

# 1000 Series Crawler Tractors



## SERVICE MANUAL 1000 Series Crawler Tractors

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ENGLISH



**SERVICE MANUAL FOR  
JOHN DEERE DEALERS**

**1000  
SERIES**

**CRAWLER  
TRACTORS**

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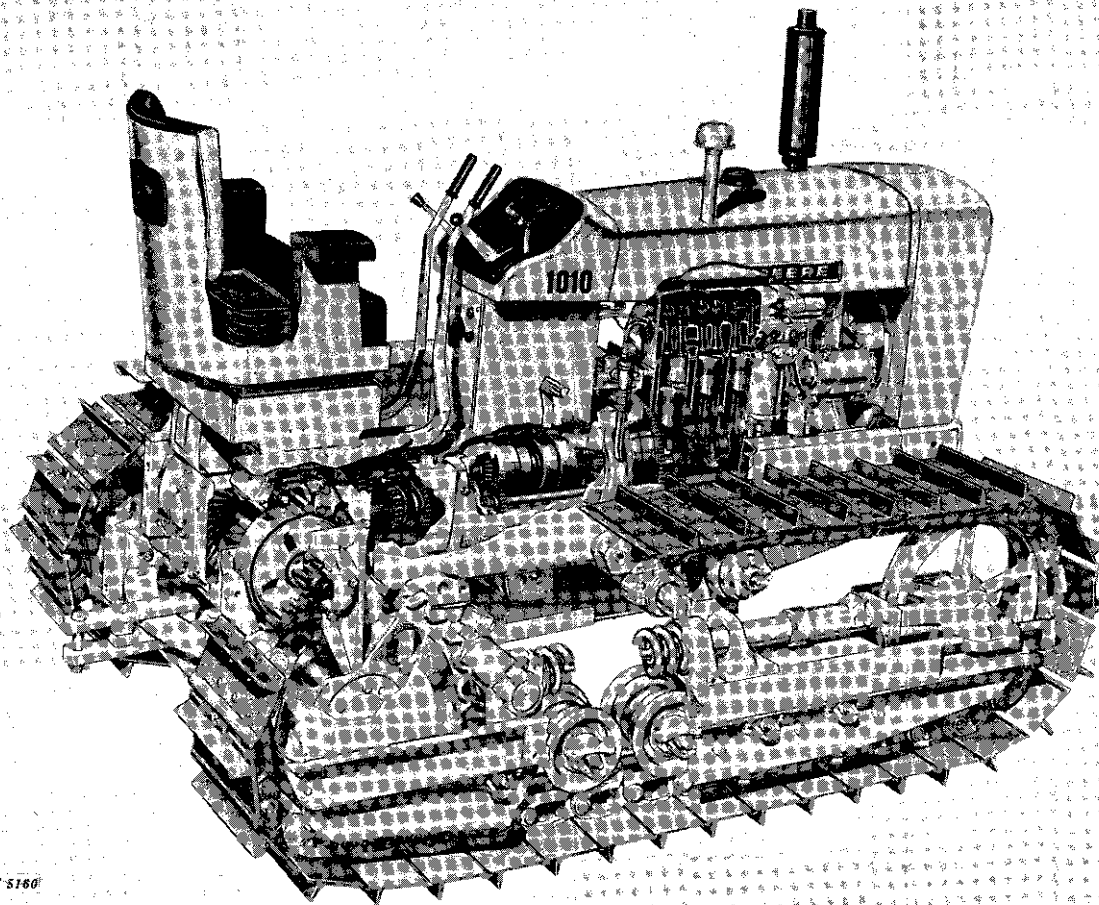
## TO THE JOHN DEERE SERVICEMAN

This service manual contains maintenance instructions for John Deere 1000 Series Crawler 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. Use the manual whenever in doubt about correct maintenance procedures. Use it as a text book for training new Service Department personnel who are unfamiliar with John Deere Tractors.

Daily use of the Service Manual as a guide for any and all service problems will reduce error and costly delay to a minimum and assure you the best in finished service work. In many instances your customer's confidence in your work will be improved when he sees you using the Service Manual. He knows you are following approved maintenance procedures and making proper adjustments. There is no guesswork when you use the manual.



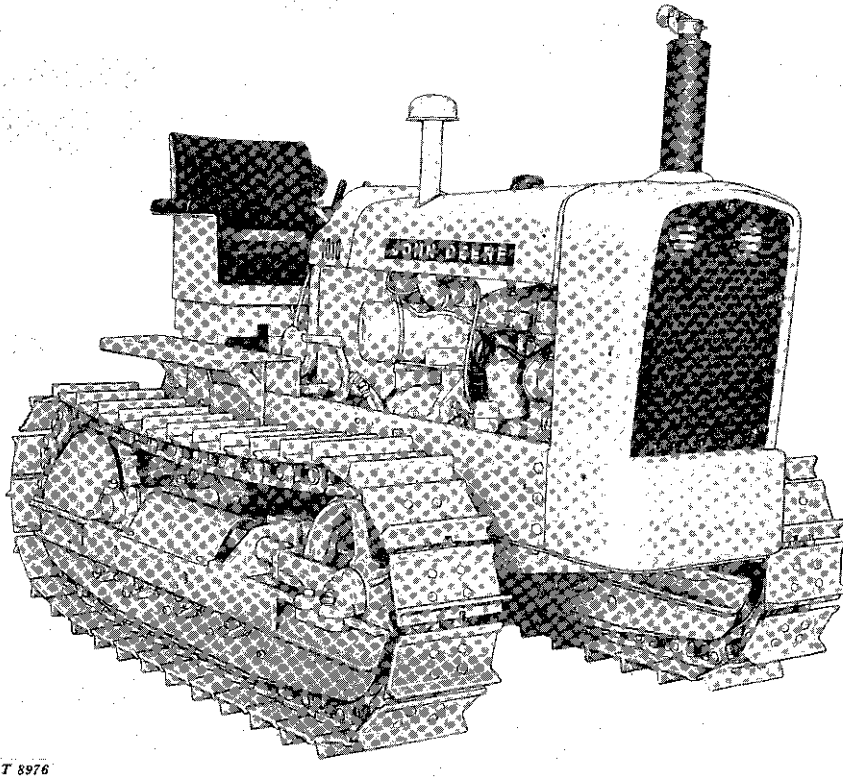
Cutaway View of John Deere 1010 Crawler Tractor

## Section 10

# DESCRIPTION, OPERATION AND SPECIFICATIONS

### Group 5

## DESCRIPTION



T 8976

Fig. 10-5-1—Right-Hand View of 1010 Crawler Tractor  
(Gasoline Illustrated)

The John Deere 1010 Series Crawler Tractor (Fig. 10-5-1) is built rugged and strong to meet the needs of industrial users. Its track laying tread makes this tractor especially useful whenever good flotation and additional traction or extra stability is desirable. With the wide variety of equipment available for this tractor, it plays an important role in the construction and logging industries.

### FEATURES

#### GASOLINE ENGINE

The 1010 Series Gasoline Crawler has a vertical, four cylinder, valve-in-head, four

stroke cycle, internal combustion engine. A bore of 3-1/2 inches and a stroke of 3 inches gives a piston displacement of approximately 115 cubic inches.

The compression ratio is 7.9 to 1. (Pistons are available for high altitude operation which provide a 9.0 to 1 compression ratio.)

A wet-type "sleeve and deck" cylinder liner assembly is used. This new feature allows worn cylinder walls to be renewed without replacing or reboring the cylinder block.

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

#### DIESEL ENGINE

The 1010 Series Diesel Crawler has a vertical, 4-cylinder, valve-in-head, fuel injection, four-stroke cycle, internal combustion engine. A bore of 3-5/8 inches and a stroke of 3-1/2 inches gives a piston displacement of approximately 145 cubic inches.

The compression ratio of the diesel engine is 19 to 1. Maximum torque is 100 ft.-lbs.

A wet-type "sleeve and deck" assembly is used. This feature allows worn cylinder walls to be renewed without replacing or reboring the cylinder block.

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

Crankshaft rotation is clockwise when viewed from the front.

#### FUEL SYSTEM

The 1010 Series gasoline fuel system is equipped with a 12 U.S. gallon fuel tank. The carburetor is a conventional updraft type.

The 1010 Series Diesel uses a distributor-type fuel injection pump. The fuel system consists of a 12 gallon fuel tank, two fuel filters, fuel strainer, fuel injection pump, fuel injection nozzles, and turbulence chambers. The fuel injection pump is an opposed plunger, inlet meter-

ing, distributor-type. The pintle-type injection nozzles are located in turbulence chambers mounted at the top of each cylinder.

#### IGNITION

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

The diesel engines are equipped with electrical pre-heating devices called "Glow Plugs" which are located above the fuel injectors on the turbulence chambers. There are four glow plugs on the 1010 Series Diesel Tractors. They are used when starting a cold engine and need not be used when starting a warm engine. The 12-volt battery also actuates this system.

#### LIGHTING SYSTEM

All lighting equipment is optional and includes grille-mounted headlights, a dash light, a combination white and red rear warning light, and auxiliary plug-in socket.

