8000 Series Tractors

JOHN DEERE

SERVICE MANUAL

8000 Series
Tractors

SM2030 (01MAR64) English

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SERVICE MANUAL FOR JOHN DEERE DEALERS

8000 SERIES TRACTORS

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SM-2030 (5-60)

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

SECTIONAL INDEX

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 gearshift 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 Hydrauic 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.

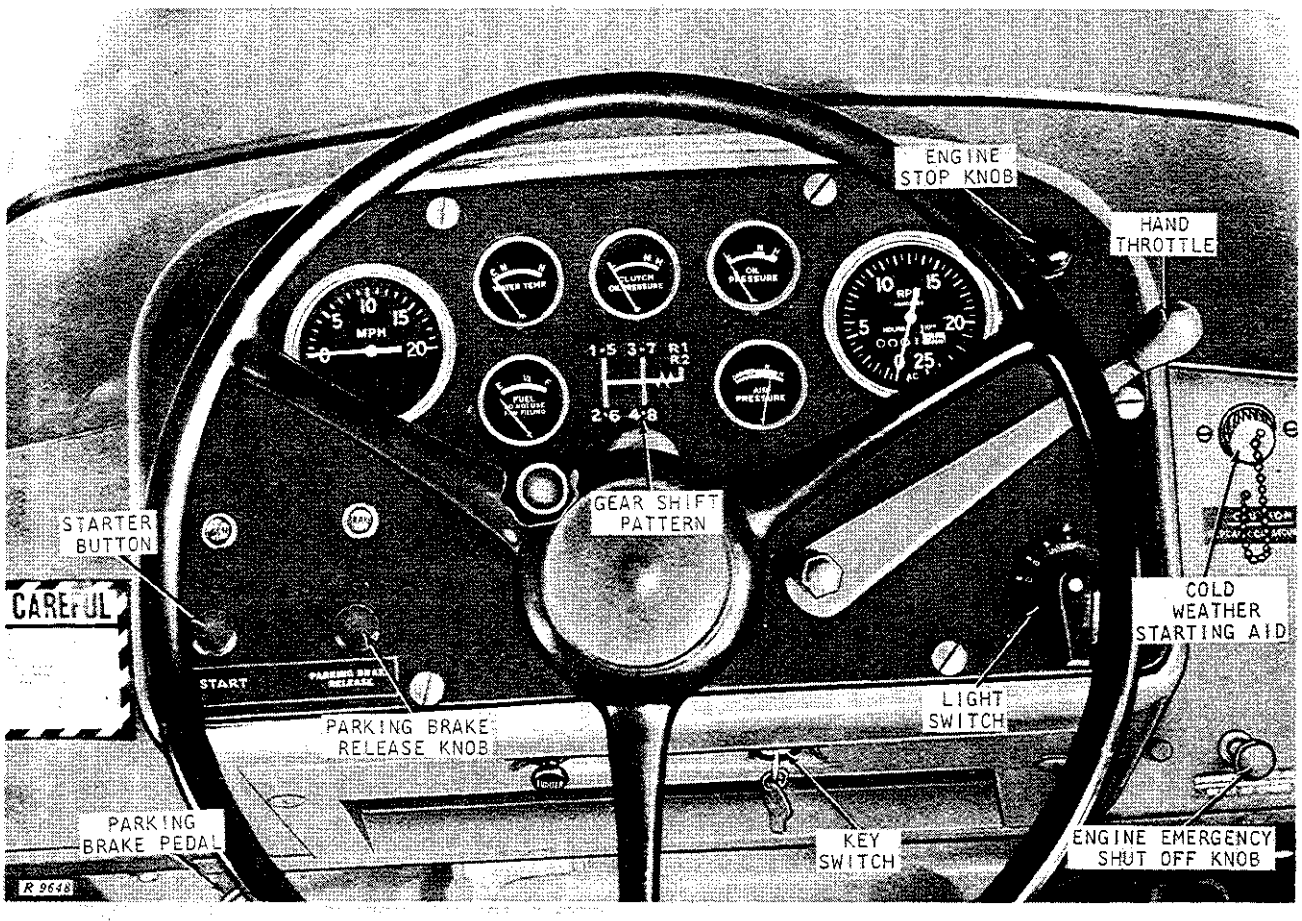


Fig. 10-10-1—Controls

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.

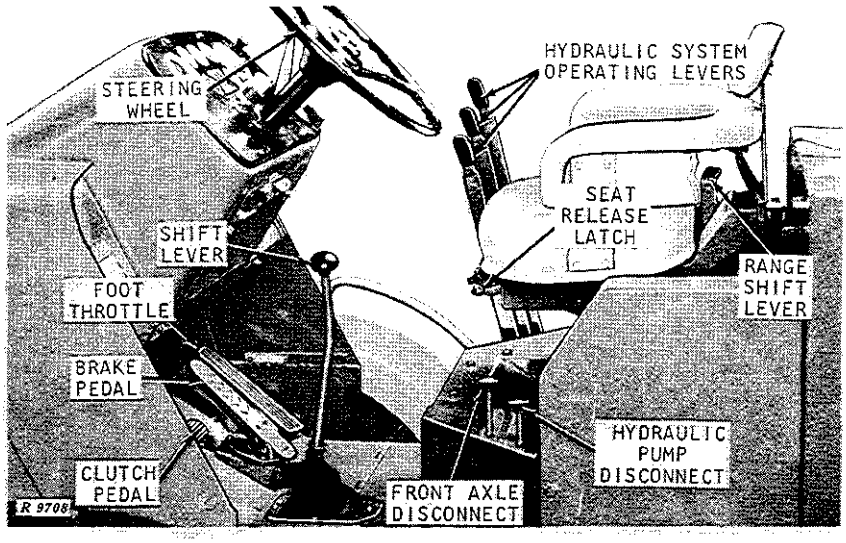


Fig. 10-10-2–Operating Controls

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.

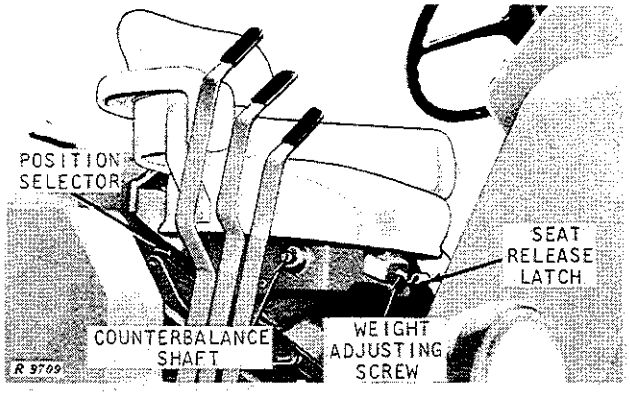


Fig. 10-10-3—Seat Controls

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.

