

John Deere 2000 Series Tractors

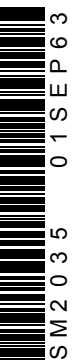


SERVICE MANUAL John Deere 2000 Series Tractors

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**SERVICE MANUAL FOR
JOHN DEERE DEALERS**

**2000
SERIES**

TRACTORS

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TO THE JOHN DEERE SERVICEMAN

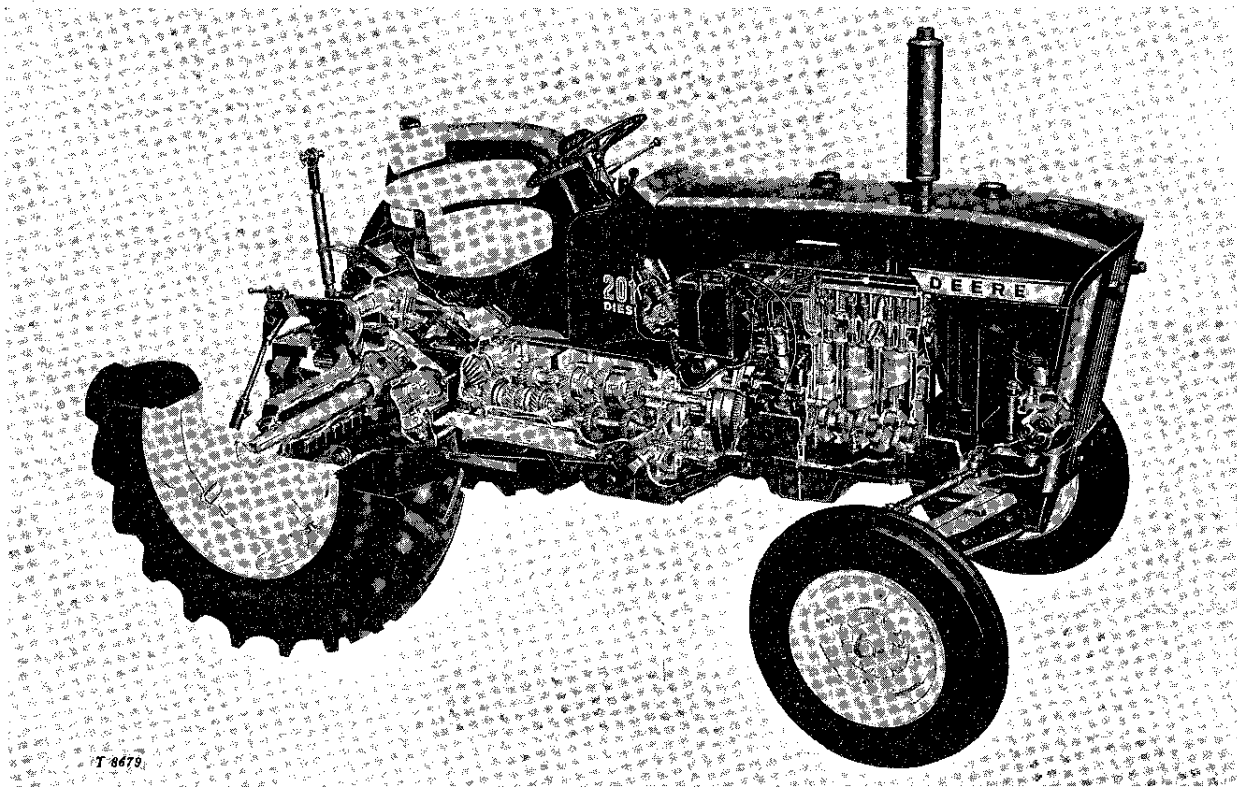
This service manual contains maintenance instructions for John Deere 2000 Series tractors. Included are complete instructions for removal, disassembly, inspection, repair, assembly and installation of the major parts and assemblies of the tractor.

In addition, the manual contains brief descriptions of the more complicated systems of the tractor, and tells how they operate. 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 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.



Cutaway View of John Deere 2010 Row-Crop Utility Tractor

Section 10**DESCRIPTION, OPERATION AND
SPECIFICATIONS****Group 5
DESCRIPTION****DESCRIPTION**

The 2010 Row-Crop is a general-purpose tractor which can be equipped with Roll-O-Matic, dual front wheels, single front wheel, or adjustable front axles. It is especially useful for planting and cultivating two, four, or six rows, mowing, seedbed preparation, and similar jobs.

The 2010 Row-Crop Utility Tractor is, as the name implies, an all-around agricultural row-crop type tractor. Its low center of gravity provides excellent stability and maneuverability even when working under adverse conditions. Its groundhugging features make it ideally suited for general purpose farming.

The 2010 Hi-Crop Tractor provides 34-inch crop clearance under the front axle and 31-inch clearance under the transmission, making late cultivating possible without damage to tall, bushy, or high-bedded crops. The flexibility of this tractor makes it ideal for bedding, planting, side-dressing, cultivating, and harvesting.

These tractors have ample power to pull two or three plow bottoms, or the equivalent, in most soils.

The tractors in the 2010 Series line are identical in many respects. Features which are common to both types are described briefly in the paragraphs which follow. The distinctive features of each are also mentioned briefly.

COMMON FEATURES**GASOLINE AND LP-GAS ENGINES**

The 2010 Series has a vertical, four-cylinder, valve-in-head, four-stroke cycle, internal com-

bustion engine. A bore of 3-5/8 inches and a stroke of 3-1/2 inches gives a piston displacement of approximately 145 cubic inches.

