

# 8000 Series Tractors



JOHN DEERE

## SERVICE MANUAL

8000 Series  
Tractors

SM2030 (01MAR64) English

**SM2030 (01MAR64)**

LITHO IN U.S.A.  
ENGLISH



# SERVICE MANUAL FOR JOHN DEERE DEALERS

**8 0 0 0**  
**SERIES**

# TRACTORS

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## TO THE JOHN DEERE SERVICEMAN

This service manual contains maintenance instructions for John Deere 8000 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.

This manual was planned and written for the Service Department; its place is in the shop. Using the manual daily to solve service problems will reduce error and costly delay and assure you the best in finished service work. There is no guesswork when you use the manual.

### SPECIAL TOOLS

Service tool references in the text and in the illustrations are followed by the vendor's tool number which serves to identify each tool. The special engine tools mentioned in this manual have been developed for General Motors 6-71E Series Diesel engines and are recommended to facilitate service operations. These tools are not supplied by Detroit Diesel Engine Division and all inquiries regarding availability should be directed to the vendor: Kent-Moore Organization, Inc., 1501 South Jackson Street, Jackson, Michigan.

Other special tools mentioned in the manual are either described in detail with dimensions or are tools commonly used in the average service shop. Most of these can be obtained from local tool suppliers.



*John Deere 8010 Tractor*

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## Section 10

# DESCRIPTION, OPERATION AND SPECIFICATIONS

### Group 5

## DESCRIPTION



Fig. 10-5-1—John Deere 8020 Tractor

The John Deere 8020 Tractor (Fig. 10-5-1) is a heavy-duty, four-wheel-drive tractor that is tailor-made to the requirements of large-acreage grain growers or for use in irrigated land.

It is capable of pulling up to 10 plow bottoms, 31-foot tandem disk harrows, 36-foot multi-hitch grain drills, field cultivators and tool carriers, two- and three-bottom, two-way deep tillage plows with 18-inch bottoms, 18-foot offset disk harrows, large disk tillers and other similar loads.

#### ENGINE

A General Motors 6-cylinder, Model 6-71E

diesel engine powers the tractor. The engine is a two-stroke cycle, full diesel engine. It is electrically cranked and has a starting aid to facilitate starting at low temperatures. It produces approximately 200 brake horsepower at 2100 revolutions per minute rated speed. Approximately 145 horsepower is developed at tractor drawbar.

#### FUEL SYSTEM

Fuel is supplied to the engine from a 106-gallon fuel tank located behind the operator's seat.

A fuel pump, located at the end of the engine blower, assures an adequate supply of fuel to the injectors at all times.

#### CLUTCH

A disk-type, wet clutch is used. It is hydraulically actuated and is operated by a treadle-type pedal at the left of the operator's platform.

Oil, under pressure and filtered, to operate the clutch is furnished by a pump attached to the engine clutch housing.

The engine clutch housing and an auxiliary reservoir contain the oil to operate the clutch.

A clutch pump suction screen in the auxiliary reservoir and a double oil filter keep the clutch oil clean.

#### TRANSMISSION

The transmission is of the selective speed, constant mesh type. It is fully synchronized except in reverse speed gears which are sliding spur-type.

Shifting is accomplished by moving the gear-shift lever to the position that gives the desired speed. The transmission has two speed ranges—low and high—controlled by a range selector lever at the right of the operator.

A drop gear housing attached to the rear of the transmission contains the high-low range selector gears, the drop gear housing output shaft and the front drive disconnect assembly.

The transmission has eight forward speeds, ranging from 2-7/8 to 18 miles per hour and two reverse speeds of 1-7/8 and 5-5/8 miles per hour.

#### DRIVE AXLES

Double-reduction type drive axles are used. In addition to the customary bevel gear and pinion reduction, a planetary gear assembly, incorporated in the hubs, provides additional reduction. This design has the advantage of reducing the torque loads on the axle shafts and drive mechanism.

The front drive axle assembly can be disconnected for high speed operation when transporting, or under conditions where a minimum of tractive effort is necessary.

