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Historical Tractor Test Reports and
Manufacturers' Literature

University of Nebraska › Lincoln

Year 1916

Operator's Instruction Manual: Case VA

OPERATOR'S
INSTRUCTION MANUAL

For the Care and Operation of ...



Est. 1842

CASE
●
MODEL
"VA" SERIES
TRACTORS

Fourth Edition

J. I. CASE CO.

RACINE - WISCONSIN - U. S. A.

TO PURCHASERS OF NEW CASE MACHINES



Congratulations on your purchase of a CASE machine. Welcome to the ever-increasing number of satisfied CASE owners.

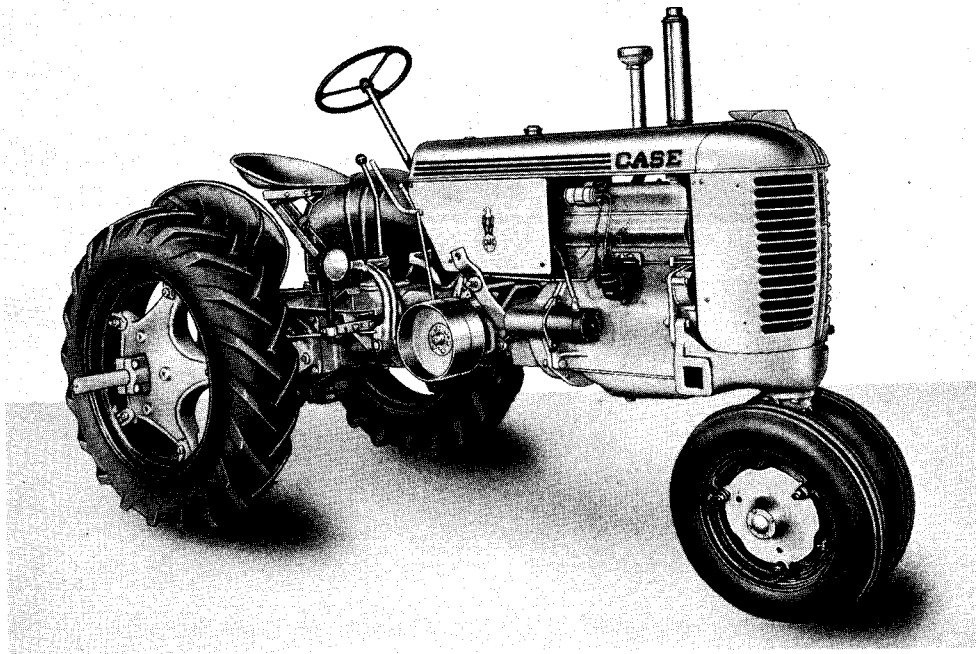
The dependability and economical performance of your new CASE machine will prove that you were wise in making this choice. The organization back of your machine has been building quality farm equipment for more than a century. Your CASE machine was built in one of the largest and best equipped plants in the world. In this factory quality materials, the finest precision machinery, high grade workmanship, thorough inspection, and complete testing equipment are combined to give you the best in performance and economical operation.

The care which you give your machine will have a great deal to do with the service and satisfaction you get from it. By observing the precautions and suggestions in this manual, your CASE machine will serve you well for many years. Make this manual your guide. Should you need information not covered here, or should your machine require special servicing, contact your Case dealer. He has trained men who are kept informed on the best methods of servicing CASE machines in the field or in his shop.

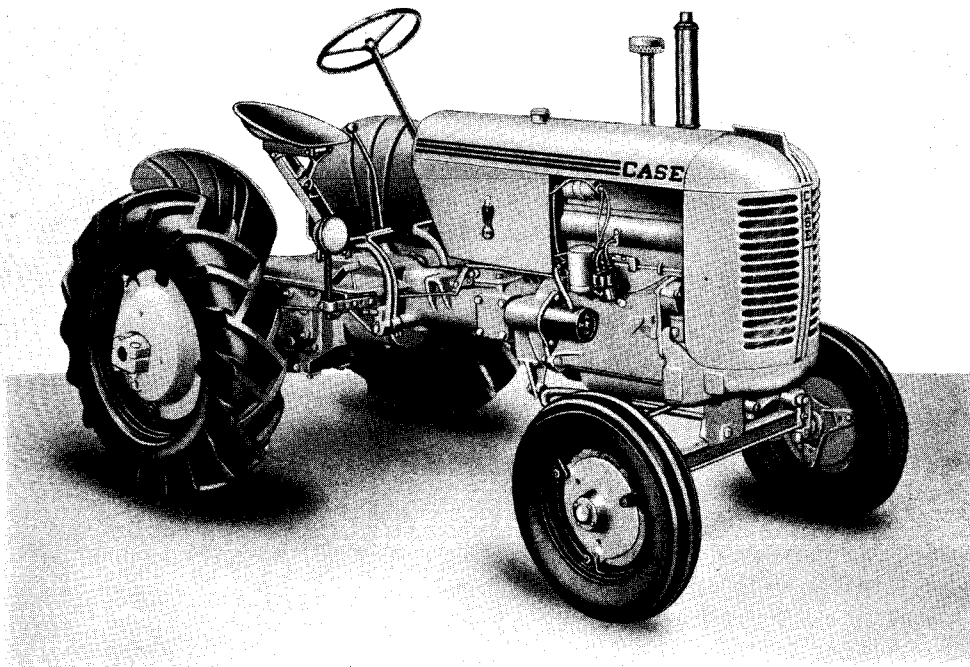
When it becomes necessary, after long use, to replace certain parts on your machine, be sure to use only genuine CASE parts which insure proper fit and continued good service. These may be obtained from your CASE dealer. It is always helpful to provide him with the MODEL AND SERIAL NUMBER of your machine in addition to a description (and part number if available) of the parts required.

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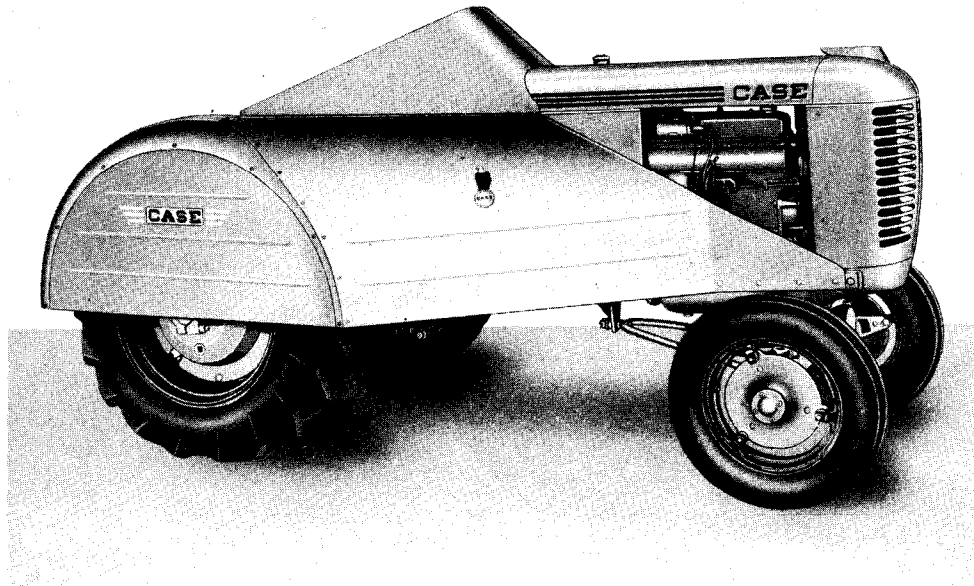
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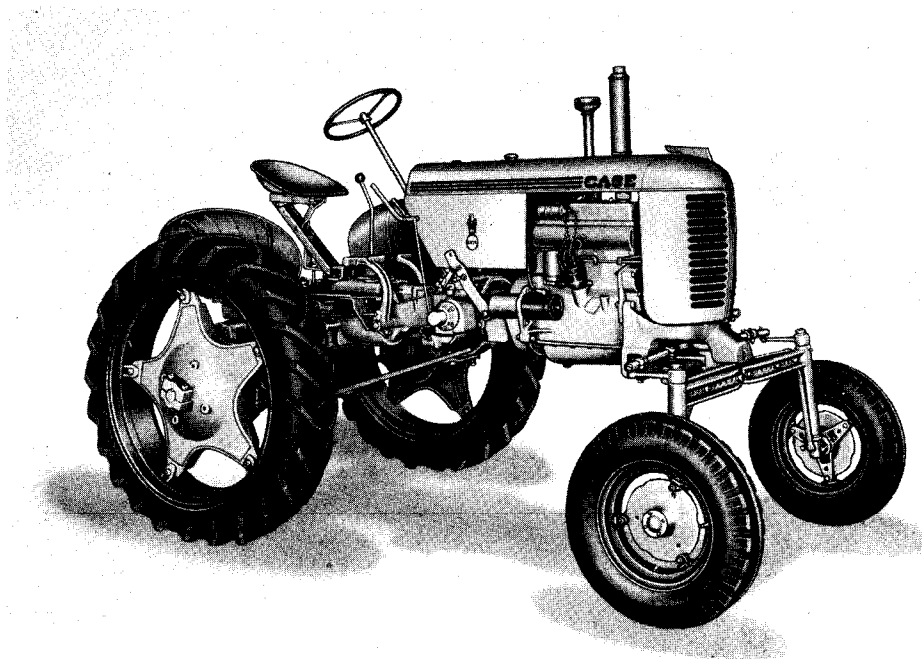
"VAC" Tractor



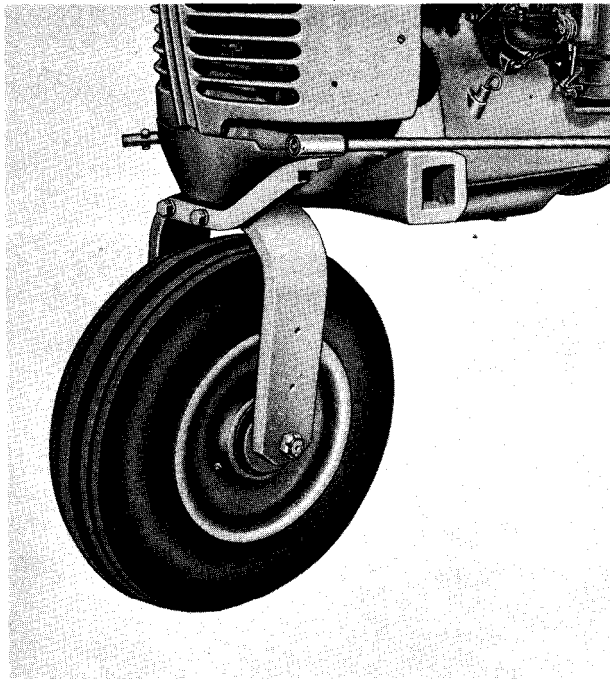
"VA" Tractor



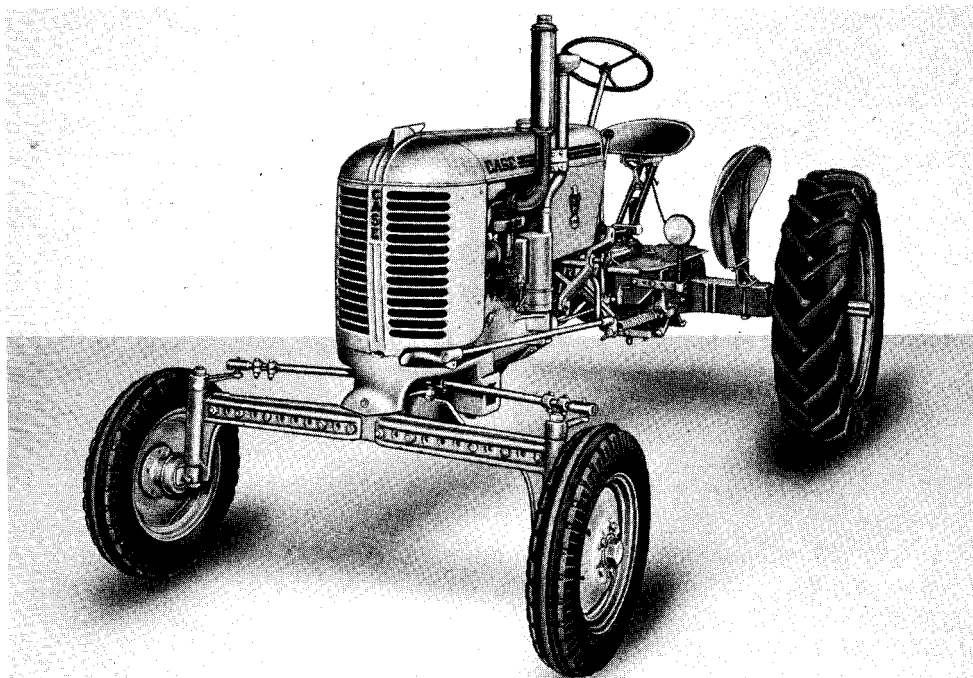
"VAO" Tractor



"VAH" Tractor



"VAC" Tractor with Single Front Wheel



"VAC" Tractor with Extensible Front Axle

MODEL "VA" SERIES TRACTORS

SPECIFICATIONS

Engine

Cylinders	4
Bore	3¼ inches
Stroke	3¾ inches
Displacement	124 cu. in..
Compression Ratio	6:1
Compression Pressure	95 pounds
Cylinder	Wet Sleeve,
Valve-in-Head	
No Load Speed	1625 RPM
Full Load Speed	1425 RPM
Firing Order	1-3-4-2
Valve Clearance014 when cold
Spark Plug	Champion No. 15A
	AC Type No. 87
	(Thread 18 MM—Gap .025)
	(Shank Length—½ inch)
Carburetor (Marvel-Shebler)	Updraft ⅞ Inch SAE Flange
Air Cleaner	Oil Bath Type
Governor	Flyball

Belt Pulley

Diameter	10¼ inches
Face	6 inches
No Load Speed	1106 RPM
Full Load Speed	969 RPM,
	at 1425 Engine RPM
Belt Speed	2600 feet per minute
Ratio Engine Speed to Pulley Speed	1.47 to 1

Power Take-Off

Normal Speed	525 RPM
Spline	1⅜ inches ASAE Standard
Guard	FEI Standard

Located on tractor center-line

Approximate Capacities

	U. S.	Imperial
Engine Crankcase	4	3.34 Qt.
Cooling System	13	10.85 Qt.
Main Fuel Tank	10	8.35 Gal.
Auxiliary Fuel Tank (when used)	1	.835 Gal.
Transmission, Differential, and Axle Housing	7	5.85 Gal.
Torque Tube	2	1.67 Gal.

Speeds

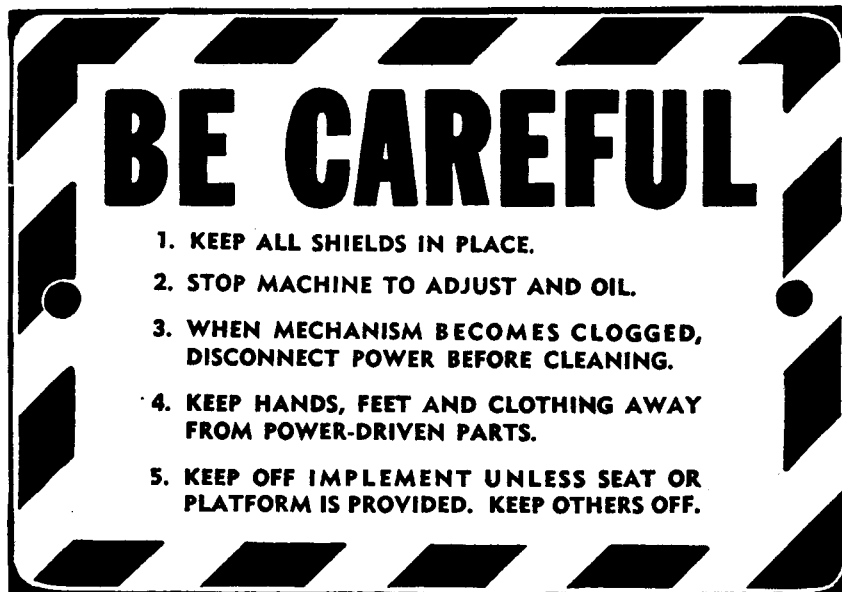
	Model VAC	Model VA&VAO	Model VA&VAO	Model VAO	Model VAH
Rear Tire Size	10-28	9-24	10-28	11-28	9-36
First	2.32	2.24	2.32	2.39	2.71
Second	3.08	2.98	3.08	3.18	3.60
Third	4.00	3.86	4.00	4.12	4.67
Fourth	8.40	8.10	8.40	8.67	9.82
Reverse	3.20	3.09	3.20	3.30	3.73

Calculated at Engine Speed of 1425 RPM

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

Shipping Weight

Model "VAC"	10-28 Rear Tires	2406 lbs.
Model "VAO"	10-28 Rear Tires	2540 lbs.
Model "VA"	10-28 Rear Tires	2366 lbs.
Model "VAC" with Adjustable Front Axle	10-28 Rear Tires	2570 lbs.
Model "VAC" with Single Front Wheel	10-28 Rear Tires	2415 lbs.
Model "VAH"	9-36 Rear Tires	2900 lbs.