The 2010 Series is available with either gasoline-burning equipment or LP-Gas-burning equipment. The compression ratio of the gasoline-burning engine is 7.9 to 1 as opposed to 8.9 to 1 in the LP-Gas engine. (Pistons are available for high altitude operation of gasoline engines which provide a 9.0 to 1 compression ratio.)

A replaceable "sleeve and deck" assembly is used in the cylinders of both gasoline and LP-Gas models. This feature provides lower costs at time of engine overhaul.

Crankshaft rotation is clockwise when viewed from the front.

The engine has replaceable precision-type main and connecting rod bearing inserts. All bearings and other parts of the engine are lubricated by a force-feed and splash-type system with a replaceable-type oil filter. The crankcase is ventilated by means of a ventilator outlet tube attached to the rocker arm cover. This tube discharges below the crankcase flange. Engine speeds are controlled by a flyweight-type governor, gear-driven from the camshaft gear.

DIESEL ENGINES

The 2010 Series has a vertical, 4-cylinder, valve-in-head, fuel injection, four-stroke cycle, internal combustion engine. A bore of 3-7/8 inches and a stroke of 3-1/2 inches gives a piston displacement of approximately 165 cubic inches.

The compression ratio of the Diesel engine is 19 to 1.

The engine has replaceable precision-type main and connecting rod bearing inserts. All bearings and other parts of the engine are lubricated by a force-feed and splash-type system with a replaceable-type oil filter. The crankcase is ventilated by means of a ventilator outlet tube attached to the rocker arm cover and discharging below the crankcase flange. Engine speeds and injection timing are controlled by the fuel injection pump.

A replaceable "sleeve and deck" assembly is used in the cylinders of the Diesel engine.

Crankshaft rotation is clockwise when viewed from the front.

FUEL SYSTEM

The 2010 Series gasoline fuel system is equipped with a 16 U.S. gallon fuel tank. The carburetor is a single-throat, updraft, adjustable idle jet type.

The 2010 Series Diesel uses a distributor-type fuel injection pump. The fuel system consists of a 16 U.S. gallon fuel tank, fuel filters, fuel strainer, fuel injection pump, fuel injection nozzles, and turbulence chambers. The fuel injection pump is an opposed plunger, inlet metering, distributor-type. Pintle-type injector nozzles are located in turbulence chambers mounted at the top of each cylinder.

The LP-Gas fuel system has a cylindrical, heavy welded tank and is equipped with several pressure valves and gauges designed as safety features. The tank has a capacity of 22.6 U.S. gallons at 80% fill. A direct reading, magnetic-type fuel gauge is mounted on the rear of the tank. A coolant-heated converter is used to turn pressurized LP-Gas fuel into a gas and reduce pressure. The carburetor is a converter-fed, single-throat, updraft model.

CAUTION: Before operating the LP-Gas-fuel system, read carefully the information in Section 92, Group 10, regarding the nature of LP-Gas and the rules for handling it safely.

IGNITION

Gasoline and LP-Gas models have a battery-distributor type ignition system with automatic spark advance. A 12-volt battery, generator, and starter are standard equipment.

The Diesel engines are equipped with an electrical pre-heating system called "glow plugs" which are electrical heating elements located above the fuel injectors on the cylinder head and extending into the turbulence chambers. There are four glow plugs on the 2010 Series Diesel Tractors. They are used when starting a cold engine and need not be used when starting a warm engine. A 12-volt battery, generator, and starter are standard equipment.

LIGHTING SYSTEM

All lighting equipment is optional and includes hood-mounted headlights, dual or single fender-mounted headlights, a dash light, a tail light, a combination white and red rear warning light, a rear warning light, a rear work light, and auxiliary plug-in light socket.

COOLING SYSTEM

The engines are liquid cooled; the coolant flows by pressure through passages around the cylinders in the block, and around valves in the cylinder head. Coolant is circulated evenly in all passages in the block, head, (converter in LP-Gas models) and through the radiator by a centrifugal water pump located on the cylinder block, and operated by the fan belt. A thermostat and fixed by-pass insure a quick and thorough engine warm-up.

LUBRICATION

The engine lubrication systems are forced by a positive displacement, gear driven oil pump. The oil pump on Diesel models is located under the fuel injection pump (distributor on Gasoline and LP-Gas) and extends into the bottom of the crankcase. Oil is fed under pressure onto governor bearings, crankshaft main bearings, and connecting rods, and splashed onto piston pins, and valve tappet assembly. These lubrication systems employ an oil filter with a replaceable filter element.

CLUTCH

The engine clutch used on the 2010 Series Tractors is a spring-loaded, single dry-disk, foot-operated clutch, located in front of the transmission. Adjustment for free clutch pedal travel can be made externally.

TRANSMISSION

The Syncro Range Transmission (Section 120) has a high range, low range, and reverse. It is a synchronized shift in series with four speed gear ratios to provide eight forward speeds and three reverse speeds.

A conventional ring-gear and bevel-pinion type differential is enclosed in the rear of the transmission case. Bevel pinion and gear backlash adjustment is made by shims between the ring gear carrier and the bearings.

POWER TAKE-OFF

The power take-off is the continuous-running type, governed by its own separate clutch, and is available with dual speeds of 540 rpm or 1000 rpm. It is an engine-driven type and is completely independent of tractor ground travel. It fully meets all ASAE-SAE standards.

BELT PULLEY

A belt pulley is available as an attachment. The pulley assembly slips over the power take-off shaft and is attached to the power take-off housing. The belt pulley is driven by the power take-off shaft. The belt speed is 3100 feet per minute at 1900 engine rpm.

