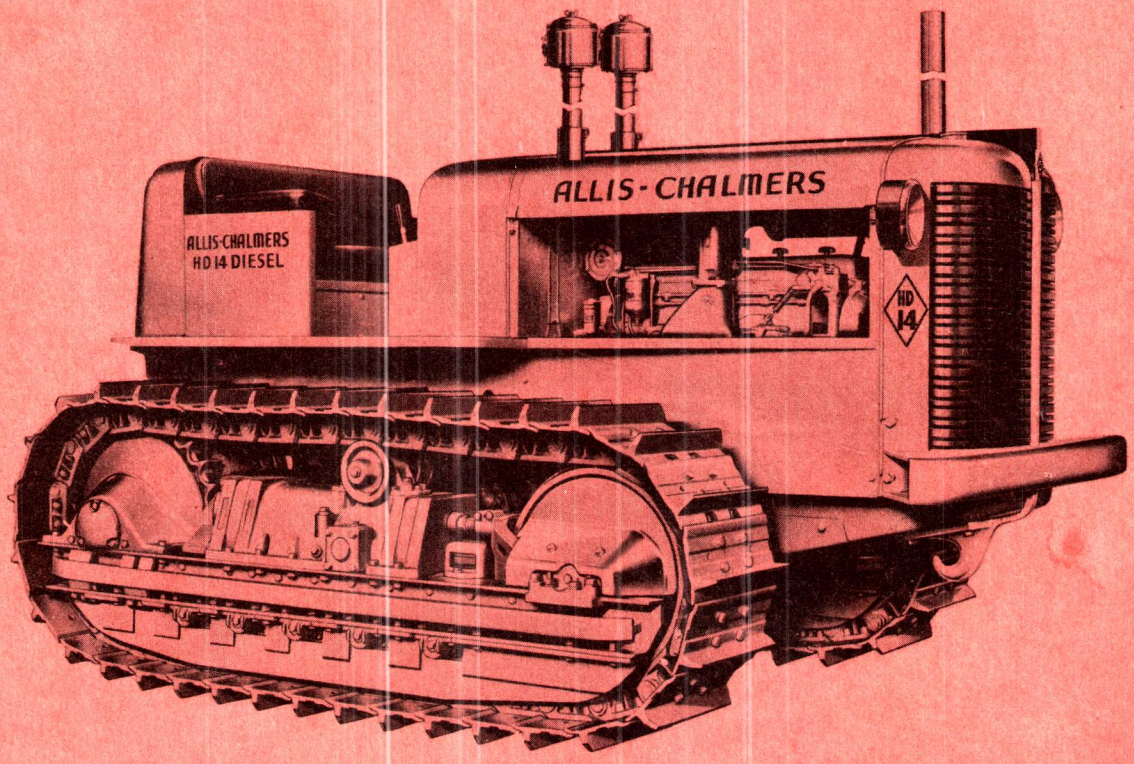
INSTRUCTION BOOK
FOR
MODEL
HD 14 TRACTOR



ALLIS-CHALMERS MFG. CO.

TRACTOR DIVISION

MILWAUKEE, WISCONSIN, U.S.A.

LITHO. IN U. S. A.

FORM T-200 B

INDEX

FOREWORD

The instructions given in this book cover the operation of the "Allis-Chalmers" "HD-14" 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	6
Bore	4-1/4"
Stroke	5"
R.P.M. (Governed at Full Load)	1500
Fuel	Commercial Diesel Fuel Oil

TRACTOR SPEEDS MILES PER HOUR

First	1.72
Second	2.18
Third	2.76
Fourth	3.50
Fifth	4.36
Sixth	7.00
Low Reverse	2.00
High Reverse	3.20
MAXIMUM DRAWBAR HORSEPOWER	132.19
Belt Horsepower	150.48
Ground Clearance	13-1/2"
Drawbar Height	15-1/2"

Shipping Weight
(Wood blocking and tools not included). . . 28,800 lbs. approximately

CAPACITIES

Crankcase for Refill (Filters Empty, Quarts)	16
(Filters Full, Quarts)	14
Cooling System. (U.S. Std. Gal.)	12
Final Drive Case (U.S. Std. Gal.)	2 each
Fuel Tank (U.S. Std. Gal.)	68
Transmission Case. (U.S. Std. Gal.)	10
Track Release Spring Housing (Quarts Each)	13

SPECIFICATIONS OF LUBRICANTS AND FUEL OIL

ENGINE CRANKCASE LUBRICANT:

USE NON-CORROSIVE DIESEL ENGINE LUBRICATING OIL CONTAINING ADDITIVES PREVENTING SLUDGE OR GUM DEPOSITS.

ATMOSPHERIC TEMP.	VISCOSITY
Above 90° F.	Use SAE. 30
32°F. to 90°F.	Use SAE. 30
10°F. to 32°F.	Use SAE. 20
Below 10°F.	Use SAE. 10

WARNING: The main, connecting rod and idler gear bearings of this engine are lead bronzed lined. UNDER NO CIRCUMSTANCES SHOULD A CORROSIVE DIESEL ENGINE LUBRICATING OIL EVER BE USED.

All manufacturers of lubricants have recognized the importance of the qualities required for use in our equipment and they are now co-operating fully to insure the use of only those oils which fulfill these requirements. The oil distributor and oil manufacturer are to be held responsible for the results obtained from their products.

TRANSMISSION, FINAL DRIVE, TRUCK WHEEL, FRONT IDLER AND TRACK SUPPORT ROLLER LUBRICANT.

Use a motor oil recommended by Allis-Chalmers Mfg. Company. See nearest Allis-Chalmers factory branch or authorized "Allis-Chalmers" dealer for approved list. Copy of approved list is shipped with each tractor.

