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LUBRICATION AND SERVICE

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FOREWORD

The instructions given in this book cover the operation of the Allis-Chalmers "HD-10" tractor. A close adherence to these instructions will result in many hours of trouble-free operation and a longer operating life for the unit.

This book is written for the purpose of giving the operator essential information regarding the day-to-day care, lubrication, and adjustment of the tractor. Economical operation will be insured if these instructions are followed.

Many Allis-Chalmers owners employ the dealer's Service Department for any work other than routine care and adjustments. This practice is encouraged as our dealers are kept well informed by the factory regarding advanced methods of servicing Allis-Chalmers products and are equipped to render satisfactory service.

SPECIFICATIONS

Engine

Make	General Motors Diesel
Type	Two Cycle
Number of Cylinders	4
Bore	4-1/4"
Stroke	5"
R.P.M. Governed at Full Load	1600
Fuel	Commercial Diesel Fuel Oil

TRACTOR SPEEDS MILES PER HOUR

First.	1.69
Second	2.06
Third.	2.68
Fourth	3.78
Fifth.	4.62
Sixth.	6.03
Low Reverse.	1.86
High Reverse	4.17
MAXIMUM DRAWBAR HORSEPOWER	86.63
Belt Horsepower.	101.62
Ground Clearance	11-5/8"
Drawbar Height	14-5/8"
Shipping Weight (Approximately)	
Narrow Tread	20,380 Lbs.
Wide Tread	21,050 Lbs.

CAPACITIES

Cooling System (U.S. Std. Gal.)	9-3/4
Fuel Tank (U.S. Std. Gal.)	44
Transmission Case (U.S. Std. Gal.)	6
Final Drive (U.S. Std. Gal.)	2 each
Crankcase (U.S. Std. Gal.)	3-1/4
Release Spring Housing (Quarts).	7-1/2 each

LUBRICATION

Engine Crankcase Lubricant

ATMOSPHERIC TEMPERATURE
(Degrees Fahrenheit)

ENGINE CRANKCASE
(Crankcase Motor Oil)

Above 90° F.
32° F. to 90° F.
10° F. to 32° F.
Below + 10° F.

Use S.A.E. #30
Use S.A.E. #30
Use S.A.E. #20
Use S.A.E. #10

Use High-Speed Non-Corrosive Diesel Lubricating Oil.

WARNING: USE ONLY NON-CORROSIVE DIESEL ENGINE LUBRICATING OIL.
THIS ENGINE IS EQUIPPED WITH LEAD BRONZE LINED MAIN AND CONNECT-
ING ROD BEARING SHELLS; UNDER NO CIRCUMSTANCES SHOULD A CORROSIVE
DIESEL ENGINE LUBRICATING OIL BE USED.

Use lubricant recommended by Allis-Chalmers. See nearest dealer
or factory branch for recommended list.

- Fuel Oil: - 1. Select a fuel of a reputable oil company coming within the
limits of No. 1 or No. 3 Diesel Fuel Oil according to the
American Society of Testing Materials.
2. The cetane number should be at least 40, since this quality
is a measure of smoothness of combustion and ease of start-
ing.
3. The fuel oil should be free enough from high boiling frac-
tions to give clean combustion.
4. The pour point should be low enough to permit it to flow
freely under the required operating conditions.
5. The fuel oil must be free from alkali, mineral acid, gum,
free sulphur, sediment, and fibrous or other foreign matter.

Transmission Case Oil: -

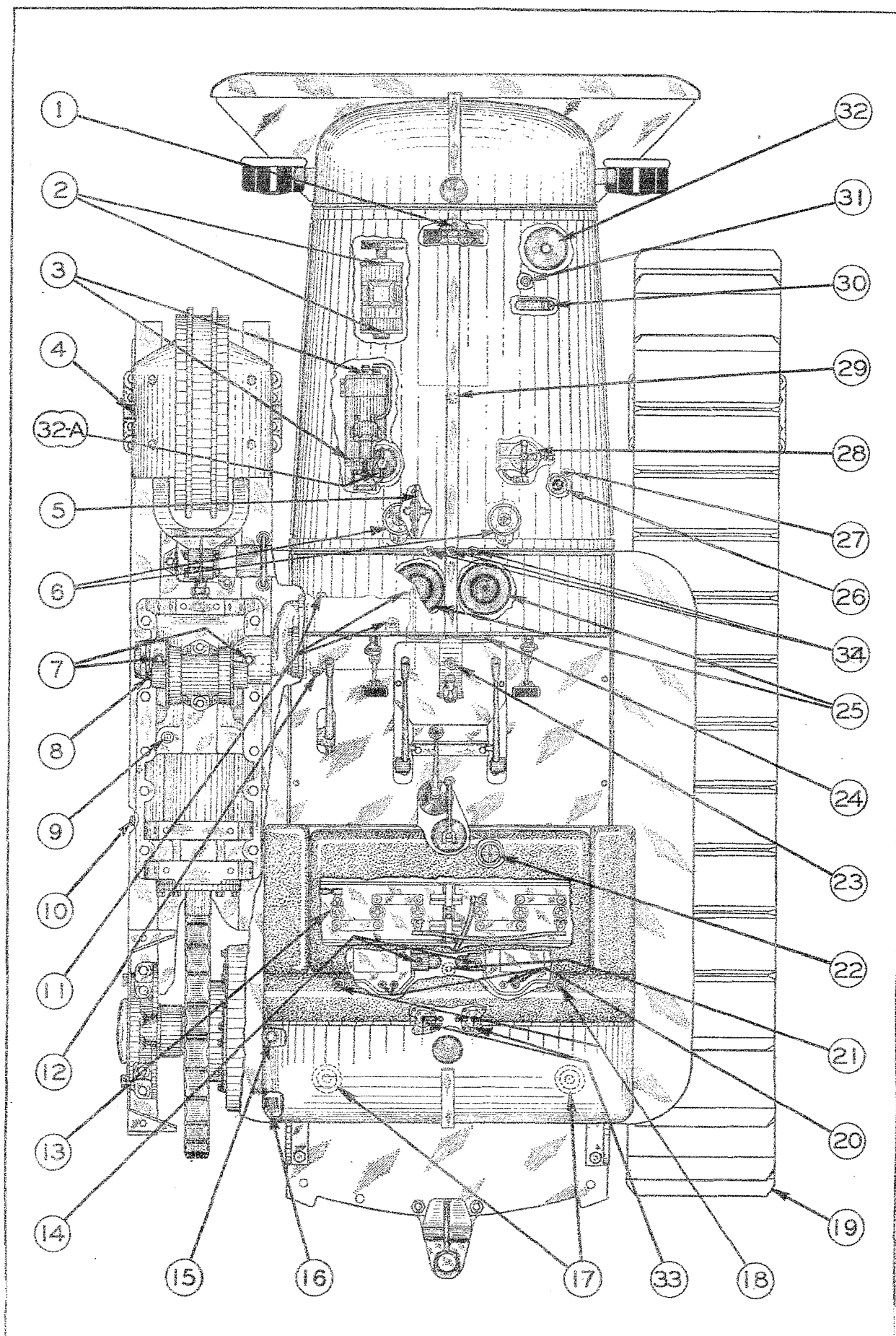
Summer - S.A.E 140 Transmission Oil
Winter - S.A.E 90 Transmission Oil

Final Drive Case Oil

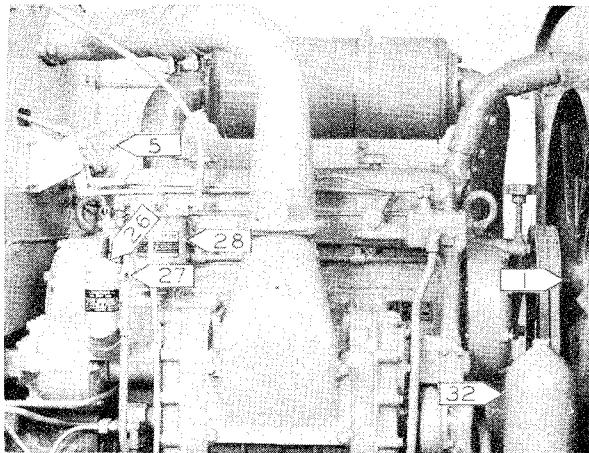
Summer - S.A.E 140 Transmission Oil
Winter - S.A.E 90 Transmission Oil

Semi-Fluid Lubricant: - Where a Semi-Fluid Lubricant is specified use solidified oil of
heavy consistency which does not contain acid and which will not cake or gum at
prevailing temperatures.

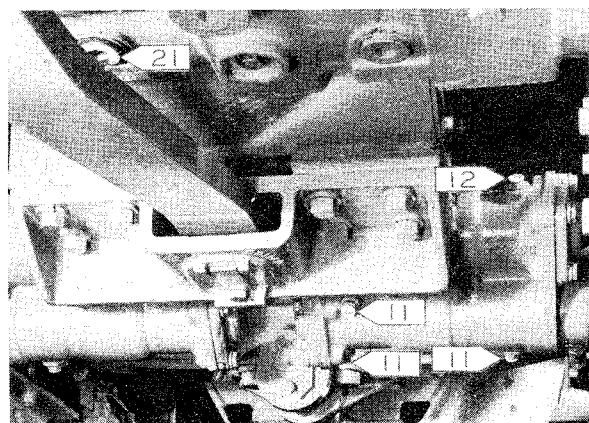
Truck Wheel, Idler, and Track Support Roller Lubricant: - Use lubricant recommended by
Allis-Chalmers. See nearest dealer or factory branch for recommended list.



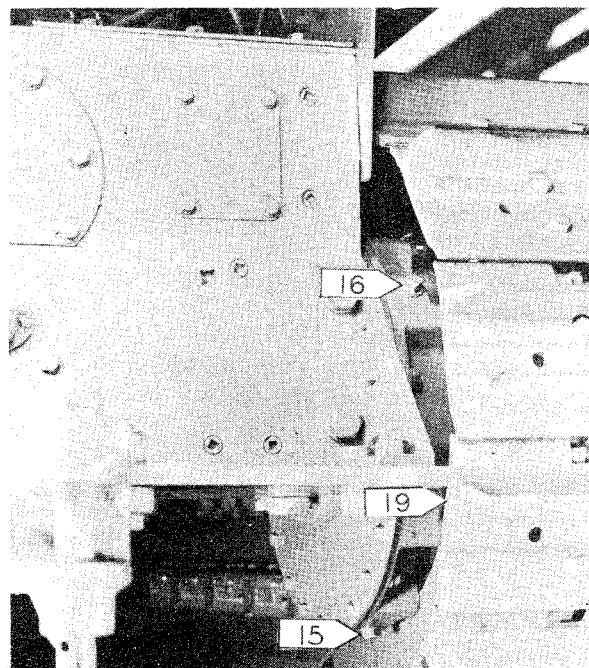
1. FAN - 1 lubrication point - Lubricate every 200 hours of operation with semi-fluid lubricant.
2. GENERATOR - 2 lubrication points - Lubricate every 200 hours of operation with light motor oil.
3. STARTER - 2 lubrication points - Lubricate every 400 hours of operation with light motor oil.
4. FRONT IDLER - 2 lubrication points - Lubricate every 200 hours of operation with 10 strokes of the gun. See the nearest dealer or factory branch for the Allis-Chalmers recommended list of lubricants. Refer to topic "Front Idler Lubrication", Page 26.
5. THROTTLE LEVER DISC - Lubricate when necessary for easy operation with semi-fluid lubricant; do not over-lubricate.
6. PRE CLEANERS - Check and service every ten hours of operation. Refer to topic "Care of Pre Cleaners". Page 11.
7. STABILIZER CRANK SUPPORT - 4 lubrication points. Lubricate every ten hours of operation with semi-fluid lubricant.
8. TRACK SUPPORT ROLLER - 2 lubrication points. Lubricate every 200 hours of operation with 8-1/2 strokes of the gun. See the nearest dealer or factory branch for the Allis-Chalmers recommended list of lubricants.
9. TRACK RELEASE SPRING MECHANISM - Check oil level every 200 working hours. Keep filled to filler plug with transmission oil.
10. TRUCK WHEEL - 10 lubrication points - Lubricate every 200 hours of operation with 6 strokes of the gun. See the nearest dealer or factory branch for the Allis-Chalmers recommended list of lubricants.
11. STABILIZER LINK - 6 lubrication points. Lubricate every ten hours of operation with semi-fluid lubricant.
12. STABILIZER LINK SHAFT - 2 lubrication points. Lubricate every ten hours of operation with semi-fluid lubricant.
13. BATTERIES - Keep the tops and terminals clean. Keep filled with clean distilled water and 3/8" above separator plates; check water level daily. Check periodically with a hydrometer.
14. BELL CRANK PIVOT PIN - 2 lubrication points - Lubricate every ten hours of operation with semi-fluid lubricant.
15. FINAL DRIVE DRAIN PLUG - Drain, flush and refill every 400 hours of operation.
16. FINAL DRIVE FILLER PLUG - Check oil level daily. Keep filled even with filler plug with transmission oil - Winter-S.A.E. #90; Summer-S.A.E. #140.
17. SEDIMENT TRAPS - Drain traps every morning before starting or more often if necessary.
18. BRAKE FLOATING BELL CRANK - Two lubrication Points. Lubricate moderately every 100 hours.
19. TRACKS - No lubrication necessary.
20. STEERING CLUTCH THROWOUT BEARING - 4 lubrication points. Lubricate every ten hours of operation with semi-fluid lubricant.
21. TRANSMISSION DRAIN PLUG - Drain flush and refill every 800 hours of operation with - Winter-S.A.E. #90; Summer-S.A.E. #140 transmission oil.
22. TRANSMISSION CASE FILLER PLUG AND OIL LEVEL BAYONET GAUGE - Check oil level every ten hours of operation and keep the transmission oil level between "Low" and "Full" on the bayonet gauge.
23. CLUTCH SHIFTER BEARING - Lubricate every ten hours of operation with semi-fluid lubricant.
24. LUBRICATING OIL PRESSURE GAUGE - Normal operating pressure when engine is warm is 25 to 35 on the gauge; if gauge does not register, stop engine immediately and determine the cause.
25. AIR CLEANERS - Check and service every ten hours of operation. Refer to topic "Care of Air Cleaners", Page 11.
26. CRANKCASE FILLER CAP - 1 filler point. Change oil every 30 to 60 hours. Do not use corrosive Diesel lubricating oils.
27. CRANKCASE BAYONET GAUGE - Check oil level every ten hours.
28. A-C FUEL OIL FILTER - Replace only when necessary, that is, when pressure drops below normal range due to filter plugging. Refer to topic "Fuel System and Filters", page 11.
29. CRANKCASE DRAIN PLUG - 1 drain point. Drain oil every 30 to 60 hours.
30. WATER PUMP DRAIN - Periodically drain and flush out system. Refer to topic "Cooling System", Page 14.
31. RADIATOR DRAIN - Periodically drain and flush out system. Refer to topic "Cooling System", Page 14.
32. LUBRICATING OIL FILTERS - Clean the first stage oil filter at each crankcase change. Install a new cartridge in the second stage filter (32A) every 240 hours or every 4th oil change. Refer to topic "Lubricating Oil Filter", Page 14.
33. COTTON WOUND FUEL OIL FILTERS - Replace only when necessary. Refer to topic "Fuel System and Filters," page 11.
34. MASTER CLUTCH CAMS - Three lubrication points. Use a high temperature lubricant and lubricate every 200 hours or oftener, if necessary for easy operation. Do not allow excess grease to get on clutch discs.



