

# **D Series Tractors and Engines**

## **SERVICE MANUAL**

**5632**

***CASE III***

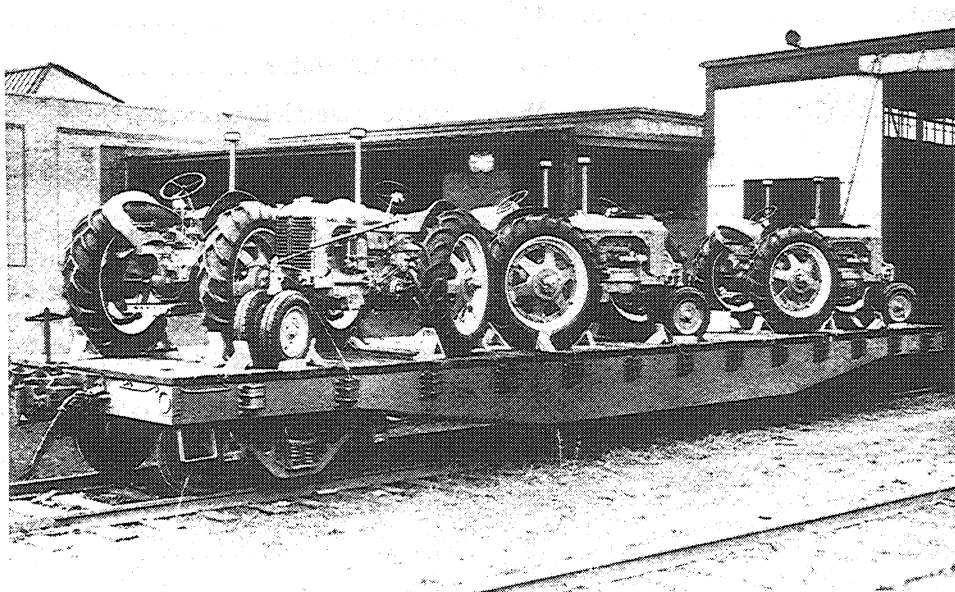
This Dealer's Service Manual has been developed to more completely familiarize Case dealers and their mechanics with all of the service details connected with the economical and efficient servicing of Model "D" Series Tractors and "DE" Engine Units.

It is, therefore, very important that this manual be carefully read and studied by all persons in the dealer's organization. If this is done, then we are sure that all tractors and engine units will be properly serviced either in the field or in the dealer's service shop.

Case tractors are built in modernly equipped factories where quality materials and the finest precision machinery is used, and where the highest grade workmanship is employed. Therefore, all tractors and engine units will perform satisfactorily if the owner is properly instructed in the care and operation.

Case users depend upon their dealers to give them advice and render service to assure long life performance that is built into every Case machine.

Parts for all Case machines are illustrated and are identified by part numbers in the regular parts catalog.



Case tractors are shipped from the factory on flat cars, as shown above, or in box cars. Report any shortages or damages immediately to transportation company. This also applies to tractors shipped via truck.

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# MODEL "D" SERIES TRACTOR—Continued

## Speeds.

Rear Tire Size .....	"D"		"DC"		"DO"	"D"
	12-26	13-26	11-38	12-38	13-26	42" Diameter Steel Wheels
Approx. Speeds						
1st .....	2.10	2.19	2.10	2.17	2.19	1.95
2nd .....	3.63	3.78	3.63	3.75	3.78	3.36
3rd .....	5.00	5.20	5.02	5.18	5.20	4.64
4th .....	10.11	10.51	10.10	10.40	10.51	9.36
Reverse .....	2.86	2.98	2.87	2.97	2.98	2.65

Note: Speed will vary with weight of wheel, traction, size tire and load.

Calculated at Engine Speed of 1200 RPM

## Shipping Weight.

Model "D" .....	12-26 Tires	4433 lbs.
Model "D" .....	13-26 Tires	4489 lbs.
Model "DO" (Orchard-Grove) .....	13-26 Tires	4602 lbs.
Model "DC3" (General Purpose) .....	11-38 Tires	4766 lbs.
Model "DC3" .....	12-38 Tires	4796 lbs.
Model "DC4" .....	11-38 Tires	4471 lbs.
Model "DC4" .....	12-38 Tires	4501 lbs.
Model "DC3" (General Purpose with Adjustable Front Axle).....	11-38 Tires	4622 lbs.
Model "DC3" .....	12-38 Tires	4662 lbs.
Model "DCS" (Cane Tractor) .....	11-38 Tires	6360 lbs.
Model "DE" (Engine Unit Less Belt Pulley) .....		1475 lbs.

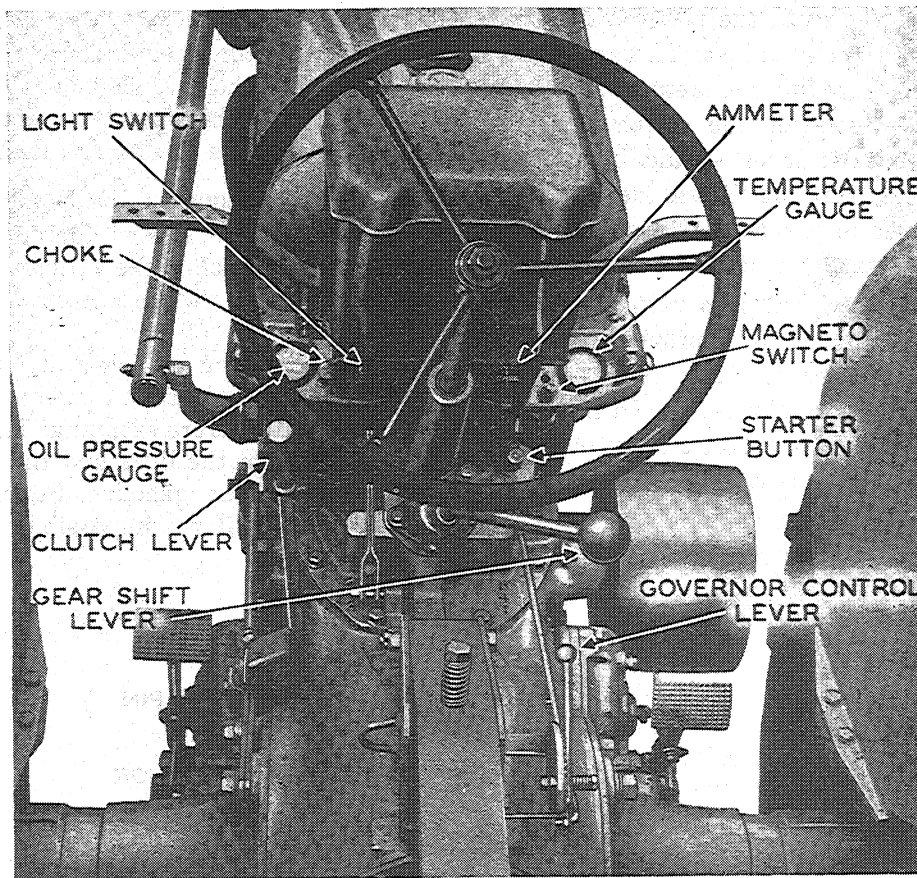


Figure 1. Operating Controls

## TRACTOR AND ENGINE OPERATION

### Starting the Engine.

Before starting the engine, check the oil level in the crankcase and the air cleaner reservoir. Fill the radiator with clean water or with anti-freeze during cold weather. Check the fuel supply.

Place the gear shift in neutral and disengage the clutch.

Push in the magneto switch for starting the engine.

Set the governor control lever at about the mid-position on the quadrant. To increase the governed engine speed, push forward on the lever and to decrease the speed, pull the lever rearward.

Start the engine by pressing down on the starter switch until the engine fires. When hand cranking, pull the crank upward with one-quarter turns, so the operator's hand will be in a position to avoid being struck by the crank, should the engine backfire.

Immediately after starting the engine, check the oil pressure gauge, to see that it is registering.

Set the governor control so that the engine runs about half normal speed and adjust the carburetor needle valve until the engine runs smooth and free.