ATMOSPHERIC TEMP.	VISCOSITY
Above 32°F.	Use SAE. 40 or 50
0°F. to 32°F.	Use SAE. 20 or 30
Below 0°F.	Use SAE. 10

PRESSURE GUN FITTINGS

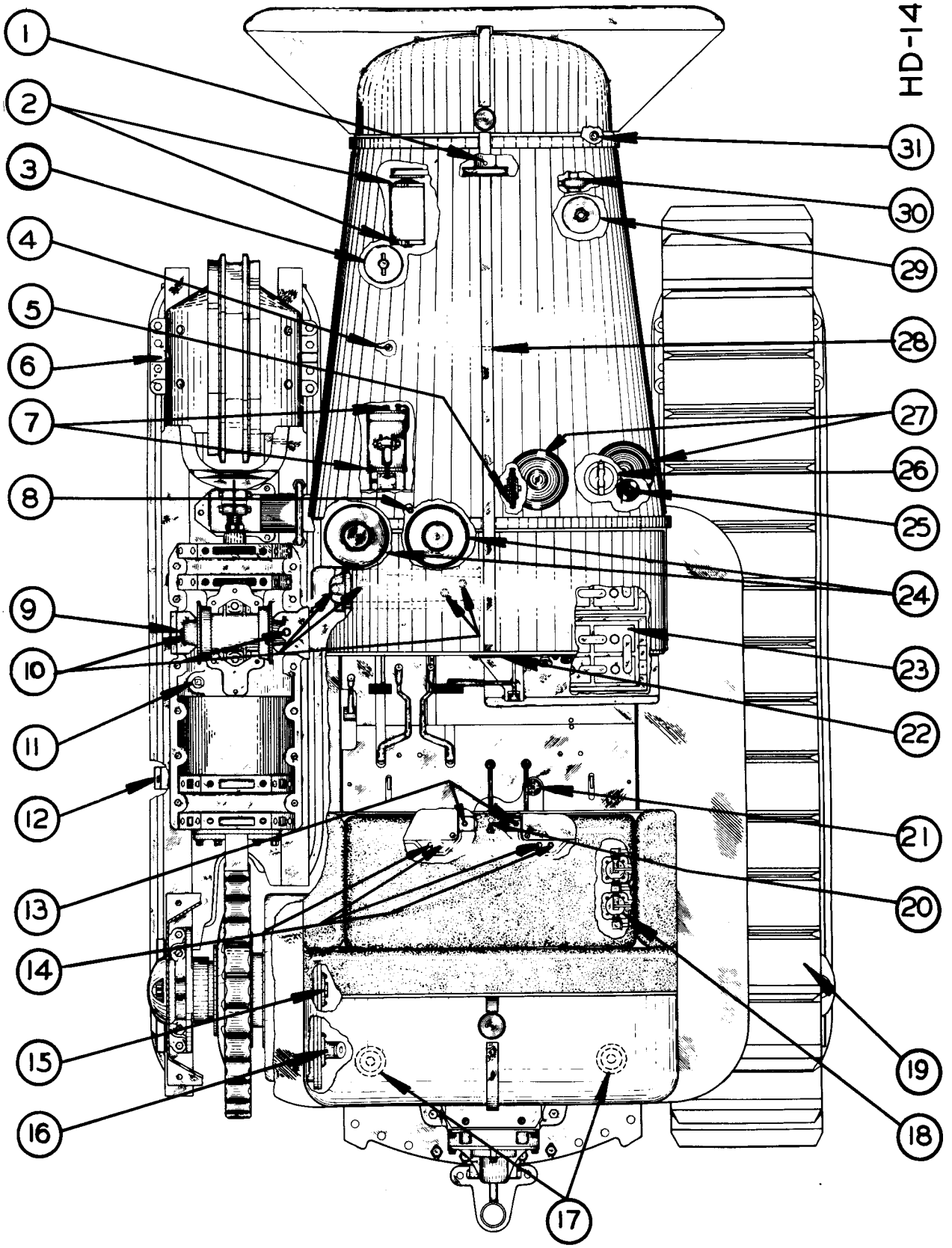
Use a pressure gun lubricant with a minimum melting point of 300°F. This lubricant should be in a viscosity range so as to insure easy handling in the pressure gun at prevailing air temperatures.

NOTE: In selecting the pressure gun lubricant make certain that it will not wash away in presence of water.

FUEL OIL

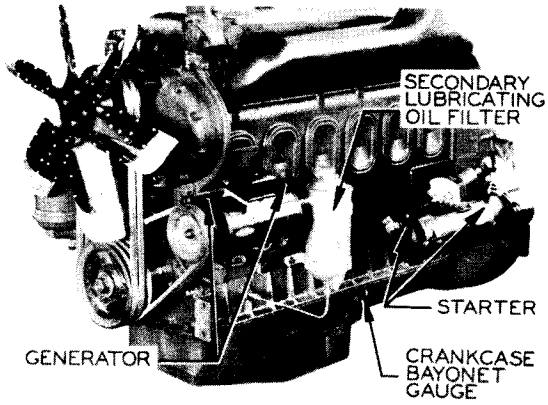
1. Purchase from a reputable oil company a fuel within the limits of No. 1 or No. 2 Diesel Fuel Oil according to the American Society of Testing Materials. Some No. 3 fuel oils can be used.
2. The cetane number should be at least 40, since this quality is a measure of smoothness of combustion and ease of starting.
3. The fuel oil should be free enough from high boiling fractions 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.

