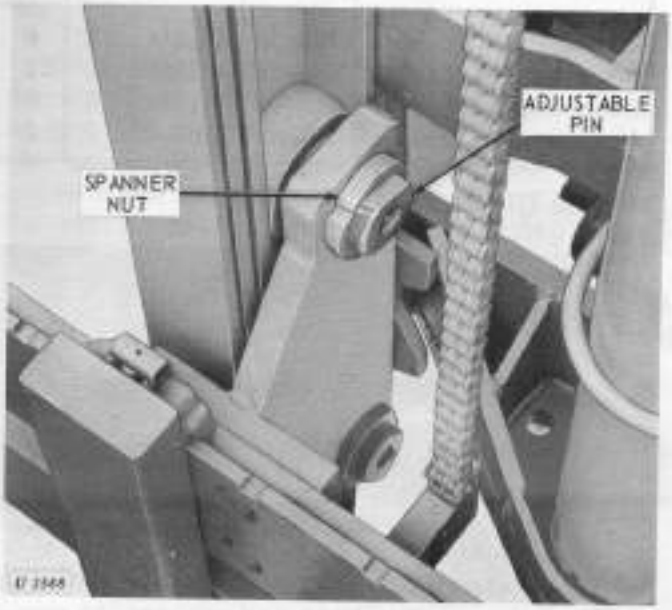
Every 600 hours, check clutch pedal free travel. Correct free travel is one inch. If free travel is less than 1/2 inch, the clutch pedal must be adjusted. To adjust, loosen hex. nut on adjusting cam. Then turn adjusting cam until free travel at clutch pedal is one inch. Hold cam and tighten jam nut. Recheck free travel.

BRAKE PEDAL ADJUSTMENT

Every 600 hours, check free travel on each brake pedal (see above). Correct free travel is 1-1/2 inches. To adjust, loosen lock nut on brake lever. Then turn adjusting nut until free travel at matching pedal is 1-1/2 inches. Tighten jam nut. If pedals are not aligned when brakes are applied, equalize them by increasing free travel on pedal having least free travel.

CARRIAGE SIDE PLAY ADJUSTMENT

Off-center loads will cause a loose carriage to bind as it is raised or lowered. If side play exceeds 1/32-inch, the carriage must be adjusted.



To adjust the carriage, loosen the spanner nuts on the adjustable roller pins and turn the pins inward until the correct adjustment is made. Use a feeler gauge between the channel and the end of the pin.

Retighten spanner nuts to lock pins in place.

Operate the carriage up and down with no load on the fork. If carriage binds at any place on the mast, loosen the pin adjustment slightly until the carriage moves freely.

TIRES

Every 200 hours, check the tires for proper inflation (page 12) and inspect them for any damage. Cuts or breaks in the sidewall or tread may expose the tire fabric, allowing moisture and dirt to rot the fabric. Repair these cuts or breaks with rubber sealing compound. If the break is more than two inches long, have the tire vulcanized.

REAR WHEEL BEARINGS

Check the rear wheels periodically for bearing end play by raising the rear wheels off the ground. If end play is evident, the bearings must be adjusted.

Every 1200 hours, clean and repack the rear wheel bearings.

ADJUSTING BEARINGS

Remove hub caps. Pull cotter pin from slotted nut. Tighten nut to 35 to 40 ft-lbs. If nut must be turned three or four slots before it is drawn tight, disassemble wheel and clean and pack bearings.

Rotate wheel several times to align bearings and retighten to 35 to 40 ft-lbs. Then back off nut to nearest slot and insert cotter pin. (If nut just matches slot after tightening, back off one full slot.) Lower rear wheels to floor and install hub caps.