BRAKES

Two individually or simultaneously operated, self-energizing double-disk brakes are provided, Fig. 10-5-1. Braking is applied by foot pedals through rod and lever linkage.

The 2010 Row-Crop and Row-Crop Utility brakes are mounted on the outside of the final drive housings. The 2010 Hi-Crop brakes are located inside the final drive housings. Brake adjustments are made externally on all tractors.

STEERING MECHANISM

The 2010 Series Tractors are steered by a steering gear and drag link which connects to a spindle mechanism over the front wheels. Power steering is optional.

REAR WHEELS

Row-Crop tractors can be equipped with sliding hub, rack and pinion, or power adjusted

rear wheels. Row-Crop Utility Tractors can be equipped with demountable rim, fixed hub, sliding hub, rack and pinion, or power-adjusted rear wheels. Hi-Crop Tractors have either a steel disk wheel on a reversible hub or a cast disk wheel with demountable rim on a reversible hub.

FRONT AXLES

The Row-Crop Utility tractor is equipped with adjustable front axles of either the straight or swept-back type. Both types of axle have an adjustable tread of 50 to 74 inches in 2-inch steps, which can be increased to 79-1/8 inches by reversing the wheels. Swept-back axles give a shorter turning radius for sharper turns in the field or in close-quarters work. An optional straight front axle can be adjusted from 62 to 88 inches (93-1/8 inches with wheels reversed).

The Row-Crop Tractor may be equipped with a front axle of the spindle and knuckle type (dual), adjustable front axle of the straight type, Roll-O-Matic type, or single front wheel type. The adjustable front axle provides a tread range of 50 to 74 inches in 2-inch steps, which can be increased to 79-1/8 inches by reversing the wheels. An optional adjustable front axle can be adjusted from 62 to 88 inches (93-1/8 inches with wheels reversed).

The Hi-Crop Tractor is equipped with a front axle which provides wheel treads of 54 to 84 inches in 6-inch steps (89-1/8 inches with wheels reversed). Radius rods are available to provide increased strength under unfavorable working conditions.

HYDRAULIC SYSTEM, 3-POINT HITCH, AND LOAD-AND-DEPTH CONTROL

As optional equipment, the 2010 Series Tractors may be equipped with a single or dual hydraulic system, a single or dual remote control system, and a 3-point hitch.

Depending on individual needs, the tractors can be equipped with either a single hydraulic system to raise, lower, or set integral implements to desired depth, or a dual hydraulic system which will raise, lower, or set at desired depth, part of an integral implement independently (such as one side of a two-row cultivator) or all of the implement simultaneously. By simple adjustments, both cylinders

may be made to act together, approximately doubling the lifting capacity.

The load-and-depth control system regulates implement working depth over uneven ground, compensating for the effect of ridges and depressions.

The desired implement working depth is set by the hydraulic system control levers. When the tractor front wheels pass over a ridge, the implement mounted at the rear of the tractor is forced downward. This pushes the center link of the 3-point hitch forward, actuating the load control yoke and linkage causing the system to raise the implement until the system is again in balance and the implement is working at the correct depth.

When tractor front wheels drop into a depression, the implement tends to rise in relation to the ground level. The resulting pull on the center link causes the load-and-depth control to lower the implement to the proper working depth. In addition, when soil conditions change so that the implement is working in abnormally hard soil, the implement is forced backward, causing the center link to push forward. The system then raises the implement sufficiently to reduce draft and minimize strain on the tractor and implement.

When once more operating in normal soil, the load-and-depth control again returns the implement to the operating depth determined by the position of the control lever.

A positive-displacement, gear-type hydraulic pump is mounted on the transmission front cover. The pump is driven by a coupling on the front end of the driveshaft. All 2010 Series Tractors

use the same pump (with varying gear sizes and capacities) in their hydraulic systems. Refer to Section 190, Group 5 of this Manual.

The tractor may be equipped to operate single-acting or double-acting remote hydraulic cylinders. A single remote cylinder is connected by hoses to a breakaway coupler mounted at the rear of the tractor. If a second cylinder is used, it is connected by short hoses to the control valve. Pressure oil from the hydraulic pump is directed by the selective control valve to the cylinder or cylinders.

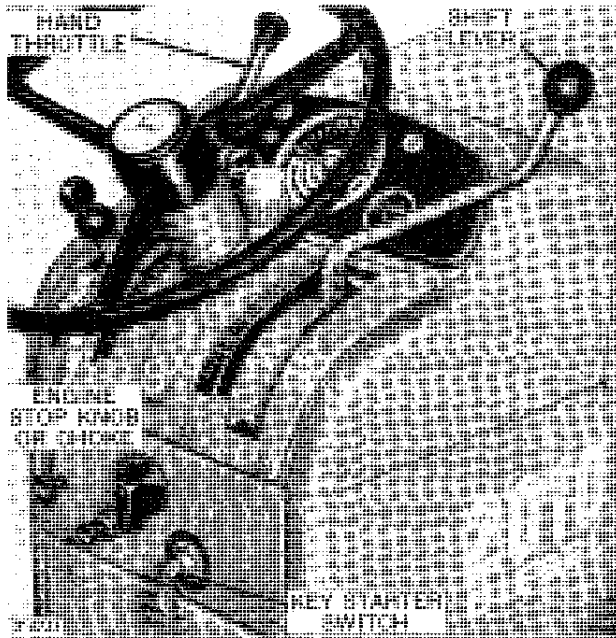
If the tractor is equipped with one remote cylinder, the cylinder can be used to control a drawn implement or to control front-mounted tools. Two remote cylinders (with dual system) permit selective control of front-mounted units and dual hookups on drawn machines. The two remote cylinders may be operated individually or simultaneously.

