

3000 SERIES TRACTORS



JOHN DEERE

SERVICE MANUAL 3000 SERIES TRACTORS

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SERVICE MANUAL

JOHN DEERE 3000 SERIES TRACTORS

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TO THE JOHN DEERE SERVICEMAN

This service manual contains maintenance instructions for John Deere 3000 Series tractors. Included are complete instructions for removal, disassembly, inspection, repair, assembly and installation of the major parts and assemblies of the tractor.

In addition, the manual contains brief descriptions of the more complicated systems of the tractor, and tells how they operate. Tests and adjustments, required to keep the tractor operating efficiently, are explained in detail.

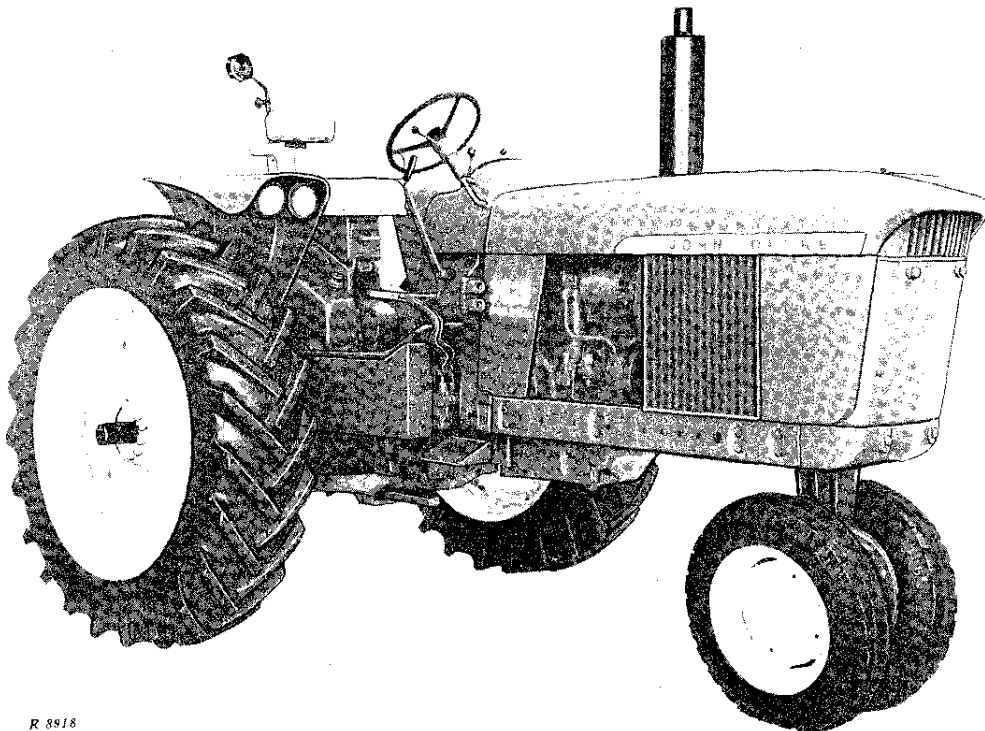
A section on "Specifications" lists dimensions of many new wearing parts as an aid in determining when parts replacement is necessary.

A section on "Tune-Up and Adjustment" contains instructions for performing the services necessary to help the tractor perform efficiently and economically after it has been in the field for some time.

A section on "Special Tools" lists special tool equipment which enables the serviceman to service the tractor efficiently with a minimum of time expended.

This manual was planned and written for the Service Department; its place is in the shop. Use the manual whenever in doubt about correct maintenance procedures. Use it as a text book for training new Service Department personnel who are unfamiliar with John Deere Tractors.

Daily use of the Service Manual as a guide for any and all service problems will reduce error and costly delay to a minimum and assure you the best in finished service work. In many instances your customer's confidence in your work will be improved when he sees you using the Service Manual. He knows you are following approved maintenance procedures and making proper adjustments. There is no guesswork when you use the manual.



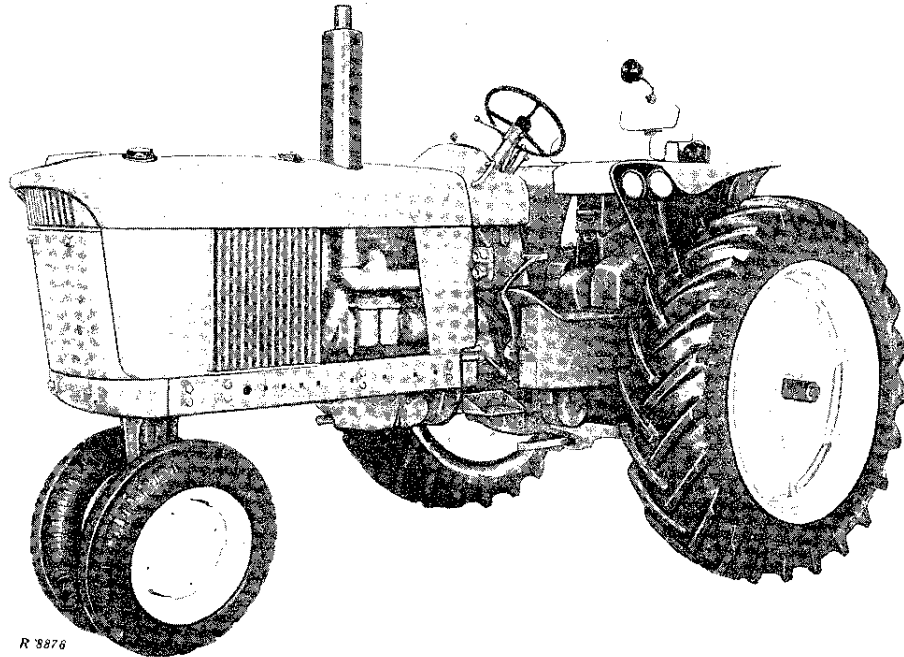
R 8918

John Deere 3020 Row-Crop Tractor with Diesel Engine



DESCRIPTION, OPERATION, AND SPECIFICATIONS

Group 5 DESCRIPTION



*Fig. 10-5-1—Left-Hand View of John Deere 3020 Row-Crop Tractor
with Diesel Engine*

John Deere 3020 Tractors are available in five basic styles: Row-Crop, Standard, Hi-Crop, Utility, and Orchard.