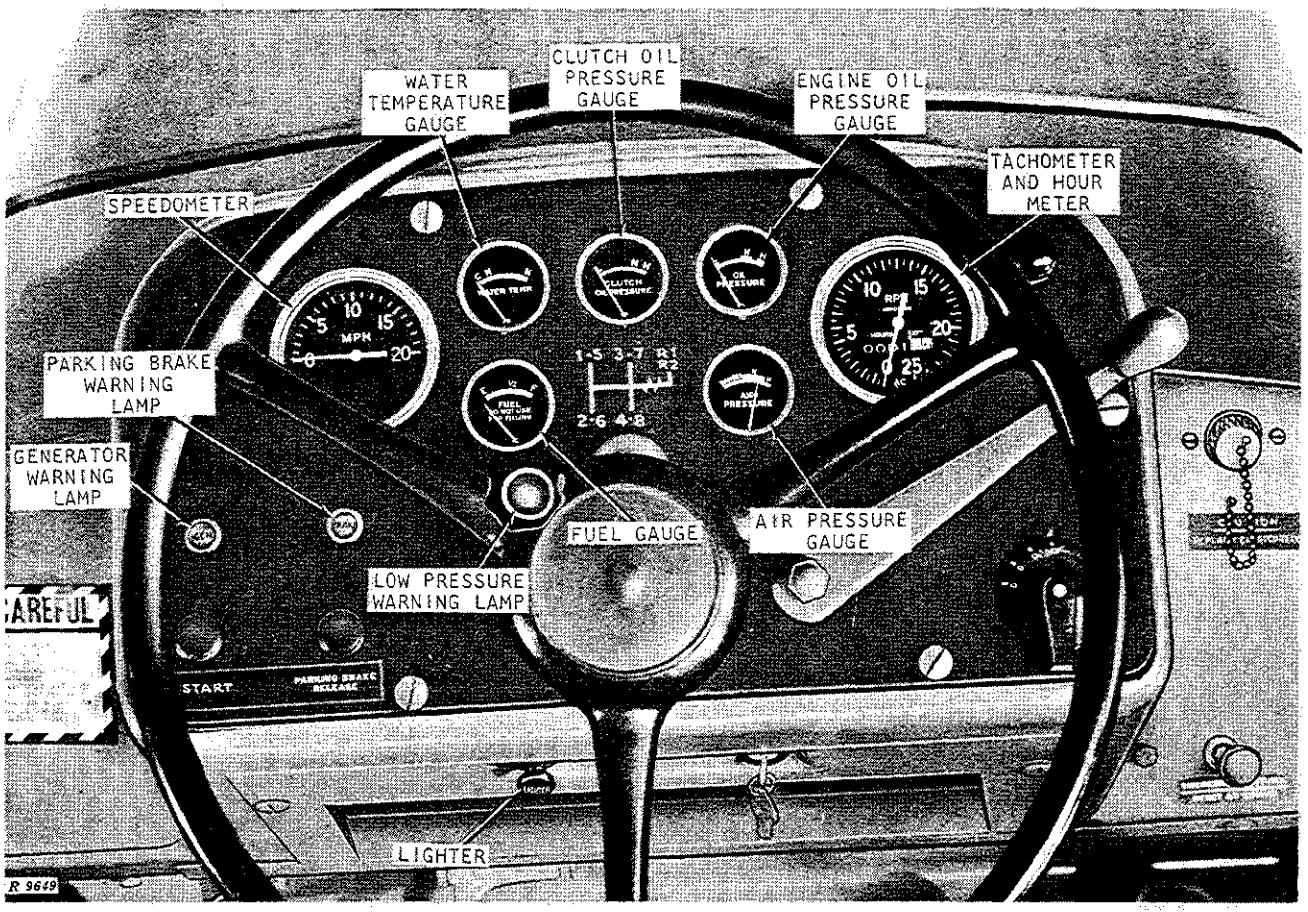


Fig. 10-10-4—Instruments

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.

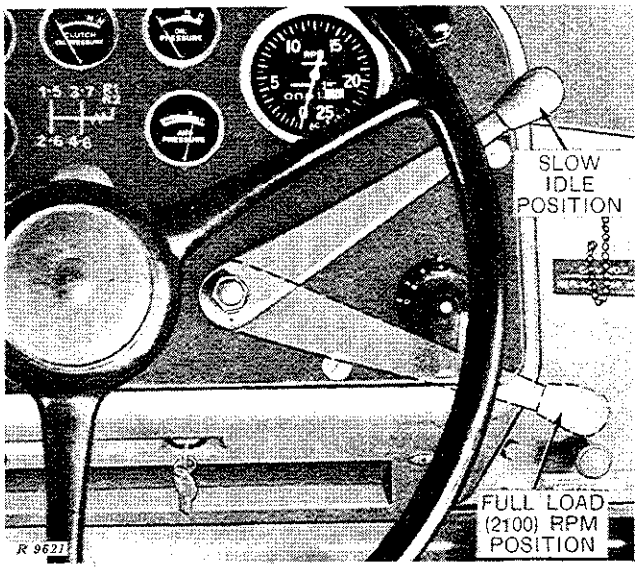


Fig. 10-10-5–Hand Throttle Positions

USING HAND THROTTLE

Use the hand throttle to select slow idle or full load (2100 rpm) engine speed.

Push the lever upward as far as it will go to obtain slow idle. Pull the lever downward as far as it will go to obtain full load.

It is always best to set the hand throttle in full load position and vary the tractor ground speed by shifting gears.

USING FOOT THROTTLE

Depress the foot throttle only when conditions are such that it is more practical to speed up the tractor by this method than it would be to shift gears.

When the pedal is pressed downward as far as it will go, the engine is operating at full throttle. When the pedal is released, engine speed reverts to that established by the setting of the hand throttle.

ENGINE IDLING–

Avoid unnecessary engine idling. Prolonged idling may cause the engine coolant to fall below the specified range of 160° to 185° F. Low operating temperature causes crankcase dilution due to incomplete fuel combustion, and permits the formation of lacquer or gummy deposits on valves, pistons, and rings. It also promotes a rapid accumulation of sludge within the engine. When the tractor is to be idle for any length of time, stop the engine.