#### COOLING SYSTEM

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

#### LUBRICATION

The engine lubrication system is force-fed by a positive displacement, gear driven oil pump. The oil pump is located underneath the fuel injection pump on diesel models and underneath the distributor on gasoline models. The pump extends into the bottom of the crankcase. Oil is fed under 35 to 50 pounds pressure onto governor bearings, crankshaft main bearings, and connecting rods, and splashed onto piston pins and valve tappet assemblies. This lubrication system employs an oil filter with a replaceable micronic filter element.

**CLUTCH**

The engine clutch used on the 1010 Series Tractors (on tractors not equipped with direction reverser) is a springloaded, single dry-disk, foot-operated clutch enclosed in the center frame. Adjustment for free clutch pedal travel can be made externally.

**TRANSMISSION**

The transmission has four forward speeds and one reverse. It is a selective sliding-gear type and is shifted manually. Power is transmitted by the output shaft, through a ring gear and hub assembly, to the steering clutches.

**POWER TAKE-OFF**

The power take-off is the continuous-running type. It is an engine-driven type and is completely independent of tractor ground travel. It fully meets all ASAE-SAE standards.

**DIRECTION REVERSER**

A direction reversing mechanism, which provides reverse speed equivalent to transmission forward speed, is available as optional equipment. The direction reverser replaces the engine clutch and is controlled hydraulically—no foot clutching is required.

The direction reverser unit is located ahead of the transmission. A control lever mounted on the instrument panel operates the unit, which has two operating positions: Forward and Reverse. When the lever is in forward position, the tractor is in direct drive.

**BELT PULLEY**

A belt pulley is available as an attachment. The pulley assembly slips over the power take-off shaft and is attached to the power take-off housing. The belt pulley is driven by the power take-off shaft.

**BRAKES**

The two brakes are of the contracting band type, and are operated by one foot brake located on the right side of the tractor. A brake lock, located on the right footrest, holds the tractor in place for belt work or when parking.

**STEERING MECHANISM**

The Crawler Tractor is steered by two combination clutch and brake mechanisms located in the steering clutch housings. Pulling back on a steering lever separates the drive faces and driven plates of dry-type multiple disk clutch on the side, interrupting flow of power to that track

sprocket. Any further rearward movement of the steering lever contracts a brake band around the drum on the clutch driven assembly, retarding or stopping motion of the sprocket and track.

The brake bands can also be operated by a pedal located on the right side of the tractor. Depressing the pedal applies both brakes; it does not disengage the steering clutches.

**TRACKS**

The tracks are made of extremely tough steel. Replaceable, four-bolt track shoes are bolted to hardened links which are joined together by replaceable pressed-in pins and bushings. Track shoes are available in 10-, 12-, and 14-inch widths.

**TRACK CARRIER ASSEMBLIES**

Tracks are held in position by heavy steel carrier assemblies.

Track tread width is fixed at 48 inches.

Tracks are aligned and adjusted for tension by shifting the idler wheels forward or backward as required. A hydraulic track tension adjuster is available as optional equipment.

**HYDRAULIC SYSTEM**

The 1010 Crawler may be equipped with either of two hydraulic systems. Both of these systems are double-acting; that is, hydraulic power is applied when raising and also when lowering the implement.

The larger of these hydraulic systems is capable of handling two sets of double-acting remote hydraulic cylinders. The smaller system can handle one set of double-acting remote cylinders.

**UNIVERSAL 3-POINT HITCH**

The 1010 Crawler Tractor may be equipped with a Universal 3-Point implement attachment system to which a wide variety of 3-point hitch implements can be attached. The hitch is actuated through the rockshaft by two remote hydraulic cylinders.

The hitch is designed for use with implements having category 2 hitch.

**TIMBER HITCH**

The 1010 Crawler Tractor may be equipped with a timber hitch. The hitch is actuated by

two hydraulic cylinders located to the right and left of the final drive housings. The hitch can be activated to raise a chain (attached between

the tractor drawbar and the logging sled), thereby relieving weight from the front of the logging sled.

## Group 10

### OPERATION

#### PRE-STARTING INSPECTION

##### COOLING SYSTEM

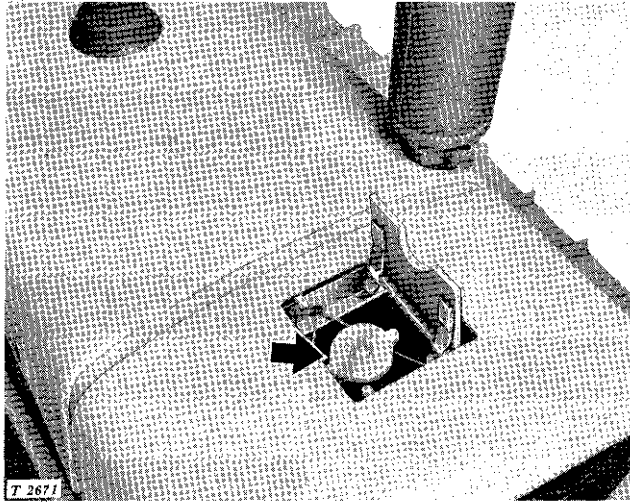


Fig. 10-10-1 -- Radiator Filler Cap

Check coolant level in radiator. Examine drain cocks and plugs to be sure they are secure. See that hose connections are tight and without evidence of leakage. If coolant is changed, add sealer and rust inhibitor.

##### CRANKCASE OIL LEVEL

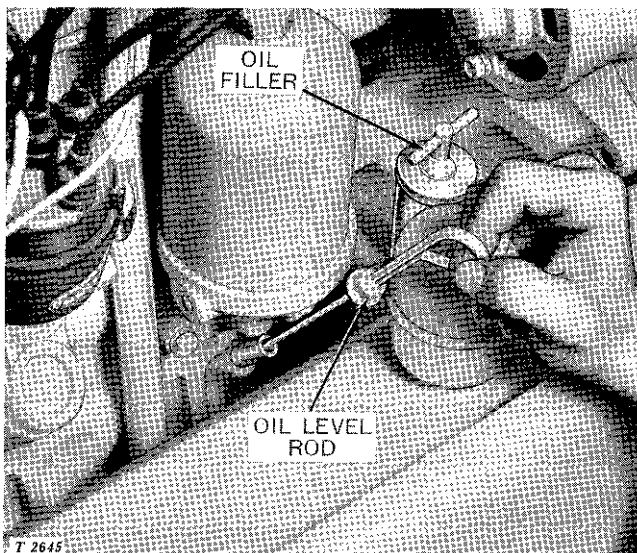


Fig. 10-10-2 -- Oil Level Rod

Check the crankcase oil level by means of the oil level rod. If oil is below the "ADD 1 QT." mark, add oil of correct weight and viscosity in sufficient amount to bring oil up to the "FULL" mark on the gauge. See Section 30 of this Manual.

##### FUEL SUPPLY

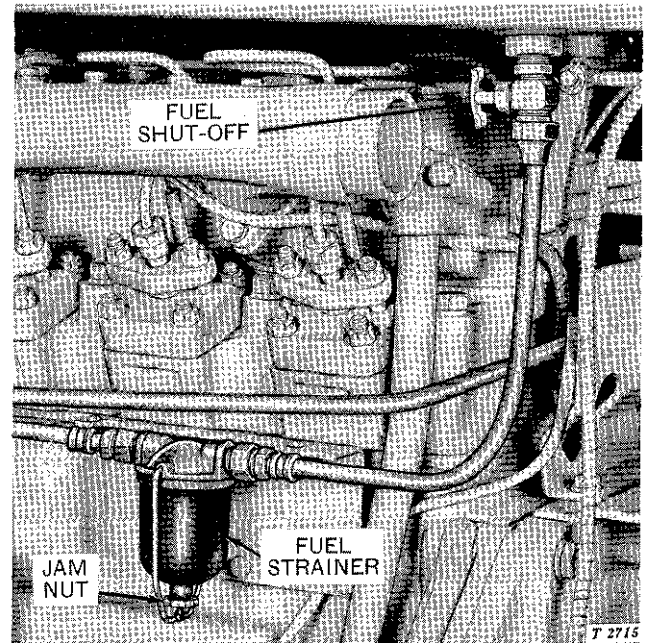


Fig. 10-10-3 -- Fuel Shut-Off Valve and Fuel Strainer (Diesel (Illustrated))

Inspect fuel strainer for signs of moisture and dirt and clean as necessary. Check to be sure that the fuel shut-off valve located under the fuel tank is in "open" position so that fuel supply to engine is not restricted.



## AIR CLEANER

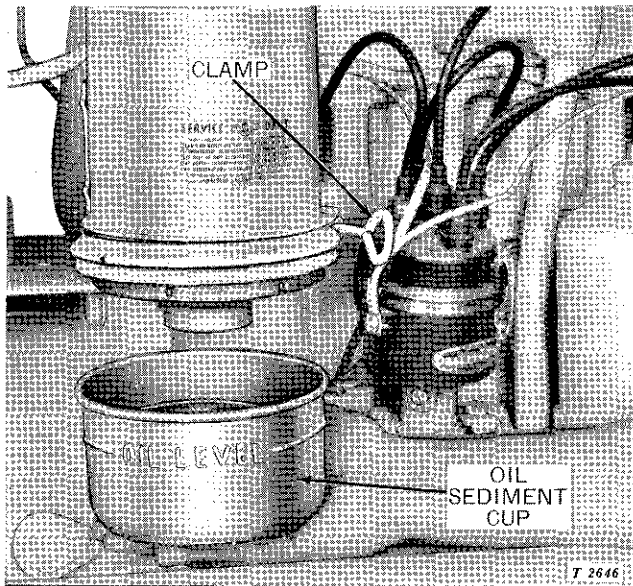


Fig. 10-10-4 -- Air Cleaner

Check air cleaner connections and make sure they are tight. Remove air cleaner cup and note level of oil. If necessary add oil of proper weight and viscosity until the level is even with the oil level mark on the cup.

