

# 3000 Series Wheel Tractors



## SERVICE MANUAL

3000 Series  
Wheel Tractors

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ENGLISH





# SERVICE MANUAL FOR JOHN DEERE DEALERS

## 3000 SERIES

# WHEEL TRACTORS

## TABLE OF CONTENTS

	Section
Description, Operation, and Specifications . . . . .	10
Lubrication and Periodic Services . . . . .	30
Engine Tune-Up and Tractor Adjustments . . . . .	40
Basic Engine . . . . .	50
Engine Lubrication System . . . . .	60
Governor, Crankcase Ventilator Pump, and Throttle Linkage . .	70
Cooling System . . . . .	80
Gasoline Fuel System . . . . .	90
Diesel Fuel System . . . . .	100
Engine Clutch . . . . .	110
Power Take-Off (PTO) Clutch . . . . .	120
Collar-Shift Transmission . . . . .	130
Differential . . . . .	160
Final Drives . . . . .	170
Power Take-Off (PTO) and Belt Pulley . . . . .	180
Sheet Metal . . . . .	190
Electrical System . . . . .	200
Seats . . . . .	210
Front Axles . . . . .	220
Wheels, Tires, and Weights . . . . .	230
The Hydraulic System . . . . .	240
Hydraulic Supply System . . . . .	250
Hydraulic Pumps . . . . .	260
Power Steering . . . . .	270
Power Brakes . . . . .	280
Remote Cylinder Selective Control Valve . . . . .	290
Breakaway Couplers and Remote Cylinders . . . . .	300
Rockshaft and 3-Point Hitch . . . . .	310
Drawbar Assembly . . . . .	320
Trouble Shooting . . . . .	330

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## TO THE JOHN DEERE SERVICEMAN

This service manual contains maintenance instructions for John Deere 3000 Series Wheel 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. Dimensions of many new wearing parts are given as an aid in determining when parts replacement is necessary. Tests and adjustments, required to keep the tractor operating efficiently, are explained in detail.

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.

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 textbook 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.



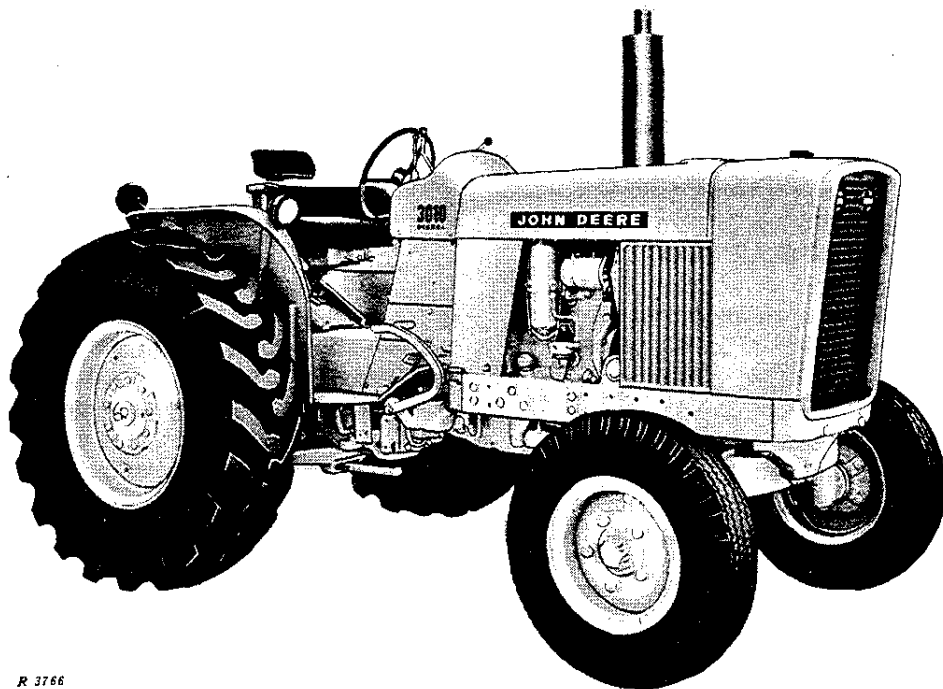
*John Deere 3010 Wheel Tractor with Loader and Backhoe*

## Section 10

# DESCRIPTION, OPERATION, AND SPECIFICATIONS

### Group 5

## DESCRIPTION



R 3766

Fig. 10-5-1—John Deere 3010 Wheel Tractor (Diesel Engine)

The John Deere 3010 Wheel Tractor (Fig. 10-5-1) is a heavy duty tractor for operating industrial equipment such as dozers and blades, for performing various hauling operation on construction projects.

The tractor is available with either a gasoline or diesel engine. The transmission has eight forward and three reverse speeds.