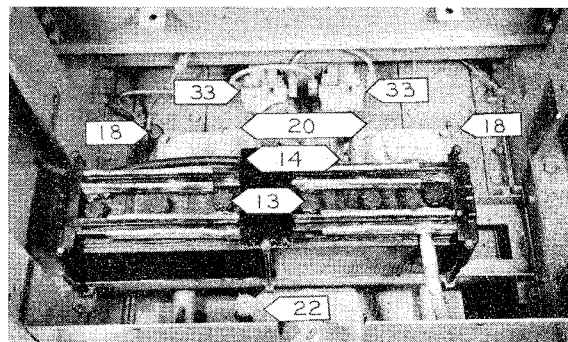
- 1. Fan
- 5. Throttle Lever Disc
- 26. Crankcase Filler Cap
- 27. Crankcase Bayonet Gauge
- 28. Fuel Oil Filter
- 32. Lubricating Oil Filter



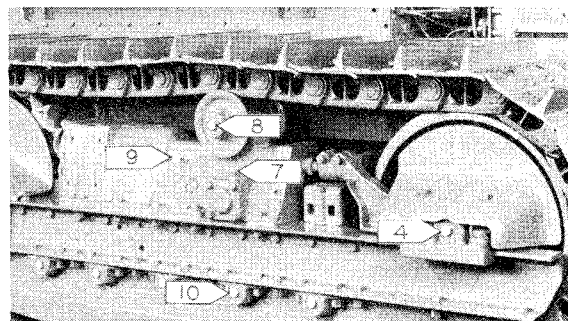
- 11. Stabilizer Link
- 12. Stabilizer Link Shaft
- 21. Transmission Drain Plug



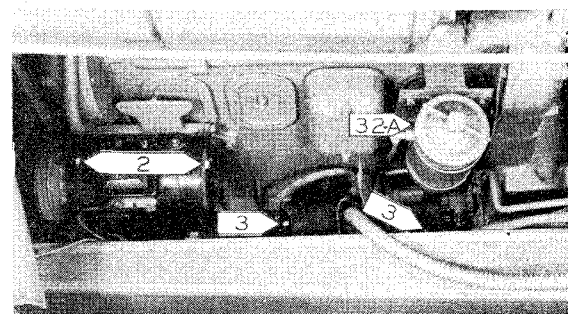
- 15. Final Drive Drain Plug
- 16. Final Drive Filler Plug
- 19. Tracks



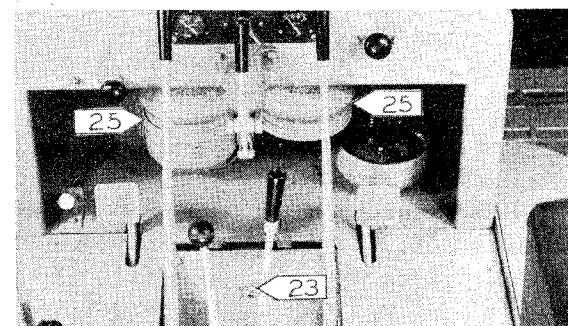
- 13. Batteries
- 14. Bell Crank Pivot Pin
- 18. Brake Floating Bell Crank
- 20. Steering Clutch Throwout Bearings
- 22. Transmission Case Filler Plug and Oil Level Bayonet Gauge
- 33. Cotton Wound Fuel Oil Filters



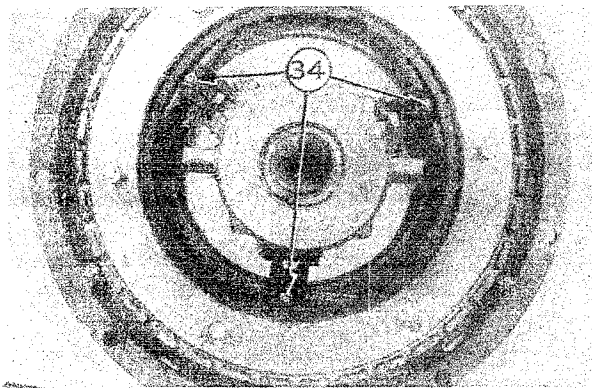
- 4. Front Idler
- 7. Stabilizer Crank Support
- 8. Track Support Roller
- 9. Track Release Spring Mechanism
- 10. Truck Wheel



- 2. Generator
- 3. Starter
- 32A. Second Stage Lubricating Oil Filter



- 23. Master Clutch Shifter Bearing
- 25. Air Cleaners



34 Master Clutch Cams



6 Pre-cleaners

ROUTINE SERVICE

The operating life of a tractor can be materially increased and fewer shut downs will be experienced if the unit is properly serviced at regular periodic intervals. Often major repairs and shut downs can be avoided if the tractor is inspected regularly and the trouble corrected when it is of a minor nature.

The following outline gives the operator the points that should be lubricated or checked at each inspection period.

TEN (10) HOUR SERVICE

Lubricate:

- All Button Head Fittings
 - (a) Stabilizer link
 - (b) Stabilizer link shaft
 - (c) Stabilizer crank support
- Master Clutch Shifter Bearing
- Steering Clutch Throwout Bearings

Check:

- Lubricating Oil Level
- Air Cleaners
- Pre Cleaners
- Final Drive Case Oil Level
- Cooling System
- Fuel Sediment Trap
- Batteries
- Transmission Case Oil Level
- Fuel Tank
- Check Tractor for Loose Nuts and Bolts

SIXTY (60) HOUR SERVICE

Drain and refill crankcase. The oil should be changed every 30 to 60 hours depending upon the quality of oil and the kind of fuel used and the working conditions.

Clean lubricating oil filters. Install a new cartridge in the second stage filter with every fourth oil change or every 240 hours.

Check:

- Steering Clutch Throwout Adjustment
- Master Clutch Adjustment
- Brake Adjustment
- Front Idler and Track Adjustment

ONE HUNDRED (100) HOUR SERVICE

Check:

- Generator Belt
- Fan Belts
- Wire Insulation and Connections
- Track Shoe Bolts
- Brake Floating Bell Crank

TWO HUNDRED (200) HOUR SERVICE

Lubricate:

- Truck Wheels
- Front Idlers
- Track Support Rollers
- Fan
- Generator
- Track Release Spring Mechanism
- Master Clutch Cams

Wash master clutch compartment (only if necessary). Drain, flush and refill cooling system. Drain, flush and refill final drive cases: The oil in the final drive cases should be changed every 200 to 400 hours of operation depending upon the operating conditions. Check cotton wound fuel filter elements and replace if necessary.

FOUR HUNDRED (400) HOUR SERVICE

Lubricate:

- Starter
- Clean and wash steering clutches in fuel oil
- Check Engine Valve Lash

EIGHT HUNDRED (800) HOUR SERVICE

Drain, flush and refill the transmission case; change sooner if seasonal conditions warrant lighter or heavier oil.

TO PREPARE A TRACTOR FOR USE

Make a complete inspection of tractor for any shortage or damage which may have occurred while in transit or in storage.

Remove the air cleaner cups to make sure they contain the correct amount and grade of oil. See care of air cleaner.

Inspect the oil level in the engine crankcase, transmission case, final drive gear cases, and the track release spring housing. Change engine crankcase oil after first 30 hours of operation.

With the exception of the truck wheels, track support rollers, and front idlers, the tractor has been lubricated at the factory for test purposes only. It is essential that all other parts be lubricated before the tractor is put into service. Refer to topics on "Truck Wheel and Front Idler Lubrication."

Check the fuel tank and fill if necessary with the correct fuel oil. Refer to topic "Fuel Oil." Special care must be taken to prevent the entrance of dirt or foreign materials while filling the tank.

Fill the cooling system with clean water that is free from lime or alkalies. In winter weather we recommend using a standard anti-freeze solution in the cooling system. The solution should be tested daily and kept to the proper strength for the prevailing temperatures. The anti-freeze used should have a higher boiling point than the operating temperature of the engine.

OPERATING INSTRUCTIONS

OPERATE A NEW TRACTOR WITH A LIGHT LOAD DURING THE FIRST SIXTY HOURS

After the first ten hours of operation, the tractor should be stopped and inspected for loose bolts and nuts, and the steering clutch throwout and the master clutch adjustments checked.

The valve lash and the injector equalizing and timing should be checked and adjusted after the first 50 hours of operation.

TO START ENGINE

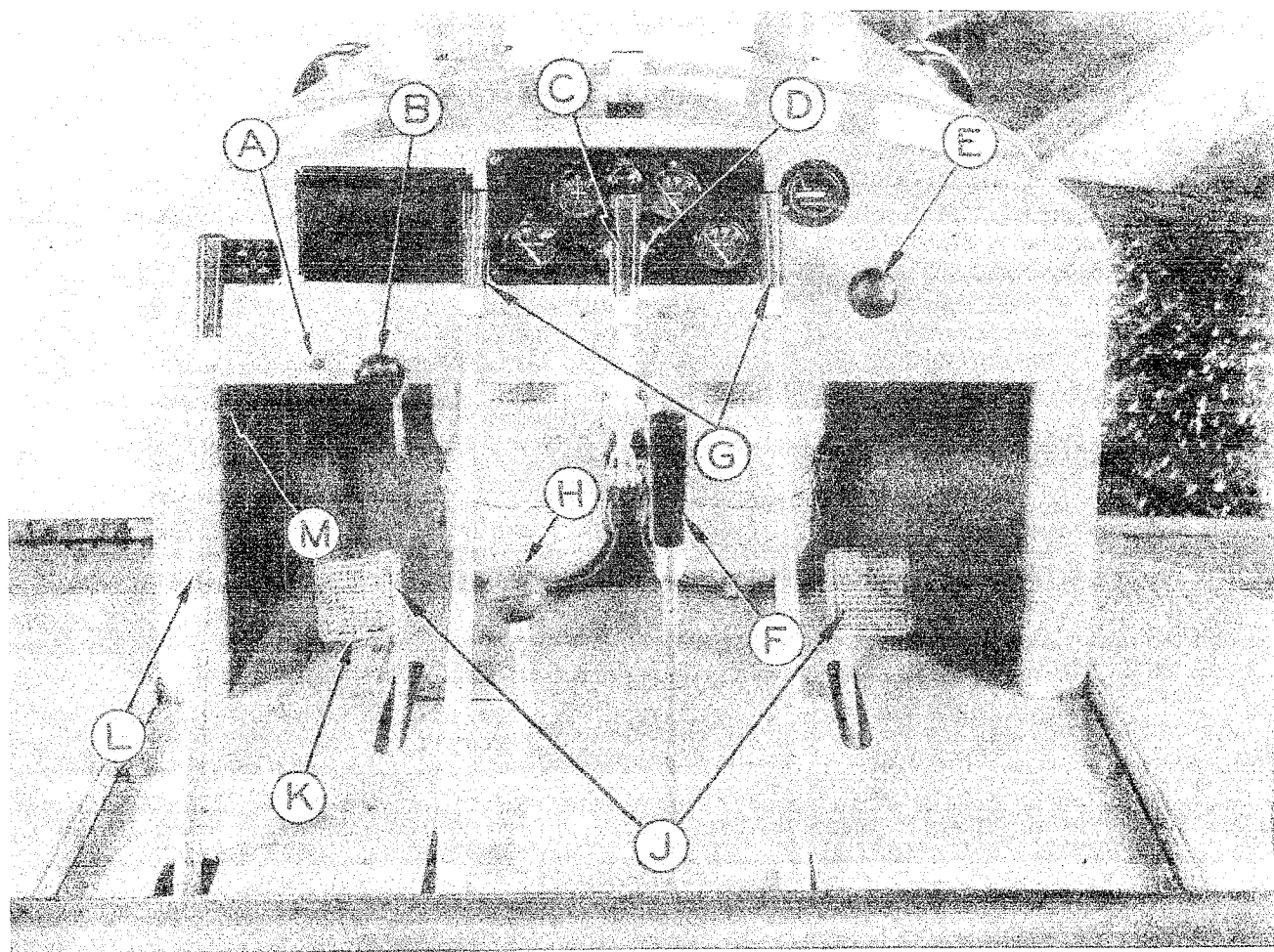
Before the engine is started, the operator should check the following points on the unit:

1. Check the fuel supply.
2. Check the crankcase oil level.
3. Check the water or anti-freeze solution in the cooling system.
4. Check the entire unit for loose bolts or nuts. This is especially necessary when repairs have been made since the previous operating period.
5. Close the radiator shutter by pulling on the shutter control lever.
6. Push the fuel shut-off control forward.
7. Open the throttle control to the fullest extent.
8. Push the starter pedal.
9. As soon as the engine fires and begins to run, close the throttle to about 3/4 engine speed and allow the engine to warm up. When the engine temperature reaches 160°F. open the shutter; the shutter should be adjusted so that an operating temperature of 160° to 180°F. is maintained at all times.
10. Check the oil pressure. At full governed speed and with the engine heated to normal operating temperature the oil pressure should be between 25 and 35 on the gauge; at part throttle the reading may drop to about 5 on the gauge; if the oil is cold, no pressure may register for about 15 seconds after the engine starts, but if the pressure does not rise to between 25 and 35 at normal operating conditions, the engine should be stopped and the cause determined.
11. Check fuel oil pressure. The fuel pressure at full governed speed should be from 20 to 30 on the gauge.
12. Open the throttle to meet operating conditions.

In colder weather when it is necessary to use the "Flame Primer" proceed as stated above for the first eight operations. Then press on the flame primer switch, stroke the pressure fuel pump handle slowly, and press on the starter pedal all at the same time. The flame primer will heat the air box and aid starting. Then proceed as stated above.

TO STOP ENGINE

To stop engine close the throttle control and pull the fuel shut-off control back.