## GENERAL LUBRICATION CHECK-OUT

Check oil level of final drives, transmission, belt pulley, Hydraulic System, PTO attachment, direction reverser, and rockshaft housing.

Lubricate track roller assembly and all grease fittings. Lubricate generator sparingly. See Section 30 of this manual.

## BATTERY

Check solution level of battery. Battery condition should be checked at least every 200 hours of operation.

## STARTING THE ENGINE

## GASOLINE MODEL

1. Open shut-off valve below fuel tank.
2. Place shift lever in "neutral," apply brake lock, and depress clutch pedal to decrease drag on engine (Fig. 10-10-9).

3. Advance hand throttle to the halfway open position (Fig. 10-10-9).

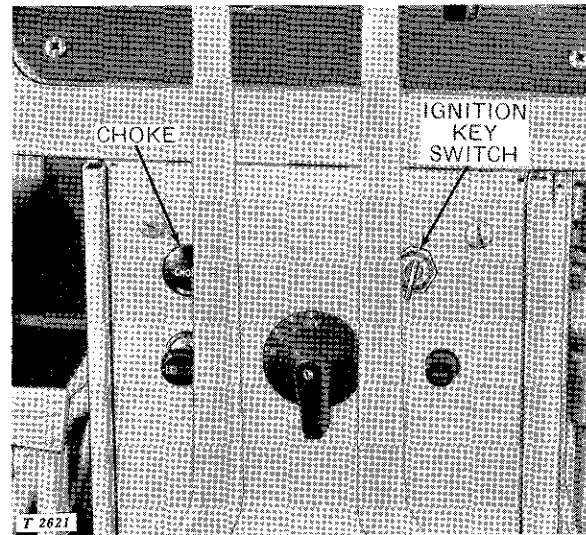


Fig. 10-10-5 -- Starting Controls (Gasoline)

4. Pull choke control outward full distance. (If tractor engine has been running previously, it may not be necessary to use choke. It is advisable to try starting engine without choking in this case.)

5. Turn ignition key switch clockwise to actuate starter. Hold in this position until engine has had time to rotate several revolutions.

NOTE: Limit time starter is used to 1/2 minute. If engine does not start within 1/2 minute, let starter rest for two minutes before trying again. This will allow battery to restore charge and give starter time to cool.

6. After engine has started, or after it has turned 4 or 5 revolutions, push choke control all the way in. This will prevent flooding of carburetor. Usually enough gasoline for starting purposes has been drawn into combustion chamber by this time.

7. Regulate engine speed by using hand throttle.

NOTE: The governor is adjusted to run engine at correct speed when tractor leaves factory -- 600 rpm slow idle and 2700 rpm fast idle.

## DIESEL MODEL

1. Open the fuel shut-off valve located under the fuel tank. Make sure the fuel shut-off control knob is pushed in.

2. Place shift lever in neutral and apply brake lock (Fig. 10-10-9).

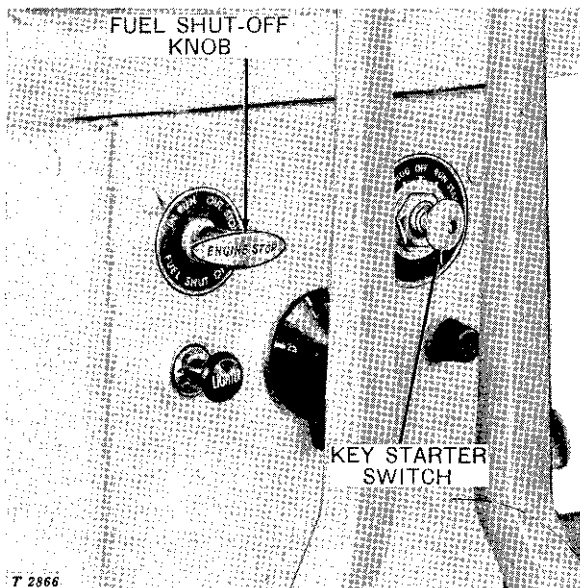


Fig. 10-10-6 -- Starting Controls (Diesel)

3. Turn key starter switch one-eighth turn counter-clockwise to actuate glow plugs. Key switch is spring loaded, and so must be held in counter-clockwise position throughout desired preheating period. Period of time for actuating glow plugs depends on the air temperature.

Refer to the following chart:

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

4. To insure delivery of fuel to the injectors, move hand throttle to the full speed position (forward) and then move lever back to approximately one-half to three-quarters open.

5. Depress clutch pedal to completely disengage clutch, thus eliminating the need of the starter turning the transmission while starting the engine (Fig. 10-10-9).

6. Turn key starter switch one-eighth turn clockwise to actuate instrument panel; then one-quarter turn clockwise to actuate engine starter.

7. If engine does not begin firing after 15 to 30 seconds of cranking, preheat an additional 1 minute before continuing cranking. Repeat this procedure until the engine starts.

**CAUTION:** If engine fails to start during the 15 to 30 second cranking period, do not actuate starting switch again until starter stops rotating. Otherwise, serious damage to the starter may result.

If no smoke is expelled from muffler at the initial cranking, it will be necessary to check the fuel system for leaks and to bleed the air out of the system. (See Section 91.)

8. As soon as engine starts, release key starter switch and adjust engine speed to approximately 1000 rpm.

9. Release clutch; warm engine and transmission for five minutes by operating engine at 800 to 1000 rpm. Do not allow engine to operate at idle speed during engine warm up.

## COLD WEATHER STARTING

The fuel injected into the turbulence chamber is ignited by the increased temperature due to compression. This temperature is high enough under ordinary operating conditions, but may not be sufficiently high at extremely low outside temperatures to ignite the fuel injected.

**NOTE:** The engine will start easier while starting at low ambient temperatures if the hand throttle is placed in the one-half speed position and the clutch disengaged. Refer to "Temperature and Preheat Time" table for instructions on proper usage of glow plugs.

If tractor gets completely cold at temperatures below -10° F., it will be necessary to use a booster battery to obtain sufficient cranking speed.

The booster battery and proper preheating should enable starting even under the most severe conditions.

**CAUTION:** To avoid any possible damage to the engine or starter, it is recommended that ETHER NOT be used as a cold weather starting aid.

### AFTER-STARTING INSPECTION

#### EFFICIENT ENGINE OPERATION (DIESEL)

The governor located in the fuel injection pump is adjusted to run engine at correct speed when tractor leaves factory — 750 rpm slow-idle and 2650 rpm fast-idle speed in overtravel.

The Diesel engine should operate SMOKE-FREE. Black smoke from the exhaust stack indicates unburned fuel normally caused by overloading or dirty injection nozzles. A thorough cleaning of the nozzles should eliminate this problem if it is due to dirty nozzles.

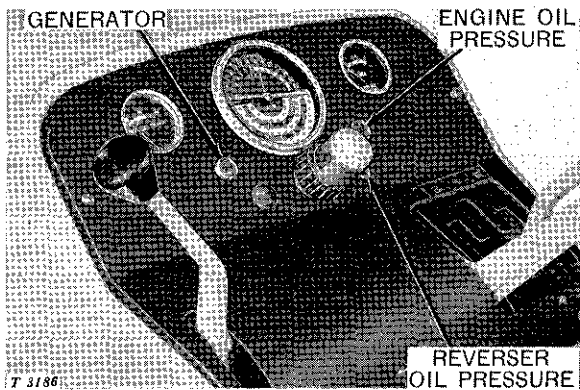


Fig. 10-10-7 -- Tel-Lights

#### GENERATOR TEL-LIGHT

The tel-light will glow red for a few seconds after ignition is turned on, during cranking, and after engine has fired. If tel-light continues to glow after engine has been running approximately 10 seconds, the battery is discharging. Check the battery, generator, and regulator to determine source of trouble.

**NOTE:** Tel-light may glow continuously with engine speed at slow idle. This is normal and does not indicate malfunction unless tel-light continues to glow after increased acceleration.

#### OIL PRESSURE TEL-LIGHT

With engine running and hand throttle advanced, oil pressure tel-light should go out. If indicator glows bright red after engine has been running 10 seconds ignition key should be turned off and cause of reduced oil pressure determined.

#### REVERSER OIL PRESSURE TEL-LIGHT

This light (marked "CLU") glows red when there is a failure in the direction reverser system. Normally, the light should go out during engine operation. A definite sign of failure is to have this light stay on with engine at speeds of 1900 rpm or over.

#### WATER TEMPERATURE GAUGE (Warm-up Period)

Note appearance of gauge: "C" (cold), "N" (normal), "H" (hot). Before placing load on engine, allow indicator to rise above "C" zone on gauge and into "N" zone. Oil will then circulate freely, preventing excessive wear on piston rings, cylinder liners, and bearings.

If indicator enters "H" zone, stop engine and allow coolant to cool off slowly. If overheating occurs during next operation of engine, discontinue operation until source of trouble has been determined and remedied. Do not race engine during warm-up period. This wastes fuel and causes excessive wear on engine parts.