#### STEERING

Hydraulic power steering is regular equipment on the tractor. A steering valve, located under the cowl and operated by the steering

wheel, directs the flow of oil under pressure to a 5 x 15-inch steering cylinder. The tractor frame is composed of two sections (termed "bogies") which are hinged together near the center. Action of the steering cylinder causes the front bogie to turn, relative to the rear bogie, thereby causing the tractor to turn. The tractor can be turned in a 17-1/2-foot radius under full power.

Oil to operate the steering system is furnished by a 40-gallon per minute pump located at the right rear side of the clutch housing. This oil is supplied from the reservoir which also supplies the main hydraulic system.

#### BRAKES

The tractor is equipped with four-wheel air brakes. Operation of the brakes is controlled by an operating valve actuated by a pedal located near the right side of the operator's platform.

Air for operation of the brakes is furnished by a compressor located on the rear of the engine. An air tank is provided which stores the air for brake operation and contains enough air for two or three brake applications after the engine is stopped and the air compressor is not operating.

A mechanical parking brake assembly is located on the output shaft at the rear of the drop gear housing. It is foot operated and locks in the applied position. The brake is released by pulling out on a knob located on the instrument panel.

#### ELECTRICAL SYSTEM

Two 12-volt batteries, located in a compartment at the left side of the front bogie, furnish current at 24 volts for starting the engine and at 12 volts to supply the lights and other accessories when the generator is not operating.

A 24-volt generator supplies current when the engine is operating to maintain battery charge.

#### HYDRAULIC SYSTEM

The hydraulic system can be furnished to operate a rockshaft and one or two remote cylinders, or two or three remote cylinders without rockshaft.

The operating valves are controlled by operating levers located to the right of the operator's seat. One of the operating valves is designed to provide a "float" position.

A 3-point hitch attachment is available for use in conjunction with the rockshaft.

Oil for operating the hydraulic system is furnished by a positive-displacement, gear-type



pump located at the lower right rear of the clutch housing. Either a 40- or 60-gallon per minute pump is available.

The hydraulic pump can be disconnected for cold weather starting.

Oil for the hydraulic system (as well as for the power steering) is contained in a reservoir at the right side of the front bogie. The reservoir contains a suction screen for the steering system; also one for the main hydraulic system. Return oil from the steering and hydraulic systems is filtered by two stacked filter elements located in the top of the reservoir.

#### FRAME

The tractor frame is of a heavy welded steel construction. The frame is in two sections (termed "bogies") which are hinged together with a yoke and gudgeon which permits steering and, due to the oscillating characteristics of the gudgeon, maintains contact of all four wheels on the ground when operating over uneven terrain. This provides for better traction.

#### TIRES

The tractor can be furnished with 23.1-26, 12-ply tires on either 16- or 20-inch rims, high or low profile tread, or 18.00 x 25, 20-ply road grader tires on 15-inch rims.

#### OPTIONAL EQUIPMENT

Engine Air Pre-Cleaner with Air Stack

Electric Hour Meter

Tire Inflation Hose and Valve

3-Spool Hydraulic Operating Valve

40 or 60 GPM Main Hydraulic Pump

3-Point Hitch

5 x 16-Inch Remote Cylinders

Quick Disconnect Couplers

## Group 10

# OPERATION

### CONTROLS

For safe and easy operation of this tractor, become familiar with all of the controls. Regardless of your previous experience, study the next few pages carefully.