The 3-point hitch on all tractors provides an efficient, versatile means of attaching integral implements to the tractor.

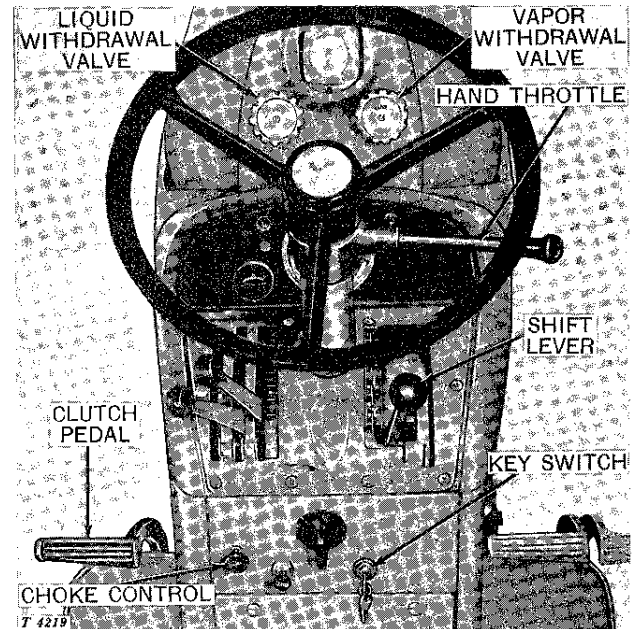
FRONT-MOUNTED ROCKSHAFT

Tractors may be equipped with a front rockshaft to control the front rigs of cultivators and other front-mounted tools. The front rockshaft can be powered by the rear rockshaft lift arms (H, R, RU) or by one or two remote cylinders (R only). When powered by the rear rockshaft, rigs on the front rockshaft can be operated together with rigs at the rear or as separate units (with dual rear rockshafts only). Remote cylinder powered front rockshafts are available in single or dual systems, which provide both up and down pressure.

Group 10 OPERATION



Gasoline and Diesel



LP-Gas

Fig. 10-10-1—Engine Starting Controls

PRE-STARTING INSPECTION

1. Check engine crankcase oil level.
2. Check radiator coolant level.
3. Check radiator hoses and connections for leaks.

4. Make sure the fuel shut-off valve under the fuel tank is open (gasoline and diesel).

STARTING CONTROLS

Fig. 10-10-1 shows starting controls for gasoline, diesel, and LP-Gas engines.

STARTING THE ENGINE

Gasoline	Diesel	LP-Gas	Procedure
X	X	X	Place shift lever in "PARK" and depress clutch pedal to decrease drag on engine.
X	X		Advance hand throttle to half-way open position.
		X	Advance hand throttle to provide a speed slightly faster than slow idle.
X		X	Pull out choke (if engine is cold).
	X		Turn key starter switch left to "GLOW PLUGS" and preheat engine. (See time chart below.)*
		X	Open the VAPOR withdrawal valve <u>slowly</u> .
X	X	X	Turn key starter switch all the way to right to start engine. <u>Do not hold switch in start position for more than 30 seconds. To do so may overheat starter.</u>
X		X	As soon as engine starts, push in choke. (During cold weather leave choke partially out a few minutes if necessary.)
X	X	X	As engine begins to run, check to see that generator and oil pressure tel-lights go out. If not, stop engine and troubleshoot.
		X	Operate engine until warm; then slowly open LIQUID withdrawal valve and close VAPOR withdrawal valve.
X	X	X	Allow engine to warm up for five minutes before placing under load. Do not idle engine during this period.

*Preheat time for diesel glow plugs at various temperatures:

Above 40° F. . . . 1 minute	10° F. to - 10° F. . . . 2 to 3 minutes
40° F. to 10° F. . . . 1-1/2 to 2 minutes	-10° F. to - 20° F. . . . 3 to 4 minutes

AFTER STARTING INSPECTION

1. Check the generator and oil pressure tel-lights on dash to make sure they go out.
2. Check water temperature gauge. Do not operate engine under load until gauge moves to "N" (normal) range.
3. Check for water, oil, and hydraulic leaks.

COLD WEATHER STARTING

Use only recommended types of fuel and crankcase oil for cold weather operation (see Section 30). (Also use same type of oil in air cleaner.)

Make sure battery is fully charged to develop maximum cranking speed.

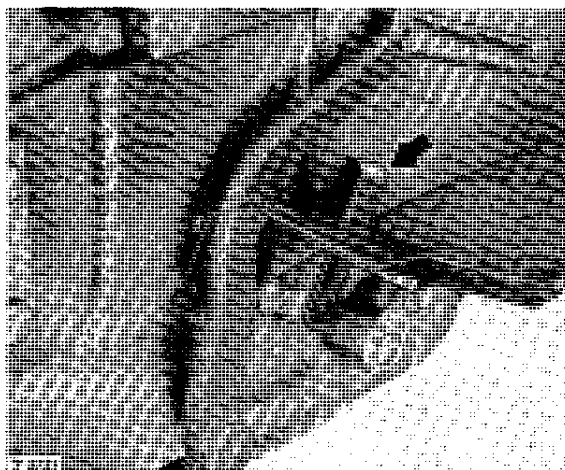


Fig. 10-10-2—Hydraulic Pump Lever

The tractor will start easier in extreme cold weather if hand throttle is placed in one-half speed position, and clutch and hydraulic pump are disengaged (Fig. 10-10-2). On diesel tractors, glow plugs should be heated for longer periods.