### STOPPING THE ENGINE

Sudden cooling of a hot engine causes extreme contraction of heated parts. For this reason, allow tractor engine to cool off gradually in cold or freezing weather by idling a few minutes before turning off ignition. In freezing weather, never drain water immediately after stopping.

#### GASOLINE ENGINE

To stop gasoline engine, first allow it to operate for a short time at full throttle. Then turn key ignition switch counter-clockwise to vertical (OFF) position.

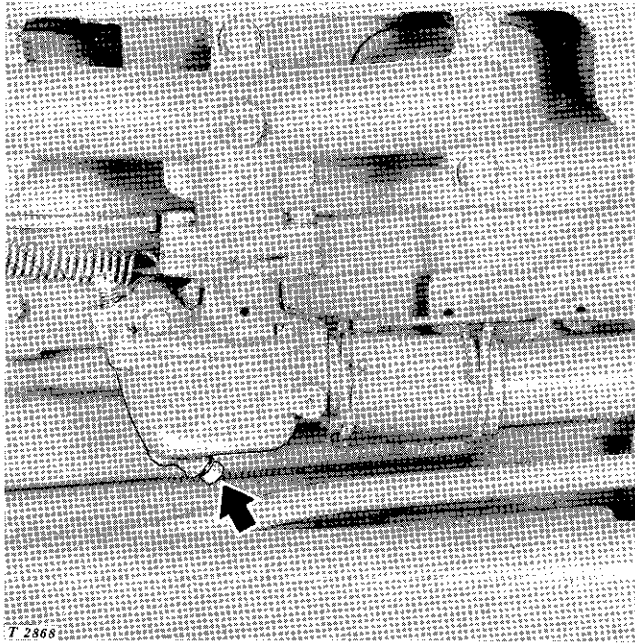


Fig. 10-10-8 -- Carburetor Drain Plug

If tractor is not to be used for several days, shut off gasoline supply at fuel shut-off valve (or valves) located below the gasoline tank (Fig. 10-10-3). Open drain plug on underside of carburetor and drain carburetor. Be sure to replace this plug after draining, to prevent dirt from entering carburetor. Draining will prevent accumulation of gum in carburetor, caused by evaporation of gasoline. This gum is a contributing factor to hard starting and poor engine operation.

#### DIESEL ENGINE

Stop the engine by performing the following sequence of operations.

1. Allow engine to idle at 1000 rpm for a short time.
2. Turn key switch to "OFF" (vertical position) and pull out fuel shut-off control to cut off fuel. Pulling out the fuel shut-off control will place the pump in the "NO FUEL" position.

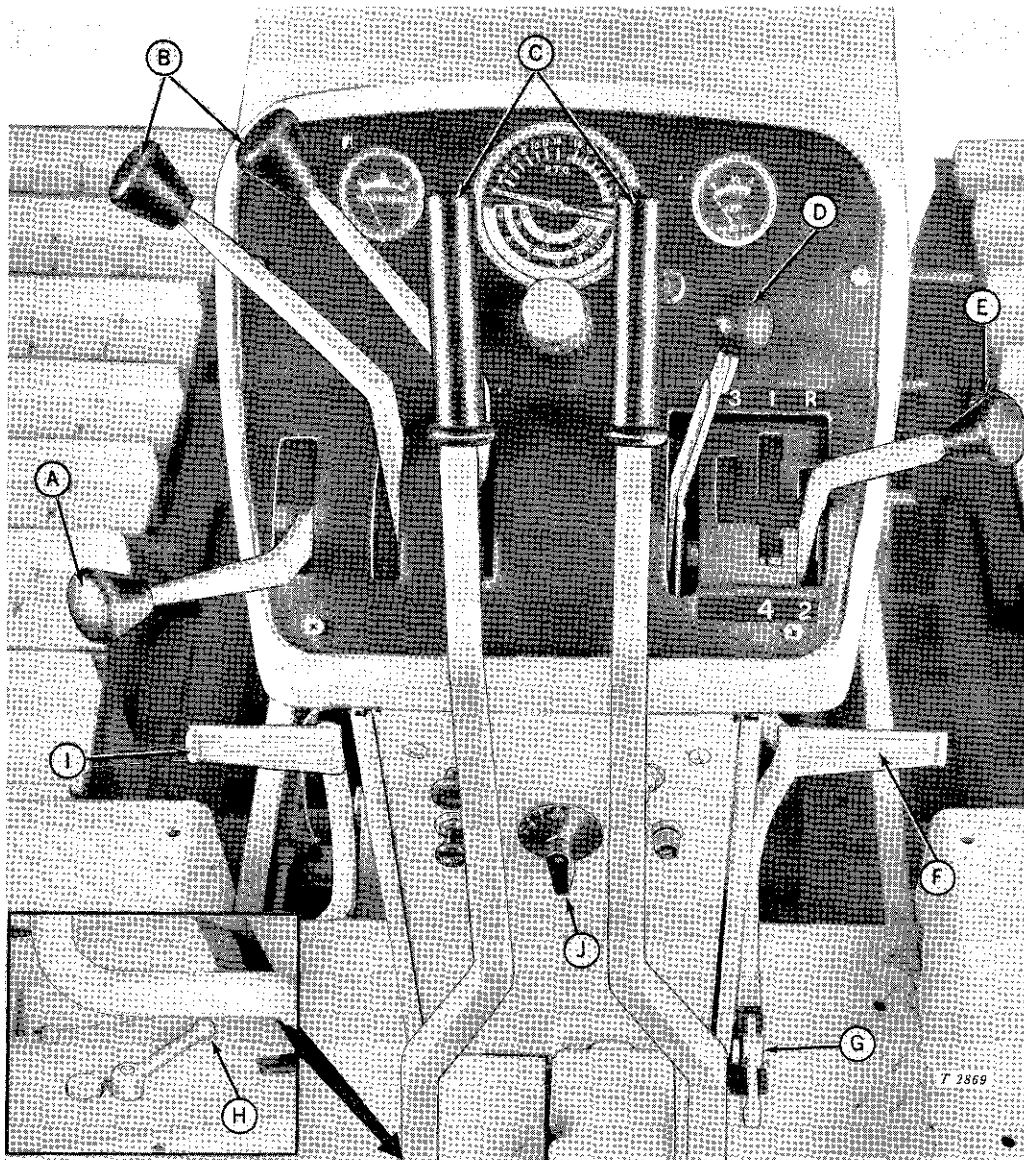
**CAUTION:** Do not attempt to stop engine by turning off fuel supply at fuel tank shut-off valve. Doing so will cause pump to run dry and damage internal parts.

#### ENGINE BREAK-IN

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

To be sure that all bearing surfaces will be properly lubricated, operate tractor under normal load for the first 20 hours of operation. Avoid light loads and excessive engine idling during this period. Check periodically to be sure that an adequate supply of oil is maintained in the crankcase. If it becomes necessary to add oil during "breaking-in" period either SAE 10W or SAE 5W-20 can be used. At the end of this 20 hour period, "Breaking-in" oil should be drained, oil filter changed, and crankcase filled with new oil in accordance with recommendations in Section 30 of this Manual.

## OPERATING THE TRACTOR



- |                                      |                       |
|--------------------------------------|-----------------------|
| A - Direction Reverser Control Lever | F - Brake Pedal       |
| B - Hydraulic System Control Levers  | G - Brake Lock        |
| C - Steering Levers                  | H - PTO Shifter Lever |
| D - Hand Throttle                    | I - Clutch Pedal      |
| E - Shift Lever                      | J - Light Switch      |

Fig. 10-10-9 -- Operating Controls

## A. DIRECTION REVERSER CONTROL LEVER

The direction reverser lever allows the operator to reverse tractor motion without de-clutching or shifting gears. The lever has two positions—front and rear—which give equivalent forward and reverse speeds for whatever forward gear the tractor is operating in. On tractors equipped with direction reverser, the clutch pedal is used for shifting transmission gears,

or it could also be used for "inching" into a load.

## B. HYDRAULIC SYSTEM CONTROL LEVERS

In the double hydraulic system, two control levers are used. The inner lever controls the hydraulic cylinders at rear of tractor; the outer lever controls remote cylinder functions when used. In the single hydraulic system only the

inner control lever is used and it controls all hydraulic functions.

#### C. STEERING LEVERS

To turn the tractor to the right, pull back on the right steering lever; to turn tractor to the left, pull back on left lever. Pulling back on one lever disengages a steering clutch, stopping flow of power to the track on the same side. Pulling the lever farther back applies a brake which retards or stops the track, making short turns possible.

#### D. HAND THROTTLE

The hand throttle controls engine speeds. Moving the hand throttle forward increases engine speed; pulling the lever rearward reduces speed. When moving the hand throttle forward, it will strike a stop at 2100 rpm. If faster engine speed is desired, press lever to the right and move forward past the stop.

#### E. SHIFT LEVER

The shift lever is used to select any one of four forward gears or one reverse gear. A shifting diagram is printed on the panel above and below the shift quadrant.

#### F. BRAKE PEDAL

The foot pedal, located in front of the right footrest, is provided to slow tractor down when it is in motion. Depressing brake pedal applies both steering brakes evenly without disengaging steering clutches, thereby allowing tractor engine to help slow or stop the tractor.