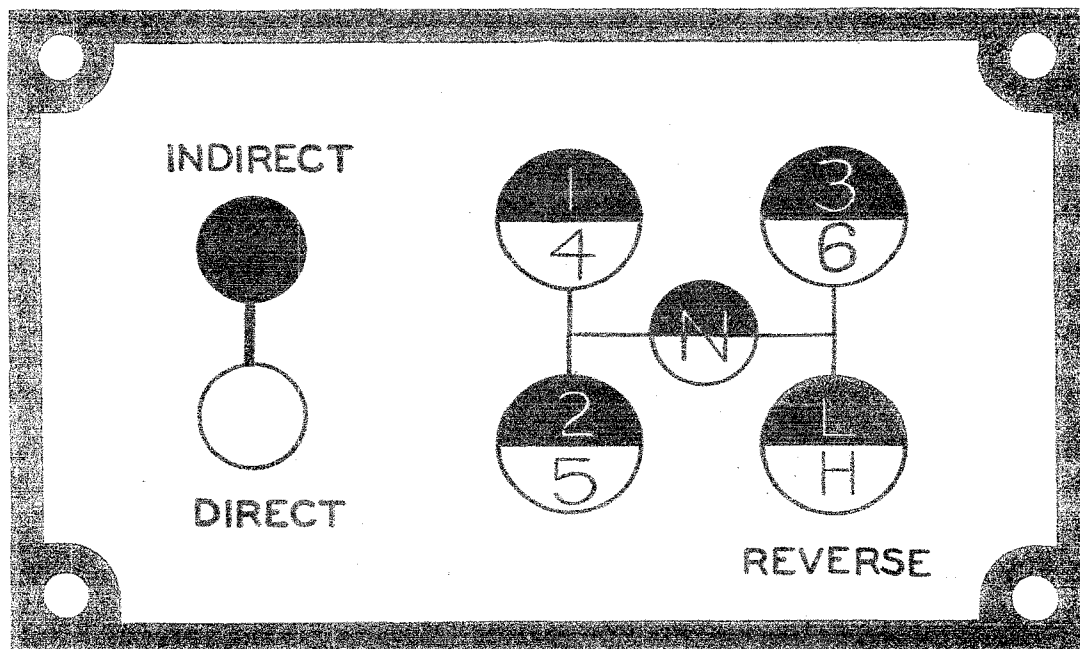
CONTROLS

- | | | |
|------------------------|-------------------------------|---------------------------|
| A. Primer Switch | E. Fuel "Shutoff" | J. Brake Pedals |
| B. Flame Primer | F. Gear Shift Lever | K. Starter |
| C. Hand Throttle Lever | G. Steering Levers | L. Master Clutch Lever |
| D. Light Switch | H. Auxiliary Gear Shift Lever | M. Radiator Shutter Lever |

USE OF MASTER CLUTCH

When the correct gears are engaged for load, open throttle and pull back on the master clutch lever steadily until all slack is taken up between tractor and load; then, pull lever back quickly to the full extent to lock clutch in its engaged position.

Do not slip the master clutch in an effort to pull an overload at high speeds. Avoid excessive wear on the clutch disc facings by shifting to a lower speed. Do not let the engine idle with the master clutch disengaged. When the engine is idling, shift the gears into neutral and engage the master clutch.



USE OF GEAR SHIFTING LEVERS

Two levers are used to shift the gears. The left lever (looking forward) is an auxiliary lever for shifting the auxiliary gears and has two positions, indirect (forward) and direct (backward); the right lever has four positions and is called the gear shift lever. When the auxiliary lever is in the direct position, the tractor can be run in 4th, 5th, 6th and high reverse; when the lever is in the indirect position the tractor can be run in 1st, 2nd, 3rd, and low reverse.

By referring to the gear shifting chart we find the following positions:

First	Gear Shift Lever Left and Forward.....	Auxiliary Lever Indirect
Second	Gear Shift Lever Left and Back.....	Auxiliary Lever Indirect
Third	Gear Shift Lever Right and Forward.....	Auxiliary Lever Indirect
Fourth	Gear Shift Lever Left and Forward.....	Auxiliary Lever Direct
Fifth	Gear Shift Lever Left and Back.....	Auxiliary Lever Direct
Sixth	Gear Shift Lever Right and Forward.....	Auxiliary Lever Direct
Low Reverse	Gear Shift Lever Right and Back.....	Auxiliary Lever Indirect
High Reverse	Gear Shift Lever Right and Back.....	Auxiliary Lever Direct

To shift gears, push master clutch lever forward and shift gears to the desired speed. When the master clutch lever is pushed forward it forces the release bearing carrier against the clutch brake assembly that is fastened to the clutch shaft, thus bringing the transmission gears to a rapid stop. This quick stopping of the gears enables the operator to shift without clashing the gears.

DO NOT CLASH GEARS IN SHIFTING.

STEERING

Steering the tractor is accomplished by the use of steering clutches which are operated by steering levers. Turn the tractor in the desired direction by pulling back to the full extent the steering lever on the side toward which the turn is to be made. The clutches must be engaged slowly and evenly to avoid excessive wear on them. Do not release the levers and let them fly forward. Do not operate tractor with steering clutches partially disengaged. Avoid excessive wear of the steering clutches by releasing and engaging the steering clutches smoothly and completely. See topic "Steering Clutch Adjustment."

USE OF STEERING CLUTCH BRAKES

The steering clutch brakes are for retarding the speed of or holding track stationary when the steering clutch on that side is released for making a turn. In making a turn always release the steering clutch before depressing the brake. They are also used as service brakes for retarding speed of tractor when going down grade and to hold tractor stationary.

DO NOT OPERATE TRACTOR WITH FEET RESTING ON BRAKE PEDALS.

STEERING DOWN HILL

In steering the tractor down steep grades with the load pushing the tractor, the use of the steering clutches is opposite to that of a tractor pulling a load. If it is desired to make a turn toward the right, the left steering clutch should be released. The engine being connected to the right track acts as a brake retarding its progress, while the left track is released and free to travel faster.

If a shorter turn is desired when the load is pushing the tractor, apply the brake on the opposite side of the clutch that is released.

CARE OF AIR CLEANER

The air cleaners must be checked every ten (10) hours of operation. Remove the oil cups and check the amount and condition of the filtering oil. In extreme dusty conditions the oil will have to be changed every eight or ten hours. Under other conditions the oil has to be changed every twenty to thirty hours, but the oil must be kept level with the top of cone in the cup. Use S.A.E. 40 in summer and S.A.E. 30 in winter. Do not use anything lighter and DO NOT USE A DIESEL LUBRICATING OIL IN THE AIR CLEANER. These lubricating oils foam and reduce air cleaner efficiency.

In extreme dusty conditions the air inlet tube on the air cleaner must be swabbed out every ten hours of operation. Oil from the oil cup splashes up on the inside of the cleaner and collects dust on the sides of the passage; this dust accumulates and reduces the volume of air going through the air cleaner.

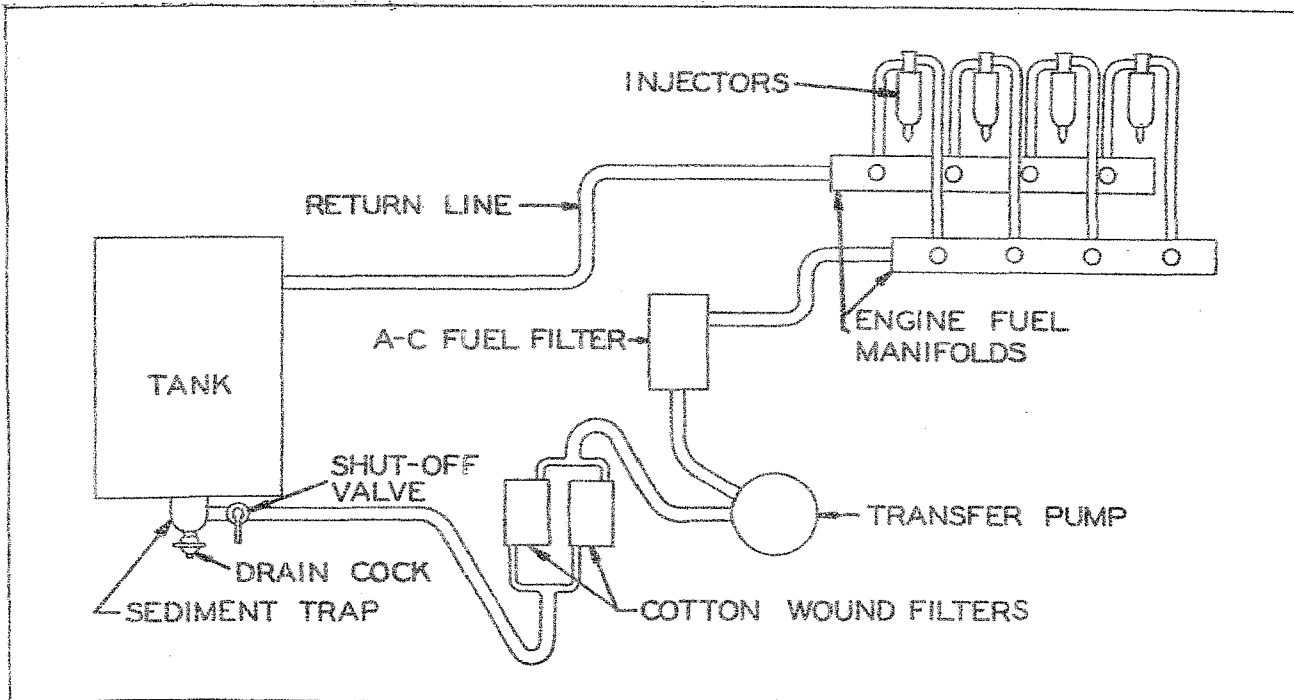
A broken hose, loose clamps, or a leak of any kind between the air cleaners and the blower will defeat the purpose of the cleaners. All connections must be tight.

Improper care of the air cleaners will result in abnormal wear on the blower, rings, pistons and cylinder liners.

CARE OF PRE-CLEANERS

Under normal operating conditions, remove the pre-cleaner jars daily. When the unit is operating in very dusty conditions, this should be done every three or four hours. Under no conditions should the jars become more than three quarters full.

Proper operation of the pre-cleaners depends upon an airtight seal between the jar and the pre-cleaner. So, in servicing this jar, be sure that the gasket is in good condition and that the jar is installed tightly.



FUEL SYSTEM AND FILTERS

As shown in the diagram, the fuel is drawn from the bottom of the fuel tank, through the cotton wound filters, by the transfer pump. The transfer pump then forces the fuel through the A-C fuel filter to the fuel intake manifold on the side of the engine. The fuel then flows under pressure to the injectors. Note that the fuel entering the injectors is filtered through a porous bronze filter. The surplus fuel leaves the injectors through another porous bronze filter, flows into the return fuel manifold and back to the fuel tank through the return fuel line.

or daily before starting engine at the beginning of the operating period. In freezing weather, drain at end of operating period as water might collect in traps and cause damage due to freezing.

Under normal operating conditions when using clean fuel, the COTTON WOUND FUEL FILTERS between sediment trap and transfer pump should operate without plugging for approximately 300 to 500 hours. The element in these filters is of the cotton wound type and is replaceable. A drop in fuel pressure may indicate that the filter is plugged. Never attempt to clean the filter element. If plugging occurs the element must be replaced.

The A-C FUEL FILTER between transfer pump and the injectors is a replaceable cartridge type. When clean fuel is used under normal operating conditions, the cartridge should last from 300 to 500 operating hours. When plugging of this filter occurs, replace the cartridge. Do not attempt to clean the plugged filter cartridge.

Open the drain at the bottom of the A-C FUEL FILTER every morning or every 10 hours of operation to drain off any water and sediment which may have accumulated. NORMAL FUEL OIL PRESSURE IS 20 TO 30 ON GAUGE AT HIGH IDLE. DO NOT OPERATE ENGINE WHEN FUEL PRESSURE IS NOT WITHIN THIS RANGE.

When pressure drops to below 20 on gauge, proceed as follows:

1. Drain Sediment Trap under fuel tank of all water and sediment.
2. Remove both Cotton Wound Fuel Filter Elements and test fuel line from the tank to the cotton wound filters to be absolutely sure that it is free and open. If necessary, replace the Cotton Wound Fuel Filter Elements with new ones. When installing them, make certain that the filter can gasket is in its proper place to prevent leakage. When starting engine after replacing this filter, it may be necessary to open drain at bottom of filter to allow air to escape before fuel will start to circulate through fuel system.
3. Start engine and check to see whether fuel oil pressure comes up to normal. If not, proceed as follows:
 - A. Stop engine and replace A-C Fuel Filter Element. Check fuel lines for obstructions and leaks and again start engine to determine whether fuel oil pressure comes up to normal.
 - B. If fuel oil pressure is still below normal, dismantle Transfer Pump and clean thoroughly.

When fuel oil pressure rises above 30 on gauge, or when operation of engine indicates that insufficient fuel is being supplied to the injection units, with fuel pressure within the normal range, proceed as follows:

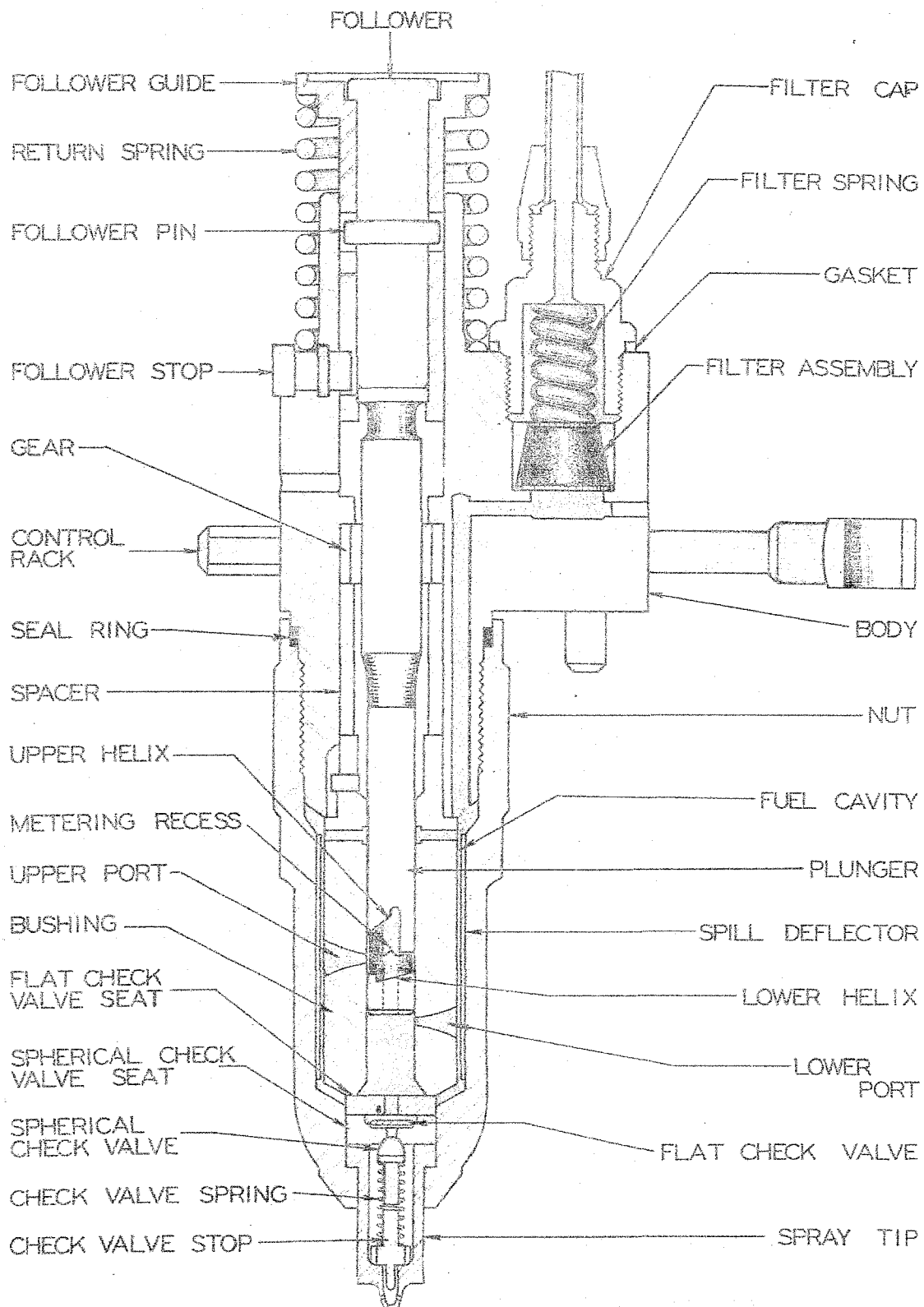
1. Check fuel lines and fuel manifold carrying fuel to the injector units for obstructions. Also see that return fuel manifold and return fuel line to tank are not restricted in any way. To check the return flow, remove the fuel tank cover and look into the tank. When the engine is running at high idle, there should be an ample flow of fuel into the tank from the return main.
2. If no restriction is found in any part of the fuel system as outlined in paragraph 1, remove injector units and replace porous bronze injector filters. Do not attempt to clean these filters, replace with new ones.

