



70 Diesel Tractor



SERVICE MANUAL

70 Diesel
Tractor

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**SERVICE MANUAL FOR
JOHN DEERE DEALERS**

MODEL 70 DIESEL TRACTOR
(GENERAL-PURPOSE AND STANDARD)

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INTRODUCTION

This Service Manual contains maintenance instructions for the Model "70" Diesel Tractor. Included are complete instructions for removal, disassembly, inspection, repair, assembly and installation of all major parts and assemblies.

In addition, the manual contains a brief description 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 at full efficiency are explained in detail. Full instructions on preparing a new tractor for delivery to the customer are included.

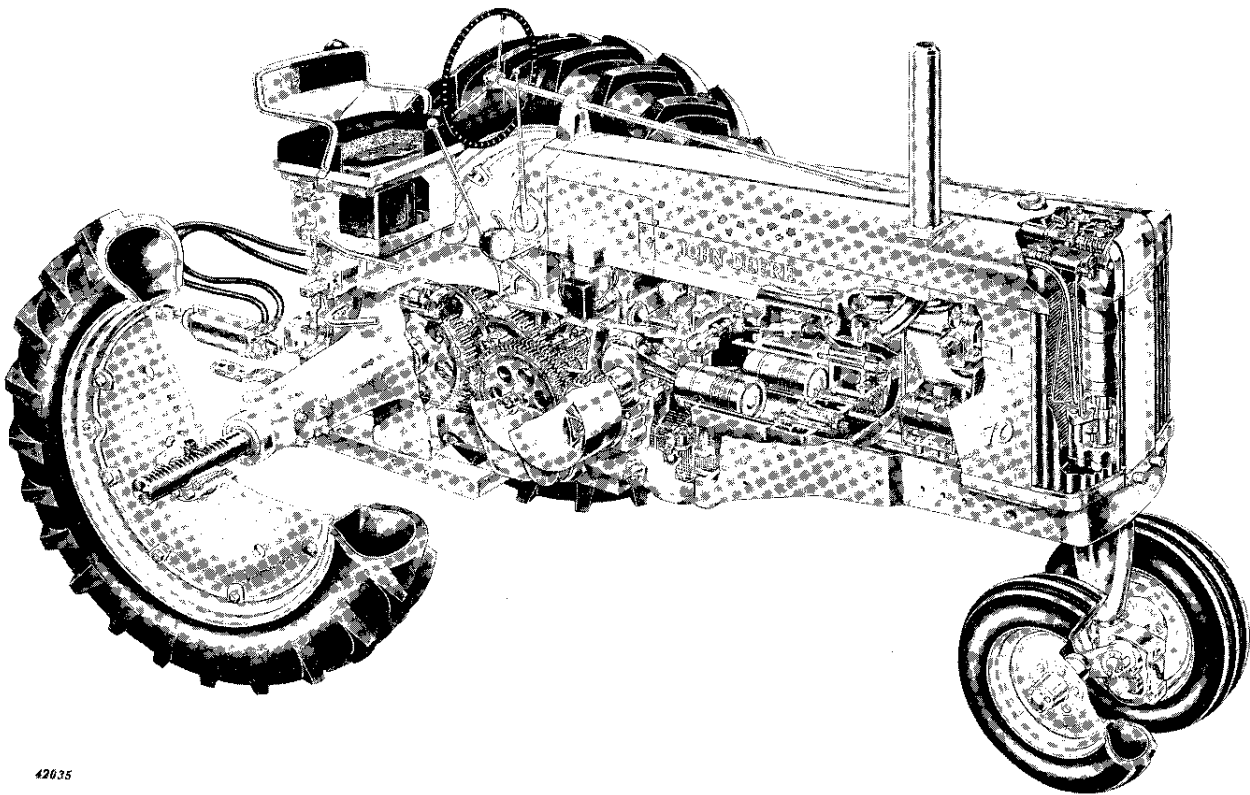
Complete instructions for testing, repairing and adjusting the generator and electric cranking motor are given in the "Tractors and Engines (General)" Service Manual. For additional information concerning the Powr-Trol mechanism, consult the "Hydraulic Equipment, Tractors (Waterloo)" Service Manual.

Full maintenance instructions for the power

steering mechanism are given in the "Power Steering for John Deere Tractors" Service Manual. When additional information concerning the injection pumps and nozzles is required, see the "Testing and Servicing Fuel Injection Pumps and Nozzles" Service Manual.

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.



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Cutaway View of John Deere Model "70" Diesel Tractor

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Section 10

DESCRIPTION, OPERATION, AND SPECIFICATIONS

Group 5 DESCRIPTION

The John Deere Model "70" Diesel Tractor has sufficient power to pull four or five 14-inch plow bottoms or the equivalent under normal conditions. The tractor is available in two basic styles: general-purpose or standard. In both styles the majority of parts and components are identical. Both types have six forward speeds and one reverse.