### To Start the Tractor or Engine Unit.

With the engine running, pull back on the clutch lever until the belt pulley stops rotating; then

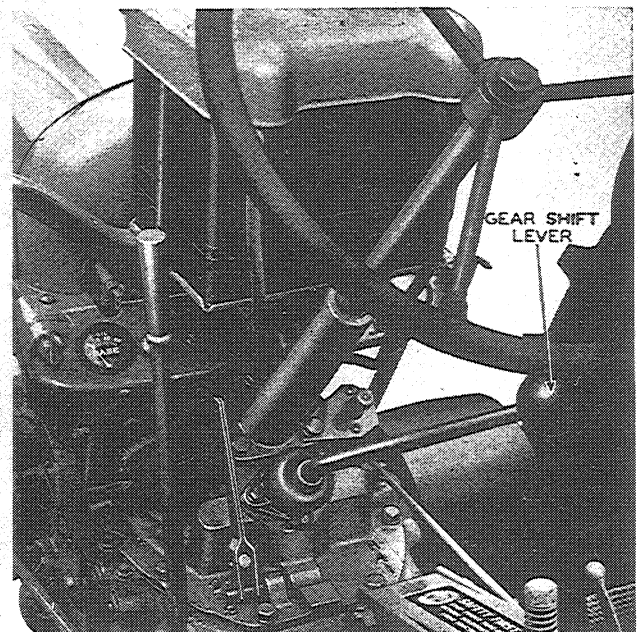


Figure 2. Gear Shift

move the gear shift lever to the position for the speed desired. Push the clutch lever forward gradually until it snaps into full engagement; but do not push on the lever after the clutch is fully engaged. The gear shift lever should be in the neutral position when starting the engine, or when running idle in order to prevent accidents in case the clutch is accidentally engaged.

Occasionally the gears will stop with the teeth ends opposite each other, thereby preventing easy shifting. Should this occur, partly engage the clutch to rotate the gears slowly, then the teeth can be meshed readily. This condition occurs more often when the tractor is new.

Before submitting an engine unit to full load, be sure it is thoroughly warmed up.

### Running in a New Engine.

A new tractor should never be loaded to full capacity. For the first 50 hours it should be run at half load with full open throttle or governed speed, before it is put on full load.

### Stopping the Engine.

When gasoline is used for fuel, the engine is stopped by reducing the speed and then pulling out the magneto switch button on the instrument panel.

When operating on low-cost fuel, turn off the fuel from the main tank and turn on the gasoline a few minutes before stopping. This will allow the low-cost fuel in the lines and the carburetor bowl to be replaced by gasoline. Starting on low-cost fuel is difficult, if not impossible, after the engine has cooled off.

## LUBRICATION

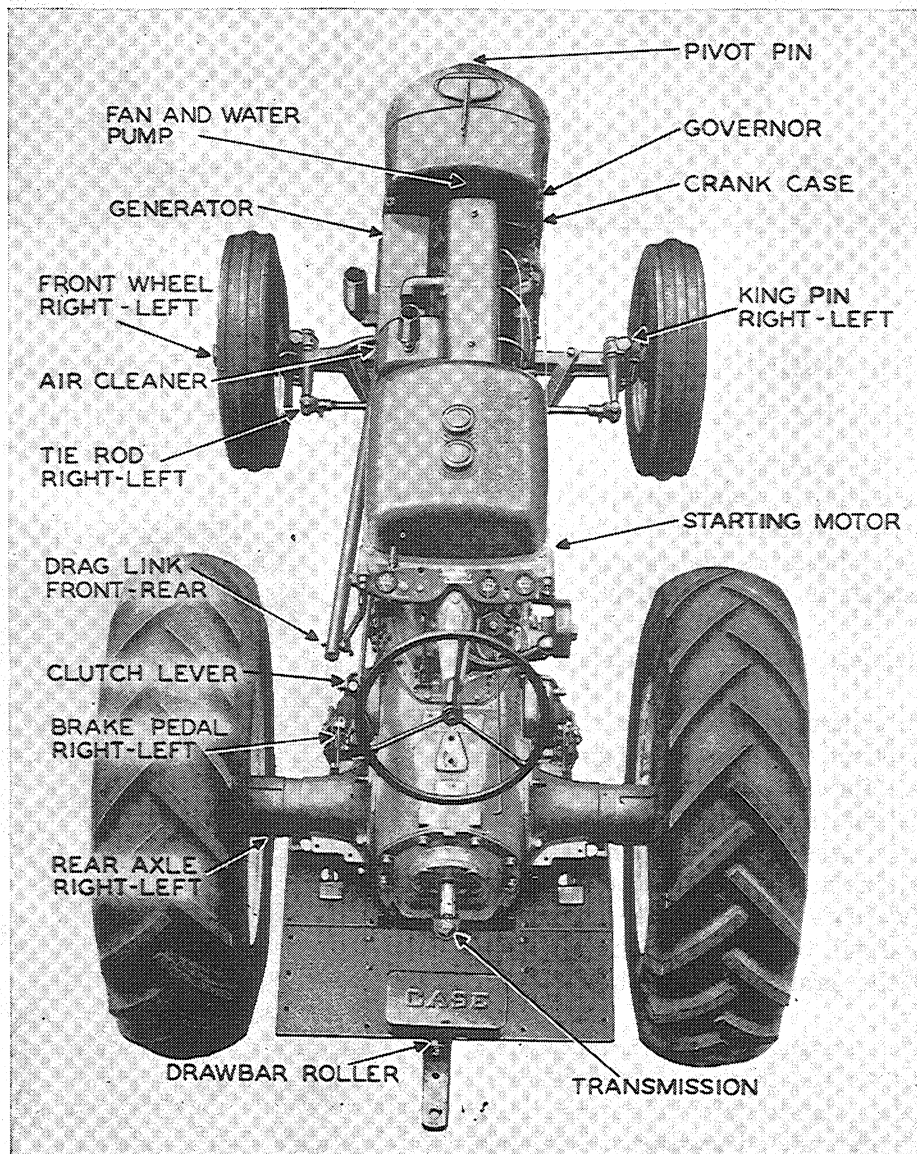


Figure 3. Lubrication Diagram—Models "D" and "DO"

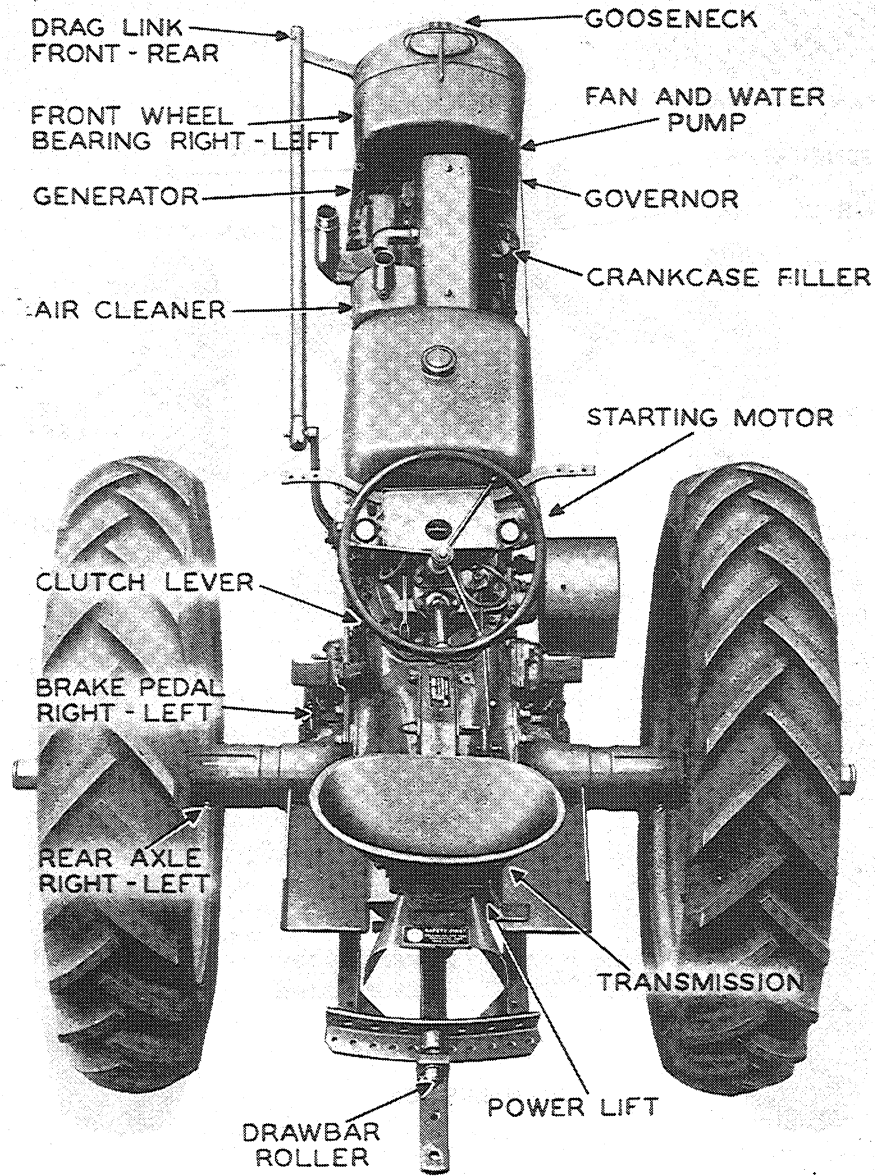


Figure 4. Lubrication Diagram—Model "DC"

### General Lubrication.

Your tractor is equipped with pressure fittings wherever automatic lubrication cannot be provided. These fittings are few but important, so do not neglect to lubricate these points regularly. A good grade of semi-fluid pressure gun lubricant should be used in the grease gun in warm weather. In cold weather a lighter grade of lubricant is desirable, to insure that the lubricant will reach the bearing surfaces. Wipe the pressure fittings clean before using the grease gun.