STOPPING THE ENGINE

ROUTINE STOPPING

Allow engine to idle for a minute or so at half speed or lower, without load, before stopping it. This permits it to cool gradually. Sudden cooling of a hot engine causes metal parts to contract unevenly and subjects them to rapid wear.

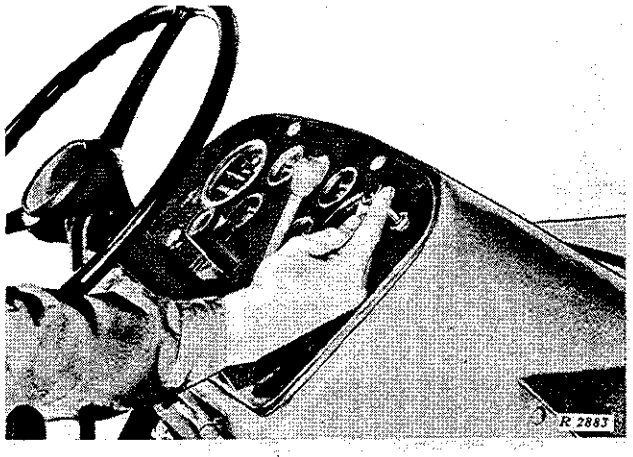


Fig. 10-10-6–Pulling Out Engine Stop Knob

With speed control lever at slow idle, pull out on stop knob on dash (Fig. 10-10-6). After a few revolutions the engine will stop. Pulling out on the stop knob shuts off the supply of fuel to the injectors.

Turn the key switch off to prevent battery discharge through the generator warning lamp and fuel gauge. Remove the key from the key switch to prevent tampering and unauthorized operation of the engine and electrical accessories. Apply the parking brake to hold the tractor stationary.

EMERGENCY ENGINE STOPPING

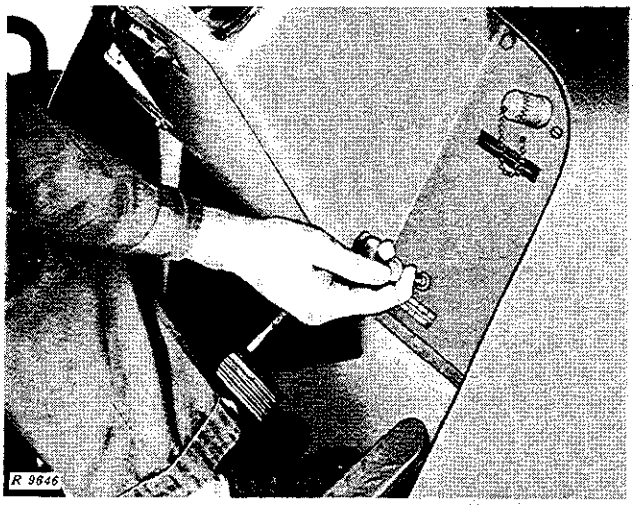


Fig. 10-10-7–Pulling Out Engine Emergency Shutoff Knob

In rare instances it may be impossible to stop the engine in the routine manner due to unusual wear or damage to the engine stopping mechanism. If this occurs, reduce engine speed (if possible) to slow idle and pull out on the engine emergency shut-off knob (Fig. 10-10-7). This stops the engine by shutting off the air supply.

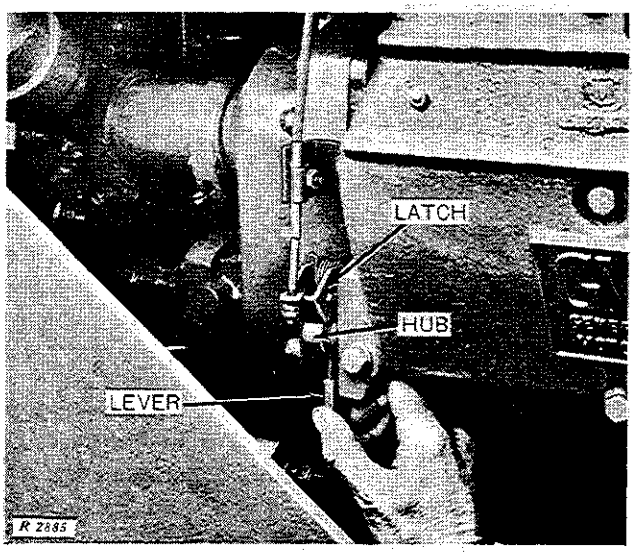


Fig. 10-10-8–Resetting Engine Emergency Shutoff Mechanism

After the emergency shutoff is used, reset the mechanism. To do so, push the knob in as far as it will go. Then push down and inward on the lever (Fig. 10-10-8) at the engine end of the mechanism to engage the latch on the cable end with hub of the operating shaft.

Before starting engine, determine why it would not stop in the normal manner and correct the cause.

Use the emergency shutoff only in case of emergency. Stopping the engine by this method may cause oil to be sucked past the oil seals into the blower housing. Damage to the engine can also result.

BREAKING IN THE ENGINE

Operate the tractor for the first 20 hours at 1/2 to 3/4 load. After this 20-hour period, the tractor is then ready for full load service. At no time should the tractor be operated under full load until it has run long enough for the engine and transmission oil to warm up thoroughly.

At the end of the first 100-hour period, drain the crankcase oil, service the oil filters, and fill the crankcase with engine oil as specified in this manual.

WARM UP PERIOD

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

A good practice is to idle the engine at about half speed for 5 minutes and then operate it at fast idle 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.

DRIVING THE TRACTOR

PRELIMINARY CHECKS

After the engine is started and warmed up, glance at the instruments to make sure everything is operating properly. The generator indicator light should be off and the oil pressure, temperature, clutch, and air pressure gauge indicator hands should be in the "N" (Normal) range.

SHIFTING GEARS

Selecting Proper Speed

The tractor has 8 forward speeds and 2 reverse speeds which enable the operator to balance load and speed for maximum economy and provide flexibility of speed to meet varying working conditions.

The transmission has two speed ranges, low and high, controlled by the range shift lever located at the right of the operator. Moving the lever to the rear places the transmission in low range; moving the lever forward places the transmission in high range. Always stop the tractor motion to make range shifts and be sure lever is moved all the way forward or to the rear.