The Diesel engine in this tractor depends upon the circulation of fuel oil through the injectors to keep the injectors cool. The transfer pump circulates approximately 25 gallons of fuel per hour through the injection system. If this quantity is allowed to decrease too low, it will possibly cause serious damage to the injectors because of their becoming overheated. As the fuel filters begin to plug up, the quantity of fuel circulating through the injectors becomes less. Although this flow may be sufficient to keep the engine operating normally, it may be reduced to the point where the injectors are becoming dangerously overheated. Therefore, proper performance of the engine does NOT necessarily mean that enough fuel is being circulated, so we recommend that the fuel filtering system be checked and the necessary filter elements replaced at the first indication of a deviation in fuel oil pressure from normal.

The first two or three times the operator has to change the fuel filter elements will give him a good indication as to about how often it will be necessary for the filter elements to be replaced thereafter. That is, if the filters plug up on an average of every 400 hours for the first two or three times the fuel filters should be changed, as an item of routine service, every 400 hours of operation thereafter without waiting for a drop in fuel pressure.

The length of time that the fuel filter elements will operate, of course, depends upon the type and kind of fuel oil being used and also how clean the fuel oil is kept on the job. In accordance with the above paragraphs, change the filter elements in the COTTON WOUND and A-C FUEL FILTERS after a reasonable number of hours of operation even though they are not completely plugged up in order to safeguard the injection system.

MODEL 71 INJECTOR ASSEMBLY



Fuel injectors are precision parts on which no service work should be attempted except by competent mechanics and in absolutely clean surroundings.

During the handling of an injector the fuel connections should be kept closed by means of a dust cap to prevent the entering of dirt or metal chips.

After removal of an injector from the engine the plunger follower should be depressed and the control rack moved back and forth to see if these parts operate freely. When these parts stick or bind in operation due to mechanical damage, replace them with new parts.

If the plunger follower and control rack are in good working order, the failure of an injector may be due to:

1. Sticking or damaged spherical valve
2. Plugged fuel passages in the spray tip
3. Plugged or damaged injector fuel filters

The parts under the first two headings are readily accessible after the removal of the nut which forms the injector seat. For this operation the injector should be carefully clamped, upside down, in a vise between soft metal jaws. A special wrench is provided for removing the injector nut. Unscrew the last few threads by hand and lift the nut carefully off in order not to displace the loose check valve assembly.

Thoroughly inspect the check valve and spherical valve, as well as their seats, for mechanical injuries and also for the presence of chips or other foreign matter which might affect their closing.

Do not attempt to regrind the spherical valve if the seat shows any signs of damage; replace it with a new valve.

The reconditioning of the spray tip should be started with the cleaning of the center fuel passage by means of the spray tip reamer. The tip should then be thoroughly blown out with compressed air in order to remove all particles which may have been loosened by the spray tip reamer.

For cleaning the six spray tip orifices a special cleaning tool has been provided. This consists of a small pin vise holding a piece of .006" music wire. Before using this tool, the end of the wire should be ground off and the sharp burr removed on a honing stone. If the orifices are elongated or worn to the extent that an .008" wire can be inserted, then they will no longer permit proper operation of the engine and the tip should be replaced.

After a second cleaning of the spray tip by means of compressed air, all parts must be thoroughly flushed out in clean fuel oil.

During reassembly, care must be taken to install all parts in their proper places. Each time the injector is disassembled and reassembled, replace the rubber seal ring in the injector nut with a new one.

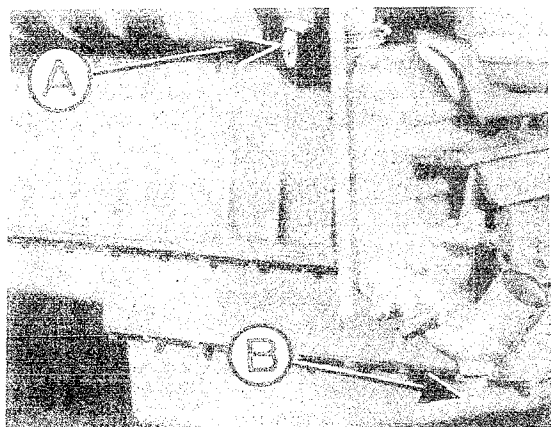
The two porous bronze filters in the injector assembly will become clogged, and should be inspected and changed if necessary. Invert the injector assembly in the vise and remove the filter caps and springs. The porous filters can then be removed; if necessary, replace with new ones. Never try to clean the filters while the injector is in the engine.

At all times extreme care should be exercised in keeping the injector parts thoroughly clean.

After the injector is inspected, cleaned and reassembled, it must be tested before it is installed in the engine. This test is known as "Popping the Injector." First, clean fuel is introduced into the injector with an oil can through the injector filter cap. By moving follower up and down rapidly several times the pattern of the spray can be observed to make sure all holes in tip are open and give about the same size spray. To test for dribble or leaky spherical valve, move follower down slowly and hold against pressure just slightly below opening pressure of spherical valve for a short time. If valve does not leak install injector in engine. It may be necessary to perform this operation several times in order to get injector working properly.

CAUTION: The fuel leaving the orifices under extremely high pressure will penetrate the flesh, which may prove serious; therefore, keep hands away from the spray.

After installation the injectors must be timed and equalized. See Page 17 & 18.



COOLING SYSTEM

Keep cooling system filled with clean water that is free from lime or alkalies. In winter weather we recommend using a standard anti-freeze solution in the cooling system. The solution should be tested daily and kept to the proper strength for the prevailing temperatures. The anti-freeze used should have a higher boiling point than the normal operating temperature of the engine (160° to 180° F).

The cooling system has two drain points and both of these should be opened when the unit is stored. One drain point is in the bottom of the water pump housing (A), the other (B) is in the lubricating oil cooler assembly.

CARE OF BATTERIES AND GENERATOR

Keep the top of the batteries clean and dry.

Add only distilled water regularly to keep water 3/8 inch above separators. Do not allow the solution level to get below the top of the separators.

When adding water to the batteries it should be done just before using tractor so that the water will mix with the electrolyte by the charging received from the generator when the tractor is running; otherwise freezing might result in freezing weather.

The charging rate of the generator is set to charge 4 to 8 amperes when the tractor leaves the factory, which is sufficient to keep the batteries fully charged under ordinary operating conditions.

LUBRICATING OIL FILTER

Two lubricating oil filters are used. The first stage, located on the blower side of the engine, is a full flow type consisting of removable metal elements. These elements must be cleaned at the same time the crankcase oil is changed.

To clean the filter: Remove the drain plug in the filter base and drain the filter body. Remove the nut from the top of the filter body and lift off the center shell. The two filter elements can then be removed. Wash the elements in fuel oil with a soft brush. Do not scrape the elements with a sharp or metal instrument or wash them with a wire brush, as they might be damaged. Wash the filter bracket and the outer shell with fuel oil. Dry all parts thoroughly before assembling the filter.

The second stage filter assembly employs the use of a renewable mineral wool cartridge as the filtering element. This cartridge should be removed and a new one installed with every fourth oil change, or every 240 hours of operation. The filter base and shell should be thoroughly washed with fuel oil and dried before the filter is assembled. This cartridge can be obtained from your local Allis-Chalmers Mfg. Company dealer.

CARE OF PILOT BEARING

The pilot bearing, mounted in the flywheel, is lubricated through a wick in the end of the crankshaft and requires no other lubrication.

CARE OF TRACKS

Do not lubricate the tracks or tighten them tighter than is recommended as either will cause rapid wear. See "Front Idler and Tracks" Adjustments, Page 24.

CARE OF STEERING CLUTCH BRAKES

The steering clutch brakes should be tightened only when necessary. Too tight adjustment of brake bands will affect the operation of the tractor and cause excessive wear on the brake linings, brake drums and steering clutch discs. See Adjustments, Page 21.

CARE OF STEERING CLUTCHES

Keep the steering clutch throwout controls adjusted correctly at all times to prevent slipping of clutches and to assure long life of clutch discs and throwout bearings. Inspect at regular intervals the packing on the bevel gear hub and adjust if necessary to prevent excessive oil leakage from the transmission into the steering clutch compartment.

Periodic washing of steering clutches is recommended. First lubricate the throw-out bearings until they are filled. Install plugs in the drain holes in the steering clutch compartment and pour in five (5) gallons of fuel oil or kerosene. The level will come up to about four inches below the steering clutch shaft.

Start the engine and run tractor back and forward for several minutes without releasing either steering clutch. Stop tractor and drain each compartment.

Replace plugs and fill each compartment with the same amount of fuel oil. Operate the tractor with no load for five minutes, releasing both steering clutches as often as possible. Drain the compartments.

The steering clutch throwout bearings and mechanisms should be lubricated after the steering clutches are washed out, as all lubricant is washed off.

Since it is possible that some fuel oil might drain from the steering clutch compartments into the final drive gear cases during the process of washing, the final drive gear cases should be drained, flushed and refilled with new oil after the steering clutches are washed.

CARE OF MASTER CLUTCH

Keep the clutch in proper adjustment at all times. If there is any slippage of the clutch discontinue operation until this has been corrected. Keep the throw out bearings and cams lubricated as directed. (page 5).

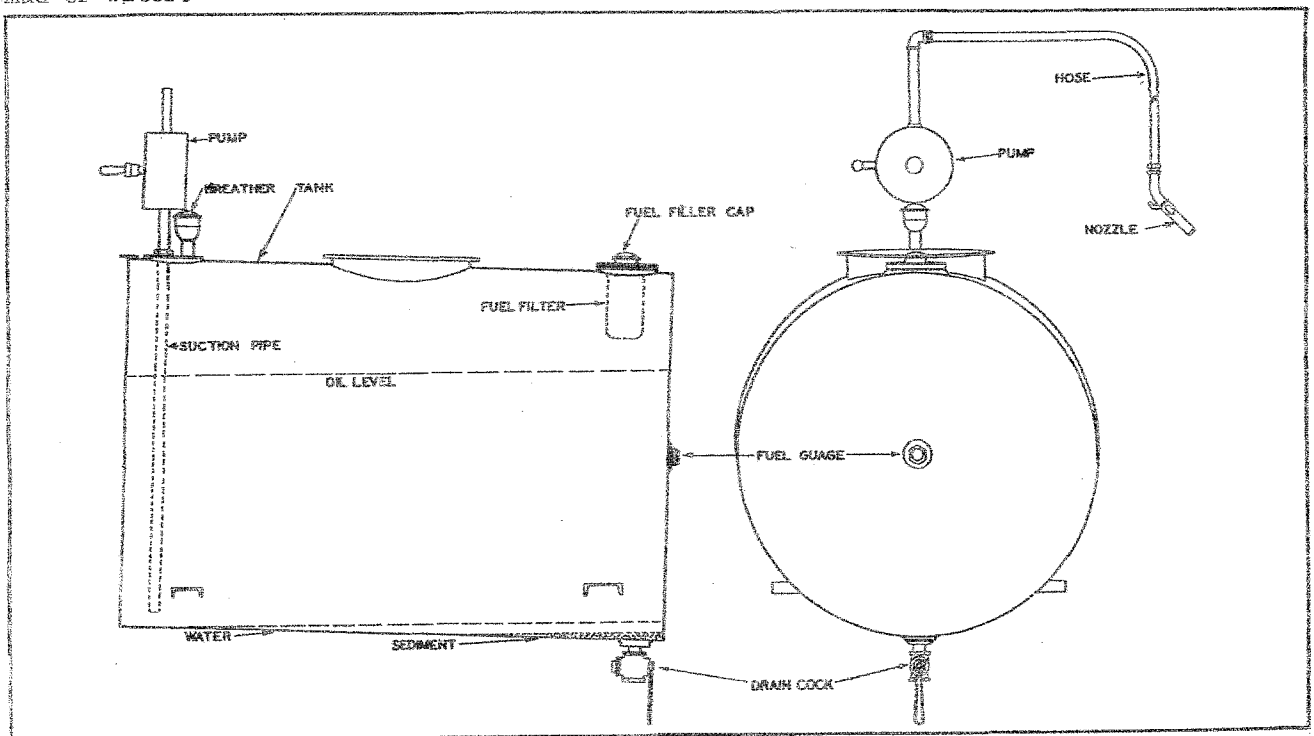
During operation, the master clutch should either be completely engaged or completely disengaged. Never operate or maneuver the tractor by slipping the master clutch. Use this clutch only to provide an even flow of power from the engine and do not use it to jerk or to rock the tractor.

TO WASH MASTER CLUTCH

There is no specified time set down to wash the master clutch; only when prevailing conditions make it necessary should the clutch be washed. Use the same procedure to wash the clutch as is used to wash the steering clutches, but use kerosene for the washing fluid.

OPERATING IN MUD OR WATER

The master clutch compartments are dry compartments and are provided with drain holes to drain out any oil that might leak into the compartments by over lubrication or other causes. In normal operation these holes are to be left open. When operating in mud, water, or extreme dusty or sandy conditions, these drain holes should be plugged to prevent the entrance of dirt or water. The plugs should be removed daily to allow any oil or grease that might accumulate in the compartments to drain out, preventing it from getting on the brake bands or clutch facings. If the tractor is idle at night, the plugs may be removed to drain the compartments, then replaced in the morning. Inspect the final drives frequently and drain, wash, and refill the case as often as the lubricant shows the presence of any mud or water.



Nearly all Diesel engine troubles can be attributed to dirty fuel. To keep the fuel injection equipment in its most efficient condition, it is necessary to keep all dirt, dust, water and other sediment out of the fuel.

