820 Series
Diesel Tractors

JOHN DEERE

SERVICE MANUAL

820 Series
Diesel Tractors

SM2021 01APR57 English

SM2021 01APR57

LITHO IN U.S.A. (REVISED)
ENGLISH

SERVICE MANUAL FOR JOHN DEERE DEALERS

820 DIESEL TRACTOR

SERIES

TABLE OF CONTENTS

TO THE JOHN DEERE SERVICEMAN

This Service Manual contains maintenance instructions for the John Deere "820" Series Diesel Tractor. 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.

The manual also contains complete instructions for performing the predelivery, delivery, after-delivery and 150-hour services outlined in the Service Policy which accompanies each tractor. By using this information, you will be sure that the tractor is ready to perform efficiently and economically when it is delivered to its new owner and that it will be restored to peak efficiency when it is brought into your shop for after-delivery services.

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.

The sections in this manual concerning the power steering mechanism, fuel injection pumps and nozzles, and electrical equipment are limited mainly to removal and installation instructions.

Full maintenance instructions for the power steering mechanism are given in *Service Manual SM-2016, "Power Steering for John Deere Tractors."* When additional information, concerning the fuel injection pumps and nozzles, is required, see *Service Manual SM-2018, "Testing and Servicing Fuel Injection Pumps and Nozzles."*

Instructions for testing, repairing and adjusting the generator and electric cranking motor are given in *Service Manual SM-2000, "Tractors and Engines (General)."* For additional information concerning the Custom Powr-Trol mechanism, consult *Service Manual SM-2022, "Custom Powr-Trol."*

Although this manual is prepared specifically as an aid to proper maintenance of the "820" Series Diesel Tractor, much of the information it contains applies equally (with minor variations) to the Model "80" Tractor. It can be used to advantage when maintenance problems concerning the Model "80" Tractor arise.

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.

INDEX

R

S

Section 10
DESCRIPTION, OPERATION, AND SPECIFICATIONS

Group 5
DESCRIPTION

The John Deere "820" Series diesel-engine-powered tractor, is a heavy-duty five-bottom plow tractor. The engine develops approximately 67-1/2 horsepower at the belt and approximately 61-3/4 at the drawbar.

The tractor is of standard-tread design with provision made to widen the rear wheel tread 4 inches with 34-inch tires or 8 inches with 26-inch tires. This is an advantage when operating in unusually muddy conditions.

The tractor has six forward speeds and one reverse speed.

The features of the tractor are described briefly in the following paragraphs. Full description of each of the assemblies is given in the various sections throughout this manual.

SERIAL NUMBERS.

Each tractor bears a serial number located on the right-hand side of the main case just in front of the belt pulley.

The Powr-Trol valve housing and hydraulic remote cylinders also bear serial numbers.