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 the 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 cranking engine distributor, Powr-Trol valve housing, and hydraulic remote cylinder also bear serial numbers.

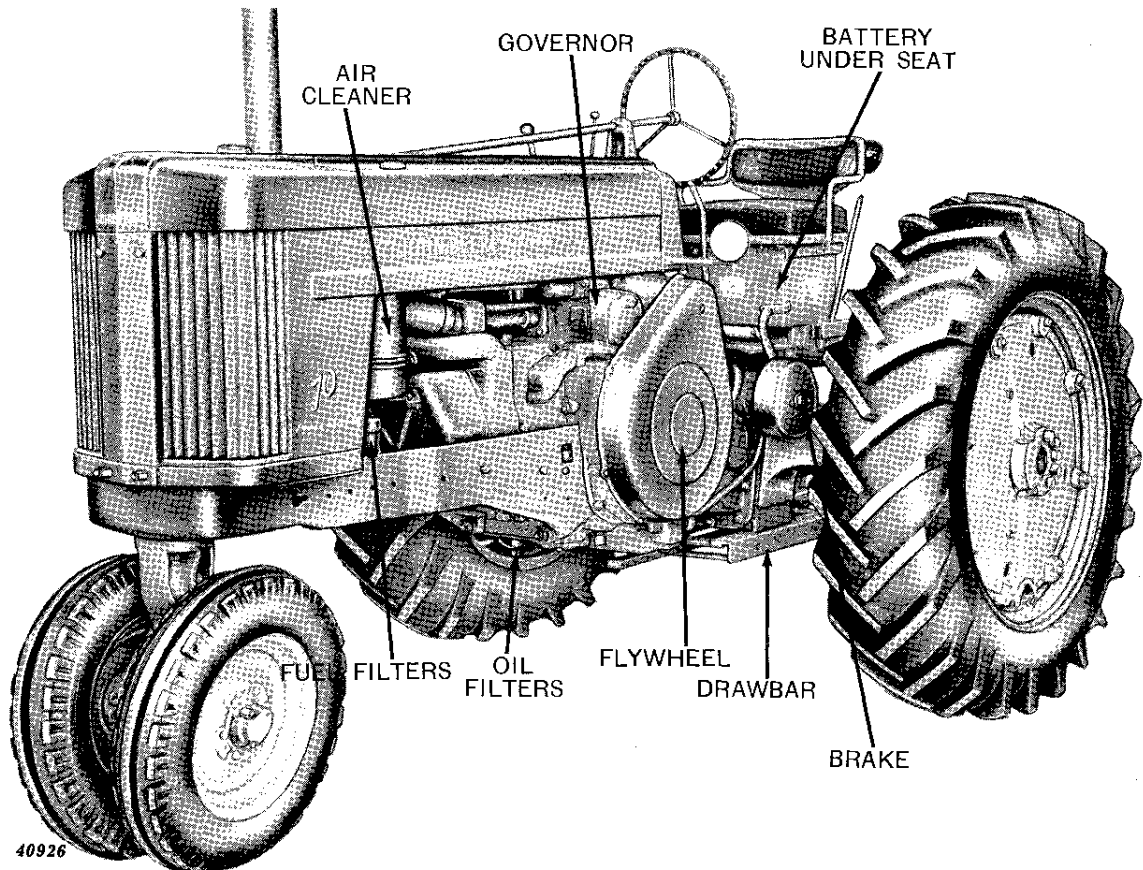


Figure 10-5-1—John Deere Model "70" Diesel Tractor (Standard)—Pulley Side

DIESEL ENGINE.

The tractor is powered by a full diesel four-stroke-cycle two-cylinder, valve-in-head, horizontal, cross-mounted engine with a displacement of 376 cubic inches. The bore is 6-1/8 inches. The stroke 6-3/8 inches and the rated load speed is 1125 rpm.