On diesel tractors, in extreme cold weather, it may be necessary to connect a booster battery in parallel with battery on tractor. CAUTION: Ether is NOT recommended as a diesel starting aid. It may damage engine or starter.

STOPPING THE ENGINE**ALL ENGINES**

Place shift lever in "PARK" position.

Idle engine at least one or two minutes before stopping. This will allow engine to cool off, preventing extreme contraction of parts, possible

back-firing, and coking of lubricating oil on piston rings, valve guides, etc.

GASOLINE ENGINE

Turn key starter switch to vertical "OFF" position.

NOTE: If tractor is not to be used for several days, drain fuel from carburetor at plug on bottom.

DIESEL ENGINE

Turn key starter switch to vertical "OFF" position while pulling out on engine stop knob to cut off fuel. CAUTION: Do not attempt to stop by turning off fuel supply at shut-off valves. Doing so will cause injection pump to run dry and damage internal parts.

LP-GAS ENGINES

Close the LIQUID withdrawal valve and slowly open the VAPOR withdrawal valve. Idle the engine for a minute or two to use up the liquid fuel in the lines.

Close the VAPOR withdrawal valve and let the engine idle until fuel is exhausted and the engine stops. TURN THE KEY SWITCH OFF.

BREAKING IN THE ENGINE

Before tractor was shipped from factory, all bearings and friction surfaces were correctly fitted, and the crankcase was filled with a "breaking-in" oil.

During the first 20 hours of service, tractor engine should be operated at rated speed, and under normal load. Avoid light loads and excessive engine idling. Check crankcase oil level periodically. If it becomes necessary to add oil during the "breaking-in" period, either SAE 10W or SAE 5W-20 may be used.

After this 20-hour period, drain the crankcase oil, replace the crankcase oil filter, and fill the crankcase with oil of the proper viscosity and quality (see Section 30).

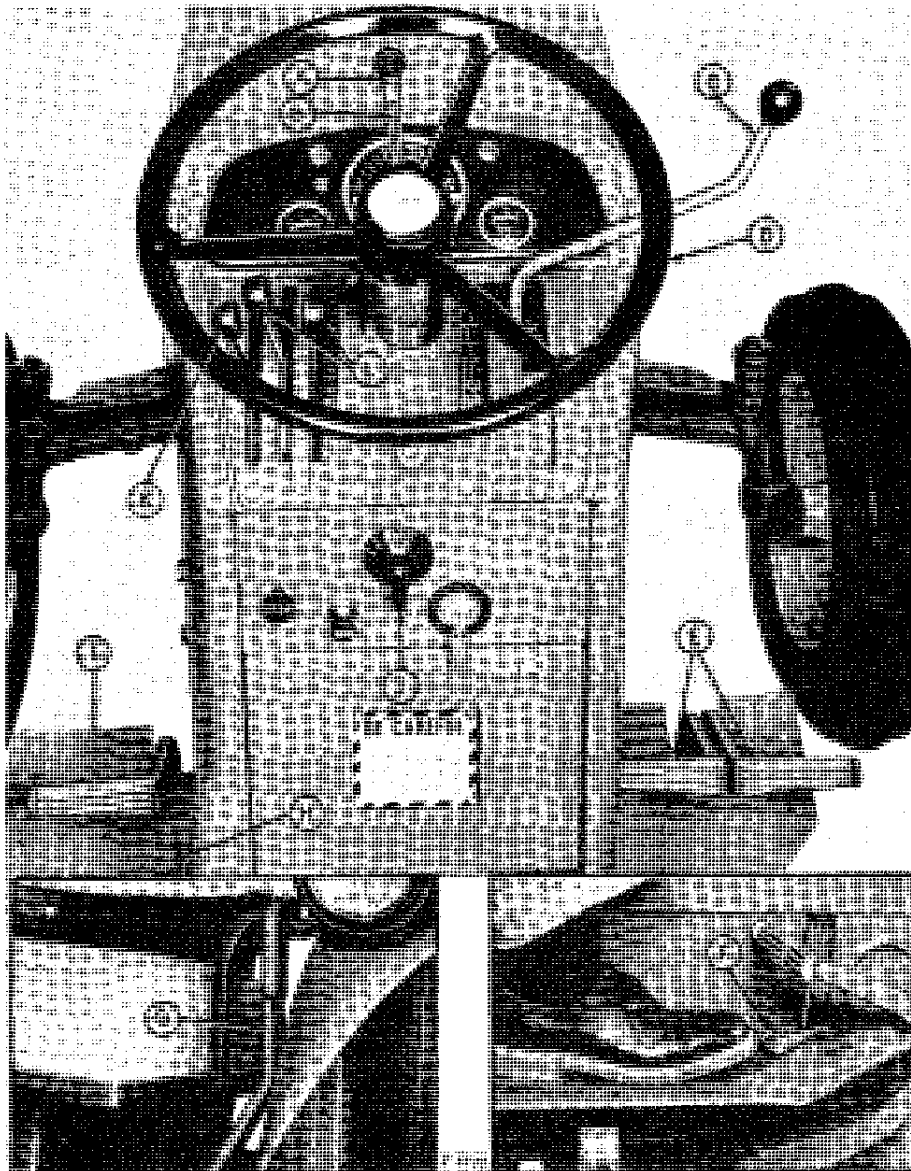
OPERATING CONTROLS

The operating controls on all tractors are identical (Fig. 10-10-3). The clutch pedal, brake pedals, shift lever, PTO clutch lever, rockshaft control levers, remote hydraulic cylinder control levers, hand throttle, and foot throttle are located in the same position on all tractors.