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

### 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.

## MODEL NUMBERS

Distributors on gasoline engines, fuel injection pumps on diesel engines, main hydraulic pump, rockshaft valve housing, and remote cylinder selective control valve housings each bear a model number.

## ENGINE

Two types of variable-speed engines are furnished for the tractor. One is a spark ignition engine - using gasoline for fuel. The other engine is of the full diesel, compression-ignition type.

The engines each have four in-line cylinders and develop up to 59 (maximum observed) horsepower at 2200 engine rpm measured at PTO.

## CRANKCASE VENTILATING SYSTEM

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

## CLUTCH

The engine clutch is of the spring-loaded, dry disk type, and is contained in the engine flywheel. It is operated by a pedal on the left side of the tractor.

## FUEL SYSTEM

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

### GASOLINE

In the gasoline fuel system, 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 to the engine is clean.

### DIESEL

In the diesel fuel system, 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.

## ELECTRICAL SYSTEM

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

Diesel-engine-powered tractors use the 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 current in this part of the system is carried entirely by wires using no part of the tractor frame as a conductor.

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

## IGNITION SYSTEM

Gasoline engines are equipped with battery ignition systems. 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

The tractor has a pressure-type cooling system with a centrifugal-type pump to provide 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 a constant operating temperature.

## TRANSMISSION

The tractor is equipped with a collar-shift transmission containing four shift "stations."

The transmission, which has eight forward and three reverse speeds, is shifted by a shift lever located at the right side of the dash. Shifting from low to high and from high to reverse can also be accomplished, within each station by a shift lever located at the left side of the dash. Helical gears are used in all transmission speeds.

An oil cooler is provided to maintain the transmission oil temperature at a satisfactory level.

## DIFFERENTIAL AND FINAL DRIVE

A conventional 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.

## POWER TAKE-OFF (PTO) AND BELT PULLEY

Tractors can be purchased with or without power take-off. On tractors equipped with PTO, the rear PTO is adaptable to 540 or 1000 rpm by use of an adapter furnished with the PTO. The front PTO operates at 1000 rpm only. The PTO clutch operating lever is located to the left of the instrument panel. A belt pulley is available for mounting on the rear PTO. The pulley is 12 inches in diameter with 3035 fpm belt speed at rated engine speed of 1900 rpm. Instructions for using the PTO and belt pulley are included in Section 180 of this manual.

## DRAWBAR

The tractor is equipped with a drawbar which can be lengthened or shortened and raised or lowered to provide the most efficient hitch point for drawn equipment. If the tractor is equipped with a rockshaft and 3-point hitch, the "signals" which activate the automatic equipment control features of the rockshaft are transmitted to the hydraulic system through the drawbar support. See Sections 310 and 320 for additional information.

## FRONT WHEEL ASSEMBLIES

The tractor is equipped with a heavy-duty front axle. For detailed information, see Sections 220 and 230 of this manual.

## REAR WHEELS

The 3010 tractor has a steel disk wheel with cast hub mounted on a splined axle.

Rear wheel tread adjustment is made by separating the wheel from the hub and reversing the wheel. For detailed information, see Section 230 of this manual.

## HYDRAULIC SYSTEM

The tractor is 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.

The tractor can also be equipped with a rear rockshaft which utilizes hydraulic power to control integral implements to best advantage in all soil.

## POWER BRAKES

The power brakes are operated by pedals located at the right side of the tractor. 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

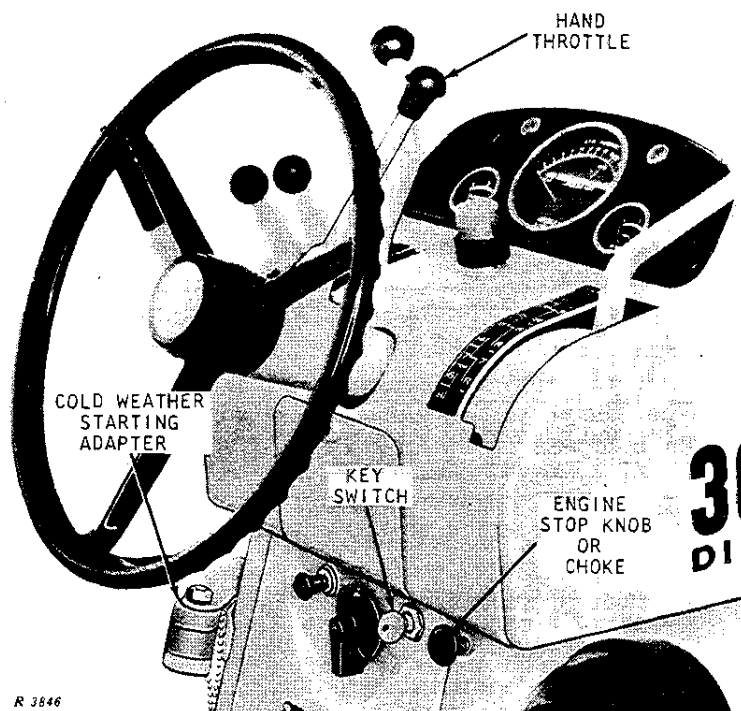
Hydraulic power steering is regular equipment on the tractor. Movement of the steering wheel activates a steering valve which directs a flow of oil, under pressure, to the two steering

cylinders which turn the front wheels. In the event of power oil supply failure, the tractor can be steered manually.

