

OLIVER

Cletrac

INSTRUCTION MANUAL

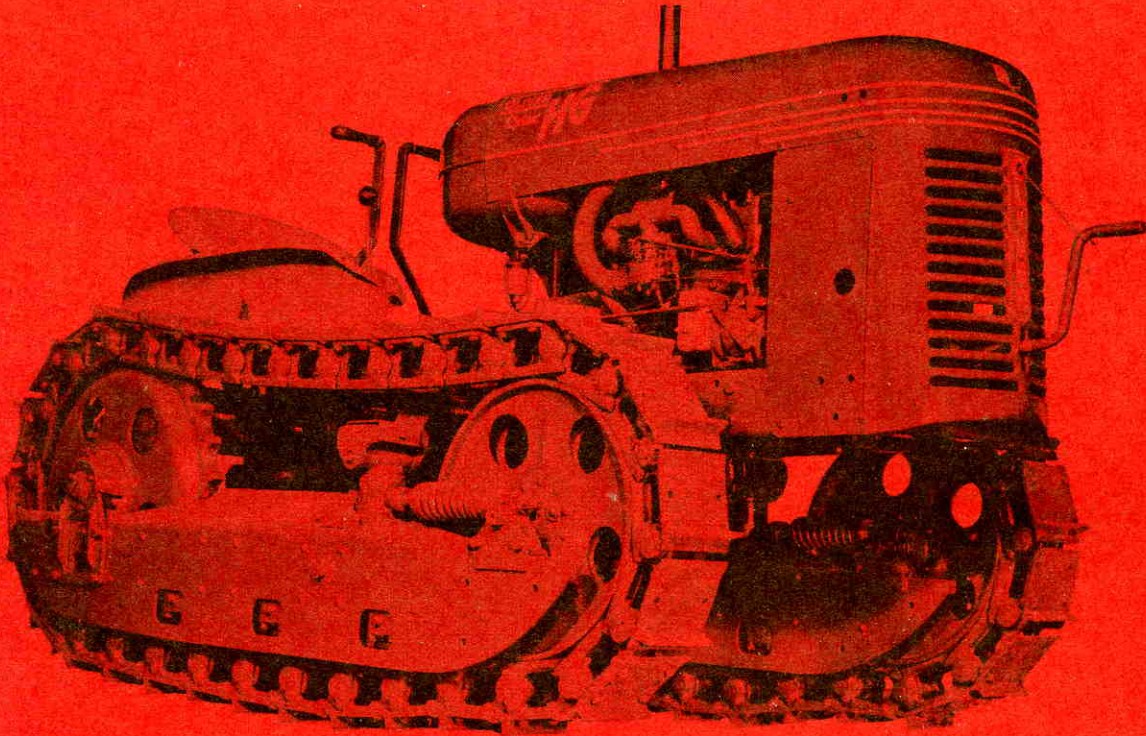
for

Model "HG"



SEVENTH EDITION MARCH 1948

The OLIVER Corporation
CLEVELAND 17, OHIO • • • • U. S. A.



POWER-FLEXIBILITY-PERFORMANCE

Your new Oliver "Cletrac" Model HG is the only crawler tractor of its kind—built specifically for the diversified farm. Its design is the result of more than 30 years of continuous field testing and improvement. We know that its amazing versatility, power and ruggedness will bring downright satisfaction in all your farm operations.

Team up with your Oliver dealer in prolonging the service life of your valuable Model HG. There are extra dividends in keeping it in the best condition . . . and your Oliver dealer is in the best position to help you. He will supply you with genuine replacement parts and provide specialized overhaul supervision.



The OLIVER Corporation

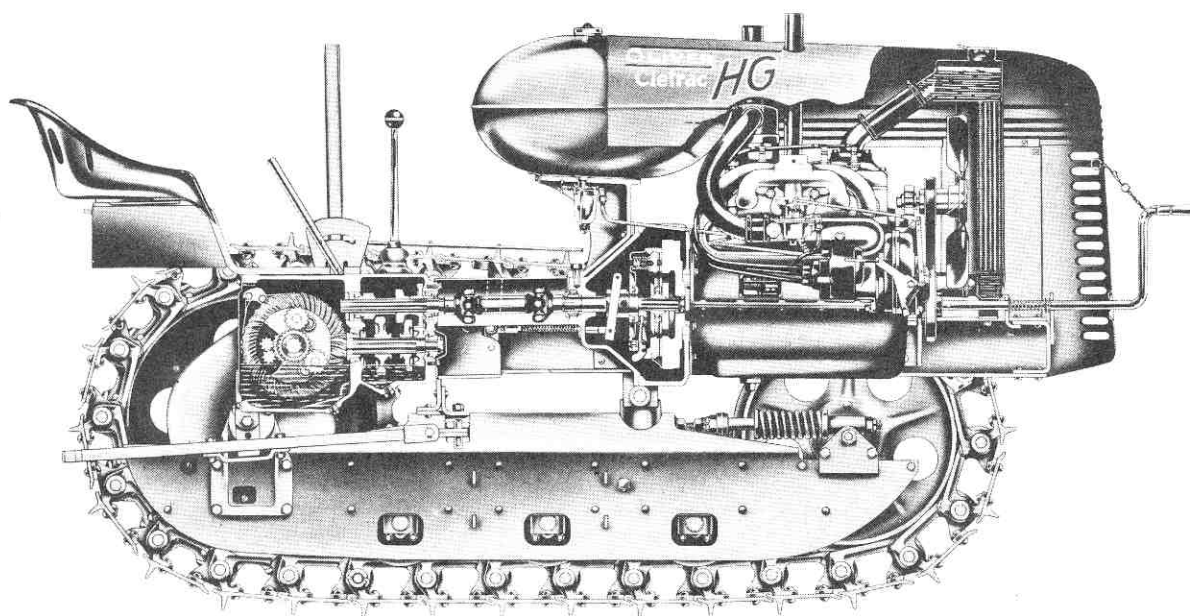
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IMPORTANT INSTRUCTIONS

STUDY BEFORE USING THIS MANUAL

CERTIFICATE OF DELIVERY - Each OLIVER "Cletrac" tractor is given a rigid operating test and final inspection at the factory before shipment and also a thoro service inspection by the Dealer before delivery to purchaser.

The Certificate of Delivery, which includes information pertaining to the tractor and accessories, special equipment, class of work, name and address of purchaser, etc., is the basis of the service history record maintained by the home office.

USE OF INSTRUCTION MANUAL - This book is divided into tractor functional groups numbered the same as the HG Parts Book. Groups are listed in numerical order thru the book; however, some numbers may be omitted as the groups are set up according to a master numerical group list for all models of OLIVER "Cletrac" tractors, and individual models do not use all master groups.

Where capitalized words, such as "TRACKS", "COOLING SYSTEM", etc., appear in this book, they are "key" words to subjects in another part of the book and should be referred to for detailed instructions.

INSTRUCTIONS FOR OPERATION AND CARE - Although the Cletrac is simple to operate and care for, it is important that the operator be thoroly instructed, at the time of delivery, in the proper use and care of the tractor. This is part of the Dealer's delivery service.

Complete instructions regarding daily care and maintenance of the tractor are found in this book. It should be thoroly studied by the operator before attempting to drive the tractor, and should be referred to whenever in doubt.

The manner in which a tractor is operated and cared for during the *first 100 working hours* determines its future life, freedom from unnecessary troubles and delays, etc. The duty of every operator placed in charge of a tractor is to *strictly adhere to instructions received* when machine is delivered and to the instructions in The Instruction Manual.

For the *first 100 working hours*, use one grade lighter engine crankcase oil than recommended under ENGINE LUBRICATION according to temperature ranges. Change oil every 30 working hours during this "break in" period.

LUBRICATION AND MAINTENANCE - Proper lubrication and maintenance are essential to satisfactory performance. Follow the maintenance schedule shown in the front part of this book.

After the first 100 hours operation, tighten all nuts, bolts, and cap screws. Then keep all bolts, nuts, and connections tight at all times.

At least once each month make a thoro check of the entire tractor and occasionally have complete service inspection made by the Dealer's Service Representative, who will call attention to any repairs or adjustments needed at that time or in the near future. Advice to the operator of certain features concerning operation or lack of care may save the owner considerable time and expense.

Dirt is your worst enemy. Before removing inspection covers, plugs, etc., from any part of the tractor, thoroly clean all dirt away from these parts. Keep oil and grease containers clean and well covered when not in use. Do not allow dust to accumulate in them. Keep all breather caps in place, except when servicing.

ANY PROBLEM WHICH MAY ARISE REGARDING PROPER CARE AND MAINTENANCE OF THE TRACTOR SHOULD BE REFERRED IMMEDIATELY TO THE SERVICE DEPARTMENT OF YOUR OLIVER "CLETRAC" DEALER.

ALPHABETICAL REFERENCE

	Page	Group		Page	Group
A			O		
Accessories.	8		Oil Filter.	10	100
Air Cleaner.	22	300	Oil Pan and Screen.	10	100
B			Oil Pressure Adjustment	11	100
*Battery	54	3100	Oil Pressure Gauge.	11	100
Before Starting Tractor.	4		Oil Pump.	11-12	100
C			Ordering Parts.	7	
Carburetor	23	400	P		
Clutch	31-34	900	Pistons	18-19	100
Cooling System	21	200	*Power Pulley and Take-Off 50		3000
Connecting Rods.	17-18	100	*Power Pulley and Take-Off		
Crankshaft Journal			Operation	6	
Dimensions	13	100	*Power Pulley and Take-Off		
*Cut-Out Relay	51-52	3100	Specifications.	1	
D			R		
Differential	38-40	1100	Rear Sprocket Wheel	44	1200
Drawbar and Hitching	5		S		
Driving Instructions	5		Spark Plugs	30	600
E			Starting the Engine	4	
*Electrical Equipment.	51-57	3100	*Starting Motor	53 & 57	3100
Engine Clearances.	13	100	*Starting Switch.	51 & 55	3100
Engine Lubrication	9	100	Steering Bands.	41	1100
F			*Step-Voltage Control	55-56	3100
Fan.	21	200	Stopping the Engine	4	
Final Drive.	42-44	1200	Storage	6-7	
Fuel Strainer.	24	400	T		
G			Tie Bar	30	800
Gear Shift	37	1000	Timing Gears and		
*Generator	52&56-57	3100	Camshaft.	19-20	100
Genuine OLIVER "Cletrac"			Track Frame	45	1400
Parts.	8		Track Frame Guide &		
Governor	24-25	500	Spring Assy.	48	1400
L			Tracks.	49-50	1500
Lower Track Wheel.	46-47	1400	Tractor Specifications.	1	
Lubrication Maintenance			Tractor Speeds.	1	
Chart.	2		Transmission.	35-37	1000
Lubrication Maintenance			V		
Schedule	3		Valve Timing.	13	100
M			Valves.	14-15	100
Magneto - Model "C".	26-27	600	*Voltage Regulator.	51-52	3100
Magneto - Model "X".	28-29	600	W		
Main Bearings.	15-17	100	Winter Operation.	6	
			Winter Overhauling.	7	
			*Wiring Diagram	53 & 55	3100
			Wrench Tension.	13	100

*Special Equipment

SPECIFICATIONS STANDARD MODEL HG

Number of Cylinders	4
Bore	3-1/8 inch
Stroke	4 inch
Number of Main Bearings	3
Number of Camshaft Bearings	4
R.P.M. - Governed	1700
Ignition	High-Tension Magneto
Clutch Diameter - Single Plate	9 inch
Fuel Tank Capacity	12 gallons
Crankcase Capacity	1-1/4 gallons
Cooling System Capacity	2-3/4 gallons
Differential and Transmission - Oil Capacity	2 gallons - Add 2 extra quarts when using power pulley.
Final Drive Capacities (Each)	1-1/2 pints
Track Shoe Width	6 inches

	HG-31	HG-42	HG-60	HG-68
Length Overall	102-1/2 inch	91 inch	91 inch	91 inch
Width Overall	41-1/2 inch	52-1/4 inch	70-1/4 inch	78-1/4 inch
Tracks -				
Center to Center	31 inch	42 inch	60 inch	60 inch

TRACTOR SPEED AT GOVERNED MOTOR SPEED

Low Gear	2.02 miles per hour
Second Gear	3.19 miles per hour
High Gear	5.25 miles per hour
Reverse Gear	2.35 miles per hour

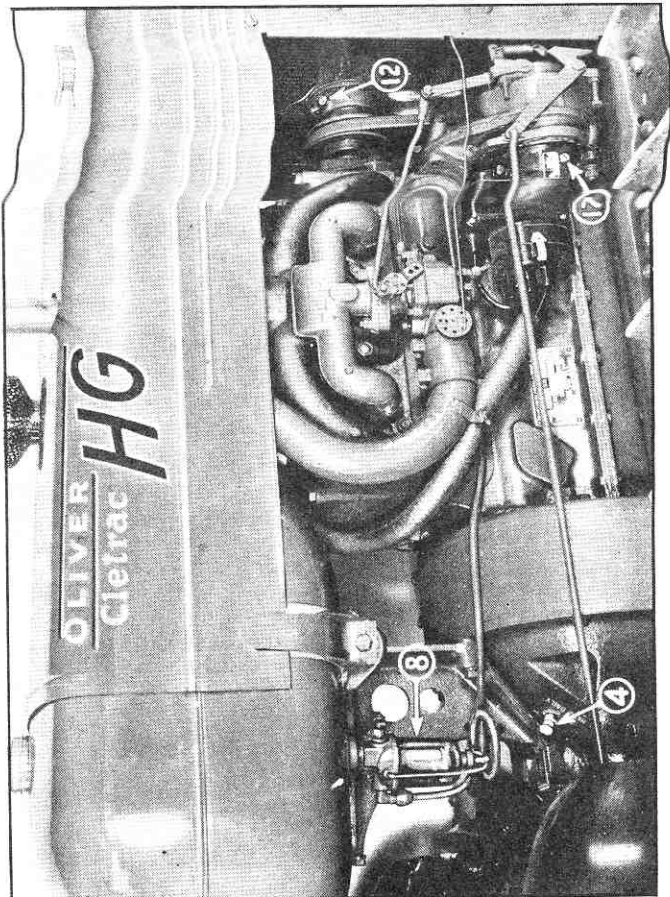
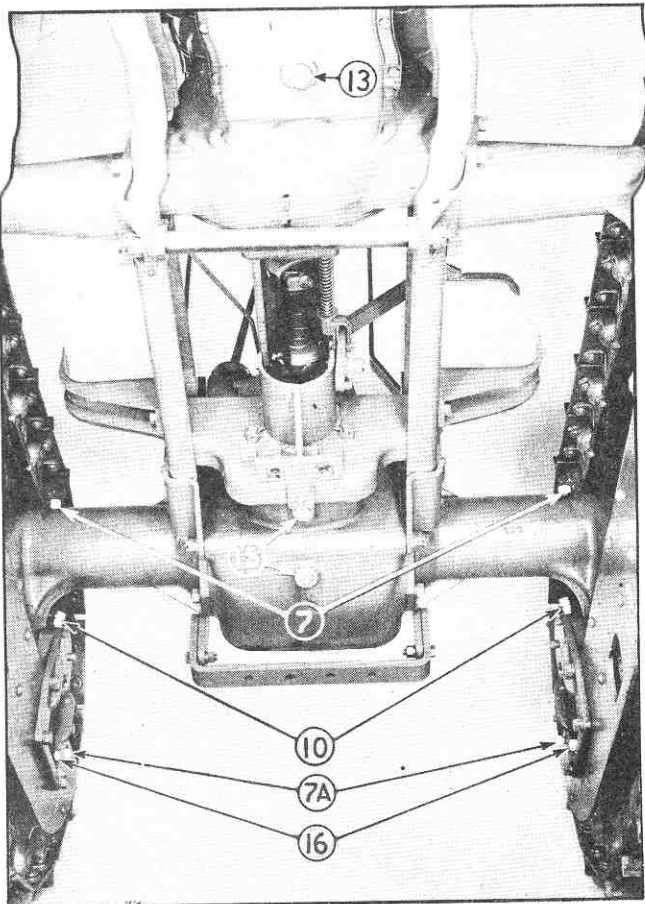
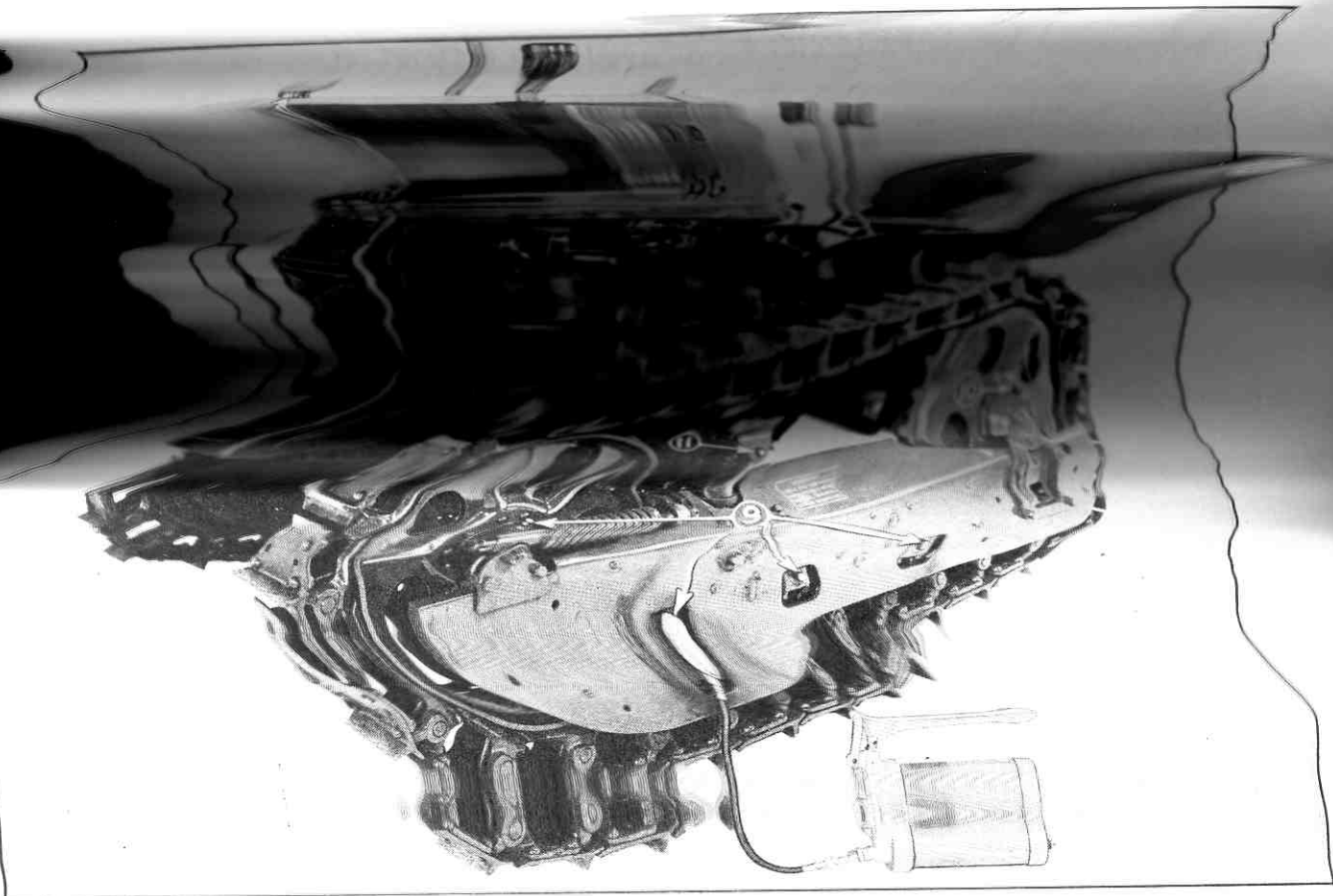
EXTRA EQUIPMENT SPECIFICATIONS

POWER PULLEY AND TAKE-OFF

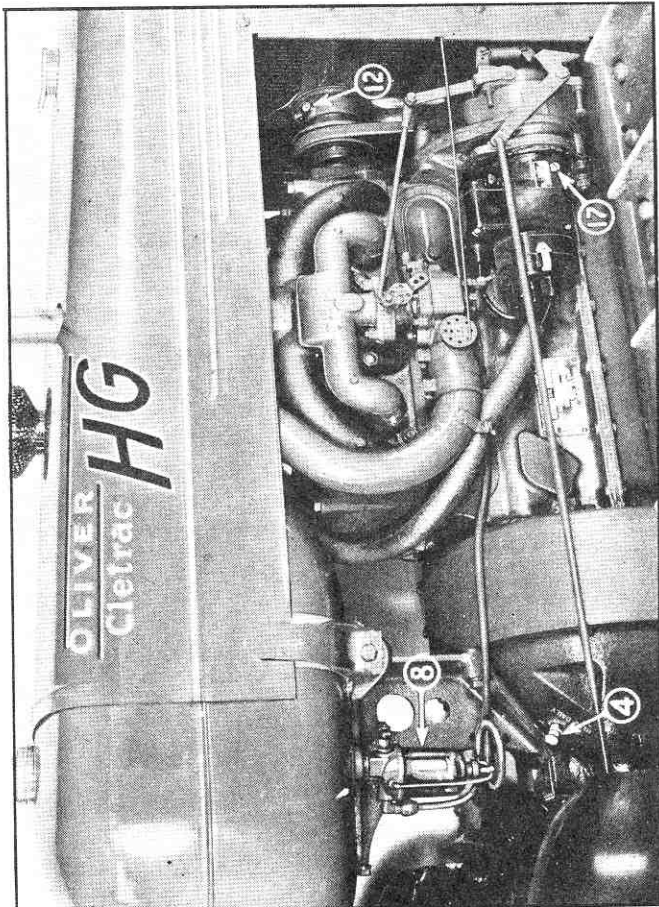
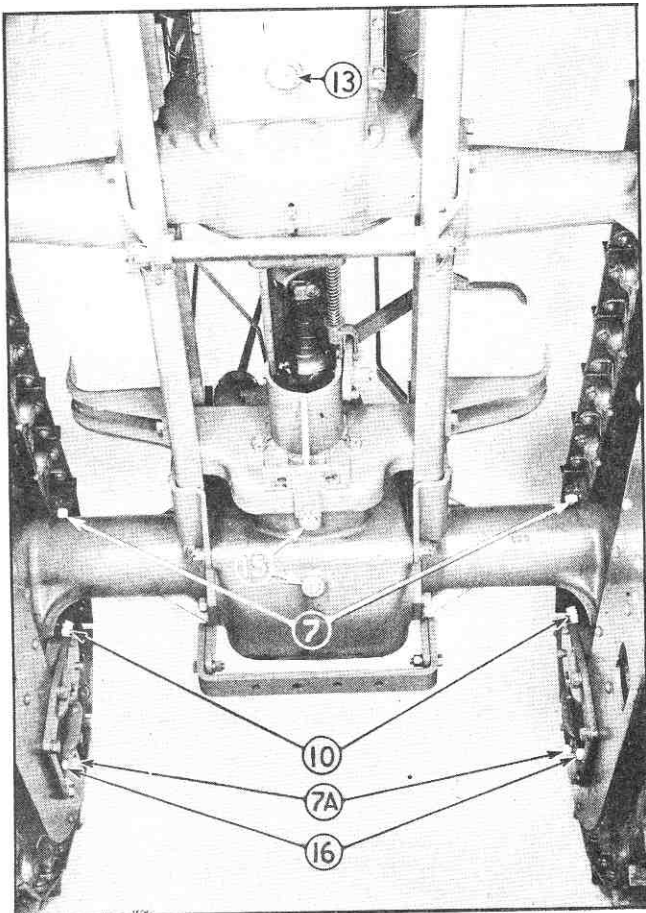
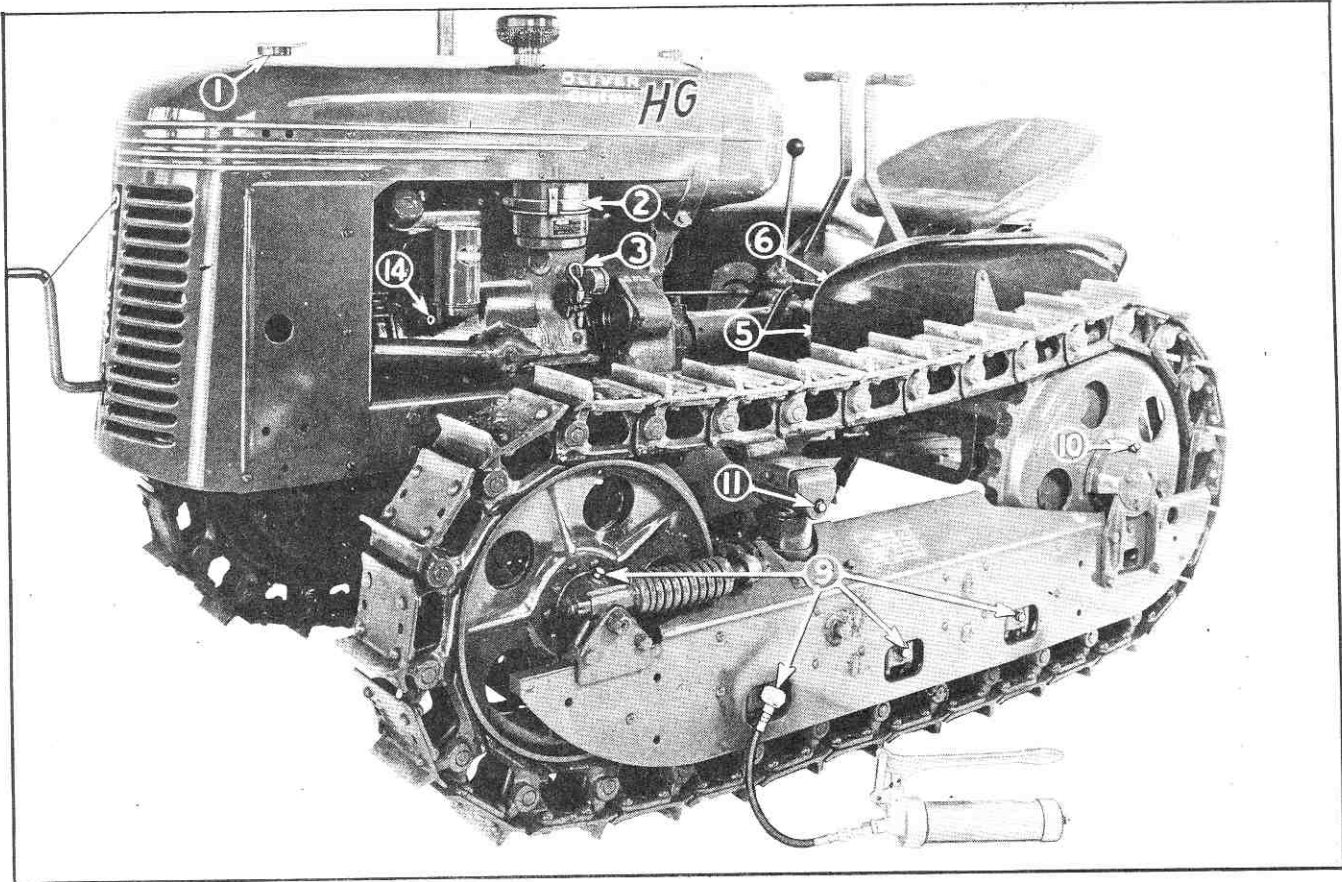
Power Pulley Diameter	8-1/2 inches
Width of Face	6-1/2 inches
Operating Speed P.T.O.	*550 R.P.M.
Belt Speed	*2315 feet per minute
(Size	*1-3/8 inch
Power Take-Off Connection (Type	*6B spline

*Speeds and sizes conform to A.S.A.E. standards.