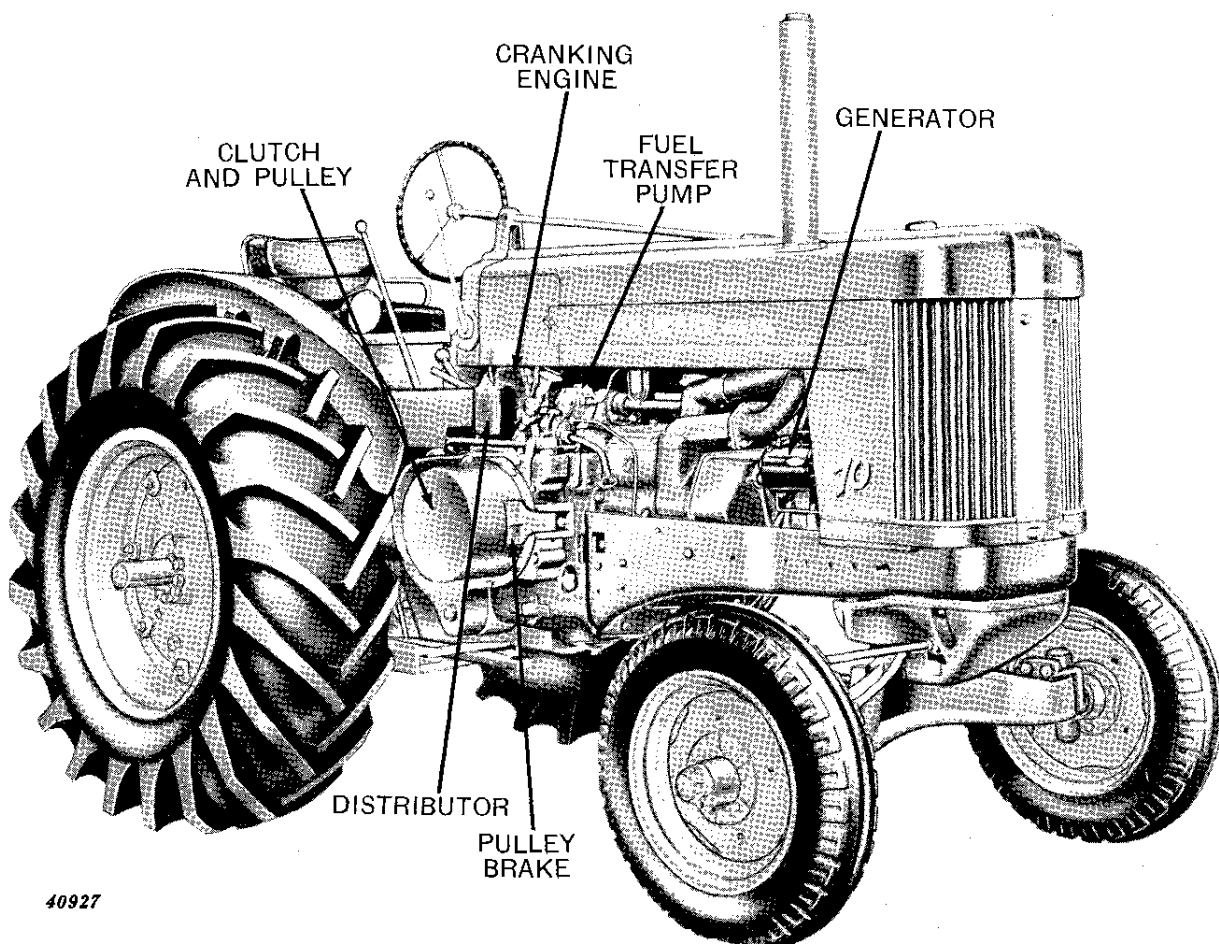
The crankshaft is supported in three main bearings. Rotation is counterclockwise when viewed from the flywheel side. All moving parts of the engine are pressure-lubricated by a force-feed pressure oiling system with a full-flow oil filter. Engine speeds are controlled by a fly-weight type governor. Full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

CRANKING ENGINE.

The diesel engine is started by means of a four-

cylinder V-type gasoline cranking engine having a 2-inch bore, 1-1/2-inch stroke and a rated speed of 5500 rpm. Engine speeds are controlled by a variable speed centrifugal type governor. The engine is equipped with a separate oil pump to assure pressure lubrication of moving parts, and with a water pump to provide circulation of the coolant when the cranking engine is running.

The cranking engine fuel system consists of a 1-quart gasoline tank mounted on the inside of the cranking engine compartment door and a down-draft carburetor. Clean air is assured by a separate oil-wash type air cleaner. A six-volt battery, coil and distributor furnish ignition. The distributor contains two sets of points—one set for each bank of cylinders, but no spark-advance mechanism. The cranking engine is started by means of a six-volt automotive-type cranking motor.



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Figure 10-5-2—John Deere Model "70" Diesel Tractor (General-Purpose)—Flywheel Side

DIESEL ENGINE STARTING MECHANISM.

A transmission with automotive-type clutch is used to connect the cranking engine to the diesel engine for starting. The transmission includes an overrunning clutch to protect the cranking engine when the diesel engine starts. One lever is used to start both engines.

For detailed starting instructions see *Group 15* of *this Section*.

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 diesel engine starting easier. After flowing through the heat exchanger the cranking engine exhaust is expelled to the atmosphere.

COOLING SYSTEM.

Both engines are cooled by an interconnected pressure-type cooling system with a capacity of 7 U.S. gallons. Adequate circulation through the diesel engine is assured by a centrifugal-type water pump located to the rear of the radiator bottom tank. The pump is driven by the generator belt. Proper engine temperature is maintained by a thermostat in the upper water manifold.

DIESEL ENGINE FUEL SYSTEM.

A 20 U.S. gallon tank is provided for diesel fuel. A sediment bowl with fuel shut-off is located beneath the fuel tank. Two stages of micronic-type fuel filters prevent entry of dirt or other foreign substances into the fuel injection system.