### SEATS

The tractor may be equipped with either the regular seat or an optional deluxe seat. The regular seat is cushioned by no-sag springs and foam padding, while the deluxe seat uses 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.

## Group 10 OPERATION



R 3846

Fig. 10-10-1—Gasoline and Diesel Engine Starting Controls

### 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.

### STARTING CONTROLS

Figure 10-10-1 shows the starting controls for tractors with gasoline or diesel engines.

## STARTING THE ENGINE

Gasoline	Diesel	Procedure
X	X	Place shift lever in neutral, "park" or "tow" position and depress clutch pedal to decrease drag on the engine.
X	X	Place the hand throttle in the 1500 rpm position, midway in its range of travel.
X		Place the hand throttle in the 600-rpm position.
X	X	Turn key switch clockwise to the first position, the generator and oil pressure indicator lamps should glow. If either lamp fails to glow, turn the key switch off and determine the cause, see Section 200, Group 40 of this manual.
X		When the prevailing temperature is below 60 degrees, pull out on the choke knob.
	X	When the prevailing temperature is below 40° F. it may be necessary to use cold weather starting aid fluid. See page 10-10-3.
X	X	Turn the key switch all the way to the right to start the engine.  NOTE: Do not hold the key switch in start position for more than 30 seconds at a time. To do so may overheat the starter.  If the engine does not start the first time, wait for a minute or two before trying again. If it does not start after four such attempts, refer to "Trouble Shooting" in this manual.
X		As soon as the engine starts, push the choke knob in. During cold weather it may be necessary to leave choke partially out for the first few minutes.
X	X	As the engine begins to run, check to see that the generator and oil pressure indicator lamps go out. If either of these lamps continues to glow, stop the engine and determine the cause. See Section 200, Group 40 of this manual.

## AFTER STARTING INSPECTION

- (1) Check for water, oil, and hydraulic leaks.
- (2) Check the generator and oil pressure indicator lamps to make sure they go out.
- (3) Check the actual oil pressure, see Section 60, Group 15.

- (4) Check the generator output, see Section 200, Group 10.

NOTE: It is necessary for the serviceman to check oil pressure and generator output. Because the indicator lamps go out does not mean that oil pressure and generator output are what they should be.

**COLD WEATHER STARTING****ADDITIONAL BATTERIES**

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

On diesel tractors, connect two additional 12-volt booster batteries in parallel with the two 12-volt batteries on the tractor.

Use jumper cables to connect the positive (+) terminal of the booster battery to the positive (+) terminal of the tractor battery, and the negative (-) terminal of the booster battery to the negative (-) terminal of the tractor battery.

**CRANKCASE OIL HEATER**

The tractor is 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, 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 the heater cord.

**BATTERY WARMER**

This warmer is used to warm the battery, permitting it to furnish electrical current to the starter efficiently in cold weather.

Place the battery warmer in the battery compartment and plug the cord from the heater into any 115-volt electrical source. It may be necessary to disconnect and connect the battery before installation of the warmer. Be sure to connect the battery cables properly after installing the warmer.

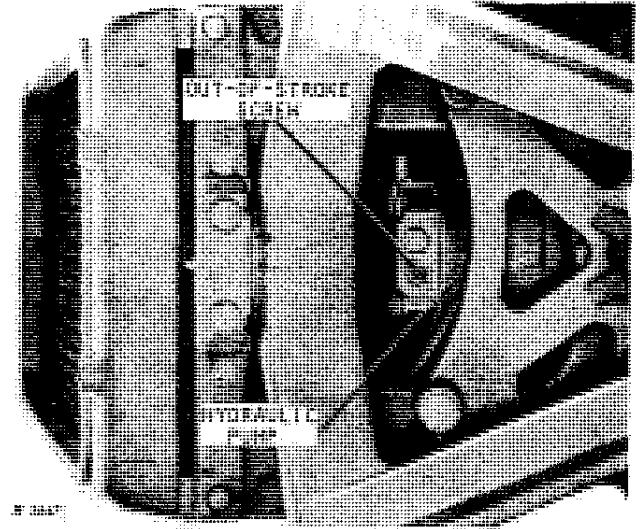
**HYDRAULIC PUMP (OUT OF STROKE)**

Fig. 10-10-2—Hydraulic Pump Out-of-stroke screw

As an additional aid to cold weather starting, the hydraulic pump can be adjusted out of stroke. Figure 10-10-2 shows the out-of-stroke screw for this operation. Turn the shut-off screw in (clockwise) a few turns with a screwdriver. Then turn the screw in by hand until resistance is felt. With a screwdriver, turn the screw in one more turn. The hydraulic pump is now out of stroke. After the engine has started, use a screwdriver to back the shut-off screw all the way out (counterclockwise). 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.