These tractors may have a Syncro-Range transmission providing eight forward and two reverse speeds, or a Power Shift transmission providing eight forward and four reverse speeds.

3020 Tractors (Serial No. 68000 and after) may be equipped with an optional differential lock which provides increased traction under certain operating conditions.

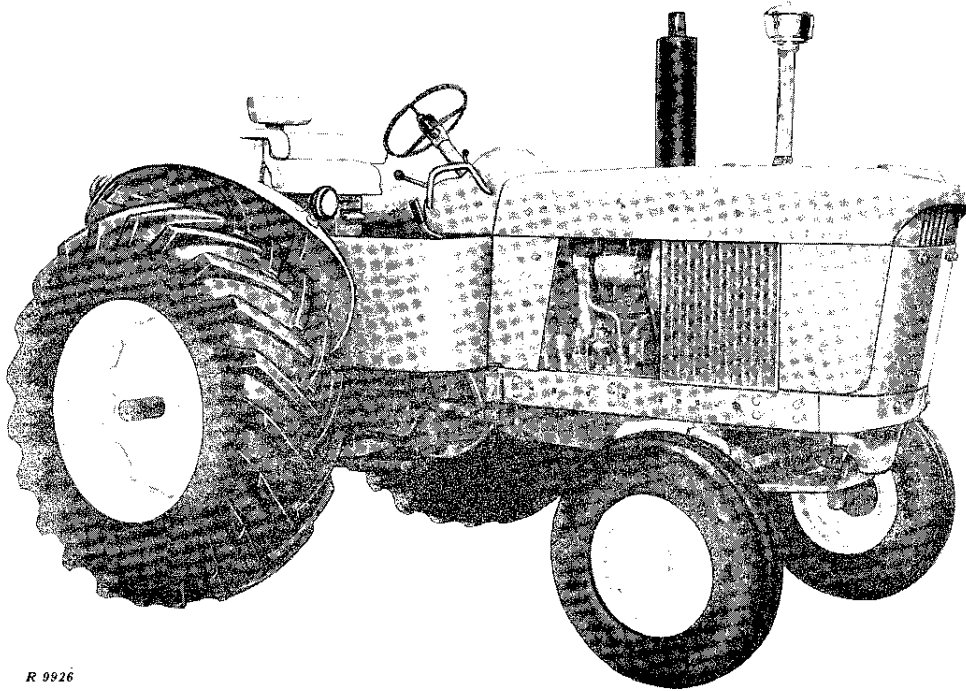
John Deere 3010 Tractors were available in

four basic styles: Row Crop, Standard, Utility, and Orchard.

These tractors have a Syncro-Range transmission providing eight forward and three reverse speeds.

In all styles the majority of parts and components are identical.

The features of the tractors are described briefly in the paragraphs which follow. Full descriptions of their various assemblies are given in the other sections throughout this manual.



R 9926

Fig. 10-5-2—Right-Hand View of John Deere Standard Tractor with Diesel Engine (Serial No. 68000-)

SERIAL NUMBERS

Each engine bears a serial number on the generator mounting pad on the front right side of the cylinder block.

The tractor serial number is located to the right of the center link attaching bracket on the rear of the transmission case.

LP-Gas fuel tanks each bear a serial number.

MODEL NUMBERS

Model numbers are carried by the distributor on spark ignition engines, the fuel injection pump on diesel engines, the main hydraulic pump, rockshaft valve housing, and remote cylinder selective control valve housings.

ENGINE

Three types of variable-speed engines are furnished for the tractor. Two are spark ignition engines - one using gasoline for fuel, the

other using LP-Gas. The third is a compression-ignition diesel engine.

All engines have four in-line cylinders. At 2500 rpm, 3020 engines develop up to 64 horsepower measured at the PTO, and 3010 engines, at 2200 rpm, up to 59 horsepower. (These are maximum observed horsepower ratings.)

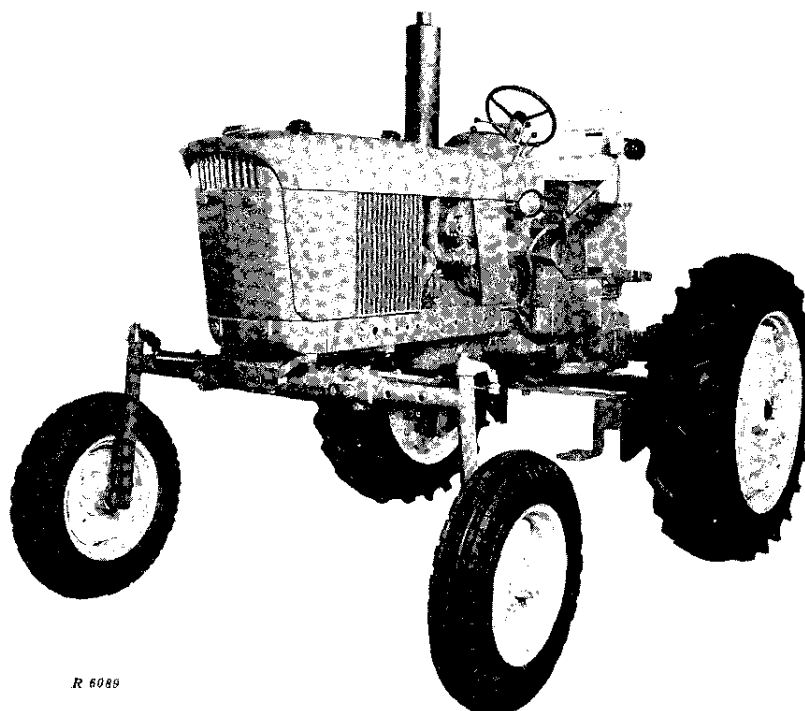
CRANKCASE VENTILATING SYSTEM

Crankcase ventilation is accomplished by a liquid-seal, impeller-type ventilating pump.

CLUTCH

SYNCHRO-RANGE

Both 3020 and 3010 Tractors, equipped with Synchro-Range transmission, have spring-loaded dry-disk-type transmission clutches located in a recess at the rear of the engine flywheel. These clutches are operated by a pedal at the left side of the operator's platform.