When the engine is operating at full load speed (2100 rpm), the ground speeds at which the tractor will travel are:

TRACTOR GROUND SPEEDS

Low Range		High Range	
1st	2-7/8 mph	5th	8-1/8 mph
2nd	3-7/8 mph	6th	11 mph
3rd	5 mph	7th	14 mph
4th	6-1/3 mph	8th	18 mph
Reverse	1-7/8 mph	Reverse	5-5/8 mph

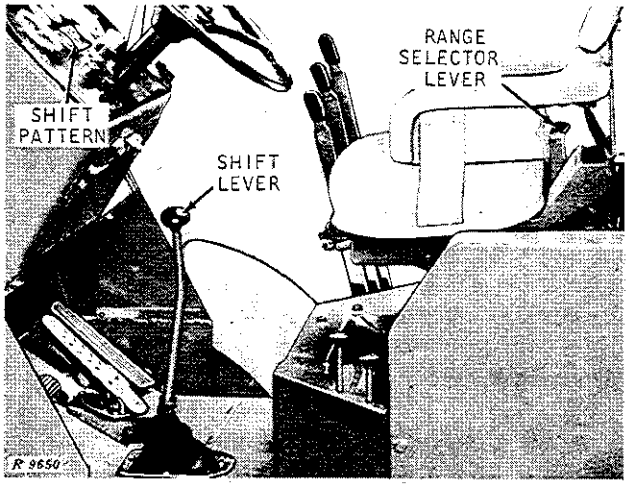


Fig. 10-10-9–Shift Levers and Shift Pattern

Each position on the shift pattern (Fig. 10-10-9) provides a different speed in each range. In high range, the position used for 1st in low range is used for 5th, the one used for 2nd is used for 6th, the one for 3rd is used for 7th, the one used for 4th is used for 8th, and the one used for reverse 1 is used for reverse 2.

Select the proper gear for the work to be done. For best performance and maximum economy, it is good practice to operate the engine at full rated load speed whenever possible, using the transmission gears to change the speed of travel. If the load is light and you want to travel at slow speed, it is better to use the gear that gives the desired speed than to use a faster gear and throttle down. A tractor traveling slowly in a high gear with a light load and a retarded throttle is wasting fuel. On the other hand, if the selected gear is too high for the load, the overloaded engine will "lug" or labor, which increases engine wear in addition to using an excessive amount of fuel.

Shifting From Neutral

Having selected the proper speed, set the range shift lever in position to obtain high or low range (lever rearward for low range, forward for high range).

Before making range shifts the tractor motion MUST BE STOPPED and the clutch disengaged. Range shifts are best accomplished at 1000 to 1200 rpm engine speed. Hold clutch disengaged until range shift is completed. Do not attempt to "double-clutch" as it will result in gear clashing.

The range shift lever must be either completely forward or completely rearward before the tractor will move.

In event gear clashing occurs during shift, hold clutch disengaged and wait momentarily to allow the clutch drum to stop rotating.

If the gears do not engage, but no clash is evident, turning the steering wheel back and forth while holding pressure on the range shift lever, will rotate the gears enough to allow engagement.

Depress the clutch pedal and move the transmission shift lever to the gear which gives the desired speed.

Release the parking brake by pulling up on the knob on the instrument panel. Gradually engage the clutch to take up the load smoothly.

Shifting from One Speed to Another

All gears except reverse are synchronized, making it possible to shift while the tractor is in motion. To shift from one speed to another in the same speed range, depress the clutch pedal and shift in the usual manner. When shifting down from a high speed to a lower speed, accelerate the engine to synchronize its speed with that of the transmission gears.

Reverse speed gears are not synchornized. To avoid clashing gears when shifting into reverse, shift first into a forward speed to stop the countershaft, then move the shift lever into reverse.

NOTE: The tractor motion MUST BE STOPPED before making range shifts. *See page 10-10-9.*

STEERING

Hydraulic power provides effortless, positive steering and eliminates wheel tug and ground shock. The system includes a hydraulic cylinder mounted between the two hinged front and rear sections (or "bogies") of the tractor.

Turning the steering wheel directs hydraulic oil under pressure to either end of the cylinder to extend or retract the piston. Piston motion causes the bogies to hinge and turn the tractor. When the operator stops turning the steering wheel, the tractor will remain in the same degree of turn established when steering wheel motion is discontinued. This is because a "follow-up" mechanism cuts off the flow of oil to the steering cylinder when steering wheel motion is stopped. When the steering wheel is returned to neutral, the tractor continues straight ahead in the new direction.

USING THE AIR BRAKES

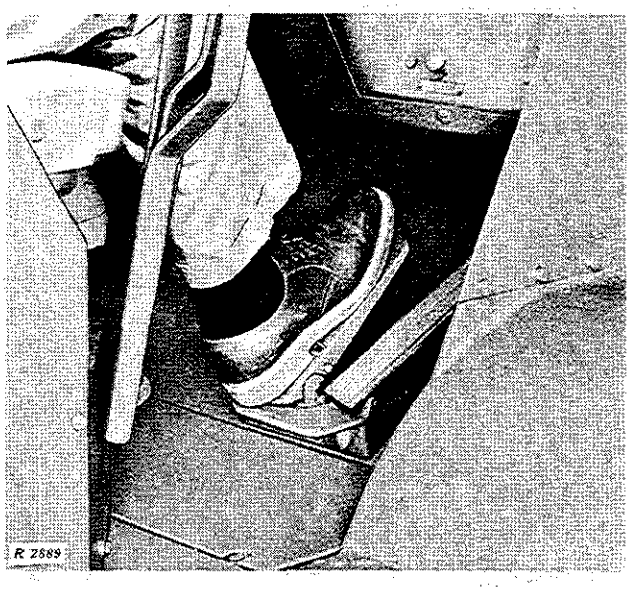


Fig. 10-10-10—Operating Air Brakes

Operation of the air brakes differs very little from operation of conventional brakes. The distance the brake pedal (Fig. 10-10-10) is depressed determines the amount of air delivered to the brake-actuating mechanism and the resultant braking force.

Never operate the tractor until the indicator hand on the air pressure gauge is in the "N" (Normal) range. If the hand drops into the "DANGER" range, indicating a pressure of 30 pounds per square inch or less, there is not sufficient pressure to operate the brakes effectively. The low air and/or low engine oil pressure warning lamp will flash to warn the operator.

To use the brakes to best advantage, apply them at first as hard as speed and ground conditions permit, then gradually release them as the speed decreases. When the stop is completed, there should be only sufficient compressed air in the actuating mechanism to hold the tractor stationary. Never "fan" the brake pedal. To do

so merely wastes compressed air and does not improve the stop.

NOTE: Normally there is sufficient compressed air in the reservoir to make two or three stops after the engine is stopped. Therefore, except in an emergency, the air brakes should NEVER be operated unless the engine is running.