The importance of proper storage of fuel oil cannot be too highly stressed. The storage tanks, drums, or service tanks must be free from rust, scale, sediment or any foreign matter that may contaminate the fuel and plug the filters.

Fuel oil should be allowed to settle at least 48 hours in the storage container before it is used for filling the fuel tank on the tractor. It is always advisable to use a pump and draw the fuel from the tank or barrel rather than from the bottom by means of a faucet or through the bung hole.

The storage tank shown in the illustration provides the best method of storing fuel oil on the job. In a tank of this kind the sediment and water can be easily drained and the fuel oil can be pumped into the tractor with the minimum of handling. Consult your local Allis-Chalmers dealer for details about this type of storage tank.

Where conditions are such that drums must be used for service to supply fuel, it is advisable to have enough drums to allow for sufficient time for the fuel to settle, and then the fuel should only be used to within about three inches of the bottom. The fuel thus left in a number of drums can be collected into one drum and used after the usual time allowed for settling. In this manner the sediment and foreign matter will be disposed of, and no fuel will be wasted. Whenever drums are used for storage, they should be covered or placed under shelter to avoid the fuel becoming contaminated by water which will enter through the filter plugs when it rains regardless of how snug the plugs are screwed down.

Since fuel oil in any supply tank is subject to condensation, it is very important that a trap be provided in the bottom of the storage tank where the water and settlings can be drained off daily. The fuel tank on the tractor should be filled at the end of the day's run rather than the next morning. This will reduce the water content, as a full tank is less subject to condensation. The fuel tank on the tractor is provided with a settling trap at the bottom.

STORAGE

It is sometimes necessary to store the tractor for a few months during the winter or slack season. If the tractor is to be idle for some time, make a complete inspection of the tractor for loose or damaged parts, and replace if necessary.

Drain, flush, and refill the engine crankcase with new oil.

Drain the fuel oil tank and fill with a half-and-half mixture of mineral seal oil and kerosene. Run the engine until all of the fuel oil is burned out and the mineral seal oil is throughout the system; this mixture of mineral seal oil and kerosene will prevent corrosion and gumming of the injector parts.

NOTE: When starting the engine again it is not necessary to drain the mixture of mineral seal oil and kerosene; drain the sediment trap and start operating.

Remove the batteries and store in a cool, dry place or store at a regular battery service station. Keep the outside and top of the batteries clean. Check the batteries once a month and recharge because an idle battery will slowly discharge. Do not allow the specific gravity of the electrolyte to get below 1.250. When the batteries are fully charged, the specific gravity of the electrolyte is about 1.280 to 1.300.

REMOVE INJECTOR

If it becomes necessary to remove one of the fuel injectors for inspection or replacement, the following procedure should be observed:

1. Thoroughly clean cylinder head.
2. Remove cylinder head cover.
3. Disconnect fuel feed lines at injector fittings; loosen fuel lines at cylinder head fittings. Turn fuel lines away from rocker arm assembly.
4. Remove the two cap screws holding the rocker arm shaft brackets to cylinder head and fold back the rocker arms, rocker arm shaft, and rocker arm shaft brackets.

CAUTION: If the cylinder from which the injector is to be removed is on compression, turn the motor over until the springs on the valves and injector are loose. Otherwise a load would be imposed on the rocker arm push rods and might bend the push rods.

5. Remove injector hold-down bolt nut and crab.
6. Pry injector from its seat by means of the injector puller tool.
7. Lift injector from seat, at the same time disengaging the control rack linkage.

Immediately after the removal of an injector, the two fuel line fittings should be protected by caps to prevent the entering of dirt.

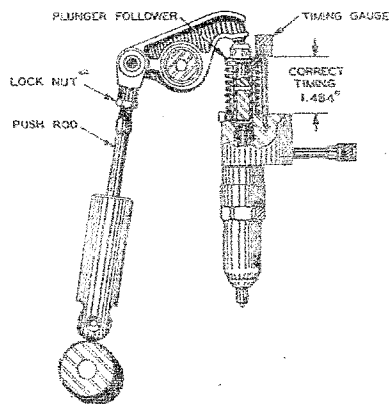
NOTE: After installing the fuel injectors in the cylinder head and connecting the fuel lines to the fuel manifolds and injectors, do not install the cylinder head cover until after the engine has been started and all fuel line connections inspected for leaks. Should fuel oil leak into the cylinder head and dilute the lubricating oil, the entire engine might be seriously damaged.

The injector must be timed and equalized after it is installed.

INJECTOR TIMING

The plunger follower of each injector has to be adjusted to a certain position in relation to the injector body after the injector is installed in the engine.

To time the injectors:



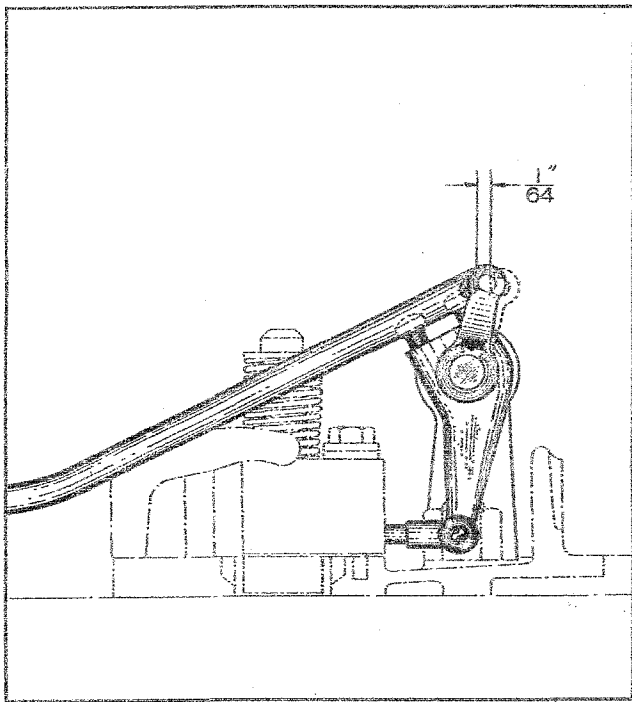
1. Remove cylinder head cover.
2. Rotate engine until valves of the same cylinder are down (fully opened).
3. Place timing gauge in hole in injector body; rotate the timing gauge until the shoulder under the knurled head clears the follower when the gauge is all the way down.

NOTE: When checking timing, hold the gauge vertical. See that there is no dirt or chips in the hole in the injector.

4. Loosen the lock nut on the push rod. Adjust the rocker arm by turning the push rod until the shoulder on the lower edge of the timing gauge just clears the top of the plunger follower.
5. Tighten the lock nut on the push rod.

After tightening the lock nut, check the gauge clearance again to see if it is the same; if not, repeat the above operations. Repeat for all cylinders.

Make these adjustments when the engine is cold and with engine stopped. Injector timing must be checked and readjusted whenever an injector has been removed, replaced or when an engine tune-up indicates faulty injector action.



TO EQUALIZE INJECTORS

1. See that all injectors are installed in the engine with operating lugs on control rack shaft levers engaging with slots in injector racks. Time injectors before equalizing.
2. Loosen adjusting screws on all rack control levers.
3. Remove pin from link and shaft operating lever so control rack can be pushed way in unhampered by the link.
4. With throttle lever at top of governor held in full load position, adjust and tighten screws on No. 1 rack control lever so that No. 1 injector rack is all the way IN and the link is moved OUT $1/64$ " as shown.
5. Hold No. 1 control lever against No. 1 injector rack in its IN position and adjust the remaining rack control levers until lugs on all control levers just contact inner faces of slots on control racks.
6. Attach link to shaft operating lever and install pin.

CHECKING EQUALIZING

The equalizing adjustment can be checked for smoother operation as follows: Start engine and allow it to idle at normal speed until engine is hot (above 160° F.). Uneven running, irregular knocking or pounding from one cylinder, varied exhaust port temperatures, et cetera, are all proof that each cylinder is not receiving the same amount of fuel at the proper time. Try first to locate the cylinder which is too weak or too strong and make adjustments for this variation. Cut out each cylinder by pressing down on the follower guide with a screw driver; the cut out cylinder that has no effect on the running of the engine is the one to be adjusted. Equalize engine to produce smoothest and quietest operation.

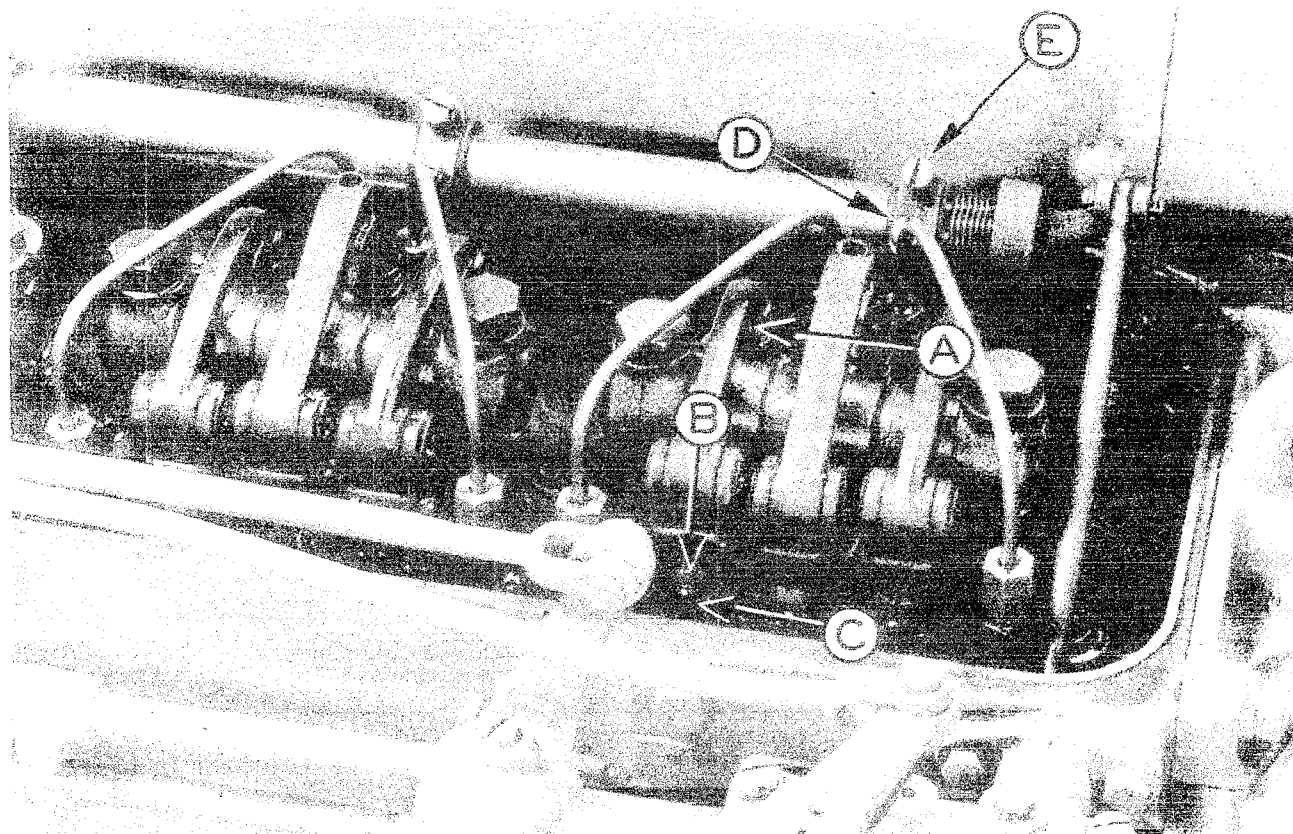
TO DECREASE AMOUNT OF FUEL INJECTED:

Loosen lower adjustment screw (D).
Follow on upper adjustment screw.
Control rack must move outward.

TO INCREASE AMOUNT OF FUEL INJECTED:

Loosen upper adjustment screw (E).
Follow on lower adjustment screw.
Control rack must move inward.

NOTE: Under no circumstances should the rack operating levers be moved more than $1/2$ turn of the adjustment screws. If one injector is adjusted too far out of line with the others, it will prevent the full travel of the racks and reduce the maximum power of the engine.



A. Valve Lash

B. Lock Nut

C. Push Rod

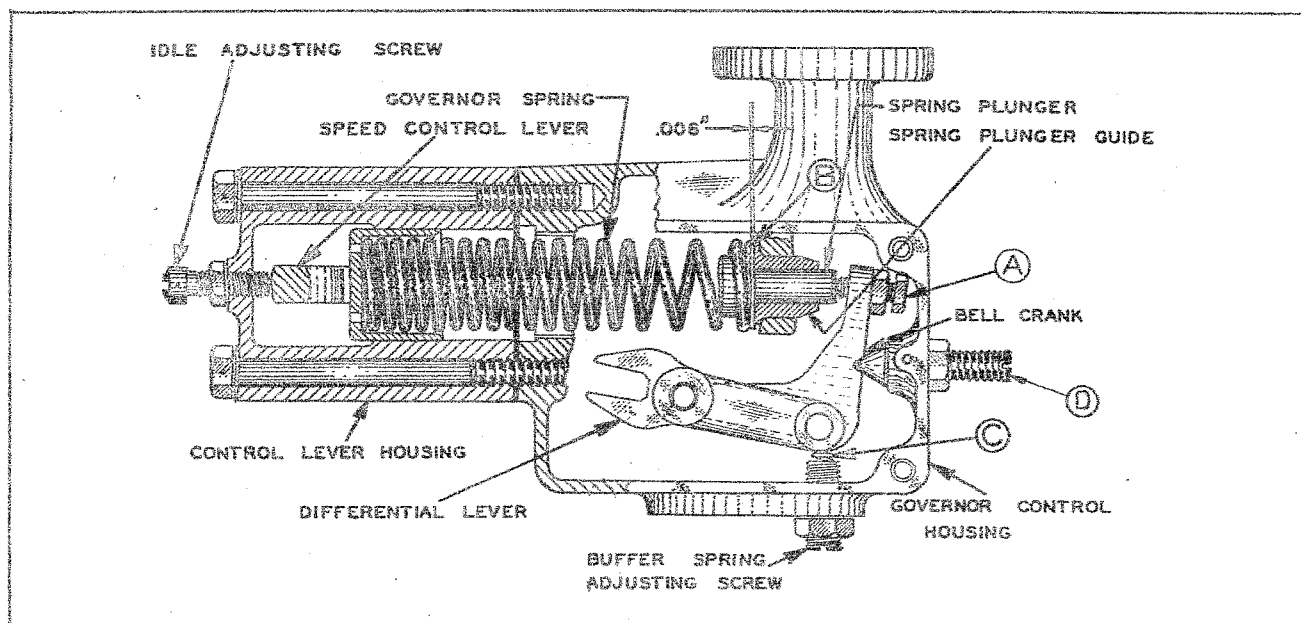
EXHAUST VALVE LASH

For good engine performance at operating temperatures, the valve lash (A) must be .010". To adjust, turn the engine over (be sure that the fuel shut-off rod is in the shut-off position) until the injector plunger is fully depressed for the cylinder to be adjusted. Loosen lock nut (B) on the threaded upper part of the push rod and turn the push rod (C) either clockwise or anti-clockwise until the correct adjustment is obtained. Lock securely and check for correct lash. If the lash is not .010", go through the same procedure again.