CLEANING AND PACKING BEARINGS

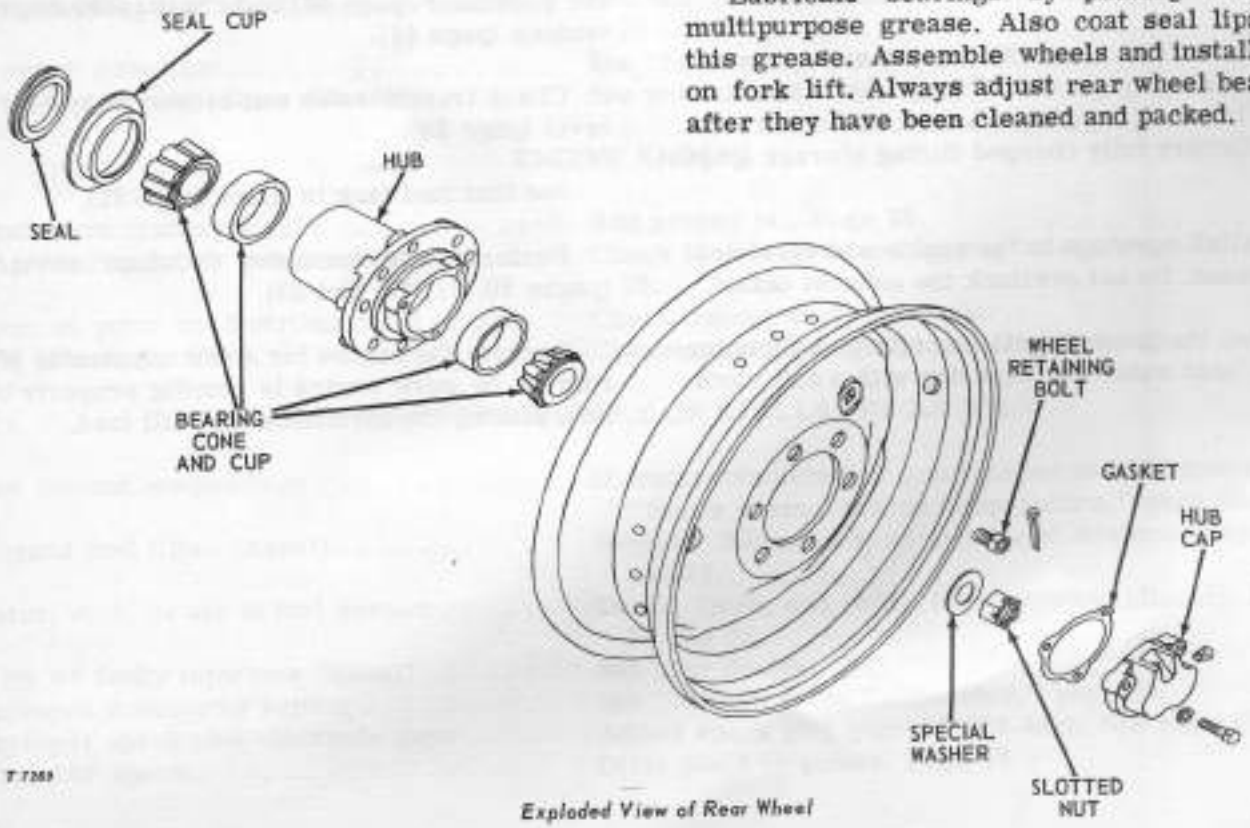
Raise rear of fork lift. Remove hub cap. Pull cotter pin from spindle and remove slotted nut. Slip off special washer and outer bearing cone and remove wheel and hub assembly. Then remove oil seal and inner bearing cone from hub (see exploded view).

Clean all dirt and grease from bearings, spindles, and hub assemblies.

Inspect bearing cups and cones for damage or excessive wear. If any part of a bearing is damaged, replace whole bearing. If a bearing cup must be replaced, drive out old one and install new cup with cupped face outward.

Examine grease seals for damage or hardened lips. Replace seals or cups if damaged.

Lubricate bearings by packing with SAE multipurpose grease. Also coat seal lips with this grease. Assemble wheels and install them on fork lift. Always adjust rear wheel bearings after they have been cleaned and packed.



Exploded View of Rear Wheel

STORAGE

STORING THE FORK LIFT

With the engine warm, drain the crankcase, replace the filter element, and fill the crankcase with new oil (page 28).

Remove and clean the air cleaner cup. Fill with new oil and reinstall (page 25).

Drain, flush, and refill the cooling system (page 41). Add a rust inhibitor and sufficient antifreeze to protect against freezing.