USING PARKING BRAKE

To apply the parking brake, depress the pedal to the left-hand side of the platform. The brake will lock automatically in the applied position.

To release the brake, pull up on the parking brake disconnect knob on the instrument panel.

Always apply the parking brake when the engine is stopped.

The clutch is held in engagement by hydraulic pressure, but when the engine is stopped there is no hydraulic pressure and the clutch is disengaged. Therefore, placing the transmission in gear will not keep the tractor from rolling on an incline.

DRIVING WITH FRONT AXLE DISCONNECTED

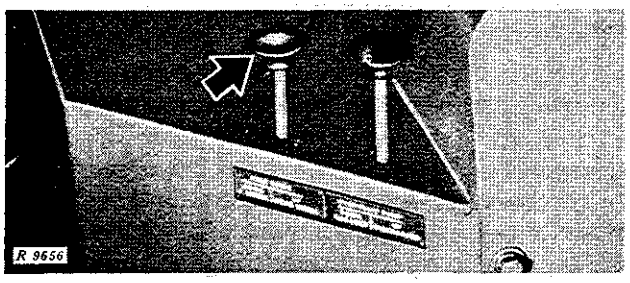


Fig. 10-10-11—Front Axle Disconnect Knob

When four-wheel drive is unnecessary, or when traveling on the highway, the front axle should be disconnected from the engine. To do so, stop tractor, depress the clutch pedal, and place the tractor in gear. While pulling up on the front axle drive disconnect knob (Fig. 10-10-11), release the clutch pedal and alternately speed up and slow down the tractor by means of the hand or foot throttle until the mechanism disengages.

To engage front axle, place the tractor in gear and drive slowly forward and rearward while pushing down on the disconnect knob until the mechanism engages.

It is always advisable to disconnect the front axle when driving the tractor on a highway. Since there is usually some difference in rolling radius between the front and rear tires, due to such variable factors as tire pressure, tire wear and weight of implements, the front and rear wheels may rotate at slightly different speeds. This will scuff the tires and subject them to rapid wear if the tractor is operated with four-wheel drive on the highway.

OVERLOADING

The tractor will handle economically and efficiently all jobs for which it was designed. Using the tractor on loads beyond its power range places excessive strain on all its parts and will eventually result in unnecessary repair expense and impaired operating efficiency. An overloaded tractor can usually be detected by a gradual slowing down in ground speed and a laboring engine. Black or gray smoke from the exhaust due to unburned fuel is also an indication of an overloaded engine.

HIGH-SPEED DRIVING

The purpose of the high speed gears in the tractor is to save time on highways and on smooth-surfaced secondary roads. Regardless of road or field conditions, use care when operating the tractor at high speed. Fast driving is the cause of many accidents. As a safety measure, shift to a lower gear when operating over rough ground. Disconnect the front axle drive for all high speed road travel.

HYDRAULIC SYSTEM

ENGAGING HYDRAULIC PUMP

To engage the pump, stop the engine and press down on the hydraulic pump disconnect knob (Fig. 10-10-12) on the left-front side of the seat support. It may be necessary to turn the engine over momentarily by turning the key switch on and pressing the starter button to align the engaging parts.

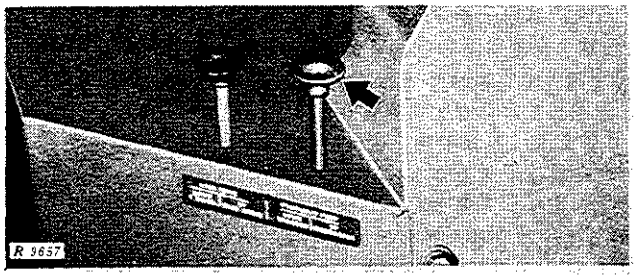


Fig. 10-10-12–Hydraulic Pump Disconnect Knob

The pump is disengaged by pulling up on the knob while the engine is slowly idling. Disengage the pump if the hydraulic system is not being used.

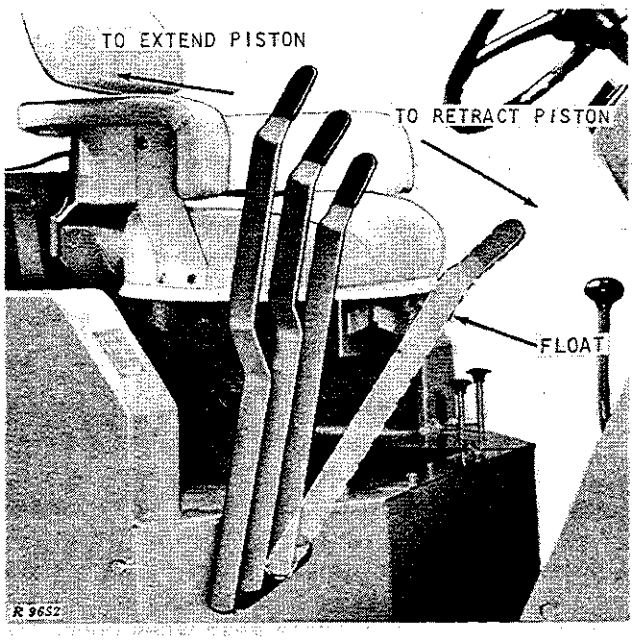


Fig. 10-10-13–Hydraulic System Operating Levers

USING HYDRAULIC SYSTEM OPERATING LEVERS

The tractor may be equipped to operate a rockshaft and 3-point implement hitch or two or three implement-mounted remote hydraulic cylinders which are connected to the tractor by means of hoses and quick couplers. The hydraulic equipment is operated by levers (Fig. 10-10-13) located at the right-hand side of the seat.

If the tractor has two levers, the inner lever controls oil flow to the rockshaft hydraulic cylinders or to the center and right-hand quick couplers. The outer lever controls oil flow to the left-hand coupler.

If the tractor has three levers, the inner lever controls oil flow to the rockshaft hydraulic cylinders, the center lever controls oil flow to the right-hand coupler, and the outer lever controls oil flow to the left-hand coupler.

If the tractor is equipped to operate three remote cylinders, the inner lever controls oil flow to the center coupler, the center lever to the right-hand coupler, and the outer lever to the left-hand coupler.

Pulling the levers to the rear extends the cylinder pistons. In most applications, this raises the implement. Pushing the levers forward retracts the pistons. In most applications, this lowers the implement. The further the levers are moved in either direction, the faster the hydraulic system will react.