OLIVER "Cletrac" MODEL HG MAINTENANCE CHART



OLIVER "Cletrac" MODEL HG MAINTENANCE CHART



OLIVER "Cletrac" MODEL HG MAINTENANCE SCHEDULE

IMPORTANT - Study the "Instruction Manual". Always clean away all dirt before removing inspection covers, filler plugs, etc., to prevent dirt from entering compartments. Use clean oil and containers. Use high quality oil and grease for longer tractor life, better operation and to prevent loss of operation time.

TIME	CHART NUMBER	MAINTENANCE OPERATION	PAGE NUMBER
Starting Each Day	1	COOLING SYSTEM - (Capacity 11 quarts.) Keep filled with clean, soft water or anti-freeze.	21
	2	AIR CLEANER - (Capacity 1 pint.) And at intervals varying from 1 to 10 hours, remove cup, clean, and refill to oil level indicated on cup baffle with light engine oil (SAE 20W). Remove prefilter from under cleaner body, also, crankcase filler breather, clean, recoil and replace.	22
	3	CRANKCASE - (Capacity 5 quarts.) And at 8 to 10 hour intervals, check oil level. Keep to 4/4 mark on gauge. Use SAE 10W below 10°+ F., SAE 20W from 10°+ to 32° F., SAE 30 above 32° F.	9-10
	4	CLUTCH - Add 3 or 4 shots of oil, from oil can, to throwout bearing, using same oil as used in crankcase. Check free pedal travel.	31-32
	5-6	DIFFERENTIAL AND TRANSMISSION - (Capacity 8 quarts.) Check oil level at plug on side of case. If low, add oil thru filler plug on top of case. Use SAE 30 below 32° F., SAE 40 from 32° to 70° F. SAE 60 above 70° F. When power pulley is attached, add 2 extra quarts of oil.	35-38
	7-7A	FINAL DRIVES - (Capacity 1-1/2 pints each side.) Check oil level. If low, add oil, using same weight as used in DIFFERENTIAL AND TRANSMISSION.	42
	8	FUEL STRAINER - Check for water and sediment and clean if necessary.	24
	9	TRACK WHEEL BEARINGS - Clean all fittings. Oil Bearings every 10 working hours. When operating in mud or water, oil every 5 working hours and at end of day. Use SAE 20W below 0° F., SAE 30 from 0° to 32° F., SAE 40 from 32° to 70° F., and SAE 60 above 70° F.	45
	10	TRACK FRAME SUPPORT BUSHINGS - Clean fittings and fill with same oil as used in TRACK WHEELS.	45
	11	TRACK FRAME GUIDE BUSHINGS - Clean fittings and fill with same oil as used in TRACK WHEELS.	45
	12	FAN - Remove plug and fill with same oil as used in crankcase. Keep belt slack 1/2 to 3/4 inch.	21
Every 30 to 60 Working Hours or Once a Week	3-13-14	CRANKCASE AND OIL FILTER - Change oil. In extreme heat or dust conditions, change every 30 hours. Remove drain plugs from filter and oil pan and drain thoroughly. Replace plugs and fill to 4/4 mark on gauge. Replace filter when oil discolors between oil changes. Wash oil filler breather cap thoroly and saturate with oil.	9-10
Every 100 to 300 Working Hours or Twice a Year	15	DIFFERENTIAL AND TRANSMISSION - Drain and refill with correct weight of oil.	35-38
	16	FINAL DRIVES - Drain by removing drain plug, and refill with correct weight of oil.	42
	17	MAGNETO - Every 200 hours on Model "C" magneto, remove plug and fill to level of hole with SAE 20 engine oil. Model "X" magneto has no external lubrication points.	26-28
	2	AIR CLEANER - Remove complete assembly, wash in gasoline, and pour light oil over element. In extreme dust conditions, wash assembly every 100 working hours.	22

BEFORE STARTING TRACTOR

Examine tractor for any damage caused by shipping or unloading.

Check the oil level in CRANKCASE and add oil if necessary. Crankcase OIL FILLER and BREATHER CAP should be oiled to prevent dust being drawn into crankcase.

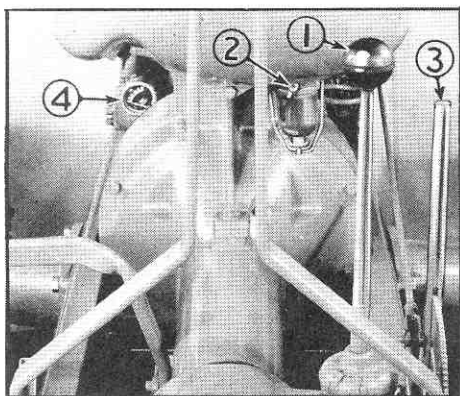
Make sure COOLING SYSTEM is full of clean cooling solution.

Fill the gasoline tank with good grade gasoline - 70 octane.

Make sure AIR CLEANER has received proper servicing.

Check TRANSMISSION, DIFFERENTIAL, and FINAL DRIVE oil levels. Oil all LOWER and FRONT TRACK WHEELS with gun supplied.

STARTING THE ENGINE



1. SHIFTING LEVER
2. GASOLINE SHUT-OFF VALVE
3. THROTTLE
4. OIL PRESSURE GAUGE

Be sure gear shift lever is in neutral position.

Open shut-off valve on gasoline strainer.

Open the throttle to off idle position.

Hold choke in full choke position while cranking engine two quarter turns; release choke and continue to crank engine. (In cold weather, it may be necessary to use choke slightly more.)

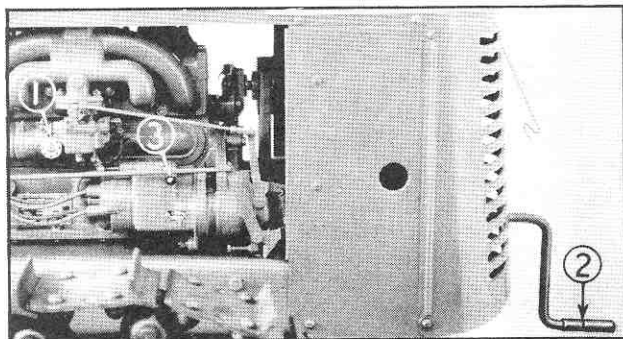
Do not attempt to spin the engine, as the magneto is equipped with an automatic impulse which furnishes a better spark for starting.

Engine should start on third or fourth quarter turn.

When engine starts, observe OIL PRESSURE GAUGE.

If gauge fails to register, stop engine and correct cause.

1. CHOKE
2. CRANK
3. GROUND BUTTON



STOPPING THE ENGINE

After completion of work, let engine idle about five minutes, then press ground button on magneto.

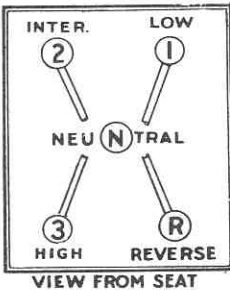
If tractor is left to stand for any length of time, shut off gasoline at the gasoline strainer.

If tractor must stand without shelter, cover the exhaust and intake pipes to exclude rain or snow.

DRIVING INSTRUCTIONS

Operate new tractor under light load for first 100 hours. Before starting to operate tractor, be sure it is properly lubricated.

Never operate throttle, clutch, gear shift, or steering levers violently, as this will not only cause excessive wear, but will give the entire tractor unnecessary abuse.



SHIFTING GEARS - Throttle engine to idling speed, press forward on clutch pedal - bringing transmission gears to a stop - then carefully shift lever into position for desired speed.

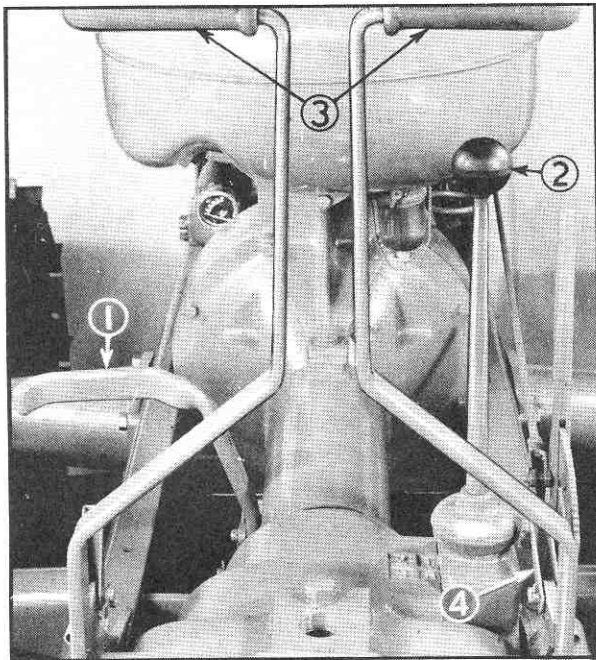
When proper gears are engaged, gradually engage clutch and open throttle sufficiently to start load. Do not shift gears if they grind or clash, or when tractor is in motion.

STEERING is accomplished by pulling steering lever back firmly on side toward which the turn is to be made.

DESCENDING STEEP GRADES - Close throttle to idle position and keep tractor in gear. Retard speed of tractor by pulling back equally on both steering levers. Never allow load to push tractor at higher engine speed than normal, nor allow tractor to coast down steep grades out of gear.

When operating over an obstruction, ditch, or bank, shift to either intermediate or low gear and control motor speed accordingly.

LOCKING TRACTOR IN STATIONARY POSITION - To set levers for stationary work, turn ratchet lock to rear and pull both levers back hard. This method is used only when tractor is stationary, as when using power pulley or for holding loads on steep grades.



1. CLUTCH PEDAL
2. SHIFT LEVER

3. STEERING LEVERS
4. STEERING LEVER LOCK

DRAWBAR AND HITCHING

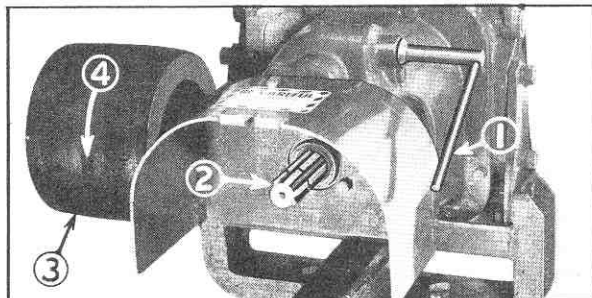
Keep brackets and supports tight. Holes are provided in drawbar support in which bolts may be used to hold drawbar rigid on certain classes of work but, wherever possible, drawbar should swing.

The manner of hitching implements determines the life of the tractor to a great extent. There are questions of side draft and up-and-down pull on the drawbar to be considered. Different types of implements and different implements of the same type do not pull the same. Therefore, it is the duty of the operator to study the hitch of each implement, adjusting it so that, when pulling, the drawbar remains in the direct line of tractor travel.

The hitch on the implement should be adjusted so that it will be as nearly level as possible with the tractor drawbar, when under load.

SAFETY FIRST - When using attaching equipment with power drives, a shield should always be used over the front universal joint to protect the driver.

POWER PULLEY AND TAKE-OFF OPERATION - (Special Equipment)



1. SHIFT LEVER 3. PULLEY - 6-1/2" FACE
2. P.T.O. DRIVE SHAFT 4. DIRECTION OF ROTATION

TO ENGAGE - Throttle engine to idling speed, press forward on clutch pedal, bringing transmission gears to a stop, then carefully engage unit by pressing down on shift lever.

When engaged, open throttle sufficient to start load and ease up on clutch pedal.

TO DISENGAGE - Throttle engine, disengage clutch, after transmission gears have stopped, pull up on shift lever.

WINTER OPERATION

When starting engine in cold weather, allow engine to run idle a few minutes before putting it to work. This will warm up the lubricating oil and assure lubrication to engine parts.

COOLING SYSTEM - Use an anti-freeze in sufficient quantity so that solution will not freeze at the lowest temperature likely to be encountered. Use any good ethylene glycol base commercial anti-freeze for this purpose. Whatever anti-freeze is used, it should be tested daily and kept up to the correct strength.

For extreme cold weather operation, where difficulty is experienced in maintaining proper operating temperatures, it will be advisable to install a radiator cover.

LUBRICATION - Change to proper grade lubricants for ENGINE, TRANSMISSION, and TRACK WHEEL SYSTEM as soon as temperatures drop to those specified in this book.

TRACKS - Keep TRACKS and TRACK WHEELS clean. Frozen tracks will stall the tractor and may cause damage to driving mechanism. Whenever soil is heavy or weather cold enough to freeze, run tractor at end of day's operation in high gear over dry, hard ground. Then thoroly lubricate it and clean all slush and mud from track and track wheel assemblies. If a high pressure water or steam supply is available, it will aid in cleaning.

GARAGE - When possible, provide warm storage place for tractor. The operator will usually give it better care under these conditions.

STORAGE

The tractor should be cleaned thoroly before storing.

Drain all oil from the crankcase and flush with a regular flushing oil. Refill with 5 quarts of S.A.E. 10W oil and run engine idle for 15 or 20 minutes.

All water should be drained by removing drain plug in elbow on left side of engine. The water drain plug should be left out so that any water that might collect in the radiator or water jacket by condensation will drain out. Wire the drain plug to the elbow casting.

Release clutch by blocking clutch pedal forward.

STORAGE - Continued

Drain all fuel from tank, CARBURETOR, and fuel lines. Leave drain valve above gasoline filter open. (This prevents formation of lacquer or gum in fuel system.)

With the engine cold, put one-half cup of good engine oil into each cylinder thru the spark plug holes. Then replace spark plugs, but leave the wires disconnected from the plugs. Turn engine over several times with the starting crank to work oil in between pistons and cylinders. Repeat this operation at least every 30 days.

The tractor should be stored in a dry place. If inside space is not available, jack up and securely block up entire tractor, cover intake and exhaust pipes and cover entire tractor with waterproof tarpauline.

Between tractor working seasons is a good time to clean and paint tractor. This can be done by the operator at a very low cost, and it will prove a profitable investment, as paint prevents rust, corrosion, and deterioration. Proper paint can be secured in small cans from your OLIVER "Cletrac" Dealer.

WINTER OVERHAULING

Neglecting to make minor repairs often results in costly delays. Therefore, when the working season is over, it is advisable to check up on the tractor and arrange with your OLIVER "Cletrac" Dealer for an overhaul, so as to save unnecessary expense and delay when the next season's work begins.

OLIVER "Cletrac" Dealers maintain adequate repair parts stocks and have experienced mechanics available for general overhauling and for immediate service work.

ORDERING PARTS



GENUINE OLIVER "Cletrac" PARTS

Thru years of experience and laboratory tests, OLIVER engineers have selected certain kinds of materials - made to standard specifications of workmanship, which insure, to the owner, the same factors of dependability and economy in OLIVER replacement parts as in the original product - qualities that constitute and distinguish a "Cletrac" tractor.

Slight changes in such specifications, as offered in substitutes, may cause the owner considerable expense and annoyance.

ACCESSORIES

Repairs and parts for carburetor and electrical equipment should be ordered from the nearest *Authorized Representative* of the manufacturer of that accessory.

ENGINE LUBRICATION

LUBRICATION SYSTEM - The engine is lubricated by means of a force feed system, which permits oil, under pressure, to be carried to the main bearings thru channels drilled in the crankcase.

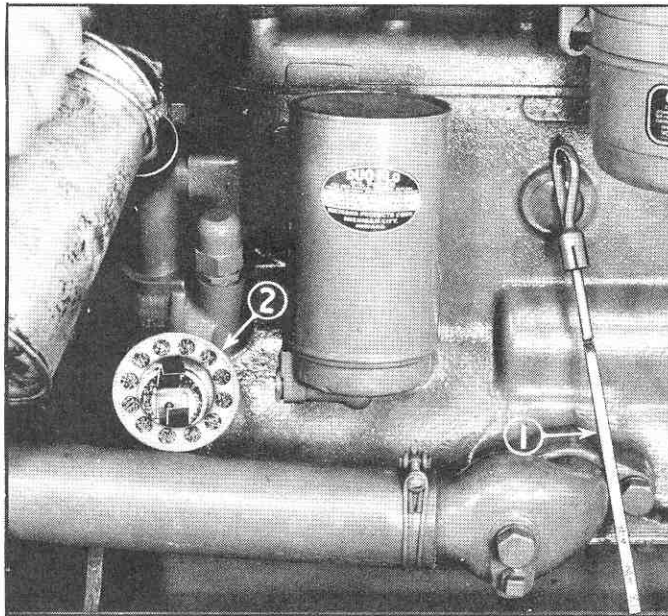
Connecting rods are lubricated by means of holes drilled thru the crankshaft, which register with the oil groove in the upper main bearing.

The camshaft bearings are oiled thru drain-back holes from valve compartment.

Piston pins, cylinder bores, tappets, and valve stems are oiled by means of the oil mist thrown off the connecting rod and main bearings.

Timing gears are supplied oil thru a drilled passage from the oil relief valve.

Crankcase capacity is 5 quarts.



1. BAYONET GAUGE

2. BREATHER FILLER CAP

We recommend the use of a good quality oil and the correct weight to use is as follows:

Below 10⁰+ F. - S.A.E.10W
10⁰+to 32⁰+F. - S.A.E.20W
Above 32⁰ F. - S.A.E.30

CRANKCASE OIL LEVEL - At the beginning of each day's operation, and every 8 to 10 working hours, drive tractor on level place, stop engine, and check oil level at once. Add oil, if necessary, to bring to 4/4 mark on bayonet gauge.

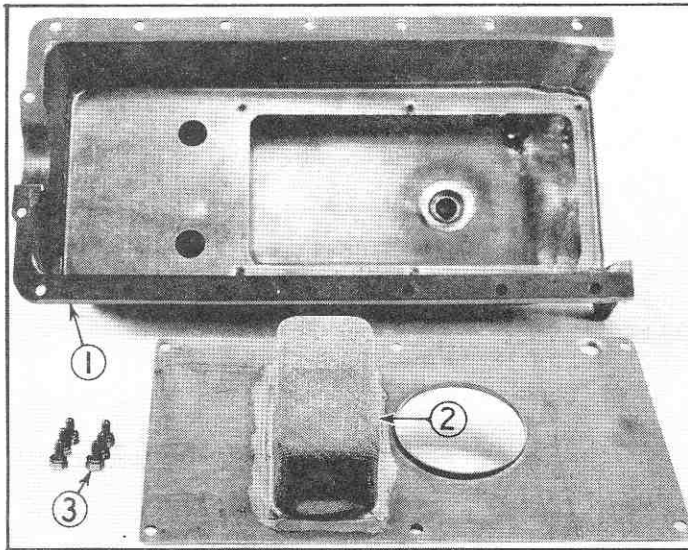
CRANKCASE FILLER BREATHER CAP - Starting each day, and at intervals of 1 to 10 hours, remove and clean cap by immersing in gasoline. Spill clean oil over element to prevent dust from getting into crankcase.

CHANGING OIL - The oil should be changed every 60 working hours, except in extremely hot or dusty conditions, then change oil every 30 working hours.

Drain oil when it is thoroly heated and free to flow. Drive tractor to a level place. Remove drain plugs from filter and bottom of oil pan and do not replace until oil has stopped flowing. Replace plugs and fill crankcase to 4/4 mark on bayonet gauge. Flush engine crankcase at every third oil change.

OIL PAN AND SCREEN

The oil pan screen is located in the bottom of oil pan attached to a baffle plate. Every 500 working hours, oil pan and screen should be removed and washed thoroly.



1. OIL PAN
2. SCREEN ASSEMBLY
3. SCREEN ASSEMBLY CAP SCREWS

REMOVAL - Drain engine oil. Remove two front oil pan round head slotted screws. (NOTE - On early production tractors, it may be necessary to loosen the front engine support from engine and main frame, and tip forward to allow removal of two front oil pan cap screws. Replace these screws with slotted head screws, so that engine support will not need to be loosened the next time oil pan is removed.) Remove remaining attaching screws and drop pan straight down.

Oil pan screen can now be removed by removing cap screws holding screen assembly to pan.

Examine gaskets and, if damaged, replace before reinstalling oil pan.

OIL FILTER

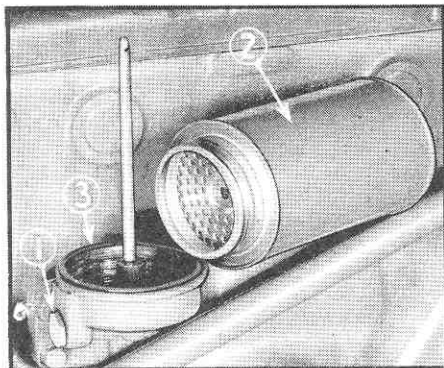
The oil filter is a non-cleanable cartridge type and its life depends upon the mechanical condition of the engine, the quality of the oil used, and general operating conditions.

CARE - At every oil change, remove drain plug and allow filter to drain thoroly.

Every 250 working hours or oftener, when oil begins to get dark and smoky between changes, the cartridge should be replaced.

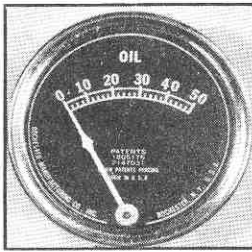
When replacing cartridge, be sure gasket at base of cartridge is in good condition.

After starting engine, when oil pressure is up to normal, check filter for leaks.



1. DRAIN PLUG
2. CARTRIDGE
3. GASKET

OIL PRESSURE GAUGE

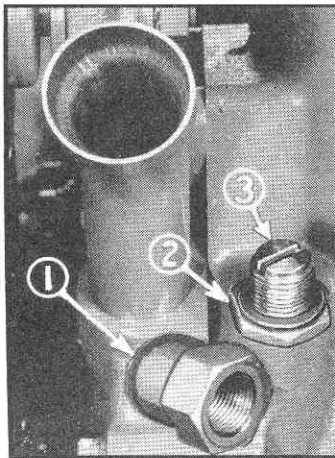


The oil pressure gauge does not tell amount or condition of oil in crankcase. It only indicates whether or not pump is working. As soon as engine starts, observe gauge. If it fails to register, stop engine at once and determine cause.

When engine is hot, pressure should be not less than 15 pounds at governed engine speed and not less than 5 pounds at idle speed.

OIL PRESSURE ADJUSTMENT

Oil pressure is regulated by a spring-loaded plunger located on engine block near the oil filler pipe.



1. ACORN NUT
2. LOCK NUT
3. SLOTTED SCREW

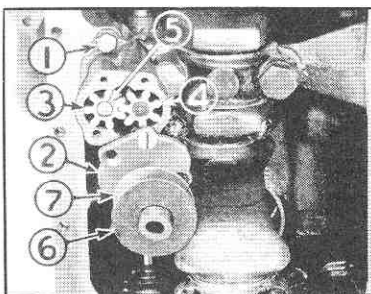
To adjust pressure, remove acorn nut, loosen lock nut and turn slotted screw to *right* to increase pressure and to *left* to decrease pressure. Adjust pressure to 15 pounds at operating temperature (oil hot) and throttle wide open. When making adjustment, if pressure does not change, remove regulating plunger and wash parts in clean gasoline, then reassemble and recheck.

Before attempting to change adjustment, check accuracy of oil pressure gauge and make sure all oil lines are clean, connections are tight, bearings are in good condition and oil is of proper grade.

Consult your OLIVER "Cletrac" dealer if in doubt.

OIL PUMP

The oil pump is attached to the cylinder block and its gear is driven by a gear integral with the camshaft. The bottom cover of the pump forms the suction line, and extends down inside the oil pan screen.



1. CAP SCREWS
2. PUMP COVER
3. LOWER GEAR
4. IDLER GEAR
5. SNAP RING
6. FELT WASHER
7. METAL WASHER

REMOVAL - Drain and remove OIL PAN. Remove two cap screws holding pump to engine block, after which pump can be pulled straight out.

SERVICING - Remove pump cover screws and remove cover. Remove pin from hub of spiral driving gear and pull or drive this gear off shaft. (Do not attempt to drive shaft thru gear.) Remove Woodruff key and pull the shaft out of bottom of pump.

To remove lower gear, push gear up on shaft about 3/8 inch and remove snap ring, after which gear can be pressed off. This same procedure applies to the idler gear and its shaft.

OIL PUMP – Continued

If new parts are used, be sure pump shaft can be rotated freely without binding.

REASSEMBLY - Reassembly is reverse of removal, however, be sure that oil pump-to-engine block gasket is not damaged and that oil pump driving gear meshes properly with camshaft gear and is not damaged when installing.

Also make certain that the felt washer and metal washer are assembled on suction tube with felt next to the OIL PAN screen assembly.