**COLD WEATHER STARTING FLUID ADAPTER (DIESEL TRACTOR)**

The diesel tractor is equipped with an adapter (Fig. 10-10-3) which is used to inject atomized starting fluid into the engine air intake system. The starting fluid, which aids fuel combustion, is provided in pressurized cans.



Fig. 10-10-3—Cold Weather Starting Fluid Adapter

To install the can of starting fluid, remove the cap from the adapter, position the outlet tube of the can on the adapter pilot, and push up gently on the can until it snaps into place.

To inject starting fluid, push the can up  $\frac{1}{16}$ -inch further while turning the key switch to start the engine. Relax pressure on the can between "shots" of starting fluid. Stop injecting the fluid after the engine starts. If the engine starts to die during the first 5 minutes of operation, inject starting fluid to smooth out engine operation. Remove the can from the adapter when the engine is operating satisfactorily.

**NOTE:** Install the cap on the adapter when it is not in use. This prevents dust from being drawn into the engine air intake system.

### STOPPING THE ENGINE

#### ALL ENGINES

Operate the engine at 600 rpm for at least one or two minutes before stopping. This will allow the engine to cool off gradually, prevent-

ing extreme contraction of parts, possible back-firing, and coking of lubricating oil on piston rings, valve guides, etc.

**NOTE:** Never drain water immediately after the engine is stopped.

#### GASOLINE ENGINE

Set the hand throttle to run the engine at 450 rpm (pull out on the hand throttle knob and push the throttle all the way up) and allow the engine to run for at least  $\frac{1}{2}$  minute. Without moving the hand throttle, turn the key switch to the off position.

#### DIESEL ENGINE

Set the hand throttle lever in the slow idle position (600 rpm) and allow the engine to idle for one or two minutes. This permits it to cool gradually. Pull out on the engine stop knob. This causes the engine to stop after a few revolutions. Turn the key switch off to prevent battery discharge, shutting off electrical current to the fuel gauge, generator indicator light, and oil pressure indicator light.

### ENGINE BREAK-IN

To be sure that all bearing surfaces will be properly lubricated during initial operation, break in the tractor engine as follows:

For the first 20 hours of service, the tractor engine should be operated at rated speed (pull hand throttle down to the first stop) with loads up to one-half of its capacity. A gasoline engine should operate between 2050 rpm and 2100 rpm, and a diesel engine should operate between 2000 and 2050 rpm at half load.

After the 20-hour break-in period, drain the oil from the crankcase, replace the crankcase oil filter, and fill the crankcase with new oil of the proper viscosity. The tractor is then ready for normal operation.

**NOTE:** Observe the engine coolant temperature carefully during the break-in period. If the temperature rises above the normal operating range, shift to a lower gear to reduce the load on the engine.