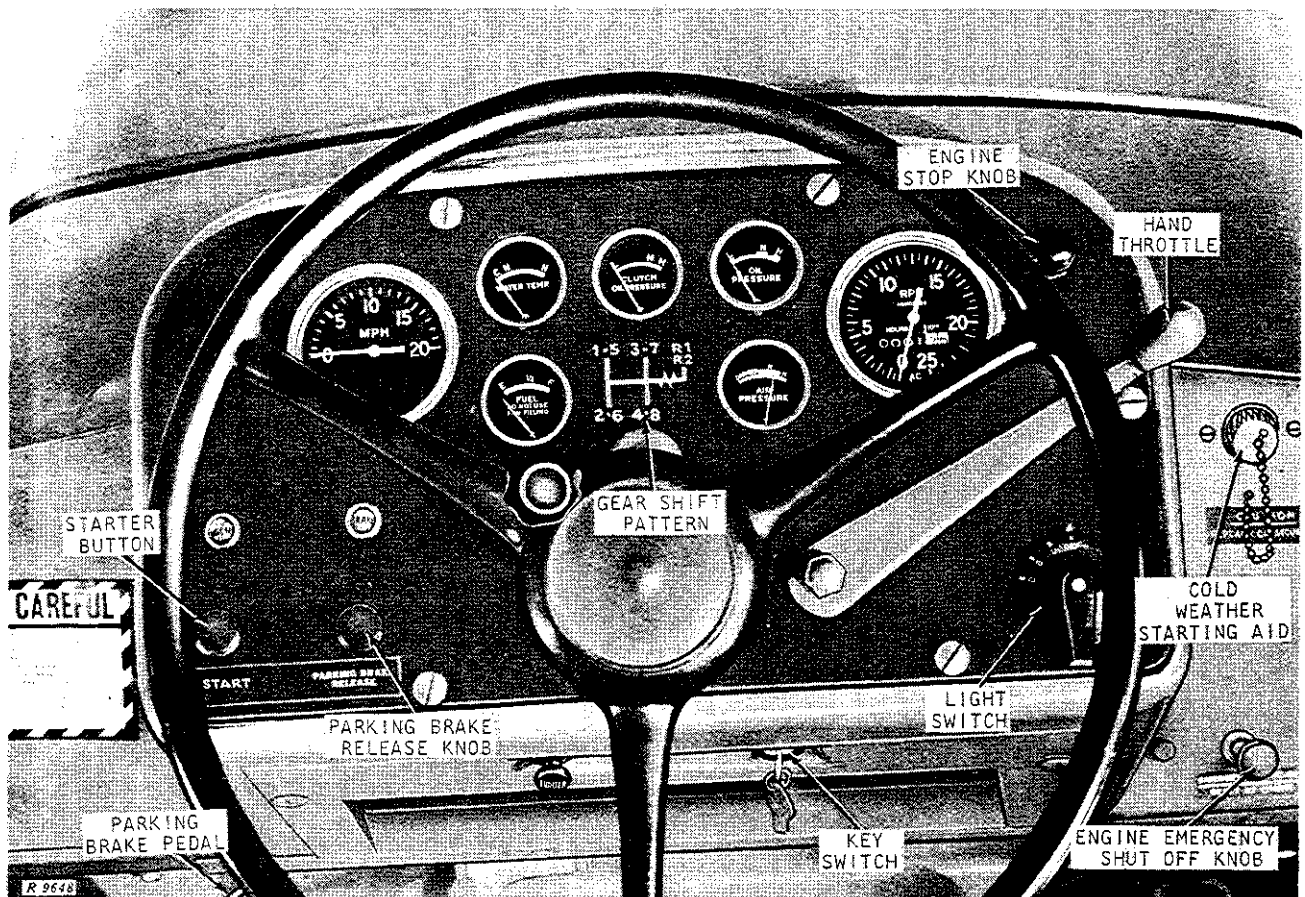


Fig. 10-10-1—Controls

#### KEY SWITCH

This switch (Fig. 10-10-1) controls the entire electrical system of the tractor. The electrical equipment on the tractor will not operate until the key switch is turned on. When the key is turned to the "ON" position, the fuel gauge is activated and current is made available to the starter and light switches and generator, parking brake, and low air and/or low engine oil pressure warning lamps.

#### COLD WEATHER STARTING AID

The covered tube (Fig. 10-10-1) on the side of the right cowl panel leads to the engine air intake system. During cold weather, ether is sprayed into this tube to help start the engine.

#### HAND THROTTLE

The hand throttle (Fig. 10-10-1) controls engine speed. Pulling the lever down increases engine speed; pushing it up decreases engine speed to slow idle.