Fuel is injected into the cylinders under high pressure at precisely the right moment by two injection nozzles which protrude into the combustion chambers through the cylinder head. Fuel is supplied to the nozzles by two injection pumps located in a compartment on top of the cylinder block. 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 by the right-hand end of the diesel engine governor shaft.

CLUTCH.

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

TRANSMISSION AND DIFFERENTIAL.

The underdrive-type transmission lies cross-wise in the main case. Shifting through the six forward speeds and reverse is accomplished by two shift levers.

The differential is of the conventional type with a ring gear and spider driven directly by a pinion in the transmission.

BRAKES.

Two individually operated foot brakes are provided to stop the tractor, hold it on inclines, or assist in making short turns. Each brake has two internal-expanding shoes and a drum with a shaft and gear which meshes with the final drive gear. The brakes can be held in the engaged position by brake latches.

STEERING MECHANISM.

The tractor may be equipped with manual steering or optional hydraulic power steering. The manual system utilizes a worm and gear with adjustments provided to compensate for all wear. The power system contains a gear-type hydraulic pump driven by the fanshaft, a valve assembly controlled by the steering shaft, and a hydraulic cylinder and vane which impart turning motion to the steering spindle and front wheels.

FRONT WHEEL ASSEMBLIES.

The tractor may be equipped with a variety of front end assemblies. For the general-purpose tractor these include Roll-O-Matic, dual front wheels, wide adjustable front axle, single front wheel, and 38-inch fixed tread. The standard tractor may be equipped with fixed or adjustable front ends.



REAR WHEELS.

On both general-purpose 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. General-purpose tractors may be equipped with regular-length, long, or extra-long rear axles.

POWER-TAKE-OFF SHAFT.

Two types of power take-off shafts are available: The conventional transmission-driven type, and optional, engine-driven "live" type with self-contained clutch permitting operation of PTO equipment independently of tractor ground travel. Both types of shaft conform to ASAE-SAE standards.

HYDRAULIC SYSTEM.

The tractor may be equipped with hydraulic Powr-Trol, which can be used to raise, lower and hold integral implements by means of a rockshaft. An implement-mounted remote cylinder may also be used with Powr-Trol.

Powr-Trol on standard tractors may or may not be equipped with rockshaft for operating integral implements.

The gear-type hydraulic pump is located in a cavity at the lower left center of the main case. The pump is driven by the crankshaft through a crankshaft gear and an idler gear.