## OPERATING CONTROLS

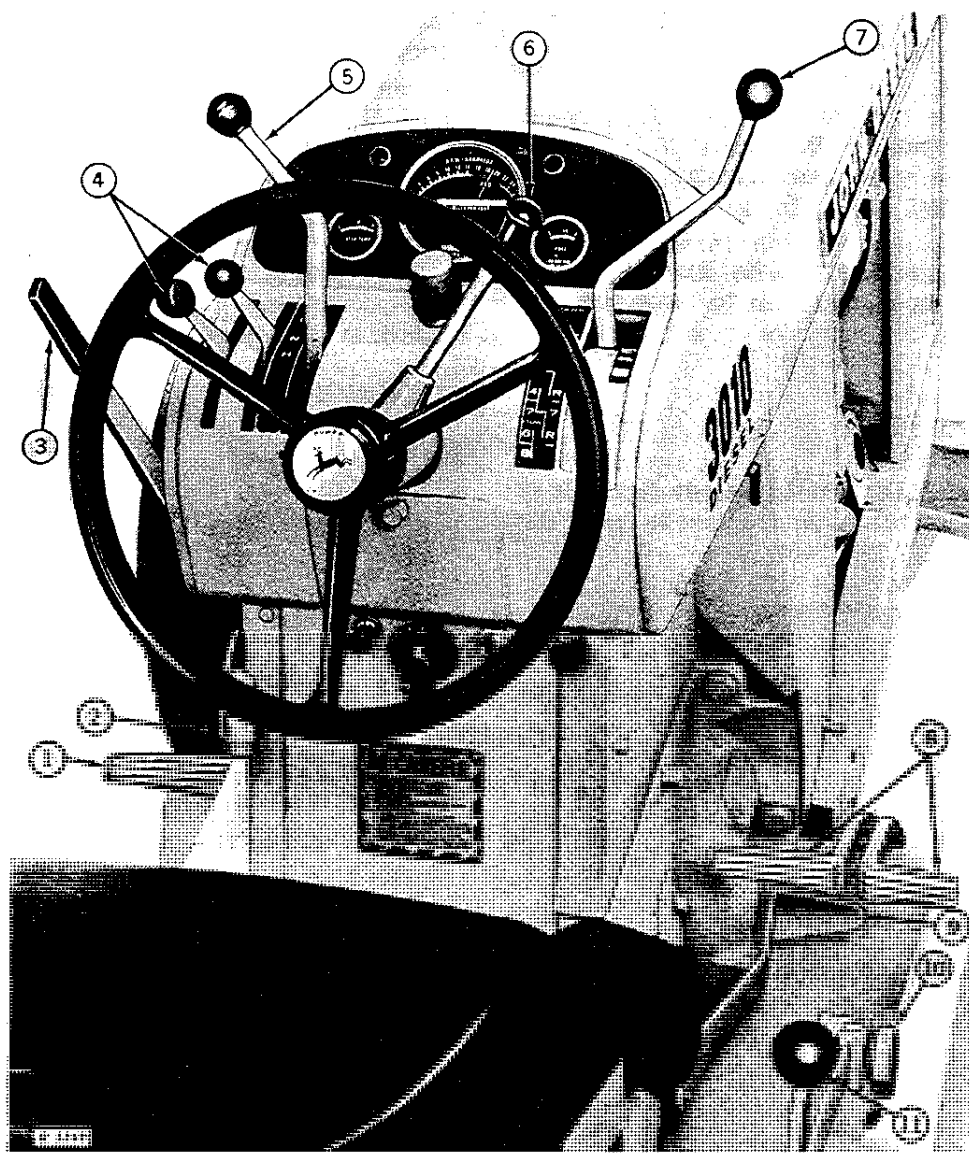
Operating controls on gasoline and diesel engine tractors are identical (Fig. 10-10-4). The clutch pedal, brake pedals, shift lever, PTO clutch lever, rockshaft control levers, remote hydraulic cylinder operating levers, hand throttle, and foot throttle are located in the same position on all tractors.

## OPERATING THE TRACTOR

## TRACTOR WARM-UP

Always be sure the tractor is warmed up properly before operating under a full load.

A good way to do this is first to idle the engine at about 1500 rpm for 5 minutes and then operate it at about 1900 rpm for another 5 minutes.



- |  |   |
|--|---|
| 1 - Clutch pedal                               | 7 - Right-hand shift lever              |
| 2 - Ether starting fluid adapter               | 8 - Brake pedals                        |
| 3 - Power take-off clutch lever                | 9 - Foot throttle                       |
| 4 - Remote hydraulic cylinder operating levers | 10 - Rockshaft control lever depth stop |
| 5 - Left-hand shift lever                      | 11 - Rockshaft control lever            |
| 6 - Hand throttle                              |   |

Fig. 10-10-4-Operating Controls

In cold weather it is also good practice to operate the tractor for the first 30 minutes in a lower gear than is normally required for the load. This gives the oil a chance to circulate freely and prevents undue wear on engine or transmission parts.

#### ENGINE SPEEDS

The tractor engine is designed to operate at working speeds ranging from 1500 to 2200 rpm. These are variable governed speeds, and the engine can be operated at any speed between the two extremes to meet various working conditions.

The rated speed of the engine is 1900 rpm. Use this speed when operating the power take-off or belt pulley. Slow idle is 600 rpm.

In addition, engine speeds may be varied between 2200 and 2500 rpm to save you time when traveling on highways or on smooth-surfaced roads.

#### Using Hand Throttle

Use the hand throttle to select slow idle or any of the variable governed speeds from 1500 to 2200 rpm (Fig. 10-10-5).