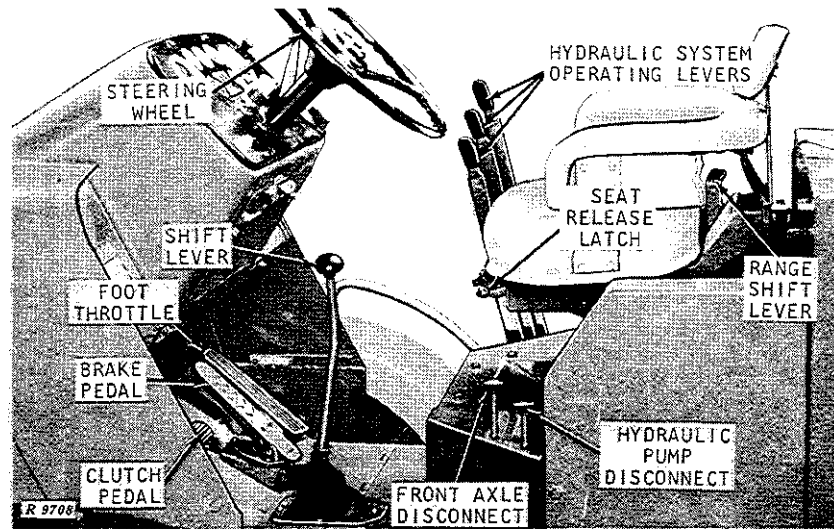


Fig. 10-10-2—Operating Controls

#### FOOT THROTTLE

Engine speed can be increased beyond the hand throttle setting by depressing the foot throttle (Fig. 10-10-2). When foot pressure is removed, engine speed reverts to the speed established by the hand throttle.

#### ENGINE STOP KNOB

This knob is located on the instrument panel (Fig. 10-10-1). The engine is normally stopped by pulling out on this knob.

#### ENGINE EMERGENCY SHUT-OFF KNOB

In rare instances, it may not be possible to stop the engine in the regular manner. In this case, the engine can be stopped by pulling out on the knob located on the right cowl panel (Fig. 10-10-1). Pulling this knob cuts off the engine air supply, causing it to stop.

**CAUTION:** Do not use this method of stopping the engine except in emergency.

#### CLUTCH PEDAL

Depressing the clutch pedal disengages the hydraulic clutch to permit shifting gears.

#### SHIFT LEVER

The transmission is shifted through its eight forward and two reverse speeds by a shift lever (Fig. 10-10-2) located at the front of the operator.

#### TRANSMISSION RANGE SELECTOR LEVER

The transmission can be operated in either of two ranges (high or low) to obtain various tractor ground speeds. The desired range is selected by the range shift lever (Fig. 10-10-2). When the lever is moved back, the transmission is in low range. When the lever is moved forward, the transmission is in high range. The lever must be in one of these two positions in order to move the tractor. The tractor motion **MUST** be stopped before changing ranges.

**BRAKE PEDAL**

This pedal (Fig. 10-10-2) activates the four air brakes. Braking effort is proportional to pedal travel.

**PARKING BRAKE PEDAL**

The mechanically operated parking brake is activated by the pedal at the extreme left-hand side of the platform, (Fig. 10-10-1). When depressed, the pedal applies the brake and automatically locks it in the applied position.

**PARKING BRAKE RELEASE KNOB**

The parking brake is released by pulling this knob (Fig. 10-10-1).

**HYDRAULIC SYSTEM OPERATING LEVERS**

These levers (Fig. 10-10-2) control the tractor hydraulic system. The tractor may be equipped with two or three levers depending on the hydraulic equipment.

**HYDRAULIC PUMP DISCONNECT KNOB**

The hydraulic pump is engaged by pushing down on the rear knob at the left-hand corner of the seat support (Fig. 10-10-2). Do not attempt to engage the pump while the engine is running. Engage the pump **ONLY** when the engine is stopped.

**FRONT AXLE DRIVE DISCONNECT KNOB**

Pulling up on the front knob (Fig. 10-10-2) at the left-hand corner of the seat support disengages the front axle drive when four-wheel drive is unnecessary or when the tractor is travelling on the highway. Pushing the knob down engages the front axle drive.

**LIGHT SWITCH**

The light switch (Fig. 10-10-1) is used to turn on the lights.

**SEAT ADJUSTMENT**

The seat can be adjusted to suit the operator.

To move the seat up and back, stand up and lift the seat release latch (Fig. 10-10-3). The seat will automatically move to the upper rear position.