Operate the engine at 1500 rpm with no load for at least two minutes to distribute oil to all parts of the engine and to allow coolant to circulate freely.

On gasoline fork lifts, drain fuel tank and leave drain open. Replace carburetor drain plug.

On diesel fork lift, fill the fuel tank (page 21).

Remove and clean the battery and add water if necessary (page 43). Charge the battery and store in a cool, dry place where it will not freeze. Keep battery fully charged during storage (page 43).

Seal all openings in the engine and electrical equipment. Do not overlook the exhaust outlet.

Wash the painted surfaces of the fork lift using clean, cold water and wipe dry with a soft cloth.

Replace or repair worn or damaged parts. Between working seasons is a good time to paint your fork lift. This can be done by your John Deere dealer at a nominal cost.

Store the fork lift in a dry, protected place. If the fork lift is stored outside, cover it with a waterproof protective material.

Block up the fork lift so that the tires do not touch the ground. Protect tires from heat and sunlight.

REMOVING THE FORK LIFT FROM STORAGE

Remove all protective coverings. Check tire inflation (page 12) and then remove blocking.

Unseal all openings in engine, electrical equipment, and exhaust outlet.

Install battery and connect cable and ground strap (positive terminal grounded). Polarize the generator (page 44) and check generator belt tension (page 44).

Check transmission and hydraulic system oil level (page 29).

See that fuel tank is filled (page 21).

Perform recommended 600-hour services (pages 30, 31, 32, and 33).

Operate the engine for a few minutes at 1000 rpm to be sure engine is running properly before placing the fork lift under full load.

TROUBLE SHOOTING

If your fork lift has a particular trouble, check the symptoms listed as headings on the following pages. Possible causes and remedies are given for each symptom. If the remedies given do not correct the trouble, see your John Deere dealer.

ENGINE

ENGINE HARD TO START, WILL NOT START

Possible Cause	Possible Remedy
No fuel	Fill tank with proper fuel. Page 20.
Old gasoline in tank	Drain tank and refill with proper fuel. Page 20.
Fuel shut-off valves closed	Open valves. Page 38 or 39.
No gasoline in carburetor	Clean fuel line, filter, and carburetor. Page 39.
Glow plugs not energized (diesel)	Energize glow plugs to proper time interval. Page 7. (Also prime engine if primer is used.)
Low battery output	Check electrolyte level and specific gravity of each cell. Recharge if necessary. Page 43.
Excessive resistance in starting circuit	Clean and tighten all connections on battery and starter. Pages 43 and 44.
Too high viscosity crankcase oil	Drain and fill with proper oil. Page 28.
Improper type of fuel	Consult fuel chart on page 20.
Water, dirt, or air in fuel system	Drain, flush, fill, and bleed system. Page 38.
Water in gasoline	Drain gasoline, clean plugs. Pages 39 and 42.
Clogged fuel filter (diesel)	Replace filter element and bleed system. Pages 30 and 38.
No spark (gasoline)	See "Ignition System," page 42.
Dirty or faulty injectors (diesel)	See your dealer.

ENGINE KNOCKS

Insufficient crankcase oil	Add proper oil. Page 25.
Oil picked up by air intake system	Check air cleaner for clogging or excessive oil. Page 25.
Injection pump or distributor out of time	Check timing. See your dealer.
Low octane gasoline	Change to regular grade gasoline. Page 20.

ENGINE RUNS IRREGULARLY OR STALLS FREQUENTLY

Low coolant temperature	If water temperature gauge is not in "N" range, see "Below normal engine temperature," page 50.
Clogged fuel filter (diesel)	Replace filter element and bleed system. Pages 30 and 38.
Water, dirt, or air in fuel system	Drain, flush, and refill. Bleed system (diesel). Pages 20 and 38.
Dirty or faulty injectors (diesel)	See your dealer.
Improper carburetor setting	See "Adjusting the Carburetor," page 39.
Improper spark plug electrode gaps	Adjust spark plug gaps to .025-inch. See page 42.
Irregular spark	Dirty plugs or points. Page 42.