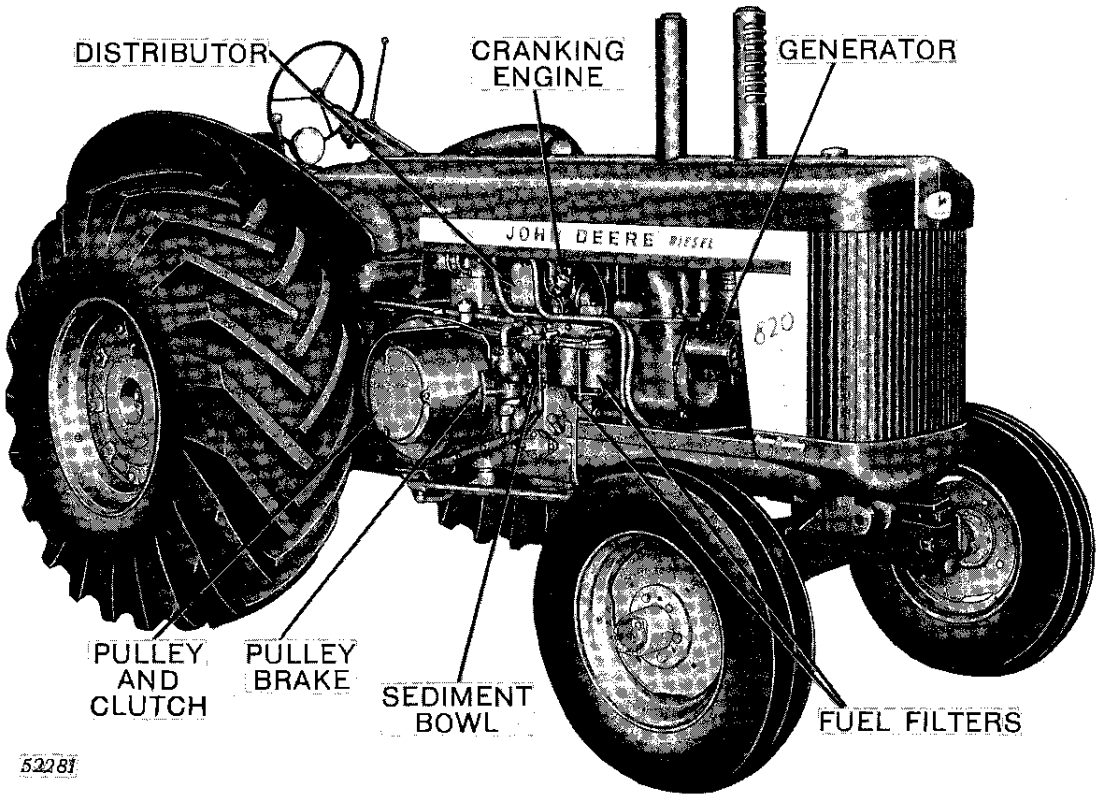

Figure 10-5-1—John Deere "820" Series Diesel Tractor—Pulley Side

DIESEL ENGINE.

The tractor is powered by a four-stroke cycle, two-cylinder, valve-in-head, horizontal, cross-mounted full diesel engine with a displacement of 471-1/2 cubic inches. The bore is 6-1/8 inches, the stroke is 8 inches, and the rated load speed is 1125 rpm.

The crankshaft is supported in three main bearings. Rotation is counter-clockwise when viewed from the flywheel side. The oiling system is of the force-feed pressure type with a full-flow oil filter. Engine speeds are controlled by a fly-weight type governor. Full automatic crankcase ventilation is provided by clean air drawn through the cranking engine air cleaner.

CRANKING ENGINE.

The diesel engine is cranked by means of a four-cylinder V-type gasoline engine having a 2-inch bore, 1-1/2-inch stroke and a rated load speed of 4500 rpm. Engine speed is controlled by a variable-speed centrifugal-type governor. The engine is equipped with a separate oil pump to assure pressure lubrication of moving parts.

The engine is also equipped with a water pump and thermostat. By-pass cooling assures quick warm-up for greater efficiency, particularly in cold weather.

The cranking engine fuel system consists of a 1-quart gasoline tank mounted underneath the tractor cowl, and down-draft carburetor. Clean air is assured by a separate oil-wash-type air cleaner. A 6-volt battery, coil and distributor furnish ignition. The distributor contains two sets of points and associated parts—one set for each bank of cylinders. The distributor has no spark advance mechanism.

CRANKING ENGINE CRANKING.

The cranking engine is cranked by means of a 6-volt automotive-type electric motor. The motor is equipped with a Bendix engaging mechanism and a solenoid switch which is activated by a push button on the tractor dash. The ignition switch is also located on the dash.