PREPARING A NEW TRACTOR FOR USE

Your tractor has been put in operating condition by the dealer from whom purchased. Regardless, it is well to check the entire tractor to insure that everything is in order. Also follow instructions contained in this manual.

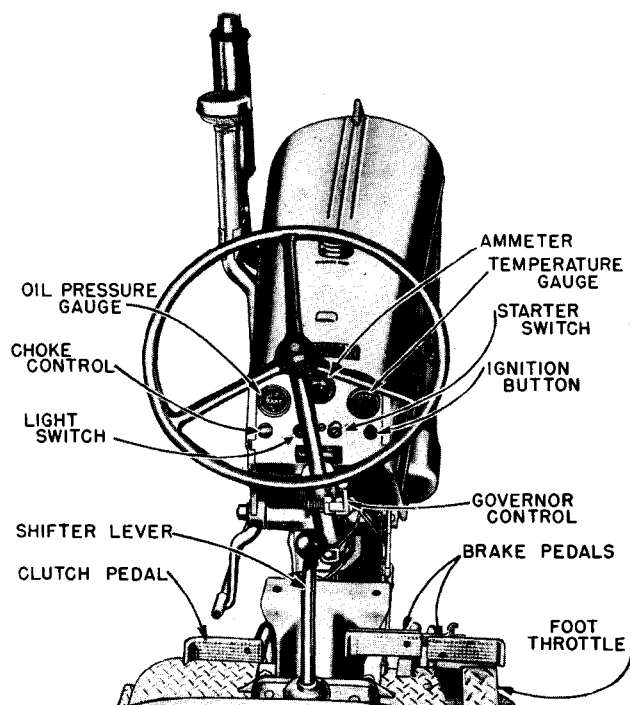


Figure 1. Operating Controls

STARTING THE ENGINE

Before starting see that engine crankcase, belt pulley housing, air cleaner and transmission are filled with oil to the proper level. See that radiator is filled with clean water or with anti-freeze during cold weather.

Set the throttle lever about mid-position.

Tractors with magneto ignition: the ignition switch on tractors equipped with magneto is pushed in for starting, and pulled out for the off position.

Tractors with distributor ignition: the ignition switch is pulled out for starting, and pushed in for the off position.

Do not choke the engine too much or the carburetor will "flood."

Place the gear shift-lever in the neutral position.

Disengage the clutch.

Press down on the starter switch button.

In the event engine is to be hand cranked, handle of crank should be pulled upward with one quarter turns, so the operator's hand will be out of the way should the engine backfire.

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

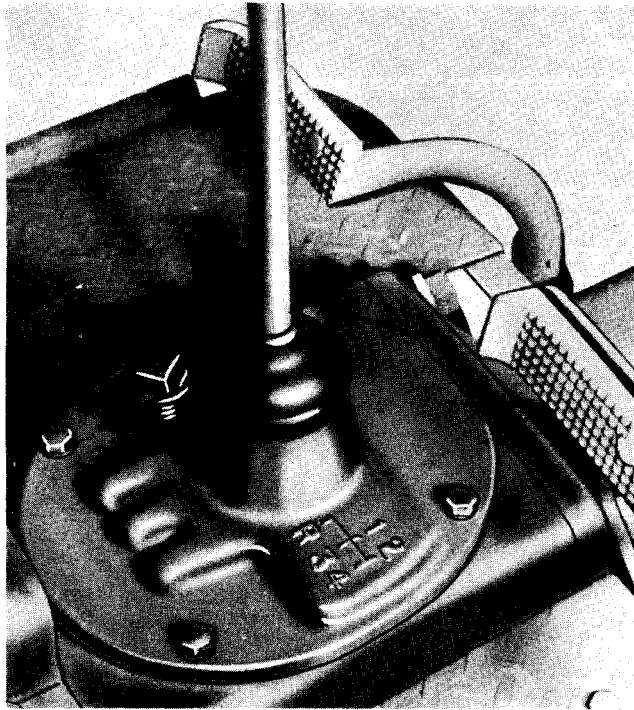


Figure 2. Gear Shift

Running a New Engine

A new tractor should never be loaded to full capacity until it has been run light for a reasonable length of time.

All tractor or engine units are shipped from the factory with a special test oil in the crankcase. This oil is satisfactory for the first 25 hours of operation, after which time it should be drained while the engine is warm and replaced with a good grade of SAE 10 oil.

For the first 50 hours it should be run at half load or less before it is put on full load. (Do not confuse half load with half speed.)

Stopping Engine

When gasoline is used for fuel, the engine is stopped by reducing the speed and then pushing in the ignition 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 the engine. This will allow the low cost fuel in the lines and carburetor bowl to be replaced by gasoline. Starting on low cost fuel is difficult, if not impossible, after the engine has cooled.

FOR YOUR SAFETY

1. Never get on or off the tractor while it is motion .
2. *When the power take-off is used, be sure the standard safety ADAPTER GUARD and POWER TAKE-OFF SHIELDS are in place. If the power take-off driven machine is received without a telescoping shield, do not operate tractor or machine until a shield is obtained from dealer.*
3. When cranking an engine the handle of the crank should be pulled upward, so the operator's hand will be in a position to avoid being struck by the crank, should the engine backfire.
4. Always engage clutch gradually when starting any tractor so the engine will pick up the load slowly. This is particularly necessary when the tractor is going up hill, climbing out of ditches or when hitched to some heavy or difficult load. Never hitch a tractor to a stump or other object by means of a long chain or rope with slack so that when the tractor moves forward it will jerk into the load.
5. When working on hillsides, any tractor may tip over sideways, especially when the wheel on the lower side strikes a hollow, hole or ditch.
6. When going up a hill or climbing out of a ditch or gully, any tractor is liable to raise its front wheels off the ground if the full power is suddenly applied, say by quickly engaging the clutch. To avoid possibility of danger under these conditions the operator should keep his foot on the clutch pedal, engaging the power of the engine slowly and being prepared to disengage the clutch promptly should the front wheels raise off the ground. The same precautions must be taken if the tractor becomes mired down in a soft bog, a mud hole or ditch.
7. Any vehicle is liable to tip over when making a short turn at high speed. Such short turns should be made only at slow traveling speed with reduced throttle.
8. Read Instruction Book carefully.



A CAREFUL OPERATOR IS THE BEST INSURANCE AGAINST AN ACCIDENT.—*National Safety Council.*

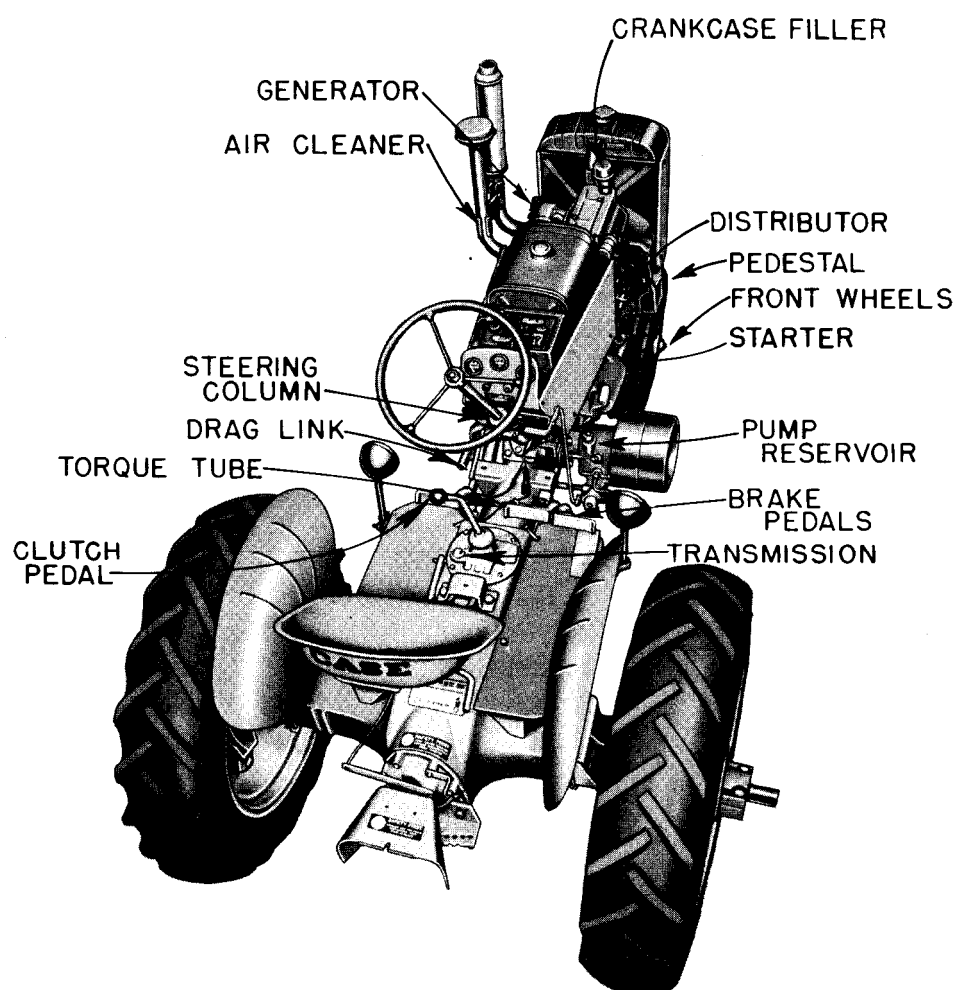


Figure 3. Lubrication Diagram

LUBRICATION

Engine Oil Recommendations

Capacity—4 Quarts

SAE No. 30 for summer or temperatures above 90° F.

SAE No. 20 for spring and fall or temperatures between 90° F. and 32° F.

SAE No. 10 for winter or temperatures between 32° F. and 10° F.

SAE No. 10-W for temperatures below +10° F.

CAUTION: If the engine is to be operated under constant heavy load over long periods in cold weather, do not use the light 10-W oil, but use the next heavier body oil. We also recommend that if the engine operates on tractor fuel or under a constant heavy load in warm weather, start using SAE 30 oil at a temperature of 65° F. instead of starting at 90° F. Do not use heavier oils than are recommended above, nor oils that are poorly refined. Such oils cause gumming of valves and pistons and their use may result in loss of compression and possible mechanical damage, such as scored cylinders or burned out bearings.

General Lubrication

This 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.

FIRST GROUP—*Attention every 10 hours of operation.*

Steering Column	2 strokes of gun
Drag Link	2 strokes of gun
Steering Housing	2 strokes of gun
Pedestal	2 strokes of gun
Clutch Pedal	2 strokes of gun
Brake Pedal	2 strokes of gun

Four Wheel Tractors Only:

King Pins	2 strokes of gun
Front Axle Pivot Pin	2 strokes of gun
Tie Rod Ends	2 strokes of gun
Radius Rod Pivot	2 strokes of gun

The oil filler and breather cap on the engine valve cover should be cleaned by dipping it several times in a small amount of gasoline or solvent to remove any moisture or oil which may clog the filter. Dust and dirt accumulations around the breather pipe should be removed daily.

Crankcase

Check level of oil in crankcase daily, and keep filled with good engine oil of the SAE specifications recommended. Four quarts of oil fills the crankcase. See section on crankcase oils.

After the engine starts, see that the oil pressure registers about 12 pounds with the engine warm and operating at normal speed.

Air Cleaner

Remove reservoir every 10 hours of operation, clean, and refill to mark with light engine oil. Under extremely dusty conditions it may be necessary to do this every 5 hours or even oftener.

Belt Pulley Housing

Check the oil level and refill if necessary with a good grade of SAE No. 10 oil.

SECOND GROUP—*Attention every 60 hours of operation.*

Governor Linkage

Oil joints with a few drops of engine oil.

Tractors with engines prior to serial number A4700000 were equipped with a grease cup or a grease fitting on the timing gear cover. Later engines have a sealed bearing for the water pump shaft, which does not require lubrication except at time of overhaul.

THIRD GROUP—*Attention every 200 hours of operation.*

Generator (on electrically equipped tractors). Every 200 hours add a few drops of oil to each of the oil cups—one on the front flange and one on the rear cover. Clean around oilers before opening.

Starting Motor (on electrically equipped tractors). Older starting motors had an oiler on the front cover. Add a few drops of oil every 200 hours. Clean end of starter before swinging small cover to one side. Later starting motors have sealed bearings which do not require oil.

Distributor (on electrically equipped tractors). Older distributors were equipped with a grease cup. Later distributors are equipped with a small oiler, covered with a knurled, sliding cover. Check grease cup or add a few drops of oil each 200 hours of operation.

FOURTH GROUP—*Attention every 250 hours of operation.*

Transmission

Before starting a new tractor be sure that transmission is filled to full mark on the gauge. Inspect level every 250 hours and refill if necessary.

Torque Tube

Keep the torque tube filled with the same body of oil as is used in the transmission to the height of the torque tube filler and level plug.

Front Wheel Bearings

The front wheel 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 bearing should then be removed, cleaned thoroughly, and repacked with a good grade of fibre grease. This should be repeated after every 250 hours of operation thereafter.

Oil Pump Screen

At least once each year the oil pump screen should be removed and cleaned. Also, remove any sludge or dirt in the oil pan.

Magneto

The Model 4JMA Magneto used on Model "VA" Series Tractors when so specified, is equipped with sealed bearings which require no lubrication except at time of general overhaul.

Engine Lubrication and Oiling 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 through "Tunnel-type" passages in the engine block to all main, connecting rod, and camshaft bearings, and to the valve rocker arms and governor. All other parts operate in an oil spray from the connecting rods. Valve lifters are flood lubricated.

CRANKCASE OIL

Before starting a new tractor, make sure that the crankcase contains oil up to the "full" mark of the bayonet gauge, on the left-hand side of the engine.

In cold weather, it is important that the oil have a low pour point or cold test, so that it will flow freely through the screen of the oil pump and permit easy starting.

Only the best grade of well refined oil of the proper body should be used in Model "VA" Series Engines. The best assurance of getting this quality oil is to purchase it from a reliable dealer in your home community, or from a reputable oil company.

We do not attempt to endorse any specific brand of oil or lubricant.

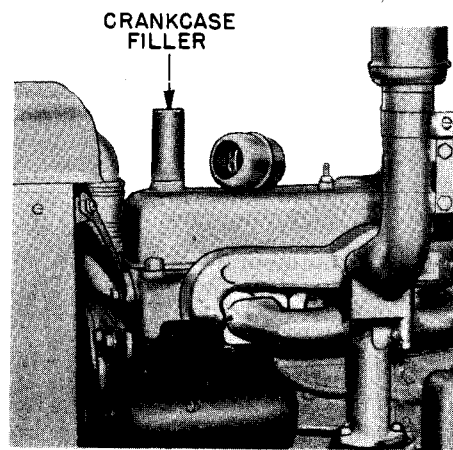


Figure 4. Crankcase Filler

Crankcase Breather and Filler

The breather stack on the engine valve cover also serves as the filler opening for adding oil to the crankcase.

When Gasoline Is Used for Fuel

After 120 hours of operation remove the crankcase drain plug when the engine is hot, and drain all oil from the crankcase. Then fill crankcase through the filler opening in the valve cover with 4 quarts of new oil. Oil should be to the "Full" mark on the bayonet gauge.

When Low Cost Fuel Is Used

After every 10 hours of operation remove the level plug in the crankcase oil pan and allow the oil to drain to this level. This level plug is on the left-hand side of crankcase. Add new oil through filler opening, to the "Full" mark on the bayonet gauge. After 90 hours of operation remove the crankcase drain plug when the engine is hot, and drain all oil out of the crankcase. Then fill the crankcase with 4 quarts of new oil, checking with the bayonet gauge to see that it is to the "Full" mark.

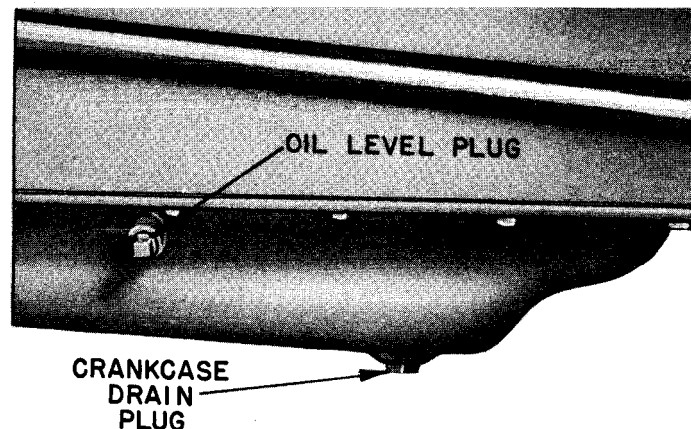


Figure 5. Crankcase Drain Plug

Transmission Lubrication

Once a year the transmission should be drained, flushed, and refilled with a high quality SAE 140 oil. This change can best be made each spring. Approximately 7 gallons will be required.