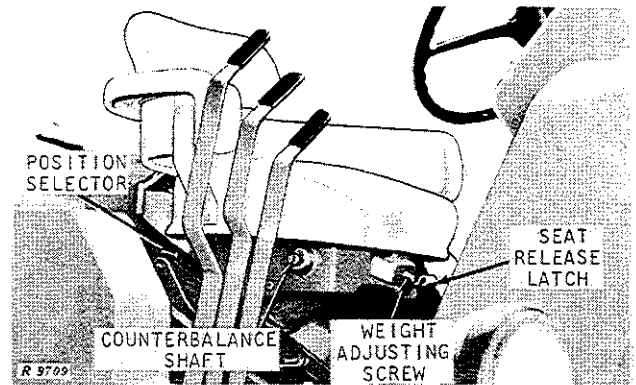


Fig. 10-10-3—Seat Controls

**Height**

To adjust the seat for the height of the operator, first move the seat to the upper, rear position. Then move the seat position selector lever (Fig. 10-10-3) between "SHORT" and "TALL" until the operator can comfortably reach the pedals and levers. The seat will always return to this position when the operator sits down after the seat has been moved up and back.

**Weight**

To adjust the seat for the weight of the operator, turn the weight-adjusting screw (Fig. 10-10-3) to conform to the operator's weight.

**Retraction**

In case the seat does not move fully up and back when unlatched, adjust the counterbalance spring as follows: Insert a screwdriver into the slot in the counterbalance shaft (Fig. 10-10-3), push in to release the shaft, and turn shaft counter-clockwise. Align the latch at the end of the shaft with one of the slots in the side of the seat support and release screwdriver pressure on the shaft to latch it in position.