CAUTION: Whenever a push rod has been disconnected from its rocker arm, care must be taken to start checking the valve lash with the push rod completely screwed into the clevis. If this is not done, the piston may hit the head of the valve when the engine is being turned, due to the very small clearance between these parts.

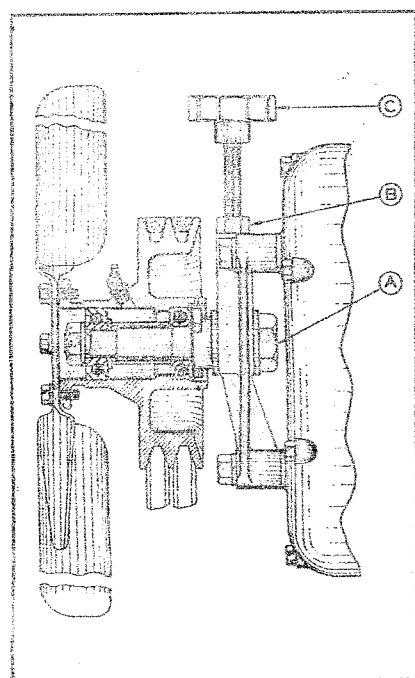
GOVERNOR

The full load speed adjustment is made at the factory and must not be changed in the field. If it becomes necessary to change the idling speed, start the engine and operate until it has reached the normal operating temperature. Loosen the lock nut on the adjusting screw and turn the screw "IN" (clockwise) for higher speeds, or "OUT" (counter clockwise) for slower speeds until the desired speed is obtained; the correct idling speed is about 350 R.P.M. Tighten the lock nut securely. The governor very seldom gets out of working order, so when the engine acts irregular, check the fuel lines, fuel filters, et cetera, before changing the governor setting.



If the governor has been dismantled for repairs, or if a new governor is installed, the following adjustments should be checked and corrected if necessary. Refer to the governor illustration and proceed as follows, with the engine stopped:

1. Remove the governor control housing cover.
2. Place the throttle control lever in the half open position.
3. Loosen lock nut on adjusting screw (A) and turn adjusting screw in or out until a .006" feeler gauge can be inserted between the spring plunger and spring plunger guide at (B).
4. Tighten lock nut.
5. Loosen lock nut on buffer spring adjusting screw.
6. With the hand, push the governor injector control rod toward the buffer spring so as to close the injectors completely.
7. Turn the buffer spring adjusting screw in or out until a .020" feeler gauge can be inserted between the differential lever and the buffer spring screw at (C).
8. Tighten lock nut.
9. Replace governor control housing cover. Be sure dowels are in holes and pin is in slot in differential lever.
10. When the motor was originally assembled the adjusting screw (D) was backed out as far as possible and the locknut securely tightened. This screw plays no part in the adjustment or operation of this governor. It will never be necessary to change the original setting of the screw.



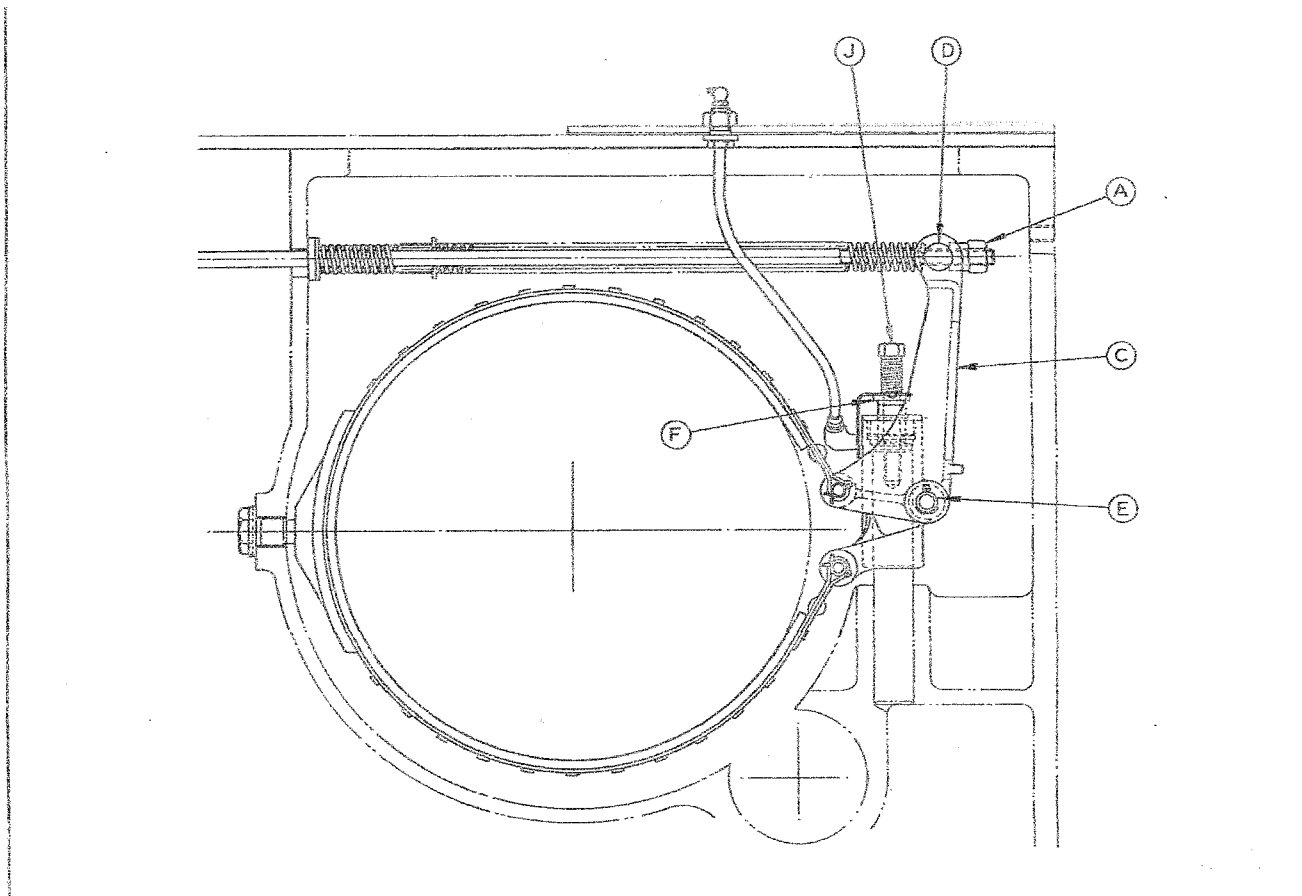
GENERATOR BELT

To adjust the generator belt, loosen the bolts holding the generator to the generator bracket. Move the generator in or out as necessary to correct the adjustment. The correct adjustment is when the belt has about 1 inch slack measured halfway between the pulleys.

- A. Nut
- B. Lock Nut
- C. Adjusting Screw

FAN BELTS

To adjust the fan belts, loosen the large nut (A) at the rear end of the fan shaft and loosen the lock nut (B) on the adjusting screw. Turn the hand screw (C) clockwise to tighten the belts or counter-clockwise to loosen the belts. Tighten both nuts securely after the belts have been adjusted. The belts have about 1-1/4" slack measured halfway between the two pulleys when the belts are correctly adjusted.



STEERING CLUTCH BRAKES

Due to normal wear on the brake linings it will be necessary to adjust the brakes from time to time.

Each brake band is composed of two parts, an upper half and a lower half. A separate adjustment is provided for each half; that is, nut (A) controls the upper half of the band while screw (F) controls the lower half.

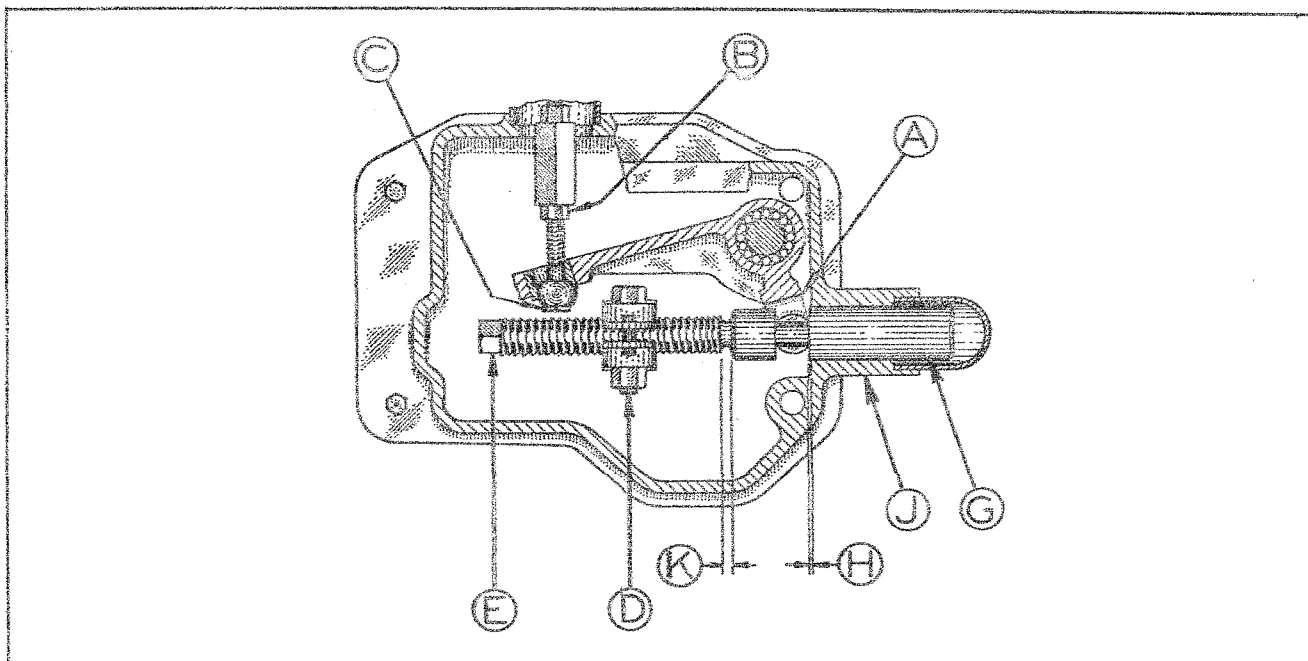
IT IS VERY IMPORTANT THAT BOTH NUT (A) AND SCREW (F) BE USED WHEN MAKING AN ADJUSTMENT AS FOLLOWS:

Remove the top cover plate (located under the seat) from the brake drum housing. Always adjust screw (F) first. Turn in on screw (F) until a clearance of $1/64$ " is obtained between the lower half of the band and the drum with the brakes in the released position. CAUTION: Do not disturb the setting of screw (J). Next adjust the upper half of the band by tightening nut (A). The nut should be tightened until the swivel pin (D) located in the top end of the floating bell crank (C), lies a little to the rear of the fulcrum pin (E) when the brakes are in the applied position. Upon releasing the brakes, a clearance of $1/64$ " must be present between the upper brake band and the drum.

It may be necessary after completing the above procedure, to equalize the clearance of the upper and lower bands when the brakes are in the released position. If the lower half is too loose, screw down on the adjusting screw (F); if too tight, back out on the screw. If the upper half is too loose, screw nut (A) forward, if too tight, screw it back. The clearance may be checked by inserting a $1/64$ " strip of sheet metal between the drum and band and pass all the way around the drum.

Remember, never try to adjust the brakes by tightening nut (A) without first tightening screw (F). To do so will cause the upper half of the band to take the entire braking action which will cause very rapid wear. Due to the construction of this assembly, the upper half of the band always contacts the drum first when the brakes are applied with the proper adjustment. Therefore, it is evident that any additional strain imposed on this band due to improper adjustment would soon result in excessive wear.

When adjusting the brakes after installing a new lining, the same procedure as outlined above must be followed.



- A. Bell Crank
- B. Jam Nut
- C. Adjusting Cap Screw
- D. Adjusting Bolt

- E. Adjusting Screw
- G. Thrust Pins
- H. Clearance
- J. Steering Clutch Control Bracket

STEERING CLUTCH ADJUSTMENT

Place a ruler or scale so it butts up against the dash and projects horizontally past the top of the steering clutch levers; check each lever separately. Push the lever forward as far as it will go; a stop on the deck of the tractor will prevent them from going too far forward. Then pull the lever back until the lost motion is taken up, which can easily be felt by a definite increase in the pull required to release the clutch.

Observe the measurement of the distance between the dash and the top of the lever when it is in its forward position, and also the distance when the lever is pulled back to the position where the lost motion is all taken up and the clutch is just beginning to release.

The difference between these two measurements should not be less than 3" and not more than 5" of free motion. The factory setting is 4-1/4" of free motion. As the steering clutches wear down, the free motion of the levers becomes less, but under no circumstances should the free motion be allowed to become less than 3". If the free motion of the levers does not come within the limits of 3" to 5", then proceed as follows to correct the adjustment.

Remove the steering clutch inspection cover. Loosen the adjusting screw lock nut and bolt (D) and adjust the adjusting screw (E) so that the top of the steering clutch lever has 5" of free motion.

Before replacing the steering clutch inspection cover, the free motion of the thrust pin "G" should be checked. This free motion should be between 1/8 and 3/16 of an inch.

It is also advisable to check the distance (H) between the end of the bell crank (A) and the steering clutch control bracket (J) when the steering levers are as far forward as they will go.

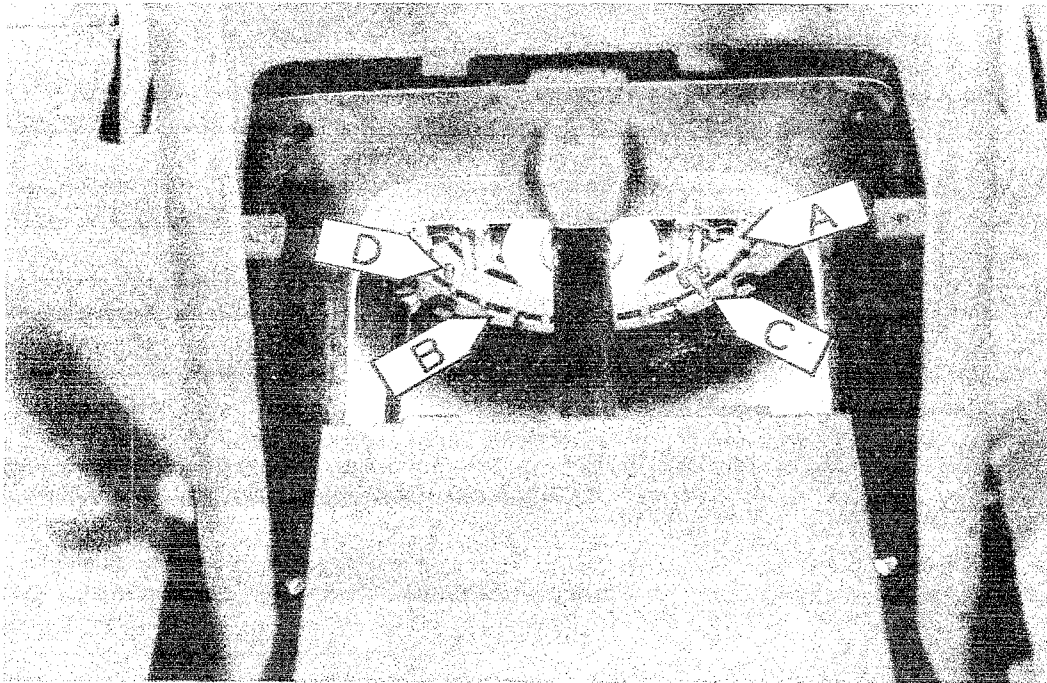
This distance should be between 1/8 to 1/4 of an inch, and if this distance is maintained there will always be a sufficient amount of clearance between the throwout bearing and the shifter plate when the top of the steering levers have the proper free motion as given above. If there is no clearance at (H), then proceed as follows to correct the adjustment.