R 6089

Fig. 10-5-3—Right-Hand View of John Deere 3020 Hi-Crop Tractor with Gasoline Engine

POWER SHIFT

Power Shift transmissions (optional equipment) in 3020 Tractors are hydraulically-actuated, having no spring-loaded transmission clutch.

A pedal, located at the left side of the operator's platform, can be used for "inching" the tractor or for emergency stops.

A spring-loaded clutch, located in a recess at the rear of the engine flywheel, provides a means of disengaging the engine from the transmission for easier cold weather starting.

The clutch is operated by the engine disconnect lever located to the left of the control support. Pulling the lever to the rear disengages the engine. The lever will latch in this position. The engine is engaged by pulling back slightly on the lever while pulling the latch button at the left rear of the support.

FUEL SYSTEM

The large-capacity fuel tank on all tractors is located at the front of the tractor just ahead of the radiator.

DIESEL

In diesel systems a fuel pump, driven by the camshaft, provides a constant supply of fuel to the injection pump.

A large-capacity fuel filter is connected between the fuel pump and the injection pump.

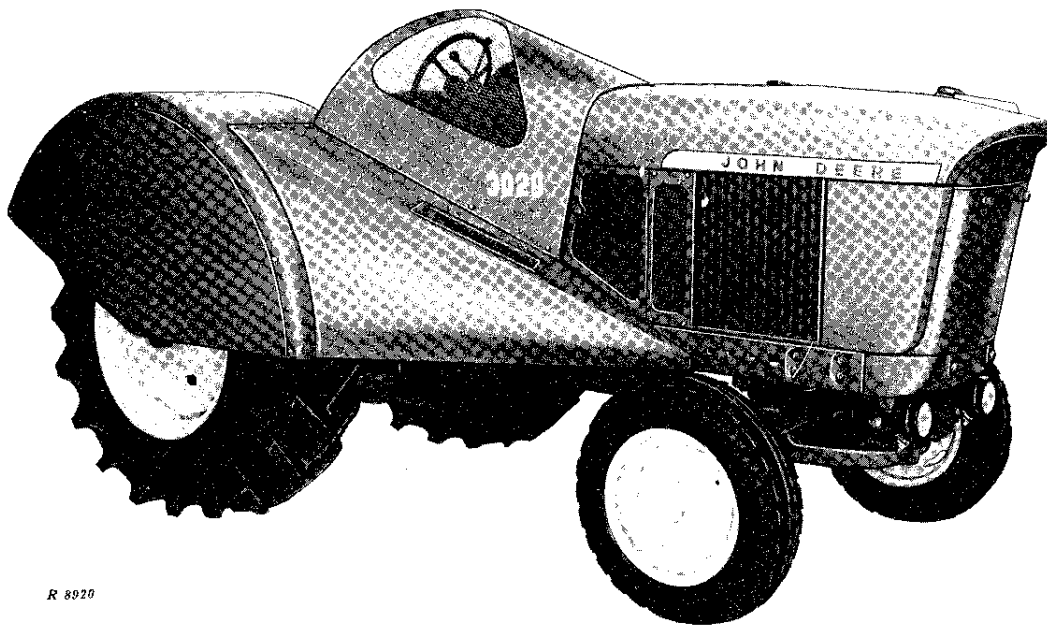
The filter contains two replaceable micronic filtering elements.

GASOLINE

In gasoline systems, a fuel pump driven from the camshaft, assures a constant supply of gasoline to the updraft carburetor. A filter and sediment bowl on the fuel pump, and a screen in the carburetor, insure that the gasoline flowing to the engine is clean.

LP-GAS

The LP-Gas fuel system includes a converter which assures that the fuel is in vapor form when supplied to the engine updraft carburetor. The converter uses the heat from the engine coolant for its operation.



R 8926

Fig. 10-5-4—Right-Hand View of John Deere 3020 Orchard Tractor
with Gasoline Engine

A combination filter and electric solenoid valve is incorporated in the system. The valve is opened electrically when the ignition switch is turned on and closes when the switch is turned off. This prevents leakage of the gas into the engine when it is not in operation.

ELECTRICAL SYSTEM

Tractors with spark ignition engines have a 12-volt grounded-type electrical system. A three-unit generator regulator is used to control generator output. An enclosed, solenoid-shift starter is used to start the engine.

Diesel tractors use a 24-volt split-load-type electrical system. In this system a 24-volt generator with a three-unit regulator supplies current to maintain the charge in two 12-volt batteries.

The lighting and accessory circuits are of the grounded type, using current at 12 volts.

IGNITION SYSTEM

Spark ignition engines are equipped with a battery ignition system. The distributor is located at the right rear of the engine block. It is driven at one-half engine speed from the engine camshaft. The distributor has a centrifugal advance mechanism.

The ignition system is of the bypass type using current at 12 volts while cranking the engine to improve starting. After cranking is stopped, the current is cut down by a resistor to 6 volts to supply the 6-volt ignition coil.

COOLING SYSTEM

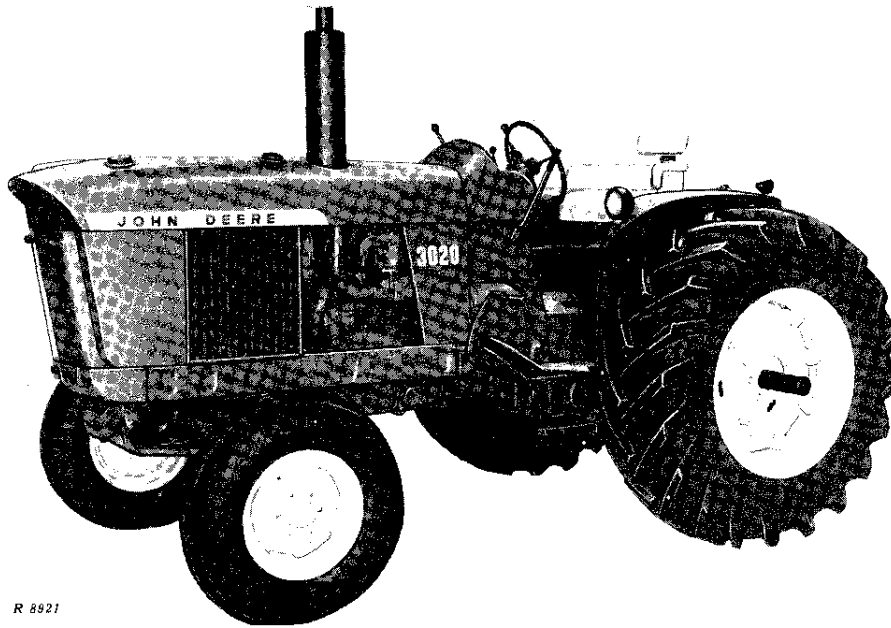
All 3000 Series Tractors have a pressure-type cooling system with a centrifugal-type pump that provides continuous circulation of the coolant. A thermostat maintains constant engine coolant temperature.