If the tractor is to be used in cold weather (below 32° F.) drain 2 or 3 gallons of the SAE 140 oil from the transmission case and replace it with an equal amount of a good grade SAE 10 or SAE 10-W engine oil having a low cold test. The thin oil will dilute the SAE 140 oil sufficiently for it to remain fluid in cold weather, and thereby prevent the transmission gears channeling in the lubricant.

Torque Tube

In continuous cold weather a good grade of SAE 90 oil should be used.

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

Transmission Oil Recommendations

Capacity—7 U. S., 5.83 Imperial Gallons

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

COOLING SYSTEM

Cooling solution is circulated by means of an impeller type pump to the radiator, engine block and engine head. The pump is driven by a "V" belt from the crankshaft. Circulation is automatically controlled by thermostats which open at 150° F. for engines equipped for gasoline, and at 175° F. for engines equipped for low cost fuels.

The capacity of the cooling system is 3¼ U. S. Gallons (13 Quarts).

CAUTION: Never pour cold 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 head. If warm water is poured into a cold engine that has been drained, add the water slowly. Too rapid filling may result in breakage.

Cleaning the Cooling System

At least once a year, particularly in the spring after draining 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 then put back in 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. Run the engine as usual for 24 hours, then drain, flush thoroughly, and refill with clean water.

Use of a rust inhibitor is recommended to preserve the interior surface of the system.

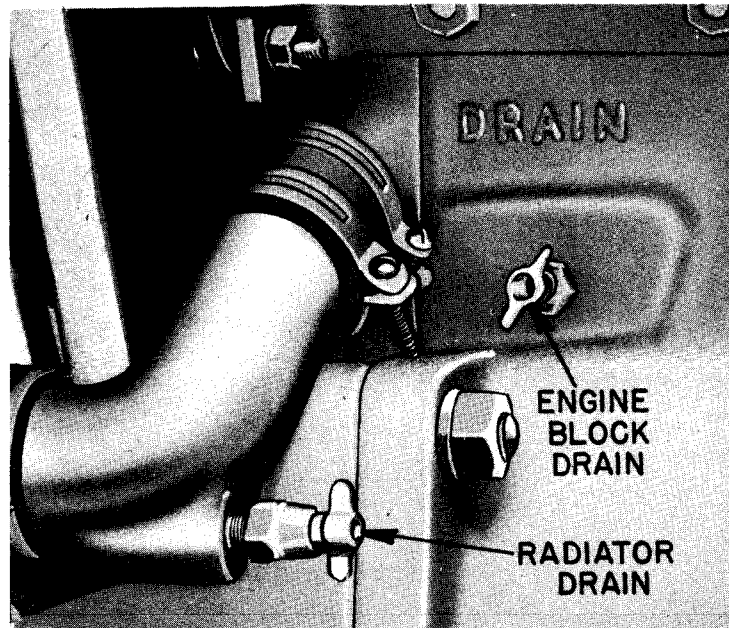


Figure 6. Radiator and Engine Block Drains

Keep radiator hose clamps tight. Remove any weeds or dirt from the core of the radiator to prevent overheating.

Fan Belt Adjustment

In all earlier tractors and on current tractors equipped with magneto ignition, fan belt adjustment is obtained by means of an adjustment flange on the fan hub. To tighten the fan belt, loosen three hexagon nuts on the fan hub. Turn 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 in the belt. Having the fan belt too tight causes rapid belt wear, excessive load on the bearings and does not aid in cooling. A properly adjusted belt can easily be depressed an inch without effort. After adjusting the belt, tighten the hexagon nuts.

Further adjustment can be made by loosening the generator and swinging it outward using care to see that V-belt does not pull down to the bottom of the fan hub pulley.

Care of Radiator for Winter Operation

In operating an engine in cold weather, use a good grade of anti-freeze in the radiator. While Prestone or similar anti-freeze is preferred, alcohol or alcohol-base solutions will be satisfactory. However, to prevent loss of alcohol by evaporation, the water temperature must not be allowed to rise above 160° F.

Inspect radiator hoses and connections before putting anti-freeze in the radiator in order to prevent loss of solution.

Under no circumstances should a compound of unknown composition be used, as it may prove harmful to the cooling system. No solutions of calcium chloride, sodium chloride, or manganese 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 hazards, destruction of the radiator hoses and gumming action of the interior surfaces of the cooling system may result from the use of such solutions.

AIR CLEANER AND INLET CONNECTIONS

Daily inspection and cleaning is imperative when operating under ordinary conditions. In extremely dusty conditions more frequent servicing may be necessary.

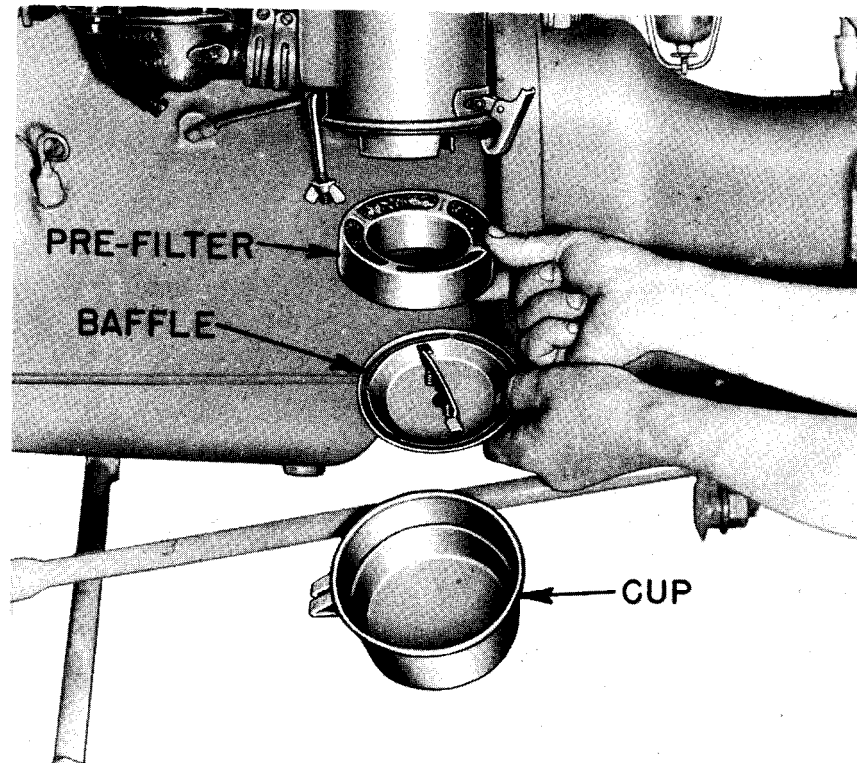


Figure 7. Air Cleaner.

The following instructions are shown on side of air cleaner:

SERVICE DAILY

Empty cup of oil and sediment daily or more often in severe dust conditions. Wash out cup thoroughly. Replace removable parts and refill cup to oil level mark with light grade oil. Keep oil thin. Maintain connections between air cleaner and carburetor air tight.

Do not use an oil heavier than SAE 10. Heavier oil will restrict the air flow.

All air cleaner connections should be air tight, or the purpose of the cleaner is defeated. Periodically, the inside surface of all hoses, the air intake pipe, and the pipe cap should be thoroughly cleaned.

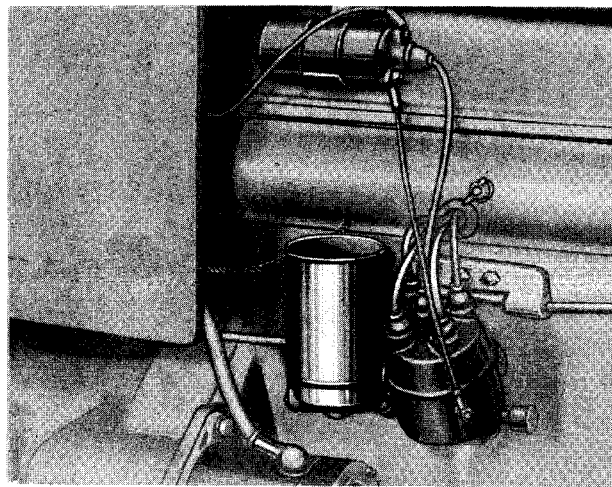


Figure 8. Oil Filter

OIL FILTER

(If Tractor Is So Equipped)

A flange-mounted type oil filter with a replaceable cartridge can be furnished as extra equipment. The purpose of the filter is to remove all foreign matter from the engine oil and prevent such material from being circulated through the engine. It is important therefore, that the filtering element be replaced when it no longer serves its purpose. Ordinarily this is the case every time the crankcase oil is changed, which is approximately every 120 hours of operation.

To remove the element, simply grasp the cylindrical unit, and turn counter-clockwise. When threaded from the housing, lift straight up to avoid damaging the inlet tube.

Allow 1 quart of oil extra for filter. When changing filter add "lost" oil.

THE USE OF DIFFERENT FUELS

The Model "VA" Series tractors can be equipped with either gasoline or low-cost fuel manifold equipment.

Efficient and economical operation is dependent to a great extent upon the quality of the fuel used. The best assurance of getting a quality fuel, of whatever grade desired, is to purchase fuel from a reliable dealer or from a reputable oil firm. The best fuel will give trouble if it contains an appreciable percentage of dirt or foreign ingredients.

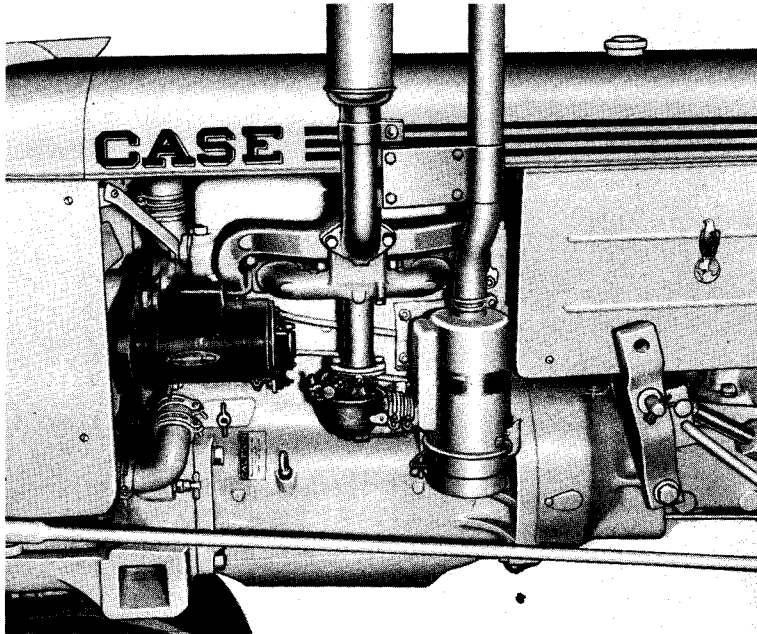


Figure 9. Gasoline Manifold

FUEL SYSTEM (Gasoline Manifold Equipped)

The fuel system of this engine is gravity flow. Capacity of the fuel tank is approximately 10 U. S. gallons.

When the tractor is new, add one pint of light oil to each five gallons of gasoline used during the first fifty hours of operation.

The engine is designed to operate on gasoline having a minimum rating of 65 octane.

See that the air vent in the fuel tank cap is open at all times.

Do not fill the fuel tank when near an open flame or when the tractor engine is running, as the air within a radius of several feet from the tank is charged with a highly explosive vapor.

When filling the fuel tank for the first time, close the shut-off valve on the sediment bulb under the fuel tank. Remove the drain plug from the carburetor bowl, open the sediment bulb shut-off valve and allow a small amount of gasoline to flow through the line to remove any dirt or foreign substance that may have entered the fuel system in transit.

Gasoline Manifold

Engines before serial No. A4700000 were equipped with a one-piece manifold, stud-mounted to the left side of the engine head. A two-section manifold was adopted after engine serial No. A4700000. Both manifolds use the same gasket to seal the eight intake and exhaust ports.

Low Cost Fuel Manifold

All low cost fuel engines have a two-piece manifold, stud-mounted to the left side of the engine head, and use the same gasket as gasoline units. A damper lever built into the exhaust manifold controls the amount of exhaust gasses which pass around the intake manifold.

Keep the radiator shutters closed during the warm-up period and open them only sufficiently to maintain a temperature of 180° F. to 190° F. After the water temperature reaches 180° F., turn the three-way valve from "gasoline" to "low cost fuel." Best results will be obtained in all but hot weather by keeping the manifold heat control valve on the "hot" position. The "cold" position is used primarily for operation on gasoline, and the intermediate position for tractor fuel in hot weather (90° F. and up), or where the tractor is under continuous heavy loads in milder weather.

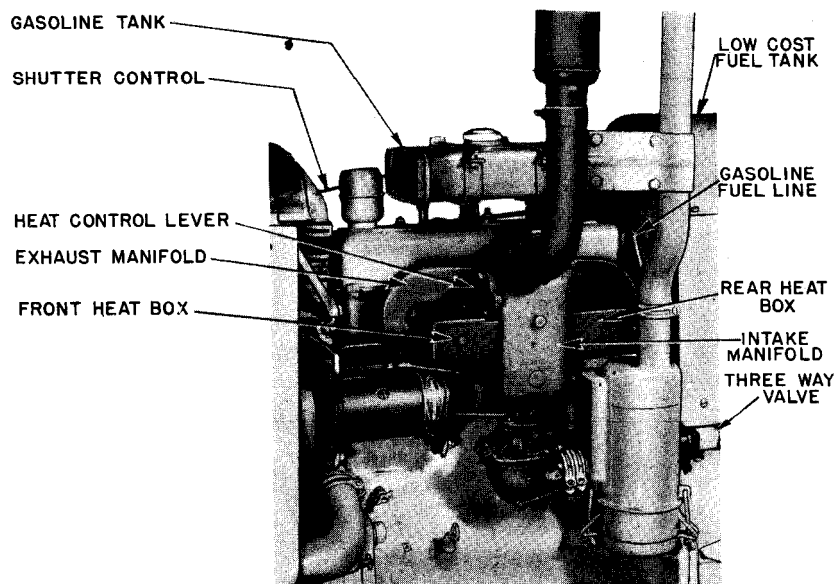


Figure 10. Low Cost Fuel Attachment

If the engine appears to be running too warm and shows a loss of horsepower, and too much heat on the manifold is indicated, then the control lever should be adjusted to a colder position. The best setting depends upon the load, fuel, and weather temperatures. The manifold shield may also be removed to correct this condition.

All low cost fuel tractors are equipped with a radiator shutter, which is adjusted from the instrument panel. The shutter limits the amount of cool air drawn through the radiator by the fan.

FUEL SYSTEM

(Low Cost Fuel Manifold)

The fuel system of this engine is gravity flow. Capacity of the main fuel tank is approximately 10 U. S. gallons; the capacity of the auxiliary tank is approximately 1 U. S. gallon.

The auxiliary tank is mounted under the hood over the valve cover, and is used for gasoline when operating the tractor on low cost fuels. A fine mesh screen is incorporated into the fitting for the gasoline line running from the auxiliary tank to the three-way valve.

Both the gasoline line from the auxiliary tank and the low cost fuel line from the main tank, lead into the three-way valve. A third line runs from the three-way valve to the carburetor. An extension handle for the valve and a dial are mounted to permit the operator to change from one fuel to another without leaving the seat. The dial is stamped "G" for gasoline, "F" for low cost fuel, and "O" for off position.

When the tractor is new, add one pint of light oil to each five gallons of fuel used during the first fifty hours of operation.

See that the air vents in both fuel tank caps are open at all times.

In stopping an engine when operating on low cost fuel, always switch to gasoline a few minutes before stopping, so that the lines and carburetor will contain only gasoline. If the engine is shut off while burning low cost fuel, switch the three-way valve to open the gasoline line. Open the drain valve on the carburetor bowl, and allow enough fuel to flow out so that only gasoline will remain in the lines and carburetor.

Do not fill either fuel tank when near open flame or when the tractor is running, as the air within a radius of several feet from the tank is charged with a highly explosive vapor.