ENGINE CLEARANCES

Camshaft Bearings	.0015 - .0025
Connecting Rod Bearings	.0010 - .0015
Connecting Rod Bearing (Side Clearance)	.005 - .010
Main Bearings	.002 - .0025
Crankshaft End Play	.002 - .004
Piston Clearance	.0025 - .003
Piston Ring Clearance in Groove	.0015 - .0025
Piston Ring Gap	.015 - .020
Piston Pin Clearance in Bushings	.0005
Intake	.006
Valve Tappet Clearance (Hot) Exhaust	.008
Valve Stem in Guide	.0025
Valve Tappet in Cylinder Block	.00075 - .001
Governor Gear to Camshaft Gear Lash	.002 - .004
Camshaft Gear to Crankshaft Gear Lash	.000 - .002
Valve Seat Diameter - Intake	1-3/8 inches
Valve Seat Diameter - Exhaust	1-1/4 inches
Angle of Valve and Seat	30 degrees
Width of Valve Seat	1/8 inch

VALVE TIMING

INTAKE	
OPENS	CLOSES
5° P T DC	45° P L DC

EXHAUST	
OPENS	CLOSES
35° B L DC	5° P T DC

NOTE - Letters designate - B-Before
P-Past

L-Lower
T-Top

DC-Dead Center

WRENCH TENSION

(For Tightening Nuts and Cap Screws)

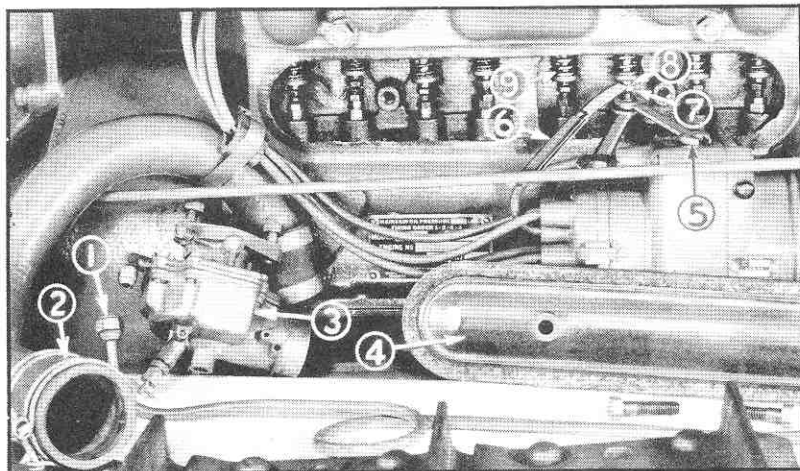
	FOOT POUNDS	INCH POUNDS
Cylinder Head	35	420
Connecting Rod	42	504
Main Bearings	77	924

CRANKSHAFT JOURNAL DIMENSIONS

	MAIN BEARING JOURNAL	CON. ROD BEARING JOURNAL
Standard	1.988 - 1.987	1.748 - 1.747
.020 Undersize	1.968 - 1.967	1.728 - 1.727
.030 Undersize	1.958 - 1.957	1.718 - 1.717
.040 Undersize	1.948 - 1.947	1.708 - 1.707
.060 Undersize	1.928 - 1.927	1.688 - 1.687

The above dimensions should be used when regrinding crankshaft to give correct oil clearance.

VALVES



- | | | |
|---------------------|-----------------------|-----------------|
| 1. FUEL LINE | 4. TAPPET COVER | 7. TAPPET |
| 2. AIR CLEANER PIPE | 5. WRENCH ON LOCK NUT | 8. VALVE STEM |
| 3. CARBURETOR | 6. FEELER GAUGE | 9. VALVE SPRING |

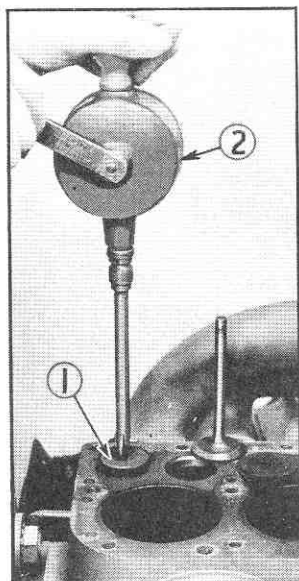
TAPPET ADJUSTMENT - Run engine until hot. Shut off fuel and disconnect fuel line at carburetor. Remove air cleaner pipe, carburetor, and tappet cover, being careful not to damage gasket. Crank engine over until intake valve on No. 1 cylinder opens and closes and tappet has reached its lowest position. Both intake and exhaust valves on No. 1 cylinder can now be adjusted. Loosen tappet lock nut and, using a feeler gauge between tappet and valve stem, adjust to proper clearance, (hot): Intake .006 inch - exhaust .008 inch. Tighten lock nut and

recheck. Follow the procedure outlined above and adjust valves on Nos. 2, 4, and 3 cylinders, in the order named.

When replacing cover, make sure gasket is in good condition.

TAPPET REPLACEMENT - Valve tappets are mushroom type, made with a screw and lock nut to provide for adjustment of valve stem clearance. When installing new tappets, a check should be made to allow .001 inch clearance in cylinder block.

To replace, remove CAMSHAFT and OIL PAN. Tappets can now be removed from the bottom of cylinder block.



- | |
|------------------|
| 1. VALVE |
| 2. VALVE GRINDER |

VALVE GRINDING - Drain COOLING SYSTEM. Remove air cleaner pipe, hood, fuel line, CARBURETOR, tappet cover, and cylinder head. Lift valve spring with suitable lifter and remove valve seat pin. Clean carbon from cylinder head, piston head, cylinder block, valves, and valve stems.

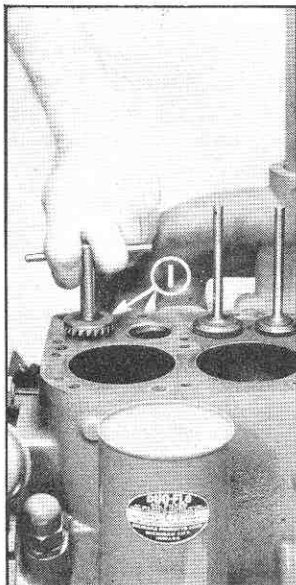
Valve grinding is done by placing a small amount of suitable grinding compound on the face of the valve. A light coil spring, placed around the valve stem before it is inserted in cylinder block for grinding, will facilitate the work, as this will lift the valve from the seat as pressure of grinding tool is relieved. Grinding tool should be turned backward and forward and lifted from its seat to change its position.

When valves have been properly ground, valve face and seat will show a clean, even, dull-gray surface, with no pits. Before replacing valves, be sure all grinding compound has been washed away and valve stems are oiled.

Replace valves and adjust, as outlined under tappet adjustment.

VALVES - Continued

REPLACEMENT OF VALVE GUIDES - When valve guides become badly worn, they should be replaced with new ones. This work should be done before any attempt is made to grind or reseat valves. Remove the guide with a punch having a pilot the size of the valve stem and drive the guide downward into the valve spring chamber. It may be necessary to break off the part of the guide which is in the valve chamber. New guides are driven in from the top and should project into valve spring chamber only as far as the original guides. After new guides are installed, they must be reamed to give valve stem clearance of .0025 inch. Use a 5/16 inch standard reamer to ream guides. New valves should be installed if stems are worn badly.



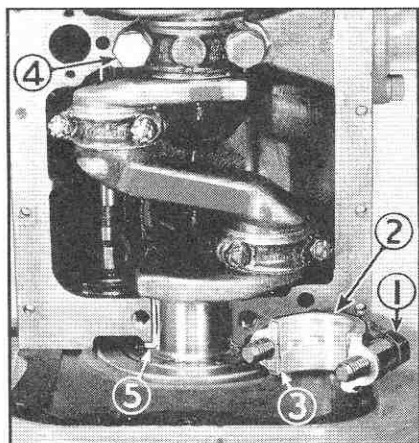
1. VALVE RESEATER

RESEATING VALVES - Valve seats should be refaced after new guides have been installed or when they have become badly pitted or worn. Use a suitable 30 degree seat reamer and a narrowing reamer so that the finished face of seat is not more than 1/8 inch wide. Valves should be refaced on a suitable 30 degree valve refacing machine.

CYLINDER HEAD INSTALLATION - Clean and examine cylinder head gasket and replace if necessary. When installing gasket, apply a light coat of Permatex to each side to act as a sealer. When replacing cylinder head, the center row of cap screws should be drawn down firmly, starting from the center and working to the front and back, alternately. Then the outside rows should be drawn down, starting at the center and working front and back, alternately. Repeat this operation until head is securely tightened. When engine is thoroly warmed up, all cap screws should be retightened.

Examine air cleaner hoses and be sure they are not damaged and all connections are tight.

Complete reassembly by installing carburetor, air cleaner pipe, and hood.



1. CAP SCREWS
2. BEARING CAPS
3. SHIMS
4. THIN-HEAD CAP SCREW
5. UPPER SHELLS

MAIN BEARINGS

REMOVAL - Drain and remove OIL PAN and OIL PUMP. Remove cap screws to remove bearing caps. Main bearing caps are numbered on the camshaft side and should always be installed in the same position as removed. Do not lose shims or change them from their respective positions. *Note thin-headed cap screw on oil pump side of center main bearing.*

Later production and service engines have precision bearing shells, use no shims and have a shorter oil pump body, to allow greater clearance for center main bearing cap.

MAIN BEARINGS - Continued

MAIN BEARING ADJUSTMENT - To adjust poured bearings, remove just enough shims until a drag can be felt against rotation of crankshaft. Then install enough shims to provide .002 to .0025 inch for oil clearance. Adjust and test each bearing separately. Bearings adjusted too tightly will cause a sluggish engine and damaged bearings.

No adjustment is needed with shell type bearings. If excessive clearance develops between shaft and bearing shells, install new shells. If crankshaft is worn underside, regrind according to table of clearances page 13 and install corresponding undersize bearing shells.

INSTALLING NEW BEARINGS - Upper main bearing shells are bronze-backed and babbitt-lined and will need no fitting, except perhaps the rear main, which is the thrust bearing. This may require a slight amount of scraping to provide .002 to .004 inch clearance for end thrust.

Shells may be removed by loosening all main bearing caps enough to allow crankshaft to sag slightly. Remove each bearing cap individually, revolve shell out around crankshaft and replace cap. New shells can be installed in the same manner.

Lower or main bearing caps are babbitt poured into steel caps and will require only a minimum amount of fitting. After new bearings have been installed, use shims for adjustment as outlined under main bearing adjustment.

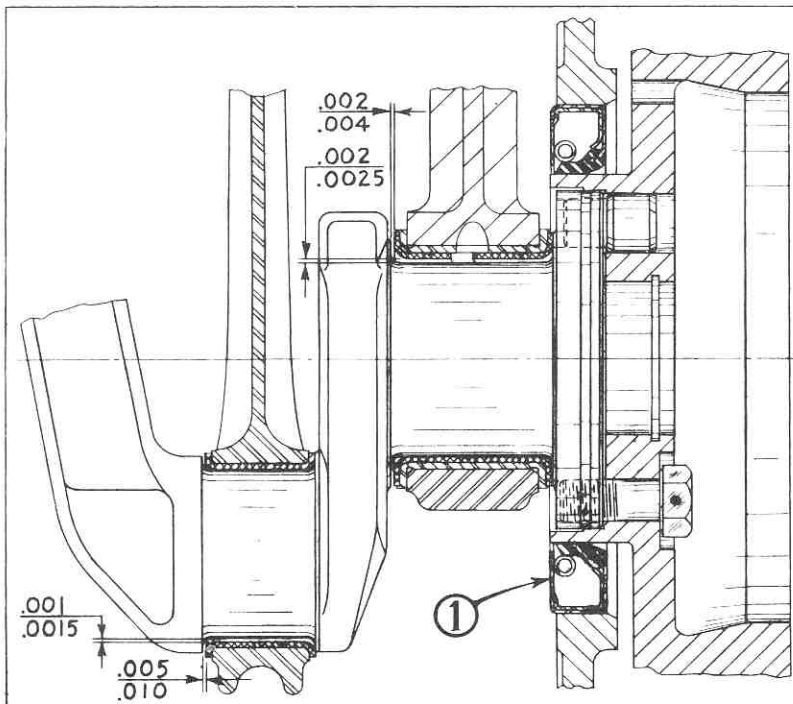
Later engines have lower bearing caps with precision shell insert bearings. Lower shells are easily inserted into the cap and rarely need adjustment except for scraping the thrust surface of the rear main bearing to obtain proper end clearance. Be sure shell is installed with ear in recess in bearing cap.

Poured babbitt main bearing caps are furnished for service in .020, .030 and .060 undersize for reground crankshafts. Precision shell type bearings are furnished in .020, .040 and .060 undersize for reground crankshafts. See table of clearances page 13 for correct crankshaft regrinding dimensions.

When reinstalling oil pan, examine gaskets and oil seal composition rubber sleeve and replace if damaged.

REAR MAIN BEARING OIL SEAL - Seal is a patented type, held in place in engine bellhousing. Proper sealing depends on the flywheel pilot surface being polished smooth so as not to cause rapid wear on seal leather. Be sure all nicks or rough spots have been removed from flywheel pilot.

MAIN BEARINGS - Continued

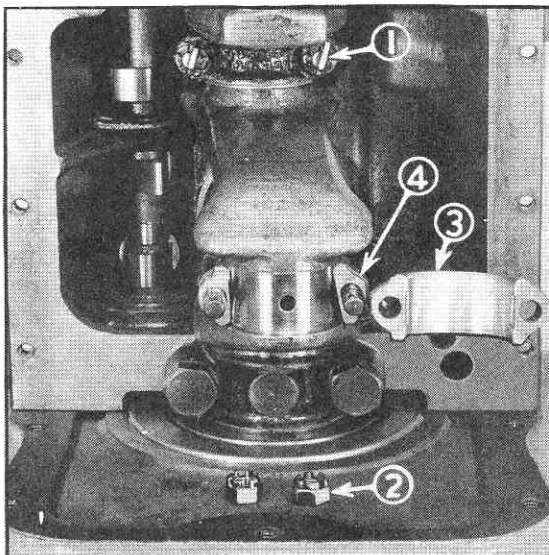


1. OIL SEAL

SEAL REPLACEMENT - Remove ENGINE OIL PAN and CLUTCH. Before removing flywheel, center punch face of flywheel and corresponding dowel pin so as to assure correct reassembly of flywheel to crankshaft. With flywheel and oil pan removed, use a small, hard-wood block and drive seal out from front to rear. New seal must be installed from the rear with lip of leather seal pointing forward to seal against oil seepage from the engine.

CONNECTING RODS

Connecting rods have babbitt spun directly into the steel rod and bearing caps and are reamed nearly to size. Shims are provided for adjustment. *Later production and service connecting rods have replaceable precision bearing shells and need no shim adjustment.*



1. COTTERS 3. CAP
2. NUTS 4. SHIMS

REMOVAL - Drain and remove OIL PAN. Remove cotter pins and nuts from rod bolts and remove cap, being extremely careful not to lose shims or to change them from their respective positions. Connecting rods and caps are always numbered on the camshaft side and must be reinstalled in their respective positions. *Rods with shell insert bearings are removed in the same manner except shims are not used.*

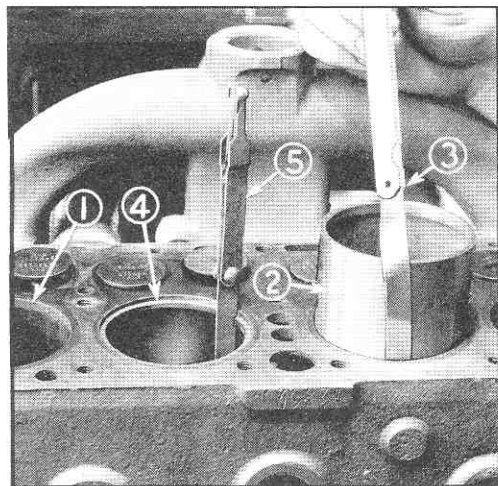
ADJUSTMENT - Connecting rods with spun babbitt bearings are adjusted by removing just enough shims to take up excessive clearance due to wear. Take out shims until a slight drag is felt against the rotation of crankshaft, then add shims to allow running clearance of .001 to .0015 inch. Rods using shell insert bearings have no adjustment. If excessive clearance develops between crankshaft and bearing shells, new shells should be installed.

CONNECTING RODS - Continued

Bearings adjusted too tightly will cause a sluggish engine and damaged bearings. Adjust each bearing separately, then check drag on all four. When final adjustment is completed, tighten nuts securely and install cotter pins.

INSTALLING NEW RODS - Both spun babbitt bearings as part of the connecting rod, and insert shell bearings, require only a minimum, if any, fitting. However, side clearance of .005 to .010 inch should be allowed. After spun babbitt bearings have been properly fitted, adjust for oil clearance of .001 to .0015 as described under **ADJUSTMENT**.

PISTONS



1. CARBON
2. PISTON
3. .0025 FEELER GAUGE
4. PISTON RING
5. .015-.020 FEELER GAUGE

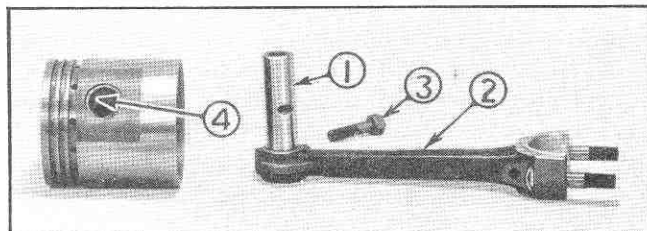
REMOVAL - Drain and remove OIL PAN, hood, and CYLINDER HEAD. Scrape all carbon out of top of cylinder bore. Remove CONNECTING ROD CAP and shove rod and piston assembly up thru cylinder.

FITTING NEW PISTONS - In fitting new pistons to cylinder bores, the clearance should be carefully controlled. Correct clearance of piston in cylinder bore is .0025 to .003 inch and should be checked with a long .0025 feeler ribbon between the skirt of the piston and cylinder bore. When pushing the piston down thru the bore, it should be possible to remove the feeler with a slight pull.

FITTING PISTON RINGS - Proper piston ring gap is from .015 to .020 inch. Each new ring should be fitted individually in the cylinder near the top of the bore.

In case of worn cylinders, new rings should also be checked at the bottom of ring travel in bore, because the amount of taper in cylinders might show that ring gaps are insufficient at this point.

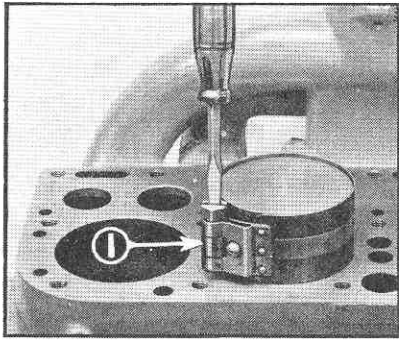
Next, clean ring grooves and oil control holes thoroly. Check rings for side clearance in grooves before installing them on pistons. Correct side clearance is .0015 to .0025 inch.



1. PISTON PIN
2. CONNECTING ROD
3. CLAMP SCREW
4. BRONZE BUSHINGS

PISTON PIN - Piston pins are clamped and held in the upper end of connecting rods with a clamp screw fitting thru a notch in piston pin. Pistons have bronze bushings in pin bosses and new pins should be fitted to a light push fit in piston pin bushings.

PISTONS – Continued



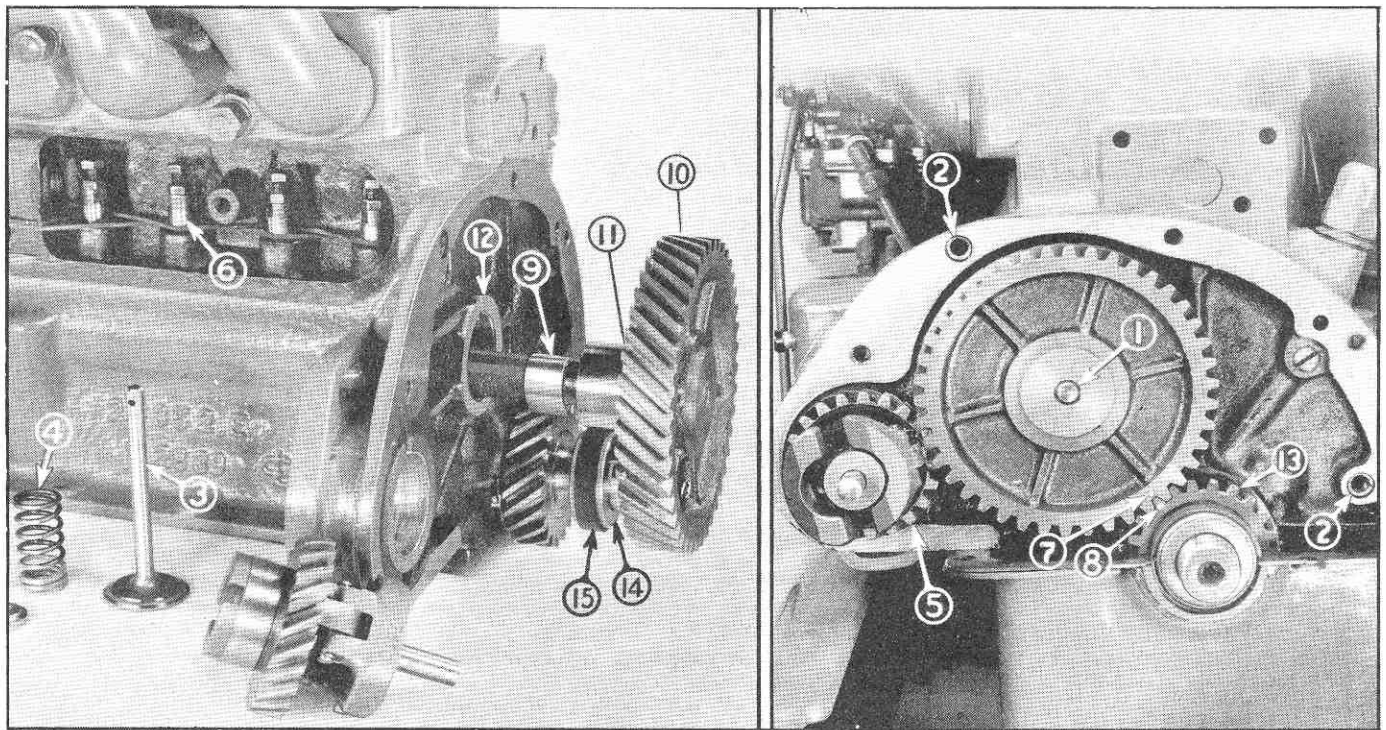
1. RING COMPRESSOR

INSTALLATION – When installing piston in cylinder, oil pistons and rings thoroly and stagger ring gaps, then compress piston rings with a suitable ring compressor.

Have crankshaft throw at bottom and use extreme care that rings enter cylinder bore correctly and are not damaged or broken during installation.

Install CONNECTING ROD CAPS.

TIMING GEARS AND CAMSHAFT



- | | | |
|--------------------------------------|-----------------------------|-------------------------------|
| 1. THRUST PLUG | 6. TAPPETS (TIED UP) | 11. POSITION OF THRUST WASHER |
| 2. DOWELS | 7. TIMING MARK (CAM GEAR) | 12. CAM BEARINGS |
| 3. VALVES | 8. TIMING MARK (CRANK GEAR) | 13. CRANKSHAFT GEAR |
| 4. VALVE SPRINGS | 9. CAMSHAFT | 14. OIL SEAL |
| 5. GOVERNOR GEAR AND WEIGHT ASSEMBLY | 10. CAM GEAR | 15. SLEEVE |

CAMSHAFT THRUST ADJUSTMENT – Camshaft end play is controlled by means of a thrust adjusting screw, accessible on the outside of gear cover. At occasional intervals, or when cover has been removed, the camshaft end play should be checked.

To adjust, loosen adjusting screw lock nut and, with a screw driver, turn the adjusting screw in until lightly seated against cam gear thrust plug and then back screw out 1/8 turn. Tighten lock nut, being careful not to disturb the adjustment.

TIMING GEARS AND CAMSHAFT - Continued

TIMING GEAR COVER REMOVAL - Drain COOLING SYSTEM.

Remove hood, radiator grill, radiator, fan and bracket, governor cover assembly, and lower fan pulley. Remove engine front support cap screws and bolts and tip support forward. Remove gear cover cap screws and lift cover off, being careful that dowels are not lost and gasket is not damaged.

When replacing cover, coat gasket with shellac on both sides and use extreme caution to see that gasket does not shift out of correct position.

CAMSHAFT GEAR REMOVAL - Remove CYLINDER HEAD, CARBURETOR, TAPPET cover, VALVES, VALVE springs, OIL PAN, OIL PUMP, and GOVERNOR gear and weight assembly. Tie tappets up away from camshaft.

Crank engine over until center punch timing marks on camshaft gear and crankshaft gear are in alignment. Camshaft can now be pulled straight out.

Cam gear can now be pressed off from front to rear.

When pressing on new gear, be sure Woodruff key is in place and when replacing camshaft in cylinder block, be certain that *thrust washer is in position between cam gear and cylinder block*, and that timing marks on camshaft gear and crankshaft gear are in exact alignment.

CAM BEARINGS - Cam bearings should be inspected when camshaft is removed and, if damaged or worn excessively, they should be replaced.

To replace, drive bearings out and use caution when driving new bearings into cylinder block, also be certain oil holes correspond with oil passages in cylinder block.

Bearings should be line reamed to a clearance of .0015 to .0025 inch.

CRANKSHAFT GEAR - Crankshaft gear is a tight fit on shaft and can be removed by drilling and splitting the gear.

When installing new gear, heat with a torch until it just turns blue (about 500 degrees F.) and immediately install gear on shaft. A thin coat of white lead will make installation easier.

Timing center punch marks should be aligned as outlined under CAMSHAFT GEAR REMOVAL.

CRANKSHAFT OIL SEAL - Front oil seal should be examined while gear cover and oil pan are removed and, if damaged, should be replaced. The composition oil sealing sleeve over the oil seal should be replaced at this time.

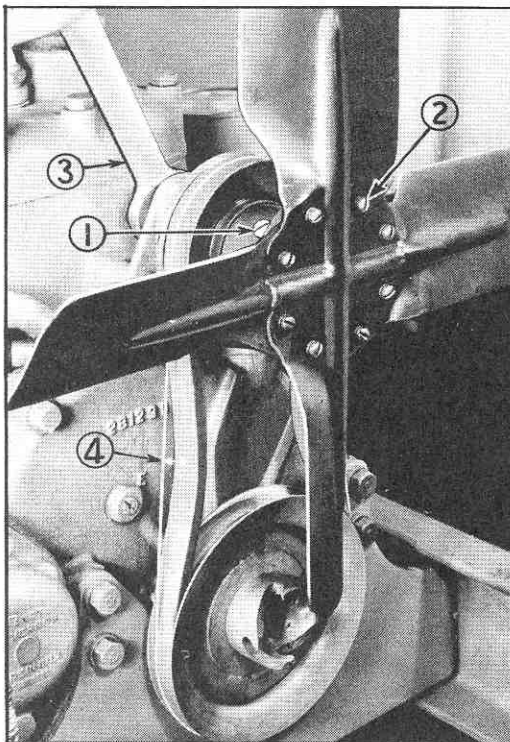
GROUP 200-COOLING SYSTEM

Capacity of cooling system is 11 quarts. The engine is water-cooled by the thermo-siphon system. Always use clean cooling solution free from dirt or other foreign matter which might clog the cooling system. Drain, flush, and refill the system several times during each season to remove any dirt and loose scale which has collected. Drain cooling system by removing 1/4 inch pipe plug in lower water inlet elbow at cylinder block. Never allow front of radiator core to become clogged with trash. Use a tire pump to clean radiator core by blowing air thru from the rear. Do not add cold water to an overheated engine. Serious damage to cylinder head and cylinder block might result.