The system is of the bypass type which permits circulation of coolant through the engine without passing through the radiator. This feature allows the engine to reach operating temperature in a shorter length of time. After the coolant reaches operating temperature, the thermostat opens allowing circulation of the coolant through the radiator to maintain constant operating temperature.

TRANSMISSION

SYNCRO-RANGE

Syncro-Range transmissions are furnished as optional equipment on 3020 Tractors and as regular equipment on all 3010 Tractors. This transmission has four shift "stations" with synchro-



R 8921

Fig. 10-5-5—Left-Hand View of John Deere 3020 Utility Tractor
with Gasoline Engine

nized shifting within stations and collar shifting between stations.

The transmission has eight forward speeds. 3020 Tractors have two reverse speeds, 3010 Tractors three reverse speeds. Shifting is accomplished by a shift lever located at the right of the instrument panel.

Normally, shifting is accomplished within stations while the tractor is on the move, but the tractor should be stopped to shift between stations.

Constant-mesh, helical gears are used in all transmission speeds.

POWER SHIFT

The planetary-type, hydraulically actuated Power Shift transmission is optional on 3020 Tractors. Any forward or reverse speed can be obtained while the tractor is on the move.

The Power Shift transmission has eight forward and four reverse speeds.

Transmission speed changes are accomplished by a speed selector located on the right side of the tractor dash.

A mechanical disconnect, at the rear of the transmission permits disengaging the final drive assembly from the transmission when towing the tractor. The tow lever, used in making the disconnect, is located at the left rear of the operator's platform.

A pedal located at the front left of the operator's platform, is used for "inching" the tractor or for emergency stops. It is not necessary to use the "inching" pedal for normal shifting. However, the pedal must be depressed to actuate the starter safety switch when starting the engine.

3020 transmission-hydraulic systems in tractors with Power Shift have two micronic oil filter assemblies to assure clean oil at all times.

An oil cooler keeps the transmission oil temperature at a satisfactory level.

DIFFERENTIAL AND FINAL DRIVE

A differential with spiral bevel ring gear and pinion is used in the tractor. A planetary gear assembly for final drive provides the final gear reduction in the drive gear train. This design reduces strain on the transmission gear train.

DIFFERENTIAL LOCK

A lock (optional in tractors 68000 and after) located in the differential assembly, enables the operator to lock the differential. This causes both rear wheels to turn at the same speed, moving the tractor under conditions where one drive wheel has lost traction.

POWER TAKE-OFF (PTO) AND BELT PULLEY

Tractors are available without power take-off, with straight 1000 rpm power take-off, or 1000 rpm front and selective 540 or 1000 rpm rear power take-off. The front PTO operates at 1000 rpm only.

On 3020 Tractors, the PTO clutch operating lever is located at the right of the control support. On 3010 Tractors the lever is at the left of the support.

A belt pulley is available for mounting on the rear PTO shaft. The pulley is 12 inches in diameter with 3065 fpm belt speed at 2100 rpm rated engine speed.

Detailed instructions for using the PTO and belt pulley are included in Sections 160 and 170 of this manual.

DRAWBAR

Tractors can be purchased with regular or wide-swing drawbar. The regular drawbar is used on tractors equipped with rear rockshaft and Universal 3-Point Hitch. The wide-swing drawbar is used on tractors which are not equipped with rear rockshaft and Universal 3-Point Hitch. Instructions for using the drawbar are included in Section 300 of this manual.

FRONT WHEEL ASSEMBLIES

The tractor may be equipped with a variety of front end assemblies. For the Row-Crop Tractor these include Roll-O-Matic, double front wheels, wide adjustable front axle, and

single front wheel. The Standard Tractor may be equipped with fixed or adjustable front axles. For detailed information, see Sections 210 and 220 of this manual.

REAR WHEELS

On both Row-Crop and Standard Tractors, rear wheel tread adjustment is made by a pinion (located in the wheel hub) which engages a rack on the axle. Extreme adjustments are made by changing the position of the rim and tire on the wheel. Row-Crop Tractors may be equipped with regular-length, long, or extra-long rear axles.

Some 3010 Row-Crop Tractors were furnished with power-adjusted rear wheels, which made it possible to change rear wheel tread by engine power without jacking up the tractor. See Section 220 of this manual.

Power-adjusted wheels are not available for 3020 Tractors.

HYDRAULIC SYSTEM

All tractors are equipped with a constant-running hydraulic pump as regular equipment. Mounted below and ahead of the radiator, it is driven at engine speed from the engine crankshaft. The hydraulic pump supplies oil under pressure for power steering, power brakes, rear rockshaft, and remote hydraulic cylinders.

The hydraulic system is constant pressure, closed center, and "live": That is, it can be operated when the engine is running, whether the tractor is moving or not. The system may be equipped with either one or two remote cylinder selective control valves and one or two pairs of breakaway couplers.

The single selective control valve operates one remote hydraulic cylinder only. Two selective control valves permit use of two remote cylinders, which can be operated either separately or simultaneously. The cylinders may be either of the single-acting or double-acting type.

Tractors can be equipped with rear rockshaft and Universal 3-Point Hitch which utilize hydraulic power to control implements to best advantage in various soil conditions.

POWER BRAKES

The power brakes are operated by two pedals located at the right front of the operator's platform. The brakes can be applied independently or simultaneously. The brakes are of the disk type, operating in oil, and are hydraulically power activated. Hydraulic oil, under pressure, to operate the brakes is supplied by the main hydraulic pump.