Push the steering clutch levers as far forward as they will go, and hold them there while making this adjustment. Loosen the jam nut (B) and turn the cap screw (C) in until the end of the bell crank (A) is moved away from the bracket (J) between 1/8 and 1/4 of an inch. Tighten the jam nut (B) to lock the cap screw (C) in place.

It is very important to maintain this clearance at (H) when the levers are in the forward position. If clearance does not exist, it is possible for the clutch throwout bearing to ride against the shifter plate even though the steering clutch levers are adjusted to their proper free motion as specified.

After making the above adjustment, be sure to check the free motion of the steering clutch levers before replacing the inspection cover plate.

Always bear in mind that as the steering clutches wear down, the free motion of the thrust pin becomes less and less, until finally, if the adjustment is not checked and corrected at frequent intervals, the throwout bearings will ride against the shifter plate. If this condition occurs, the throwout bearings will become overheated and will wear rapidly. This condition will also cause the steering clutches to be partially disengaged, thus causing them to slip and wear excessively.



A. Adjusting Ring

B. Back Plate

C. Locking Lug

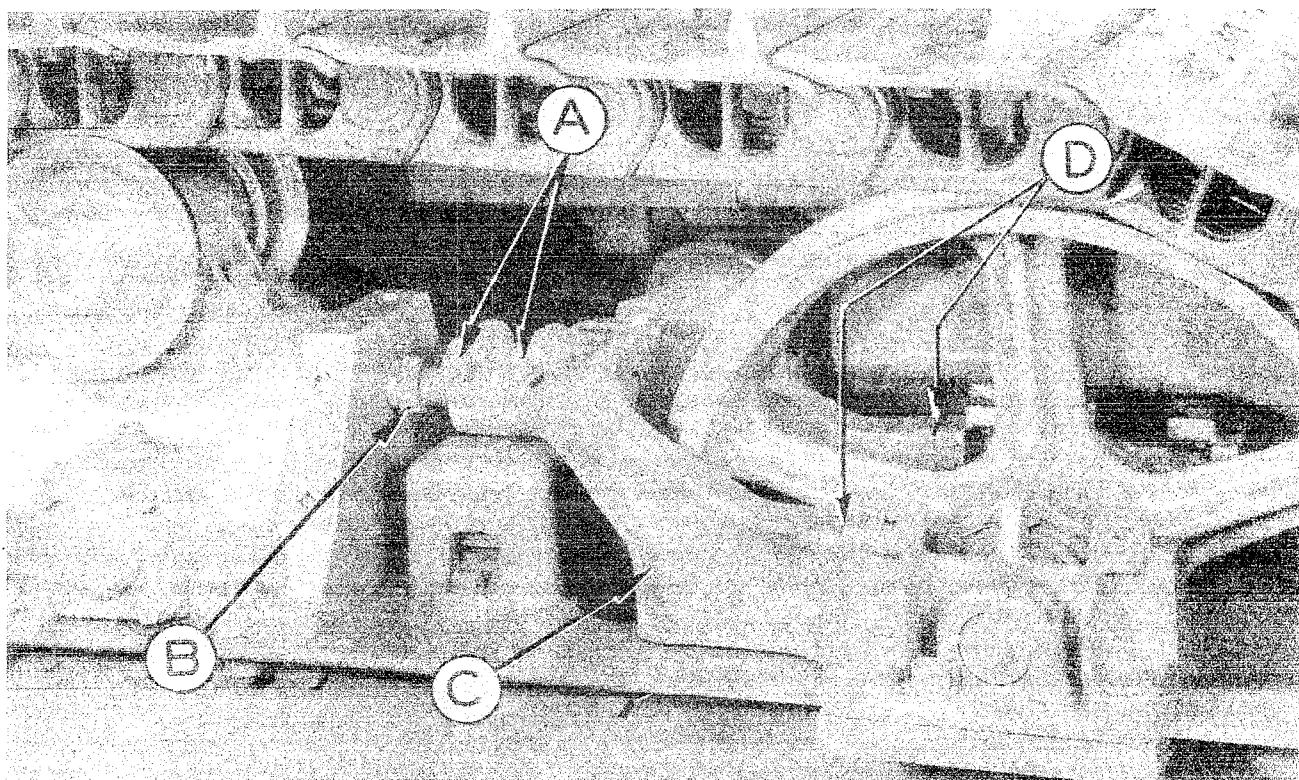
D. Adjusting Lug

MASTER CLUTCH

The master clutch, when in proper adjustment, engages with a snap, and the control lever locks into position with an over-center action. When this action is not present, it indicates that the clutch should be adjusted before slippage occurs. The tractor should never be operated with the clutch slipping.

This clutch is an over-center, cam engaging type with screw thread adjustment between an adjusting ring and back plate.

To adjust master clutch, remove the master clutch inspection cover from the top of the transmission housing. Disengage the master clutch and revolve the clutch until the locking lug (C) on the adjusting ring (A) is located near the inspection hole. Disengage the locking lug from the slot in the backing plate (B). With a bar, pry on the lugs (D) on the adjusting ring to tighten or loosen the clutch; to tighten the clutch, turn the ring clockwise, and to loosen the clutch turn the ring anti-clockwise. Lock the ring in place by turning the locking lug into the nearest slot in the backing plate.



A. Lock Bolts
B. Adjusting Bolt

C. Track Release Yoke
D. Shims

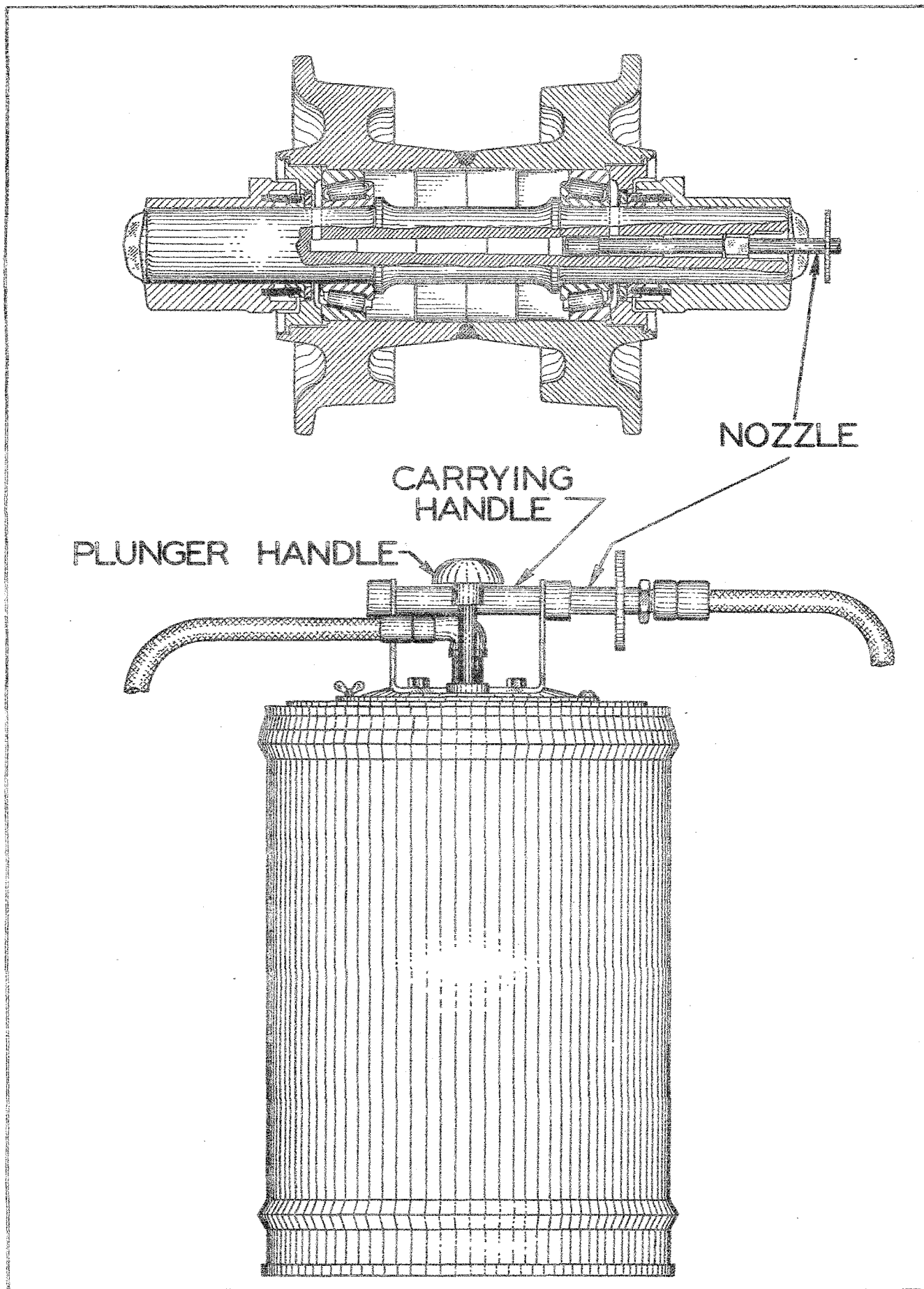
FRONT IDLER AND TRACKS

The tracks should not be run tight, as this will cause rapid wear. The track adjustment is correct when the track can be lifted 1-1/2" to 2" above the track support roller. Tracks should not be allowed to run too loose, for there is danger of damaging the final drive case and bearing plate.

To adjust the tracks, loosen the lock bolts (A) and turn the adjusting bolt (B) until the tracks are properly adjusted to the dimensions above. Turning the adjusting bolt clockwise or anti-clockwise forces the release fork (C) backward or forward, and this loosens or tightens the track.

The shims (D) provide means for keeping the front idlers in proper alignment. If the idlers are not kept in alignment, the tracks will ride on one flange or the other causing that side to wear rapidly.

To adjust the idler for alignment loosen the clamp bolts (A) and the track adjusting bolt (B). Remove shims from one side and insert in the other side as the case may be in order to bring the idler into proper alignment with the track.



TRUCK WHEEL LUBRICATION

The truck wheels, which employ the use of positive seals, are lubricated at the factory and require no additional lubrication at the time of delivery, but must be lubricated every two hundred hours of operation thereafter.

Use only a lubricant as recommended by Allis-Chalmers — see nearest dealer or factory branch for recommended list. About 12-1/4 quarts of lubricant will be required for each complete servicing of the truck wheels, support rollers and front idlers.

The lubrication of these truck wheels is a process of flushing out the old lubricant by driving it out with the new lubricant. The lubricating equipment for the truck wheels consists of a special lubricator which is included in the tool equipment of the tractor.

Before lubricating the truck wheels, wash the ends of the shafts and the nozzle of the lubricator hose thoroughly in gasoline or fuel oil. Before inserting the nozzle into the truck wheel, pump the lubricator plunger up and down several times to make sure that it is discharging the full amount of lubricant.

Remove the plug from the end of the truck wheel shaft and insert the nozzle as far as it will go (approximately 6 inches) into the shaft. Holding the nozzle firmly in this position, pump the lubricant slowly into the wheel. The plunger should be lifted slowly and to its full height so that the full amount of lubricant will be drawn into the plunger barrel. Six (6) such strokes are required to fill each truck wheel. Each stroke of the lubricator delivers four (4) ounces of lubricant.

CAUTION: Never put too much pressure on the lubricator handle because of the danger of developing too much pressure which is injurious to truck wheel seals.

Immediately after injecting the lubricant into the wheel assembly, replace the plug and gasket to prevent the new lubricant from running out. The nozzle should always be inserted into the carrying handle when the lubricator is not in use to prevent dirt from clogging in the nozzle or hose.

FRONT IDLER LUBRICATION

The front idlers are positive sealed and are lubricated with the same equipment and in the same manner as the truck wheels. They do not require any lubrication at the time of delivery, but must be lubricated every two hundred hours of operation thereafter. The same specified lubricant used in the truck wheels is used in the front idlers. Each idler wheel should be serviced with ten (10) strokes of the lubricator.

TRACK SUPPORT ROLLER LUBRICATION

The track support rollers are lubricated with the same equipment and in the same manner as truck wheels and front idlers. Each support roller should be serviced with eight and one-half (8-1/2) strokes of the lubricator.