OPERATING THE TRACTOR

TRACTOR WARM-UP

Before putting tractor under full load or into high gear, be sure it is warmed up sufficiently. Oil will then circulate freely, preventing undue wear on engine or transmission parts.



- | | |
|------------------------|--|
| A - Hand Throttle Knob | G - Powershaft and Belt Pulley Control Lever |
| B - Hand Throttle | H - Hydraulic Pump Disengaging Lever |
| C - Shift Lever | I - Clutch Pedal |
| D - Steering Wheel | J - Light Switch |
| E - Brake Pedals | K - Remote Hydraulic Cylinder Control Lever |
| F - Foot Throttle | L - Rockshaft Control Levers |

Fig. 10-10-3—Operating Controls

ENGINE SPEEDS

The tractor is designed to operate at speeds ranging from 1500 to 2500 rpm. These are variable governed speeds, and the engine can be operated at any speed between the two extremes to meet various working conditions.

Full load SAE standard PTO speed is 1900 rpm. Use this speed when operating the power take off or belt pulley. Slow-idle is 600 rpm (gasoline and LP-Gas) or 750 rpm (diesel).

In addition, an engine speed of 2500 rpm is provided to save 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. Move the lever clockwise to accelerate; move the lever counter-clockwise to decelerate.

Move the throttle counter-clockwise as far as it will go to obtain slow-idle. To obtain the 1900 rpm engine speed, pull throttle clockwise to the first stop. Placing the throttle halfway between slow-idle and 1900 rpm gives the 1500 rpm speed.

To obtain working speeds above 1900 rpm, pull out on the throttle knob and move throttle clockwise as far as it will go. This is the 2500 rpm position.

Using Foot Throttle

The foot throttle operates in conjunction with the hand throttle. It provides foot control of engine speed and is a convenient means of accelerating or decelerating, especially during transport operation. When pedal is released, engine will decelerate to hand throttle setting.

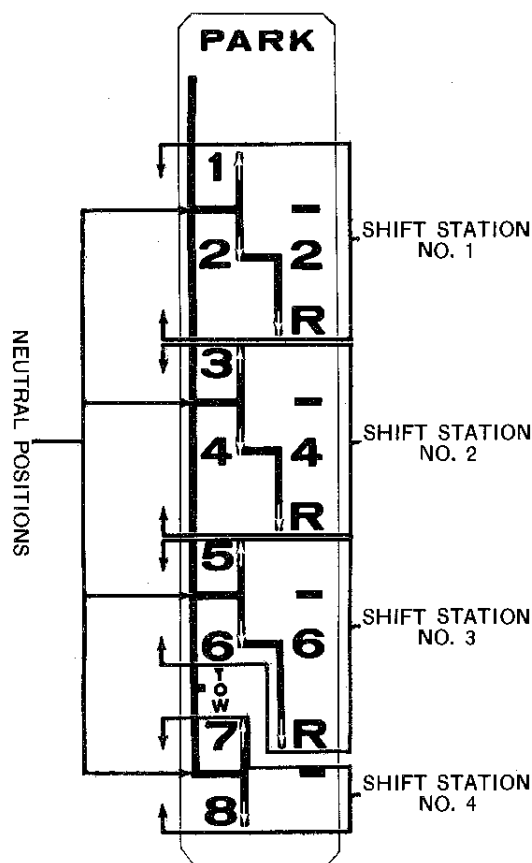
NOTE: The foot throttle is not intended as a means of "revving up" engine beyond normal working speeds.

SELECTING GROUND SPEED

The tractor has eight forward gears and three reverse gears. These gears, together with the engine speeds that may be selected, enable the

operator to balance load and speed for maximum economy and allow him flexibility to meet varying working conditions. For example, to obtain 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 and 2500 rpm.



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Fig. 10-10-4—Gear Shifting Pattern

SHIFTING GEARS

The gear shifting pattern is shown in the decal diagram in Fig. 10-10-4. Note that the eight forward gears are paired in four shifting stations, and that three of the stations have reverse gears. Also notice that lines between each part of forward gears indicate neutral positions.

SHIFTING FROM NEUTRAL

Having determined the proper gear, 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 GEAR TO ANOTHER

The transmission can be shifted from one forward gear to another forward gear of the same shift station while the tractor is in motion. For instance, you can shift between 1st and 2nd gear without stopping the tractor. This is a speed shift: merely declutch momentarily while shifting. You can also shift from a forward gear to a reverse gear of the same shift station while the tractor is in motion. This is especially useful in "shuttling" the tractor back and forth when a traction stall has occurred or for loader operation.

To shift to a new gear not in the same shift station, stop the tractor, depress the clutch pedal, and move the shift lever to neutral. You can then shift from neutral to the new gear in the usual manner and gradually release the clutch pedal to engage the clutch.

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 upward from neutral to the "PARK" position.

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

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

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 a speed greater than 20 miles per hour. Always attach a tow bar or chain to the tractor frame.



Group 15 SPECIFICATIONS

PERFORMANCE (Observed at Nebraska Tests 799 and 800)

	Gasoline	Diesel
Maximum drawbar horsepower	40.82	41.40
Maximum power take-off horsepower	46.86	46.67
Maximum drawbar pull (pounds)	4596	4553

CAPACITIES (U.S. Standard Measures)

Fuel tank . . . Gasoline and Diesel, 16 gals.;	
LP-Gas @80% full, 22.6 gals.	
Cooling system	3 gals.
Engine lubrication (including filter)	5 qts.
Transmission case	8 gals.
Final drive cases (each)	1 gal.