WATER SOFTENER - In certain localities, scale forms on inside walls of entire cooling system, due to use of hard water. This clogs radiator and causes overheating. Use rain water or suitable water softener, in such localities, to prevent this deposit. After scale is once formed, it is very difficult to remove.

FREEZING WEATHER necessitates special attention. Never let tractor stand idle with only clear water in cooling system. Either drain cooling system completely or use an ethylene glycol base anti-freeze solution of proper strength and quality. If tractor is drained to prevent freezing, make sure all water is out of system and do not replace drain plug until ready to refill. Always mix solution before pouring into radiator.

When operating in cold weather, cover lower part of radiator core to keep engine at normal operating temperature of 160° F. for correct engine operation. This will aid in prevention of crankcase dilution, condensation and sludge. NOTE - A special radiator curtain with spring tension to roll up or down, may be purchased from your OLIVER "Cletrac" Dealer.



1. OIL PLUG
2. BLADE SCREWS
3. WRENCH ON NUT
4. SLACK IN BELT 1/2 TO 3/4 INCH

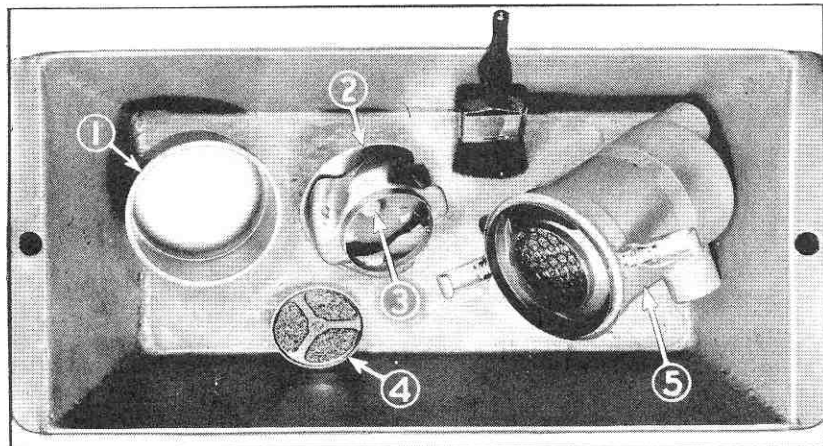
FAN

LUBRICATION - Use oil only in fan bearing - the same weight as used in engine. Every 30 to 60 working hours, use a screw driver to remove screw plug in the fan hub, and add motor oil until full. Replace and tighten plug. Once a month, check blade screws for tightness.

BELT ADJUSTMENT - Loosen fan shaft nut, and with a screw driver or bar, raise or lower fan assembly in slotted bracket to correct belt tension. Belt tension is correct when belt can be pulled in approximately 1/2 to 3/4 inch. If fan belt is too tight, excessive wear in fan bearing and pulleys will result; while, if it is too loose, belt will slip and cause motor to overheat. After adjustment is made, be sure to tighten fan shaft nut securely.

OVERHEATING - If engine overheats, always check fan and belt first. Overheating is usually caused by an improperly adjusted, damaged, or worn fan belt. Adjust or replace belt, as the case may require.

GROUP 300-AIR CLEANER



- | | |
|--------------------------|--------------------------|
| 1. OIL CUP | 3. OIL LEVEL DESIGNATION |
| 2. BAFFLE | 4. PREFILTERING ELEMENT |
| 5. CLEANER BODY ASSEMBLY | |

We cannot stress too strongly the importance of servicing the air cleaner. The air cleaner will remove dust from the air, but the operator must remove the dust from the cleaner.

Keep all connections between air cleaner and carburetor tight. This is important. Should air cleaner or carburetor hose connections become damaged they should be replaced at once, for any slight air leak could easily be the cause of a damaged engine.

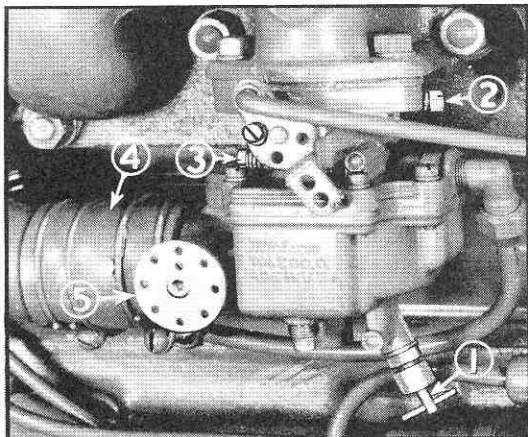
At the beginning of each day's operation and at intervals varying from 1 to 10 working hours, depending upon dust conditions, remove oil cup. Remove baffle in cup and wash both thoroly in gasoline and refill to oil level designation mark on baffle with clean, light (S.A.E. 20W) engine oil. NOTE - (Never use drained crankcase oil).

Remove prefilter, located in bottom of cleaner body, by turning to grooves and pulling down. Clean and saturate with oil before reassembly to cleaner.

Every 100 to 300 working hours, depending upon dust conditions, remove entire cleaner assembly, wash thoroly in gasoline and pour clean, light (S.A.E. 20W) engine oil over screen in cleaner body. In extremely dusty conditions, clean air cleaner assembly every 100 working hours.

When operating in extremely dusty conditions, use an extension on cleaner intake pipe, high enough to get above dust line, or use an auxiliary cleaner.

In instances where an auxiliary cleaner is used as extra equipment, the necessity of regular attention to the oil bath cleaner is not lessened. Follow closely the instructions on care of this cleaner.

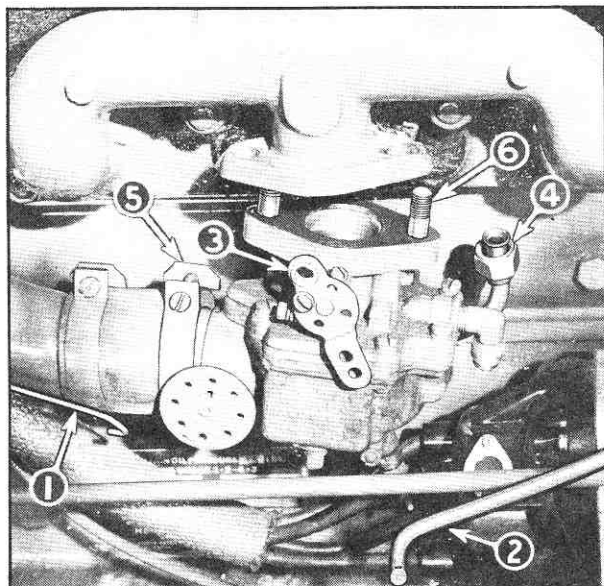
GROUP 400-FUEL SYSTEM**CARBURETOR**

- | | |
|----------------------|--------------------|
| 1. HIGH-SPEED NEEDLE | 3. STOP SCREW |
| 2. LOW-SPEED NEEDLE | 4. HOSE CONNECTION |
| 5. CHOKE | |

ADJUSTMENT - HIGH SPEED - Turn high-speed needle in until lightly seated, then back out two turns. Start engine and let it warm up to operating temperature.

With throttle wide open, slowly turn high-speed needle in until engine speed slows down, then back out just enough so engine runs smoothly at high speed. This adjustment will be approximately 1-3/4 turns open.

ADJUSTMENT - IDLE - Close throttle and adjust low-speed needle for smooth idling, then recheck high-speed adjustment. Set stop screw on throttle lever so engine idles at about 350 R.P.M.



- | | |
|-------------------------------|---------------------|
| 1. CHOKE WIRE | 4. FUEL LINE |
| 2. GOVERNOR TO CARBURETOR ROD | 5. HOSE CLAMP |
| 3. BUTTERFLY LEVER | 6. CARBURETOR STUDS |

CARBURETOR REMOVAL - Shut off fuel at tank and remove choke wire from carburetor.

Push throttle forward, remove cotter pin and washer from governor to carburetor rod and push rod back out of carburetor butterfly lever.

Remove fuel line at carburetor and push back against engine body. Loosen hose clamp on air cleaner pipe hose to carburetor.

Remove nuts and lockwasher from carburetor to manifold studs and push down out of manifold.

ADJUSTMENT OF FLOAT LEVEL - To set correctly - remove upper body assembly containing complete float mechanism. Turn upside down and with float lever resting on the inlet needle, carefully bend each lever arm if necessary, to give a distance of 1-5/64" from face of body gasket to the top of raised seam encircling each float. This measurement must be maintained with both floats to obtain proper performance.

NOTE - Make certain that air cleaner pipe hose is always tight and in good condition, otherwise dirt may enter engine.

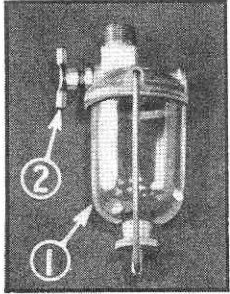
REPAIRS - Carburetor repairs should be made by nearest authorized Tillotson Service Station.

FUEL STRAINER

Keep lines clean and tight, and vent in fuel tank cap open.

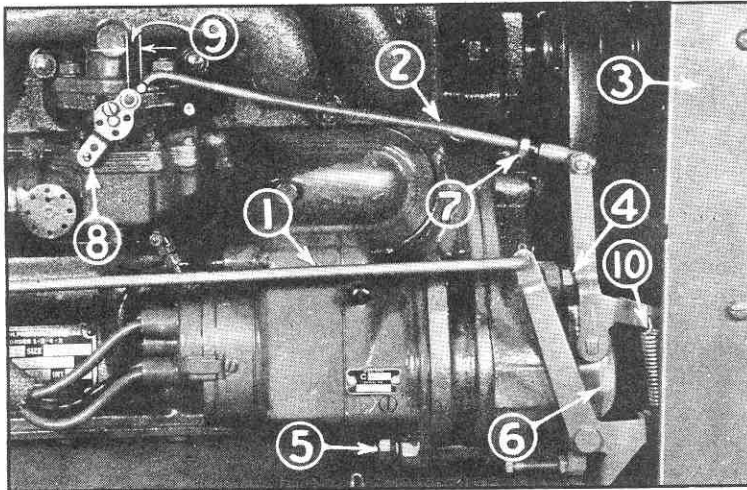
At the start of each day's operation, check filter for water and sediment and if either are present, clean by removing glass bowl. When removing or replacing bowl, do not damage gasket.

When engine is to be shut down for any length of time, or over night, shut off fuel cock at fuel strainer.

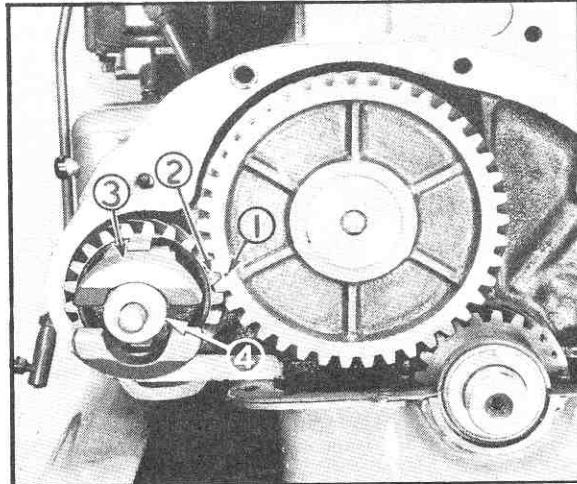


1. GLASS BOWL
2. FUEL COCK

GROUP 500-GOVERNOR



1. THROTTLE ROD
2. GOVERNOR ROD
3. HOOD SIDE PLATE
4. CAP SCREW
5. THRU-BOLT
6. GOVERNOR COVER
7. JAM NUT
8. BUTTERFLY LEVER
9. ROD ADJUSTMENT-1/4 INCH
10. GOVERNOR SPRING



1. CENTER PUNCH MARK ON CAMSHAFT GEAR
2. "3" OR "0" MARK ON GOVERNOR GEAR
3. WEIGHT AND GEAR ASSEMBLY
4. THRUST BEARING

GOVERNOR

The governor is of variable speed, flyball type, and is driven by the camshaft gear. Lubrication is supplied from the timing gears. Operating linkage and pawl in throttle lever should be oiled weekly.

SURGING - Governor surging may be caused by improperly adjusted, damaged or dirty governor, carburetor, engine valves, spark plugs, or ignition system. Any such conditions must be corrected before a satisfactory adjustment of control rods can be made.

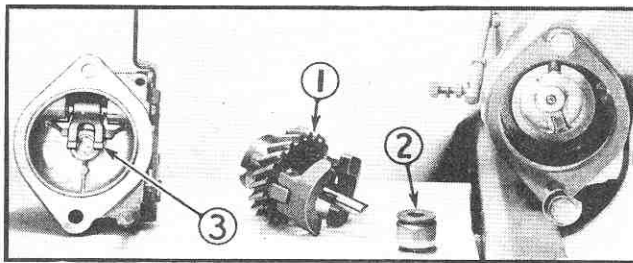
GOVERNOR OPERATING ADJUSTMENTS - Approximate rod adjustments are as follows: With engine shut off, open throttle to last notch on control quadrant. Remove cotter pin at carburetor and loosen jam nut at governor end of governor rod. Hold carburetor butterfly lever in wide open, forward position and adjust governor rod so that rear end lines up with front side of hole in carburetor lever, which is the same as adjusting the rod 1/4 inch short. In some cases, it may be necessary to adjust this rod one turn shorter, after engine test. Governor control rod clevis at hand lever quadrant should be adjusted so the quadrant acts as a high speed stop rather than having this function transferred to the projection on the lower end of the operating lever at the governor.

GOVERNOR - Continued

GOVERNOR OPERATING ADJUSTMENTS (for Governors with Bumper Spring) - With hand throttle in wide open position and carburetor butterfly lever in wide open forward position, adjust governor rod length so that it comes 1/16 to 1/8 inch short of lining up with the hole in butterfly lever.

Start and warm up the engine.

With throttle wide open, adjust the bumper spring in gradually until governor surge disappears and engine operates smoothly at all speed ranges. Bumper screw should be screwed in only far enough to eliminate surge, as over adjustment will result in an excessive "No Load" speed and a sluggish operating governor. After adjustment is completed, tighten the lock nut on the bumper spring screw.



1. GEAR AND WEIGHT ASSEMBLY 2. THRUST BEARING
3. FORK ON OPERATING LEVER SHAFT

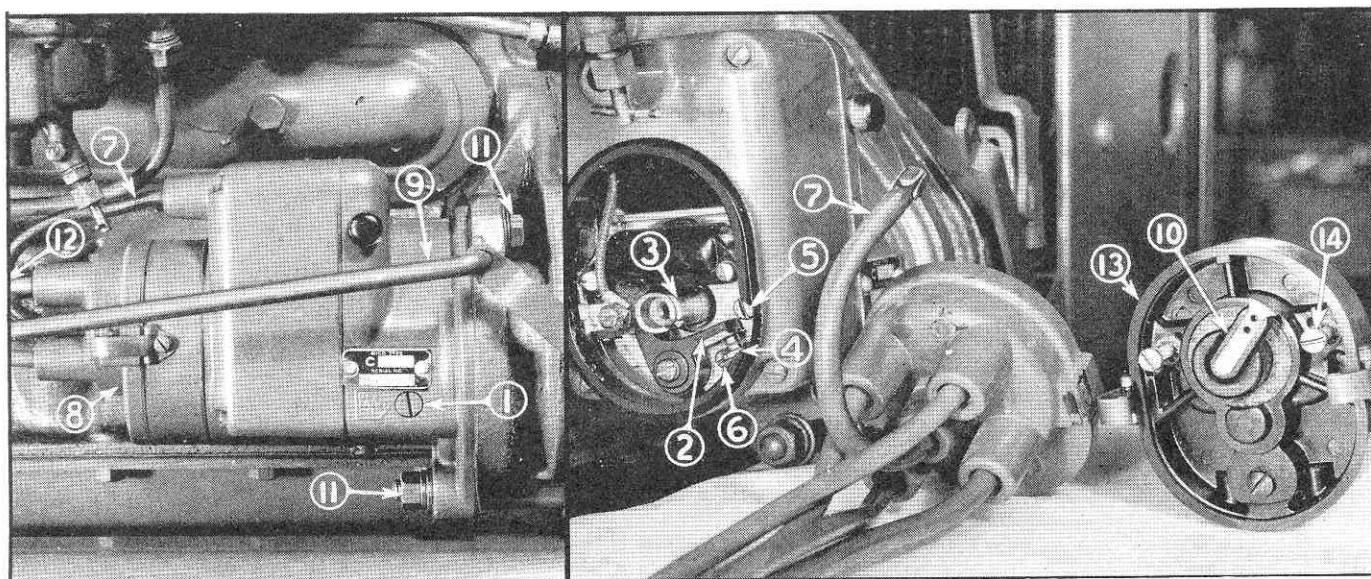
REMOVAL - Remove throttle rod, governor rod to carburetor, and right hand engine hood side plate. Remove governor cover top cap screw, bottom thru-bolt, and governor cover assembly without governor works. Crank engine over until center punch mark on camshaft gear aligns with a "3" or "0" on front face of governor gear, depending on whichever mark may appear on gear. Governor works can now be pulled out for servicing.

REASSEMBLY - Be sure governor weights are free and cover gasket is in good condition. Align timing marks, as outlined under **REMOVAL**, when reassembling governor into housing.

Thrust bearing should always be assembled with bearing side toward fork on operating lever shaft.

If magneto has been removed, see MAGNETO timing.

GROUP 600-IGNITION



- | | | | |
|----------------------|-------------------------------|--------------------------|---------------------|
| 1. OIL HOLE PLUG | 4. ADJUSTABLE CONTACT BRACKET | 8. DISTRIBUTOR CAP | 12. NO. 1 PLUG WIRE |
| 2. INTERRUPTER LEVER | 5. FASTENING SCREW | 9. THROTTLE ROD | 13. REDUCTION COVER |
| 3. CAM | 6. ECCENTRIC SCREW | 10. ROTOR NO. 1 POSITION | 14. COVER SCREWS |
| | 7. HIGH TENSION WIRE | 11. MOUNTING SCREW NUTS | |

WICO MODEL "C" MAGNETO

LUBRICATION - Every 200 working hours, wipe away all dirt and remove oil plug and fill to overflowing with SAE 20 engine oil.

CARE - Never allow oil to accumulate on magneto points or on outside of magneto. Always clean magneto before attempting to service or remove it from engine.

CARE AND ADJUSTMENT OF CONTACT POINTS - Every 200 working hours, check the condition of the contact points. Points should be adjusted to an opening of .014 to .016 inch when interrupter lever rests on high point of the cam. (Measure this opening with a feeler gauge.) This adjustment is made by means of the adjustable contact bracket. Loosen bracket fastening screw slightly, and shift bracket with the eccentric screw, until the correct opening has been reached, then tighten fastening screw.

Contact points must be free of oil or grease and be in proper alignment, so that the full surface of both contacts meet squarely. Pitted points should be properly dressed flat with a stone or file. When point renewal becomes necessary, always replace both interrupter lever and contact bracket at the same time.

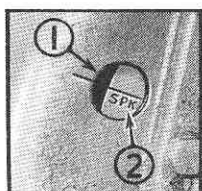
If the magneto has been idle for some time, the contact points must be cleaned to remove a film of oxide which may be present. (Oxidation will cause hard starting.) Use a fine-grained carborundum stone, which is available in thin strips, for this purpose. Make sure all particles of metal and abrasive material are wiped from the points and from the breaker box.

CAUTION - Before removing reduction cover, make certain of position of rotor and reinstall in exactly this same position, as it is possible to install rotor 180 degrees out of correct position.

WICO MODEL "C" MAGNETO - Continued

CHECKING TIMING - Remove timing hole plug from right side of engine bellhousing. Crank engine over until "SPK" mark on flywheel appears thru plug opening. Use a piece of chalk and whiten the timing line above the "SPK" mark. Use a piece of insulated wire (or a timing light) and insert this into the upper right hand distributor cap terminal in place of No. 1 spark plug cable.

Next run the engine at a moderate speed and hold the open end of the insulated wire in line with the chisel mark on engine bellhousing so that the spark will jump to the flywheel. This spark flash will allow you to observe the location of the flywheel timing line, with respect to the chisel mark on the engine bellhousing, at the time No. 1 spark plug is firing. If these lines do not appear to line up perfectly, change the timing by loosening the magneto flange attaching screw nuts and tapping the top of magneto away from the engine to advance the spark and toward the engine to retard the spark.

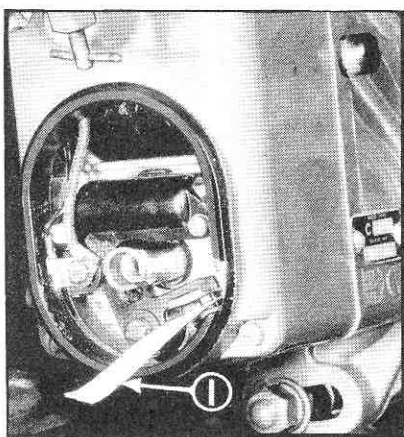


1. TIMING HOLE
2. "SPK" MARK

REMOVAL - Remove high tension wire, distributor cap, throttle rod and timing hole plug from right side of bellhousing. Crank engine until No. 1 piston is coming up on compression and align "SPK" mark on flywheel with center of timing hole in bellhousing, noting that distributor rotor corresponds with No. 1 spark plug wire outlet. Remove mounting screw nuts and pull magneto to rear.

INSTALLING AND TIMING - Correct magneto timing is 14 degrees or 1-5/16 inches before top dead center, which is the same as "SPK" mark on flywheel. Before installing magneto, turn drive coupling in a direction opposite to its ordinary rotation, until rotor points to No. 1 spark plug cable outlet, and drive coupling is aligned with drive.

Install magneto with gasket on engine, with top of magneto toward the engine block as far as possible, leaving attaching screw nuts slightly loose.



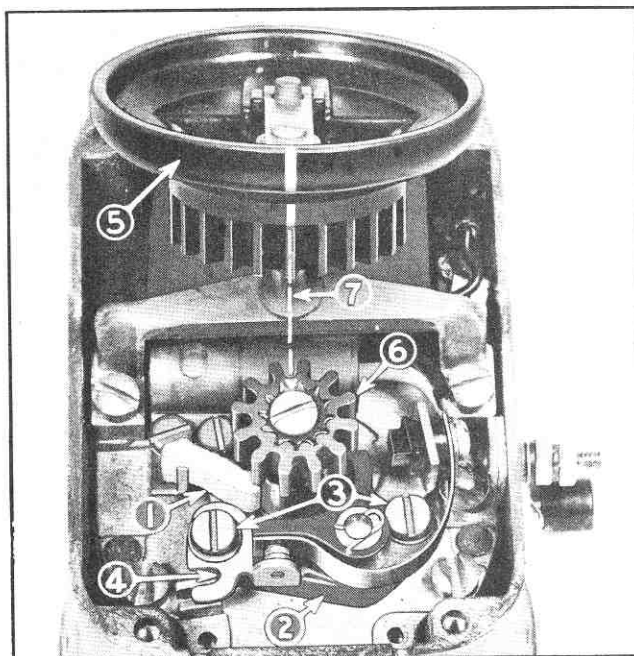
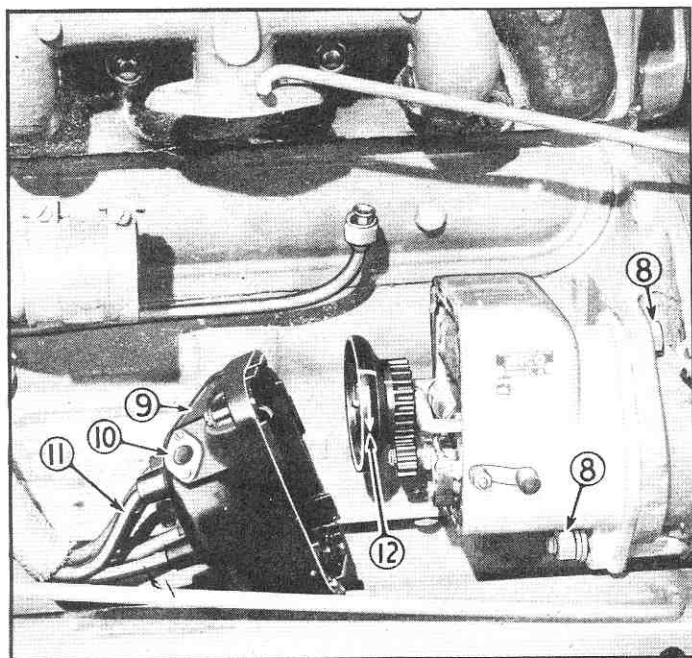
1. CIGARETTE PAPER

Next, loosen reduction cover screws and remove cover. Insert a narrow piece of cigarette paper between breaker points and carefully tap top of magneto away from engine until points just release the paper. This will mean that points are just starting to open and that magneto is set on the firing position.

Tighten magneto attaching screws. Replace rotor reduction cover and gasket, with rotor pointing to No. 1 spark plug cable. This is important because of the two-to-one reduction within this cover, which makes it possible to install the cover 180 degrees out of correct firing position.

Replace distributor cap and gasket, and timing hole plug. Reconnect high tension wire and throttle rod.

If for any reason, governor and gear assembly have been removed, refer to GOVERNOR and follow instructions outlined under removal, as correct timing of magneto depends on correct assembly of this unit.



1. CAM WIPER FELT
2. ADJUSTMENT CONTACT PLATE
3. CLAMP SCREWS
4. ADJUSTING SLOT

5. ROTOR & GEAR ASSY.
6. DRIVE GEAR
7. LINE UP ROTOR & GEAR MARKS
8. MOUNTING SCREW NUTS

9. DISTRIBUTOR CAP
10. DISTRIBUTOR CAP WINDOW
11. CABLE NO. 1
12. DIRECTION OF ROTOR ROTATION

WICO MODEL "X" MAGNETO

LUBRICATION - The only lubricating point in the Model "X" magneto is the cam wiper felt in the breaker compartment. This felt should be replaced whenever it is necessary to replace the contact points.

CARE - Every 100 working hours, wipe all dirt and oil off the magneto and lead wires. Always clean magneto before attempting to service or remove it from engine.

CARE AND ADJUSTMENT OF CONTACT POINTS - Every 200 working hours, check the condition of the contact points. Points should be adjusted to an opening of .015 to .017 when fully opened. (Measure this opening with a feeler gauge.) To adjust points, loosen the two clamp screws enough so that the contact plate can be moved. Insert a small screw driver in the adjusting slot and move the plate until the proper measurement is obtained. Tighten the two clamp screws.

Contact points must be free of oil or grease and be aligned so that both surfaces meet squarely. Special Tool No. S-5449 for aligning points, may be obtained from the Wico Electric Co. or an Official service station.

Pitted points should be dressed flat with a stone or file. When point renewal becomes necessary, always replace fixed contact and breaker arm at the same time.