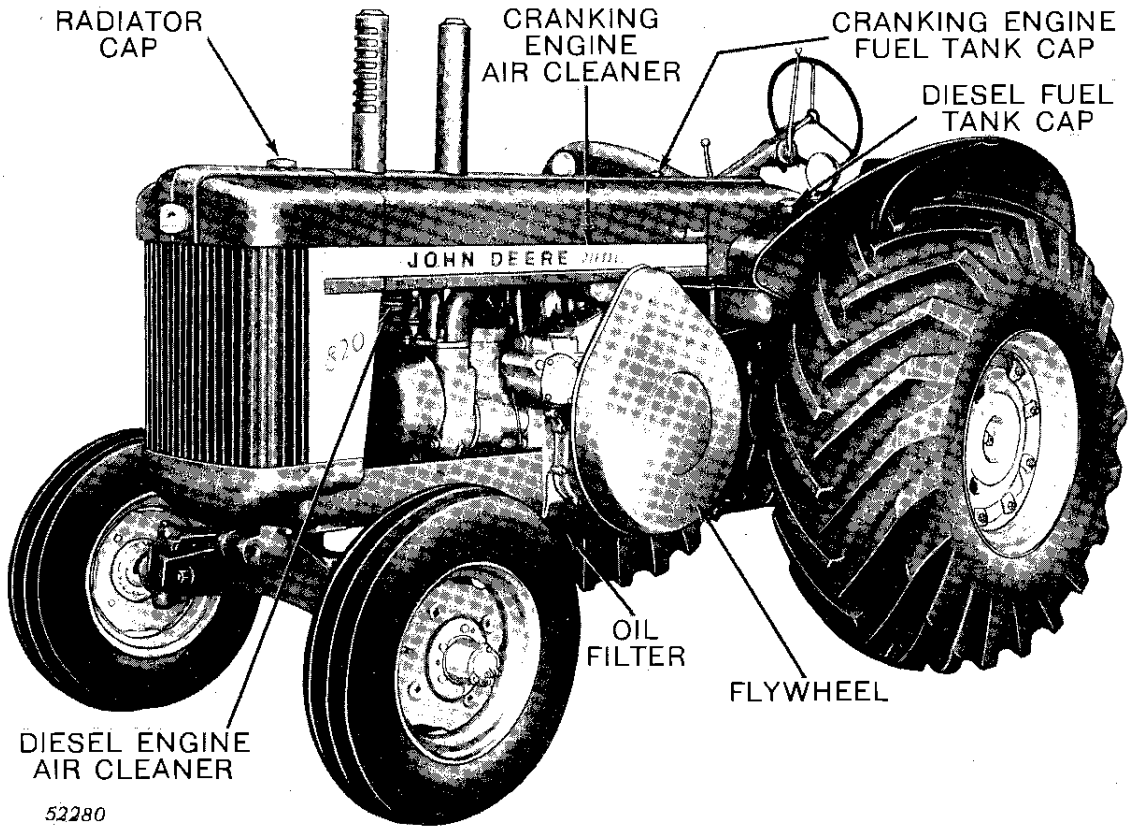

Figure 10-5-2—John Deere "820" Series Diesel Tractor—Flywheel Side

DIESEL ENGINE CRANKING.

A transmission with automotive-type clutch is used to connect the cranking engine to the diesel engine for cranking. The transmission includes an over-running clutch to protect the cranking engine when the diesel engine starts. Two levers are used when cranking the diesel engine. One lever is used to decompress the diesel engine and the other lever is used, first to engage the transmission pinion with the diesel engine flywheel, and then to engage the cranking engine clutch.

HEAT EXCHANGER.

Hot exhaust gases from the cranking engine are piped to a chamber surrounding the diesel engine air intake pipe where they warm the incoming air to make starting easier. After flowing through the heat exchanger the exhaust gases are expelled to the atmosphere. A muffler is provided to quiet the cranking engine exhaust noise.

COOLING SYSTEM.

Both engines are cooled by an interconnected pressure-type cooling system with a capacity of 8-3/4 U.S. gallons. Adequate circulation is maintained through the engines by a centrifugal-type water pump attached to the rear of the bottom radiator tank. This pump is driven by a belt from the fan drive. There is a similar gear-driven pump attached to the cranking engine. Proper engine temperature is assured by a thermostat in each of the main engine cylinder head water outlet openings. The cranking engine has its own thermostat located in the water outlet from the water manifold.