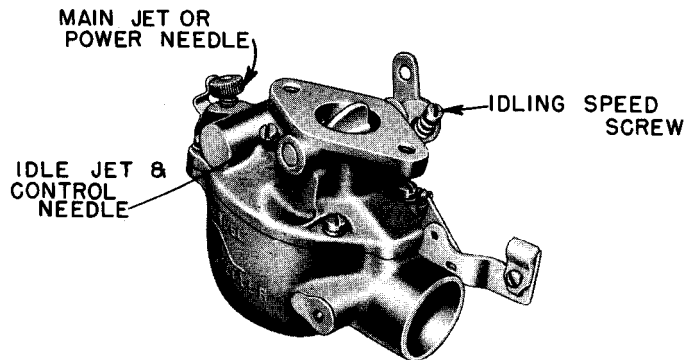


Figure 11. Carburetor
CARBURETOR

The carburetor is of the sealed bowl type which is a protection against dirt. It is equipped with a built in, back suction economizer which enables the engine to operate at maximum economy when full power is not required.

Carburetor Adjustment

The carburetor is easy to adjust and once adjusted will not require attention for long periods. Three adjustments are provided:

Idling Speed Screw.

Idling Jet Needle.

Power Jet Needle.

The power jet controls the mixture at higher speeds and loads, while the idling jet controls the mixture supplied when the engine is throttled down and under no load.

For best results, including power, fuel economy, and evenness of operation, these adjustments should be carefully made, and once set should not be changed unless for different temperatures or different fuels.

Idling Adjustment

Adjustment for idling speed and idle mixture are best made together and should be made when the engine is warm. The throttle lever should be closed before starting adjustment. The stop screw on the throttle lever should be adjusted so that the engine will run fast enough to prevent stalling. Then adjust the idling screw until the engine runs smoothly.

CAUTION: When making carburetor adjustments, do not force adjusting screws against the valve seat.

Power Jet Adjustment

Since the power jet controls the fuel supply for normal operating engine speeds and loads, it should be adjusted when the engine is warm and working under a load. Turning the valve inward provides a leaner mixture, and turning the valve outward provides a richer mixture.

When adjusting, turn the power jet valve inward until the engine starts to miss or the power falls off; then turn outward until proper operation is obtained. This should provide a setting to give maximum fuel economy with very nearly maximum power.

A rich mixture is indicated by sluggish action of the engine, and usually by black smoke from the exhaust. A lean mixture is indicated by loss of power, missing, and spitting through the carburetor, especially when the engine is accelerated. The final setting should be as lean as possible and still have satisfactory engine operation and power.

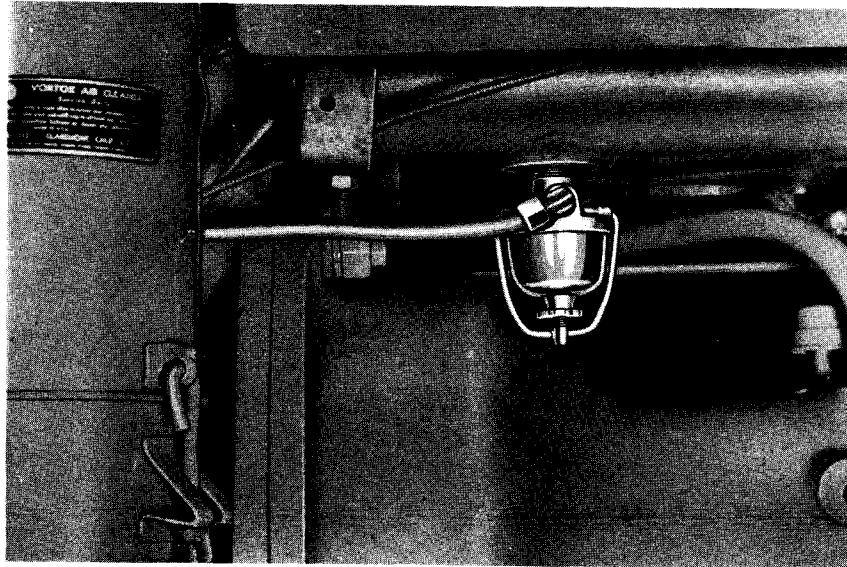


Figure 12. Fuel Filter

FUEL FILTER

The fuel filter should be inspected and cleaned daily.

Shut off the fuel supply valve, and remove the glass sediment bowl. Clean out any foreign matter adhering to the filter screen by shaking it in gasoline. Clean the bowl and re-assemble. In cold weather, watch for any water or ice accumulation in the filter or carburetor bowl.

Water in the fuel is especially troublesome because it may not all be removed by the filter. Occasionally the drain plug in the carburetor bowl should be removed so that any accumulated water or foreign matter will drain out.

GOVERNOR

The governor controls have been properly adjusted at the factory to provide a no-load speed of 1625 RPM and a full speed of 1425 RPM. In no case should the full load speed exceed 1425 RPM. To determine the engine speed, a reliable tachometer (Speed indicator) should be used and the RPM reading taken from either the Power-take-off shaft or the Belt Pulley. The following calculations can then be made:

$\text{RPM of PTO Shaft} \times 2.714 = \text{RPM of Engine}$

$\text{RPM of Belt Pulley} \times 1.47 = \text{RPM of Engine}$

SUGGESTIONS FOR CHECKING DIFFICULTIES

Listed herewith under their respective headings are some of the possible causes of engines not functioning properly. If you are having any difficulty with your engine, it may be well to check this list, to help you make the necessary adjustments to your engine so that it will function in a satisfactory manner.

ENGINE HARD TO START

- Spark Plugs
- Defective wires
- Wires connected to wrong plugs
- Defective magneto or distributor
- Gasoline flow obstructed
- Vent in fuel tank clogged
- Water in fuel supply
- Improper gas mixture
- Valves not seating properly
- Valve tappets improperly adjusted
- Intake manifold leaking
- Improper timing.

ENGINE MISSING

- Spark plug fouled
- Wrong gap in spark plug
- Cylinder head gasket leaking
- Defective wiring
- Manifold gasket leaking
- Valves warped
- Valves or tappets stuck
- Valves improperly adjusted.

ENGINE OVERHEATING

- Lack of water
- Radiator clogged
- Water hose clogged
- Slipping fan belt
- Leaky valves
- Improper gas mixture
- Carburetor choke valve partially closed
- Spark retarded too far
- Improper valve timing
- Lack of oil
- Using too heavy an oil
- Engine too closely housed not permitting sufficient air
- Oil diluted.

LACK OF POWER

Valve seats worn	}	Fuel may contain too great a percentage of lead
Valves sluggish or sticking		
Piston rings weak		
Piston ring stuck		
Improper gas mixture		
Improper timing		
Exhaust stopped up		
Oil diluted		
Air cleaner choked with dust		
Air vent holes in fuel tank caps clogged.		

ENGINE KNOCKS

Carbon in cylinders
Loose connecting rod bearing
Loose main bearings
Loose piston pins
Worn pistons and cylinders
Magneto or distributor timed too early
Loose cam follower
Overheated engine
Tight pistons
Loose flywheel
Lack of oil or water.

EXCESSIVE SMOKE FROM EXHAUST

Carburetor needle valve open too far	}	Black Smoke
Carburetor float sticking		
Leaking piston rings	}	Blue Smoke
Lubricating oil too thin		
Too much oil in crankcase		

EXPLOSION IN EXHAUST PIPE

Ignition too late
Weak spark
Exhaust valve holding open
Exhaust valve warped.

NOTE: When minor adjustments will not overcome your difficulties, then consult your Case dealer who has experienced personnel as well as the necessary equipment to keep your tractor operating satisfactorily.

IGNITION

Distributor: On Tractors So Equipped

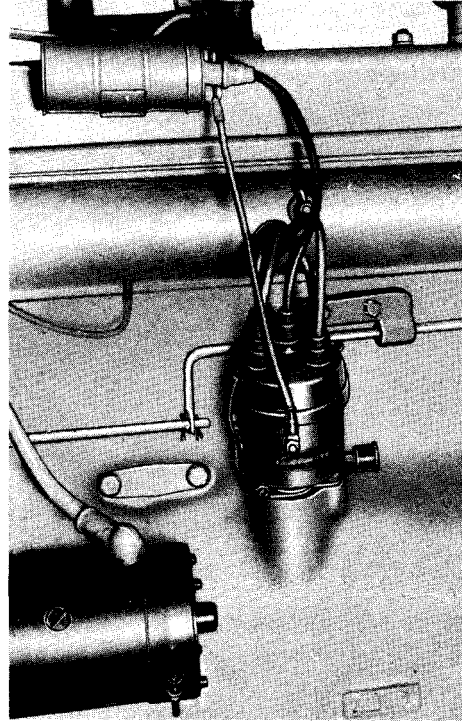


Figure 13. Distributor

Model "VA" Series Tractors having electric starter equipment are equipped with distributor ignition when shipped from the factory, unless otherwise specified. Aside from retiming the distributor and minor servicing, such as lubricating, cleaning, and replacement of breaker points, it is recommended that all major servicing and parts replacement be referred to an Authorized Service Station.

The distributor is completely sealed and dustproof. Therefore, do not remove the dust plate and expose the working mechanism frequently.

Lubrication

The driving shaft should be lubricated every 200 hours. A grease cup is provided on earlier distributors, and should be filled with a high temperature magneto grease. Later units are fitted with a small, sealed oiling cup, to which a few drops of oil should be added every 200 hours.

Cleaning

The distributor cap should be kept reasonably free of dust and oil deposits both inside and out. Keep the small ventilator hole in the side of the cap open at all times. Also keep the rotor assembly clean.

Breaker Points

Inspect the breaker points for adjustment and conditioning after each 500 hours of operation, as improperly adjusted breaker points will affect ignition timing.

To adjust or recondition breaker points, remove the distributor cap, pull the rotor from the shaft, and remove the dust plate.

Remove all traces of oil and dirt from all parts of the breaker chamber. If any oil appears on the rotating cam, clean with a dry cloth and apply a light film of magneto grease over the entire surface of the cam.

Due to the passage of primary current across the breaker points, a normal transfer of metal from one point to the other may cause the surfaces of the points to become rough and pitted. This roughness must be removed with a small file or hone before the points can be adjusted with a feeler gauge. Turn the engine over sufficiently to bring the breaker arm in contact with the peak of a lobe in the rotating cam. The points should open to .20". Adjustments to increase or decrease the gap are made by loosening the lock screw in the breaker arm, and turning the adjusting screw clockwise; to decrease turn counter-clockwise. When the correct gap is obtained, tighten the lock screw.

Replace the dust plate, rotor, and the distributor cap.

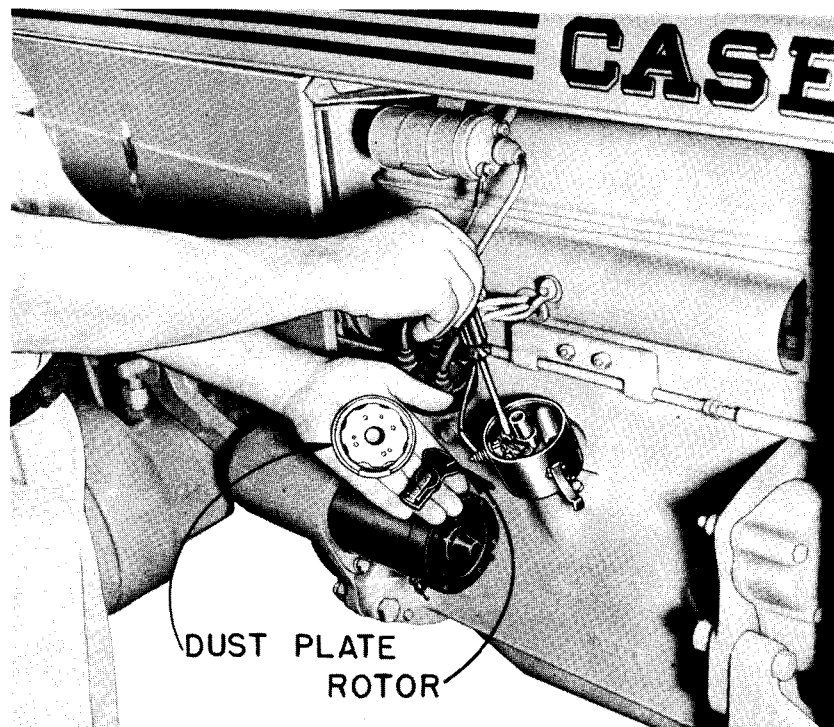


Figure 14. Distributor Rotor and Points

Timing the Distributor

The distributor has been correctly timed before shipment and will seldom need retiming through normal use. Should it become necessary to retime the distributor, it may be accomplished as follows:

Turn the engine over until No. 1 piston is at top dead center of its compression stroke. The compression stroke can be determined by removing the No. 1 spark plug and placing the thumb over the spark plug opening as the engine is turned over until an outward pressure can be felt. To determine dead-center the marking on the fly wheel DC 1 & 4 will be directly opposite the

EX. CL.

pointer in the timing hole located on the left-hand side of the flywheel housing

Remove the cap from the distributor. With the engine crankshaft in this position the breaker points should be just starting to open. The rotor should be pressed against its normal direction of rotation so as to take up the backlash in the driving mechanism. If the position of the rotor is not correct, loosen the clamp of the adjusting plate at the base of the distributor and rotate the distributor in the direction necessary to obtain the proper setting.

Rotating the distributor in a clockwise direction retards the ignition and rotating in a counter-clockwise direction advances the ignition. The rotation of the rotor is clockwise.

Slight re-adjustment of the timing can best be made with the engine running. It is impossible to state a specific setting for proper engine performance due to variations in grade of fuels combined with differences in altitudes. When using lower grade fuels or after carbon has accumulated within the engine, spark knock may be excessive when timed by this method. In such cases, retard the ignition not to exceed 4° after dead center. When using high grade or premium fuels, improved performance may be obtained by advancing the ignition. Tighten all locking screws after making adjustments.

IGNITION

Magneto: On Tractors So Equipped

The Model 4JMA 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 in the following paragraphs, 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 plug does not change appreciably in use.

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



Figure 15. Flywheel Timing Marks

Checking Timing of Magneto

In checking the timing, turn the engine over slowly with the hand crank until the impulse coupling releases. At this point the marking on the flywheel DC 1 & 4
EX. CL.

should be $\frac{5}{16}$ " below the pointer in the timing hole located on the left side of the flywheel housing.

If the impulse coupling releases at some other point, it will be necessary to loosen the two cap-screws in the mounted flange of the magneto, and rotate the magneto slightly until the impulse releases at the desired point. Moving the top of the magneto toward the engine retards the spark; moving it away from the engine advances the spark.

CAUTION: Never advance the spark from that established above, especially if the tractor is to be hand cranked. There is danger of kick-back due to the spark occurring ahead of the top dead center position of the crankshaft if the spark is too far advanced.

Removing the Magneto from the Engine

Disconnect all wires from the magneto to spark plugs. Disconnect the grounding wire. Take out the two capscrews attaching the flange of the magneto to the magneto adapter housing. The magneto can then be lifted off.

Installing and Timing Magneto

When the magneto is installed on the tractor it must be retimed as follows: Remove all spark plug wires as well as No. 1 spark plug. The spark plugs in the other cylinders may remain in place.

Make sure the gear shift lever is in the neutral position.

Slide the timing hole cover on the left side of the torque tube bell housing away from the timing hole.

Determine the compression stroke by holding the thumb over No. 1 spark plug opening, while having the engine turned over until an outward pressure is felt.

Continue to turn the engine slowly until the marking on the flywheel DC 1 & 4
EX. CL.
is 5/16" past the timing pointer in the timing inspection hole. This is the proper position for timing the magneto.

Support the magneto in an upright position, as shown in the illustration. Connect one of the spark plug wires to No. 1 terminal of the magneto cap.

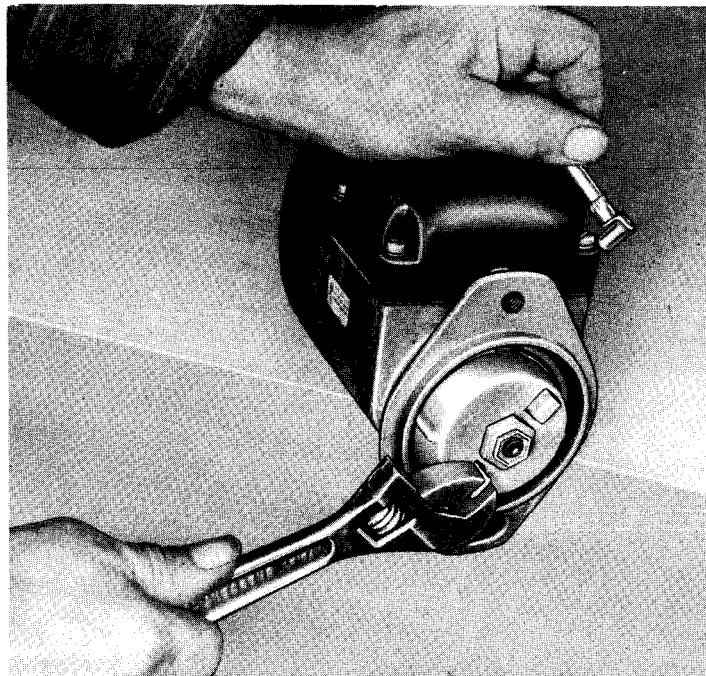


Figure 16. Locating Firing Position

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 indicates the approximate setting of the magneto for firing position of No. 1 cylinder. Back up the impulse slightly so the driving lugs are in a horizontal position.