### Engine Oil Recommendations.

Capacity— $1\frac{3}{4}$  U.S. Gallons  
 $1\frac{1}{2}$  Imperial Gallons  
 SAE No. 30 for summer or temperature above 90° F.  
 SAE No. 20 for spring and fall or temperature between 90° F. and 32° F.  
 SAE No. 10 for winter or temperature between 32° F. and +10° F.  
 SAE No. 10-W for temperature below +10° F.

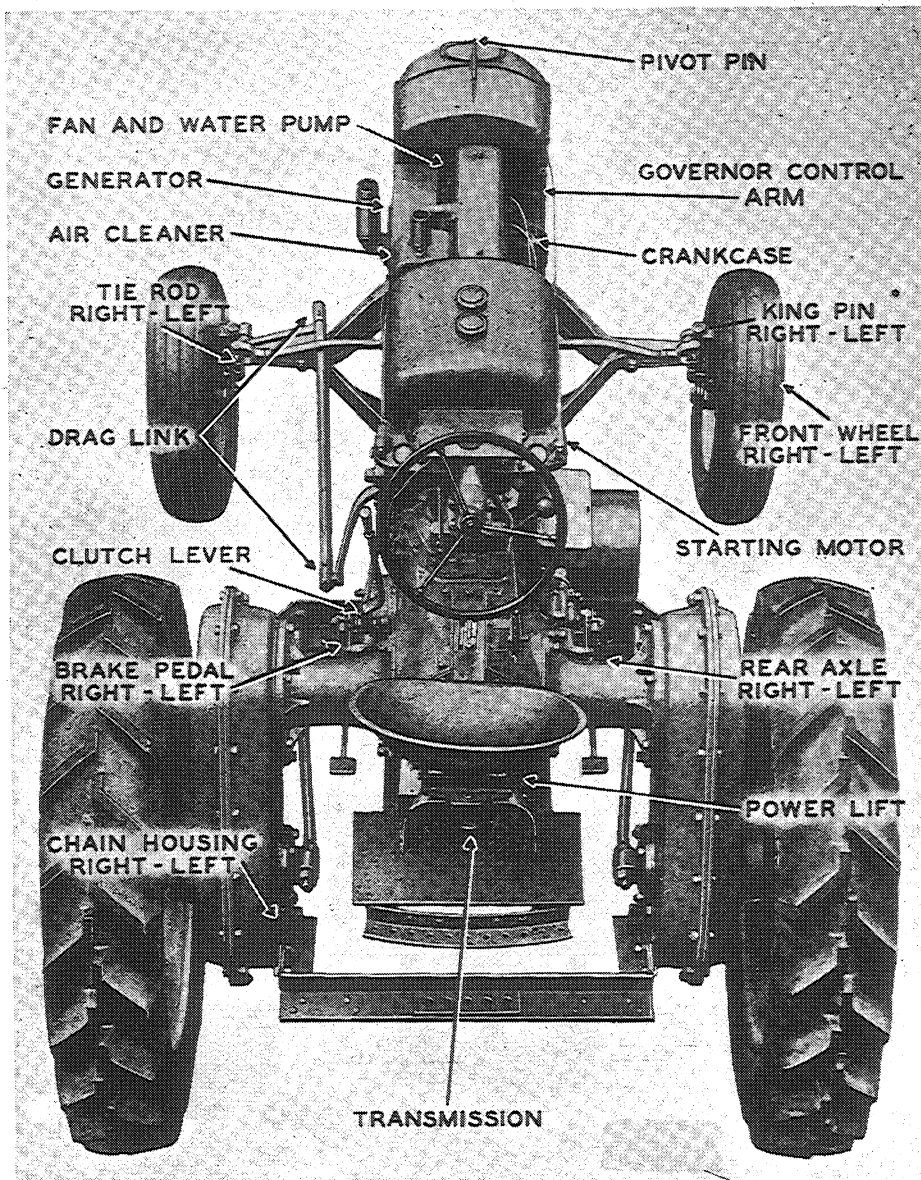


Figure 5. Lubrication Diagram—Model "DCS"

**First Group—Attention Daily—Every 10 hours of operation**

**Rear Axle Bearings**

**Gooseneck**

Two fittings. "DC" only.

**Drag Link**

Two fittings.

**Front Axle Pivot Pin**

"D," "DO" and "DCS."

**King Pins**

Four fittings. "D," "DO" and "DCS."

**Tie Rod**

Two fittings. "D," "DO" and "DCS."

**Independent Brake Pedals**

**Clutch Lever**

**Drawbar**

**Belt Pulley**

On tractors prior to serial number 4805353. On tractors after 4805353 ball bearings are lubricated from within the transmission case.

**Power Take-off**

**Second Group—Attention every 60 hours of operation.**

**Governor**

**Fan Bearing**

**Third Group—Attention every 200 hours of operation.**

**Generator**

Add a few drops of oil to each of the oil cups—one on front flange and one on the rear cover. Clean around the oilers before opening. Use a good grade of light oil.

### Starting Motor

Add a few drops of a good grade of light oil to oiler in front end of starter. Clean the end of starter before swinging the small cover on oil hole to one side.

**Fourth Group**—Attention every 250 hours of operation.

### Oil Pump Screen

Every 250 hours of operation, the oil pump screen should be removed and cleaned. Also remove any sludge or dirt in oil pan.

### Transmission

Transmission is filled to height of level plug on rear transmission cover. Inspect level every 250 hours and refill if needed.

### Front Wheel Bearings.

These bearings are packed with grease at the factory and under normal conditions, will require no attention for the first 250 hours of operation. The wheel bearings should then be removed, cleaned thoroughly and repacked with a good grade of fibre grease. This should be repeated every 250 hours thereafter.

### Clutch Housing.

Oil from the crankcase is constantly circulating through the clutch housing and a small amount of oil is retained in the clutch housing when the engine is stopped. The clutch housing drain plug should be removed and the clutch housing drained at the same time that the crankcase oil is changed. Install plug after draining.

### Magneto.

The Case magneto is equipped with sealed oil bearings and oil-impregnated bushings which re-

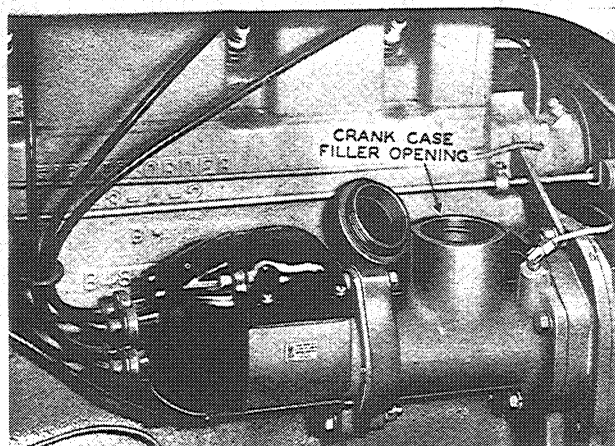


Figure 6. Crankcase Filler

quire no lubrication except at time of general overhaul.

### Engine Lubricating System.

A pressure feed lubricating system built into this engine assures positive lubrication to all working parts. A gear type oil pump equipped with non-adjustable relief valve circulates oil in the engine block to all main, connecting rod, camshaft bearings, clutch pilot bearing and clutch throwout bearing, valve rocker arms and governor. All other parts operate in an oil spray from connecting rod bearings. Valve lifters are flood lubricated.

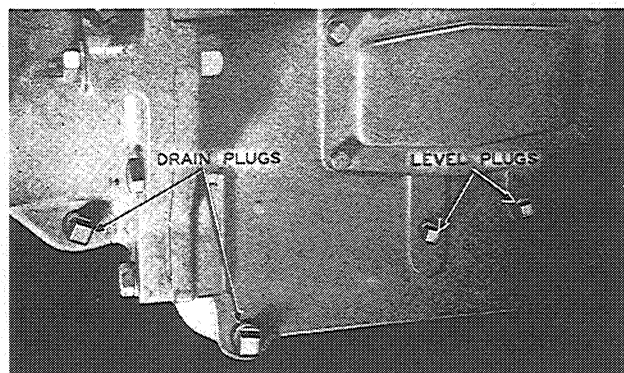


Figure 7. Oil Level and Drain Plugs

### Crankcase Oil.

Before starting a new tractor, make sure that the oil pan contains oil up to the proper level. Inspect the oil level by removing the level plugs on the right side of the engine; the oil level should be between the two plugs when the engine is not running.