#### G. BRAKE LOCK

A brake lock is provided for locking brake pedal in depressed position during parking. This lock is engaged by lifting lock from footrest and inserting it in ratchet on brake while pedal is depressed.

#### H. PTO SHIFTER LEVER

This control lever engages and disengages the powershaft. When the belt pulley is mounted on the powershaft, the lever is used to engage and disengage the belt pulley. The powershaft is engaged when lever is moved to left.

#### I. CLUTCH PEDAL

The clutch pedal interrupts the flow of power from the engine to the transmission and powershaft. The clutch is disengaged by depressing the pedal. Releasing the pedal engages the power from the engine to the transmission and powershaft.

#### J. LIGHT SWITCH

All lights are controlled by the light switch. The switch has four positions as follows:

- "OFF" All light off.
- "L" Bright front lights and white rear light on.
- "B" Bright front lights and red rear light on.
- "D" Dim front lights and red rear light on.

#### PROMOTING LONGER ENGINE LIFE

The tractors will handle economically and efficiently all jobs within their range of power. Using tractor on loads beyond its power range places excessive strain on all its parts and will eventually result in unnecessary expense and impaired operating efficiency. An overloaded tractor can usually be detected by gradual slowing down in ground speed and slowing down and laboring of engine.

Since starting the engine is accomplished with no more effort than starting the average automobile engine, there should be no reason for prolonged engine idling. (Stop the engine, as you would your automobile engine, when prolonged idling periods would otherwise occur.) Load may be placed on engine as soon as indicator on water temperature gauge enters "N" zone. A full load should not be placed on a "cold" engine. Low operating engine temperatures causes the development of several conditions detrimental to engine operation and life. Incomplete combustion of fuel in a cold engine causes crankcase dilution and forms lacquer or gummy deposits on valves, pistons, and rings. It also causes rapid accumulation of sludge within the engine.

## Group 10

# ENGINE TUNE-UP

Fundamentally, a badly worn engine cannot be tuned up; therefore, certain inspections and tests must be made to determine whether a major overhaul is necessary or whether a tune-up will bring the engine to peak efficiency of operation.

Three important conditions are necessary for efficient and economical engine performance: sufficient compression, proper timing, and correct fuel-air mixture or injection delivered to each combustion chamber.

### COMPRESSION TEST

If engine parts are excessively worn, sufficient compression can only be obtained by a major overhaul.

To make the compression test, proceed as follows:

1. Start the engine and allow it to warm up to normal operation temperature.
2. Check oil pressure at starting and later at operating speed of 1900 rpm.
3. When engine reaches its normal operating temperature, shut off engine.
4. On gasoline tractors, advance hand throttle to its maximum open or forward position. On diesel tractors, pull out fuel shut-off knob ( -31000) or pull hand throttle past offset into the "no fuel" position (31001-up).
5. Remove spark plugs or injector nozzles.
6. Hold compression gauge firmly in place in No. 1 (front) cylinder spark plug or nozzle hole, and crank engine for several seconds with starter.

*NOTE: Make sure battery is fully charged in order to develop full cranking speed for this test.*

7. Note pressure gauge reading.

The minimum compression reading of an engine (with rings seated) should be as follows: Gasoline- 125 psi at 200 rpm cranking speed; Diesel- 300 to 350 psi at 150 rpm cranking speed or 350 to 400 psi at 250 rpm cranking speed. Repeat this test on No. 3 cylinder; then No. 4 cylinder; then on No. 2 cylinder.

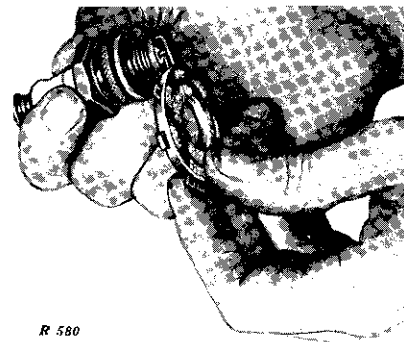
In general an engine with excessively low compression must be reconditioned before a tune-up can be effective.

By cranking the engine, much can be learned of its condition. The engine will rotate with practically no resistance if compression pres-

sure is low in all cylinders. With pressure low in one cylinder, resistance can be felt when a good piston is coming upward on compression stroke. If the intake or exhaust valves are leaking, this can be heard while cranking.

If the pressure was found to be good in all cylinders, tune up the engine by the following procedure:

### IGNITION AND ELECTRICAL SYSTEMS

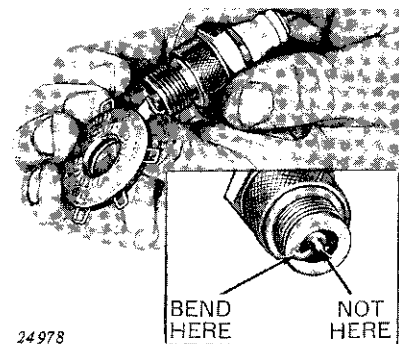


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Fig. 40-10-1—Checking Spark Plug Point Gap

### SPARK PLUGS

On gasoline engines, check, clean, and re-gap spark plugs according to instructions in Section 100, Group 10 of this manual. Clean up electrodes with a point file. Electrode gap of spark plugs should be .025 inch. Install spark plugs, using new gaskets, and tighten to 35 ft-lbs.



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Fig. 40-10-2—Adjusting Spark Plug Point Gap

### GENERATOR BELT

Adjust generator belt tension. With the generator bracket cap screw and adjusting cap screw loose, force the generator away from the engine until there is a 5/8-inch flex at 25 pounds pull on one side of the belt (Fig. 40-10-3).



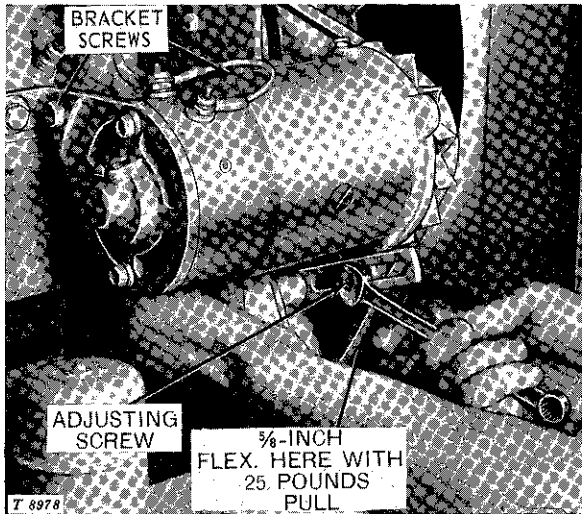


Fig. 40-10-3—Adjusting Generator Belt Tension

**IGNITION AND ELECTRICAL CIRCUITS**

Test ignition and electrical circuits by referring to Section 100, Group 10 of this manual.

**BATTERY**

Inspect battery and cables according to instructions given in Section 100, Group 30 of this manual.

Check level of electrolyte solution in battery. Fill battery cells, if necessary, to level of filler ring. Use distilled water, if possible, or clean water with a low mineral content.

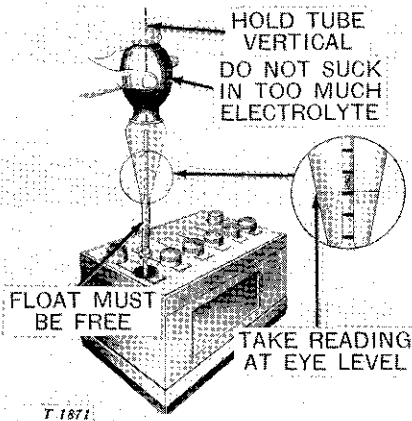


Fig. 40-10-4—Checking Specific Gravity of Battery

Check specific gravity of battery (Fig. 40-10-4). If specific gravity of battery is below 1.225, recharge the battery (Section 100, Group 30).

**STARTER AND GENERATOR**

Complete service information on starting motors and generators is covered in Service Manual SM-2029, John Deere Electrical Systems.

**DISTRIBUTOR**

Test and service distributor following instruction given in Section 100, Group 5 of this Manual and in Service Manual SM-2029, John Deere Electrical Systems.