The power brakes are so designed that if the supply of pressure oil should fail they would operate in much the same manner as conventional hydraulic brakes.

STEERING

Hydraulic power steering is regular equip-

ment on all tractors. Movement of the steering wheel activates a steering valve which directs a flow of oil, under pressure, to the steering motor which turns the front wheels. In the event of power oil supply failure, the tractor can be steered manually.

SEATS

All 3020 Tractors are equipped with a deluxe seat which contains a steel compression spring and shock absorber to provide "Float-Ride" suspension. The deluxe seat is also equipped with a flexibly-mounted padded backrest and semi-circular foam padding which surrounds the operator.

3010 Tractors were equipped optionally with the deluxe seat or a regular seat cushioned by no-sag springs and foam padding.

Regular seats are not available on 3020 Tractors shipped from the factory.

Group 10 OPERATION

STARTING CONTROLS

Figures 10-10-1 through 10-10-5 illustrate starting controls for 3020 and 3010 Tractors with various engine and transmission options.

3020 LP-Gas Tractor starting controls are not illustrated but are similar to those used on 3010 Tractors.

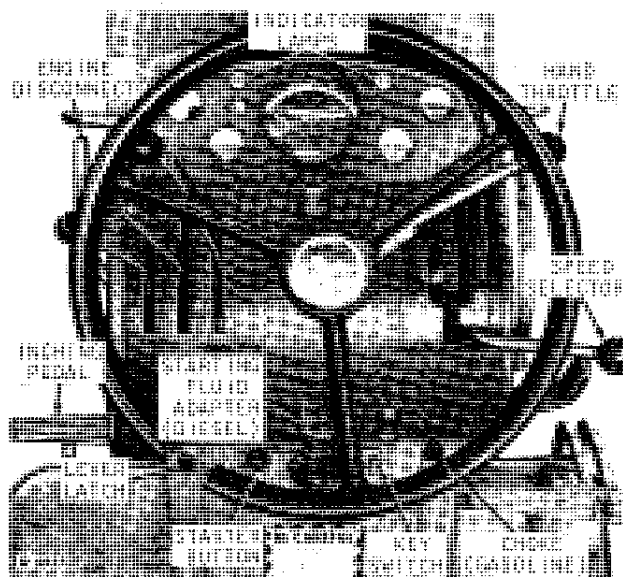


Fig. 10-10-1—Starting Controls on 3020 with Power Shift Transmission (68000 and After)

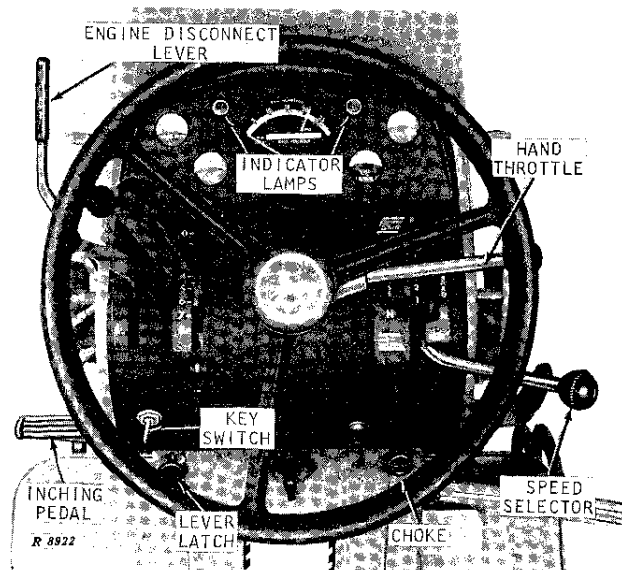


Fig. 10-10-3—Starting Controls (3020 Gasoline with Power Shift Transmission, Prior to 68000)

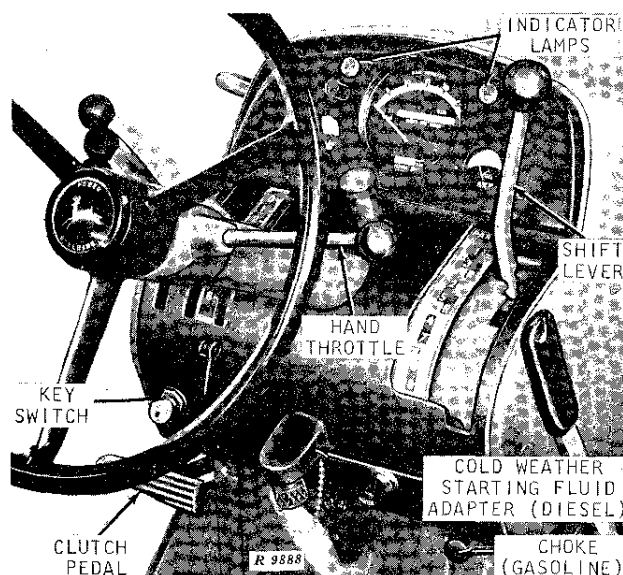


Fig. 10-10-2—Starting Controls (3020 with Syncro-Range Transmission, Prior to 68000)

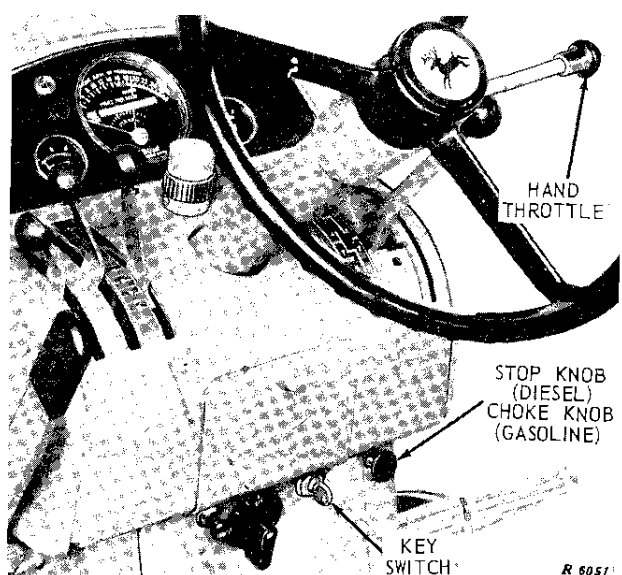


Fig. 10-10-4—Starting Controls (3010 Diesel and Gasoline)

PRE-STARTING INSPECTION

- (1) Check the engine crankcase oil level.
- (2) Check the radiator coolant level.
- (3) Check radiator hose and connections for leaks.
- (4) Make sure the fuel shut-off valve on the bottom of the fuel tank is open (tractor with gasoline or diesel engine.)
- (5) Turn on vapor withdrawal valve (tractor with LP-Gas engine).