If the magneto has been idle for some time, the contact points must be cleaned to remove a film of oxide which may be present. (Oxidation will cause hard starting.) Use a fine-grained carborundum stone, which is available in thin strips, for this purpose. Make sure all particles of metal and abrasive material are removed from the points and distributor compartment.

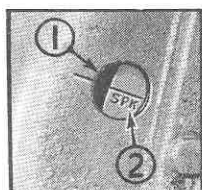
WICO MODEL "X" MAGNETO - Continued

CAUTION - When installing rotor and gear assembly to drive gear, be sure that the marked tooth of the rotor gear lines up with the mark under the star washer on the drive gear.

CHECKING TIMING - Remove timing hole plug from right side of engine bellhousing. Crank engine over until "SPK" mark on flywheel appears thru plug opening. Use a piece of insulated wire (or a timing light) and insert this into the upper right hand distributor cap terminal marked (1) in place of No. 1 spark plug cable.

Next run the engine at a moderate speed and hold the open end of the insulated wire in line with the chisel mark on engine bellhousing so that the spark will jump to the flywheel. This spark flash will allow you to observe the location of the flywheel timing line with respect to the chisel mark on the engine bellhousing at the time No. 1 spark plug is firing. If a timing light is used, it may be checked with the line in the magneto window.

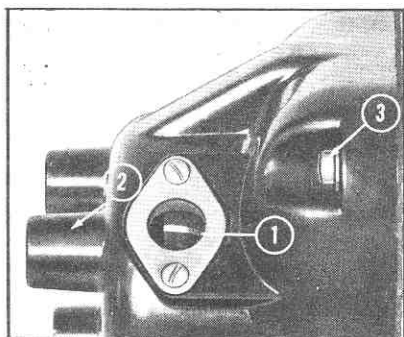
If the lines do not appear to line up properly, (slightly advanced) change the timing by loosening the magneto flange attaching screw nuts and tapping the top of magneto away from engine to advance spark and toward engine to retard spark.



1. TIMING HOLE
2. "SPK" MARK

REMOVAL - Remove timing hole plug from bellhousing. Crank engine until No. 1 piston is coming up on compression and align "SPK" mark on flywheel with center of timing hole in bellhousing. Remove CARBURETOR and magneto mounting screw nuts, then pull magneto to rear.

Rotation of impulse coupling is counter clockwise and rotation of rotor is clockwise looking at the distributor compartment. No. 1 spark plug cable plugs in distributor cap terminal in the upper right hand corner marked (1), cables No. 2-4-3 follow in clockwise order.



1. MARK IN WINDOW
2. NO. 1 TERMINAL
3. DISTRIBUTOR CAP MOUNTING SCREW

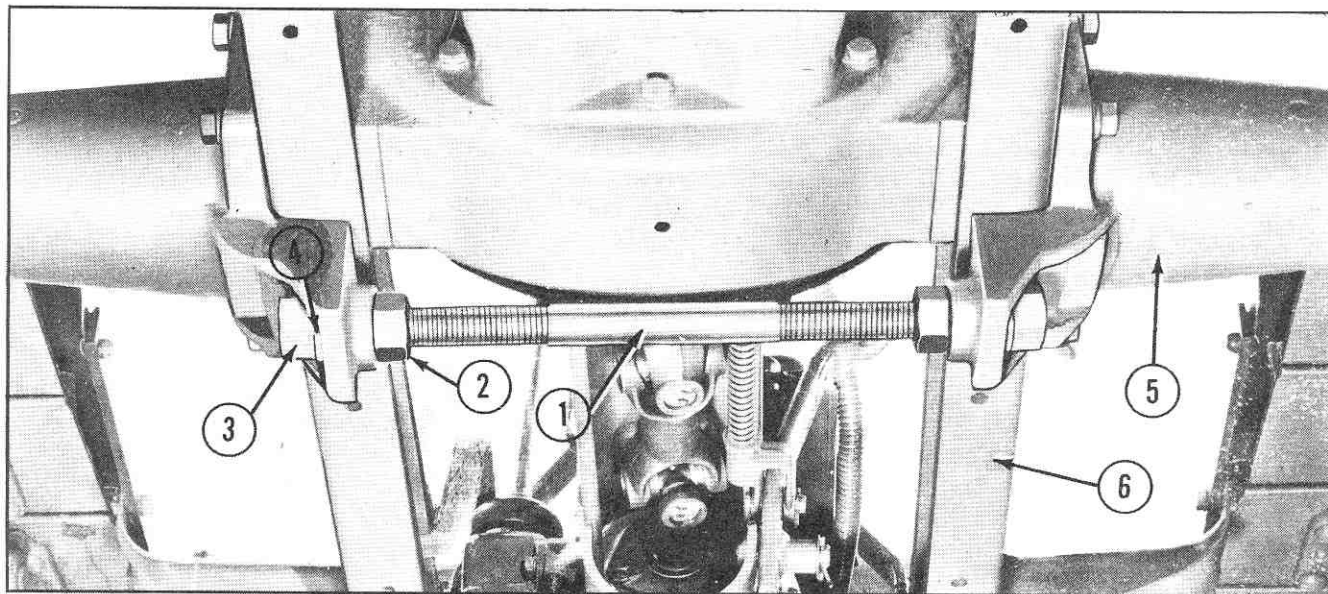
INSTALLING AND TIMING - Correct magneto timing is 14 degrees or 1-5/16 inches before top dead center, which is the same as "SPK" mark on flywheel. Before installing magneto, make sure rotor is correctly timed to drive gear (see instructions under **CAUTION** heading), replace distributor cap, and turn drive coupling in opposite direction to its ordinary rotation, until white line on rotor shows in center of distributor cap window. If flywheel "SPK" mark is in center of bellhousing timing hole, magneto coupling should align with drive. Install magneto with gasket on engine, leaving attaching screw nuts slightly loose. Move top of magneto toward or away from engine body to line up white line in magneto window and tighten attaching screw nuts. Install carburetor and throttle rod to engine.

If, for any reason, governor and gear assembly have been removed, refer to **GOVERNOR** and follow instructions outlined under **REASSEMBLY**, as correct timing of magneto depends on correct assembly of this unit.

SPARK PLUGS

CARE - Examine frequently for cracked or broken porcelains and burned points. Gaps must be .020 to .025 inch. Measure with a feeler gauge. Every 500 working hours, new plugs should be installed. Use 7/8-18 U.S.F. thread plugs with same heat range as original equipment. Keep ignition connections tight and replace all damaged cables at once.

GROUP 800-TIE BAR



1. TIE BAR
2. INNER NUT

3. OUTER NUT
4. LOCKWASHER

5. TRACK FRAME-GUIDE SUPPORT
6. MAIN FRAME

The tie bar is located under the main frame, between the right and left hand track frame guide supports. This tie bar is used to stabilize these supports, making a more rigid construction of the track frames and supports to the tractor main frame.

REMOVAL - Turn both inside nuts, located between main frame channels, in to the center of the tie bar. Remove outer nuts and lockwashers, and slide tie bar out of supports.

INSTALLATION AND ADJUSTMENT - Make sure that no initial strains are induced into the main frame at any time during installation and adjustment of tie bar.

With entire tractor blocked up under main frame, support with blocks, both track frame assemblies, high enough so that all weight is just removed from track frame guide supports.

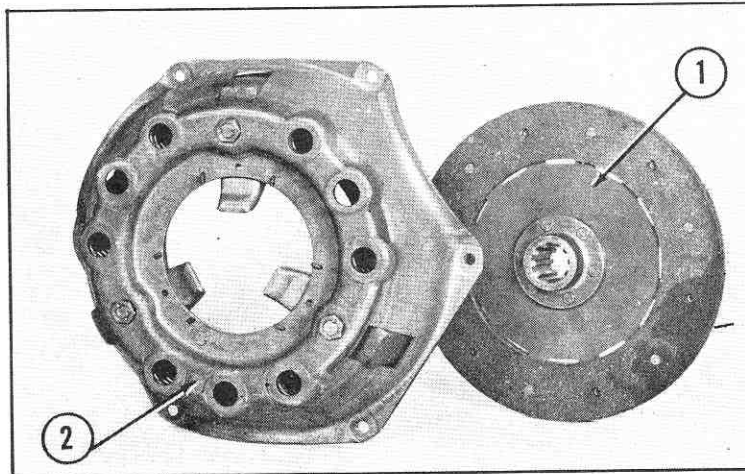
With both inner nuts turned in to the center, from both ends of the bar, install the bar thru supports. Turn inner nuts out from center of bar until they are just snug to the supports, but not tight enough to place any outward pressure on the supports. Install lockwashers and outer nuts and tighten securely.

Be sure bar is evenly spaced between the supports to allow both outside nuts to be tightened on the bar to full depth of nut threads.

MODEL HG

GROUP - 900 CLUTCH

(For Tractor Serial Nos. 24GA040 to 25GA553 inclusive)



1. CLUTCH COVER ASSEMBLY

2. DRIVEN PLATE ASSEMBLY

The clutch assembly used in tractors within the above serial numbers is the same general design as regular production clutches, except for the action of the release fingers.

Removal and reassembly of the clutch assembly and release mechanism out of and into the tractor is the same as outlined in the following pages for the regular assembly. Clutch lubrication and pedal adjustment for facing wear are also the same as regular production assemblies. However, it is best not to attempt dis-

assembly and repair of the clutch cover assembly in the field as a special jig fixture is required to set the proper finger adjustment.

If the pressure plate, springs or fingers become damaged or badly worn, replace the complete clutch cover assembly which includes these parts. New facings and rivets will be available for refacing the driven plate, or if needed, the complete driven plate and facing assembly may be ordered.

This clutch will be used only when completely serviceable, regular production assemblies, are not available due to production conditions outside the OLIVER Corp.

Clutch

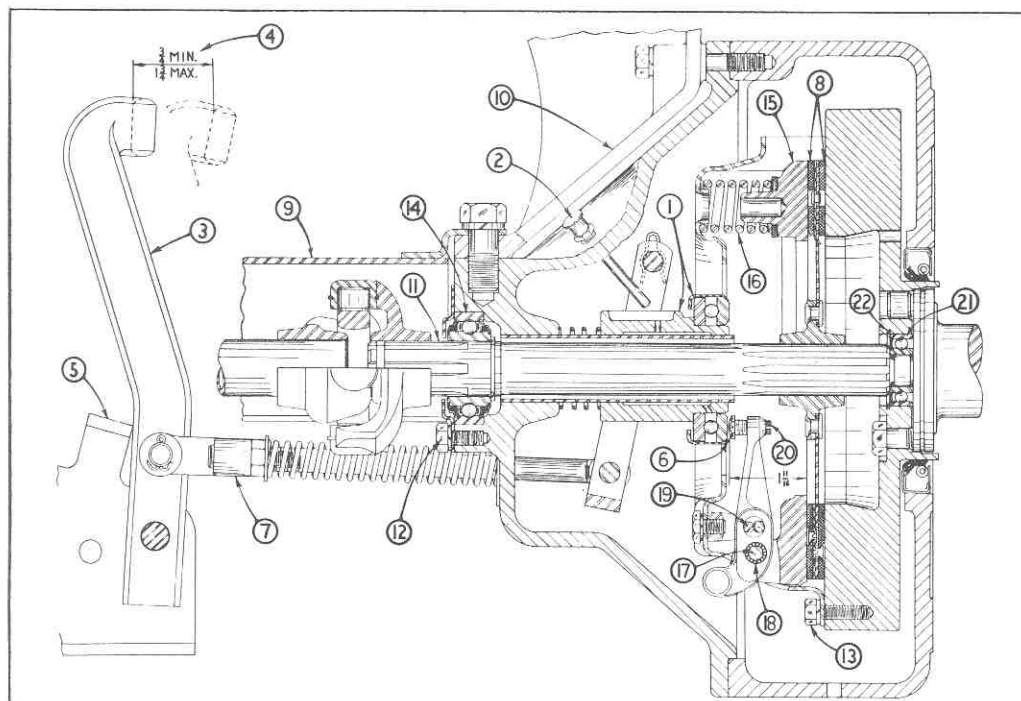
(For Tractor Serials Nos. 1GA000 to 24GA039 inc. and 25GA554 and up)

LUBRICATION - Each day oil clutch release sleeve and bearing assembly thru spring cap oiler on clutch housing. Give this three or four shots from oil can. Use same oil as in engine crankcase. Keep clutch pedal and linkage oiled.

CLUTCH PEDAL ADJUSTMENT - Clutch is self-adjusting for friction facing wear and requires only that sufficient free pedal travel be maintained during life of facings. *Form the habit of checking free pedal travel at beginning of each day's operation.* (Free pedal travel is distance pedal pad travels from extreme rear position, when lower end of pedal is against stop, to point where throw-out bearing touches release levers.)

Clutch pedal originally has 1-3/4 inches free pedal travel. As friction facings wear, this distance gradually reduces. When travel is reduced to 3/4 inch, readjust release rod yoke to give original adjustment of 1-3/4 inches. Never allow less than 3/4 inch travel.

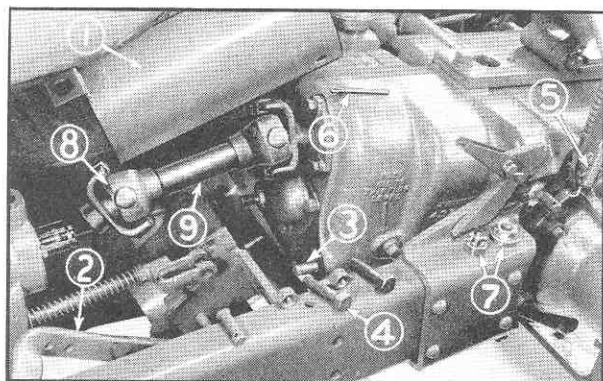
CLUTCH - Continued



1. RELEASE BEARING
2. OIL CUP
3. PEDAL
4. FREE PEDAL TRAVEL
5. STOP
6. CLEARANCE
7. RELEASE ROD YOKE
8. FRICTION FACINGS
9. PROPELLER SHAFT GUARD
10. FUEL TANK SUPPORT
11. CLUTCH SHAFT
12. REAR BEARING RETAINER CAP SCREWS
13. CLUTCH ASSEMBLY TO FLYWHEEL SCREWS
14. CLUTCH SHAFT REAR BEARING
15. PRESSURE PLATE
16. SPRINGS
17. RELEASE LEVER PIN
18. NEEDLE BEARINGS
19. ROLLER
20. RELEASE LEVER SCREWS
21. PILOT BEARING
22. LOCK RING

CLUTCH SLIPS - Never rest foot on pedal with engine running, as this will cause slippage. If clutch slips when there is sufficient free pedal travel, it indicates that friction facings are worn and should be replaced immediately. Never operate tractor in this condition. Slippage will cause excessive heat and damage to clutch and flywheel. Before disturbing any clutch parts, be sure of their exact positions so replacements can be made correctly.

CLUTCH REMOVAL - On 31 and 42 inch widths, only, remove fenders. Remove propeller shaft guard. Disconnect fuel line at filter bowl. Remove fuel tank strap bolts and fuel tank support cap screws. Remove tank and support as a unit.

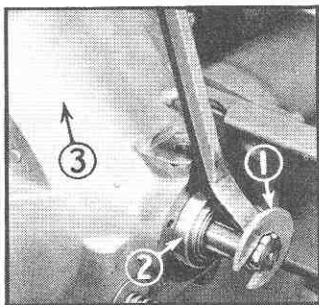


1. PROPELLER SHAFT GUARD
2. CLUTCH PEDAL
3. CROSS MEMBER TO CASE STUDS
4. CROSS MEMBER TO FRAME BOLTS
5. STEERING LEVER RETURN SPRINGS
6. UNIVERSAL COTTER
7. NUT AND COLLET
8. FRONT UNIVERSAL
9. PROPELLER SHAFT

Remove clutch pedal. Remove nuts from studs holding main frame crossmember to transmission case, also bolts holding crossmember to main frame, and slide ahead off studs. Remove steering lever return springs, and cotter pin holding rear universal to transmission shaft. Remove two nuts and collets holding main frame to top of transmission case. Now loosen, but do not remove, the two lower nuts and collets holding main frame to transmission case.

Pivot the transmission and differential case to the rear on the lower collets which hold the main frame to transmission case and, at the same time, tap lightly on the front universal joint to remove it from the clutch shaft. Propeller shaft assembly can now be removed from the transmission shaft.

CLUTCH - Continued



1. 1" SLOTTED WASHER
2. BEARING
3. HOUSING

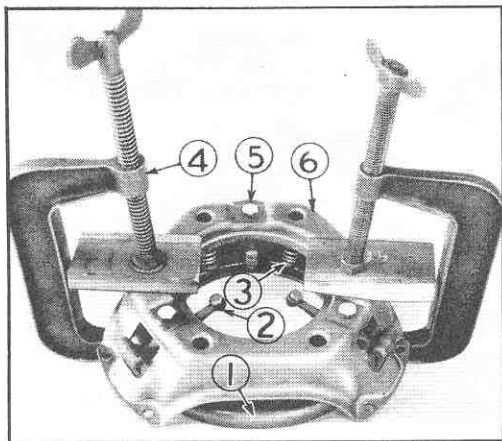
On early tractors remove clutch shaft rear bearing retainer cap screws and, by using a one inch slotted flat washer in groove of shaft, pry the clutch shaft and bearing out of housing. Next remove clutch housing.

Remove the six cap screws holding clutch assembly to flywheel and take out the clutch.

On later models, the clutch housing cover will be slotted and by removing the two top track frame guide support bolts, housing cover can be rotated for slots to clear engine frame, so that entire clutch housing assembly can be removed without first removing the clutch shaft and rear bearing.

FACING REPLACEMENT - If clutch slips, as stated above, facings should be replaced at once with genuine Cletrac friction facings. This particular type is required for proper operation of clutch. Under no circumstances allow a substitution.

Certain parts of clutch assembly may need replacing when driven plates are refaced, especially if large cracks appear in the pressure plate. Excessive heat, as shown by highly discolored pressure plate, may cause pressure springs to lose their tension. In such case, install new springs.



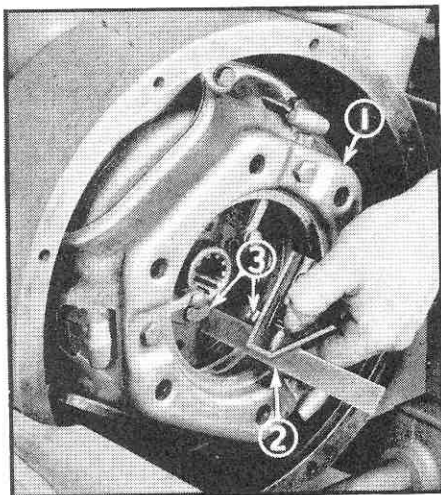
1. PRESSURE PLATE
2. RELEASE LEVERS
3. SPRINGS
4. CLAMPS
5. CAP SCREWS
6. COVER

PRESSURE PLATE - Examine plate for cracks. Discoloration will do no harm. Small local heat cracks, due to abusive operation, may occur in faces of pressure plate or flywheel. These will not interfere with operation of clutch, provided they are polished smooth with fine emery cloth. If cracks are large, pressure plate should be replaced.

Should pressure plate, release levers, or springs need replacing, use two clamps on clutch cover to release spring pressure from release levers. Remove three cap screws holding cover to lever yokes, loosen clamps alternately until pressure is released and lift cover off.

Next, remove pin holding release lever to pressure plate being careful not to lose or misplace the 19 needle roller bearings. (For reassembly, grease the needle rollers to hold them in place while pin is being inserted. Also be sure to assemble lever yoke, roller, and pin in the same positions as when disassembled.) All above parts can now be serviced.

CLUTCH - Continued



- 1. CLUTCH ASSEMBLY
- 2. DEPTH GAUGE
- 3. DISTANCE 1-11/16"

SETTING RELEASE LEVER SCREWS - After servicing pressure plate or release levers, bolt clutch assembly back into the flywheel. Use a depth gauge as in illustration and adjust the three lever screws to 1-11/16 inch, measuring from flange on hub of driven plate to outer surface of screws.

Next, remove the clutch assembly from flywheel, turn the cover assembly upside down and lock the lever screws by driving a portion of the lever into the screw slot.

REASSEMBLY - Before installing clutch, examine pilot bearing in flywheel. Should this need replacing, remove lock ring and pull bearing out. Pack bearing with light cup grease before reinstalling.

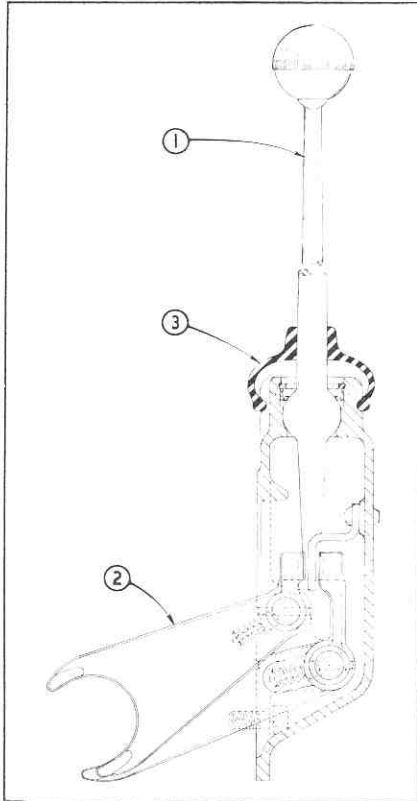
On early models without slotted housing cover, place clutch shaft thru cover assembly and driven plate and enter shaft into pilot bearing (driven plate should be installed with flanged side of hub away from flywheel). Install and tighten evenly 6 cover assembly cap screws so that shaft can be removed without binding. This will align driven plate so that shaft can later be installed easily. *Now remove clutch shaft.* Install housing and cap screws. Install clutch shaft with outer bearing and tap gently to place, then install bearing retainer and cap screws.

On later models, install driven plate (flanged side of hub away from flywheel) and clutch cover assembly into flywheel, tighten six attaching screws only enough to put slight pressure on the driven plate to hold it from slipping down. To properly align driven plate, use the clutch shaft assembled with the housing cover, install shaft thru driven plate and move plate as needed until the clutch shaft will slip into the pilot bearing in flywheel.

Remove shaft and housing cover, being careful not to move driven plate, and tighten the six clutch cover to flywheel screws. Reinstall clutch housing cover assembly and cover attaching screws.

Reinstall propeller shaft on transmission shaft. Rock transmission and differential assembly forward and, at the same time, line up splines of front universal with splines on clutch shaft, and tap universal into place, using a lead hammer.

Reinstall balance of parts removed and check free travel of clutch pedal, adjusting it to 1-3/4.

GROUP 1000-TRANSMISSION

1. SHIFT LEVER ASSEMBLY
2. SHIFT FORKS
3. SHIFT LEVER DUST COVER

LUBRICATION - Differential and transmission are lubricated thru one source. See DIFFERENTIAL for capacity, draining, and correct grade of oils.

REMOVAL OF CASE ASSEMBLY - Block tractor up securely and remove TRACK FRAMES and FINAL DRIVE ASSEMBLIES.

Remove main frame cross member, also nuts and collets holding main frame to case. Rock case backward to remove universal joint, then continue to rock case backward out of main frame. Remove DIFFERENTIAL.

SHIFT LEVER ASSEMBLY - To remove from case, remove mounting cap screws and pull out. Inspect shift forks and shift lever dust cover and replace any worn or damaged parts. When replacing, be sure gasket is in good condition and coat both sides with shellac or Permatex. Also have sliding gears and shifting lever in neutral position and make certain that shift forks enter shifting groove of corresponding gears.

REMOVAL OF COUNTERSHAFT (LOWER) - Remove front bearing cap. Use a small chisel to unlock shaft nut from groove and remove nut. With a lead hammer, tap shaft out of case from front to rear, lifting gears and bearings off as shaft is removed. Keep all parts in their respective positions to facilitate reassembly. Bearing cups can now be driven out of case.

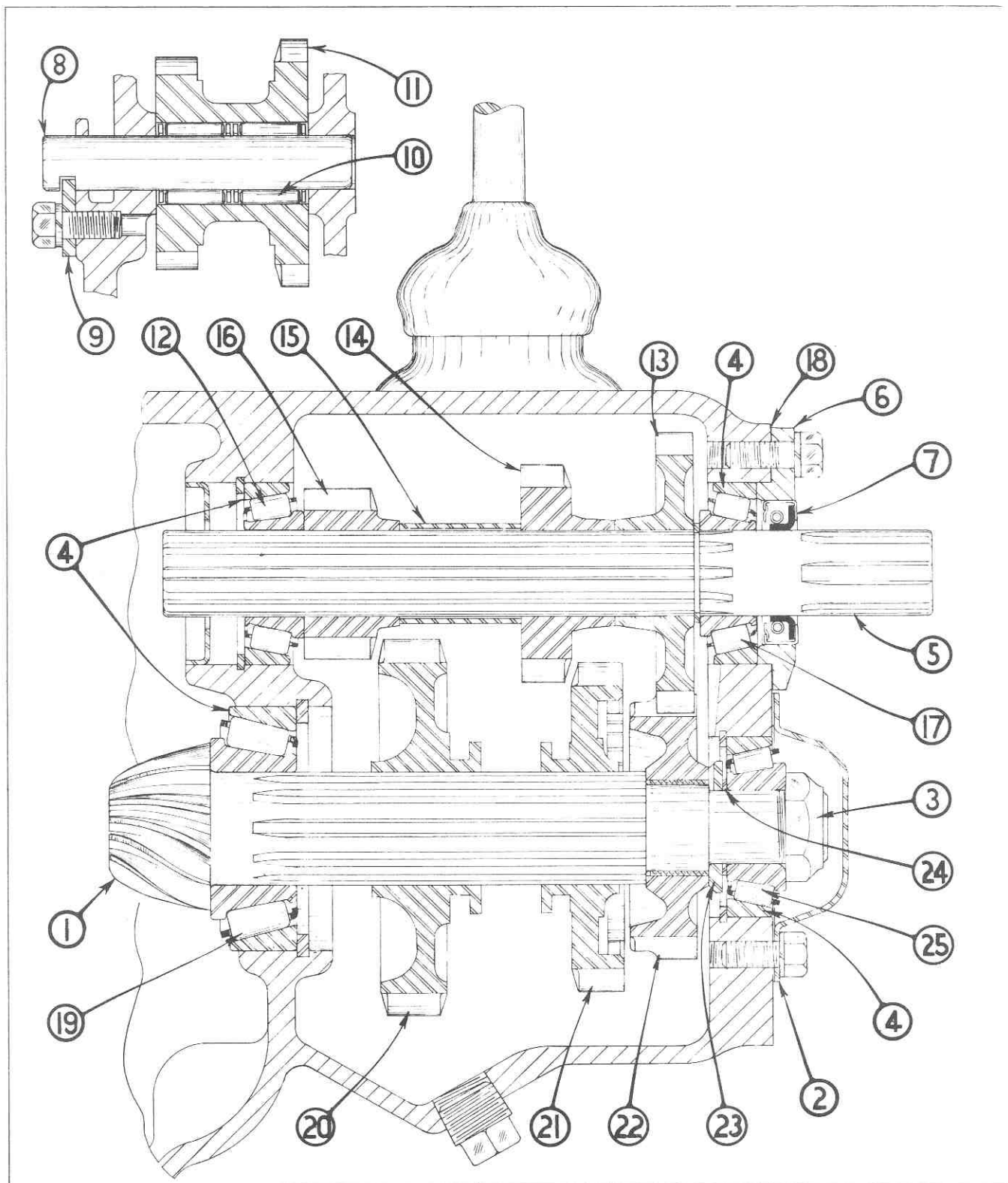
REMOVAL OF MAIN SHAFT (UPPER) - Remove front bearing retainer and oil seal assembly, being careful to note number of shims used and that they are not lost. Use lead hammer to drive shaft out from rear to front, lifting gears, bearings and spacer off as shaft is removed. Keep all parts in their respective positions to facilitate reassembly. Rear bearing cup can now be driven out of case.