In cold weather it is important to use good oil that flows freely through the screen of the oil pump and permits easy cranking when starting. A simple method of checking this is to remove lower level plug and see if the oil flows freely.

### Engine Lubrication

#### When Gasoline Is Used for Fuel.

Add new oil through filler opening on the governor housing to bring to level of upper plug. After 120 hours of operation, remove the crankcase drain plug when the engine is hot, and drain all oil out of crankcase. Replace the drain plug. Then fill the crankcase with  $1\frac{3}{4}$  U.S. gallons or  $1\frac{1}{2}$  Imperial gallons of new oil through the filler opening in the governor housing.

Although the oil level should be maintained to the level of the upper plug, no difficulty will be experienced if the engine is operated with the level slightly below this top level. Under no circumstances should it be operated if the oil level is below the lower plug.

### Engine Lubrication When Low-Cost Fuel Is Used.

After every 10 hours of operation, remove lower level plug and allow oil to drain to this level. Add new oil through filler opening on the governor housing to bring to level of upper plug. After 90 hours of operation, remove the crankcase drain plug when the engine is hot, and drain all oil out of crankcase. Then fill the crankcase with 1¾ U.S. gallons or 1½ Imp. gallons of new oil to the upper level plug through the filler opening in the governor housing.

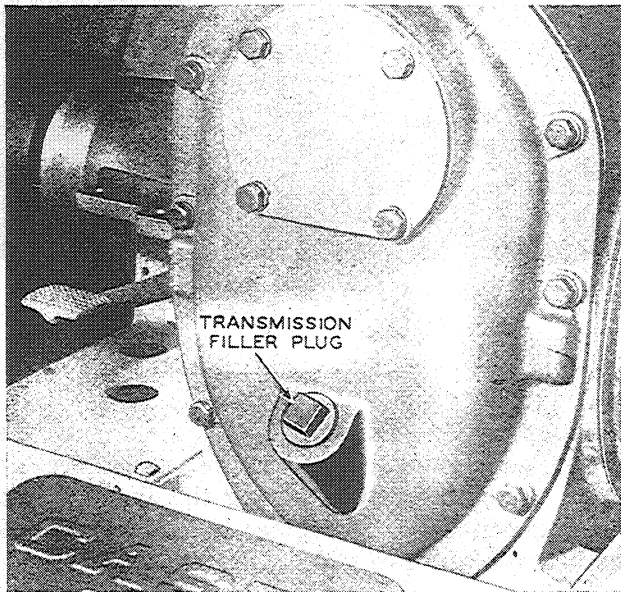


Figure 8. Transmission Filler Plug

#### Transmission Lubrication.

Capacity—Approximately 10½ U.S. or 8½ Imperial Gallons.

Body of Oil	Temperature
SAE 140	32° F. and above
SAE 90	Below 32° F.

The transmission should be drained, flushed and refilled with a high quality oil every 2000 hours or once a year. Approximately 10½ gallons will be required.

If the tractor is to be used in cold weather (below 32° F.) with SAE 140 oil, drain 2 to 3 gallons of the oil from the transmission case, and replace it with an equal amount of a good grade SAE 10 or 10W engine oil. The thin oil will dilute

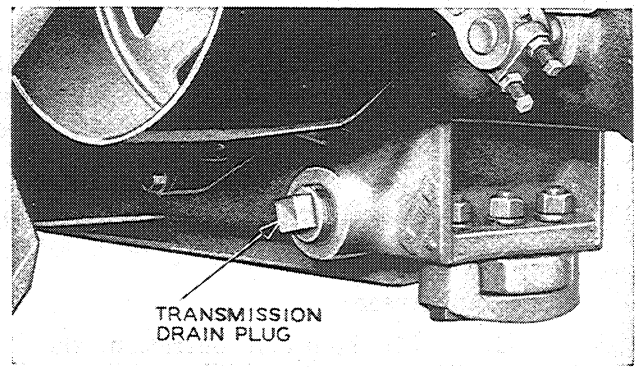


Figure 9. Transmission Drain Plug

the SAE 140 oil sufficiently for it to remain fluid in cold weather and thereby prevent the transmission gears or chains from channeling in the lubricant.

In cold weather use a good grade of SAE 90 oil.

When doing belt work, the tractor should be set level, so all bearings, shafts, etc., will be properly lubricated.

#### Motor Lift Lubrication.

On motor lift equipped tractors, it is necessary to have the motor lift housing filled with oil to the level of the filler plug. Use the same grade of oil as is used in the transmission case.

#### COOLING SYSTEM

The capacity of the cooling system is 6¾ U.S. or 5½ Imperial gallons.

Cooling solution is circulated by means of an impeller type pump, through the radiator, engine block and engine head. The pump is driven by a V-belt from the crankshaft. The heat of the engine is controlled by regulating the air draft through the radiator, which in turn affects the temperature of the cooling solution. This is accomplished by means of the radiator shutter; therefore, before starting, close the shutters until the engine reaches operating temperature.

The water temperature should always be 180° to 200° F. or just below the boiling point. Low-cost fuel, if used, can then be turned on and the shutters opened just enough to keep the engine at this temperature.

**CAUTION:** Never pour water into a hot engine in which the water has been allowed to become very low. To do so may result in cracking the cylinder block or cylinder head. If water is poured into a cold engine that has been drained, add the water slowly. Too rapid pouring may result in breakage.

#### Cleaning the Cooling System.

At least once a year, particularly in the spring after draining the anti-freeze, the cooling system

should be given a treatment with washing soda solution to remove any sludge and sediment that is accumulated. The easiest way is to drain the system and put back  $3\frac{1}{2}$  gallons of fresh water. Then bring to a boil an equal amount of water and add all the common washing soda that will dissolve. While this is still hot, add it to the cooling system. Operate the engine for 24 hours, drain, flush thoroughly, and refill with clean water.

Use of an anti-rust oil is recommended to preserve the interior surface of the cooling system.

Keep radiator hose clamps tight. Remove all trash from the core of the radiator to prevent overheating.

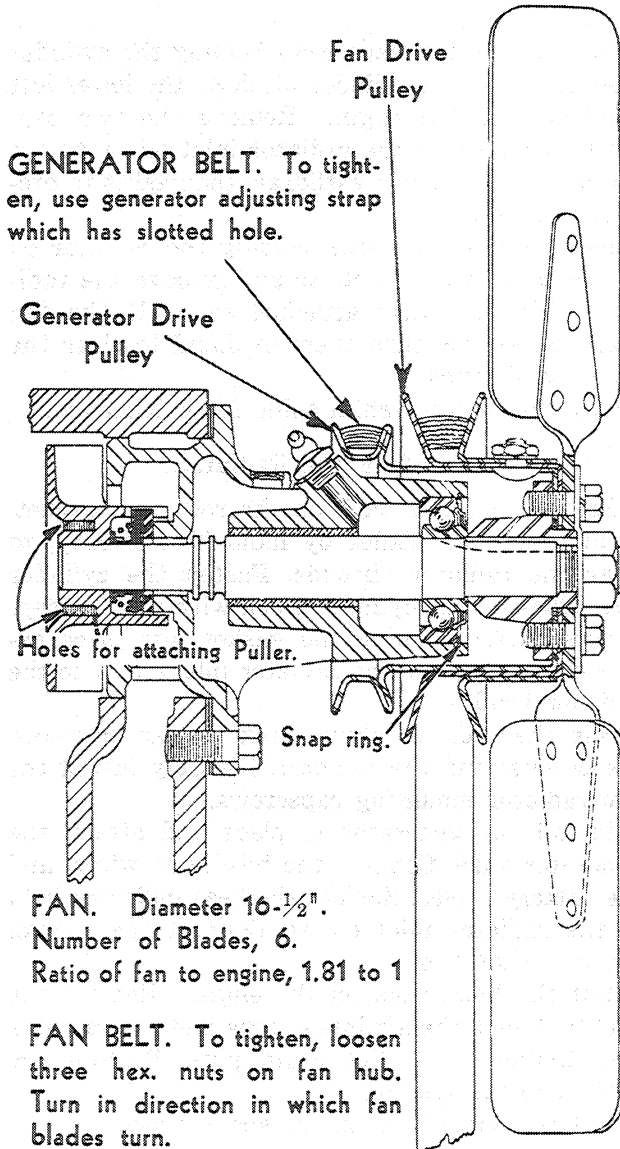


Figure 10. Fan and Water Pump

### Servicing the Fan and the Water Pump.

This pump is of the mechanical seal type, and no attention is required other than periodic lubrication and occasional adjustment of the fan belt

tension. The lubricant is the same as used for other pressure fittings. Lubricant is fed only to the ball bearing and to a long plain bushing; the sealing member of the pump requires no lubrication, and hence water pump grease should not be used. To prevent damage to the seals of the ball bearing, do not use an excessive amount of grease.

### Fan and Water Pump Disassembly.

Remove the radiator. Remove the four capscrews securing the fan and pull the fan hub, Figure 10. Remove the three capscrews, securing the water pump body to the engine block.