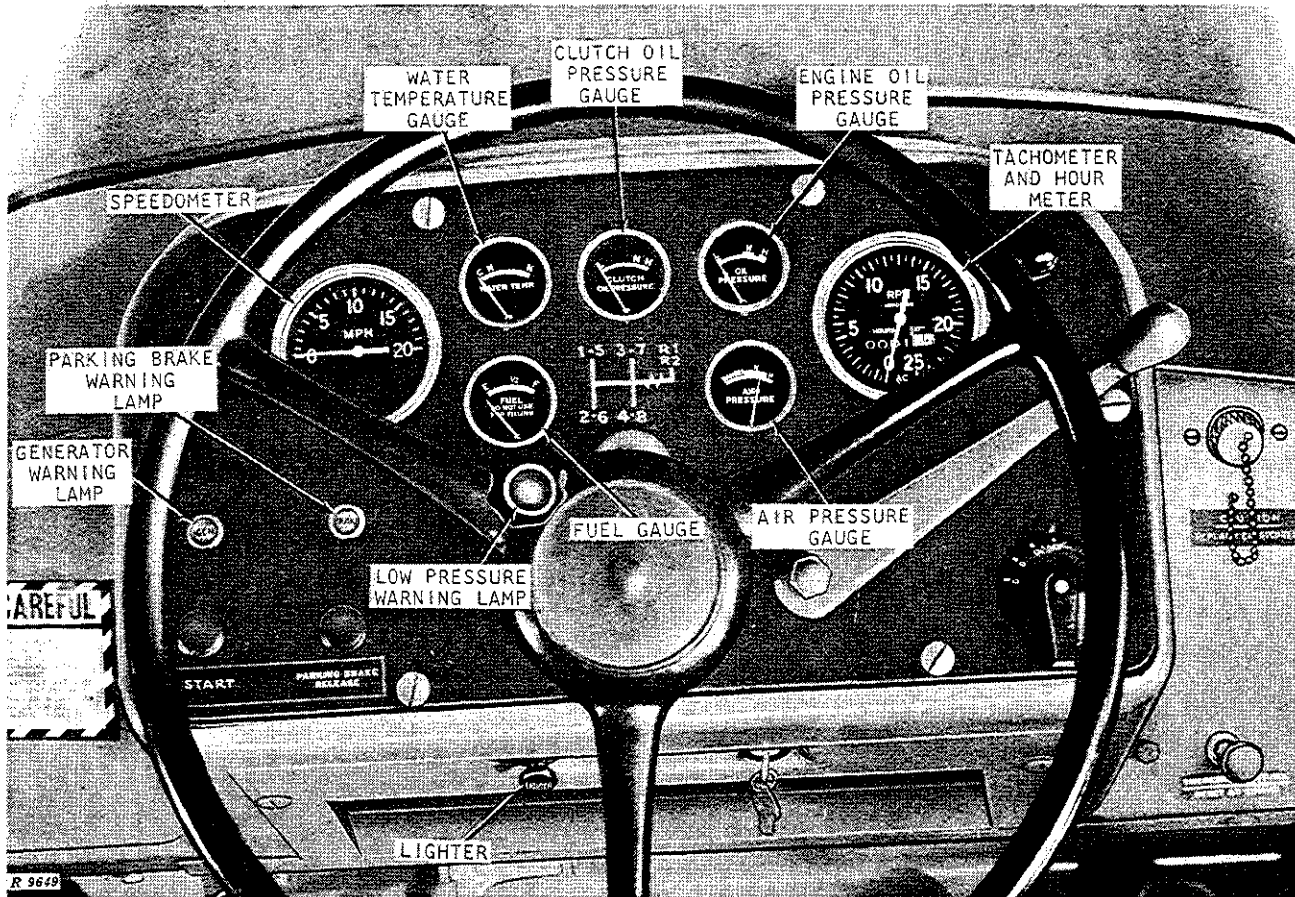


Fig. 10-10-4—Instruments

## INSTRUMENTS

All instruments and gauges are grouped on the instrument panel (Fig. 10-10-4) where they can be observed at a glance by the operator.

### SPEEDOMETER

This instrument gives the tractor speed in miles per hour.

### WATER TEMPERATURE GAUGE

This gauge indicates the temperature of the coolant in the engine cooling system. During operation the indicator hand should remain in the "N" (Normal) range.

### CLUTCH OIL PRESSURE GAUGE

This gauge shows the pressure of the oil in the clutch hydraulic system when the engine is running. To avoid wear, stop the tractor immediately if clutch oil pressure is low. Gauge will register zero when the clutch is disengaged.

### ENGINE OIL PRESSURE GAUGE

This gauge shows whether or not the engine oil pump is operating satisfactorily. It does not reveal the condition or amount of oil in the crankcase. If the indicator hand does not register pressure, stop the engine immediately and determine the cause.

### TACHOMETER AND HOUR METER

The accumulated hours of engine service, measured in hours and tenths of hours, are shown by the hour meter. Engine revolutions per minute are also indicated.

### AIR PRESSURE GAUGE

This gauge shows the pressure of air in the air brake reservoir. After the engine is started, wait until the indicator hand is in the "N" (Normal) range before operating the tractor. If the indicator hand drops into the "DANGER" range, indicating that the air pressure is less than 30



pounds per square inch, the warning lamp on the dash will flash on and off to alert the operator.

#### FUEL GAUGE

This electrically-operated gauge indicates the amount of fuel in the tank. The gauge will not operate until the key switch is turned on.

#### GENERATOR WARNING LAMP

With the key switch on, this lamp glows red if the generator fails to charge the batteries properly. The light goes out when the generator is rotating fast enough to force a charge into the batteries. If the lamp glows while the engine is running at operating speed, stop the engine immediately and determine the cause. In normal operation the lamp will glow after the engine is stopped to remind the operator to turn the key switch off.

#### PARKING BRAKE WARNING LAMP

If the parking brake is applied, this lamp glows red when the key switch is turned on. It serves as a reminder to release the brake before operating the tractor.

#### LOW PRESSURE WARNING LAMP

With the key switch turned on, whenever either the air or engine oil pressure or both are low, the low pressure warning lamp (Fig. 10-10-5) flashes intermittently as a warning to the operator. This lamp flashes momentarily each time the engine is started.

#### CIGARETTE LIGHTER

The tractor is equipped with a cigarette lighter located on the recessed panel below the instrument panel.