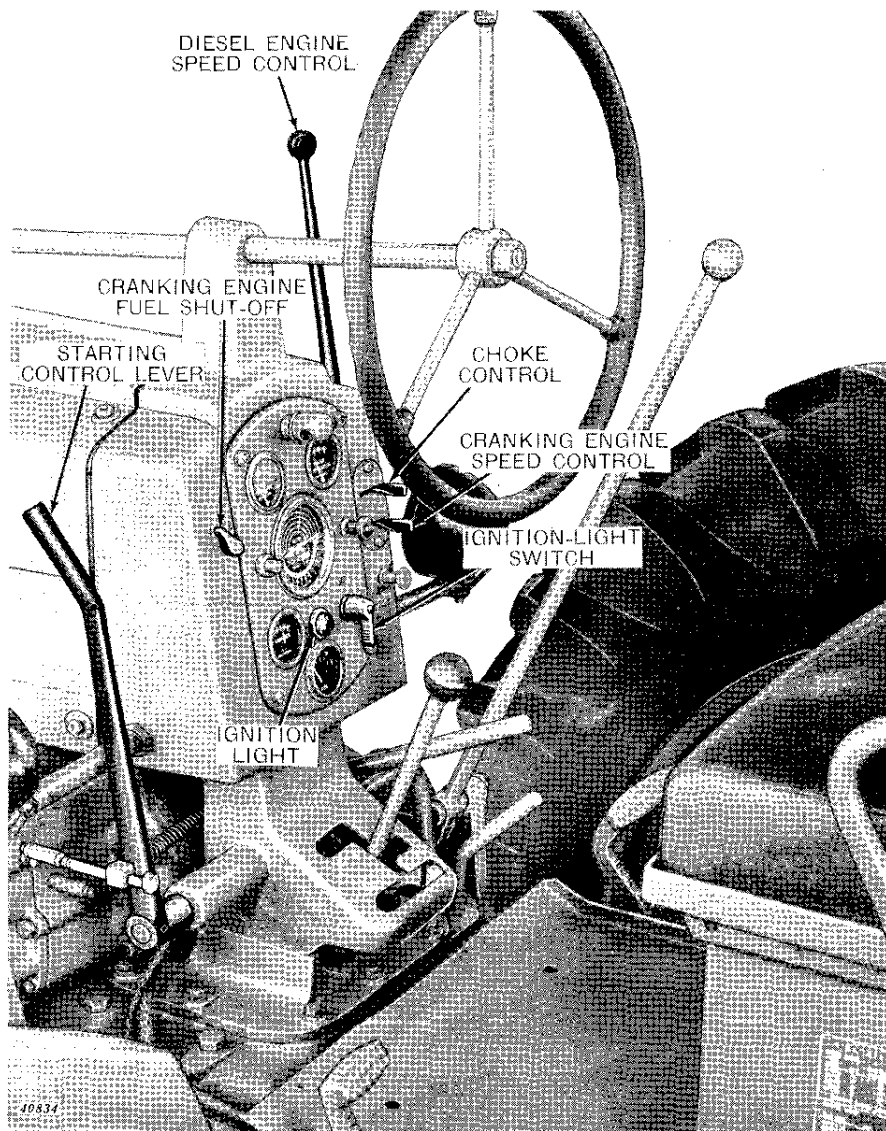


Figure 10-5-3—Starting Controls

Group 10

STARTING AND STOPPING THE ENGINES

PRELIMINARY STEPS

- (1) Set gear shift lever in neutral and pull the clutch lever back into disengaged position.
- (2) In cold weather, set power shaft shift lever in disengaged position to relieve drag on engine caused by cold transmission oil. If power shaft is to be used, permit engine to warm up before engaging power shaft shift lever.
- (3) Make sure fuel shut-off valve at sediment bowl (located under main fuel tank) is open.
- (4) See that diesel engine speed control lever is in the "stop" position (all the way to the rear with stop pin pulled out).

STARTING THE CRANKING ENGINE

- (1) Open fuel shut-off valve two or three turns by turning it counter-clockwise.
- (2) See that cranking engine throttle lever is to the right in "idle" position.
- (3) Turn ignition-light switch to "I" position (Figure 10-10-1).

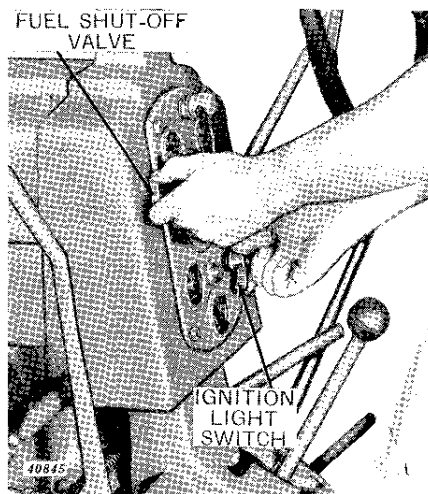


Figure 10-10-1—Operating Fuel Shut-Off Valve and Ignition Switch

- (4) Hold choke lever to the left. The cranking engine will not continue to run with the choke in this position; therefore, when engine starts, release the choke lever. It is not always necessary to choke the engine.

- (5) Push starting control lever forward to operate the cranking motor. Release lever when engine begins to run (Figure 10-10-2).

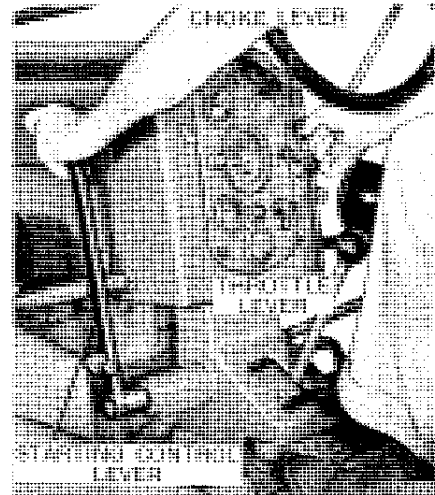


Figure 10-10-2—Starting the Cranking Engine

STARTING THE DIESEL ENGINE

- (1) Allow cranking engine to run a short while before engaging it with the diesel engine. The length of time will vary with temperature conditions, being normally from 1 to 3 minutes.
- (2) Place cranking engine throttle lever in "run" position (to the left).
- (3) **Slowly**, pull the starting control lever all the way to the rear (Figure 10-10-3).

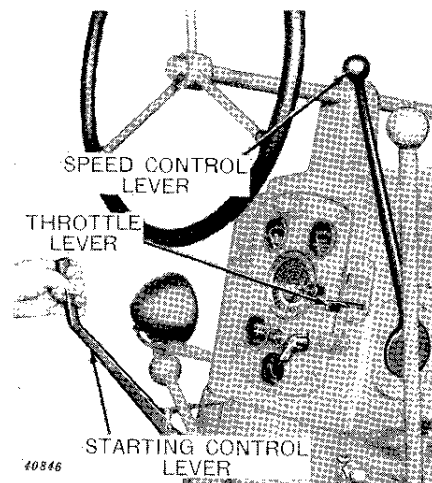


Figure 10-10-3—Engaging the Cranking Engine Clutch

Movement through the first half of lever travel relieves compression in the diesel engine and engages the cranking engine with the diesel engine. Movement through the second half of lever travel engages the cranking engine clutch. Lever will remain in the extreme rear position. 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 turn (or "motor") the diesel engine longer before it will start.