DIESEL ENGINE FUEL SYSTEM.

A 32-1/2 U.S. gallon tank is provided for diesel fuel. A fuel shutoff is located at the bottom of the fuel tank. A sediment bowl and two stages of micronic-type fuel filters prevent entrance of dirt or other foreign substances into the fuel injection system.

Fuel is injected into the cylinders under high pressure at precisely the correct moment by two injection nozzles located in the cylinder head. The spray tips of the nozzles protrude into the combustion chambers. Fuel is supplied to the nozzles by two injection pumps located in a compartment in the top of the cylinder casting. The pumps are operated by the engine camshaft. The amount of fuel delivered by the pumps to the nozzles is controlled by the governor and by the position of the speed control lever. An adequate supply of fuel from the filters to the pumps is assured by a fuel transfer pump driven from the right-hand end of the diesel engine camshaft.

CLUTCH.

A dry-disc, hand-operated clutch is located in the belt pulley. When the clutch is disengaged, a brake prevents pulley rotation.

TRANSMISSION AND DIFFERENTIAL.

The transmission sliding gear shaft and countershaft are mounted crosswise in the main case. Shifting through the six forward and one reverse speeds is accomplished by one shift lever. Design of the gear shifters is such that the gears are locked in position when shifted into gear.

The differential is of conventional design with a ring gear and spider driven directly by a pinion on the countershaft.

BRAKES.

Individually operated foot brakes are provided to stop the tractor, hold it on inclines or to assist in making short turns. Each brake has two internal-expanding shoes and a cast-iron drum with a shaft and a gear that meshes with the final drive gear. The brakes can be locked in the engaged position.

STEERING MECHANISM.

The tractor can be equipped with manual steering or optional hydraulic power steering. The manual system is of the worm and gear type with adjustments provided to compensate for all wear. The power steering system includes a gear-type hydraulic pump driven by the fan drive shaft assembly, a valve assembly controlled by the

steering shaft, and a circular hydraulic cylinder which imparts turning motion to the steering spindle and front wheels.

FRONT WHEELS.

The front wheels are equipped with 7.50 x 18 tires. The wheel disks are reversible to give added tread width necessary under certain conditions.

The rear wheels can be equipped with either 14-34, 15-34, or 18-26 tires. 15-34 or 18-26 cane and rice tires are also available. By changing the position of the tire rim on the wheel and reversing the rim and tire, additional width of rear wheel tread can be obtained for use under extremely muddy conditions.

POWER TAKE-OFF SHAFT.

Tractors can be purchased without power take-off shaft or with optional engine-driven "live" power shaft. The "live" power take-off shaft is equipped with a self-contained clutch permitting operation of PTO equipment independently of tractor ground travel. The shaft conforms to ASAE-SAE standards.

HYDRAULIC SYSTEM.

The tractor can be equipped with hydraulic Powr-Trol, which will raise, lower or regulate implements by means of remote cylinders. The Powr-Trol system is "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 a dual function valve housing or a single function valve-housing. The dual function housing permits use of one or two remote cylinders. When equipped with two remote cylinders, they can be operated either separately or simultaneously. The dual valve housing will accommodate double-acting remote cylinders only.

The single function valve housing operates one remote cylinder only. The cylinder may be either of the single-acting or double-acting type.

The gear-type hydraulic pump is mounted on the timing gear housing cover at the forward end. It is driven from the engine crankshaft through the cam gear. Provision is made to disengage the pump when the Powr-Trol is not being used (Figure 10-5-3).