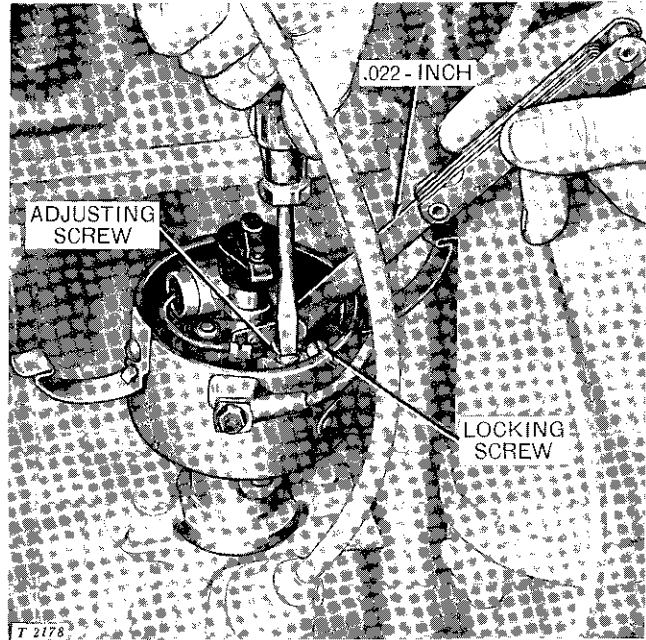


Fig. 40-10-5—Setting Distributor Point Gap (Delco-Remy Illustrated)

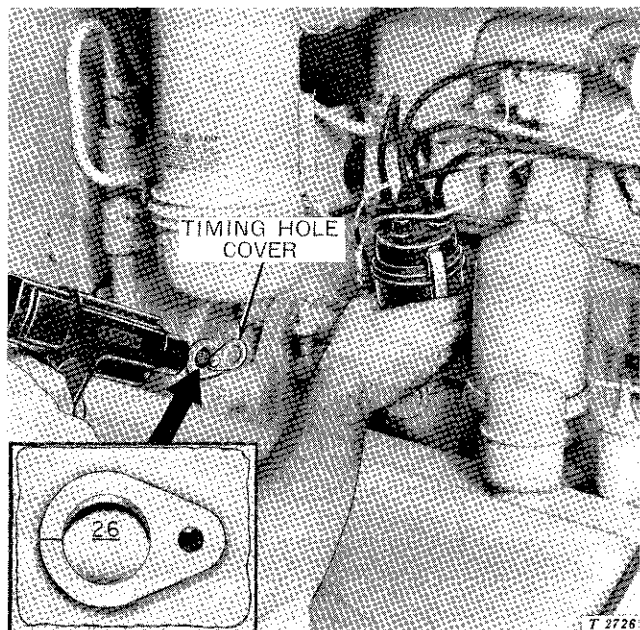


Fig. 40-10-6—Timing Distributor with Timing Light

*Checking Distributor Points and Point Gap*

The distributor rotates counterclockwise, viewed from the top. The automatic spark advance is 26 degrees of engine rotation. Clean



points to remove corrosion and set point gap to .022 inch (Fig. 40-10-5). Pitted or corroded points cannot be accurately set with a feeler gauge. (For details, see Section 100, Group 10 of this Manual.)

#### Timing Distributor with Power Timing Light

Although the distributor can be timed either by use of a power timing light or by the manual method, it is highly recommended that the power timing light method be used.

Instructions for using power timing lights are provided by the timing light manufacturer. However, the following steps must be taken to prepare the engine for timing by this method.

1. Start engine and allow it to run until normal operating temperature is reached.
2. Uncover timing hole (Fig. 40-10-6).
3. Stop engine and follow manufacturer's instructions for attaching timing light leads to battery and to No. 1 (front) spark plug. (Positive side of battery is grounded in 1000 Series Tractors.)
4. Start engine and bring it up to 2500 rpm, plus or minus 25 rpm.
5. Loosen distributor attaching cap screws.
6. Direct timing light toward timing hole in center frame (Fig. 40-10-6) and rotate distributor body until "26" mark on flywheel lines up with mark on timing hole.
7. Hold distributor in this timed position and tighten attaching cap screws.
8. Recheck position of "26" mark. When engine is properly timed, remove timing light leads in order outlined in manufacturer's instructions.
9. Slide cover over timing hole and tighten screw securely.

#### Timing Distributor by Manual Method

The 1000 Series Tractors may be equipped with either Delco-Remy or Wico Distributors. The automatic advance mechanism differs slightly in the two distributors. On the Delco-Remy models, both the rotor and the cam advance in operation. On the Wico Model, only the cam advances. Due to these differences, the procedures for manual timing differ slightly (as shown in Step 4).

**NOTE:** Use of a timing light is recommended for more accurate timing. When using a timing light, the procedure for either distributor, Delco-Remy or Wico, is the same.

1. Uncover timing hole located on distributor side of clutch housing (Fig. 40-10-7).

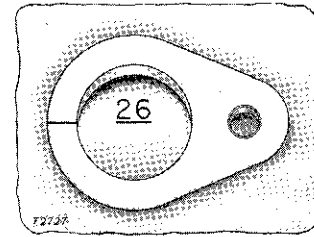


Fig. 40-10-7—Flywheel Timing Mark

2. Remove all spark plugs.

3. Turn engine very slowly. Place thumb in spark plug port of No. 1 (front) cylinder. Turn engine until considerable air pressure is felt against thumb; then continue turning until "26" mark on flywheel lines up with marks on side of timing hole (Fig. 40-10-7). Do not reverse rotation of engine if "26" mark goes past hole; instead, repeat procedure.

4. On Delco-Remy distributors, remove distributor cap and dust cover. Install distributor rotor and turn it counterclockwise as far as possible. While holding rotor in this position, rotate distributor body slowly until points are just beginning to open (Fig. 40-10-8).

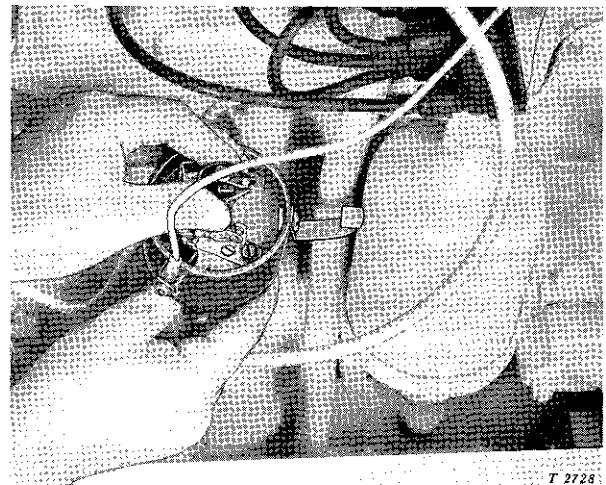


Fig. 40-10-8—Timing Delco-Remy Distributor

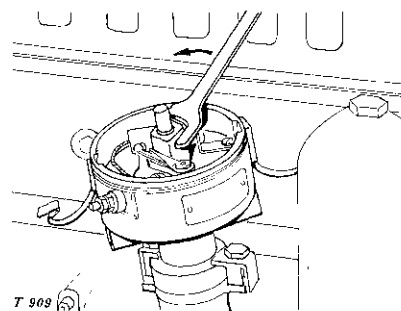


Fig. 40-10-9—Timing Wico Distributor

On Wico distributors, remove distributor cap, dust cover, and rotor. Using an open end wrench, turn cam counterclockwise as far as possible. While holding cam in this position, rotate distributor body slowly until points are just beginning to open (Fig. 40-10-9).

### TIMING INJECTION PUMP (DIESEL)

The engine and the fuel injection pump must be timed to each other. To check the timing, do the following:

1. Uncover timing hole on clutch housing (Fig. 40-10-10).

2. Turn engine in direction of rotation (counterclockwise when viewed from flywheel end) until No. 1 piston is on a compression stroke and the "DC" mark on the flywheel rim aligns with timing mark on the clutch housing (Fig. 40-10-10).

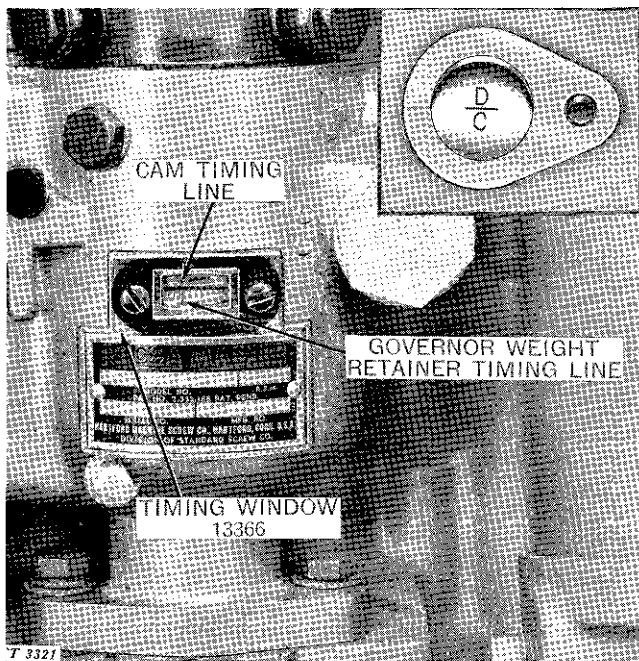


Fig. 40-10-10—Timing Lines

3. Remove timing hole cover on injection pump housing and check to see if the timing line on the weight retainer hub aligns with the mark on the cam rim as shown in Fig. 40-10-10. If adjustment is required, loosen pump mounting bolts, and turn injection pump assembly by hand so that the timing marks line up, and retighten mounting bolts.

4. Turn engine over two revolutions in direction of engine rotation and recheck pump timing.

NOTE: When rotating crankshaft, care must be taken so that the crankshaft is not rotated beyond the specified timing mark. If the timing mark has been passed, it will be necessary to turn the engine backward at least 1/4 turn and again rotate the crankshaft counterclockwise, thus removing all gear train backlash.

5. Replace timing hole cover on clutch housing and on fuel injection pump. Bleed fuel system as described under "Fuel System" in this Group.

### CHECKING INJECTION PUMP LOAD ADVANCE

See Section 91, Group 20 for correct procedure.

### ADJUSTING VALVE CLEARANCE

To adjust valve clearance properly, each piston must be at top dead center at end of its compression stroke at time adjustment is made.