To remove the impeller, use a puller that has a center adjustment. When securing the puller to the impeller, use two  $\frac{5}{16}$ " NC bolts, screwed all the way to the bottom of the tapped holes in the impeller. The holes are shown in Figure 10. Puller No. 382 3AA is used to pull the impeller.

Remove the snap ring which secures the ball bearing in place, from the pump body. The shaft can then be withdrawn from the pump body by removing it from the fan end. Remove the nut from the end of the shaft, and with a puller, remove the hub from the shaft. Remove the ball bearing from the fan end of the shaft.

If the bushing must be taken out of the pump body, it should also be removed from the fan end.

### Fan and Water Pump Assembly.

When replacing the water pump bushing, ream to  $.8735$ "-. $875$ " after the bushing has been pressed into place.

Press the bushing for the water pump into the pump body, then ream to size so the pump shaft turns freely. The water pump impeller, which has its parts held in place with a snap ring, is press fitted on one end of the shaft. The spring should be assembled with the small end facing the impeller. The seal spring guide fits on the flexible seal. The other end of the shaft fits into the pump and through a bearing which is held in place by a snap ring. The fan hub, which drives both the impeller and the fan is keyed to this end of the shaft. A nut holds the fan hub in place.

The fan pulley consists of an adjustable half and the drive hub half, fitted together. This assembly fits over the generator drive pulley, which in turn fits over the fan hub. The fan blade assembly is fastened (spider portion to the front), to the hub with four  $\frac{5}{16}$ "x $\frac{7}{8}$ " capscrews. The hexagon nut is locked to the water pump and fan shaft by the lock, which is held in place by two capscrews.

The water pump and fan assembly is driven through a belt, from the fan drive pulley. A second belt, in turn, drives the generator.

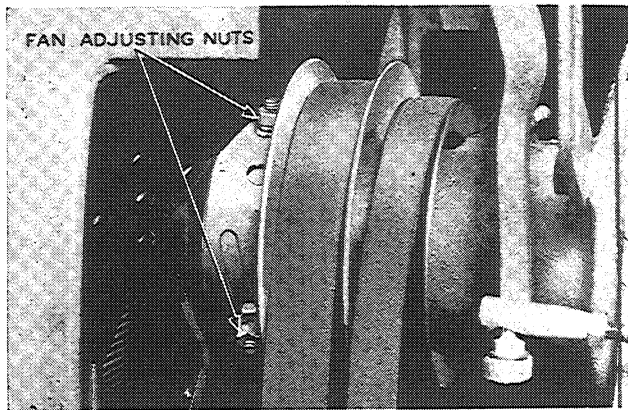


Figure 11. Fan Belt Adjustment

### Adjusting Fan and Water Pump Belt.

For your safety, remove all spark plug wires to avoid any possibility of engine starting while working on the fan and water pump assembly.

Loosen three hexagon nuts, Figure 11, and tighten the belt by turning the front half of the pulley in the direction in which the fan blades turn. The tension should be just enough to take up any looseness or slack. A properly adjusted belt can be easily depressed 1" by the thumb midway between the pulleys. Too tight a belt causes excessive belt wear, excessive load on the bearings, and does not aid cooling. The belt should always ride on the sides of the V pulley and never on the bottom of the pulley. After adjusting the belt, tighten hexagon nuts.

### Installing New Belts.

Remove the fan blades by taking out the four capscrews, two of which are shown in Figure 10. The fan blades may then be dropped down just in back of the radiator core. This operation may be facilitated by disconnecting the radiator and shifting it ahead a few inches, or by removing it completely.

Loosen the adjustable flange on the water pump. The old belts then can be slipped off the fan shaft, and removed from the lower pulley by working them between the starting crank and starting jaw on the crankshaft, and between the drive pulley and fan shroud. If preferred, the starting crank can be removed by taking out the two capscrews holding the assembly to the radiator bracket.

### Removing the Radiator.

The following suggestions will facilitate the removal of the radiator.

Disconnect the spark plug wires to avoid any possibility of the engine starting.

Drain the coolant and remove the outlet drain pipe. Take off the radiator cap, the air intake pipe and the fuel tank cap. Remove the hood from over the engine. Disconnect the shutter control rod on the upper right front side. Remove the heat indicator bulb from the radiator inlet elbow.

Disconnect the battery cables, the headlight wires and the wire at the generator. Remove the generator completely and lay aside to avoid damaging it.

Remove the two capscrews holding the cylinder inlet elbow to the cylinder block at the lower left hand side of the engine. Remove the two capscrews connecting the radiator inlet elbow to the cylinder head. Gently withdraw the gasket to prevent damaging it.

Remove the capscrews holding the radiator on the radiator bracket. Raise and remove the radiator with the inlets attached to it. If the fan blades interfere, turn them by hand to clear the radiator shrouds.

Lay the radiator shim aside for safekeeping.

### Installing the Radiator.

Set the radiator back on the radiator bracket, turning the fan blades by hand if necessary, to clear the radiator shrouds. Fasten the cylinder inlet elbow to the cylinder block with the two capscrews. After slipping the gasket into place between them, secure the radiator inlet elbow to the cylinder head.

Slip the radiator shims back in place between the bracket and the radiator. Securely install the two radiator mounting capscrews.

Install the generator in place and attach the generator wire. Connect the headlight wires, and the battery cables. Replace the heat indicator bulb in the radiator inlet elbow. Connect the control rod to the shutter.

Put the hood back on the engine. Replace the fuel tank cap, the air intake pipe and the radiator cap. Install the outlet drain pipe. Restore the coolant to the system.

Put the wires back on the spark plugs.

### Radiator Shutter.

Model "D" Series Tractors are equipped with shutters. The shutter control is operated from operator's seat by a crank on the right hand side of instrument panel. The correct water temperature recommended for satisfactory operation is

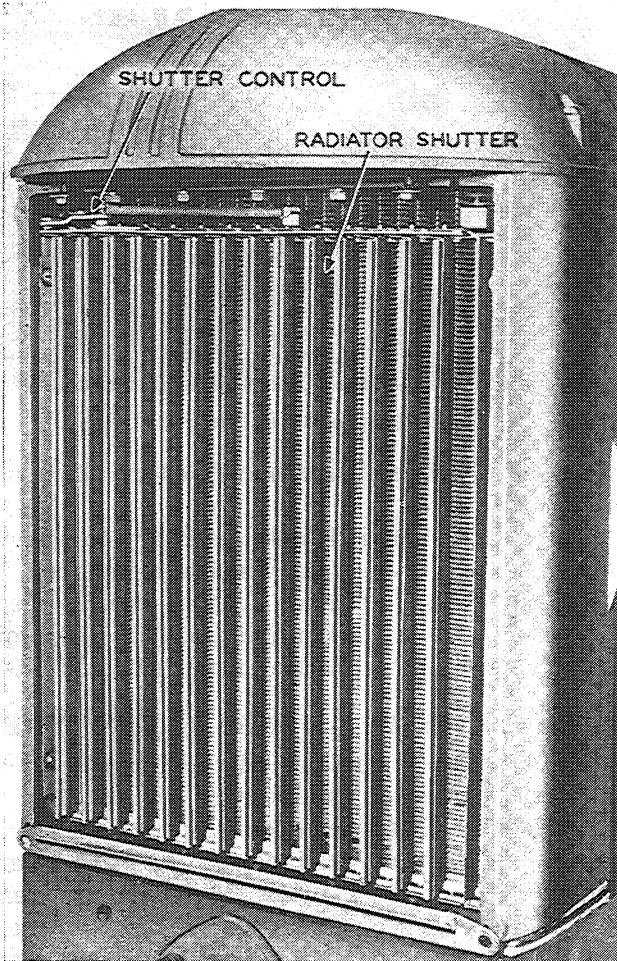


Figure 12. Radiator Shutter

about 180° to 200° F., or just below the boiling point.

To open shutters, turn crank on right hand side of instrument panel to "left."

To close shutters, turn crank on right hand side of instrument panel to "right."

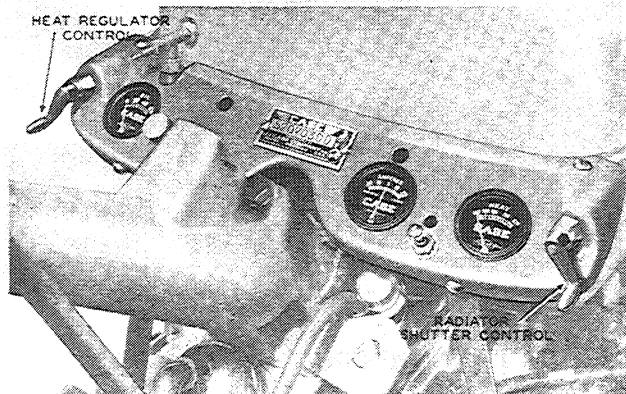


Figure 13. Shutter Control

#### Care of the Cooling System for Winter Operation.

When operating an engine in cold weather, always use a good grade of anti-freeze in the

cooling system. Any nationally advertised brand will work satisfactorily in a Case Tractor. Under no circumstances use a compound of unknown composition, as this might prove harmful to the cooling system. No solutions of calcium chloride, sodium chloride or magnesium chloride should be used. The electrolytic and corrosive action is very damaging to metal parts. Likewise, no substances such as lubricating oil, kerosene, honey or sugar solutions, sodium silicate or glucose should be used. Extra fire hazard, destruction of the radiator hoses and gumming action on the interior surfaces of the cooling system may result from the use of such solutions.