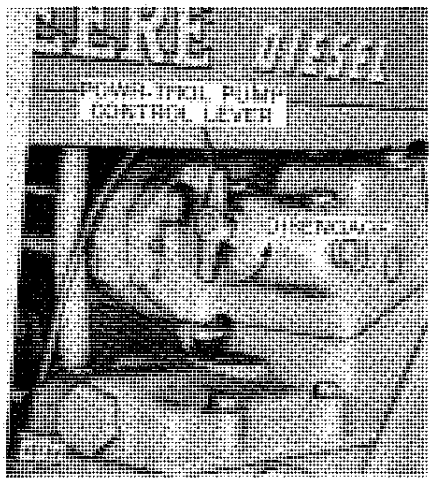

Figure 10-5-3—Powr-Trol Pump Control Lever

Group 10

STARTING AND STOPPING THE ENGINES

PRELIMINARY STEPS

(1) Set gear shift lever in neutral and pull the diesel engine clutch lever to the disengaged position.

(2) In cold weather disengage the Powr-Trol pump to relieve drag on the engine caused by cold oil.

(3) Make sure that the fuel shut-off valve, located underneath the main fuel tank is open.

(4) See that the diesel engine speed control lever (Figure 10-10-1) is in the **stopped** position (all the way to the rear) with the stop button pulled out. The lever **must** be in this position.

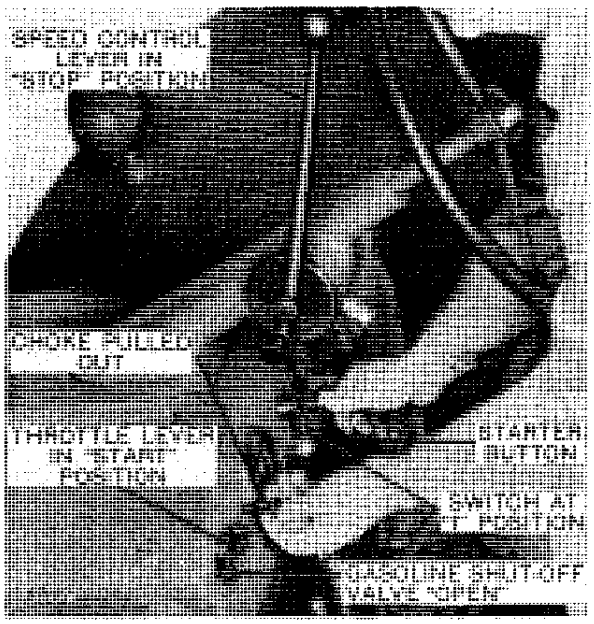

Figure 10-10-1—Starting the Cranking Engine

STARTING THE CRANKING ENGINE

(1) Open the gasoline shut-off valve two or three turns by turning the handle counter-clockwise (Figure 10-10-1).

(2) See that the cranking engine throttle lever is turned counter-clockwise to the "start" position.

(3) Turn the ignition switch to the "I" position (red light on).

(4) In cold weather pull out on the choke control knob. The engine will not continue to run with the choke in this position; therefore, when the engine starts, push the choke control knob in. It is not always necessary to choke the engine.

(5) Push the "starter" button. Release the button when the engine begins to run.

STARTING THE DIESEL ENGINE

(1) Allow the cranking engine to run a short while before engaging it with the diesel engine. The length of time will vary with the air temperature, being normally from 1 to 3 minutes.

(2) Turn the cranking engine throttle lever clockwise to the "run" position.

(3) Pull the decompression lever to the rear (Figure 10-10-2).

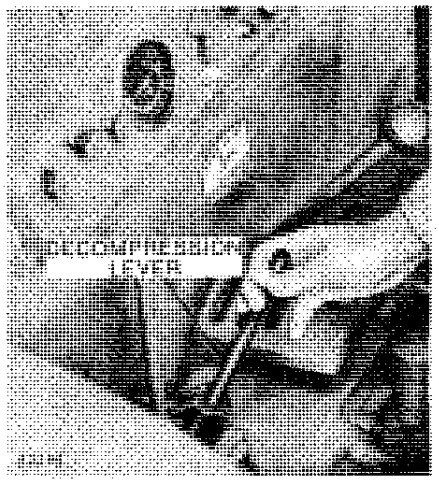

Figure 10-10-2—Operating Decompression Lever

(4) **Slowly** pull the cranking engine clutch lever all the way to the rear (Figure 10-10-3).