CAUTION: Never overload the hydraulic system. Although the system has relief valves to protect it from overloads, never impose a greater load than that for which it was designed. Many implements have auxiliary springs to help raise them. If the implement will not rise when the hydraulic system operating levers are operated, adjust the auxiliary lifting spring. See the implement operator's manual.

When hand pressure is released from the hydraulic system operating levers, they will return automatically to neutral and the implement will remain in the position established when the levers were released.

When the inner lever (Fig. 10-10-13) is pushed all the way forward it latches, and the hydraulic cylinder which it controls will "float." This means that the piston will freely extend or retract according to movement of the implement to which it is attached.

When the tractor is equipped with a rockshaft and 3-point hitch, the two cylinders which raise and lower the hitch are connected in parallel to the hydraulic valve housing so that both cylinders can be operated by the inner lever.

REMOTE HYDRAULIC CYLINDERS

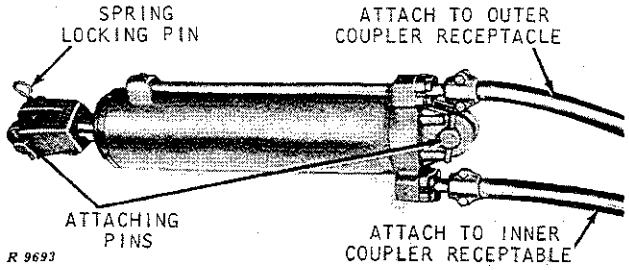


Fig. 10-10-14–Remote Hydraulic Cylinder

Implement-mounted remote hydraulic cylinders are identical with the two hydraulic cylinders of the 3-point hitch used to operate the rockshaft.

Attaching Remote Cylinder Hoses

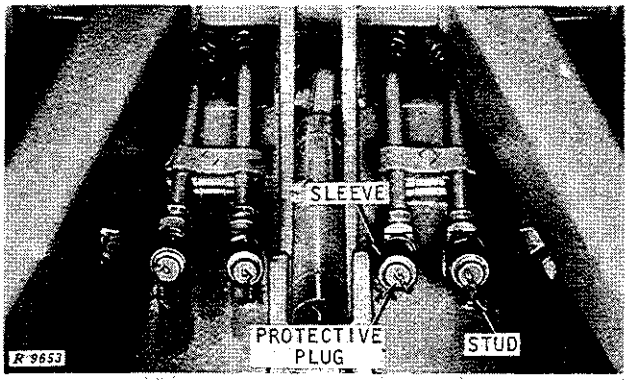


Fig. 10-10-15–Quick Couplers

Coupler receptacles (Fig. 10-10-15) at the rear of the tractor make it possible to connect or disconnect the remote cylinder hoses without loss of oil.

To insert the hose ends into the couplers, stop the engine or disconnect the hydraulic pump and move the hydraulic system operating levers back and forth several times to relieve pressure on the couplers.

Push forward on the coupler sleeves to release the protective plugs. Pull the plugs from the receptacles and install them on the studs below the couplers.

Clean the hose ends thoroughly and remove all weight from the remote cylinder.

Again push forward on the coupler sleeves and insert the hose ends into the receptacles. Release the sleeves to lock the hose ends in the receptacles.

If it is difficult to insert the hoses into the couplers, it may be due to oil pressure in the remote cylinder and hoses caused by a rise in temperature. This pressure can be relieved by tapping on the ball check in the end of the hose coupler with a soft mallet or piece of wood.

Bleeding Remote Cylinders

If the remote cylinder and hose assembly has been disassembled, all trapped air must be removed after the hoses are connected to the couplers. To do so hold the remote cylinder with the hose end up, engage the hydraulic pump, start the engine, and move the remote cylinder operating levers back and forth seven or eight times.

Attaching Remote Cylinder to Implement

To install a remote hydraulic cylinder on most implements, remove the spring locking pins and pull the attaching pins.

Set the remote cylinder in place on the implement. Install the attaching pins and locking pins.

Many implements have a locking device to hold it in transport position when the remote cylinder is removed. Be sure to disengage the locking device before attempting to operate the remote cylinder. After the cylinder is removed from the implement, replace the attaching pins immediately.

FLOW-DIVIDER VALVE

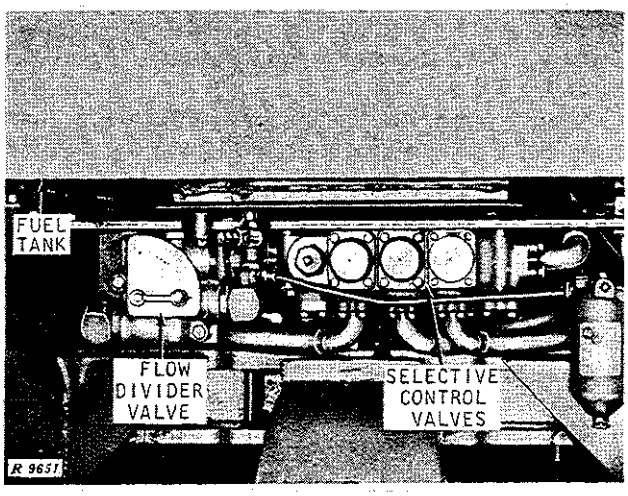


Fig. 10-10-16–Flow-Divider Valve

Standard hydraulic equipment includes a flow-divider valve (Fig. 10-10-16).

This device permits the operator to adjust the amount of oil flow to the selective control valve and, in turn, regulate the response (speed-of-action) of the remote cylinder or hitch.

The position of the flow-divider valve lever determines the rate of flow in gallons-per-minute to the selective control valve.

The same flow-divider face plate is used when either a 40- or 60-gallons-per-minute hydraulic pump is used. However, no difficulty will be encountered if the rate-of-flow is set at 60 gpm when a 40-gallons-per-minute pump is used.