#### Water in the Crankcase.

There is a great amount of condensation in the engine crankcase during cold weather. If a sufficient amount of this water of condensation is allowed to collect, it may freeze in the bottom of the crankcase or on the oil pump screen and result in a broken oil pump or burned out bearings. To avoid any danger from this cause, it is advisable to loosen the oil pan drain plug daily, after the tractor has been idle for a few hours, and check for the presence of water. It is not necessary to entirely remove the drain plug. Simply turn it out until one or two threads are holding. Any water present will then run out of the crankcase. Be sure to tighten the drain plug before starting the tractor.

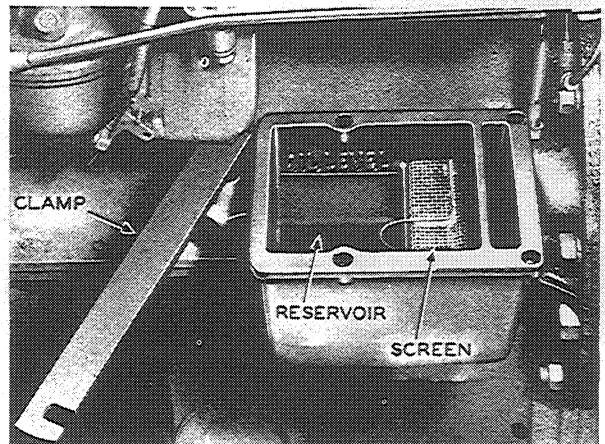


Figure 14. Air Cleaner

#### AIR CLEANER

The function of the air cleaner is to prevent dirt and abrasive material from entering the engine. Proper servicing should be maintained at all times because dirt or dust taken into the engine with the intake air is extremely harmful. They will cause excessive wear on pistons and cylinders, sticking of valves, wear on valve stem guides and may cause the valves to become sluggish or hold open so that they will leak or burn.

To remove the reservoir for cleaning, loosen hand nut and swing clamp strap to one side.

Discard the old oil from reservoir and clean out all foreign matter.

In very dusty conditions, use a long screw driver to dislodge dirt from bottom and sides of intake passage.

The air cleaner oil reservoir should be removed daily, cleaned and filled to the level mark on reservoir with an oil having a viscosity of SAE 10. However, if the engine is operated when the weather is quite cool, it might be necessary to thin out the SAE 10 oil with a slight amount of kerosene.

The daily inspection and cleaning of air cleaner is imperative when operating under normal conditions. However, in extremely dusty conditions, more frequent servicing may be found necessary.

#### Care of Connections.

Gasket between air cleaner and carburetor must be properly installed and kept tight at all times, otherwise excessive engine wear will result if there are any leaks between the air cleaner and carburetor.

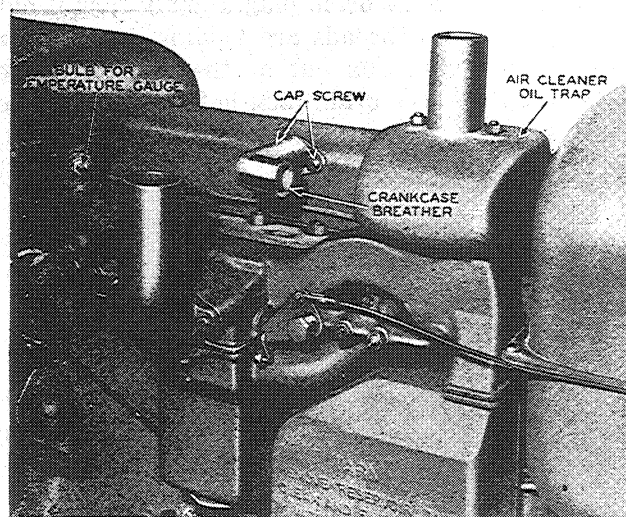


Figure 15. Air Cleaner Oil Trap

#### Air Cleaner Oil Trap.

The air cleaner oil trap is located over the air cleaner in the air intake pipe and is attached to the exhaust manifold. The oil trap prevents oil from being thrown out of air cleaner if engine should back-fire.

#### OIL FILTER

The purpose of an oil filter on an engine is to separate and remove dirt and other foreign substances from the oil to prevent these materials from being circulated to the engine. Therefore, it is important that the element, No. 33516, be replaced every time the oil in crankcase is

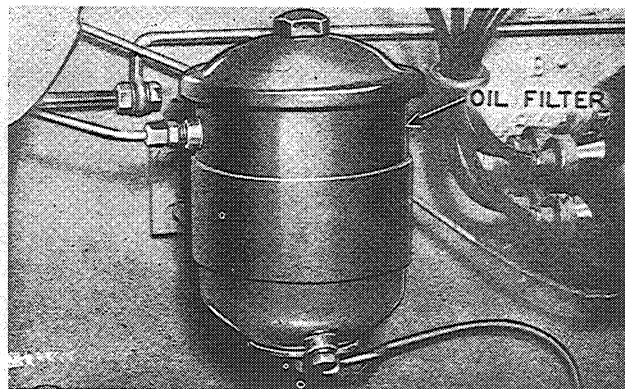


Figure 16. Oil Filter

changed, which is approximately every 120 hours of operation.

To replace filter, it is only necessary to remove top nut and cover after which element can be lifted out. Before replacing element, remove drain plug from bottom of filter and drain out all old oil. Also remove foreign matter from inside of filter.

#### CRANKCASE BREATHER, SCREEN TYPE

The crankcase breather is located on outside of cylinder head cover as shown in Figure 15. It is recommended that when operating engine in dusty conditions that an examination be made about every 100 hours to see that all screens are clean and that breather is operating freely. Under extremely dusty conditions, this should be checked oftener.

To clean screens, remove the two capscrews holding the breather elbow. Wash entire elbow assembly in gasoline until all dirt and sediment are removed.

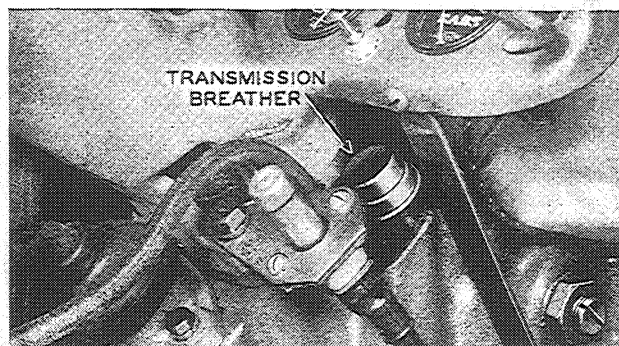


Figure 17. Transmission Breather

#### TRANSMISSION BREATHER

The transmission breather located on the transmission case top cover should be removed and cleaned in gasoline or fuel oil every 100 hours. Put a few drops of engine oil in the breather before putting it back in place.

Under extremely dusty conditions, this breather should be checked and cleaned more often.

## IGNITION

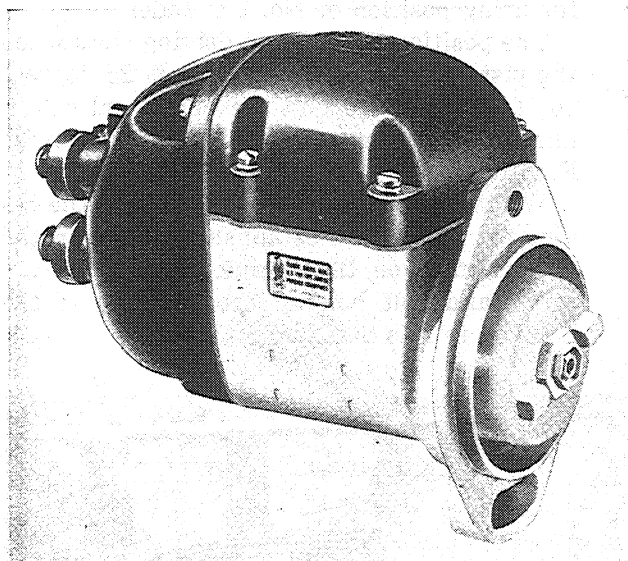


Figure 18. Case 4-JMA Magneto

### Magneto.

The Case 4-JMA magneto—located on the right side of the engine—is a very precisely built, self-contained unit which should not be taken apart in the field. Many magnetos are ruined because they are tampered with by inexperienced operators, under dirty, dusty conditions or at places where proper service tools are not available.