ENGINE

Number of cylinders	4
Bore and stroke, inches . . Gasoline and LP-Gas, 3-5/8 x 3-1/2;	
Diesel, 3-7/8 x 3-1/2	
Displacement in cubic inches	Gasoline and LP-Gas, 145; Diesel, 165
Compression ratio . . . Gasoline, 7.9 to 1;	
Gasoline high altitude engine, 9.0 to 1;	
LP-Gas, 8.9 to 1;	
Diesel, 19 to 1	

ENGINE SPEEDS

SAE standard PTO engine speed. . .	1900 rpm
Fast-idle for PTO	2100 rpm
Slow-idle	800 rpm (Diesel)
600 rpm (Gasoline and LP)	
Fast-idle for full engine power	2700 rpm (Gasoline and LP)
2650 rpm (Diesel)	
Full engine power	2500 rpm

IGNITION SYSTEM (Gasoline and LP-Gas)

Type	Battery - distributor
Distributor point gap022-inch
Spark plugs	
Size	14 mm
Gap025-inch (Gasoline) .015-inch (LP-Gas)

TRANSMISSION SPEEDS, MPH (NO SLIP)

Hi-Crop Tractor (13.6 x 38 rear tires).

Gear	(-29000)		(29001-Up)	
	Engine rpm		Engine rpm	
	1500	2500	1500	2500
1st	1.57	2.61	1.37	2.29
2nd	2.22	3.70	1.94	3.24
3rd	2.72	4.54	2.38	3.97
4th	3.86	6.43	3.38	5.63
5th	4.79	7.98	4.19	6.99
6th	6.79	11.31	5.94	9.90
7th	8.00	13.33	7.00	11.67
8th	11.30	18.89	9.92	16.53
Rev. 1	1.74	2.89	1.52	2.53
Rev. 2	3.02	5.03	2.64	4.40
Rev. 3	5.31	8.84	4.64	7.74

Row-Crop Tractor (12.4 x 36 or 13.9 x 36 rear tires)

Gear	(-29000)		(29001-Up)	
	Engine rpm		Engine rpm	
	1500	2500	1500	2500
1st	1.59	2.65	1.27	2.12
2nd	2.25	3.75	1.80	3.01
3rd	2.76	4.60	2.21	3.69
4th	3.91	6.52	3.13	5.22
5th	4.86	8.10	3.89	6.49
6th	6.88	11.47	5.51	9.19
7th	8.11	13.52	6.50	10.83
8th	11.49	19.16	9.20	15.34
Rev. 1	1.76	2.93	1.41	2.35
Rev. 2	3.06	5.10	2.45	4.08
Rev. 3	5.38	8.97	4.31	7.18

Row-Crop Utility (13.6 x 28 rear tires)

Gear	(-29000)		(29001-Up)	
	Engine rpm		Engine rpm	
	1500	2500	1500	2500
1st	1.60	2.67	1.12	1.86
2nd	2.27	3.78	1.58	2.64
3rd	2.78	4.64	1.94	3.23
4th	3.94	6.57	2.75	4.58
5th	4.90	8.16	3.41	5.69
6th	6.94	11.56	4.83	8.06
7th	8.18	13.63	5.70	9.50
8th	11.58	19.31	8.07	13.45
Rev. 1	1.77	2.96	1.24	2.06
Rev. 2	3.08	5.14	2.15	3.58
Rev. 3	5.42	9.04	3.78	6.30

GEAR REDUCTION RATIO (ENGINE TO AXLE)

Gear reduction ratio in first gear

Hi-Crop (-29000) 163 to 1

Hi-Crop (29001-Up) 186 to 1

Row-Crop (-29000) 151 to 1

Row-Crop (29001-Up) 188 to 1

Row-Crop Utility (-29000) 127 to 1

Row-Crop Utility (29001-Up) 188 to 1

Gear reduction ratio in eighth gear

Hi-Crop (-29000) 22.5 to 1

Hi-Crop (29001-Up) 25.7 to 1

Row-Crop (-29000) 20.8 to 1

Row-Crop (29001-Up) 26 to 1

Row-Crop Utility (-29000) 17.6 to 1

Row-Crop Utility (29001-Up) 26 to 1

DIMENSIONS (INCHES)

Point of Measurement	Hi-Crop	Row-Crop	Row-Crop Utility
Height to top of hood (Gas & Diesel)	72-5/8	60-1/16	55-5/8
(LP-Gas)	81-1/2	68-5/16	64-1/2
Over-all height	93-1/4	85-3/4	76-1/4
Over-all width, minimum	75-3/8	86	71
Over-all length (straight axle)	134-3/4	132	127-1/4
(swept-back axle)			121-3/4
(with 3-point hitch)	142-7/8	142	139-3/4
Wheel base (straight axle)	89-3/8	90	86-7/8
(swept-back axle)			81-1/2
Clearance, front axle	34-1/2	23-3/4	19-5/8

APPROXIMATE SHIPPING WEIGHT (LBS.)