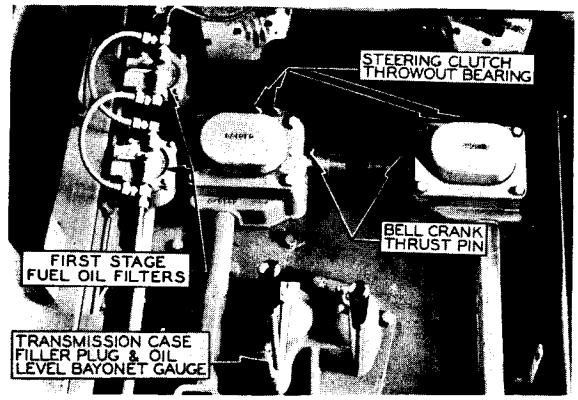
HD-14

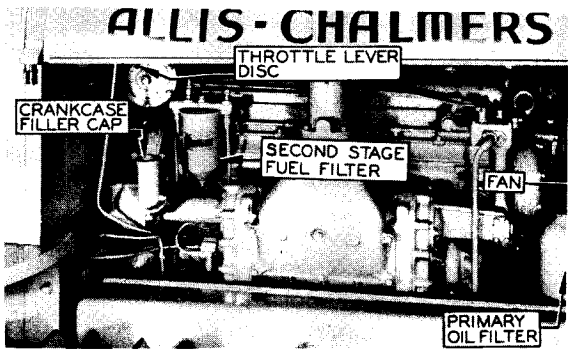

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31

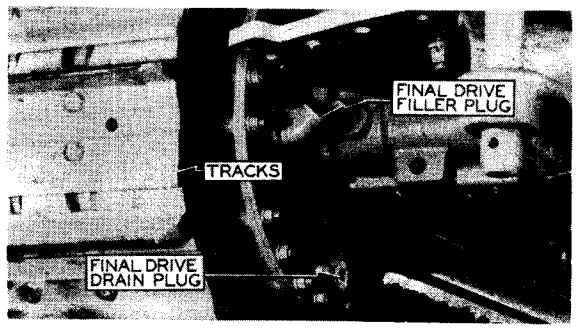
"HD 14" LUBRICATION AND SERVICE CHART

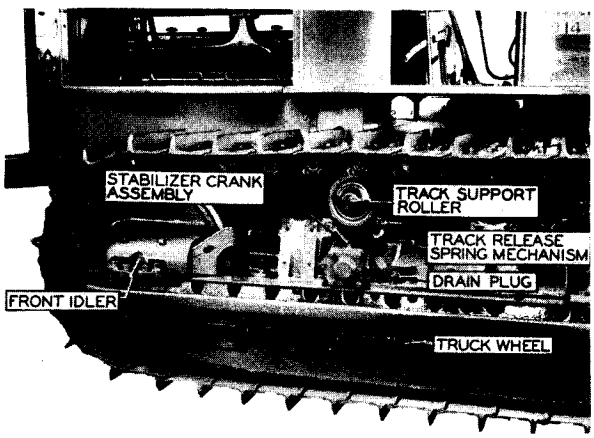
1. FAN - One lubrication point. Lubricate every 200 hours of operation with pressure gun lubricant.
2. GENERATOR - Two lubrication points. Lubricate every 200 hours of operation with light motor oil.
3. SECONDARY OIL FILTER - Install a new element in the secondary filter every 240 hours of operation or every fourth oil change. Refer to Topic 10.
4. CRANKCASE BAYONNET GAUGE - Inspect oil level every 10 hours of operation.
5. THROTTLE LEVER DISC - Lubricate when necessary for easy operation with pressure gun lubricant; do not over-lubricate.
6. FRONT IDLER - Two lubrication points. Lubricate every 200 hours of operation with 18 strokes of the gun. Use approved motor oil. Refer to Topic 7.
7. STARTER - Two lubrication points. Lubricate every 200 hours of operation with light motor oil.
8. CLUTCH SHIFTER BEARING -Lubricate every 10 hours of operation with pressure gun lubricant of high heat resistance.
9. TRACK SUPPORT ROLLER - Two lubrication points. Lubricate every 200 hours of operation with 10 strokes of the gun. Use approved motor oil. Refer to Topic 8.
10. STABILIZER CRANK ASSEMBLY - Twelve lubrication points. Lubricate every 10 hours of operation with pressure gun lubricant.
11. TRACK RELEASE SPRING MECHANISM--Inspect oil level every 200 hours of operation. Keep filled to filler plug with motor oil same viscosity as used in transmission. Drain, flush and refill with motor oil same viscosity as used in transmission every 800 hours of operation. Capacity 13 quarts.
12. TRUCK WHEELS--Ten lubrication points. Lubricate every 200 hours of operation with 8-1/2 strokes of the gun. Use approved motor oil. Refer to Topic 6.
13. BELL CRANK THRUST PIN - Two lubrication points. Lubricate every 10 hours of operation with pressure gun lubricant.
14. STEERING CLUTCH THROWOUT BEARING - Four lubrication points. Lubricate every 10 hours of operation with pressure gun lubricant of high heat resistance.
15. FINAL DRIVE DRAIN PLUG - Drain flush, and refill every 200 to 400 hours of operation. Capacity 8 quarts each.
16. FINAL DRIVE FILLER PLUG -- Inspect oil level every 10 hours of operation. Keep filled to level of filler elbow with approved motor oil.
17. SEDIMENT TRAPS - Drain traps every morning before starting, or more often if necessary. In freezing weather, drain after stopping so water will not freeze in traps.
18. FIRST STAGE FUEL OIL FILTERS - Install new elements when necessary. Refer to Topic 11.
19. TRACKS - No lubrication necessary.
20. TRANSMISSION DRAIN PLUG - Drain, flush, and refill every 800 hours of operation with approved motor oil. Capacity 40 quarts.
21. TRANSMISSION CASE FILLER PLUG AND OIL LEVEL BAYONNET GAUGE -Inspect oil level every 10 hours of operation and keep the oil level between "Low" and "Full" on the bayonet gauge.
22. LUBRICATING OIL PRESSURE GAUGE - Normal operating pressure when engine is warm at full throttle is 25 to 35 on the gauge; if gauge does not register stop engine immediately and determine the cause.
23. BATTERIES - Keep the top and terminals clean. Keep filled with clean distilled water to 3/8" above separator plates; inspect water level daily. Test with a hydrometer.
24. AIR CLEANERS - Inspect and service every 10 hours of operation. Refer to Topic 13.
25. CRANKCASE FILLER CAP - One filler point. Change oil every 30 to 60 hours of operation. USE NON-CORROSIVE DIESEL LUBRICATING OILS CONTAINING ADDITIVES PREVENTING SLUDGE OR GUM DEPOSITS. Capacity 14 quarts.
26. SECOND STAGE FUEL OIL FILTER - Install new element when necessary, that is, when pressure drops below normal range (25 to 65) due to filter clogging. Refer to Topic 11.
27. PRE-CLEANERS - Inspect and service every 10 hours of operation. Refer to Topic 12.
28. CRANKCASE DRAIN PLUG - One drain point. Drain and refill with new oil every 30 to 60 hours of operation. Refer to Topic 1A.
29. PRIMARY OIL FILTER - Clean the Primary Oil Filter at each crankcase oil change. Refer to Topic 10.
30. WATER PUMP DRAIN - Periodically drain and flush out system. Refer to Topic 18.
31. RADIATOR DRAIN - Periodically drain and flush out system. Refer to Topic 18. Capacity 12 gallons.