REMOVAL OF REVERSE SHAFT - Remove lock screw and plate located in differential compartment. Reverse shaft can now be pulled out to the rear, and gear with bearings, lifted out.

CAUTION - Before starting reassembly of transmission, inspect all parts and replace any that are damaged or excessively worn. When installing new bearings, it is advisable to install new cups. All cap screws leading directly into case should be shellacked around threads.

INSTALLATION OF REVERSE SHAFT - Place both roller bearings on inside of gear. Position gear and bearings in case with large gear to front and install shaft. Install lock plate and screw.

TRANSMISSION – Continued



- | | | | |
|------------------------|---------------------------|------------------------|--------------------------------|
| 1. COUNTERSHAFT | 8. REVERSE SHAFT | 14. 2ND SPEED GEAR | 20. LOW & REVERSE SLIDING GEAR |
| 2. BEARING CAP | 9. LOCK PLATE | 15. SPACER | 21. 2ND & 3RD SLIDING GEAR |
| 3. SHAFT ADJUSTING NUT | 10. REVERSE GEAR BEARINGS | 16. LOW & REVERSE GEAR | 22. 3RD SPEED GEAR |
| 4. BEARING CUPS | 11. REVERSE GEAR | 17. FRONT BEARING | 23. LOCATING WASHER |
| 5. MAIN SHAFT | 12. REAR BEARING | 18. SHIMS | 24. RETAINING WASHER |
| 6. BEARING RETAINER | 13. 3RD SPEED GEAR | 19. REAR BEARING | 25. FRONT BEARING |

TRANSMISSION - Continued

INSTALLATION OF MAIN SHAFT (UPPER) - With rear bearing in place in cup, slip shaft with lock ring thru front bearing opening in case, installing the following in order named: third speed gear (with hub to rear); second speed gear (with hub to front); spacer, low and reverse gear (with chamfer of teeth to front); and tap shaft thru rear bearing. Install front bearing on shaft. Inspect oil seal and replace if necessary, with lip of leather to rear. Install retainer assembly and by removing or adding shims, adjust shaft bearings until a definite drag can be felt, then add one .005 shim. This should give correct end play of .002 to .005.

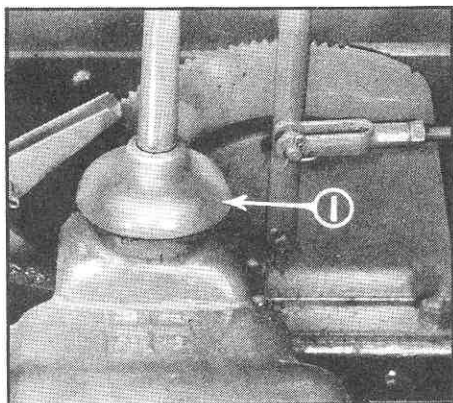
INSTALLATION OF COUNTER SHAFT (LOWER) - Install rear bearing on shaft with small end of bearing to the front. Slip shaft in thru rear bearing hole in case, installing the following, in order named: low and reverse sliding gear (with shifter groove to front); second and third sliding gear (with shifter groove to rear); third speed gear (with chamfer of teeth to rear); third speed gear locating washer (with oil grooved side toward gear); spring retaining washer; and front bearing. Install shaft bearing adjusting nut and tighten until a very slight drag can be felt when rotating shaft, equivalent to a one pound pull on a 6 inch extension from shaft. Lock the adjusting nut by driving a section of nut down into lock groove in shaft.

Install DIFFERENTIAL and shifting lever assembly.

INSTALLATION OF CASE TO FRAME - Raise differential and transmission case assembly and enter into bottom slots in main frame. Start lower collets and nuts. Install propeller shaft rear universal and rock case forward, aligning front universal, and install upper collets and nuts.

Install balance of parts removed.

GEAR SHIFT



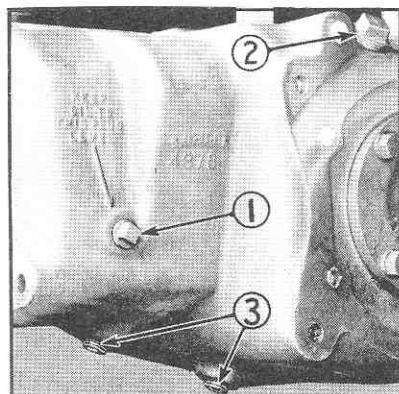
To prevent dirt getting into transmission and differential compartments, keep all attaching covers and cap screws tight.

Inspect shifting lever composition-rubber dust cover frequently for cracks or holes and, if damaged, replace at once.

1. DUST COVER

GROUP 1100-DIFFERENTIAL

LUBRICATION - Differential and transmission are lubricated thru one source. Capacity is 8 quarts. When power pulley is attached, add 2 extra quarts of oil. The level plug is located on left hand side of transmission, while the filler plug is near the top left hand side of differential compartment. Each day, with tractor on level place, check oil and keep up to level of test plug.

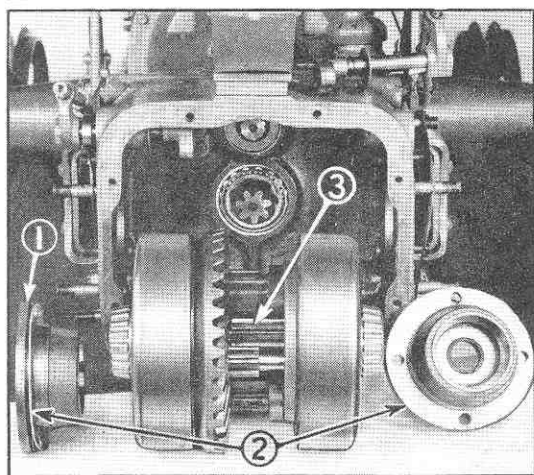


1. LEVEL PLUG
2. FILLER PLUG
3. DRAIN PLUGS

DRAINING - Twice each year, or every 300 working hours, remove drain plugs in bottom of transmission and differential compartment, thoroly drain and refill with a high quality oil. Correct grade oils to use are as follows:

Above 70°F.-S.A.E. 60; From 32° to 70°F.-S.A.E. 40
Below 32° F. - S.A.E. 30

REMOVAL - Drain differential and transmission. Jack up tractor and block securely. Disconnect TRACKS, remove TRACK FRAMES, REAR SPROCKET WHEELS, seat, fenders (if used), differential case rear cover, and STEERING BAND ASSEMBLIES. Remove both left and right hand FINAL DRIVE assemblies with shafts. Remove STEERING BAND cams.

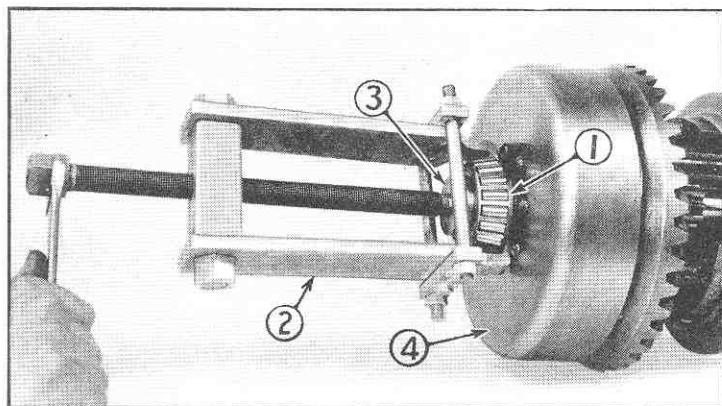


1. BEARING RETAINER
2. SHIMS
3. DIFFERENTIAL ASSEMBLY

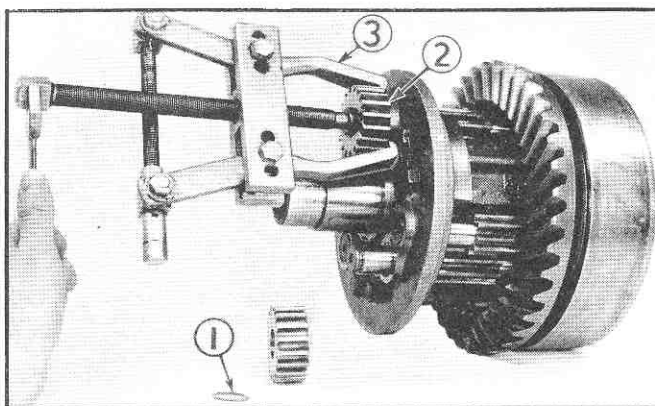
Center-punch differential bearing retainers and case so they may be reassembled in their respective positions. Place small wood blocks under steering drums and remove bearing retainers and shims. Wire or tie shims to each retainer to assure correct spacing of differential and bearings in re-assembly. This is important. Differential can now be rolled out of case.

DIFFERENTIAL DISASSEMBLY - Pull off tapered roller bearings with suitable puller and adapter plug, as shown in illustration. Remove steering drum assemblies.

Remove snap rings from planet gears. Gears are a tight press fit and will require a puller to remove them. On the left, or ring gear side, it will be necessary to remove three bevel gear cap screws nearest to the planet pinions to provide clearance for the puller.

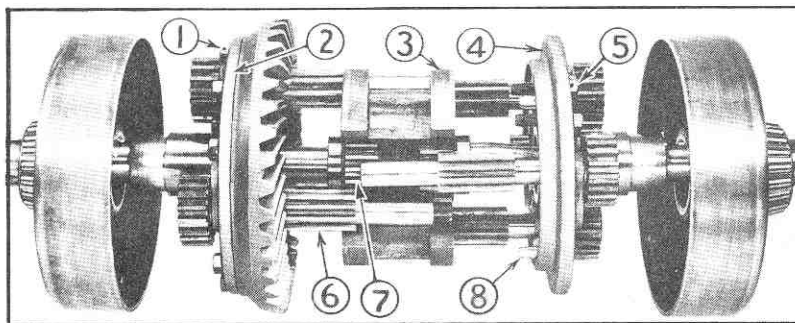


1. ROLLER BEARINGS
2. PULLER
3. ADAPTER PLUG
4. STEERING DRUMS



1. SNAP RINGS
2. PLANET GEARS
3. PULLER

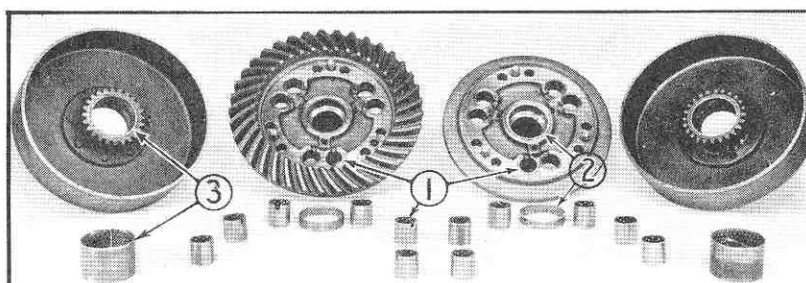
DIFFERENTIAL - Continued



- | | |
|--------------------------------|-----------------------|
| 1. BEVEL GEAR CAP SCREWS | 5. HOUSING CAP SCREWS |
| 2. LEFT DIFFERENTIAL HOUSING | 6. PLANET PINION |
| 3. CENTER DIFFERENTIAL HOUSING | 7. AXLE SHAFT GEAR |
| 4. RIGHT DIFFERENTIAL HOUSING | 8. DOWELS |

Punch-Mark left, center, and right differential housing to facilitate reassembly. Remove locking wire and 12 cap screws holding housing together, and separate them, using a drift or hammer of lead or bronze material.

All gears can now be removed.



- | | |
|---------------------------|-----------------------------|
| 1. PLANET PINION BUSHINGS | 2. AXLE SHAFT GEAR BUSHINGS |
| 3. STEERING DRUM BUSHINGS | |

BUSHING REPLACEMENT - All bushings are split type, steel-backed, bronze-lined, and can be removed by driving a small chisel down along the split line. To re-install planet pinion bushings, line up the locking slot and drive bushings in, using the planet pinion and lead hammer. Peen over a portion of the bushing into locking slot in housings.

The axle shaft gear bushings can be replaced by using the axle shaft gear as a driver.

Install new steering drum gear bushings from the gear side of drum, driving them in with a flat, hard wood block. It will not be necessary to ream bushings after they are installed, provided they are installed carefully. (Use a press for all bushing installations, if available.)

REASSEMBLY - Reinstall and tighten all ring gear cap screws in left hand housing and relace with wire; then assemble three planet gears into every other hole in housing with keyway out.

Stand housing and gears on end on solid bench, with keyways up. Install keys and drive or press on planet pinions, using suitable driver. *Install new snap rings.* Install axle shaft gear into housing and fit center housing in place. Install housing cap screws, but before screws are securely tightened, drive dowels to place and peen housing hole to prevent dowel from coming out. Then tighten screws securely and wire.

Next, assemble the other three planet gears in the right hand housing. Check housing center-punch marks to be sure gears are placed in the correct holes so that right and left hand assemblies can be later fitted together, and proceed as for left housing.

DIFFERENTIAL - Continued

REASSEMBLY - (Continued) - Install the right axle shaft gear in housing. Slip the two halves of differential together while slightly rotating gears until proper mesh is obtained, to allow both halves of differential housing to fit together correctly. Install housing cap screws and drive dowels to place.

Install steering drums and check their rotation to be sure differential assembly does not bind. Then drive on tapered bearings (small end out) using a drift of soft material.

REASSEMBLY INTO CASE - Place differential on small blocks in case to give correct height to install bearing retainers. Examine bearing retainer oil seals and replace with lip of leather pointing in, to seal against oil.

If shims have been kept attached to correct retainers as removed, install left retainer with the same number of shims. However, if shims have been mixed, or in the event new ring gear and pinion have been installed, then proceed as follows:

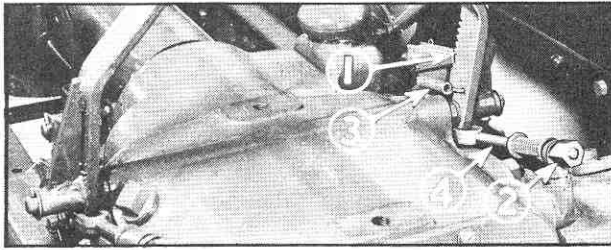
Install left retainer, using all shims removed from both retainers, with the exception of two .005 inch shims, and install and tighten retainer cap screws. Next, install right retainer without any shims and draw retainer cap screws up equally, about 1/4 turn at a time, and continue to check tightness of differential carrier bearings by turning ring gear with hand (being sure transmission gears are in neutral) until a definite drag is felt. Then back off cap screws equally, just enough, until no drag is apparent - which is usually about one full turn. Then measure distance between retainer and differential case with a feeler gauge, select the correct number of shims to equal feeler gauge thickness, add one additional .005 shim and install under right retainer.

When both retainers have been installed and tightened, check backlash between ring gear and pinion. This should be .006 to .010 inch and, if not correct, remove shims from under right retainer and add to left to give more backlash and just the opposite to give less backlash.

Reinstall balance of parts removed and, while doing so, check and replace any worn or damaged parts.

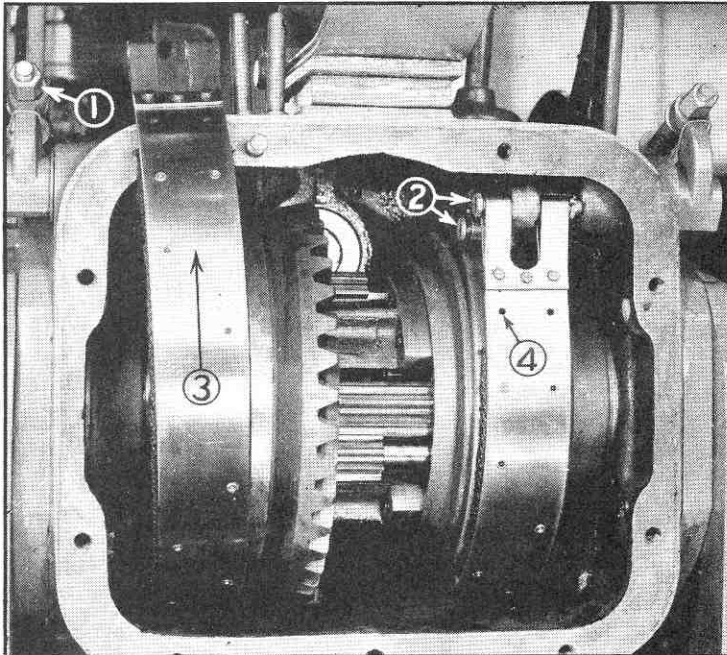
Adjust STEERING BANDS and refill with correct grade of oil.

STEERING BANDS



1. LOCK 6TH NOTCH
2. ADJUSTING NUT

3. RETURN SPRING
4. OPERATING ROD



1. ADJUSTING NUTS
2. BRAKE PINS

3. DIRECTION OF REMOVAL
4. RIVET HOLES (NOT COVERED)

ADJUSTMENT - Bands should be adjusted so steering levers can be pulled back allowing lock to drop into sixth notch on levers. Adjusting nuts are on outside of case. Turn nuts to right to tighten bands, and to left to loosen.

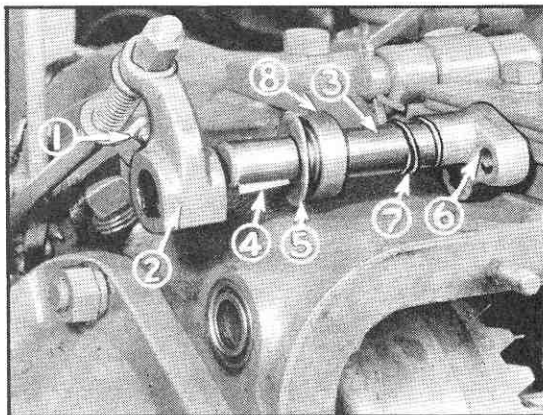
CAUTION - Do not operate the tractor with steering lever return springs broken or removed, as this will allow bands to drag on drum and cause damage to both.

REMOVAL AND RELINING - Drain differential and remove differential case rear cover. Loosen steering band adjusting nuts to relieve tension on bands. Remove cotters and pins from each end of bands, and rotate bands out around drums as indicated.

To insure correct operation, use only *genuine Cletrac linings* when relining bands.

REASSEMBLY - When reassembling, make certain that end of band, upon which the lining does not cover the last two rivet holes, is to the rear of tractor.

Balance of reassembly is reverse of removal. However, be sure to refill **TRANSMISSION** and **DIFFERENTIAL** with correct grade of oil.



1. SET SCREW
2. LEVER
3. SHAFT
4. WOODRUFF KEY

5. WASHER
6. CAM
7. SPRING
8. SEAL

BAND CAM REMOVAL - Remove differential case cover and bands. Remove lever wire and set screw. With blunt punch and hammer, drive lever from shaft. Remove Woodruff key and washer. Cam and shaft can now be removed from case, pulling them out toward inside of case, being careful that spring is not lost.

Examine seal and, if damaged, pry out and replace with new seal, with lip of leather toward center of case.

When reassembling, coat both the shaft and seal with light cup grease and be very careful that leather seal is not crimped or damaged when installing shaft.

GROUP 1200-FINAL DRIVE

FINAL DRIVE

LUBRICATION - Oil capacity is 1-1/2 pints, each side. At the start of each day, have tractor on level place and check oil level at plug (SEE MAINTENANCE CHART pg. 2). If low, add oil thru the filler holes, located in top of each housing. Use only high quality oil according to the following temperature ranges:

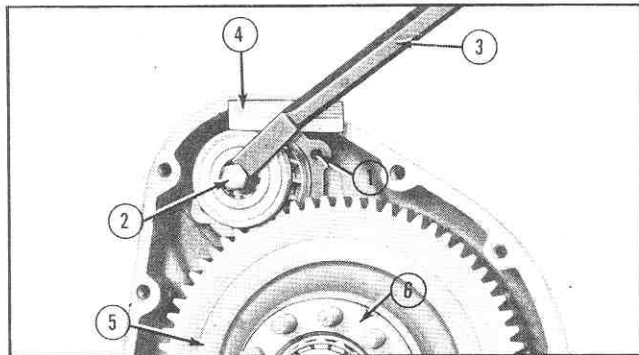
Above 70° F. - S.A.E. 60 From 32° to 70° F. - S.A.E. 40
Below 30° F. - S.A.E. 30

Twice each year, or every 300 working hours, drain by removing plugs at bottom of housing and refill with correct grade of oil.

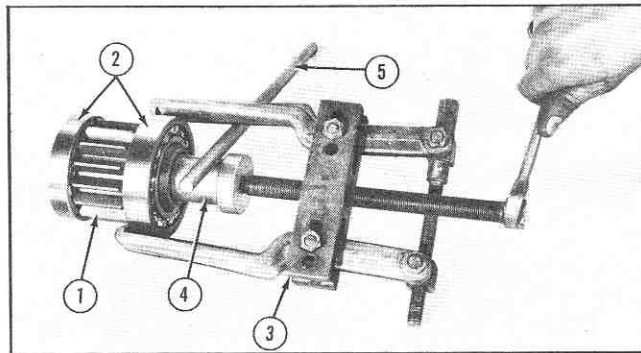
REMOVAL AND SERVICING - Disconnect TRACK. Remove TRACK FRAME and REAR SPROCKET WHEEL. Remove cotter and shaft nut, and take trunnion off, being careful not to lose or misplace bearing spacing shims. Remove oil seal retainer with small seal, cover plate screws, noting position of dowel screws, and pry off cover plate and large oil seal assembly. If outer pinion bearing does not come off with the housing cover plate, it must be removed before rear wheel ring gear assembly can be removed. Ring gear assembly and outer tapered bearing may then be pried or pulled from shaft.

Inner tapered bearing is a tap fit on shaft and can be removed by using small pinch bars behind each side of bearing. When replacing tapered bearings, also replace bearing cups. Cups are positioned in the gear hub by snap rings except in later production and service gear assemblies, which are countersunk so that the cup is positioned against a solid shoulder. Drive cups out of gear with a long punch.

Carefully inspect all oil seals and wearing surfaces and replace if necessary. A removeable wear plate, for the large oil seal, is installed over the hub of the ring gear.



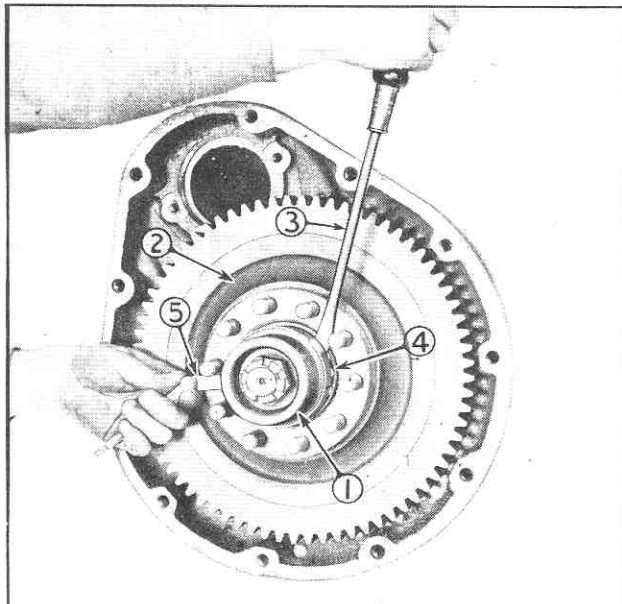
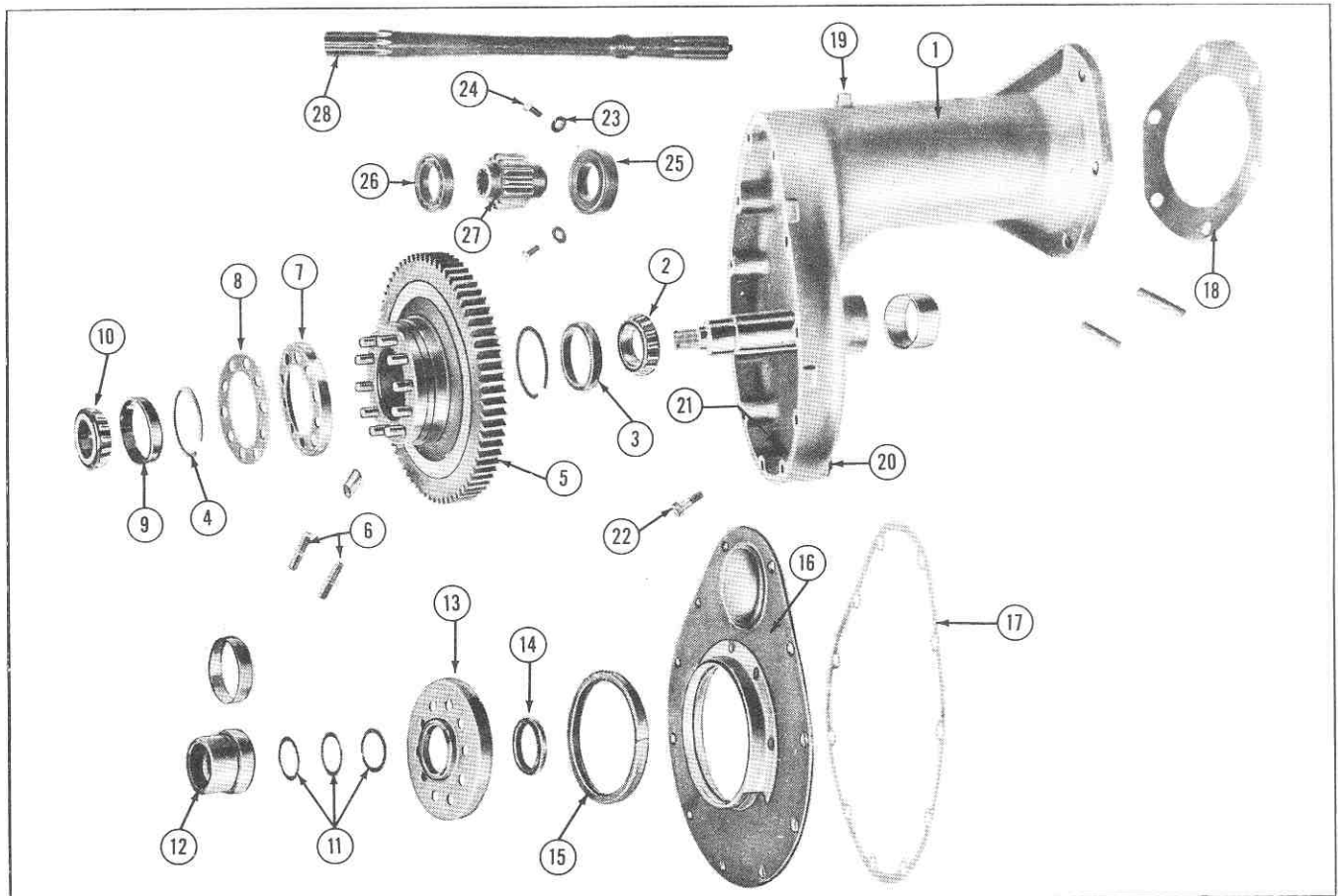
- | | |
|------------------------|--------------------------|
| 1. RETAINER SCREW HOLE | 4. WOOD BLOCK |
| 2. COVER SCREW | 5. RING GEAR & HUB ASSY. |
| 3. PRY BAR | 6. WEAR PLATE |



- | | |
|-------------|-----------------|
| 1. PINION | 3. PULLER |
| 2. BEARINGS | 4. ADAPTER PLUG |
| 5. BAR | |

MAIN DRIVE SHAFT - Should pinion, bearings or shaft need to be serviced, loosen and cock ring gear and hub assembly to pull off shaft, cut lock wire and remove the retaining cap screws and washers. Screw one of the housing cover screws into end of shaft and pry out against screw. Bearings may be pulled from pinion with a bearing puller. NOTE - Ring gear tapered bearing adjustment as given under REASSEMBLY, must be made before main drive shaft, pinion and bearings are installed. To assemble, enter the shaft carefully into splined gear in differential, assemble inner carrier bearing to pinion (shielded side toward pinion), then place pinion on shaft and tap bearing into housing, using a lead hammer. Install retaining washers and screws and lock with wire.