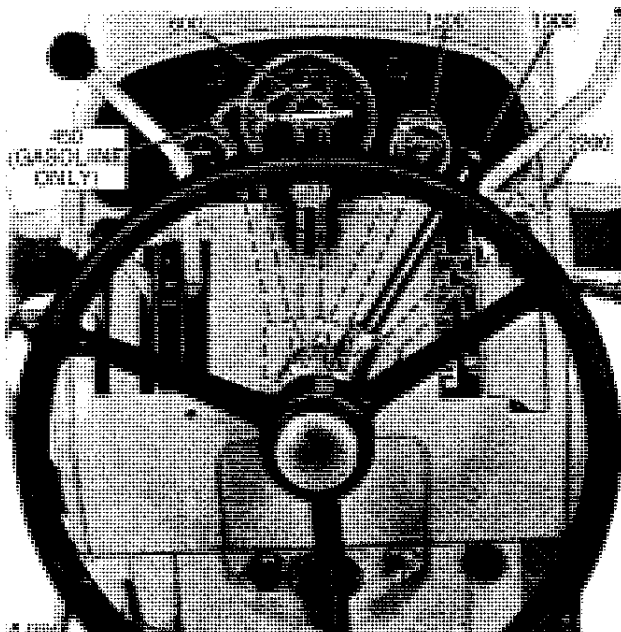


Fig. 10-10-5—Range of Hand Throttle Positions

Push the lever upward as far as it will go to obtain slow idle. To obtain the 1900 rpm rated engine speed, pull the lever downward to the first stop. Placing the lever halfway between slow idle and 1900 rpm gives the 1500 rpm speed. Engine speeds between 1500 and 1900 rpm may be selected by moving the lever between these two positions.

To obtain working speeds above 1900 rpm, pull out on the knob at the end of the hand throttle. With the knob pulled out, pull the throttle downward as far as it will go. This is the 2200 rpm position. Engine speeds between 1900 and 2200 rpm may be selected by moving the lever between these two positions.

#### Using Foot Throttle

The foot throttle is used to select engine transport speeds from 2200 to 2500 rpm or to change engine speed momentarily.

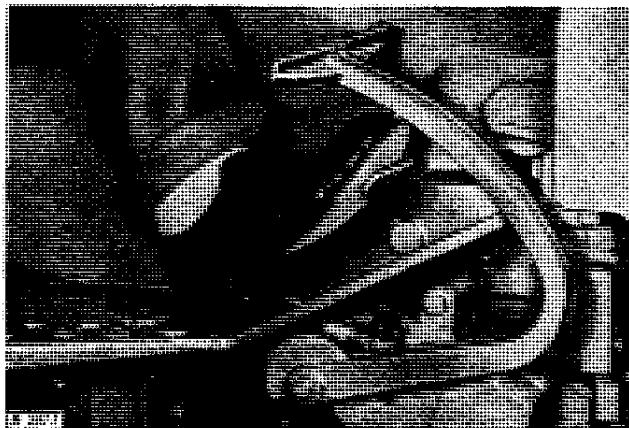


Fig. 10-10-6—Using the Foot Throttle

Press down on the foot throttle to speed up the engine (Fig. 10-10-6). When the pedal is pushed down as far as it will go, the engine operates at 2500 rpm.

The foot throttle operates independent of the hand throttle. When it is not in use, engine speed is determined by the setting of the hand throttle.

**NOTE:** The foot throttle is not intended as a means of increasing the normal working speed of the engine.

**SELECTING GROUND SPEED**

The tractor has 8 forward speeds and 3 reverse speeds for each of the throttle positions that may be used. These combinations enable the operator to balance speed and power for maximum economy and allow him flexibility to meet varying working conditions. For example, for a given ground speed the operator may choose to work in a low gear at high engine speed for maximum reserve power or in a higher gear at a lower engine speed for maximum fuel economy.

Examples of the ground speeds at which the tractor will travel are shown in Group 15 of this section. Engine working speeds may be varied between 1500 rpm and 2200 rpm, and engine transport speeds may be varied up to 2500 rpm.

**NOTE:** Avoid overloading the tractor. Overloading causes undue strain on parts, eventually resulting in poor operation.

**SHIFTING FROM NEUTRAL**

Having determined the proper speed, depress the clutch pedal to disengage the clutch and move the shift lever from neutral to the slot for the gear desired.

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

**SHIFTING FROM ONE SPEED TO ANOTHER**

The shift quadrant has four shift stations. Stations No. 1, 2, and 3 have two forward speeds and one reverse speed. Station No. 4 has two forward speeds only.

With the clutch pedal depressed, the transmission can be shifted with *either* shift lever from one forward speed to the other forward speed within the same station. For instance, you can shift between 1st and 3rd gears, 2nd and 5th gears, 4th and 7th gears, and 6th and 8th gears.

*Either* shift lever can also be used to shift from the highest forward speed in any station to the reverse speed in the same station.

To shift from one station to another, depress the clutch pedal, stop the tractor, and move the *right-hand* shift lever to neutral. Then shift from neutral to the new gear in the new station and gradually release the clutch pedal to engage the clutch.