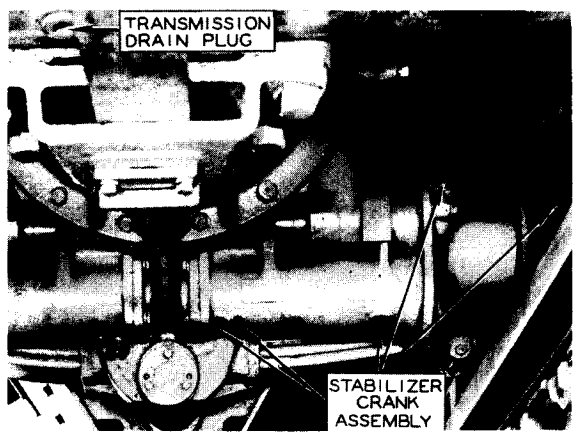

SECONDARY LUBRICATING OIL FILTER
STARTER
GENERATOR
CRANKCASE BAYONET GAUGE

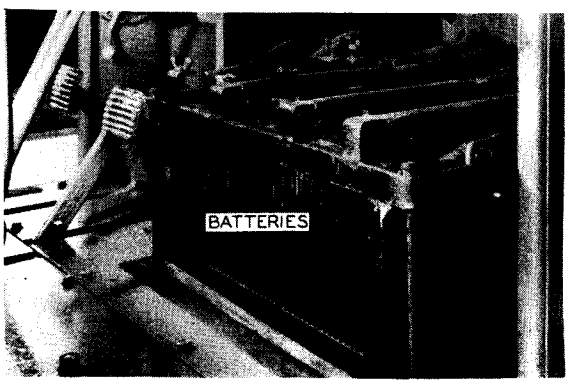

STEERING CLUTCH THROWOUT BEARING
BELL CRANK THRUST PIN
FIRST STAGE FUEL OIL FILTERS
TRANSMISSION CASE FILLER PLUG & OIL LEVEL BAYONET GAUGE