Without disturbing this setting, install the magneto on the engine, and tighten the two capscrews. This provides an approximate setting for the magneto and should be very nearly the midpoint of the adjustment range.

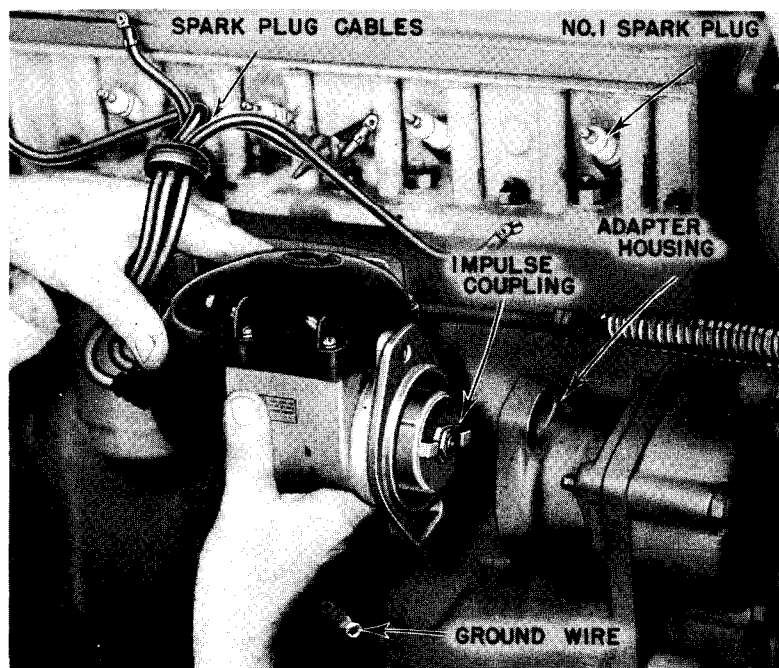


Figure 17. Installing Magneto

Connect the grounding wire and the spark plug wires. The No. 1 terminal as marked on the distributor cap is connected to the front spark plug, No. 2 terminal to the No. 2 spark plug, etc.

The magneto adapter houses the magneto drive shaft and drive gear. The shaft operates in bronze bushings which have a running clearance of .002 to .004 inch. The drive gear is pressed on the shaft and is secured with a drive pin. Should it be necessary to remove the magneto adapter from the engine, mark the position of the driving slots on the face of the housing so that it can be replaced in the same position. The driving slot of the shaft must match with the driving lugs of the impulse coupling when No. 1 piston is on top dead center of its compression stroke and in firing position.

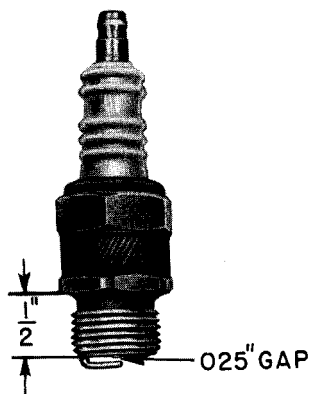


Figure 18. Spark Plug

Spark Plugs

There are only four things that can cause trouble due to spark plugs.

They are:

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

Spark plugs used are 18 MM thread size. AC No. 87 or Champion No. 15A are best suited for the Model "VA" Series engine. Only a complete set of either type should be used. A gap of .025 inch should always be maintained between the electrodes, and the shank length should be $\frac{1}{2}$ inch. When adjusting the spark gap, always bend the outer electrode and never the center as the porcelain may be cracked by so doing. Spark plugs frequently develop a fine coating of black carbon around the porcelain insulator which causes electrical leaking and starting difficulties. When this occurs, sandblasting is the recommended method for cleaning. Never scrape or clean the insulator with anything that will scratch the porcelain; scratched porcelain will allow carbon and dirt to accumulate much faster.

In case one cylinder is not firing, probable cause is failure of the ignition or low compression. First, as you crank the engine slowly, notice the compression on the cylinder at fault. Sometimes a valve sticks open, which always causes the cylinder to miss. 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 to see that they are in good condition. When removing or installing spark plugs, use the special socket wrench furnished with the tractor.

A holder is provided to keep the spark plug cables separated and to prevent the terminals from shorting out on the rocker arm push rod guides. This holder should be kept in place at all times the tractor is being operated.

STARTING AND LIGHTING

Lubrication

The only parts of the lighting and starting system that need lubrication are the generator and starting motor. A few drops of oil should be put in the oilers every 200 hours of operation. The oiler openings in the starting motor and generator are closed with small sheet metal covers, which should be swung to one side (after cleaning the surrounding faces to prevent dirt getting in the lubricant reservoirs). Two lubrication fittings are provided on the generator, one at each end, and one on the starting motor. (Later starting motors have no fittings.) Do not over-oil the starting motor. Three to five drops of oil are sufficient.

Starting Motor

The starting motor is bolted to the front flange of the torque tube with two capscrews. These screws must be tight to prevent the starting motor from rocking.

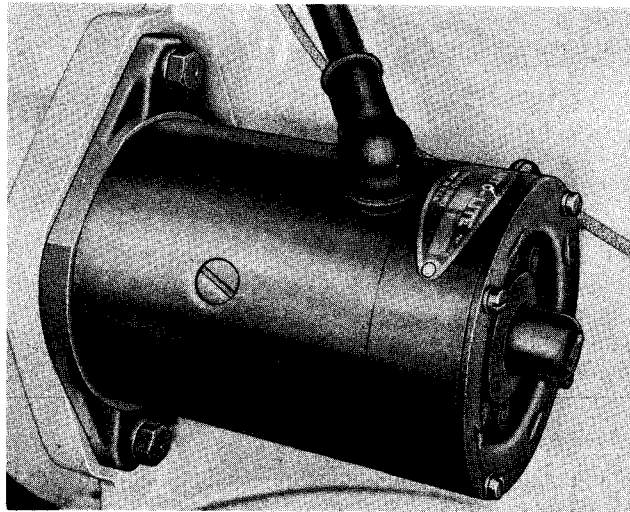


Figure 19. Starting Motor

The terminal post on the starting motor to which the cable from the starter switch is attached is copper. Care should be used in tightening the nut because the post can easily be broken if too much pressure is applied with a wrench.

Generator

The generator used on "VA" Series Engines is belt driven, adjustable third brush type having a maximum cold output of approximately 12 amperes. The charging rate is adjusted by shifting the position of the third brush, which can be reached by removing the cover band on the rear end of the generator. The movable third brush is on top and a little toward the engine. Moving the third brush in the same direction as the rotation of the armature increases the

rate of charge, while movement opposite to the armature rotation reduces the rate. However, there normally should be no reason for shifting the position of the third brush. A rate of charge more than 15 amperes will tend to overheat the generator.

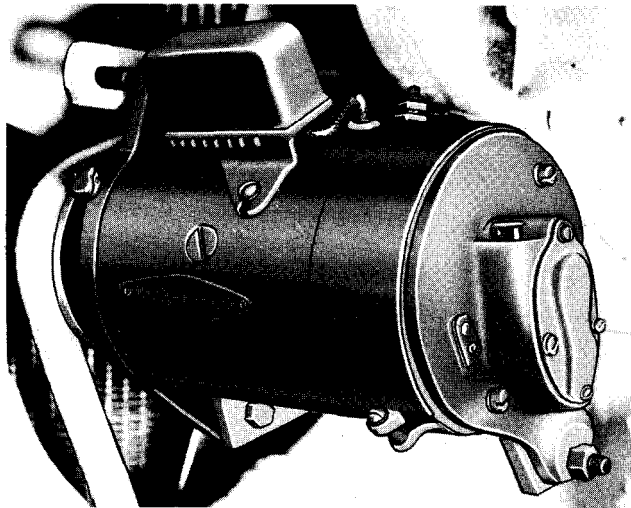


Figure 20. Generator

Charge Regulator

The amperage output of the generator can be controlled and regulated by the light switch which is mounted on the instrument panel. The switch has three regulating positions.

The first position, that is with the switch button in as far as possible, connects a resistance in the field circuit of the generator which reduces the generator output to 3 amperes but does not turn on the lights.

The second position shorts out the resistance giving the full output of the generator, but does not turn on the lights.

The third position turns on the lights, and also shorts out the resistance, giving full output of the generator.

Whenever the generator is operated without the battery connected in the circuit, the field lead should be disconnected. This is the lead which is connected to the field terminal on the generator and to the light switch. Care should be taken that the generator at no time operates on an open circuit. Failure to do this will cause the generator to burn out.

The user need have no concern about the generator wear due to generator operation when a battery is not being charged. In this condition no electrical contact occurs and wear factors become a minor importance. The important thing under operation of this kind is that the generator be properly grounded as

described above. If this unit fails to function properly, it should be referred to an authorized Electrical Equipment Service Station, where the necessary technical information and equipment are available for servicing

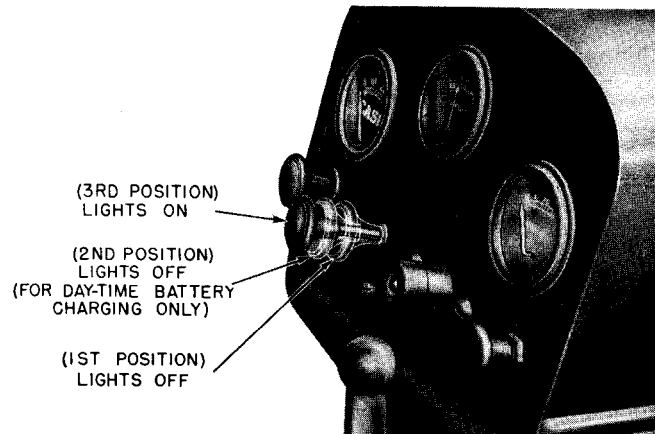


Figure 21. Light Switch

Fuse

This fuse is located under the hood directly behind the instrument panel, and is a part of the light switch. If the fuse burns out, pull it from the clips and insert a new 15 ampere fuse.

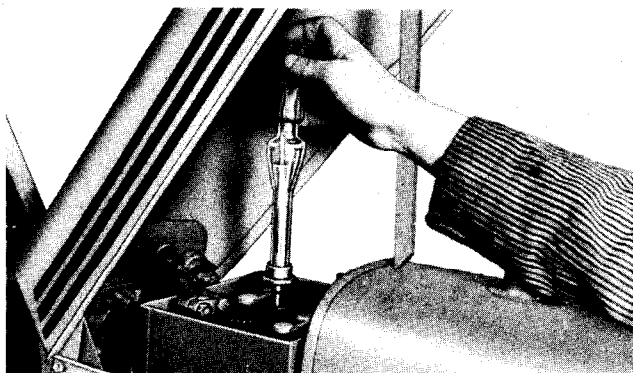


Figure 22. Storage Battery

Storage 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.

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 terminal as a spark or short circuit will result.

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

Take and record Hydrometer Readings of each cell—do this occasionally.

If readings are below 1.240 the battery is not receiving sufficient charge. The electrical system should be adjusted to increase the charge rate. (In zero weather there is danger of freezing if readings are below 1.175.

Adding Water

If water is added in freezing temperature and battery is not charged to mix water and electrolyte, water will remain on top and freeze. In freezing weather water should be added to the battery just before the tractor is to be used. Sufficiently charge battery to thoroughly mix water with electrolyte by gassing of battery on charge before the water can freeze. If this is not done the ice may break the rubber container.

Replace Vent Plugs

Always keep vent plugs in place and tight except when filling and taking gravity readings. Be certain that holes in vent plugs are clean and free of dirt to prevent gas pressure in cells breaking sealing or container.

Battery Warranty

Be sure you receive a battery warranty from your dealer when your tractor is delivered, and that your dealer registers this warranty with the battery manufacturer.

Keep Battery Clean and Dry

If wet or dirty, wash with baking soda solution or ammonia, then with clear water. Be sure vent plugs are tight before washing.

Keep Cable Terminals Tight and Clean

If terminals are corroded disconnect and clean, wash as in above. Apply a thin coat of vaseline (or light cup grease) to terminal and battery posts before re-applying terminal.

Be sure that ground connection where it attaches to frame is also kept clean.

Idle Batteries

An idle battery requires a charge every month or two, or at sufficient intervals to keep the gravity above 1.240.

OIL PUMP

The oil pump is a single stage, gear-driven type, operating off the crankshaft gear. It circulates oil through drilled passages to all main, connecting rod and camshaft bearing as well as rocker arms and governor assembly. All other engine parts not lubricated by pressure or gravity flow operate in spray from the connecting rods.

Oil Pressure

The pressure relief valve located in the base of the pump body is set to show an oil pressure of 10 to 14 pounds on the oil pressure gauge on the instrument panel when the engine is operating.

The valve will by-pass the oil in case where oil lines are plugged, oil is too thin or is too heavy. In such cases a marked drop of pressure will be recorded by the oil pressure gauge on the instrument panel.

With continued use of the engine, the pressure may gradually become less due to increasing clearance in the bearings. This, however, will be very gradual. A sudden drop of pressure should be investigated immediately.

The following list of causes may result in lack of the necessary oil pressure:

Dirty oil pump screen.

Lack of oil.

Oil too heavy to flow.

Loose bearings.

Broken oil pump parts.

Plugged oil passages.

Oil Pump and Screen

At least once each season, remove the float assembly and wash thoroughly. This will protect the finely finished surface of the engine parts, by insuring constant circulation of oil and no restrictions at the screen. At the same time inspect the interior of the crankcase and the oil pan, and clean out any sludge or dirt which may have accumulated.

Since the intake screen floats on the surface of the oil, there is no danger of the screen being coated in cold weather with ice from water accumulated through condensation.

VALVE COVER AND GASKET

The valve cover on the engine head seals dust and dirt from the valve rocker arm mechanism.

When the valve cover is removed, clean thoroughly before replacing on the engine. It is recommended also that a new valve cover gasket be used to make sure the cover will be fully sealed, and oil leaks will be prevented.

Valves and Rocker Arms

Some engine difficulties can be traced to the operation and adjustment of the valves. Hard starting, engine missing, engine over-heating, lack of power, and explosions in the exhaust pipe are a few of these difficulties.

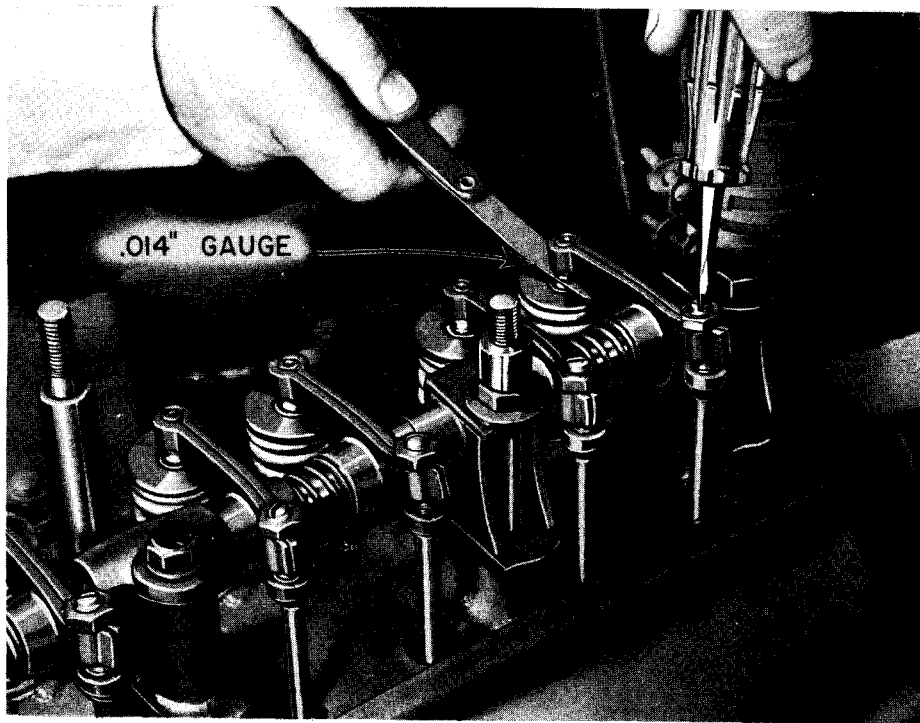


Figure 23. Setting Valve Clearance

Adjusting Valve Clearance

The clearance between the rocker arms and the end of the valve stem should be checked occasionally and adjustments made if necessary. The proper clearance should be .014 inch for both the intake and the exhaust valves when the engine is cold.