To determine correct position, turn engine until No. 1 (front) piston is at top dead center on compression stroke (both valves closed). The "DC" mark on flywheel will now be lined up with the mark on timing hole (Fig. 40-10-11).

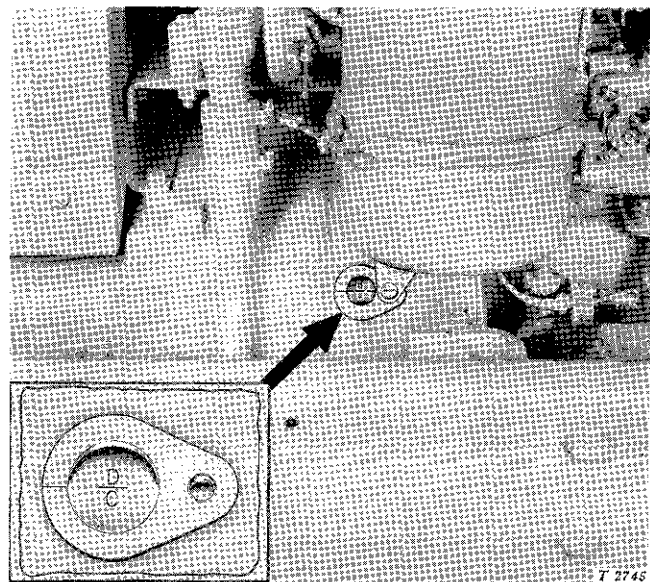


Fig. 40-10-11—"DC" Mark on Flywheel

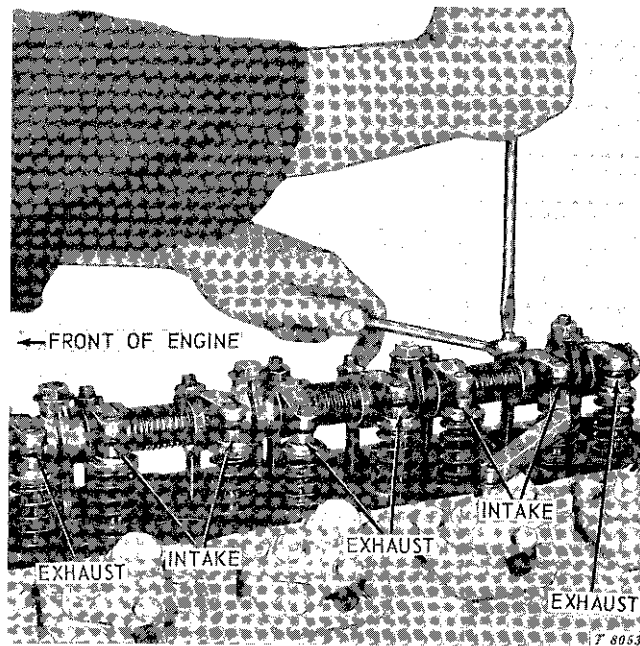


Fig. 40-10-12—Adjusting Valve Tappet Clearance

Adjust valve clearance (Fig. 40-10-12). Start with the No. 1 (front) cylinder valves. Intake valves are set at .012-inch and exhaust valves are set at .018-inch when engine is cold. Turn engine 1/2 revolution of crankshaft and set No. 3 valves. Turn engine 1/2 revolution of crankshaft and set No. 4 valves; turn engine 1/2 revolution of crankshaft and set No. 2 valves.

### CYLINDER HEAD GASKET AND BOLTS

*NOTE: Refer to Sections 50 and 51 for servicing details.*

While rocker arm cover is removed, re-torque cylinder head bolts. First check cylinder head gasket for possible leaks. (Any compression leaks would have been indicated during the compression test which preceded this.) Replace gasket if any air, water, or oil leaks are evident. Re-torque cylinder head bolts to 150 ft-lbs in the sequences shown in Figures 50-15-14 (Gasoline) or 51-15-13 (Diesel).

## COOLING SYSTEM

### RADIATOR

Run the engine sufficiently to stir up any rust or sediment. Stop the engine and drain the cooling system completely before sediment settles again. Close drain cocks and fill radiator with a solution composed of one pound of washing soda per gallon of water. (Cooling system capacity is 2-3/4 U.S. gallons.) Install the filler cap and run the engine for one hour.

Drain out the solution, add fresh water, and run the engine for a few minutes. Stop the engine and drain out this flushing water.

Fill system with fresh water.

**CAUTION:** Do not pour hot water in a cold engine or cold water in a hot engine at any time. Do not operate the tractor without water even for a few minutes.

If radiator still shows signs of being clogged, it may require more drastic cleaning such as use of commercial cleaners and back flushing (Section 80, Group 5).

### HOSES

Inspect radiator hoses for "mushy" interior. Hoses may look good outwardly but be partially deteriorated inside, requiring new hoses. Whenever in doubt, install new hoses, making sure all connections are tight.

### GRILLE AND RADIATOR CORE

Remove hood and grille. Blow out all traces of dirt and chaff from grille and radiator core with compressed air. Straighten all bent fins.

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## AIR CLEANER

## OIL-BATH TYPE (See Section 91, Group 35)

Remove air cleaner cup and clean out thoroughly.

Check air cleaner hole, cleaner body, and wire filter element. Wash all parts in solvent.

**CAUTION:** Do not dry the oil bath-type filter element with compressed air because of possible damage. Do not steam-clean the element, as tiny mud balls may be formed which cannot be removed.

Replace air cleaner, making sure all hose connections are tight. Fill cup to level with same weight of oil as is used in crankcase. Replace cup.

Be sure cup is properly seated against upper body and that band is properly fitted in place. Tighten thumb screw on band only until finger-tight. (Do not use any tools.)

## DRY-TYPE (See Section 91, Group 36)

Remove and empty dust cup.

Check filter element, filter body, air cleaner hole, and all hose connections.

If filter needs cleaning, use one of the following methods:

**Dry or Dusty Element:** Use compressed air (not over 100 psi at the nozzle) to blow dust from element keeping a reasonable distance between air nozzle and filter.

**Oily or Sooty Element.** Wash the element in warm water (not over 100° F), adding John Deere Dry Filter Element Cleaner (R36757R) to the water.

**CAUTION:** Never wash dry-type filter element in fuel oil, gasoline, or solvents. Never use compressed air to dry a wet element.

Reinstall filter, dust cup and baffle. Tighten clamp on dust cup only until finger-tight. Reset restriction indicator if red signal is showing (see Section 91, Group 36.)

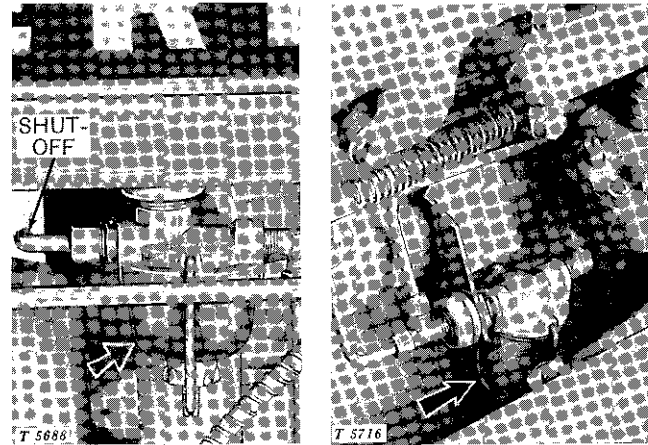
**IMPORTANT:** Replace filter element after six cleanings or one year of service, whichever occurs first. Always be sure wing nut on element is tightened securely, as dirt can be drawn into engine if element is loose.

## FUEL SYSTEM

## GASOLINE

*Fuel Tank and Lines*

Check fuel tank and lines for dirt or foreign matter and remove to clean if necessary.

*Fuel Filter*

( -15782)

(15783-Up)

Fig. 40-10-13—Gasoline Fuel Filter

Clean sediment bowl and filter screen thoroughly. (Fig. 40-10-13).

Install filter screen, gasket, and bowl.

**NOTE:** Use new gasket, making sure gasket and screen are properly seated before tightening jam nut.

## DIESEL

*Fuel Tank and Lines*

Inspect fuel tank and lines for dirt or foreign matter and remove to clean if necessary.

*Fuel Strainer and Fuel Filters*

Remove and clean fuel sediment bowl. On tractors ( -42000), reinstall filter screen, gasket, and bowl. Use new gasket and be sure gasket and screen are properly seated before tightening jam nut. On tractors (42001-up), reinstall first-stage filter bowl and tighten large stud screw until finger tight. Be sure gasket is in place on shoulder of filter element before tightening stud.