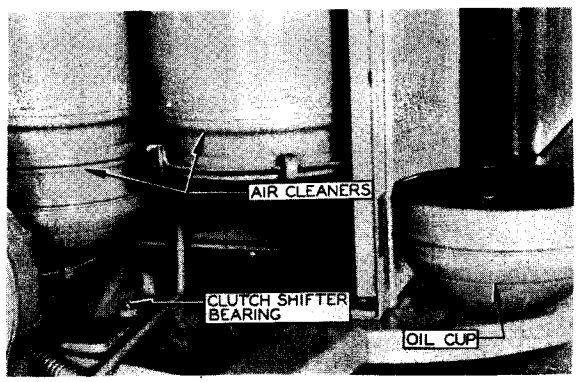

ALLIS-CHALMERS
THROTTLE LEVER DISC
CRANKCASE FILLER CAP
SECOND STAGE FUEL FILTER
FAN
PRIMARY OIL FILTER

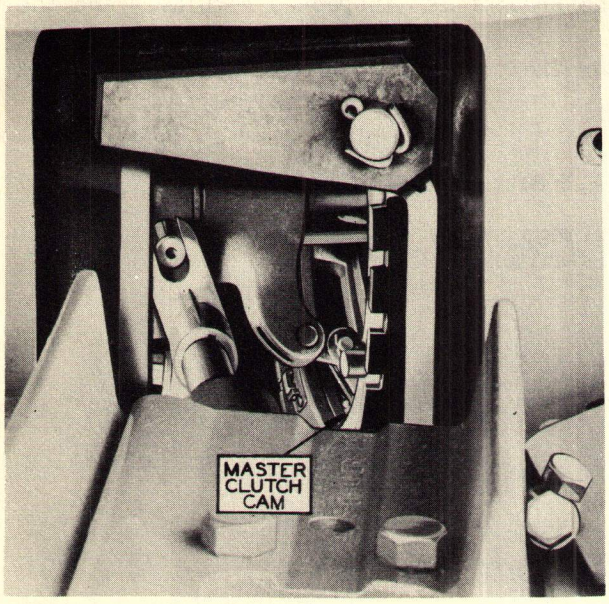

FINAL DRIVE FILLER PLUG
TRACKS
FINAL DRIVE DRAIN PLUG

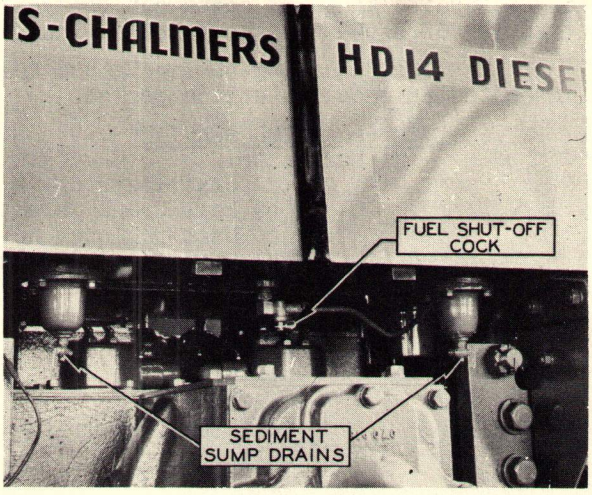

STABILIZER CRANK ASSEMBLY
TRACK SUPPORT ROLLER
TRACK RELEASE SPRING MECHANISM
DRAIN PLUG
FRONT IDLER
TRUCK WHEEL

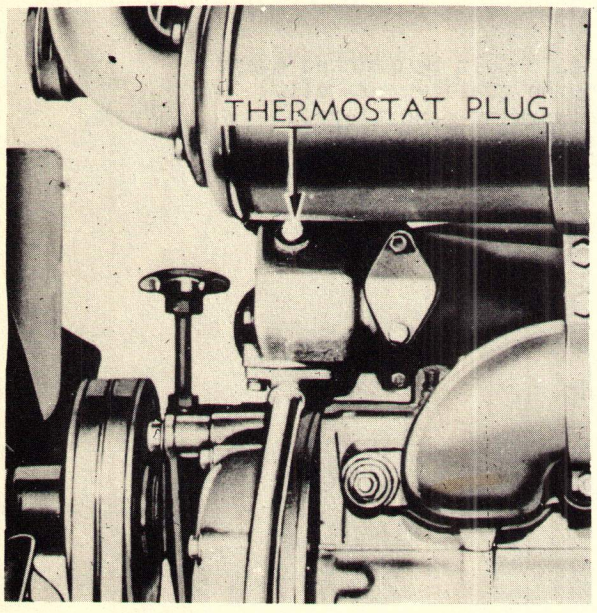

TRANSMISSION DRAIN PLUG
STABILIZER CRANK ASSEMBLY

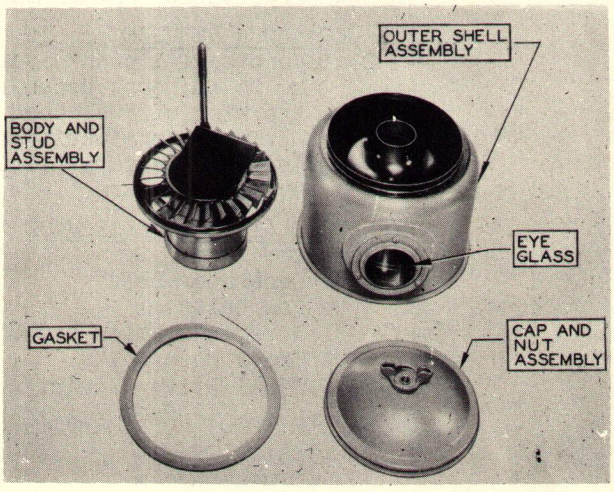

BATTERIES

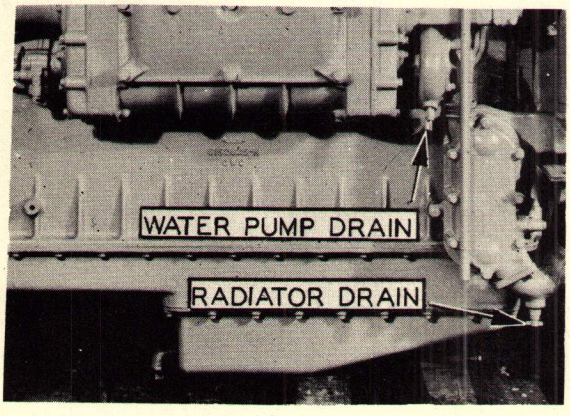

AIR CLEANERS
CLUTCH SHIFTER BEARING
OIL CUP


MASTER
CLUTCH
CAM


IS-CHALMERS
HD14 DIESE
FUEL SHUT-OFF
COCK
SEDIMENT
SUMP DRAINS


THERMOSTAT PLUG


OUTER SHELL
ASSEMBLY
BODY AND
STUD
ASSEMBLY
EYE
GLASS
GASKET
CAP AND
NUT
ASSEMBLY


WATER PUMP DRAIN
RADIATOR DRAIN

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 and inspected at each inspection period.

TEN (10) HOUR SERVICE

Lubricate:

(a) Stabilizer Crank Assy. (All Button-Head Fittings)
(b) Bell Crank Thrust Pin
(c) Master Clutch Shifter Bearings
(d) Steering Clutch Release Bearings

Inspect:

Lubricating Oil Level
Air Cleaners
Pre-Cleaners
Cooling System
Fuel Sediment Traps
Batteries
Transmission Case Oil Level
Fuel Level
Final Drive Case Oil Level
Inspect Tractor for Loose Nuts and Bolts
Steering Clutch Throwout Adjustment
Master Clutch Adjustment
Brake Adjustment
Front Idler and Track Adjustment

SIXTY (60) HOUR SERVICE

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

Clean primary lubricating oil filter. Install a new element in the secondary filter with every fourth oil change or every 240 hours.