	Hi-Crop	Row-Crop	Row-Crop Utility
(Gas)	5301	4671	4799
(LP-Gas)	5474	4844	4972
(Diesel)	5406	4776	4904

APPROVED TIRE OPTIONS

Front Tires

Size	Ply	Hi-Crop	Row-Crop	Row-Crop Utility
6.00 x 14	4		X	
6.00 x 14	6		X	
6.00 x 16	4	X		X
6.00 x 16	6			X
6.50 x 16	6	X		X
6.50 x 16	8		X	
7.50 x 15	6			X
7.50 x 16	4	X		X
9.00 x 10	8		X	

Rear Tires

Size	Ply	Hi-Crop	Row-Crop	Row-Crop Utility
16.9 x 26	6			X
12.4 x 28	4			X
13.6 x 28	4			X
14.9 x 28	6			X
16.9 x 28	6			X (RUS)
16.9 x 30	6			X
11.2 x 36	4		X	X
12.4 x 36	4		X	X
13.9 x 36	4		X	X
13.9 x 36	6		X	X
11.2 x 38	4	X		
12.4 x 38	4	X		
13.6 x 38	6	X		

WHEEL TREADS

Type	Tractor	Range in Inches
Front:		
Straight adjustable axle	H	54 to 84*
	R, RU	50 to 74* or 62 to 88*
Swept-back adjustable axle	RU	50 to 74* or 48 to 68*
Rear:		
Steel disk	H	54 to 90
Steel disk	RU	64 to 84**
Cast disk	H	60 to 90
Sliding hub	R	56 to 93 or 56 to 104
	RU	53 to 96 or 53 to 106
Power adjusted	R	56 to 80 or 64 to 88
	RU	58 to 80
Rack and pinion	R, RU	54 to 96***
	H	58 to 90
Demountable rim	RU	56 to 80

*Add 5-1/8 inches with wheels reversed

**58 or 74 with 16.9 x 26 tires

***62 to 88 with 16.9 x 30 tires (RU only)

Section 30

PERIODIC LUBRICATION

Group 5

LUBRICATION TIMETABLE

Effective use of lubricating oils and greases is perhaps the most important step towards low upkeep cost, long tractor life, and satisfactory service. Use only those lubricants specified in this section; apply them at the intervals and according to the instructions in the lubrication section.

ENGINE LUBRICATING OILS

When selecting proper oil for the engine crankcase, three factors should be considered: the reliability of the oil supplier and manufacturer, the viscosity for the fill period, and the type of service under which the engine will be operated. Let's consider each of these.

RELIABILITY OF OIL SUPPLIER AND MANUFACTURER

There is no universal label indicating the quality of an oil, nor is there an independent reviewing organization to insure that claims made on oil labels are true. Therefore it is important that you select only recognized brands of oils furnished by a reliable manufacturer and supplier.

VISCOSITY

Either single viscosity oil or multi-viscosity oil may be used. Single viscosity oil provides satisfactory lubrication when smaller or more limited temperature fluctuations are encountered. Multi-viscosity oil provides satisfactory lubrication whenever a wider range of temperature is encountered and makes starting easier at low temperature.

Depending on the highest expected prevailing temperature for the fill period, use oil of viscosity as shown in the following chart:

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 or 5W-20 may cause some increase in oil consumption. Check level more often when using these oils.*

TYPE OF SERVICE

The oil manufacturer identifies, on the oil container, the type of service for which an oil is classified. The identification is an American Petroleum Institute (API) service designation. The manufacturer may also indicate on the container that the oil meets an Ordnance Department Military specification or other engine manufacturer's requirements.

API service classifications are not specifications and do not necessarily guarantee quality. These classifications only establish terminology for type of service so that the oil manufacturer may make his best recommendations. Military designations are used to identify oils which have qualified under military performance specifications.

For diesel engines, the type of service under which your tractor is operated is determined by the amount of sulfur in the fuel being used. When fuel contains less than 0.5% sulfur, use oil having an API service classification DM. Oils that are designated as Mil-L-2104B or Supplement 1 may also be used. When fuel contains more than 0.5% sulfur, use oil having an API service classification DS or Military specification Mil-45199A (Series 3).

For spark ignition engines, use oil having an API service classification MS or Military specification Mil-L-2104A. Oils having an API designation DM or Supplement 1 may also be used.

As further insurance of quality for either diesel or spark-ignition engines, use only those oils bearing the following statement on the container, or words to the effect, "Passes Manufacturer's Sequence Tests."

GREASES

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

SAE multipurpose type grease, made from lithium soap for extreme resistance to both heat and water washing, has a broad range of uses.

Single applications of these greases provide lubrication for a relatively long period and serve the important function of helping to keep contamination out of bearings.

STORING LUBRICANTS

Use clean containers to store and handle all lubricants. The tractor can operate at top efficiency only if clean lubricants are used.

The tractor is equipped with safeguards, such as the air cleaner and oil filter, which are designed to keep dust, dirt, and other abrasives from reaching operating parts. Clean lubricants will help these safeguards do their jobs properly.

LUBRICATION AND SERVICE INTERVALS

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

The chart on the following pages is a condensed list of the tractor components to be serviced at each interval and the service to be performed.

LUBRICATION TIMETABLE

EVERY 10 HOURS

Component	Description of Service	Unit Capacity	Description of Lubricant
Engine Crankcase	Check oil level with oil filler gauge	To "FULL" mark	Oil type: DM or DS (diesel); 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
Air Cleaner	Check dirt and oil level in cup	To "OIL LEVEL" Line	Same as crankcase
Steering Drag Link (-42000)	Lubricate fitting	Several strokes of grease gun	SAE multipurpose grease
Brake Linkage	Lubricate 2 fittings	Several strokes of grease gun	SAE multipurpose grease
Front Rockshaft	Lubricate fittings	Two strokes of grease gun	SAE multipurpose grease
Roll-O-Matic	Lubricate 2 fittings	Several strokes of grease gun	SAE multipurpose grease
Fuel Sediment Bowls (diesel) (42001-Up)	Drain any water or dirt deposits
Radiator	Check coolant level	To midway between core and filler neck	See Section 80