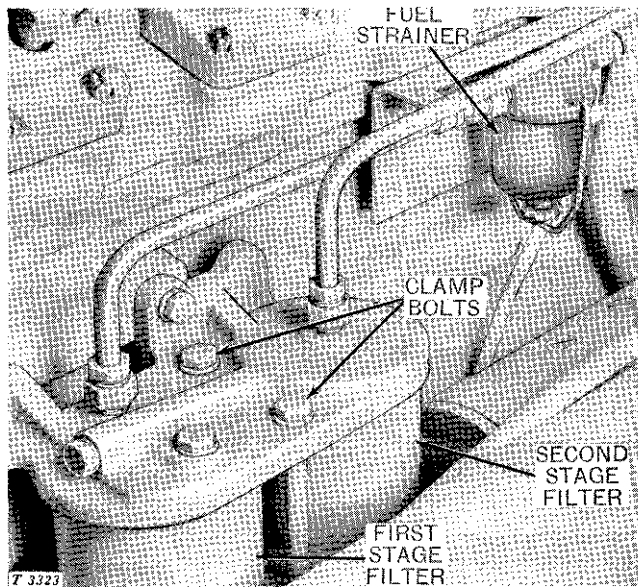


Fig. 40-10-14—Fuel Strainer and Fuel Filters ( -42000)

Tractors ( -42000). Check first-stage fuel filter element for dirt or water-soaking (Fig. 40-10-14). Loosen bolts holding filter clamp and remove case marked "1ST STA" from filter head. Make sure that metal ferrule on top of element is removed with case. Replace the element if it is dirty or water-soaked. Install a new felt washer on filter sleeve; then grease sleeve and install new "O" ring. Unless first-stage filter is extremely dirty or water-soaked, do not replace second-stage filter except at major overhaul. Install filter case under filter head. Adjust clamp and tighten clamp bolts. Bleed fuel system (see following).

Tractors (42001-up). Check the first-stage filter element (rear) for dirt or water soaking. (Fig. 40-10-16). Back off large stud screw under filter sediment bowl and remove screw and bowl. Remove filter element. Replace element and gaskets if element is dirty or water soaked. Place gaskets on shoulders of element and slip element under filter head. Reinstall screw and bowl under filter element. Be sure gaskets are not crimped, then tighten stud screw until snug. Do not replace second-stage filter element except in the case of major engine overhaul, unless first stage filter is extremely dirty or water-soaked. Bleed fuel system (see next page).

*Bleeding Diesel Fuel System ( -42000)*

Any time the Diesel fuel system is opened or has run dry, it is necessary to bleed the entire fuel system to remove air bubbles. Do this as follows:

Fill fuel stank with No. 1-D or No. 2-D Diesel fuel (see chart, page 91-5-1).

Service the fuel strainer to remove moisture condensation or air lock. Loosen jam nut under sediment bowl and gradually loosen bowl until fuel flows freely. Tighten jam nut.

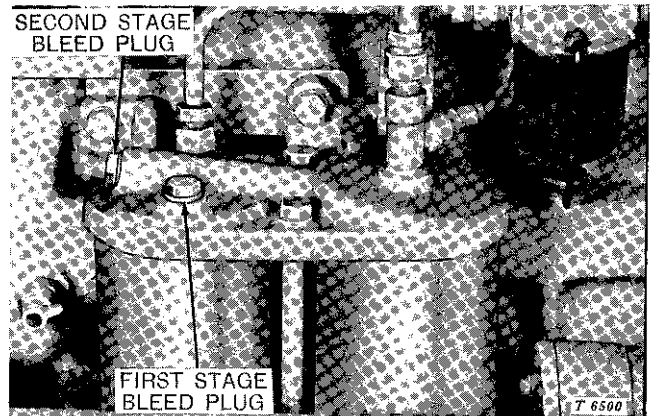


Fig. 40-10-15—Diesel Fuel Filter Bleed Plugs ( -42000)

Loosen bleed plug on top of first-stage filter and let fuel flow until it is free of air bubbles (Fig. 40-10-15). Retighten bleed plug.

Loosen bleed plug for second-stage filter and let fuel flow until it is free of air bubbles. Retighten bleed plug.

Loosen the fuel injector nozzle nuts (or screws) on each injector nozzle. Crank engine with starter until fuel begins to slowly flow around loosened injector nozzle. Retighten after air is dispelled. Torque injector nozzle nuts as follows: Tractors (10001-29000)—15 ft.-lbs. Tractors (29000-42000)—35 ft.-lbs.

**CAUTION:** Loosen only one turn to avoid excessive fuel spray.

*NOTE:* If engine is running, loosen only one at a time. Retighten before going on to the next one.



*Bleeding Diesel Fuel System (42000-Up)*

If the engine has been idle for a long period or if the fuel system has been opened or has run dry, you must bleed the entire fuel system before operation to remove air. Do this as follows:

1. Fill fuel tank with No. 1-D or No. 2-D diesel fuel (see chart, page 91-5-1).
2. Loosen bleed plug on top of first-stage (rear) filter and let fuel flow until it is free of air bubbles (Fig. 40-10-16). Tighten bleed plug.

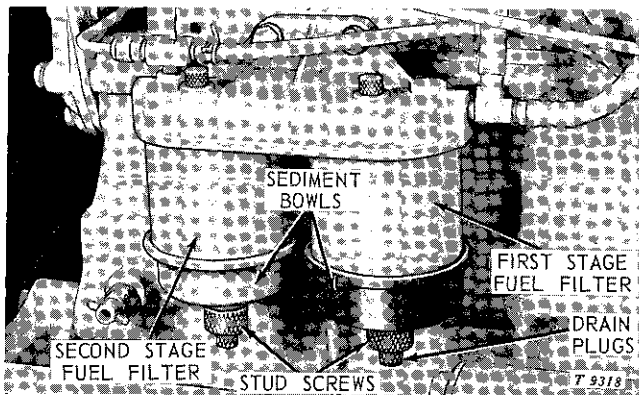


Fig. 40-10-16—Bleeding Diesel Fuel System (42001-Up)

3. Loosen bleed plug for second-stage (front) filter and let fuel flow until it is free of air bubbles. Tighten bleed plug.

4. Loosen the nuts on each injector line. Crank engine with starter until fuel begins to slowly flow around loosened nuts. Tighten injector line nuts to 15 to 20 ft.-lbs.

**CAUTION:** Loosen the injector line nut only one turn to avoid excessive fuel spray.

**NOTE:** If engine is running, loosen only one injector line nut at a time. Tighten nut before going on to the next one.

### GASOLINE SPEED CONTROL ADJUSTMENTS ( -31000)

Check for wear in the speed control, governor, and carburetor linkage. Start engine and operate hand throttle. Note way in which engine idles and accelerates. If engine operation is erratic, or if linkage is worn or damaged, adjust speed control linkage in exact order given here. Use hand tachometer for correct engine speed readings.

#### THROTTLE STOP AND ROD ADJUSTMENT

Detach throttle rod from lever and shaft assembly. With engine running, push throttle arm

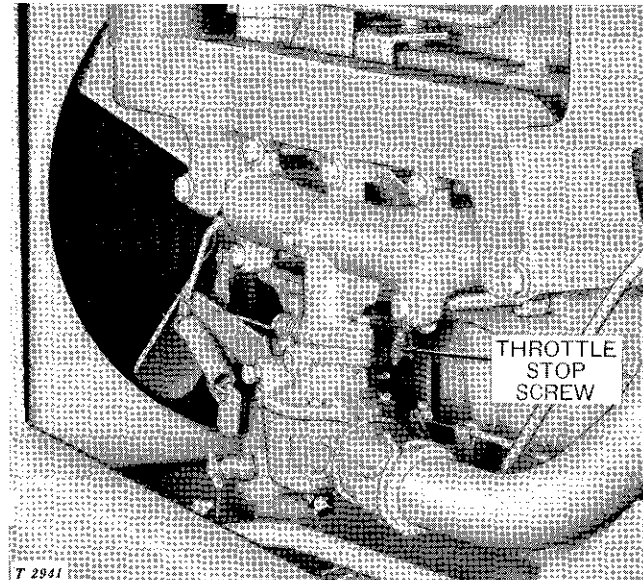


Fig. 40-10-17—Throttle Stop Screw

on carburetor to rear so that throttle stop screw (Fig. 40-10-17) touches its stop. Check engine for correct idle speed of 600 rpm. Adjust if necessary by screwing in or out on throttle stop screw.

Adjust length of throttle rod (Fig. 40-10-18). With rod unhooked from governor, move governor lever and shaft assembly forward (counterclockwise) as far as possible; move throttle rod all the way forward. Adjust length of throttle rod until it will just match hole in lever and shaft assembly. Then shorten throttle rod by turning into ball joint three complete turns (John Deere governor) or one complete turn (Pierce governor). Secure ball joint with lock nut. Connect throttle rod.

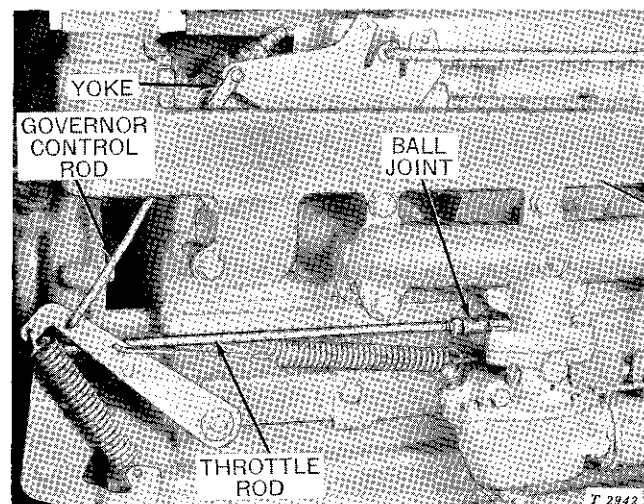


Fig. 40-10-18—Speed Control Linkage Adjustments ( -31000)  
(John Deere Governor Illustrated)