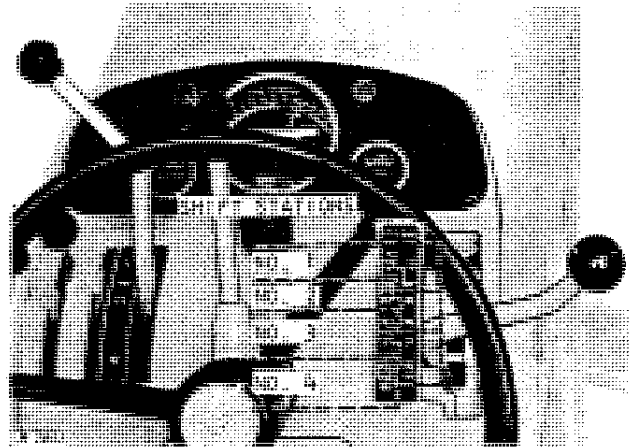


Fig. 10-10-7—Shift Lever in "TOW" Position in Quadrant

**CAUTION:** Stop the tractor before shifting from one gear to another within a station or when shifting from one station to another.

**PARKING THE TRACTOR**

When the tractor is stopped for parking, for holding it on an incline, or for holding it during PTO or belt work, move the shift lever as far as it will go forward from neutral to the "PARK" position.

**CAUTION:** Be sure the tractor is stopped before placing the shift lever in "PARK" position.

This automatically holds the tractor stationary. Shifting from "PARK" to neutral or to an operating gear releases the braking action.

**TOWING THE TRACTOR**

The shift quadrant on your tractor also has a "TOW" position. Whenever the tractor is to be towed, move the shift lever to this position. This will eliminate unnecessary wear of transmission parts when the tractor is being towed by another vehicle.

**CAUTION:** The tractor should never be towed at high speed. Always attach a tow bar or chain to the tractor frame.



## HYDRAULIC SYSTEM

The John Deere hydraulic system is a constant pressure, closed center system.

Pressure and flow are maintained by a variable displacement, constant pressure pump driven by the engine crankshaft. Reservoir for the system is the transmission case and oil is carried through external steel pipes to each hydraulic function. All oil in the system is filtered through a full-flow filter.

## POWER BRAKES

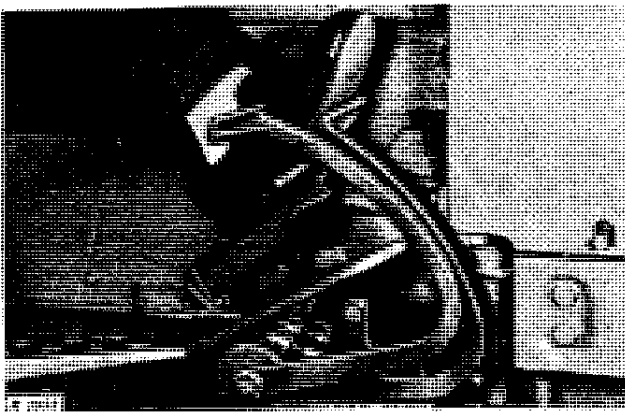


Fig. 10-10-8—Using Power Brakes to Help Make Sharp Left-Hand Turn

The tractor is equipped with fully hydraulic power brakes. The oil used in the transmission and hydraulic system operates the power brakes. A constant pressure of oil is maintained at all engine speeds. The two brake pedals may be applied individually to assist in making sharp turns (Fig. 10-10-8). They may also be applied together for slowing or stopping the tractor (Fig. 10-10-9).

## POWER STEERING

The tractor is also equipped with fully hydraulic power steering and, like the power brakes, uses the same oil as the transmission and hydraulic system.

The power steering system consists of a valve, cylinders, and hydraulic pipes. The valve directs the flow of oil to and from the cylinders for either a right- or left-hand turn.

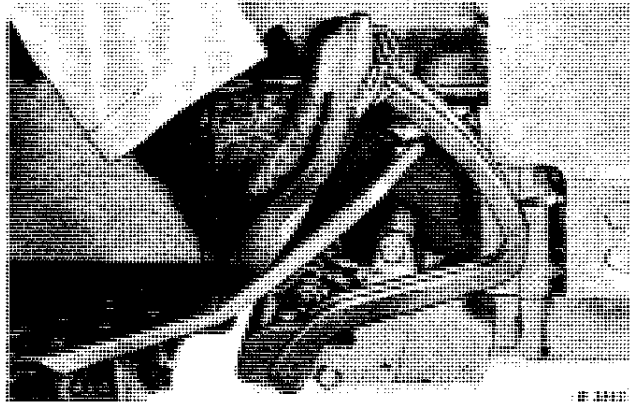


Fig. 10-10-9—Using Power Brakes to Stop Tractor

## IMPLEMENT CONTROL SYSTEM

### ROCKSHAFT

The tractor can be equipped with a rear rockshaft which can be used to raise, lower, and control a wide variety of integral implements and 3-point hitch tools.

The position of the rockshaft is in direct relation to the position of the rockshaft control lever (Fig. 10-10-10). Therefore, the rockshaft can be quickly moved through its full range of travel or "inched" to any position in between. The rockshaft can be operated whether the tractor is moving or standing still so long as the engine is running. Pushing the lever forward raises the rockshaft; pulling backward lowers it.