ONE HUNDRED (100) HOUR SERVICE

Inspect:

Generator Belt
Fan Belts
Wire insulation and Connections
Track Shoe Bolts
Final Drive Packing Adjustment

TWO HUNDRED (200) HOUR SERVICE

Lubricate:

Truck Wheels
Front Idlers
Track Support Rollers
Fan
Generator
Starter
Master Clutch Cams

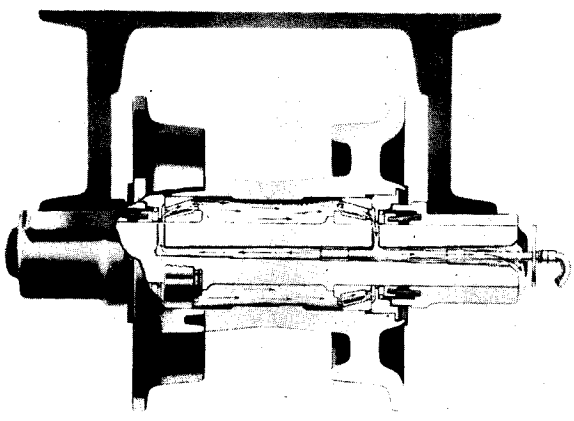
Inspect:

Track Release Spring Mechanism Oil Level
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.

EIGHT HUNDRED (800) HOUR SERVICE

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

Drain, flush and refill the track release housing.



TRUCK WHEEL LUBRICATION

Approximately 17 quarts of lubricant will be required for each complete servicing of truck wheels, front idlers and support rollers.

The truck wheels, which employ the use of positive seals, are lubricated at the factory but must be re-lubricated upon delivery and every two hundred hours thereafter.

The lubrication of these truck wheels is a process of flushing out the old lubricant by forcing 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. 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. 8-1/2 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 extreme 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 entering the nozzle or hose.

TRUCK WHEEL LUBRICATION (Cont'd.)

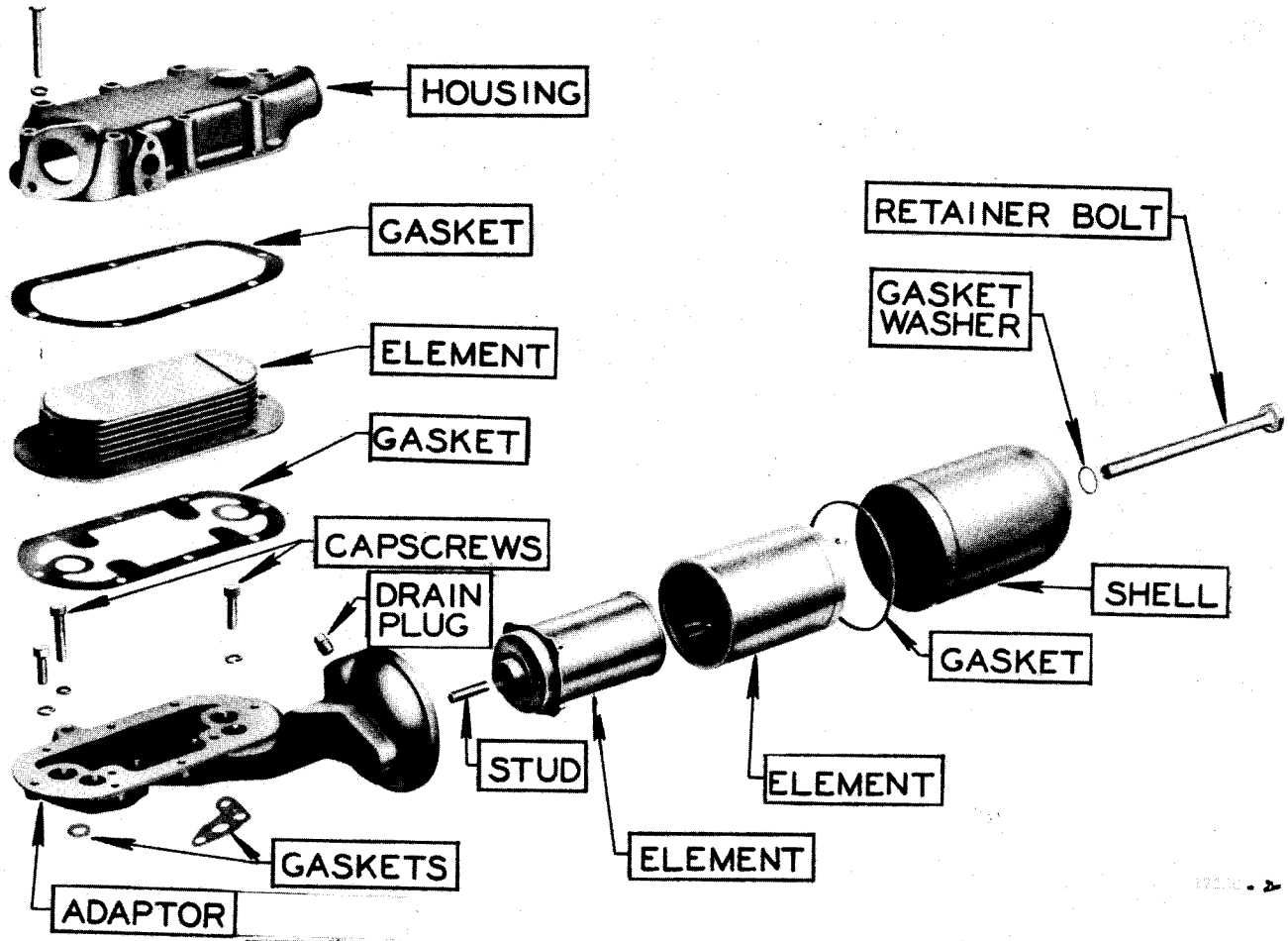
Use only motor oil recommended by Allis-Chalmers--see the nearest Allis-Chalmers dealer or Allis-Chalmers factory branch for the current approved list of oils.

FRONT IDLER LUBRICATION

The front idlers are lubricated with the same equipment and in the same manner with the same oil as the truck wheels. Each front idler should be serviced with 18 strokes of the lubricator.