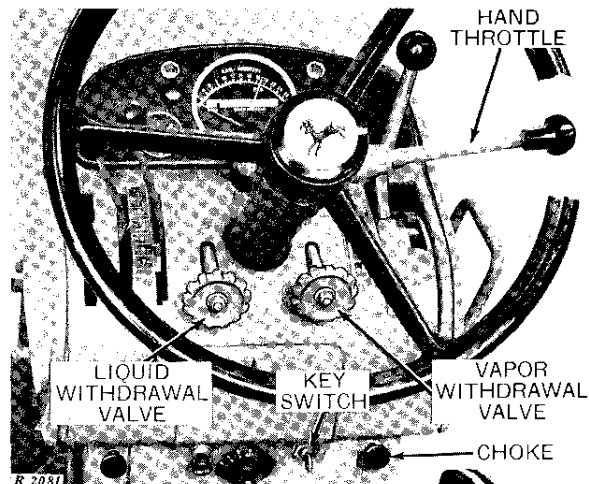


Fig. 10-10-5—Starting Controls (3010 LP-Gas)

STARTING THE ENGINE

Diesel	Gasoline	LP-Gas	
X	X	X	Place shift lever (or speed selector) in park position. Depress clutch (or inching) pedal.
X	X	X	Place hand throttle in 1200 rpm position. Place hand throttle in slow idle position.
X	X	X	Turn key switch clockwise to first position. Generator and oil pressure indicator lamps should light. If either lamp fails to light, turn key switch off and determine cause. See Section 190 of this manual.
X	X	X	During cold weather it may be necessary to: Use starting aids. See page 10-10-3.
X	X	X	Pull out on choke knob on gasoline and LP-Gas engines.
X	X	X	Pull engine disconnect lever rearward on all tractors with Power Shift.
X	X	X	Press the starter button (Serial No. 68000 and After). Turn key switch clockwise all the way (Prior to Serial No. 68000). If engine is not at operating temperature, momentarily pull choke knob out while starting gasoline or LP-Gas engine. <i>NOTE: Do not operate starter more than 30 seconds at a time, to do so may overheat the starter.</i> If engine does not start the first time, wait a minute or two before trying again. If it does not start after four such attempts, refer to Section 310 of this manual.
	X	X	As soon as engine starts, push choke knob in. During cold weather it may be necessary to leave choke partially out for first few minutes.
X	X	X	As the engine begins to run, note whether generator and oil pressure indicator lamps go out. If either lamp remains lighted, stop engine and determine cause. See Section 190 of this manual.

STARTING THE ENGINE (Continued)

		X	Allow engine to run until coolant in cooling system is warm, then slowly open liquid withdrawal valve and close vapor withdrawal valve.
X	X	X	If the engine disconnect was used on Power Shift tractors, pull the engine disconnect lever slightly to the rear while pulling out on the latch. Allow the lever to move to its full forward position.
X	X	X	On Power Shift tractors, the transmission oil pressure gauge should indicate oil pressure.
X	X	X	Check for water, oil, and hydraulic leaks.

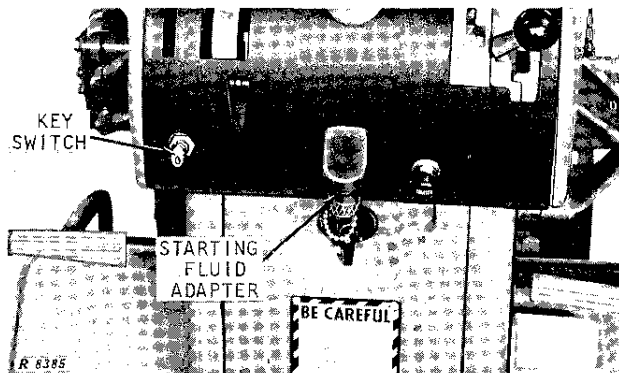
COLD WEATHER STARTING**COLD WEATHER STARTING FLUID ADAPTER
(Diesel Tractor)**

Fig. 10-10-6—Cold Weather Starting Fluid Adapter (3020 Tractor Illustrated)

Diesel tractors are equipped with a cold weather starting fluid adapter (Fig. 10-10-6) which is used to inject atomized starting fluid into the engine intake system. Starting fluid, which aids fuel combustion, is provided in pressurized cans.

To use the can of starting fluid, remove the safety cap and plastic spray button from the can. Remove the cap from the adapter and position the can under the adapter.

To inject a "shot" of starting fluid, momentarily push on the can.

CAUTION: To avoid damage, turn engine with starter one or two revolutions before injecting starting fluid and inject starting fluid only while the engine is turning.

Relax pressure on the can between "shots" of starting fluid. Stop injecting fluid after the engine starts. If the engine begins to die during the first few minutes of operation, inject another "shot" of fluid. When the engine is operating satisfactorily, remove the can from the adapter and replace the safety cap on the can.

Be sure to install the cap on the adapter when it is not in use. This will prevent dust from being drawn into the engine.

Store starting fluid cans where they will not be subject to extreme cold or warm temperatures. For best results, store fluid at room temperature.

CAUTION: Ether starting fluid is highly flammable.