To make adjustments, loosen the lock nut on the rocker arm and turn the adjusting screw until the proper clearance is obtained. A .014 inch feeler gauge should slip snugly between the rocker arm and valve stem. Tighten the lock nut and re-check clearance.

Valves and Valve Seats

One of the causes of lack of power is poor compression in one or more cylinders. An engine with poor compression is inefficient, and should not be kept in service.

The engine can easily be tested for compression leaks. **DO NOT TRY TO TEST COMPRESSION ON A COLD ENGINE, AS THIS IS MISLEADING.** Be sure the engine has run long enough to be at working temperature, and that the valves and other working parts are properly oiled. Hand crank the engine to see if a marked resistance can be felt as each piston is on compression stroke. If compression is poor, it is probably because of compression leaks past the valves.

If that is the case, remove the valve cover and put kerosene on the valve stems and rocker arms to remove any gummy accumulation; then oil with light oil. Many times this will help to seat the valves tightly.

Generally speaking, if the engine has good power, it is best to leave the valves alone. It is time enough to recondition valve seats when they are known to be the cause of lack of power.

CLUTCH

The clutch will require a minimum of attention except for occasional adjustment to compensate for normal wear of facings. A new clutch particularly may need adjusting probably several times until a smooth friction surface is obtained. Need of adjustment is indicated by clutch slippage—on full load the engine may speed up, or a heavy load on either drawbar or belt may not be picked up promptly on engaging the clutch; also the clutch can be engaged without an appreciable “snap” of the pedal. As soon as there is any indication of clutch slippage, adjustment should be made immediately to prevent damage to the facings, necessitating replacement.

Remove all spark plug wires to avoid the possibility of the engine starting while working on the clutch.

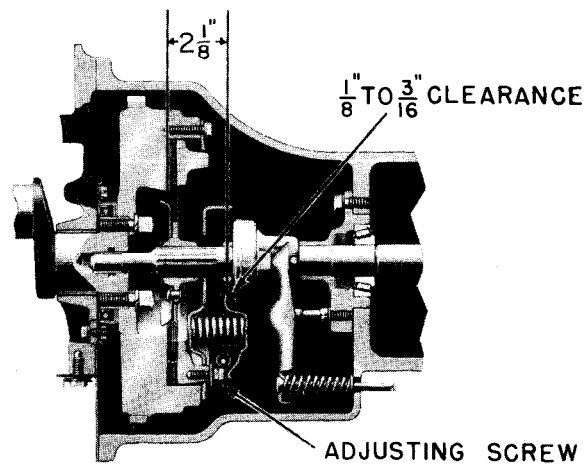


Figure 24. Tractor Clutch

Tractor Clutch

Adjusting the Clutch

Clearance between the clutch release bearing and clutch release levers should be $\frac{1}{8}$ to $\frac{3}{16}$ inch. To maintain this clearance, the clutch foot pedal should have $1\frac{1}{2}$ to 2 inches free movement before the clutch begins to disengage.

To obtain and maintain the proper free pedal movement, adjust the clutch throw-out rod between the clutch pedal and the throw-out bearing. This can be done by simply loosening the lock nut behind the clevis, and turning the rod to obtain the proper amount of pedal travel. When the adjustment has been completed, tighten the lock nut.

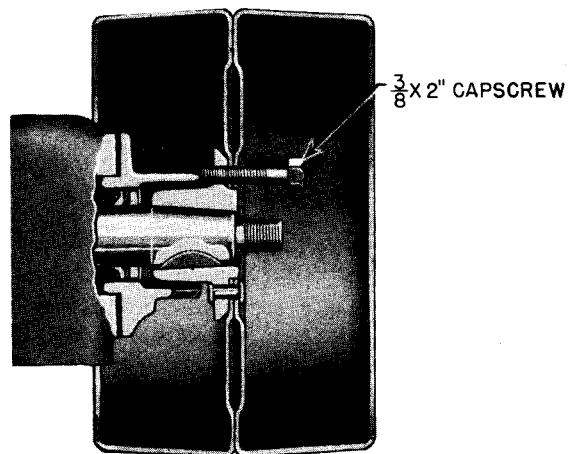


Figure 25. Removal of Belt Pulley

BELT PULLEYS

Two types of Belt Pulleys are provided for Model "VA" Series Tractors.

Belt Pulley for Tractors Equipped with Hydraulic Pump

In this unit the belt pulley housing is designed so that a hydraulic pump can be attached. The housing also serves as a reservoir for the oil used in the pump and ram. Cams on the pulley shaft operate the hydraulic pump.

On this unit the pulley can easily be removed when not in use over a long period of time or when front mounted implements interfere. To remove, first remove belt pulley nut and lockwasher from the shaft; then screw $\frac{3}{8} \times 2''$ cap-screw into the threaded pulley hole. Tighten bolt until pulley is free enough to remove from the tractor. A sheet metal cap is furnished and should be used at all times when the pulley is removed.

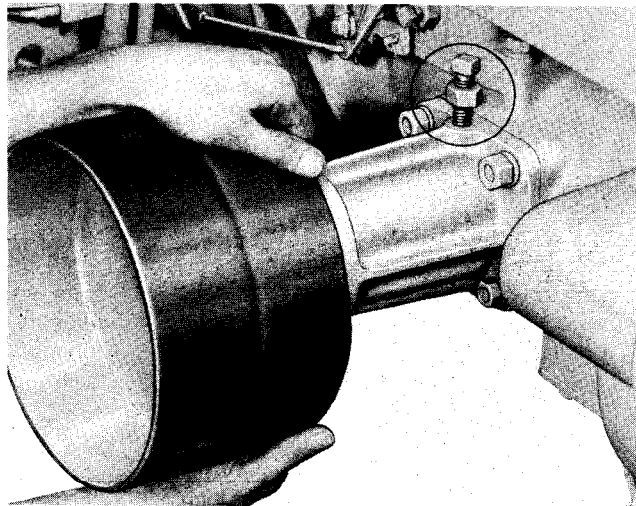


Figure 26. Disengaging Belt Pulley

Belt Pulley for Tractors Not Equipped with Hydraulic Pump

Belt Pulley Attachment VTA-149 is provided for tractors not equipped with hydraulic lift. The pulley can easily be disengaged so that it will not revolve when it is not to be used for long periods of time.

To disengage the pulley, loosen the set screw in the housing and pull the pulley away from the housing. This action disengages the bevel drive gears; then retighten the set screw. The pulley is engaged by reversing the procedure.

The belt pulley is $10\frac{1}{4}$ inches in diameter, and has a 6-inch face. The engine at its normal loaded speed of 1425 RPM will give a pulley speed of 969 RPM and the belt speed will be 2600 feet per minute.

When setting the tractor for belt work, the pulley should be properly aligned to prevent unnecessary belt wear. The pulley is crowned and with proper

alignment, a belt in reasonably good condition will run true. Normally the engine should be operated at full speed for belt work.

For proper lubrication, the tractor should be set level when doing belt work. If the front end must be high for some reason, additional oil should be put in the torque tube to insure proper lubrication of the gears and front bearings on the clutch shaft.

To figure the correct pulley size for a driven machine which is to be operated with the tractor belt pulley, the following information has been compiled:

Multiply the diameter of the tractor pulley by the number of revolutions per minute of the tractor pulley, and divide the answer by the recommended revolutions per minute of the driven machine.

Example: The Model "VAC" Tractor with a belt pulley $10\frac{1}{4}$ inches in diameter, turning at 969 RPM at governed speed, is to be used to operate a driven machine whose recommended speed is 3000 RPM.

Answer: Multiplying $10\frac{1}{4}$, the tractor pulley diameter, by the 969 revolutions per minute, gives approximately 9932. Dividing 9932 by 3000, the recommended speed of the driven machine, gives 3.31 or $3\frac{5}{16}$ ". Therefore, the driven machine should be equipped with a $3\frac{1}{4}$ or 3" pulley. Perhaps the 3" pulley would be preferable as the belt slippage would compensate for the surplus speed given by the smaller size pulley.

To find the speed at which the tractor will drive a certain machine already equipped with a pulley, multiply the tractor pulley diameter ($10\frac{1}{4}$ ") by its governed speed (969 RPM) and divide the answer by the diameter of the pulley on the driven machine.

NOTE: On tractor equipped with the hydraulic lift, it is essential that the belt pulley housing be filled with oil to the proper level regardless of whether or not the hydraulic pump is attached, otherwise the outer bearings will not receive lubrication. The upper notch on the bayonet gauge indicates the capacity of approximately $1\frac{3}{4}$ quarts. The lower notch indicates the minimum for proper lubrication. Use only high grade SAE No. 10 oil.

TRACTOR BRAKES

Model "VA" Series Tractors are equipped with 6-inch diameter, flange type turning brakes.

These brakes are self-energizing in both forward and reverse motion. As the brakes are adjusted at the factory, they should, with normal use, remain effective and operate smoothly for a long time. When the tractor is new or after installing new linings, the brakes should be applied lightly for the first 50 hours of operation. This will permit the braking surface to acquire a good friction face.

When using the brakes to assist in turning, swing the steering wheel in the direction of travel before applying brakes. Do not force the brakes to swing the tractor around. When stopping the tractor, disengage the clutch before applying the brakes. Do not stall the engine with the brakes. A heavy rolling load can be slowed down by throttling the engine before disengaging the clutch, thus using the engine as a brake. Turning sharply or a sudden application of one brake at high speed should be avoided to prevent tipping the tractor over.

When operating the tractor on a highway, the brake pedals should be locked together. In the event a quick stop is necessary, the brakes could then be applied to both wheels equally and at the same time.

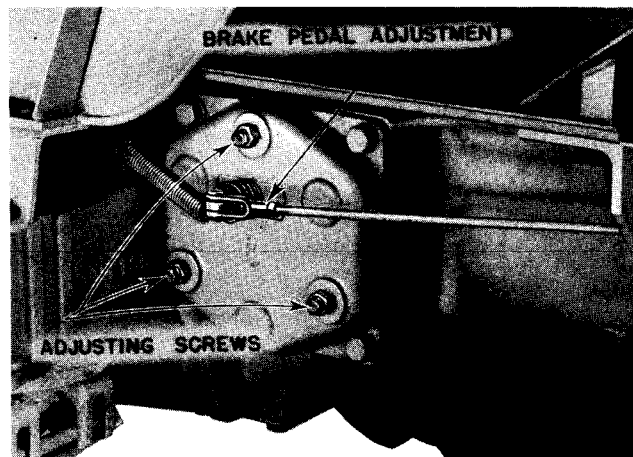


Figure 27. Brake Housing and Control

Brake Adjustment

Adjustment of the brakes can best be made by jacking up each rear wheel, and proceeding in the following manner:

Loosen the three locking screws several turns, but do not remove them.

Turn down the three adjusting screws in a clockwise direction until a noticeable drag is present when the wheel is turned by hand. This action forces the power plate and primary disk inward and decreases the clearance at the brake lining.

Back off the adjusting screws $\frac{1}{4}$ to $\frac{1}{2}$ turn. This should leave adequate clearance to assure that the brake will not drag. The screws should be turned down equally to assure uniform pressure at all three points.

When proper adjustment is obtained, tighten the locking screws to lock the power plate in place.

After continued use and long service, a certain amount of "free play" in the actuating levers of the brake may be noticeable. When this occurs, take up the play by adjusting the length of the brake control rod with the threaded rod end so there is no more than $\frac{1}{8}$ " free movement at the end of the lever.

It is important that each brake lining have the same amount of clearance, and also that each brake pedal have the same amount of movement in order to obtain brake equalization. A definite method to check this condition is to jack up both rear wheels and block the tractor securely; then start the engine and run the tractor in third or fourth gear. Lock the brake pedals together and apply the brakes slowly. This will tend to slow down the engine speed. Observe the braking action; both wheels should slow down at the same time. If one wheel stops turning while the other continues, loosen the adjustment of that wheel until both are equal.

Model "VAH" Tractor Brakes

On the Model "VAH" Tractor, the brakes are mounted inside the axle drop housings.

Brake adjustment is the same as on the other Model "VA" Series Tractors.

RUBBER TIRES

Before starting tractor, check all tires inflations and see that the front wheel tires have 28 lbs. pressure and the rear wheel tires have 12 lbs. pressure.

If wheel weights are used, or heavy loads are carried on the tractor, the air pressure must be increased accordingly.

Note: When plowing, increase air pressure in rear furrow wheel by 4 pounds. Due to the added load on the furrow wheel when plowing, the weight added to this wheel should be less than the maximum specified.

When inflating or checking air pressure in tires having water or calcium chloride solution, the valve should be at the top of the wheel to prevent loss of liquid.

1. Maintain the correct inflation pressures.
2. Keep valve caps on all valve stems.
3. Repair any cuts or breaks in the casing promptly to prevent damage from water, dirt, or weakened fabric.

Protect your tires by keeping the valve caps on all valve stems at all times (except when checking pressures or inflating). These caps seal the dirt out and the air in.

FOR SAFETY

When operating a pneumatic tire equipped tractor going at a high rate of speed, or with one wheel in the furrow when plowing, apply brakes with caution or the tractor may turn over.

WHEEL WEIGHTS

Under some conditions a certain amount of slippage will be experienced when using a rubber tired tractor to pull heavy loads. Weight may be added in two ways, either of which will increase the traction obtained and will reduce excessive slippage.

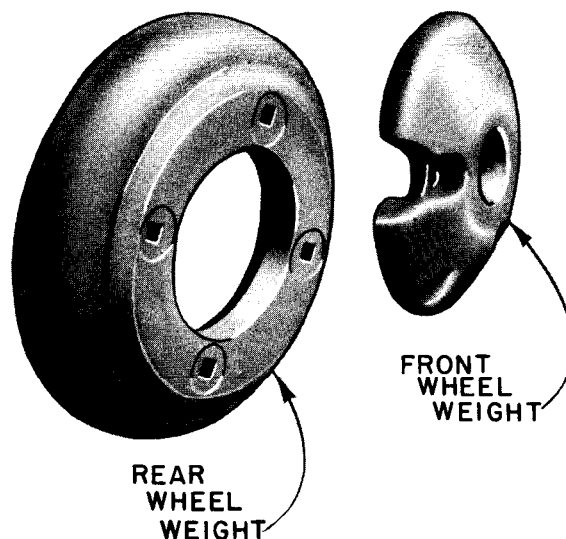


Figure 28. Front and Rear Wheel Weights

Cast Iron Weights

The first method is to attach cast iron weights to the wheels.

Cast iron wheel weights are preferred by many operators to using water in the tires, chiefly due to the greater ease of installation and removal.

Liquid Weight

The second method is to add weight by filling the tires with water or solution.

Either method is satisfactory. Whichever one is used, it is desirable to have the weight in the wheels only when heavy work is being done. Operating this tractor with unnecessary weight merely consumes more fuel and throws a greater load on the gears, shafts and bearings.

Water will work satisfactorily if certain precautions are taken. Wherever freezing is experienced it is necessary to use an anti-freeze or drain the tires to prevent ice damaging the tires. The tractor should not be operated with ice inside the tires, as the sharp particles of ice will cut the inner tube.

If there is no danger of freezing, fill tires with water direct from the hose connected to a pressure water system. Secure an adapter which will permit connecting hose directly to the tire valves.

For information on calcium chloride anti-freeze solution most frequently used in tires, consult your dealer for amount necessary for the different tire sizes.

NOTE: $3\frac{1}{2}$ pounds of calcium chloride per gallon of water will protect tires to 40° below zero.

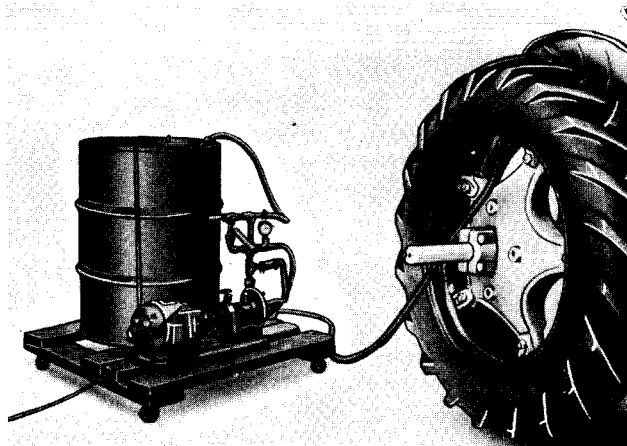


Figure 29. Filling or Removing Liquid
(Power Pump Method)

Filling or Removing Liquid (Power Pump Method)

A very efficient method of filling or removing liquid from tires is the use of a power pump similar to that shown above.

To use pump, proceed as follows:

Attach hose to tube valve.

Remove valve core housing or valve core with patented valve core and housing ejector.

Start motor with lower handle to left and pump out all air and solution in the tube until a vacuum is created, as shown by gauge.

Fill tube to desired pressure by reversing lower lever to left—pressure is indicated on gauge—then replace core housing or core.