SUPPORT ROLLER LUBRICATION

The track support rollers are lubricated with the same equipment and in the same manner as the truck wheels and front idlers. Each support roller should be serviced with 10 strokes of the lubricator.



PRIMARY OIL FILTER AND OIL COOLER

LUBRICATING OIL FILTERS AND OIL COOLER

To provide a normal flow of clean, cool oil to the engine it is essential that both the primary oil filter, secondary oil filter and cooler be kept in good condition. Each of these units will be discussed separately in the following text.

A. PRIMARY OIL FILTER

1. The primary oil filter of the double screen type, is located in the lubricating system between the oil pump and the oil cooler. (See illustration). All the oil from the pump passes through the filter and cooler. The oil filter removes all larger particles from the oil and collects a portion of the sludge from the oil on the two screen elements. The strainer will remove any particles from the oil larger than .005" in diameter. If the strainer should become clogged, the by-pass valve will open and allow the oil to flow directly from the pump to the main oil gallery. This condition should by no means be tolerated since oil flowing by way of the by-pass will not have the benefit of being cleaned or cooled, and continuous operation in this manner may cause unliminted damage to engine parts.

B. REMOVAL AND CLEANING OF PRIMARY FILTER

1. Remove filter drain plug.

2. Remove the oil filter retainer bolt.
3. Remove the oil filter shell and filter elements from the filter base.
4. The filter elements must be washed after every oil change. 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. Wash the filter base and outer shell before reassembling.

After washing, reassembly the filter on the filter base. After assembling check to see whether copper gasket under retainer bolt prevents oil leaks. Also be sure oil filter shell gasket fits properly. Run the motor for a few minutes and inspect for oil leaks.

C. CLEANING PRIMARY FILTER ELEMENTS AND OIL COOLER WITH SOLVENTS.

A filter element that has become loaded with impurities due to neglect can usually be cleaned only through use of special solvents in conjunction with some type of circulating system that will create a flushing action.

NOTE: When a filter element is removed from an engine it should be cleaned immediately. Do not allow a dirty element to dry, since this will cause lacquer or sludge deposits to harden. Keep submerged in a pail of fuel oil before cleaning.

1. Effective solvents

Excello Floor cleaning compound
Bendix cleaning compound
Turco cleaning compound
#70 stripper
A mixture of Oakite #7 and fuel oil. 3 parts Oakite and 5 parts of fuel oil.

NOTE: The solvents listed above should be used according to the directions of manufacture. After cleaning operation is completed all traces of the cleaning solution should be washed from the filter elements. In the event that the above procedure does not eliminate the clogged condition, a new filter element must be installed.

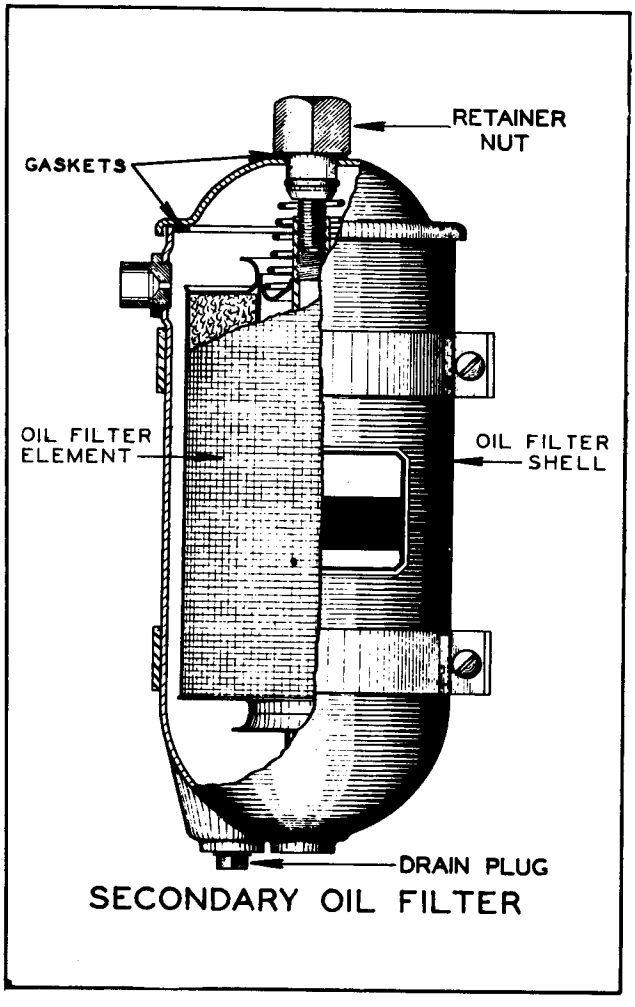
2. Another very effective solvent is the new Bendix cleaner which dissolves or loosens the sludge or other foreign matter that may be collected on the metal of the oil cooler or filter elements.

Its application is very simple since all that is required is submersion of cooler or filter in solution for a sufficient length of time to allow the chemical action of the fluid to properly remove the impurities. The length of time for the submersion will depend upon the condition of the cooler or filter elements.

The impurities, etc., removed from elements will settle in the bottom of the containers used for this cleaning operation.

After the above operation, the cooler or filter elements should be left to drain for a few minutes, then followed up with a thorough washing with spirits or live steam to remove all traces of the cleaning solution. If solution in container is properly covered to prevent evaporation, it may be used again.

NOTE: The above information is submitted in a general manner in order to explain the principles of this cleaner. However, it is recommended that the more specific instructions supplied by the manufacturer of cleaner be studied carefully before using any cleaning solution.



SECONDARY OIL FILTER

D. SECONDARY OIL FILTER.

The secondary oil filter is located on the left side of the motor. The inlet line at the top of the filter body is connected to the main oil gallery in the cylinder block.

The outlet line from the filter body is at the bottom and drains back into the crankcase.