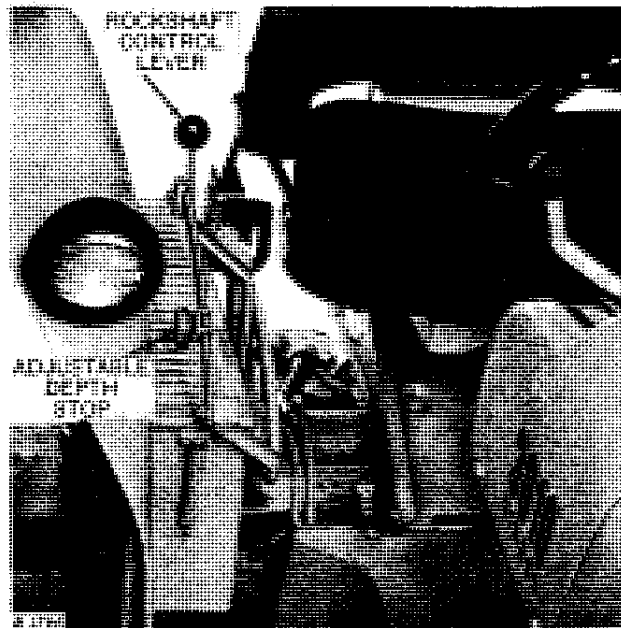


Fig. 10-10-10—Rockshaft Control Lever

### 3-POINT HITCH

The Universal 3-Point Hitch (Fig. 10-10-11) provides a fast, easy means of attaching rear mounted integral implements. A Quik Coupler or hitch bar can be obtained to provide for attaching implements without the operator leaving the tractor seat.

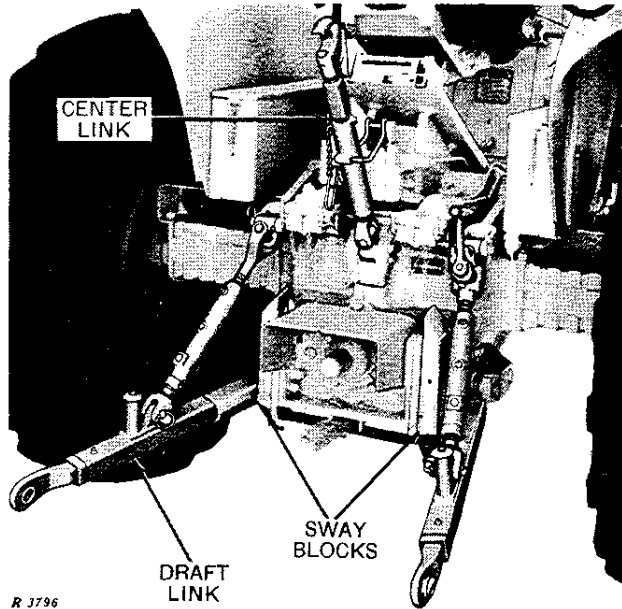


Fig. 10-10-11—Universal 3-Point Hitch

The rockshaft operates the 3-point hitch. Movement of the rockshaft control lever results in a corresponding movement of the rockshaft, hitch, and any integral implement attached to it.

### SELECTIVE CONTROL

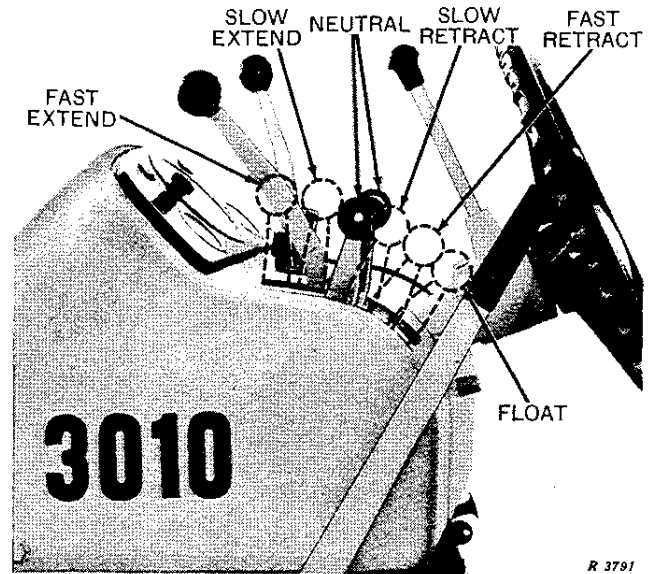


Fig. 10-10-12—Remote Cylinder Operating Levers

Selective control valves can be obtained for the operation of implement-mounted remote cylinders. Operating levers (Fig. 10-10-12) are located at the left side of the dash.