### STARTING THE ENGINE

*NOTE: For instructions relative to starting new or overhauled engines, refer to "PRE-STARTING INSPECTION," page 10-10-19.*

- (1) Perform the following periodic services before starting the engine for the first time each day: (Refer to Group 10 of Section 30 for details).
  - (a) Check the engine crankcase oil level.
  - (b) Service air cleaner.
  - (c) Check the radiator coolant level.

- (d) Drain 1/4 pint of fuel from the fuel strainer and filter.

- (e) Fill the fuel tank.

- (2) Make sure fuel shutoff valve on the bottom of the fuel tank is open.

- (3) Place shift lever in neutral and depress the clutch pedal to decrease drag on the engine. During cold weather, disengage the hydraulic pump by pulling up on the hydraulic pump disconnect knob.

- (4) Pull the hand throttle down to full-open position to set injector racks and insure delivery of fuel to the injectors. Then move the throttle back to idle position (as far up as it will go).

- (5) Turn key switch on. Press starter button (Fig. 10-10-1) to crank the engine. Do not hold button 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 a minute or so before trying again. This will allow the starter to cool.

If engine fails to start after four such attempts, refer to "Trouble Shooting."

*NOTE: If the prevailing temperature is 40 degrees Fahrenheit or lower, it may be necessary to use the cold weather starting aid to start the engine.*

- (6) Watch the engine oil pressure and clutch oil pressure gauges as the engine begins to run. If the indicator hands are not in the "N" (Normal) range, stop the engine immediately and determine the cause.

Make sure the generator and low air and/or low engine oil pressure red lights go out as the engine picks up speed. If either lamp continues to glow, stop the engine and determine the cause. If the parking brake warning lamp glows, release the parking brake.

- (7) After the engine starts, use the hand throttle or foot throttle to bring it up to operating speed. Be sure the engine is warmed up before placing it under full load.

#### COLD WEATHER STARTING

When the air temperature is extremely cold, the heat of compression in the engine combustion chamber may not be high enough to ignite the injected fuel.

If the outside temperature is 40 degrees Fahrenheit or lower, an engine starting aid may be necessary. The need for such a starting aid depends to some extent on the type of fuel used and the condition of the engine. A starting aid will not correct such deficiencies as low battery charge, crankcase oil of heavy viscosity, or high electrical resistance. Starting aids are intended for use only when the air is too cold for heat of compression to ignite the fuel-air mixture and the engine is otherwise operating satisfactorily.

Pressurized push-button cans containing starting fluid which aids fuel combustion, can be obtained from John Deere Parts Depot.

To start the engine in cold weather, remove the cap from the cold weather starting aid adapter on the right cowl panel (Fig. 10-10-1).

Follow steps (1) through (5) for normal starting. While attempting to start the engine (step 5), spray starting fluid into the inlet tube until the engine starts.

**CAUTION:** If the tractor is equipped with a cab, use extra precaution while spraying the fluid. Do not smoke while using the fluid and be sure there are no other fire hazards.

During extremely cold weather, it may be necessary to continue spraying fluid for a short time after engine starts to keep it running. However, avoid using an excessive amount of fluid. Too many "shots" of starting fluid may cause

pre-ignition or flooding, either of which could damage the engine or starter.

After engine is running satisfactorily, replace the cap on the starting aid inlet tube, making sure that the O-ring in the cap is in good condition. This will prevent entrance of unfiltered air into the engine.

Do not spray fluid into the air cleaner intake as instructed on some starting fluid cans. Fluid drawn through the oil in the air cleaners loses much of its effectiveness. This practice can also result in getting too much fluid in the cylinders, especially when the air is extremely cold.

After engine has started, follow steps (6) and (7) for normal starting.

## ENGINE SPEEDS

### OPERATING SPEEDS

It is important for economy and best performance to operate the engine at full throttle whenever possible (2100 rpm). Correct fast idle (full open but no load) speed is 2230 to 2270 rpm, and correct slow idle speed is 550 to 600 rpm. The engine is designed to operate at these speeds. High fuel consumption, excessive smoke from the exhaust, and increased maintenance costs will result from operating the engine above the specified speeds. **SUCH PRACTICE WILL ALSO VOID THE ENGINE WARRANTY.**