When calcium chloride solution has been employed, it may be desirable to save the solution for re-use.

STATIC ELECTRICITY

When operating a full rubber tire equipped tractor either on the belt or in the field, a light chain should be fastened to the drawbar or other suitable metal part on the tractor, and sufficiently long for the other end to touch the ground. By the use of such a chain all danger of static electricity will be overcome. If the tractor is operated without some proper ground there is danger of fire being started from the static discharge.

REAR WHEEL TREADS

Rear wheel treads can be varied by sliding the rear wheels on the axle shafts, by reversing the wheels, and by changing the rim clamping positions on the wheels. To accomplish the above changes proceed as follows:

1. Lock the brakes securely to avoid any possibility of the tractor slipping. Jack up the rear axle to remove the weight from the rear wheels.

2. Turn the wheel so the keyway in axle shaft is facing upward and then loosen the hub bolts. Move rear wheels to desired position and tighten the hub bolts evenly and firmly. The hub bolts should be checked for tightness every few days while the tractor is new, or after changing the wheel setting. Keep hub bolts and rim clamp bolts tight at all times.

NOTE: If the key has been removed from the axle shaft and wheel hub, make sure the key is installed properly before the hub bolts are tightened. The small pin in the key fits into a drilled hole in the wheel cap keyway, and might cause wheel breakage if not properly located.

ADJUSTING FRONT WHEEL BEARINGS

Occasionally it may be necessary to adjust the front wheel bearings. Inspect the front wheel bearings every 30 days to make sure there is no excessive play.

To adjust the bearings, first block up the front end of the tractor so the wheels are clear of the ground and remove the hub caps from the wheels.

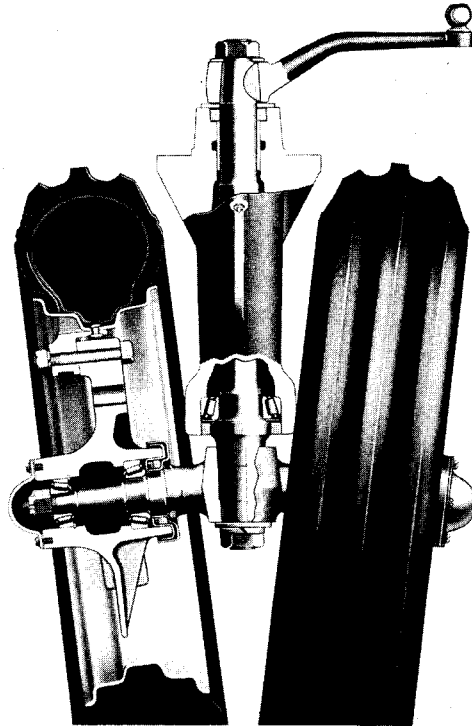


Figure 30. Front Wheel Bearings

The adjusting nut should be drawn up, pressing the outer bearing cone inward. Rotate the wheel while turning the nut until the pressure of the nut causes a noticeable bind in the bearings. Then back off the nut until the bind is removed but still prevents end play. When the proper adjustment is obtained, lock the nut with a new cotter and replace the hub cap.

When wheels are removed for cleaning and repacking with grease, always be sure that the felt and cork washers are correctly fitted when assembling. If this is not done, dirt and water would be allowed to enter the hub and to ruin the bearings in a very short time.

POWER TAKE-OFF

The power take-off is centrally located between the rear wheels. The shaft rotates clockwise at 525 RPM at an engine speed of 1425 RPM. The shaft spline is $1\frac{3}{8}$ inches ASAE for use with standard couplings for power driven implements and tools.

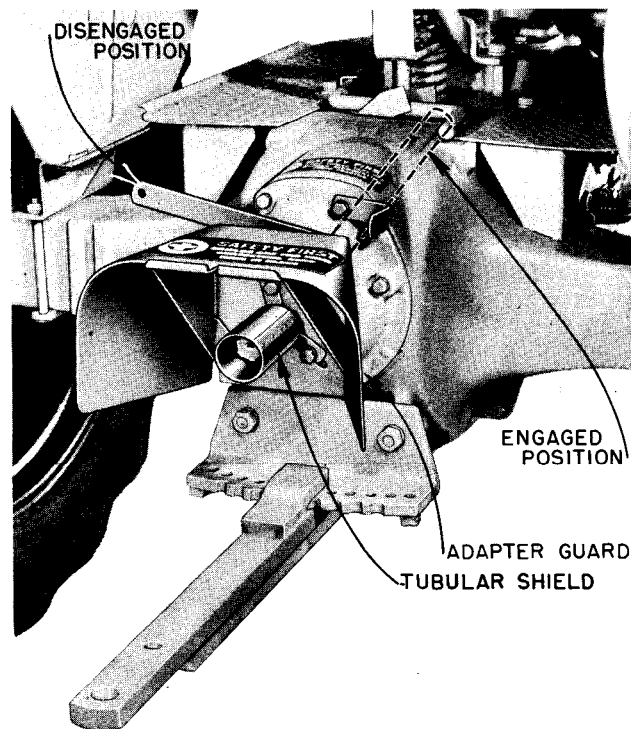


Figure 31. Shields and Shift Lever

When the Power Take-Off is not being used, put on the small tubular guard. This guard covers the splines. NEVER OPERATE A TRACTOR WITHOUT EITHER THE LARGE OR SMALL GUARD IN PLACE.

When Power Take-Off is connected to driven machinery, it will be necessary to remove the small guard. When this guard is removed, make sure the larger ADAPTER GUARD is installed and properly connected to the telescoping shield which should be furnished with all Power Take-Off driven machines.

It is equally important that the telescoping shields on Power Take-Off driven machines, which attach to the standard guard, are in place.

Shift Lever used to engage and disengage the Power Take-Off drive gear which drives the power take-off shaft, should always be swung to the left when the Power Take-Off is not in use. Swing the lever to the right to engage the gears and start shaft operation.

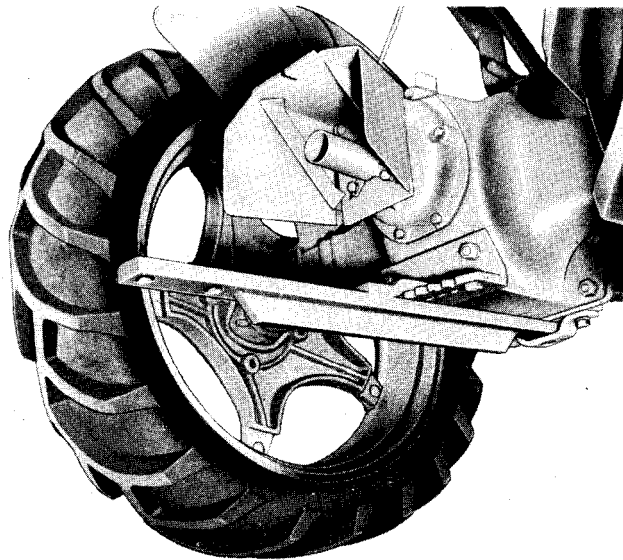


Figure 32. Drawbar (Models "VAC", "VA", and "VAO" Tractors)

DRAWBAR

When doing power take-off work, always lock the swinging drawbar to prevent its movement, as such movement will cause serious damage to your drive mechanism. For most work the drawbar can be locked by dropping two pins or bolts through two holes in the drawbar guide angle, one on each side of the drawbar. When a heavy machine is to be pulled, a better installation can be made by bolting a heavy steel strap to the top side of the drawbar in such a way that the drawbar is drawn securely against the guide angle. The bolts should pass through the guide angle on each side of the drawbar.

For power take-off work, the drawbar pin should always be midway between the two universal joints. Should one of the universal joints be materially closer to the drawbar pin than the other joint, the first mentioned joint will assume too great an angle on short turns; this sharp angle may result in serious damage to the power take-off drive.

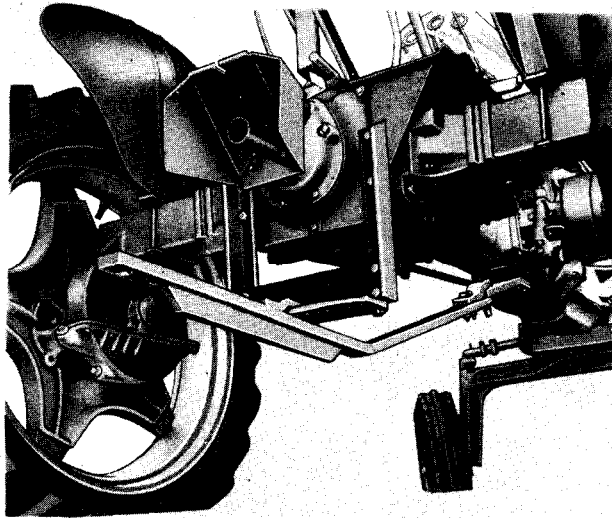


Figure 33. Drawbar Model "VAH"

MODEL "VA" SERIES HYDRAULIC PUMP

General Description

The Model "VA" Series Pump is a piston type pump. It receives its fluid (oil) from the belt pulley housing reservoir and is operated by the eccentrics of the belt pulley shaft. It is equipped with a "lockout" arrangement so that during winter months, or periods when the lift is not generally required, the pump may be locked out of operation.

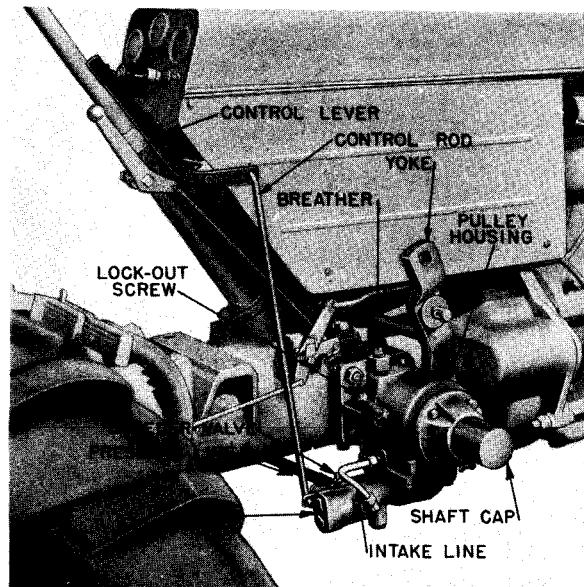


Figure 34. Model "VA" Series Hydraulic Power Lift System

The operation of the pump is controlled by a convenient lever located on the instrument panel to the right of the steering wheel column.

Generally, any difficulties encountered with the pump will be caused from dirt or air locks in the system.

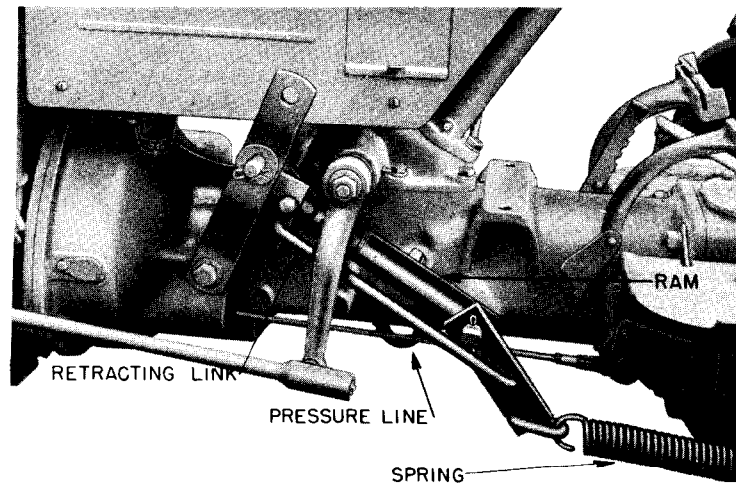


Figure 35. Model "VA" Series Lifting Ram

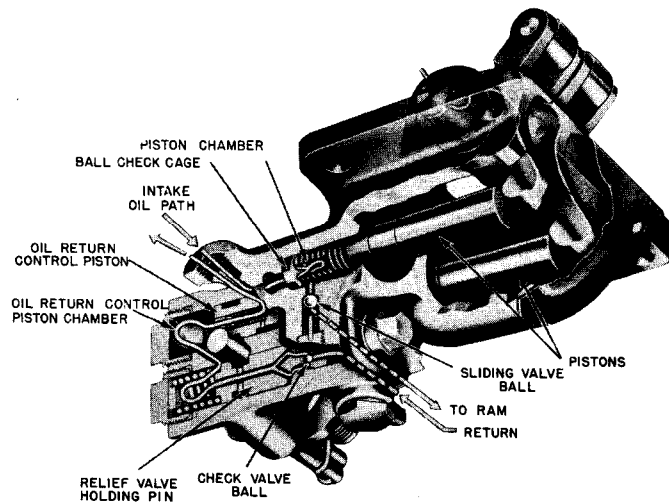


Figure 36. Model "VA" Series Hydraulic Pump
(Cutaway View—Pump with Straight Type Pistons)

PUMP OPERATION

The pump is started into operation by pushing the control level upward. This releases the oil return control piston assembly from its seat, allowing the oil to be drawn into both hydraulic pump piston chambers by the outward stroke of the pistons, which operate alternately. This action takes place during the first

half of the piston cycle; during the second half of the cycle the eccentrics on the belt pulley shaft will push the piston arms forward developing a compression stroke of the pistons. This action closes the ball check cage and opens the sliding valve ball. The oil then passes through the outlet and into the lifting ram. This operation continues until pressure is built up against the check valve ball forcing it open. This allows the oil to pass through the relief valve holding pin and into the oil return control piston chamber forcing the oil return control piston to close. This will cause the oil supply from the belt pulley housing to be cut off. A clicking sound can be noted in the pump when this action occurs.

While these cycles have been taking place, pressure has been developed within the ram sufficiently to raise the implement. The pressure remains in the pump and the ram, the implement will remain in the raised position until lowered.

The pump operation during the lowering procedure is as follows: Lower the implement by pushing the control lever downward. This will cause the check valve ball to open, allowing the oil to flow back out of the lifting ram through the relief valve holding pin, the oil control piston chamber, the oil return piston assembly, and back to the housing reservoir.

GENERAL INFORMATION

(Important—Read Carefully)

Dirt in the System

Sand, dirt, and grit are the worst enemies of the hydraulic power lift. Every care should be used when filling the oil reservoir, and disconnecting and connecting the oil lines to prevent dirt from getting into the system.

It is very essential that the system be kept clean as a small particle of grit, dirt, or metal under the safety valve will stop the functioning of the pump.

Oil Reservoir

With the ram retracted, the belt pulley housing reservoir should be filled to the full mark on the bayonet gauge of the filler plug with a good grade of clean SAE #10 oil. It is important that clean, dirt free containers be used for filling the reservoir so that clean oil only will be supplied to the pump. Also, do not use oil drained from the engine crankcase, and do not carry oil in the reservoir above the full mark on the bayonet gauge. If the reservoir is too full, oil will be forced out of the filler plug. After the first filling, add oil as needed to keep the oil level up to the full mark on the bayonet gauge with the ram retracted. At least once a month, during the time when the power lift is being used, remove the combination filler plug and breather and wash the breather element in clean gasoline. The breather element, when clean, allows the power lift to breathe and prevents dust from getting into the system.

The pump should be removed from the belt pulley housing every six months, preferably between winter and summer seasons. The belt pulley housing, pump, hose, and ram should then be washed in a solvent or cleaning fluid (kerosene or gasoline acceptable) to remove all dirt and grit.

Bleeder Valve

Often pump difficulties are due to air locks in the system, making it impossible for the pump to function as it should. This is usually encountered when starting a new pump from which the oil has been drained, or in a pump that has been inoperative for a considerable period of time. The air locks are easily removed, whether the pump is equipped with a bleeder valve (drain cock) or the $\frac{1}{8}$ " slotted head pipe plug. The bleeder valve is a more convenient arrangement; it will be found on all later pumps and is available for earlier models.

The method for removing the air lock is as follows: Stop the tractor and disconnect the high pressure hose from the pump, remove the $\frac{1}{8}$ " slotted pipe plug from the left hand side of the pump body, or open the bleeder valve on a pump so equipped. Work hand control lever up and down a few times until the oil flows out of the bleeder valve, or the pump opening when the $\frac{1}{8}$ " slotted pipe plug was removed. Replace plug or close bleeder valve and start tractor. The valve must be tight enough so that it will not allow air to be drawn back into the system, which in turn will cause additional "air locks." Use a wrench or pliers as shown.