(4) Push starting control lever forward until swivel on control lever just contacts jam nut. This puts the diesel engine on full compression (Figure 10-10-4).

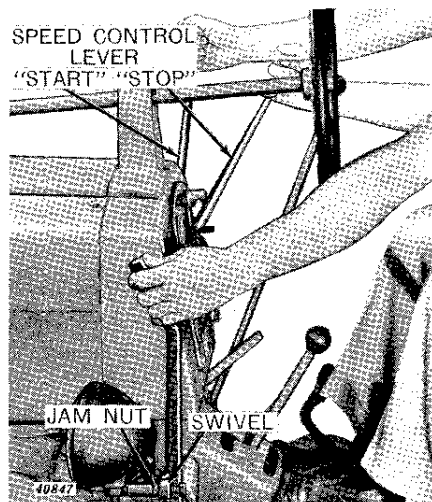


Figure 10-10-4—Starting the Diesel Engine

Allow engine to turn over several revolutions on full compression, then advance speed control lever about half way.

(5) As soon as diesel engine starts, push starting control lever forward to neutral. **CAUTION: Do not push lever beyond neutral.**

In cold weather, if diesel engine fails to start within 15 seconds, return diesel engine speed control lever to stop position and pull starting control lever all the way back.

After about a minute, try again to start the diesel engine. Repeat operation until engine starts.

CAUTION: Do not motor diesel engine more than 15 seconds on full compression

with the speed control open while trying to start the engine. The injected fuel may cause trouble.

(6) Use speed control lever to bring diesel engine to desired operating speed.

The engine is set to run at the correct speed when the tractor leaves the factory; 1125 rpm under full load and approximately 1250 rpm for fast idle.

CAUTION: Under no circumstances should the engine be operated at an idle speed higher than specified rpm.

STOPPING THE CRANKING ENGINE

Turn off the fuel to the cranking engine. Wait a few minutes to allow engine to use all the fuel in the carburetor, then turn off the ignition switch.



Always Make Sure There Is Plenty of Ventilation Before Starting the Engine

WARM-UP PERIOD

Before placing your tractor under full load, be sure it is warmed up to proper operating temperature.

A good practice is to idle engine at about half speed for 5 minutes and at full speed for the same length of time before applying a load.

When starting to work with a cold tractor it is best to operate for about 30 minutes in a lower gear than is normally required for the load. This will give the oil a chance to circulate freely and will prevent undue wear on engine and transmission parts.

STOPPING THE DIESEL ENGINE

Idle the engine a few minutes before you stop it. This permits it to cool off gradually. Sudden cooling of a hot engine causes extreme contraction of the heated metal parts. In freezing weather, never drain the water immediately after stopping, for the same reason. You are assured of better performance year in and year out, if you follow this practice.

To stop the engine, pull out speed control lever stop button on dash and pull speed control lever all the way back (Figure 10-10-5). The purpose of the stop button is to permit moving the speed control lever to the idling position without stopping the engine. When speed control lever stop button is pulled all the way back, the fuel supply to the engine is cut off and after a few revolutions, the engine will stop.

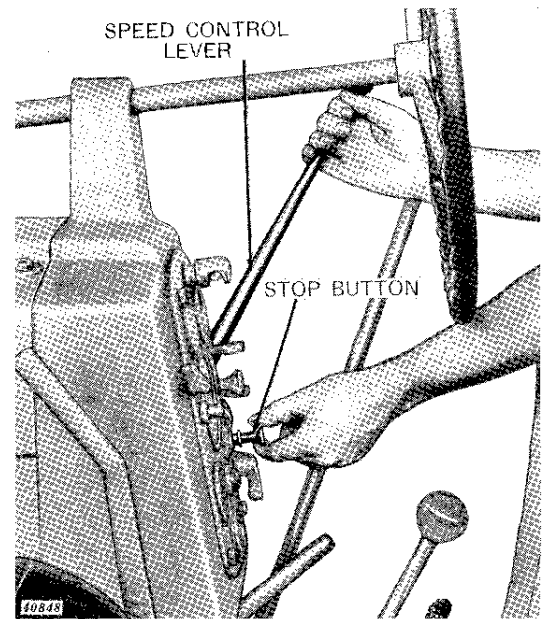


Figure 10-10-5—Stopping the Diesel Engine

Group 15 SPECIFICATIONS

PERFORMANCE:

Capacity for Work:

Four 14-inch plow bottoms in most soil conditions, five in many soils; four-row bedder and other big-capacity tools.

Maximum Horsepower:

Belt 50 hp Approx.
Drawbar 44 hp Approx.