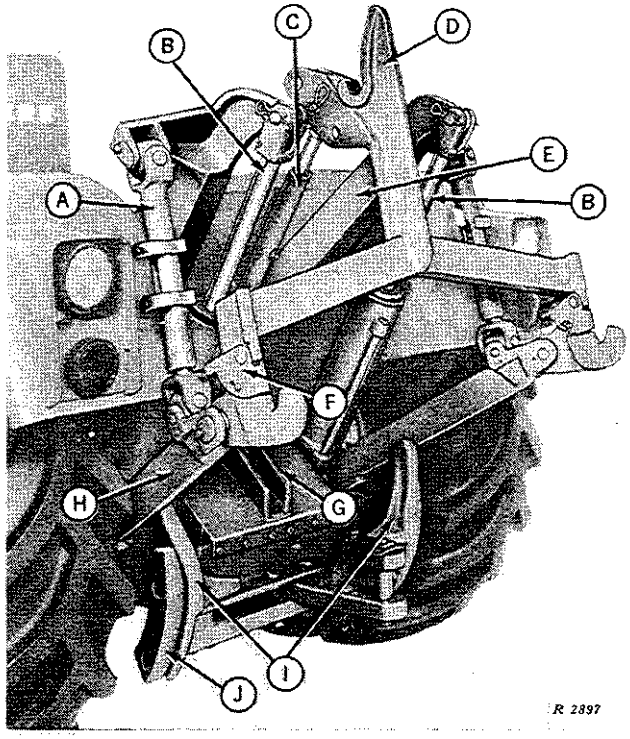
When the flow-divider valve lever is set in the 0 (zero) position, no oil flows to the selective control valve and no remote cylinder or hitch action can be obtained.

NOTE: It is not recommended that the tractor ever be operated with the flow-divider valve on the 0 position.

In operation, the flow-divider valve determines how fast the cylinder extends or retracts. The higher on the scale the valve lever is set, the faster the action.

The operator should set the valve to obtain the desired speed-of-action of the remote cylinder or hitch.

3-POINT IMPLEMENT HITCH



A. Lift Link
B. Rockshaft Hydraulic Cylinders
C. Center Link
D. Implement Coupler
E. Lift Arm
F. Implement Coupler Latch
G. Center Link Anchor
H. Draft Link
I. Sway Stops
J. Sway Blocks

Fig. 10-10-17–3-Point Implement Hitch

The tractor's optional equipment includes a 3-point implement hitch (Fig. 10-10-17) which provides a fast, easy means of attaching and raising integral implements. The hitch is operated by the two rockshaft double-acting hydraulic cylinders which not only raise and lower the hitch but also provide down pressure when desired.

The hitch cylinders are operated by the inner hydraulic operating lever located beside the seat Pulling the lever to the rear raises the hitch. Pushing the lever forward lowers the hitch and applies down pressure.

Floating and Non-Floating Action

Each lift link (Fig. 10-10-18) has a series of holes into which spring locking pins can be placed. The pins have two purposes—to level the implement laterally (sideways) and to provide floating or non-floating action. When the pins are placed in any two adjacent holes near the center of the slots in the lift link tubes, the implement

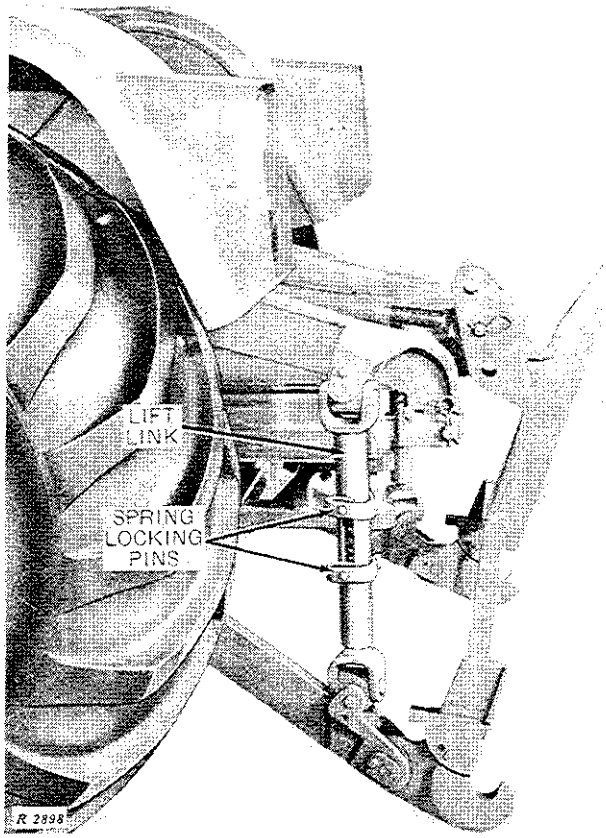


Fig. 10-10-18–Lift Link Anchor Adjusted for Non-Floating Action

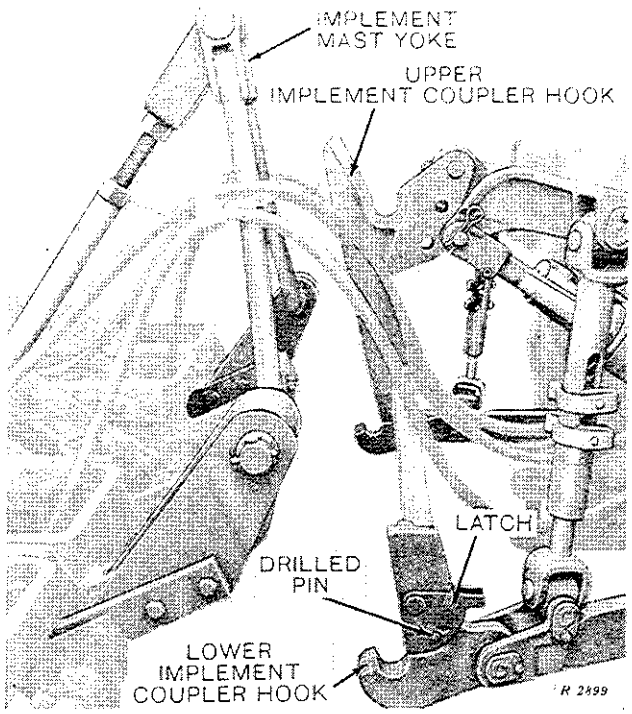


Fig. 10-10-19–Implement Hitch in Correct Position for Attaching Implement

will float (follow the contour of the ground). When the pins are placed in the holes which line up with both ends on the slots in the lift link tubes, the implement cannot float, because the lift links are locked solidly to the hydraulic cylinders. If it is desired to change the up-and-down position of the implement, the hitch and implement must be raised or lowered by means of the hydraulic system operating levers.

Center Link Position

Certain integral implements increase tractor rear wheel traction (and thus decrease wheel slippage) because their weight is supported by, or transferred to, the rear bogie. Weight transfer is further increased by the "suck" of the implement; that is, by its tendency to pull itself down into the soil. The force created by implement suck is transferred in the form of weight to the rear bogie through the center link of the hitch.