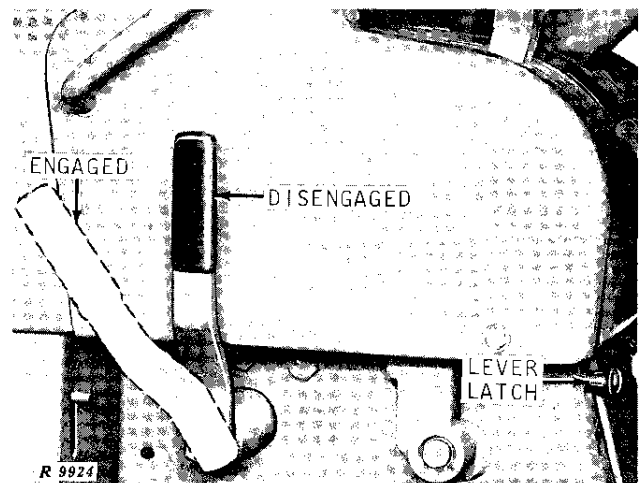
ENGINE DISCONNECT LEVER

Fig. 10-10-7—Engine Disconnect Lever (3020 Power Shift)

All 3020 Tractors with Power Shift transmission have a spring-loaded clutch, located in the engine flywheel, for use during cold weather starting. When the engine disconnect lever (Fig. 10-10-7) is pulled to the rear until it latches, the engine is disengaged from the transmission, thus decreasing the cranking load.

After the engine is running the clutch is engaged by holding the lever to the rear, pulling latch, and allowing the lever to move forward to the stop.

CAUTION: Do not operate engine with engine disconnect clutch disengaged for more than ten minutes. To do so will damage the main hydraulic pump.

CRANKCASE OIL HEATER

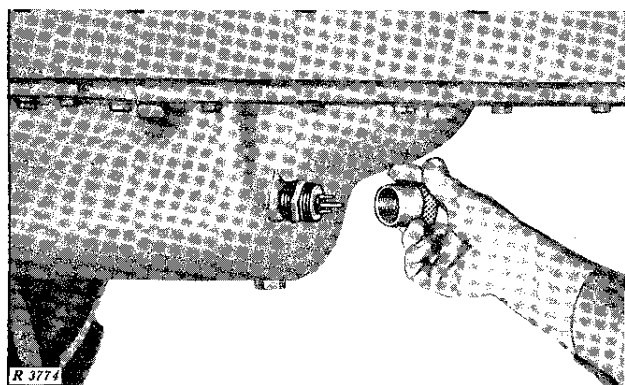


Fig. 10-10-8—Removing Cap from Crankcase Oil Heater

Tractors are designed to permit use of a 240-watt electrical crankcase oil heater. The heater warms the oil in the crankcase to facilitate engine starting.

To install the crankcase, oil heater, remove the heater plug from the crankcase and drain the crankcase oil. Apply thread paste to the threads of the heater, insert the heater in the opening and refill the crankcase. When the heater is to be put into use, remove the protective cap (Fig. 10-10-8), attach the cord, and plug the cord into any convenient 115-volt electrical source with suitable ground. The connector on the cord has a release lever to lock the connector and heater terminal connection. Press the release lever when connecting or disconnecting the heater cord.

ADDITIONAL BATTERIES

Starting the engine in cold weather can be made easier on gasoline and LP-Gas tractors by connecting an additional 12-volt battery in parallel with the 12-volt battery on the tractor.

CAUTION: The gas which escapes from a battery is highly explosive. Use care when connecting booster batteries to avoid creation of a spark which could cause an explosion.

Make sure all electrical switches or accessories are turned off and make the last connection or the first disconnection at some point away from the battery.

On gasoline or LP-Gas tractors, connect a jumper cable to the negative post of a 12-volt booster battery and to the negative post of the tractor battery. Connect one end of the other jumper cable to the positive (+) post of the booster battery and the other end to a good ground on the tractor frame away from the battery. NEVER connect jumper cable to pipes or thin sheet metal.

NOTE: On diesel tractors 68000 and after, the only battery ground connection is a light gauge ground wire. NEVER connect a booster battery to the tractor frame.

On diesel tractors, use two 12-volt batteries and four jumper cables. Connect first jumper cable to the positive (+) post of the first booster battery and to the positive (+) post of the right-hand tractor battery. Connect the second jumper cable from the negative post of the second booster battery and to the negative post of the left-hand tractor battery. Connect one end of the third jumper cable to the negative post of the first booster battery. Connect one end of the fourth jumper cable to the positive (+) post of the second booster battery. To make the last connection away from the batteries, connect together the other ends of the third and fourth jumper cables.

SHUTTING OFF HYDRAULIC PUMP

The starter speed may be increased during cold weather by shutting off the hydraulic pump so it will not build up pressure. The hydraulic pump shut-off screw on early designed 3010 tractors is at the bottom of the hydraulic pump

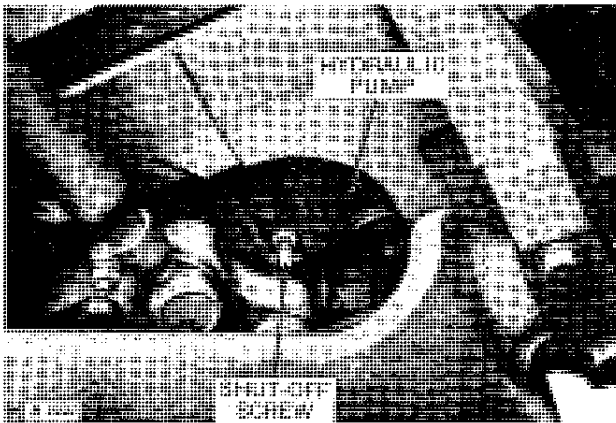


Fig. 10-10-9—Hydraulic Pump Shut-Off Screw
(Early Design 3010)

(Fig. 10-10-9). On late-design 3010 Tractors, the shut-off screw is on top of the hydraulic pump (Fig. 10-10-10).

Hydraulic pumps on 3020 Tractors do not have shut-off screws. However, they can be obtained for field installation.

To adjust the pump out of stroke, turn the shut-off screw in (clockwise) a few turns with a screwdriver. Then turn the screw in by hand until resistance is felt. Turn the screw in one more turn. After the engine has started, use the screwdriver to back the shut-off screw ALL the way out. The pump will now build up pressure.

NOTE: Oil will leak past the shut-off screw if it is not backed all the way out against the internal stop.