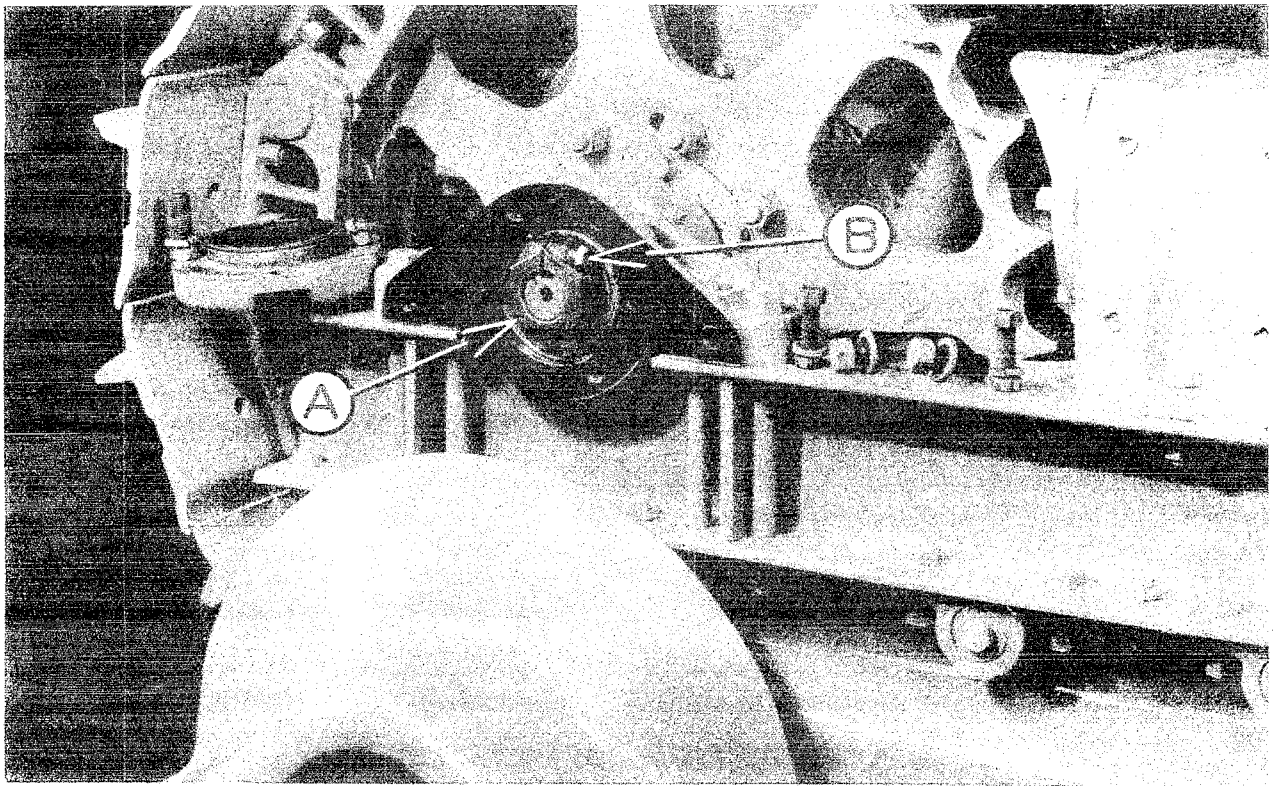
FINAL DRIVE OIL SEALS

This seal is of the spring loaded, lug driven Neoprene type. It is composed of a metal seal ring assembly, driving lugs, springs, Neoprene seal boot and guide ring assembly. A constant pressure is maintained between the ground surfaces of the metal seal rings by the springs; hence a dirt tight seal is formed at that point. Due to the rubbing contact between the seal rings, a small quantity of oil works its way through the ground joint thereby keeping it well lubricated and free from dirt. The purpose of the Neoprene seal boot is to provide a water tight seal and prevent any foreign material from entering the bearing.

There is no adjustment provided for tightening this seal. If the seal becomes worn to the extent that an excessive amount of oil begins to leak, then the seal must be dismantled and the worn parts replaced.

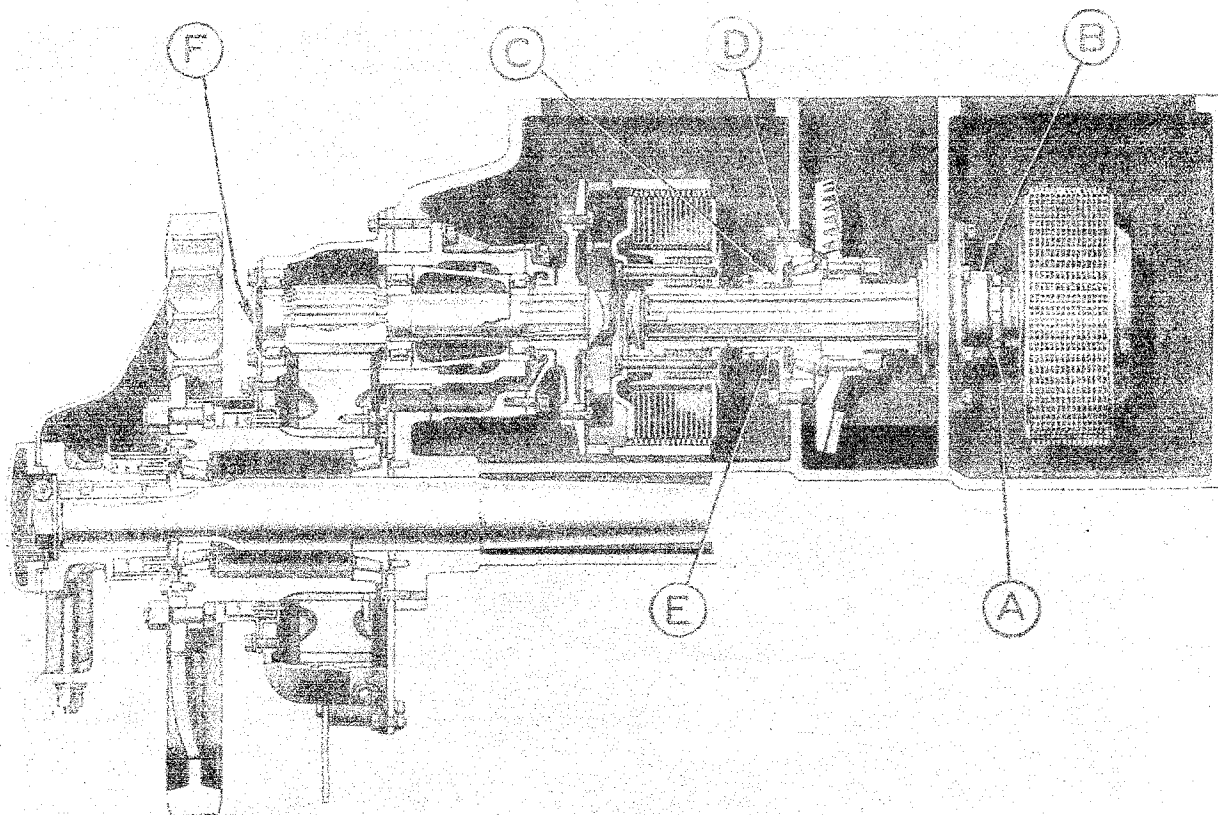
REAR AXLE BRACKET OIL SEAL

There is no adjustment provided for the rear axle bracket oil seal, as this seal is the same type as used for the final drive oil seal.



REAR AXLE SHAFT BEARINGS

To adjust the final drive clamp nut (A), remove the end cover, lubricate the threads on the shaft, loosen the clamp screw (B) in the clamp nut, and back the nut off. Turn the nut to within 1/8 inch of the thrust washer and tighten the clamp screw in the nut snugly to prevent the clamp nut from spreading. Turn the nut on the shaft until the nut contacts the thrust washer and retighten the clamp screw. Turn the clamp nut on the shaft until the bearings are tight, using an extension on the wrench to make a total length of four feet. Back off the clamp nut one-fourth of a turn for bearing clearance; tighten the clamp screw in the nut to the maximum, using an extension on the socket wrench. To prevent excessive wear, adjust the nut according to the above rules.



A. Packing Gland Nut
 B. Gland Nut Lock
 C. Bearing Retainer

D. Adjusting Shims
 E. Bevel Gear Hub Packing
 F. Bearing Cover

BEVEL GEAR HUB PACKING

Remove the covers over the steering clutch compartments; remove steering clutch throwout forks and loosen cap screw that holds gland nut lock. Turn gland nuts to the right to tighten packings. Tighten the packing adjusting nuts only enough to stop oil leaks.

BEVEL GEAR HUB BEARINGS

The bevel gear hub bearings usually do not require any adjustments until time of general overhaul, unless the oil in the transmission contains abrasive materials, causing excessive wear of the bearings.

To adjust the bearings, remove bearing retainers and necessary thickness of adjusting shims from each side to adjust the bearings to a free running fit. The adjusting shims also adjust bevel gear to bevel pinion. Removing shims from left hand side and installing on opposite side moves the bevel gear in closer to the bevel pinion. For this reason it is necessary that when adjusting bearings, caution must be taken so that the adjustment of the bevel gear is not changed. Be sure to remove the same thickness of shims from each side when only the bearings need adjusting.

SERVICE CHART

The satisfactory performance of a Diesel engine depends on two items of foremost importance:

1. The presence of sufficiently high compression pressure.
2. The injection of the proper amount of fuel at the right time.

The first of these items depends almost entirely on pistons, piston rings and valves with their operating mechanism; the second depends on the injectors and their operating mechanism.

Lack of engine power, uneven running, excessive vibration and a tendency to stall when idling may be caused by a compression loss or faulty injector action.

I. Engine Fails to Start at Temperatures Above Freezing

1. Throttle not in starting position.
2. Fuel shut-off cock closed.
3. Fuel tank empty.
4. Fuel supply insufficient.
5. Water in air box (possible only after a disassembly of the cylinder head).

Note: In cold weather the flame primer must be used for easy starting.

II. Uneven Running and Excessive Vibration

1. Faulty "Injector Timing" or "Equalizing".
2. Fuel supply insufficient.
3. Hunting governor.
4. One or more cylinders missing.

III. Loss of Power

1. Insufficient fuel supply.
Cause: a. Plugged fuel filters.
b. Faulty control system.
2. Injectors not properly equalized.
3. Injector timing faulty.
4. Air cleaner plugged.
5. One or more cylinders missing.
6. Butterfly valve in the air intake is out of adjustment.
7. Piston rings carbonized or stuck.
8. Piston and cylinder liners badly worn.

IV. Smoky Exhaust

BLACK SMOKE

1. Poor grade of fuel.
2. Injector timing late.
3. Defective injector.
4. Air box cover plate gasket blown.
5. Butterfly valve adjustment wrong.

BLUE SMOKE

1. Injectors not properly equalized.
2. Cylinder missing.
3. Lubricating oil enters combustion chambers.
 - a. Piston rings worn or stuck.
 - b. Oil leaks into air box or blower housing because end plate gaskets are defective or the blower rotor shaft seals are defective.

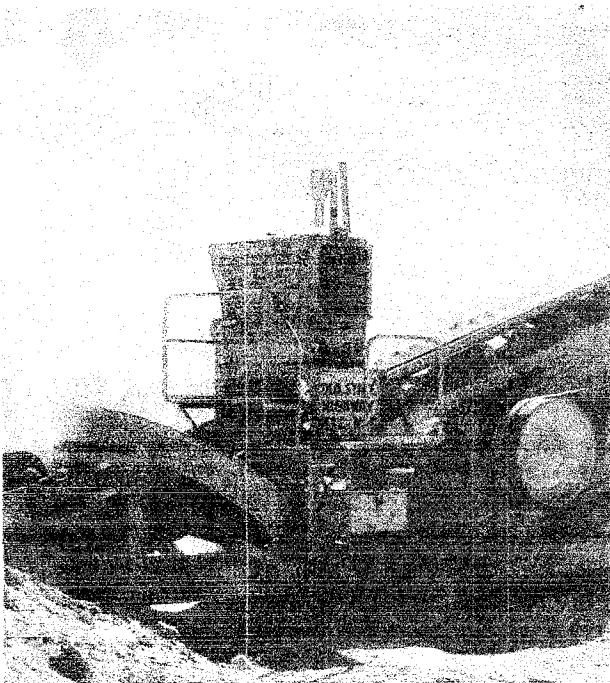
V. Engine Detonates

Equalize and time injectors.

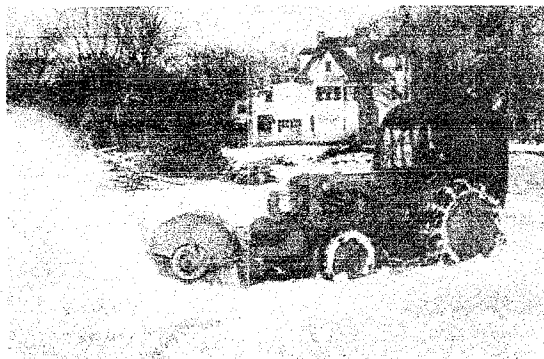
VI. Lack of Lubricating Oil Pressure

1. Oil supply in crankcase low.
2. Crankcase oil diluted by fuel oil.
3. Use of improper lubricant.
4. Wear on crankshaft bearings.
5. Defective lubricating oil pump.

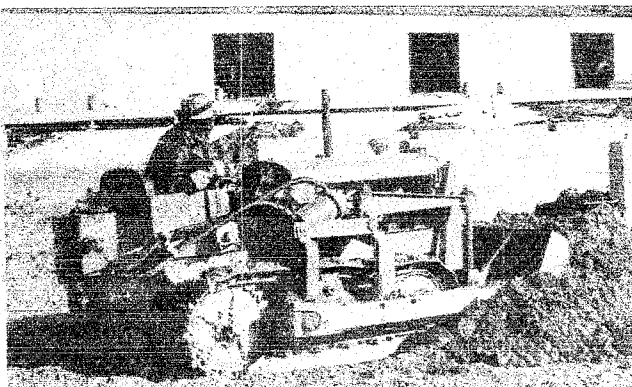
EQUIPMENT FOR EVERY JOB



Power unit in five sizes (19 to 110 H.P.) provide economical, dependable power for crushers, pumps, conveyors, sawmills, and compressors.

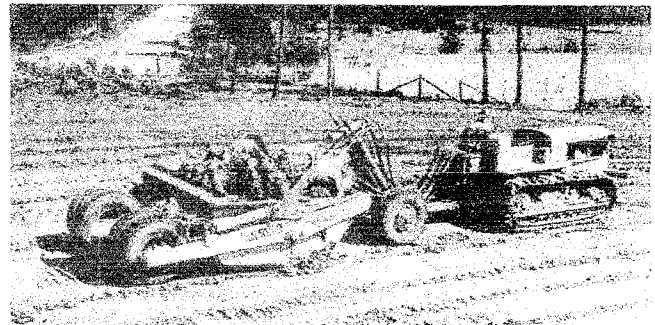


Industrial wheel tractors will do your hauling and can be equipped with numerous attachments—available in four sizes (13.5 to 50.5 H.P.)

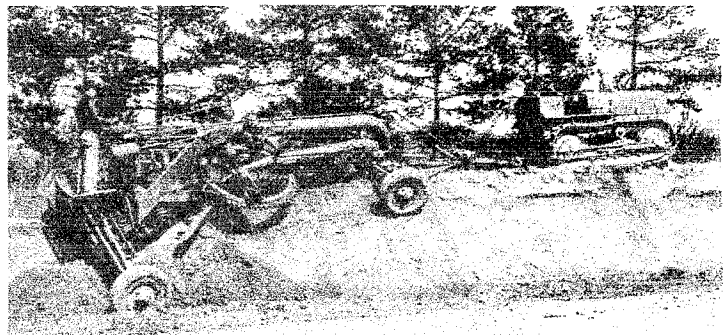


Four gasoline crawler tractors (32.5 to 91.5 H.P.) provide low cost, dependable power for every job.

Every job requires special types of equipment due to its particular conditions. To meet these special conditions, Allis-Chalmers and its allied equipment manufacturers have designed a complete line of construction and logging equipment. No matter what job you tackle, there is an A-C product to successfully and economically help you do that job. "It doesn't cost—it pays to own Allis-Chalmers equipment."



Three Diesel crawler tractors (60 to 132 H.P.) offer smooth 2-cycle Diesel power and can be equipped with many types of allied equipment.



Power-controlled graders with the unique leaning frame feature will handle your road construction, ditching and bank cutting.



The low-cost W-patrol will handle your maintenance, light ditching and construction at a minimum cost.

GO A-C ALL THE WAY