LACK OF ENGINE POWER

Possible Cause	Possible Remedy
Engine overloaded	Reduce load or shift to lower gear.
Too high viscosity oil in crankcase and air cleaner	Drain and fill with proper oil. Page 28.
Intake air restricted	Clean air cleaner and replace oil if necessary. Page 25.
Clogged fuel filter (diesel)	Replace filter element and bleed system. Pages 30 and 38.
High altitude operation	Engines lose horsepower with increased altitude. Use proper fuel for high altitude. Page 20.
Overheated engine	See "Engine Overheats" (below).
Improper valve tappet clearance	See your John Deere dealer.
Dirty or faulty injectors (diesel)	See your dealer.
Injection pump or distributor out of time	Check timing. See your dealer.
Carburetor adjusted too lean	See "Adjusting Carburetor," page 39.
Unsatisfactory fuel	Change to better grade fuel. Page 20.
Obstruction in fuel system	See "Gasoline Fuel System," page 39.
Dirty points or spark plugs	Clean and gap. Page 42.

ENGINE OVERHEATS

Low radiator coolant level	Fill radiator to proper level. Check for leaks or loose hoses. Page 41.
Dirty radiator core or grille screen	Remove all foreign matter from exterior or radiator core and grille screen. Page 41.
Loose or defective generator belt	Adjust belt tension. Replace worn belt. Page 44.
Cooling system limed up	Drain and flush cooling system. Page 41.
Defective temperature gauge	Check water with thermometer. Have serviceman replace gauge if defective. (To overheat, an engine must use water. Check water level.)
Defective radiator pressure cap	Test cap. Page 41.

BELOW NORMAL ENGINE TEMPERATURE

Defective thermostat	Replace with new thermostat.
Defective temperature gauge	Check water with thermometer. Have serviceman replace gauge if defective.

LOW ENGINE OIL PRESSURE

Low crankcase oil level	Add proper oil. Page 25.
Improper type of crankcase oil	Drain and fill with proper oil. Page 28.

HIGH OIL CONSUMPTION

Too low viscosity crankcase oil	Drain and fill with proper oil. Page 28.
Oil leaks	Check for leaks at lines, gaskets, and plugs.
Engine overheating	See "Engine Overheats," above.

HIGH FUEL CONSUMPTION

Possible Cause	Possible Remedy
Improper type of fuel	Consult fuel chart on page 20.
Engine overloaded	Reduce load or shift to lower gear.
Clogged or dirty air cleaner	Clean air cleaner and replace oil if necessary. Page 25.
Dirty or faulty injectors (diesel)	See your dealer.
Engine out of time	Check timing. See your dealer.
Improper carburetor setting	See "Adjusting the Carburetor," page 39.

SPARK PLUG FOULING

Wrong heat range plug	Replace with plugs recommended by your John Deere dealer. Set gap. Page 42.
Low engine temperature	Check operation of thermostat.

DIESEL ENGINE EMITS BLACK OR GRAY EXHAUST SMOKE

Improper type of fuel	Consult fuel chart on page 20.
Engine overloaded	Reduce load or shift to a lower gear.
Clogged or dirty air cleaner	Check for restrictions. Be sure screens are clean and cup is filled with proper oil. Page 25.
Defective muffler	Check the muffler for possible damage which might create back pressure.
Dirty or faulty injectors	See your dealer.
Engine out of time	Check pump timing. See your dealer.

DIESEL ENGINE EMITS WHITE EXHAUST SMOKE

Improper type of fuel	Low cetane fuel will cause misfiring. Use only fuel of recommended cetane. Page 20.
Cold engine	Warm engine up to normal operating temperature.
Defective thermostat	Remove and check thermostat.
Engine out of time	Check pump timing. See your dealer.

BATTERY WILL NOT CHARGE

Loose or corroded connections	Clean and tighten battery connections. Page 43.
Sulfated or worn-out battery	Check specific gravity and electrolyte level of battery. Page 43.
Loose or defective generator belt	Adjust belt. Replace worn belt. Page 45.

STARTER INOPERATIVE

Shift lever not in start	Move shift lever to start. Page 7.
Loose or corroded connections	Clean and tighten loose connections. Page 44.
Low battery output	Check specific gravity and electrolyte level of battery. Page 43.