Should the magneto require attention other than that described herein, take it to one of the authorized Service Stations listed in our Magneto Service Station directory.

### Servicing Magneto.

This should include only service operations involving the timing of the engine or replacement of the entire magneto unit.

In normal use, the magneto will seldom require timing unless it has been removed from the engine for servicing. The magneto has been properly timed and adjusted at the factory and the position of the crankshaft in relation to the occurrence of the spark does not change appreciably in use.

**NOTE:** No Warranty Service Work will be approved should it be done on a Case Magneto by any one other than an authorized Case Magneto Service Station or Case Magneto Depot Station as they have all the necessary tools and equipment to do this work in a satisfactory manner and are familiar with handling Magneto Warranty Service.

### Removing the Magneto from the Engine.

Disconnect all wires from the magneto to spark plugs, see Figure 22. Disconnect the grounding wire. Take out the two capscrews attaching the flange of the magneto to the magneto drive. The magneto can then be lifted off.

### Installing and Timing Magneto.

When the magneto is installed on the tractor, it must be re-timed. Follow this procedure:

Remove all spark plug wires as well as No. 1 spark plug. The spark plugs in No. 2, 3 and 4 cylinders remain in place. Figure 22.

Make sure the gear shift lever is in neutral position.

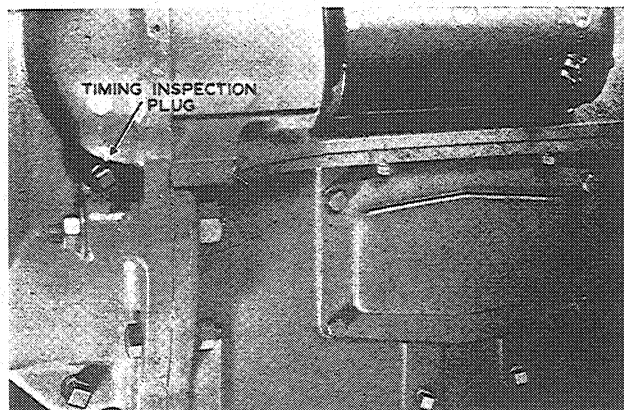


Figure 19. Timing Inspection Hole

Remove the plug from the timing inspection hole on the right side of the clutch housing. Figure 19.

The compression stroke may be determined by removing No. 1 spark plug and holding the thumb over the spark plug opening. While the engine is cranked slowly, outward pressure is felt when the piston is coming up on the compression stroke. A lighter pressure is also felt on the exhaust stroke. Do not confuse the two.

The proper position of the flywheel for timing the magneto, is when the letter "D" appears in the center of the inspection hole. To locate "D," turn the belt pulley clockwise with the clutch engaged until the "D" centers in the inspection hole.

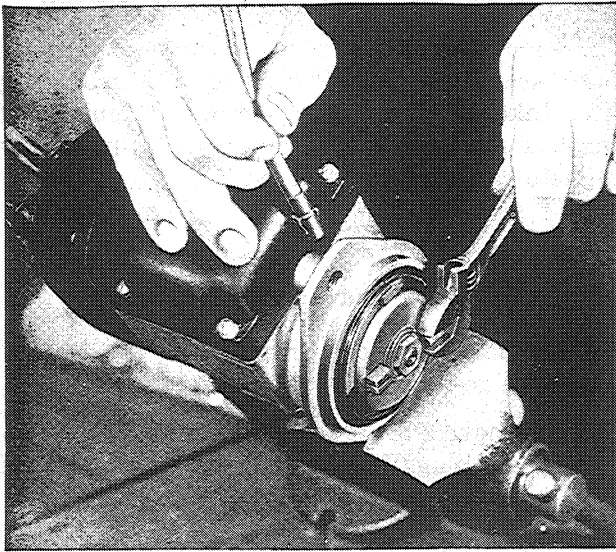


Figure 20. Locating Number 1 Firing Position on Magneto

Support the magneto in an upright position, as shown in Figure 20. Connect one of the spark plug wires to No. 1 terminal of the magneto cap. The terminal is marked 1 and is the upper right hand terminal. Hold the free end of the spark plug wire about  $\frac{1}{8}$  inch from the frame of the magneto. Turn the impulse with the wrench one click at a time until a spark jumps between the wire and the frame. Use care to hold the wrench and magneto firmly so impulse will not move beyond the point where it trips and the spark occurs. The position at which the spark occurs indi-

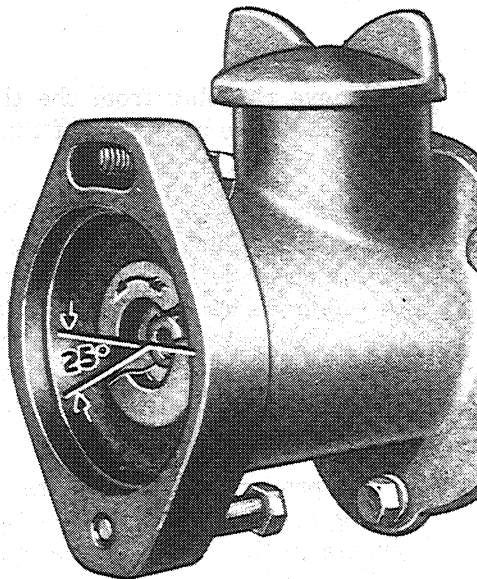


Figure 21. View of Couplings in Governor Bracket

cates the approximate setting of the magneto for firing position of No. 1 cylinder.

The position of magneto driving slots when the piston is at top dead center is 25 degrees (or two teeth) beyond the horizontal center line in direction of rotation as shown in Figure 21.

Without disturbing the settings of the engine or magneto as established above, install the magneto on the engine. Install the cap-screw and bolt holding the magneto to the housing in this position.

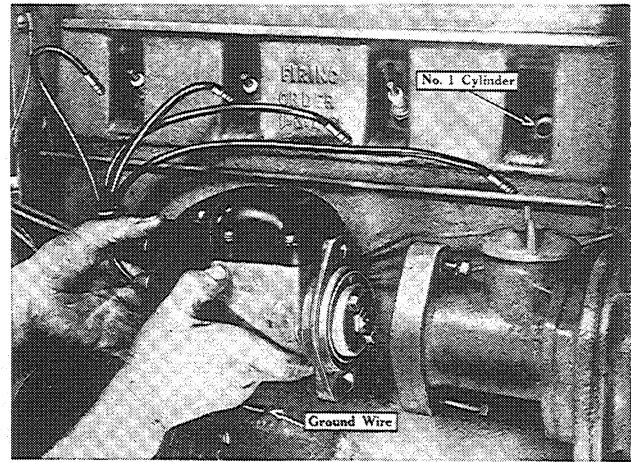


Figure 22. Magneto in Proper Position for Installing on Engine

Connect the grounding wire and install the spark plug wires. Connect the No. 1 terminal as marked on the distributor cap with the No. 1 spark plug, the No. 2 terminal with No. 2 spark plug, etc.

The final setting for maximum economy will be when the impulse trips at the time the "D" on the flywheel is in the center of the inspection hole in clutch housing. This can be adjusted by rotating the magneto on the governor bracket.

#### Lubricating the Magneto.

The Case Type 4-JMA magneto used on this tractor is equipped with sealed ball bearings and oil impregnated bushings which require no lubrication.

#### Governor Gear Timing.

The magneto drive gear is timed with the camshaft as shown in Figure 54, Page 31.

Should it be necessary to service the governor assembly, without removing the radiator and front gear cover, proceed as follows:

Set the engine with No. 1 piston at top dead center.

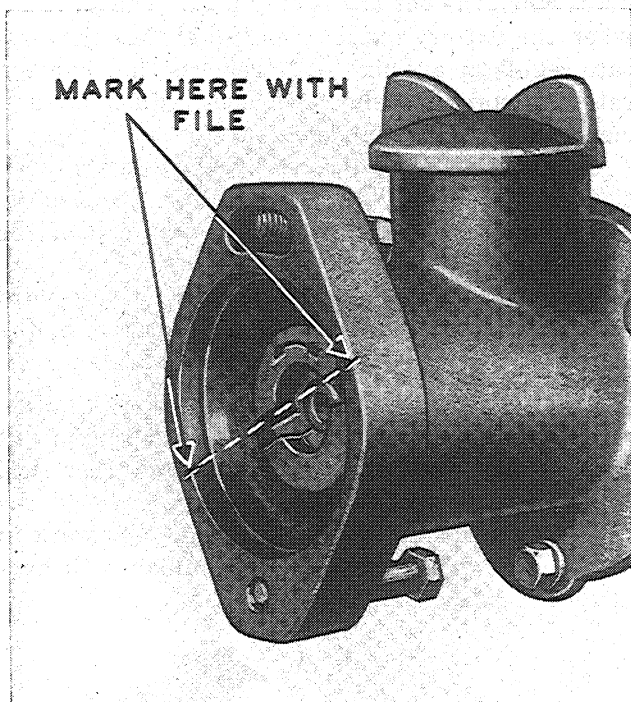


Figure 23. Coupling Location Mark

Mark the location of the coupling on the face of the governor assembly flange, Figure 23.