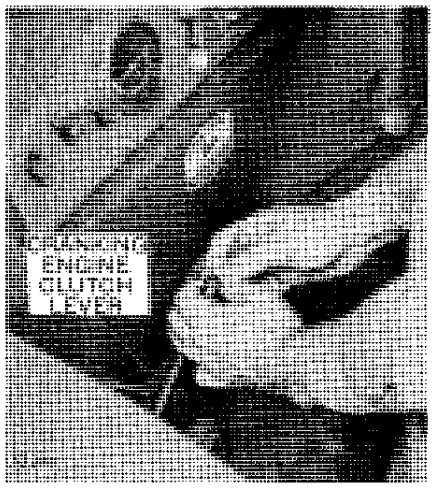

Figure 10-10-3—Operating Cranking Engine Clutch Lever

Movement through the first half of the lever travel engages the cranking engine with the diesel engine. Movement through the second half of lever travel engages the cranking engine clutch.

The two levers (decompression and clutch lever) can be locked in the rear or engaged position (Figure 10-10-4). Allow the cranking engine to motor the diesel engine **until oil pressure registers on the oil gauge.** In cold weather it is normally necessary to motor the diesel engine longer before it will start.

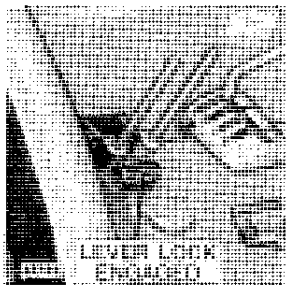

Figure 10-10-4—Lever Lock Engaged

(5) Release the decompression lever. This puts the diesel engine on full compression. Allow the engine to turn over several revolutions on full compression, then advance the speed control lever about half way (Figure 10-10-5).

(6) As soon as the diesel engine starts, release the cranking engine clutch lever. In cold weather, if the diesel engine fails to start in 15 seconds, re-

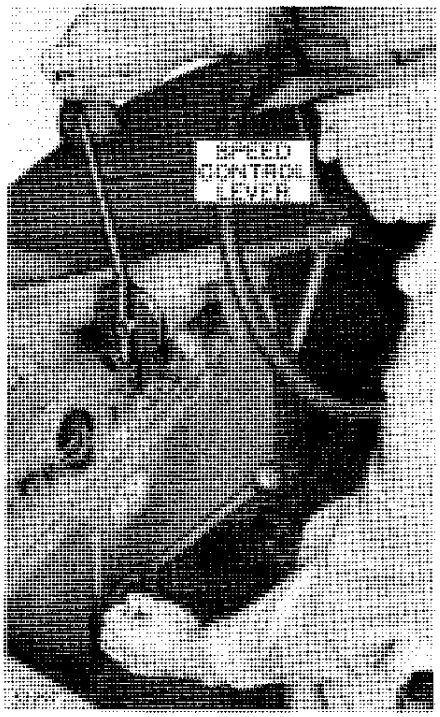

Figure 10-10-5—Advancing Speed Control Lever

turn diesel engine speed control lever to the "stop" position and continue to motor the diesel engine on full compression. After about a minute, try again to start the diesel engine. Repeat procedure until engine starts.

CAUTION: Do not motor the diesel engine on full compression for more than 15 seconds at any one time with the speed control lever advanced while trying to start the engine. The injected fuel can cause trouble.

(7) Use the speed control lever to bring the diesel engine to desired operating speed. The engine is adjusted to run at the correct speed at the factory—1125 rpm under full load and approximately 1250 rpm at fast idle. **CAUTION: Under no circumstances should the engine be operated at a fast idle speed higher than specified.** The engine is designed to operate at these speeds. High fuel consumption, excessive smoke from the exhaust, together with increased repair and maintenance costs can result from operating the engine at speeds above those specified.