FINAL DRIVE - Continued



REASSEMBLY - Install inner tapered bearing on shaft, slide ring gear assembly on shaft then install outer tapered bearing. *NOTE - Drive pinion must be removed to make the following tapered bearing adjustment.* Place trunnion and nut on shaft and tighten. Pry ring gear and bearing back on shaft as far as possible and measure clearance between trunnion and tapered bearing with a feeler gauge.

Remove trunnion, and for test only, install sufficient spacer shims on shaft to add up to the measured clearance plus one .012 shim. Shims are available in .005, .012 and .020 sizes.

- 1. TRUNNION
- 2. RING GEAR ASSY.
- 3. PRY
- 4. BEARING
- 5. FEELER GAUGE

FINAL DRIVE - Continued

REASSEMBLY - (Continued) - Again install and tighten trunnion. Test rotation of ring gear for a definite drag of 2 to 4 pounds pull at the ring gear teeth. Add or remove shims until this correct adjustment is obtained. Add shims to tighten, and remove shims to loosen bearing adjustment.

After correct bearing adjustment is secured, remove nut, trunnion, shims, outer bearing and ring gear. Be careful to keep corrected number of spacing shims together so that correct adjustment will be assured when shims are reinstalled.

Install shaft, pinion and bearings as shown under MAIN DRIVE SHAFT. Install ring gear, tapered bearing and correct spacer shims as determined by previous adjustment. Install outer pinion bearing, gasket, and spacer cover plate, making certain large oil seal has lip of leather pointing out.

Assemble outer (small) oil seal in retainer with lip of leather pointing OUT for tractors prior to Serial No. 17GA215, and with lip of leather pointing IN toward ring gear for tractors after Serial No. 17GA215. Slip retainer over trunnion, making sure seal leather is not crimped or rolled over in assembly. Install retainer and trunnion as an assembly on shaft, then tighten shaft nut and cotter.

Install rear sprocket and be sure nuts and collets are drawn up extremely tight. **NOTE** - When installing a new hub and ring gear assembly without a new rear sprocket wheel on tractors prior to Serial No. 31GA680 it may be necessary to grind out the track frame to give running clearance at the driving studs and wheel disc.

Complete assembly by reinstalling TRACK FRAMES and TRACKS. After 5 working hours, retighten sprocket nuts and check tightness daily thereafter.

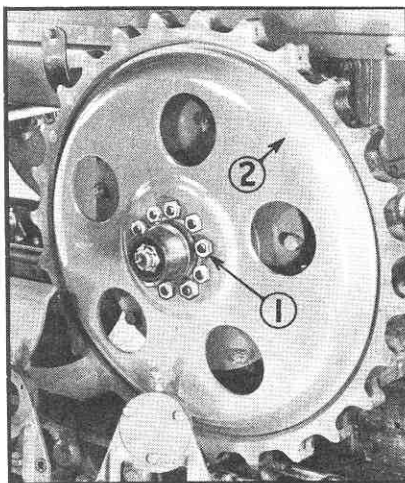
REAR SPROCKET WHEEL

CARE - After the first 50 hours of use, remove trunnion dust cover and retighten wheel nuts.

Keep these sprocket wheel nuts tight at all times to prevent sprocket from rocking on studs, thereby damaging the studs and holes in wheels.

REMOVAL - Disconnect TRACKS and remove TRACK FRAMES. Remove sprocket stud nuts and lift wheel with collets off studs.

NOTE. - When installing a replacement rear sprocket without a new hub and ring gear assembly, on tractors prior to Serial No. 31GA680, it may be necessary to install longer driving studs and a spacer between ring gear hub wear plate and small oil seal retainer, to properly space the sprocket in track frame. This will not be necessary if a new hub and ring gear assembly is installed.

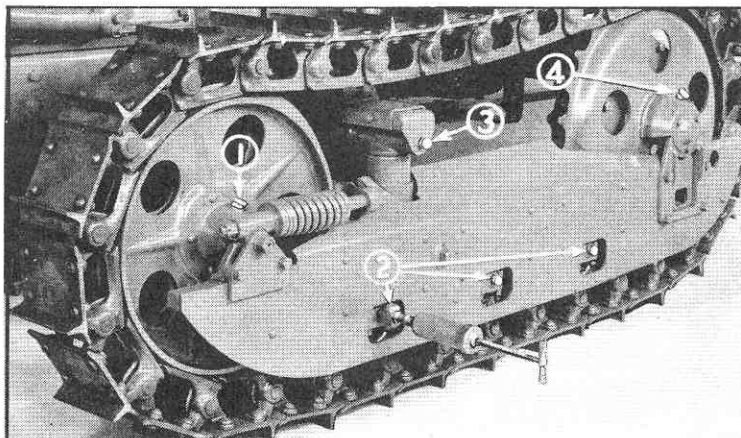


1. NUTS

2. SPROCKET

GROUP 1400-TRACK FRAME ASSEMBLY

LUBRICATION SYSTEM



- | | |
|-----------------------------------|---------------------------|
| 1. FRONT WHEEL OIL FITTINGS | 3. GUIDE PIN OIL FITTINGS |
| 2. LOWER TRACK WHEEL OIL FITTINGS | 4. SUPPORT OIL FITTINGS |

FRONT IDLER WHEEL AND LOWER WHEEL BEARINGS - Following are the correct weight *Engine Oils* to use under varying temperatures:

- | | |
|------------|----------------------|
| S.A.E. 20W | - below 0° F. |
| S.A.E. 30 | - from 0° to 32° F. |
| S.A.E. 40 | - from 32° to 70° F. |
| S.A.E. 60 | - above 70° F. |

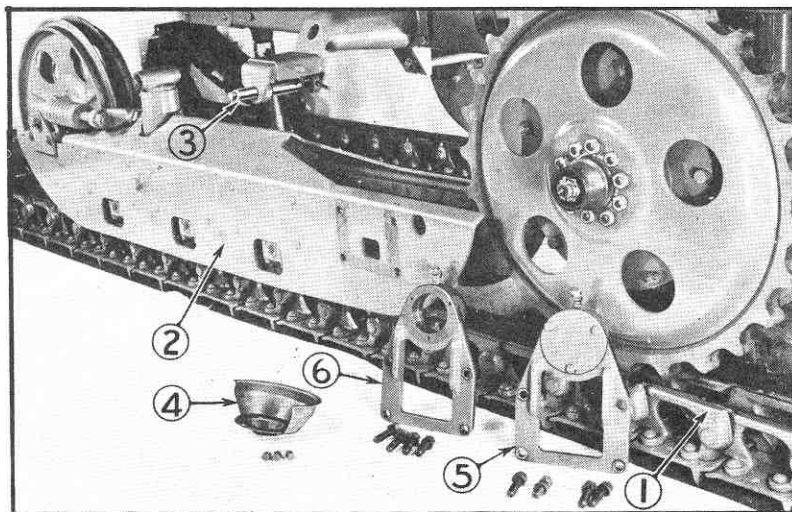
At the beginning of each day, under normal operating conditions, fill the bearings, then refill every 10 working hours. When working the tractor in mud or water, fill bearings every 5 working hours and

at the end of the day's operation, also at the start of next day's operation. To oil the track wheel bearings, thoroly clean the button-head fittings. Hook the oil gun connection on button-head fitting, and fill each bearing until oil is forced out thru the leather seals.

CARE - Occasionally during each day's operation, observe all track wheels to see that they revolve. The cause of any wheel not revolving must be corrected immediately. Never allow mud to dry and harden around wheels. *After the first 50 working hours*, tighten all nuts that hold bearing assemblies to the track frame. Then conduct this same operation every 500 working hours.

TRACK FRAME GUIDE PIN AND TRACK FRAME SUPPORT BUSHINGS - At the beginning of each day, and every 10 working hours, fill track frame guide pins (2 fittings) and track frame support bushings (4 fittings) thru the button-head fittings with the same oil as used in the track wheel bearings.

TRACK FRAMES



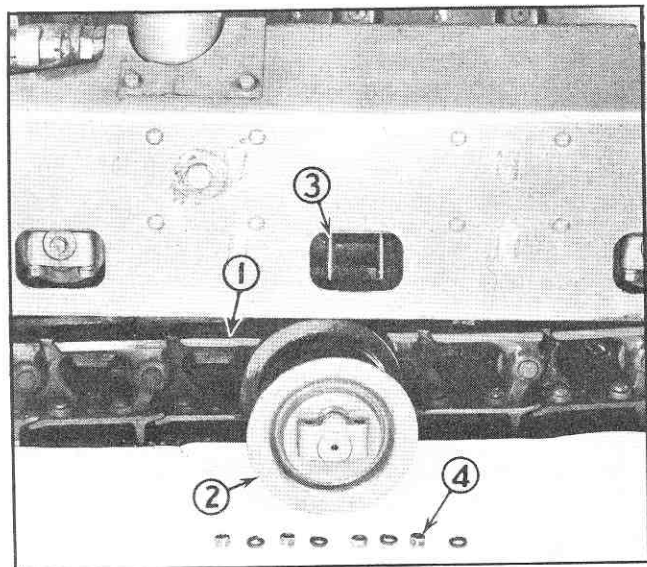
- | | | |
|----------------|----------------------|--------------------------|
| 1. TRACK | 3. GUIDE STEM PIN | 5. INNER SUPPORT BRACKET |
| 2. TRACK FRAME | 4. OUTER DUST COVERS | 6. OUTER SUPPORT BRACKET |

REMOVAL - Disconnect TRACKS.

Jack up tractor at front and rear until weight is just removed from the track frames. Remove TRACK FRAME GUIDE stem pin. Remove outer track frame support dust cover and both inner and outer support brackets. Roll track frames ahead on tracks.

REASSEMBLY - Raise or lower tractor with jacks to line up trunnion to track frame cap screws and track frame guide stem pin, and install parts as removed.

LOWER TRACK WHEEL



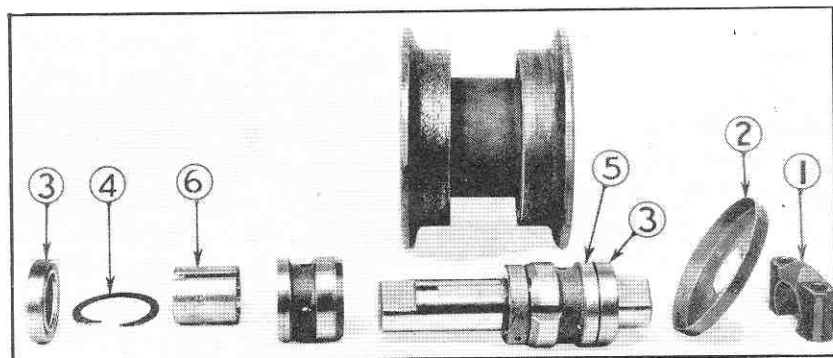
REMOVAL - Disconnect TRACK.

Jack up tractor enough to release weight from tracks.

Slide track in enough to allow wheel to drop down to clear track frames.

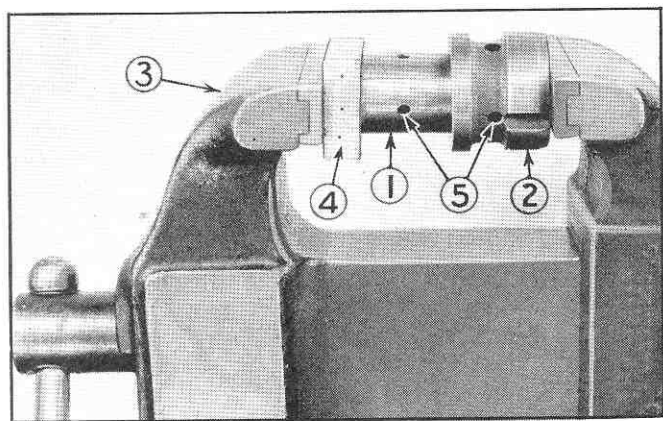
Remove stud nuts holding wheel assembly to track frame, allowing wheel to drop off studs.

1. TRACK
2. WHEEL
3. STUDS
4. STUD NUTS



1. SHAFT RETAINERS
2. DUST SHIELDS
3. OIL SEALS
4. SNAP RINGS
5. BUSHING RETAINERS
6. BUSHING

ner. (If a press is available, this operation can be more conveniently done by the use of same.)

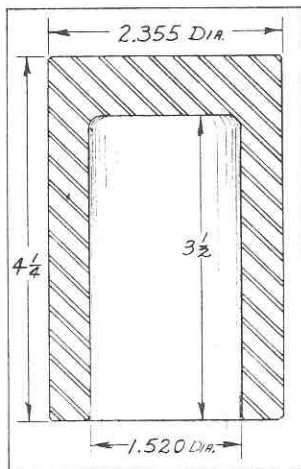


1. BUSHING
2. BUSHING RETAINER
3. VISE
4. WOOD BLOCK
5. OIL HOLES

BUSHING REMOVAL - The split-type bushing can be removed by driving a small chisel down behind the bushing at the split line, being careful not to cut into the retainer.

BUSHING INSTALLATION - Oil holes in bushings are offset from the center line, and bushings must be installed in the retainers, with the shorter end from holes, to the outside. Use a vise or press and hard wood block to press new bushings in, making sure that the oil holes in bushings are lined up with oil holes in retainers.

LOWER TRACK WHEEL - Continued



BUSHING AND OIL SEAL DRIVER

REASSEMBLY - The tapered end of the bushing retainer is the thrust end, and must be installed to center of wheel.

Install one retainer in track wheel, using a retainer driver as shown, and press retainer in until lock ring can just be installed in groove.

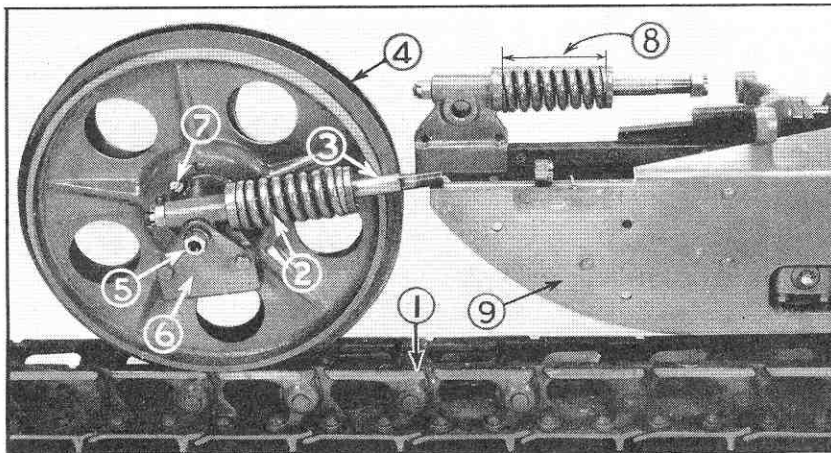
Stand wheel on end, on two wood blocks. Place shaft in wheel and then install opposite retainer and lock ring.

Should shaft bind or thrust, drive on either end of shaft with a piece of soft material to free it up.

Use retainer driver and tap seal into place, making sure lip of leather seal is to the outside.

INSTALLATION - Install assembly to frame, being sure dust shield is in good condition. Complete reassembly of balance of parts removed.

FRONT WHEEL



1. TRACK
2. BUFFER SPRINGS
3. BUFFER SPRING CLAMP ROD

4. FRONT WHEEL
5. SHAFT NUT
6. SUPPORTS

7. OIL FITTING
8. COMPRESSED LENGTH
9. TRACK FRAME

REMOVAL - Disconnect TRACK. Remove buffer spring inner and outer clamp rod cotters and nuts from rear end of rods. Remove front wheel shaft nuts. Slide front wheel and buffer spring assemblies off track frame. Slip front wheel supports off front wheel shaft.

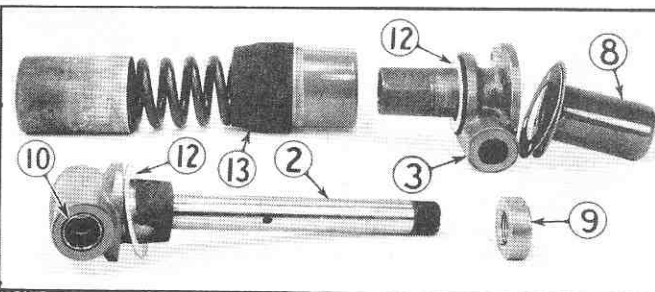
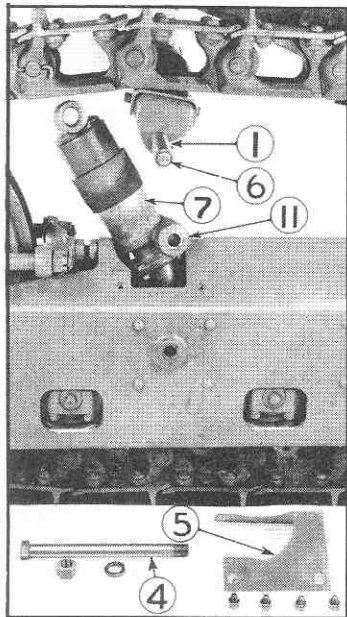
DISASSEMBLY - Remove oil seals from wheel by cutting them with a small, sharp chisel. Remove snap rings. Block

up wheel near hub to drive out bearing retainers. This is important so as not to spring rims of wheels. Install nut on shaft backward and, with a piece of bronze and heavy hammer, drive out bushing retainers. (If press is available, this operation can be more conveniently done by use of same.)

BUSHING REMOVAL, BUSHING INSTALLATION AND REASSEMBLY - Same as under LOWER TRACK WHEEL.

INSTALLATION - Installation is reverse of REMOVAL. However, have oil fitting on outside of wheel for accessibility in oiling. If, for any reason, front wheel buffer springs have been removed, when reassembling, the compressed length of each spring must be equal to assure correct running alignment of wheel and free sliding action of front wheel supports on the track frame.

TRACK FRAME GUIDE AND SPRING ASSEMBLY



1. STEM PIN
2. STEM
3. SPRING SUPPORT
4. SUPPORT BOLT
5. DUST GUARD
6. OIL FITTING
7. SPRING ASSEMBLY
8. STEM DUST SHIELD
9. STEM NUT
10. BRONZE BUSHING
11. SUPPORT SPACER
12. GASKETS
13. RUBBER SLEEVE

LUBRICATION - Use same oil as used in TRACK WHEEL SYSTEM. Stem pin, stem, and spring support have drilled oil passages, therefore, be certain to add enough oil thru oil fitting so that it will pass all the way down to the spring support bolt.

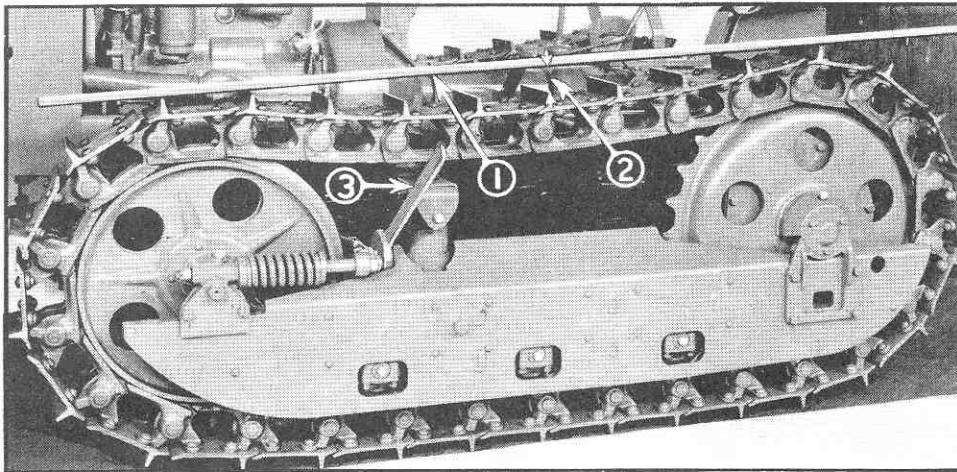
REMOVAL - Jack up tractor at front of main frame. Remove dust guard from track frame. Cut riveted head from one end of stem pin lock-pin and drive out. Drive stem pin out, being careful not to damage oil fitting. Remove spring support bolt.

Continue jacking up tractor until enough clearance is obtained at guide arm to remove the complete assembly. (Track can be loosened if necessary.)

SERVICING - Place the assembly in a vise and remove stem dust shield. Remove the stem nut which will allow entire assembly to be taken apart. Remove and wash the small round felt installed thru the drilled oil hole leading from the bracket down to the crosswise hole in the stem. Use a small wire, tire pump, or compressed air to remove felt from drilled passage.

Before reassembly, clean all parts thoroly. Replace bronze bushing spring support spacer if worn. Replace gaskets and composition rubber sleeve, and fill stem dust shield with light cup grease. In reassembly, lock the stem nut by peening a portion of it into slot cut in stem.

Balance of reassembly is the reverse of removal.

GROUP 1500-TRACKS

1. STRAIGHT EDGE

2. CORRECT ADJUSTMENT (2")

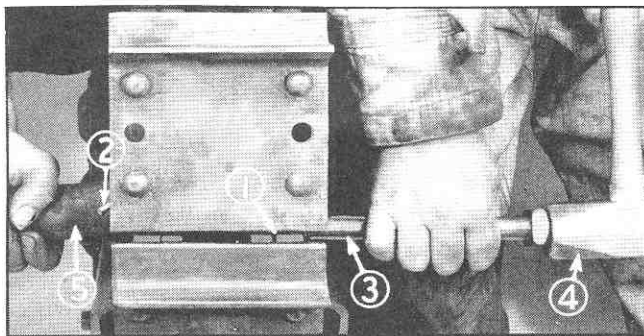
3. ADJUSTING WRENCH

ADJUSTMENT -
Keep tracks adjusted as loosely as possible to facilitate steering and reduce wear. To make correct adjustment, run tractor forward until there is a grouser directly over the center of the rear wheel sprocket. Place a straight edge on the tracks so that the ends

rest on the grousers over the sprocket and front idler wheel. Adjust track so that the vertical distance from the straight edge to the top of the grouser, midway between sprocket and front wheel, is 2 inches, for average conditions.

Operating conditions in some localities may require different adjustment. Consult your OLIVER "Cletrac" Dealer if in doubt.

Do not attempt to adjust tracks until lock nut is loosened and do not fail to tighten after proper adjustment is made. Adjustment is made by turning adjusting screw either to right or left (with wrench) as the condition requires.



1. MASTER PIN LOCATION

2. LOCK PIN

3. DRIFT

4. HAMMER

5. BACK-UP BAR

DISCONNECTING (Before Tractor Serial No. 16GA566) - Have master pin (pin with lock pins in ends) at rear of tractor for convenient removal. Master pin is removed from right to left. If ever in doubt, do not attempt removal until direction is determined by observing arrow and word "Out" on back face of shoe. Cut lock pin on right side and use a drift of smaller diameter than master pin to drive out pin.

When removing master pin, always back up opposite side of shoe with a heavy bar to avoid spreading the shoe while pin is being driven out.

Master pins are shoulder-type construction, the same as balance of track pins, except they have two holes for lock pins and are not fitted so tightly. With this construction, and a larger hole in left track rail than in right, it is only necessary to drive pin the length of the shoulder, after which pin may be tapped out.

RECONNECTING - Bring ends of tracks together and align pin holes of shoes with drift so master pin can be inserted. With lock pin in outer end of master pin, install master pin from left to right. (Check with arrow on back face of shoe.) The master pins can be easily inserted up to shoulder on pin, but must be driven the remaining distance. Align lock pin with slot in shoe, then drive pin in until lock pin is seated. Do not fail to install both lock pins.

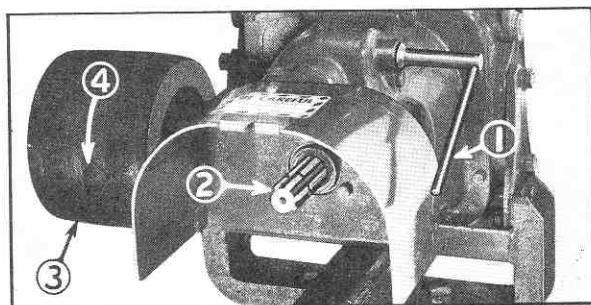
TRACKS - Continued

DISCONNECTING TRACKS (After Tractor Serial No. 16GA566) - Beginning at tractor Serial No. 16GA566 a change has been made in the track shoe pin and bushing, whereby only straight type pins and bushings are being used in all tracks.