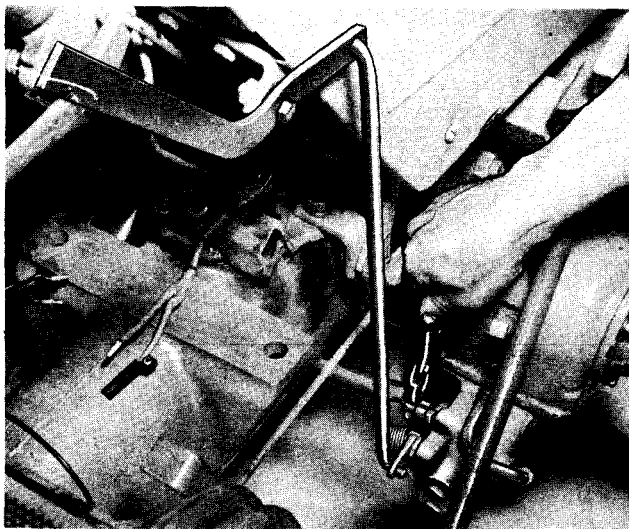


Figure 37. Tightening Bleeder Valve

When the hand control lever is pushed forward, oil from the pump should discharge through the high pressure hose opening. If an oil flow is not obtained, air pressure may be applied either with a small hand air pump, or with air pressure from an air compressor.

Remove the "Breather and Dip Stick Assembly" from the belt pulley housing. With the tractor running and the pump control lever in the raised position, apply from 1 to 5 pounds of air pressure through the dip stick opening in the housing. This will force oil into the pistons and start the pump operating. Maintain this air pressure while the control lever is raised and lowered several times to make certain the pump is operating satisfactorily. In the event too much air pressure is applied, some of the pump gaskets and seals may be damaged. Therefore it is advisable to install an elbow in the opening of the housing and to attach a pressure gauge such as is used on the hydraulic pump test stand, so that no more than 5 pounds per square inch of pressure will be applied.

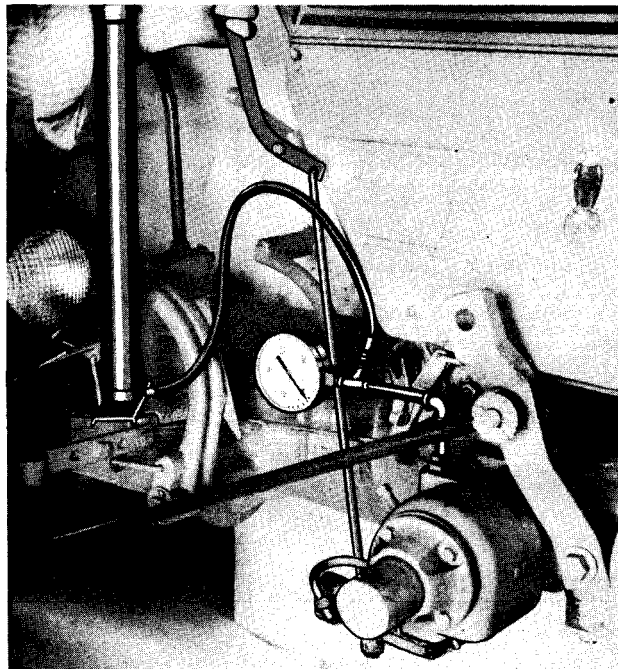


Figure 38. Applying Air Pressure

To Obtain Best Pump Operation

Maintain proper oil level.

Use only clean oil.

Use only SAE #10 oil.

Operate the hand control lever just long enough to start the ram well on its upward movement and then release.

If the control handle is held in the upward position too long, damage to the relief valve may result from continued by-passing of the oil through the relief valve.

See that ram has proper packing.

See that ball valves and seats are clean and that the balls are seated properly.

Replace piston springs if broken.

Relieve air locks in system.

Keep suction line fittings tight.

Keep high pressure hose line fittings tight.

See that belt pulley shaft rotates.

See that pump control lever moves pump control through its full range.

Service breather and filler plug monthly.

Replace belt pulley oil shaft seals when oil leaks occur.

Drain the oil in the belt pulley housing approximately every six months, preferably between winter and summer seasons. Also remove the pump and clean the entire system including the belt pulley housing, pump, ram, and oil lines.

See that ram shaft is retracted when not using lift.

Keep oil from power lift free of water to prevent pump from freezing.

Hydraulic Pump Lockout

During winter months or periods when the hydraulic lift is not generally required, it is recommended the pump be locked out of operation position. As the pump operates whenever the belt pulley is in motion, the lock out position will eliminate unnecessary wear on the rollers and pistons of the pump, and the cams on the pulley shaft.

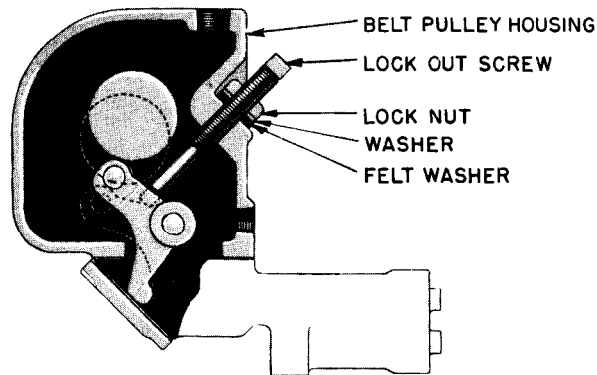


Figure 39. Hydraulic Pump Lock-Out

The lockout position is obtained through the lockout screw located on the belt pulley housing. Loosen the lock nut and thread the screw into the housing until the distance from the top of the nut to the end of the screw is approximately $\frac{1}{2}$ ".

Check this position of the screw by operating the control lever to see if the rocker arms still contact the cams. If contact is made, a pulsating action of the pump will be noted. Eliminate by threading the screw in until all action of the pump has stopped. When the correct position of the screw has been obtained, secure the seal, washer, and screw by tightening the lock nut.

To re-engage the pump into operating position loosen the lock nut and retract the screw until the distance from the top of the lock nut to the end of the lock nut screw is $\frac{1}{8}$ " to $\frac{1}{4}$ ". Lock screw in position with lock nut.

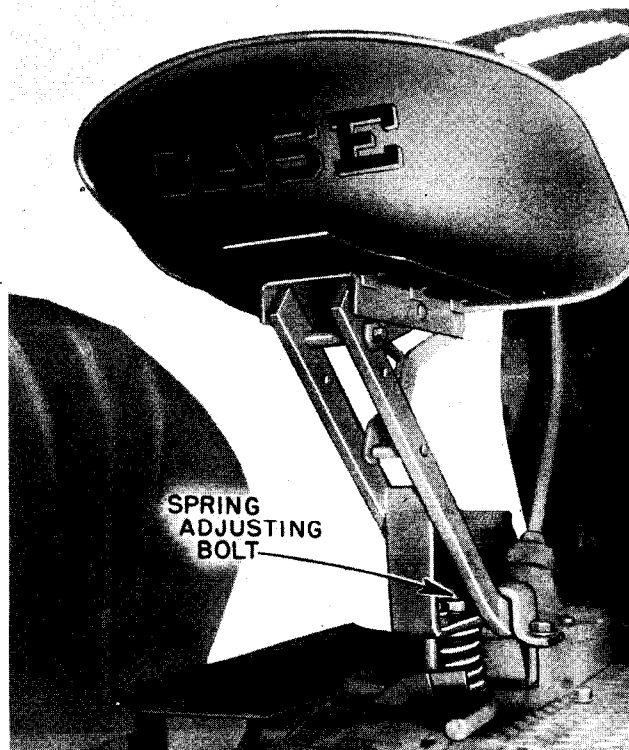


Figure 40. Seat for Models "VAC," "VA," and "VAH" Tractors

SEAT

The seat on the Models "VAC", "VA", and "VAH" tractors can be adjusted on the mounting channel to obtain the most comfortable position for the operator. The seat will tip forward and upward to permit standing on the platform.

The seat spring action can be adjusted for the weight of each operator by loosening the nut on the spring pilot bolt, to move the spring either to the front or rear of the seat base slot.

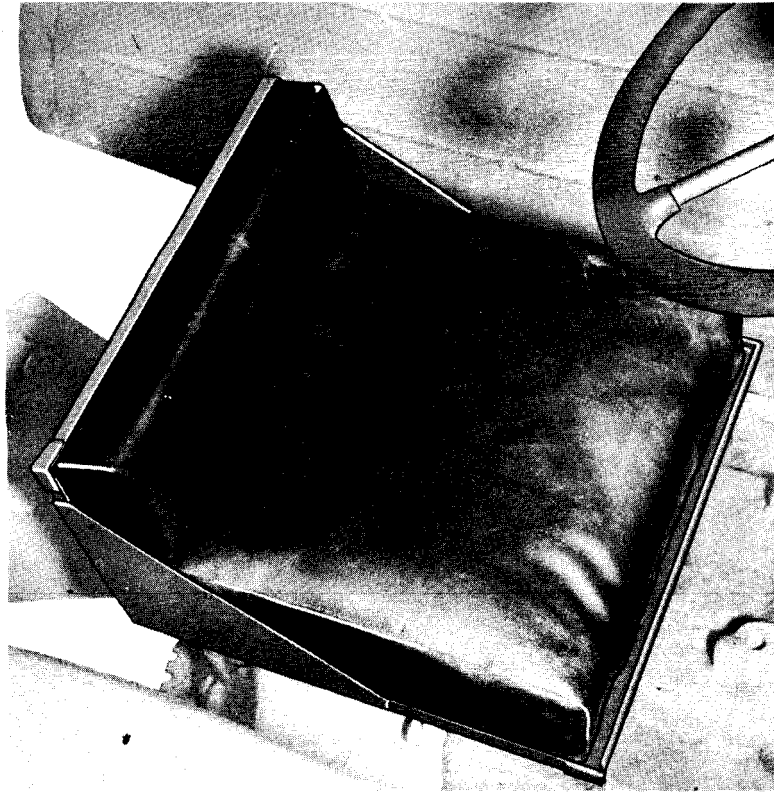


Figure 41. Seat for Model "VAO" Tractor

The Model "VAO" seat is equipped with an upholstered back rest. The seat cushion contains a pneumatic pad which can be inflated as desired to obtain maximum comfort for the individual tractor operator. There are two positions that may be used to accommodate short and tall operators.

SERIAL NUMBER



Figure 42. Tractor Serial Number

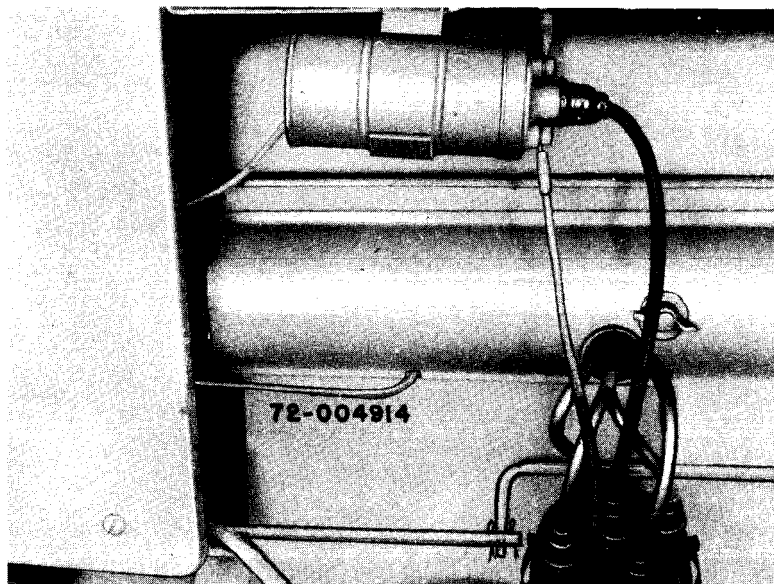


Figure 43. Engine Serial Number

When ordering parts, always give the tractor serial number. This is found on the name plate on the instrument panel.

If the parts to be ordered are engine parts, give the serial number of the engine, which is stamped in the right hand side of the block.

STORING THE TRACTOR

At times when tractors are laid up for the winter months, and to avoid difficulty in starting later on, the following precautions should be observed:

Fuel System

All fuel should be drained from the tanks, carburetor bowl, fuel filter, and lines. Many fuels if left standing for considerable periods form gum and varnish which soon clogs the fuel passages.

Cooling System

Drain water from the cooling system, and flush out to remove any sediment or loosened scale that may be collected. This is a good time to clean out the cooling system with soda solution. Leave the drain plug open, and loosen the radiator filler cap to release pressure on the gasket.

Lubricating System

Drain oil from the crankcase while the engine is warm. Remove and clean oil screen, and while the screen is removed, clean out any sediment present in the oil pan. Remove spark plugs, and pour into each cylinder about a quarter pint of clean engine oil of a viscosity equivalent to SAE 10 or 20. Turn the crankshaft over a dozen revolutions or so to allow this oil to thoroughly cover the cylinder walls, and to work in around the rings. (If a good grade of anti-rust oil, such as No-Ox-Id, is available, use it instead to give greater protection against rusting; however a good grade of engine oil will serve very well in most cases.)

Tires

Store the tractor in a dry place, and place blocks under the axle and front end to take the weight off the tires and prevent the tires touching the ground. Protect the tires from light and heat. It is not necessary to reduce the air pressure, but before putting the tractor back in service the pressure should be brought up to the specified figure.

Battery

Protect the battery from freezing.

Cleaning

To protect the finish the exterior of the tractor should be cleaned to remove any dirt or grease. Soap and water will remove most of the dirt and grease; use kerosene and a brush if necessary. This is a good time to touch up any spots from which the paint is missing, or better yet, paint the entire tractor. Flambeau Red paint can be purchased from your Case dealer at a reasonable price.

Inspect the tractor and order any parts which may need replacing. Any extensive service work can best be handled by your Case dealer during the winter months; you will receive better service then than during the rush season later.

All Case products are sold subject to the following Warranty.

WARRANTY

The J. I. Case Company, hereinafter called "Company", warrants each Case machine (except belting, canvasses, magnetos, carburetors and other attachments, devices or equipment not made by it and which may be warranted by the respective makers but are not warranted by the Company):

1. To be well made of good material and to be durable with good care.
 - (a) If any part made by the Company shall fail from defect in material during the first season's use, and, within ten days after such failure, written notice is given to the Dealer from or through whom said part was purchased, it will be replaced free upon presentation at the factory, subject to the option of the Company to repair the same.
 - (b) No claim shall be allowed for breakage of hardened moldboards, shares, landsides, cultivator shovels, plow disks, harrow disks or spring tooth harrow teeth, excepting upon manifest defect in material or labor, and in no case after they have been heated outside the Company's factory.
2. If properly set up, adjusted, and operated by competent persons, to be capable under ordinary conditions of doing the work for which it is designed.
 - (a) If upon operation by the purchaser in the manner aforesaid for two days any Case machine shall fail to fulfill such warranty, written notice thereof shall be given at once to the dealer from or through whom the same was purchased. If the dealer does not remedy the defect within two days after notification, then immediate written notice of the defect particularly describing the same, specifying the time of discovery thereof and the time of notification to the dealer shall be given by registered letter to J. I. Case Company at its branch house having jurisdiction over such dealer's territory, after which notice reasonable time shall be given to the Company to either send a competent person to remedy the defect or suggest by letter the remedy of the defect, if it be of such a nature. If the machine is found by the Company to be defective in material or workmanship, then the Company will see to it that the defect is remedied, otherwise, purchaser agrees to pay the expenses incurred by the Company with reference thereto and in any event purchaser agrees to render necessary and friendly assistance without compensation.
 - (b) If, after such notice and opportunity to remedy the difficulty, the Company fails to make the machine fulfill the warranty, the part that fails shall be returned immediately by the purchaser, free of charge, to the place from whence it was received and the Company notified thereof at its Branch House aforesaid, whereupon the Company shall have the option to furnish another machine or part in place of the one so returned which shall fulfill the warranty, or to cause to be returned the money and notes or proportionate part thereof received for such machine or part and no further claim shall be made.
 - (c) Failure to give notice, or the use of the machine after the two (2) day limit aforesaid without giving such notice, or failure to return such machine or part as aforesaid shall be conclusive evidence of due fulfillment of the warranty.
3. There is no express, implied or statutory warranty by the Company of any nature whatsoever other than or different from the conditional warranty aforesaid.
4. Any order under this warranty is divisible as to each machine and attachment ordered and the failure of any machine or attachment to fill the warranty shall not affect the liability of the purchaser for any other machine or attachment.
5. The Company's liability for any breach of this warranty is limited to the return of cash and/or notes actually received by it on account of the purchase price of said machine or part.
6. The placing upon any Case machine or implement of any part, attachment or equipment not manufactured or sold by J. I. Case Company or authorized by it, shall operate to void and waive any warranty whatsoever by J. I. Case Company.

NOTICE

Insist on GENUINE CASE PARTS

CASE made parts fit and insure satisfactory service because they are made from the original patterns and of the same materials as used in new machines. - - - - -

FOR SERVICE AND PARTS

See Your Case Dealer

Always Give Model and Description of Machine

NOTE: The J. I. Case Company reserves the right to make improvements in design or changes in specifications at any time without incurring any obligation to install them on units previously sold.