CAPACITIES (U. S. MEASUREMENTS):

Fuel Tank 20 Gals.
Gasoline Tank 1 Qt.
Crankcase (Diesel) 12 Qts.
Transmission (Diesel) 7-1/2 Gals.
Crankcase (Cranking Engine) 1 Qt.
Transmission (Cranking Engine) 1/2 Pt.
Powr-Trol 1-1/3 Gals.
Power Shaft Clutch 2-1/4 Qts.
Remote Cylinder 1 Qt.
Cooling System 7 Gals.
First Reduction Gear Cover 1-1/2 Qts.
Power Steering Reservoir 5 Qts.

SPEEDS:

Gear	General-Purpose	Standard
	on 12-38 Tires	on 15-30 Tires
1	2-1/2 mph	2-1/2 mph
2	3-1/2 mph	3-1/2 mph
3	4-1/2 mph	4-1/2 mph
4	6-1/2 mph	6-1/4 mph
5	8-3/4 mph	8-1/2 mph
6	12-1/2 mph	12 mph
Reverse	3-1/4 mph	3-1/4 mph

DIESEL ENGINE:

Type Two-cylinder, cast-in-block, valves-in-head.

Engine Speeds:

Load 1125 rpm
Idle 1250 rpm
Bore and Stroke 6-1/8" x 6-3/8"
Displacement 376 cu. in.
Compression Ratio 16 to 1

CRANKING ENGINE:

Type 4-cylinder V-type, valves-in-head.

Engine Speeds:

Load 5500 rpm
Slow Idle 3000 rpm
Fast Idle 6000 rpm
Bore and Stroke 2" x 1-1/2"
Displacement 18.85 cu. in.

LUBRICATION SYSTEM:

Type Full force-feed pressure system with full-flow oil filter.

FUEL SYSTEM:

Type Gravity to sediment bowl. Transfer pump to filters.
Air Cleaners .. Oil-wash type.

COOLING SYSTEM:

Type Pressure system. Centrifugal pump with engine temperature controlled by heavy-duty automotive-type thermostat.

IGNITION SYSTEM (CRANKING ENGINE):

Type Battery-Distributor
Distributor Point Gap020"
Spark Plugs:
Size 14 mm.
Spark Plug Gap025"

ELECTRICAL SYSTEM:

Battery Voltage 6 Volts
Generator Regulation Voltage Regulator
Battery Group 1

CLUTCH:

Type Hand-operated, 10-inch dry disks.

BELT PULLEY:

Diameter 12-7/8"
Width 7-3/8"
Rpm (Load) 1125
Belt Speed 3790 fpm

TRANSMISSION:

Type Six forward speeds and one in reverse.
Gears Selective-type, straight spur-cut gears, forged and heat-treated.
Bearings Shafts operate on five roller bearings, six tapered roller bearings, and four ball bearings.

REAR WHEEL BRAKES:

Type Two automotive-type internal-expanding rear wheel brakes.

(Continued on next page)

Section 20

PREPARING THE TRACTOR FOR DELIVERY TO THE CUSTOMER

(Off the Car or Truck)

Group 5

Each Model "70" Diesel Tractor is manufactured with care and precision. Before it leaves the factory it is thoroughly inspected, adjusted, and tested.

However, during shipment and storage, many situations exist which may affect the general condition of the tractor. It is, therefore, important that the tractor be inspected thoroughly, and adjusted if necessary, before it is delivered to the customer.

By following the procedures given in this Section, you can be certain that the tractor is delivered in tip-top condition—ready to perform the work for which it was built. You will save

time and money by avoiding after-delivery complaints and service calls which will result if the tractor is not correctly adjusted when it leaves your shop. Above all, you can be sure of a satisfied customer when he puts the tractor to work.

The chart below is a quick reminder of all points which should be checked or inspected prior to delivery. Detailed instructions for the less experienced serviceman follow the chart. *Notice that each point on the chart is preceded by a number in parenthesis. For complete instructions regarding any inspection, test, or adjustment, refer to like-numbered paragraph in the detailed instructions which follow the chart.*