Remove the governor assembly from the engine.

Before installing the governor assembly, be sure that the engine is again on No. 1 top dead center.

Install the governor assembly with the slot in the coupling, which drives the magneto, lined up with the mark made on the flange.

This mark will be 25 degrees beyond the horizontal center line in the direction of rotation, as shown in Figure 21.

This will be correct every 180 degrees.

In the event the gears are not in their correct setting, one tooth would be 13 degrees before or after the correct position and, therefore, this will be very easily detected without measuring.

Following the above instructions makes it possible to set the governor gear in correct timing without removing the radiator, or front gear cover.

### Spark Plugs.

Spark plugs used are of the 18 mm. thread size. AC spark plug No. 85 or any equivalent plug will work very satisfactorily. A gap of .030 inch should always be maintained between the electrodes, and the shank length should be 1½". It must be remembered if the gap between the electrodes is

too great due to improper setting or burning, the spark may jump elsewhere in the circuit, resulting in misfiring. Therefore, it is always very important that the correct gap be maintained at all times.

If one cylinder is misfiring, the cause may be either failure of the ignition or low compression. To locate the cause, crank the engine slowly and notice the compression on that cylinder. Sometimes a valve sticks open, which always causes the cylinder to lose compression.

If the compression is satisfactory, replace the spark plug with a new one, or one from a live cylinder. If the cylinder then fires, the trouble was due to a defective spark plug, or plug not being sufficiently tightened in the head.

If further difficulty is experienced, examine all wires leading to the plugs and see that they are in good condition. When removing or installing spark plugs, use the special socket wrench furnished with the tools.

Never use any other wrench as it is the only kind that will avoid distortion of the plug and insure the insulator against damage or breakage.

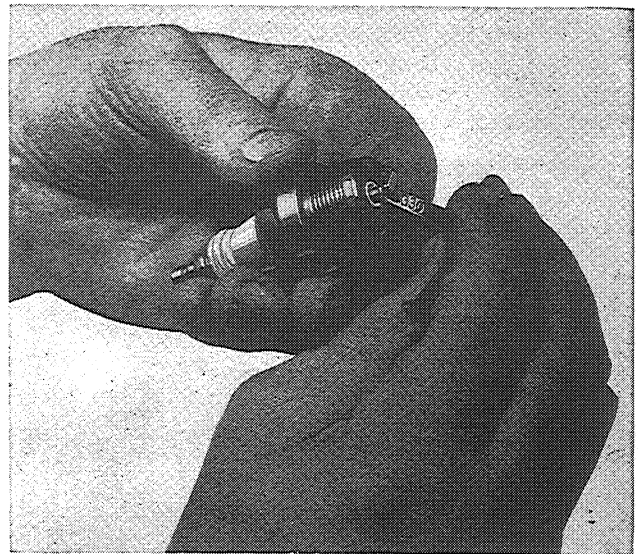


Figure 24. Spark Plug

**There are only four things that can happen to spark plugs.**

**They are:**

1. Normal Wearing Out
2. Dirty
3. Worn Gap
4. Broken Insulator



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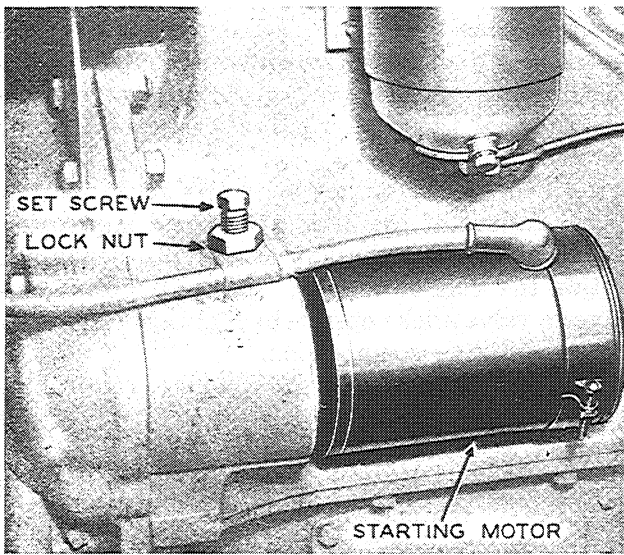


Figure 25. Starting Motor

### Starting Motor.

The starting motor is held in position by means of a heavy set screw and lock nut. This screw must be tight to prevent rocking of the starting motor in the housing.

The terminal post on the starter to which the cable from the starter switch is attached is copper. Care must be exercised in tightening the nut because the post can easily be broken off if too much pressure is applied to the wrench.

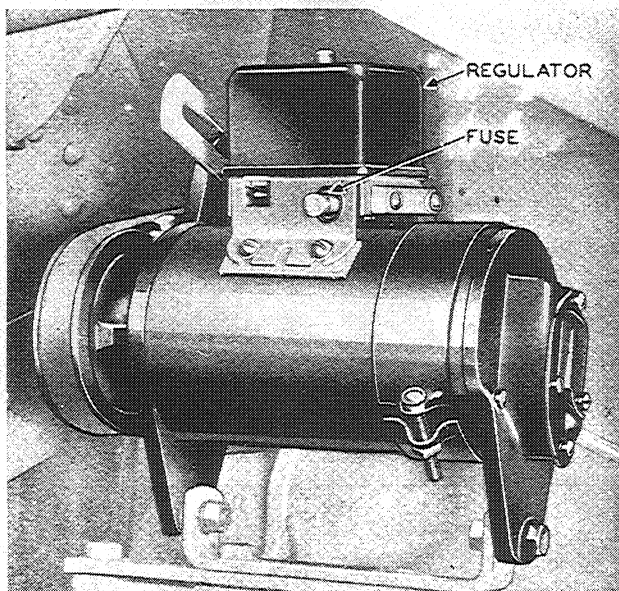


Figure 26. Generator

### Generator.

The generator is belt driven, of the adjustable third brush type, with charging rate controlled by a "two-rate" regulator. As adjusted at the factory, the generator charges approximately 11-14 am-

peres when the battery is only partly charged, but when the battery approaches full charge the two-rate regulator automatically reduces the charging rate to approximately 3 amperes, which is sufficiently low to prevent overcharging.

Charging rate is adjusted by shifting the position of the "third" brush, which is reached by removing the cover band on the rear end of the generator; the movable third brush is on top, somewhat toward the engine. Moving the third brush in the same direction as the rotation of the generator armature increases the charging rate.

**NOTE:** No Warranty Service Work will be approved should it be done on Electrical Equipment by any one other than an authorized Electrical Equipment Service Station, as they have all the necessary tools and equipment to do this work in a satisfactory manner and are familiar with handling electrical equipment.

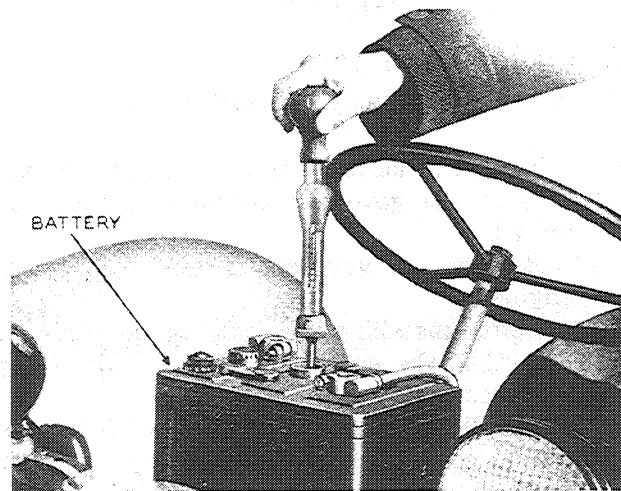


Figure 27. Servicing the Battery

### Storage Battery.

When working around the battery remember that all its exposed metal parts are "alive" and that no metal tool or wire should be laid across the terminals as a spark or short-circuit will result.

Sparks and lighted matches or exposed flames should be avoided near the battery due to the danger of exploding the gas in the battery.

Low electrolyte temperature reduces the battery capacity as though numbed by cold. In cold weather if the battery is kept warm its capacity will be greatly increased (do not allow temperature to exceed 110° F.). Regular maintenance is essential.

Periodically take and record hydrometer readings of each cell.

If readings are below 1.240 the battery is not receiving sufficient charge. The electrical system

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