The position of the center link can be altered by attaching it at different points as determined by seven attaching holes in the center link anchor (Fig. 10-10-17). Three attaching points for the rear of the center link are also provided in the yoke at the top of the upper implement coupler hook.

Shifting the position of the center link makes it possible to obtain maximum weight transfer for the implement, as well as best implement performance. For maximum weight transfer, attach the center link to the lower anchor hole on the tractor and to the top hole on the upper implement coupler hook. For maximum implement penetration, attach the center link to the top anchor hole on the tractor and to the lower hole on the upper implement coupler hook. Combinations of settings are available between these two extremes. See the implement operator's manual for the recommended center link position.

Attaching Implement to 3-Point Hitch

Lower the hitch (Fig. 10-10-19) by pushing the inner operating lever forward until the lower implement coupler hooks are below the implement hitch pins and the upper implement coupler hook is below the yoke on the implement mast.

Remove the drilled pins from the latches on the end of both coupler hooks. (The pins may be installed in the rear holes of latches, if desired.)

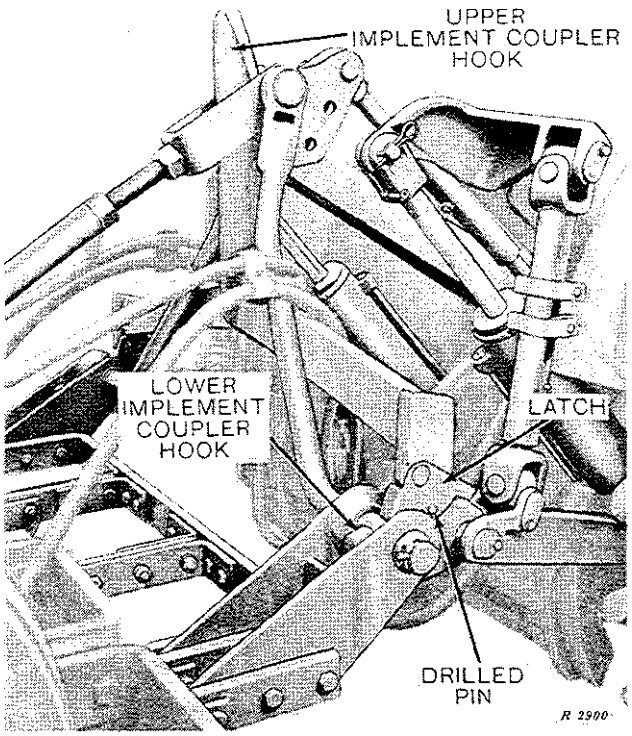


Fig. 10-10-20—Implement Attached to Hitch

Back the tractor until the implement hitch pins contact the rubbing pads on the coupler hooks and the upper coupler hook is behind the implement mast yoke.

Raise the hitch and implement by pulling the operating lever to the rear.

Lock the implement hitch pins to the lower coupler hooks by inserting the drilled pins through the front holes in the latches (Fig. 10-10-20).

Leveling the Implement

If the implement is to be locked to the hitch, level the implement laterally (sideways) and insert one spring locking pin in the hole at the bottom of the slot in each lift link tube as shown in (Fig. 10-10-18). Place the other pins in the holes at the top of the slots. If the implement is to float (follow the contour of the land), place both pins in adjacent holes near the center of the slots in the lift link tubes.

Level the implement fore-and-aft by lengthening or shortening the threaded center link (Fig. 10-10-21). Turn the handle until it is perpendicular to the body of the center link. This permits rotating the center link by hand to give the desired length. Turn the handle parallel to the center link when the adjustment is correct.

Detaching Implement from 3-Point Hitch

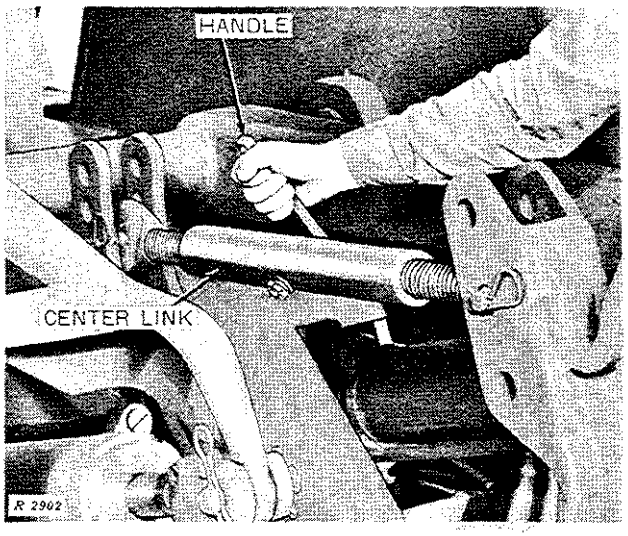


Fig. 10-10-21—Adjusting Center Link for Fore-and-Aft Implement Leveling

Raise the implement and transfer the drilled pins in the lower coupler latches from the front holes to the rear holes to unlock the implement hitch pins. Lower the implement to the ground. Continue lowering the hitch until the coupler hooks clear the implement hitch pins and mast yoke. Drive the tractor away from implement.

CAUTION: If the implement does not stand steady alone when disconnected from the hitch support it with blocks or a suitable stand.

Sway Blocks

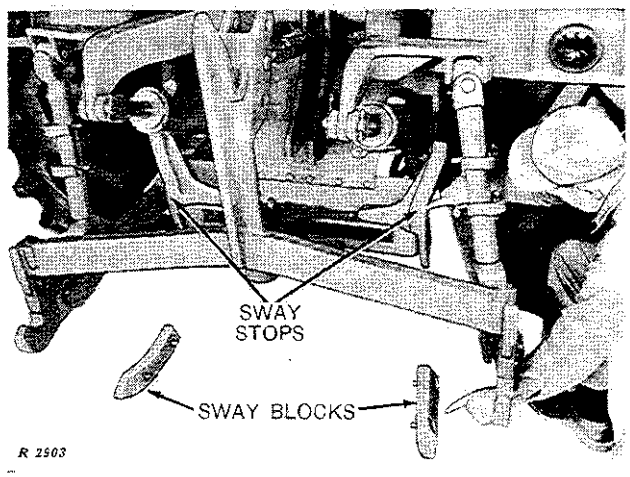


Fig. 10-10-22—Sway Blocks

Sway stops (Fig. 10-10-22) will prevent implement side sway when the implement is in the transport position. Sway blocks are used to eliminate side sway of the 3-point implement hitch when implements are attached that require a rigid hitch when in working position.