STARTER CRANKS SLOWLY

Possible Cause	Possible Remedy
Low battery output	Check specific gravity and electrolyte level of battery. Page 43.
Too high viscosity crankcase oil	Drain and fill with proper oil. Page 28.
Loose or corroded connections	Clean and tighten loose connections. Page 44.

BRAKES NOT EFFECTIVE

Improperly adjusted	Adjust brakes. Page 46.

LIGHTS FAIL

Circuit breakers tripped	Reset circuit breakers. Page 45.

LOW HYDRAULIC REVERSING TRANSMISSION OIL PRESSURE

Low oil supply	Fill system with proper oil. Page 29.

HYDRAULIC REVERSING TRANSMISSION OIL OVERHEATS

Too high oil supply	Fill system to proper level. Page 29.
Oil cooler air passages clogged	Clean oil cooler.
Excessive shifting under heavy load	Reduce shifting or load.

FORK LIFTS TOO SLOWLY

Cold oil	Allow oil to warm up with slow engine speed.
Viscosity of oil too heavy	Use oil specified in lubrication chart, page 21.
Insufficient engine speed	Open throttle.
Badly worn pump	Repair or replace pump. See your John Deere dealer.
Oil leaking past cylinder O-rings	Replace worn parts. See your John Deere dealer, page 37.
Oil leaking past control valve	Repair or replace worn parts. See your John Deere dealer, page 37.
Air in lift cylinder	Bleed cylinder. See page 34.
Flow regulator plugged	Clean regulator. See page 37.

FORK FAILS TO HOLD UP OR LOWERS TOO RAPIDLY

Possible Cause	Possible Remedy
Leaking or broken lines from control valve to cylinders	Check for leaks. Tighten or replace lines. See page 36.
Dirty oil	Drain and refill with new oil. See page 34.
Oil leaking past cylinder O-rings	Replace worn parts, page 37. See your John Deere dealer.
Oil leaking past control valve	Repair or replace valve. See your John Deere dealer, page 37.
Flow regulator stuck open	Repair or replace regulator. See page 37.

PUMP MAKES NOISE

Starvation	Check for low oil supply. Page 26.

OIL HEATS

Operator holds valves open too long, causing relief valve to open	Return control to neutral position when not in use.
Incorrect relief valve pressure	See your John Deere dealer.
Using very light oil in hot weather	Use oil specified in lubrication chart, page 21.
Dirty oil	Drain and refill with new oil. Page 34.

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nobody can fill them like you can!

That's what the owner of this pair of boots is finding out—the hard way. Through a careless action, he has become the victim of an accident. It's a mighty tough way to find out that nobody else can wear your boots or practice safety for you. And a needless, costly lesson to learn that safety is an everyday need.

Put safety into each of your workdays; read the operator's manual thoroughly; know how to operate each machine properly and safely; take the safety precautions specified; think before you act.

Make sure you wear your "boots" everyday. Outfit yourself with a safety program now.

As a member of the National Safety Council, we are privileged to use the Green Cross for Safety to designate not only our interest in Safety, but to emphasize and call attention to the safety precautions in this manual.

GREEN CROSS FOR SAFETY®

Here's Dependable John Deere Service

Servicemen who know their Business

You can place full confidence in a John Deere Dealer's Serviceman. He's skilled . . . experienced . . . knows equipment inside-out.

Trained in servicing methods recommended by John Deere, these mechanics know what to do and how to do it; they keep up to date on methods, changes, and new machines.

This assures quality work . . . quickly and efficiently done . . . *the first time* . . . and at the lowest cost. Remember . . . you'll get your money's worth with John Deere Service!

Parts Departments well stocked to meet your needs

Having parts when you need them—that's the true test of good parts service!

That's also the aim of your John Deere Dealer. His parts department keeps a good supply of JD Parts at all times. Should he be temporarily out of stock, additional parts can be secured quickly . . . often overnight.

Most important, you'll get only *genuine* John Deere Parts. They're made right . . . fit properly . . . last longer . . . for continued, dependable John Deere performance.

Your John Deere Industrial Dealer - Home of Quality Service, Genuine John Deere Parts