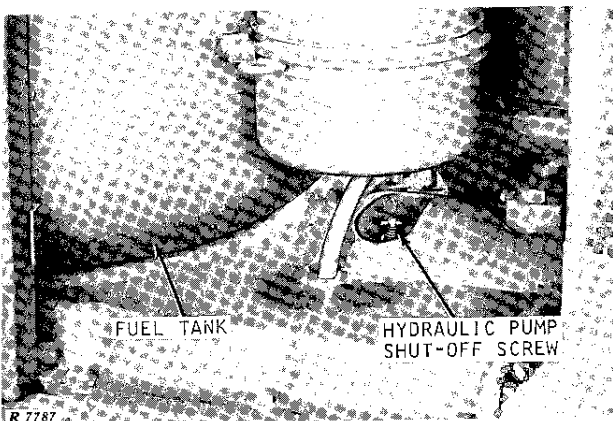


Fig. 10-10-10—Hydraulic Pump Shut-Off Screw
(Late Design 3010)

TANK-TYPE COOLANT HEATER

A thermostatically controlled tank-type coolant heater will improve cold weather starting by keeping the coolant warm to reduce oil drag and will shorten engine warm-up.

ENGINE BREAK-IN

NOTE: If the coolant temperature rises above the "N" range, operate in a lower gear to reduce the load on the engine.

With the following exceptions, the engine is ready for normal operation:

During the first 20 hours, it is not recommended to use the foot throttle or to place the hand throttle in speeds above the 2100 rpm load speed position. To facilitate break-in, avoid prolonged periods of engine idling, for the first 100 hours of service.

After the first 100 hours of service, change the engine oil and oil filter. Thereafter, change the oil and filter at the normal 200 hour interval. If during the first 100 hours it is necessary to add oil to a diesel engine, use the proper single viscosity engine oil meeting specification Mil-L-2104B. If it is necessary to add oil to a gasoline or LP-gas engine, use SAE10W-30 Service MS oil.

STOPPING THE ENGINE

Place the shift lever or speed selector in "PARK" and allow the engine to idle a few minutes. Sudden stopping of a hot engine may allow some parts to overheat momentarily and cause possible damage.

DIESEL ENGINES

Stop 3020 diesel engines by moving throttle lever counterclockwise (knob out) to stop position. Turn off key switch.

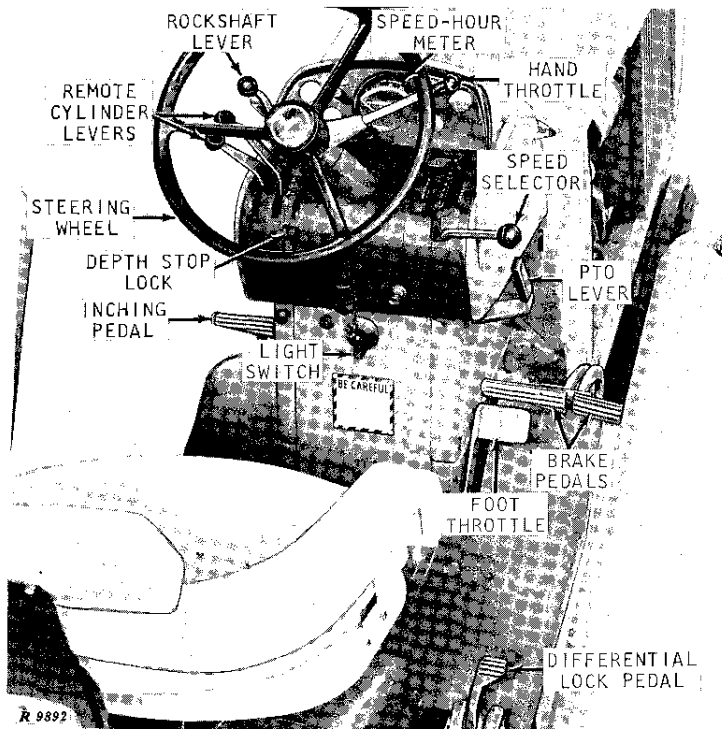


Fig. 10-10-11—Operating Controls on 3020 Diesel Tractor with Power Shift Transmission (68000 and After)

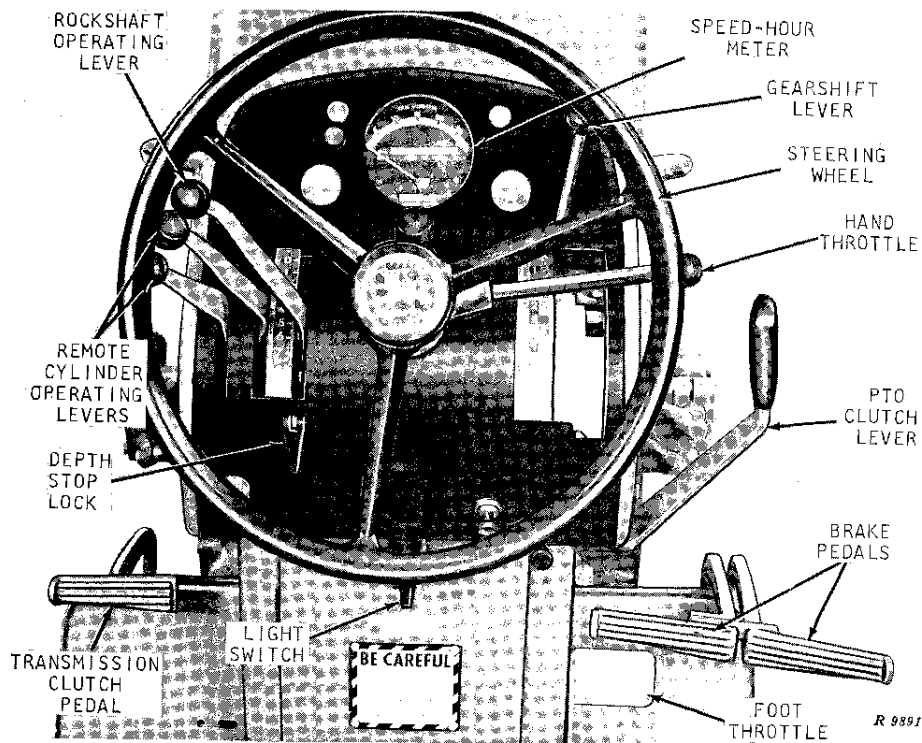


Fig. 10-10-12—Operating Controls on 3020 Tractor with Synco-Range Transmission Prior to 68000