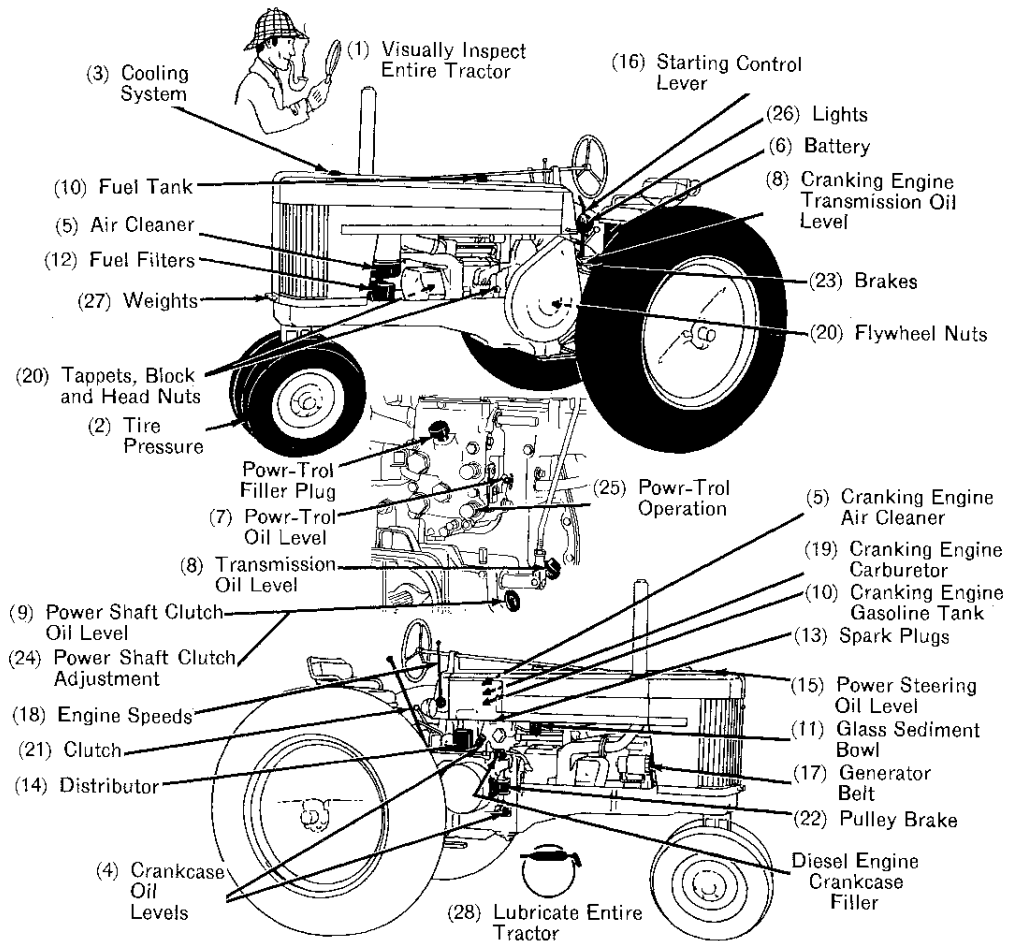


Figure 20-5-1—Predelivery Check Chart

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» » » » **DETAILED PREDELIVERY INSTRUCTIONS** « « « «

The following pages contain detailed instructions for performing the tests, checks, and adjustments shown in the chart on page 20-5-1.

Lubrication charts for both the general-purpose and standard Model "70" Diesel Tractors are given on pages 20-5-10 and 20-5-11.

BEFORE UNLOADING THE TRACTOR

1. VISUAL INSPECTION.

Before unloading the tractor from the car or truck, inspect it carefully for loss of parts or for dents, scratches, or other damage that may have occurred in transit. Make a note of any damage or shortage on the freight bill and initiate claim reports immediately. Otherwise, it may be difficult to collect from the carrier.

2. TIRES.

When tractors are shipped from the factory, the tires are overinflated to prevent possible damage to the tractors while in transit. Check the pressure in the tires and deflate them to the correct operating pressure as shown in the charts below.

RUBBER TIRE INFLATION CHART FOR STANDARD TRACTOR

REAR TIRES

Tire Size	Inflation Ply	Inflation Pressure	When tractor is heavily ballasted, as with maximum
14-30	6	12	added ballast or extremely
15-30	6	12	heavy rear-mounted imple-
18-26	8	12	ments, increase inflation
			pressure of 14-30 tires 4
			pounds.

Maximum ballast (liquid or cast-iron) per wheel—1000 pounds.

FRONT TIRES

Tire Size	Ply	Inflation Pressure
6.50 x 18	4	28
7.50 x 18	4	28

RUBBER TIRE INFLATION CHART FOR GENERAL-PURPOSE TRACTORS

REAR TIRES

Tire Size	Inflation Ply	Inflation Pressure	When tractor is heavily ballasted, as with maximum
12-38	6	14	added ballast or extremely
13-38	6	12	heavy implements such as
			two-row mounted corn
			picker or four-row rear
			mounted bedder with plant-
			ing attachment, increase in-
			flation pressure 6 pounds.

Maximum added ballast (liquid or cast-iron) per wheel—1015 pounds.

FRONT TIRES

Tire Size	Ply	Inflation Pressure	
		With Towed or	With Front
		Rear Mounted	Mounted
		Implements	Implements
6.00 x 16	4	28	28
6.00 x 16	6	36	44
7.50 x 16	10	48	60

Over- or under-inflation will shorten tire life.

If additional traction is required, add weight to the wheels. Lowering the air pressure will make little difference in the traction and may ruin the tires.

3. COOLING SYSTEM.

Check the coolant level to make sure it is up to bottom of baffle in radiator. During cold weather test the strength of the anti-freeze solution to be certain it will not freeze.

4. OIL LEVEL IN CRANKCASES.

Check the crankcase oil level in both engines on the dip sticks (Figures 20-5-2 and 20-5-4). Be sure dip sticks are screwed all the way down before removing them.