When the straight type of pins are used they may be driven out or reinstalled in the shoes from either direction. This also makes it necessary to drive or press the pin or bushing the full width of the track shoe.

Otherwise the removal or servicing of tracks is to be conducted the same as outlined in the preceding paragraphs.

GROUP 3000 - POWER PULLEY AND TAKE-OFF (Special Equipment)



1. SHIFT LEVER
2. P.T.O. DRIVE SHAFT
3. PULLEY-6-1/2" FACE
4. DIRECTION OF ROTATION

LUBRICATION - Pulley assembly is lubricated from differential compartment.

When using power pulley add 2 extra quarts of oil to maintain proper level at transmission oil level plug.

DIRECTIONS FOR ATTACHING - Drain oil from differential housing. Remove drawbar support, housing cover and gasket from rear of transmission case.

Pull splined drive shaft out of pulley housing. Move the differential ring gear by moving the tractor either forward or backward, until gear teeth allow pulley drive shaft to be slipped on to upper transmission shaft freely.

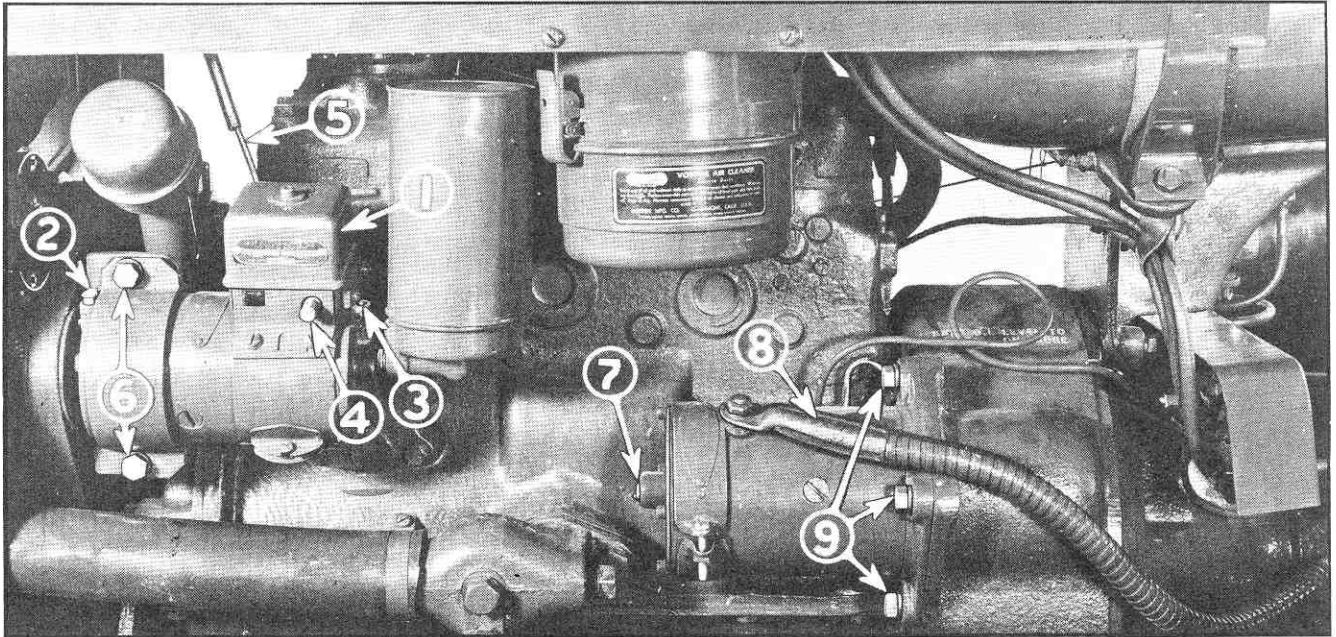
Remove the drive shaft and assemble it back into the pulley.

Install the pulley assembly, making sure the drive shaft coupling splines are on the splines of transmission shaft, and that power pulley gasket is in place.

Securely tighten all cap screws and add oil to oil level hole.

GROUP 3100-ELECTRICAL SYSTEM**(Special Equipment)**

(Used on Tractor Serial Nos. 1GA000 to 25GA377 inclusive)



1. VOLTAGE REGULATOR
2. GENERATOR FRONT OILER
3. GENERATOR REAR OIL HOLE

4. FUSE
5. GENERATOR WIRE
6. GENERATOR CRADLE CAP SCREWS

7. STARTING MOTOR OIL HOLE
8. STARTING MOTOR CABLE
9. STARTING MOTOR ATTACHING SCREWS

STARTING SWITCH

Keep connections tight at all times. Never press starting switch while engine is running. When starting, if engine misfires, wait until starter and engine have stopped rotating before again pressing starter button.

CUT-OUT RELAY AND TWO-CHARGE VOLTAGE REGULATOR

This unit is a combination circuit breaker and two-charge voltage regulator. The circuit breaker acts as an automatic switch to disconnect the generator from the battery when the generator is not running or is running too slow to charge. The regulator reduces the generator output by inserting a resistance in the field circuit whenever the generator voltage reaches a predetermined maximum as in the case of a fully-charged battery.

The adjustment of this unit is necessarily very delicate and is held within very close limits. Therefore, we recommend that no repairs or adjustments be attempted in the field. However, if you have reason to believe that this unit is not working correctly, we would suggest that the generator and relay regulator assembly be taken to an official Auto-Lite Service Station for a check and any needed repairs.

CARE - Do not lubricate any part of this relay regulator unit. Keep all connections tight.

CUT-OUT RELAY AND TWO-CHARGE VOLTAGE REGULATOR - Cont.

Damage to or burning out of this unit may be caused by wrong polarity connections to the battery; shorts between regulator and battery; generator overcharging; damaged battery, such as loose or broken terminals; worn out battery; worn out or sticking generator brushes; loose, dirty or corroded connections; low electrolyte in battery; or by the use of an over-capacity generator fuse when any of the foregoing are present.

GENERATOR (Special Equipment)

(Used on Tractor Serial Nos. 1GA000 to 25GA377 inclusive)

LUBRICATION - Every 30 to 60 working hours, clean away dirt and add a few drops of light engine oil to the spring cap oiler on front, or drive, end of generator, also at the ball sealed oiler at the rear end of the generator.

CARE - Keep all connections tight. Do not allow oil or dirt to accumulate on generator.

Always keep fan and generator drive belt tight enough to drive the generator. However, if belt is adjusted too tightly, it will cause excessive wear on the generator bearings. Belt tension is correct when belt can be pushed in approximately 1/2 to 3/4 inch.

CHARGING RATE - This generator is a voltage-regulated unit. Therefore, if the battery becomes run down, the ammeter should show 10 to 12 amperes charge, but, if the battery is fully charged, the ammeter will show only 5 to 6 amperes charge when the engine is running at governed speed.

Should there be any question as to the generator charging rate, first check the fuse and all wiring connections between generator and battery, and inspect the battery terminals and ground connection, making sure all terminals are clean and tight.

We do not recommend resetting the generator charging rate in the field. Due to the fact that certain instruments are required for this work, we recommend that the generator be taken to an authorized Auto-Lite Service Station for a general check-up or necessary repairs.

REMOVAL - Loosen the fan belt adjustment and remove the drive belt from generator pulley. Disconnect wire to generator and remove cap screws from generator cradle cap. Do not lose 1/4" generator locating pin.

FUSE - Use only a 5 ampere fuse. Nearly all tractors are shipped from the factory without batteries and the generator fuse is shipped in an envelope with the tool kit. The fuse must not be inserted in the regulator until a battery is installed and the cables connected. If, at any time, the tractor is to be run without a battery, remove the fuse from the regulator.

Repeated burning out of the fuse may be caused by loose, damaged, shorted or corroded connections; faulty or damaged cut-out or voltage regulator unit; or from the generator charging rate being set too high.

Burning out of the light fuse, located at rear of instrument panel, may be caused by shorts in wiring of lights or poor connections.

STARTING MOTOR

(Used on Tractor Serial Nos. 1GA000 to 25GA377 inclusive)

LUBRICATION - Every 30 to 60 working hours, oil commutator end bearing with 4 or 5 drops of light engine oil. This can be done by swinging the oil hole cover downward to uncover oil hole.

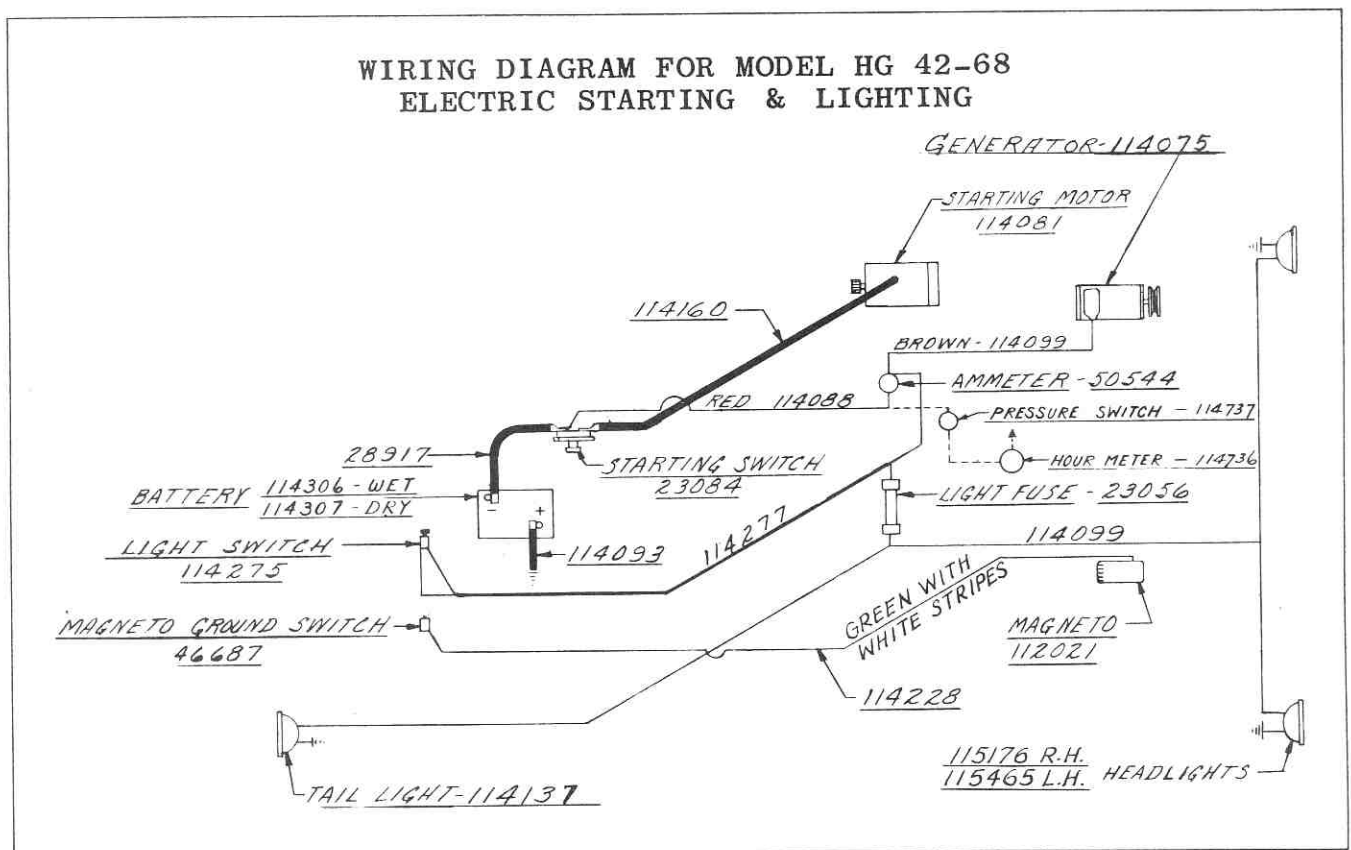
CARE - Every 1000 working hours, remove starting motor, clean Bendix drive parts and inspect commutator and brushes. If all parts are in good condition, apply light oil to drive parts and starting motor shaft and reinstall starting motor to engine.

Should commutator or brushes need truing up or replacing, we strongly advise that the starting motor be taken to your nearest authorized Auto-Lite Service Station for the needed repairs.

REMOVAL - Disconnect cable at starting motor and remove attaching screws and pull motor out of housing.

WIRING DIAGRAM

(Used on Tractor Serial Nos. 1GA000 to 25GA377 inclusive)



BATTERY

(Used on All Tractors Electrically Equipped)

CARE - At beginning of each day's operation, when working in dusty conditions, examine cell vent holes and *keep vent holes clean*.

Keep all hold-down bolts tight and greased to prevent corrosion. Keep connections tight and clean, as loose connections will cause high voltage and amperage. When cables are disconnected, thoroly clean terminals and connections and, after replacing, coat with vaseline or cup grease to retard corrosion.

CAUTION - Every 30 working hours, on batteries with the vent hole separate from the cap, remove the cap and place it over the vent hole. Fill the battery to the top of the cap hole. Remove the cap from the vent and screw it back onto the cell. This manner of filling will automatically allow for correct level of electrolyte solution. On other batteries, remove all filler caps and, if necessary, add sufficient distilled water to keep level of electrolyte 3/8 inch above plates. Run engine 15 to 20 minutes at normal charging rate to agitate solution.

FREEZING WEATHER - Keep battery fully charged. Check specific gravity of each cell with hydrometer at frequent intervals. A fully-charged battery will not freeze in temperatures ordinarily encountered, but a discharged battery will freeze at a temperature slightly below 32° F. in which case the plates will be ruined.

When battery is fully charged, hydrometer reading of each cell will be 1280 to 1300 and, if entirely discharged, the reading will be 1150. If readings are below 1225, have battery recharged at once.

NOTE - Even though a storage battery is fully charged and in good condition, it does not have the same starting capacity at cold temperatures as it does at 80° F. At freezing temperature (32°F.) the capacity is approximately 2/3 the normal capacity at summer temperature, and at zero degrees F. it has less than 1/2 its normal starting capacity. If the tractor can be stored in a warm place during cold weather, not only will the engine be easier to crank, but more electric power will be available to do the cranking.

STORING TRACTOR - If the tractor is to be idle for several weeks, either take the battery to a Service Station to be maintained during the idle period, or have it recharged at least once a month.

ELECTROLYTE (ACID) - If electrolyte is spilled from battery, do not refill with water. Either take battery to nearest Service Station of the respective battery manufacturer for refilling or secure proper solution and add to battery as directed by Service Station attendant. If battery acid is spilled on tractor, sprinkle ordinary baking soda over the acid at once to neutralize it.

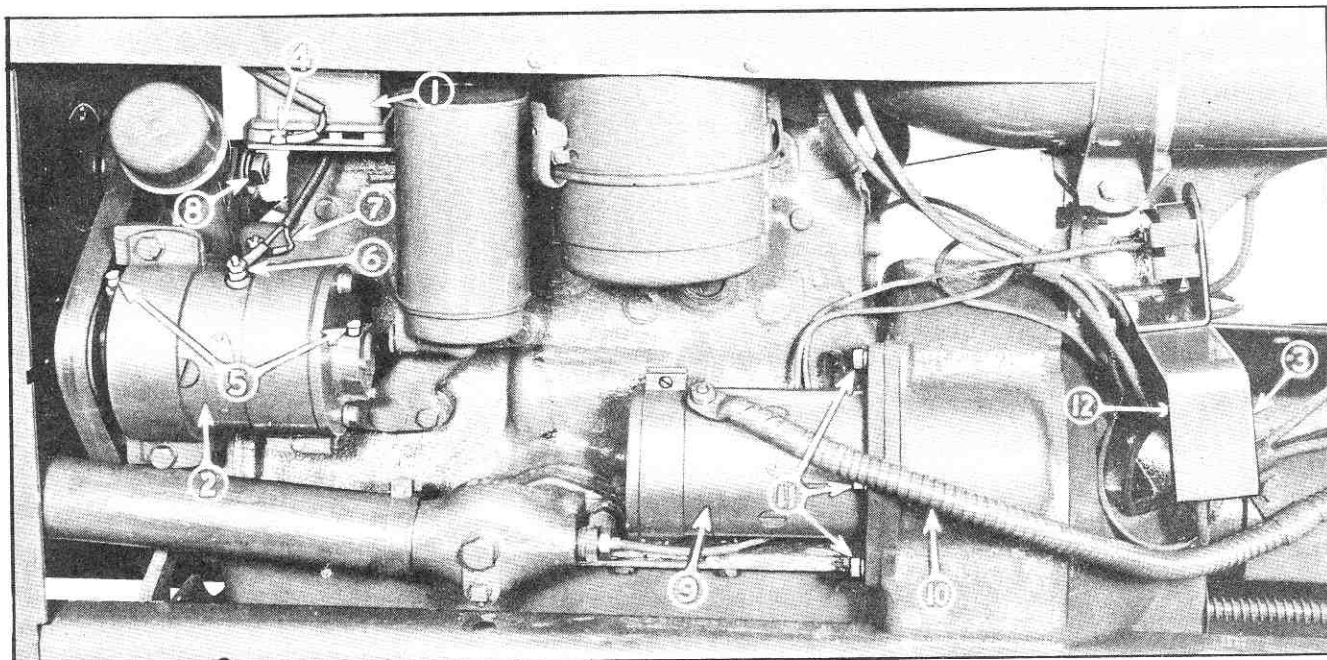
CAUTION - When installing battery in tractor, be sure to connect ground cable to positive battery terminal and starting switch cable to negative battery terminal. On tractor Serial Nos. 1GA000 to 25GA377 inclusive using Auto-Lite generators, be sure to install fuse in voltage regulator. As soon as battery is installed, start the engine and check ammeter. If cables are properly installed, ammeter hand should show "Charge". If ammeter hand shows "Discharge", it indicates battery cables are connected to wrong terminals.

Never operate tractor with battery connected to wrong terminals, as this will change the potential of battery and cause serious damage.

GROUP 3100-ELECTRICAL SYSTEM

(Special Equipment)

(Used on Tractor Serial Nos. 25GA378 and up)



1. STEP VOLTAGE CONTROL
2. GENERATOR
3. AMMETER IN PANEL
4. "BAT" TERMINAL

5. GENERATOR OILERS
6. "A" ARMATURE TERMINAL
7. "F" FIELD WIRE
8. FAN BELT ADJUSTMENT

9. STARTING MOTOR
10. STARTER CABLE TO BATTERY
11. STARTING MOTOR ATTACHING SCREWS
12. FUSE ON BACK OF PANEL

STARTING SWITCH

Keep connections tight at all times. Never press starting switch while engine is running. When starting, if engine misfires, wait until starter and engine have stopped rotating before again pressing starter button.

STEP-VOLTAGE CONTROL

LUBRICATION - Do not lubricate any part of the step-voltage unit.

This unit is a combination cutout relay and step-voltage control. The cut-out relay acts as an automatic switch to disconnect the generator from the battery when the generator is not running or is running too slow to charge. The step-voltage control acts to balance the generator output with the amount of battery charge and electrical load.

CARE - Keep cover screwed down tight to keep out dirt and moisture. Keep all wire connections tight.

The adjustment of this unit is necessarily very delicate and is held within very close limits. Therefore, we recommend that no repairs or adjustments be attempted in the field. If you have reason to believe that the unit is not working correctly, we suggest that both the generator and step-voltage control assemblies be removed from the tractor and taken to your nearest authorized Delco-Remy Service Station for a check and any needed repairs.

STEP-VOLTAGE CONTROL - Continued

CARE - (Continued) - Two of the most common indications that the step-voltage unit or the generator are not operating properly are (1) the ammeter shows a high charging rate when the battery is fully charged or (2) the ammeter shows low or no charge when the battery is known to be partially or completely discharged.

Damage to or burning out of this unit may be caused by wrong polarity connections to the battery; loose, dirty, corroded, or shorted wires and connections; damaged battery, such as loose or broken terminals; worn out battery; worn out or sticking generator brushes; low acid level in battery; or generator over-charging.

REMOVAL - Disconnect wire from single "BAT" terminal side and wrap with tape for insulation. Disconnect "GEN" and "F" terminal wires. Remove screws holding unit to bracket.

GENERATOR (Special Equipment)

(Used on Tractor Serial Nos. 25GA378 and up)

LUBRICATION - *Every 100 working hours or twice a month*, clean away dirt and add 8 to 10 drops of light engine oil into the spring cap oilers on front and rear of generator. Avoid excessive lubrication as this might cause oil to spread out onto the commutator where it would gum and collect dirt, causing excessive brush wear and reducing generator output. Do not lubricate while generator is in operation.

CARE - Keep all connections tight. Do not allow oil or dirt to accumulate on generator.

Always keep fan and generator drive belt tight enough to drive the generator, but not so tight as to cause excessive wear on generator bearings. Belt tension is correct when belt can be pushed in, between generator and fan, approximately 1/2 inch.

CHARGING RATE - This generator is voltage regulated; therefore, if the battery becomes run down, the ammeter should show 10 to 12 amperes charge, but if the battery is fully charged, the ammeter will show only 5 to 6 amperes charge when the engine is running at governed speed and lights are off.

If generator charging rate does not appear to be correct, check first all wiring connections between generator and battery, and inspect battery terminals and ground connections, to make sure all terminals are clean and tight.

We do not recommend resetting the generator charging rate in the field, due to the fact that certain instruments are required for this work. We recommend that the generator and step-voltage control assemblies both be removed and taken to an authorized Delco-Remy Service Station for check-up or necessary repairs.

REMOVAL - Loosen the fan belt adjustment and remove the drive belt from generator pulley. Disconnect single wire at "BAT" terminal of voltage unit. This is a 'hot' wire and open terminal should be taped and tied up so that the wire cannot become grounded on any part of tractor. Disconnect wires from generator to step-voltage control and remove cap screws from generator cradle cap. Do not lose 1/4" generator locating pin in cradle.

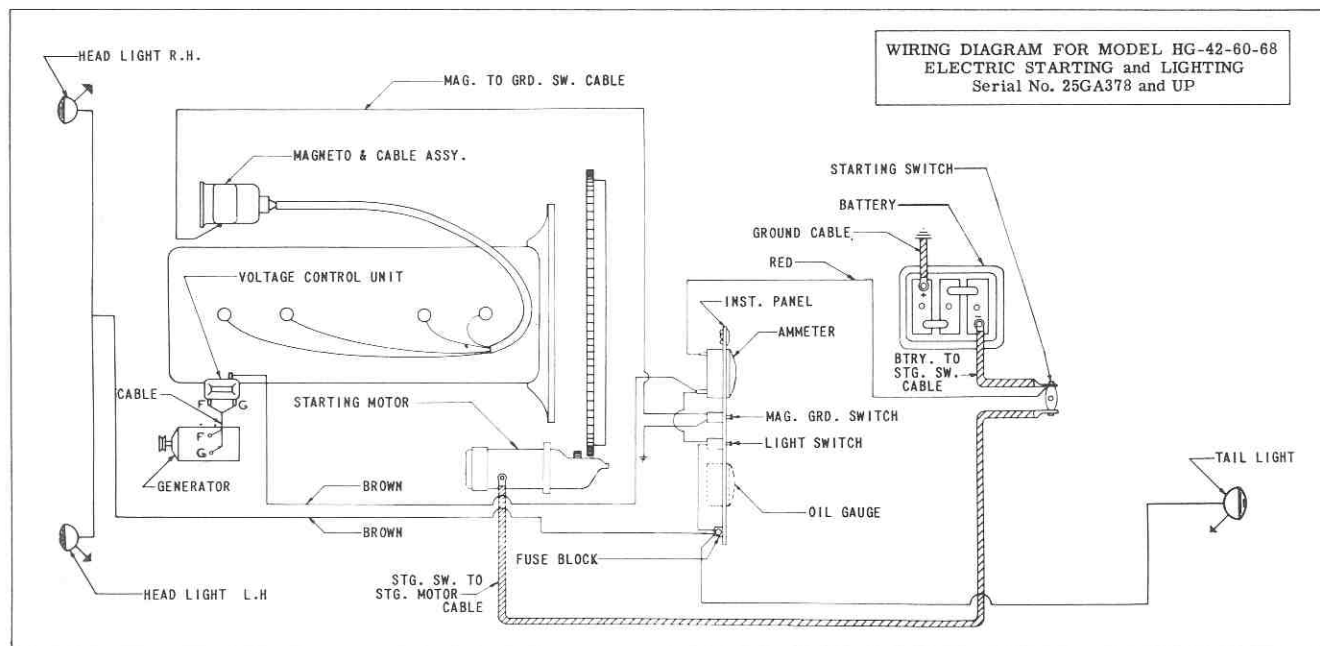
GENERATOR - Continued

IMPORTANT NOTE - When tractor is shipped from the factory, the wire to generator *field* terminal is disconnected and taped for insulation. This wire must be connected before tractor is operated with a battery. If, at any time, the tractor is to be run without a battery, be sure to disconnect *field* wire at generator and tape for insulation. If armature wire is removed and field left connected, generator will burn out.

Burning out of the light fuse, located at rear of instrument panel may be caused by shorts in wiring, poor connections or excessive generator voltage.

WIRING DIAGRAM

(Used on Tractor Serial Nos. 25GA378 and up)



STARTING MOTOR

(Used on Tractor Serial Nos. 25GA378 and up)

LUBRICATION - This starting motor is equipped with oilless bushings which need no additional lubrication other than when the motor is disassembled for service or repair.

CARE - Every 1000 working hours, remove starting motor, clean Bendix drive parts and inspect commutator and brushes. If all parts are in good condition apply a small amount of light engine oil to drive parts and shaft bushing and reinstall starting motor to engine.

Should commutator or brushes need servicing, we strongly advise that the starting motor be taken to your nearest authorized Delco-Remy Service Station for the needed repairs.

REMOVAL - Disconnect cable at starting motor, remove screws attaching motor to bellhousing and pull motor out of housing.



RULES FOR SAFE TRACTOR OPERATION



Most tractor accidents, like industrial, home and highway accidents, are caused by the failure of some individual to observe simple and fundamental safe rules or precaution. For this reason tractor accidents, just as other types of accidents, can be prevented by recognizing the cause of accidents and doing something about it before the accident occurs.

Regardless of the care used in the design and construction of equipment, there are many points that cannot be completely safeguarded without interfering with accessibility and efficient operation.

A careful operator is the best insurance against an accident.

The complete observance of one simple rule would prevent many thousand serious injuries each year. That rule is: "NEVER ATTEMPT TO CLEAN, OIL, OR ADJUST A MACHINE WHILE IN MOTION."

--- National Safety Council

Remember a CAREFUL OPERATOR always is the BEST INSURANCE against an accident

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