Only a portion of the oil flows through this filter. This filter has a replaceable element and must be changed every 4th oil change or every 240 hours of operation.

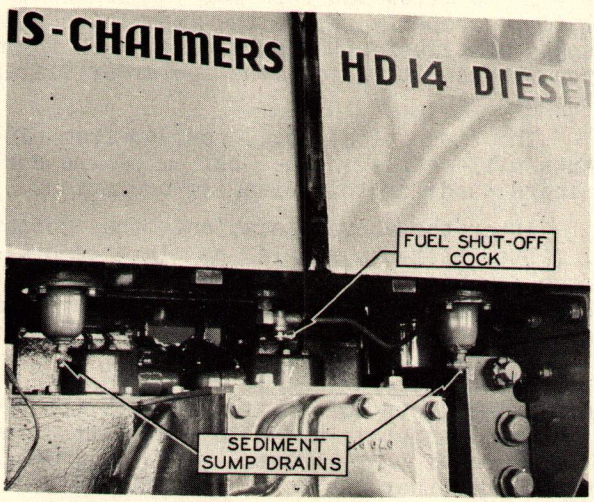
E. REMOVAL OF SECONDARY FILTER ELEMENT AND INSTALLATION OF A NEW ONE.

1. Remove the drain plug at the bottom of body and loosen the cover. Let the oil drain out before removing the element.
2. Remove the filter element and discard it.
3. Clean out the filter body and replace drain plug.
4. Install new element, new cover gasket and tighten cover securely.
5. When installing new element one extra quart of oil is required for crankcase filling. NOTE: When filling crankcase with oil fill only to full mark on crankcase bayonet gauge.
6. Start motor, inspect for leaks and run for a few minutes. Then stop motor and let it set long enough for the oil to drain back into crankcase. Check crankcase bayonet gauge to see if more oil is needed.
7. In cold weather the motor should be run long enough to attain operating temperature before checking the oil level.

F. OIL COOLER

1. The lubricating oil cooler lowers the oil temperature as the oil travels through the small passages inside the cooling element. If these passages become entirely clogged, no cooling of the oil can take place, and the oil is by-passed without filtering or cooling directly to cylinder block oil gallery. It is absolutely necessary that the oil cooler element be kept clean for proper oil cooling.
2. Cleaning of a clogged cooler is sometimes very difficult. A cooler that has become loaded with impurities over a long period of operation can usually be cleaned only through use of special solvents in conjunction with some type of circulating system that will create a flushing action. However, in most cases the use of any of the special solvents, as listed perviously, in a hand operated force pump will dislodge any accumulation. In the event that such treatment does not eliminate the clogged condition, a new cooler element must be installed.

NOTE: A clogged oil cooler or filter is a contributing factor in low engine oil pressure which may be the cause of one or many operating difficulties.

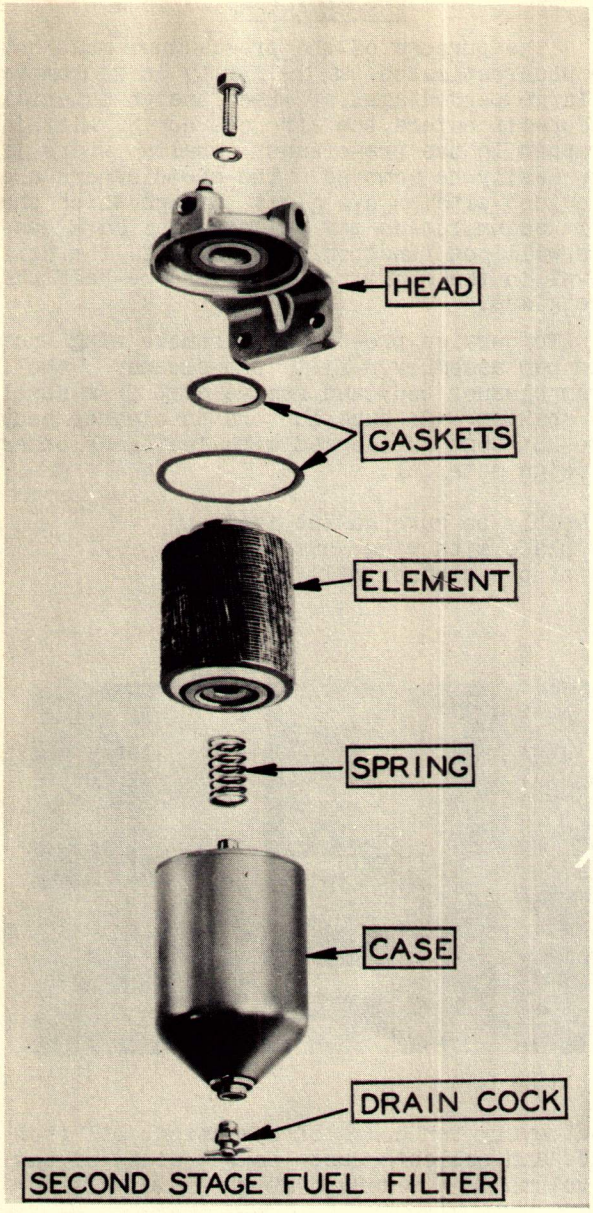


FUEL SYSTEM AND FILTERS

Fuel is drawn from the bottom of the fuel tank, through the first stage filters, by the transfer pump. The transfer pump then forces through the second stage 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.

The sediment traps on the fuel tank should be drained every 10 hours of operation or once daily before starting engine; preferably 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 FIRST STAGE FUEL FILTERS between sediment trap and transfer pump should operate without clogging for approximately 300 to 500 hours. The elements in these filters are replaceable. A drop in fuel pressure may indicate that the filter is clogged. Never attempt to clean the filter element. If clogging occurs, install new elements and gaskets.



SECOND STAGE FUEL FILTER

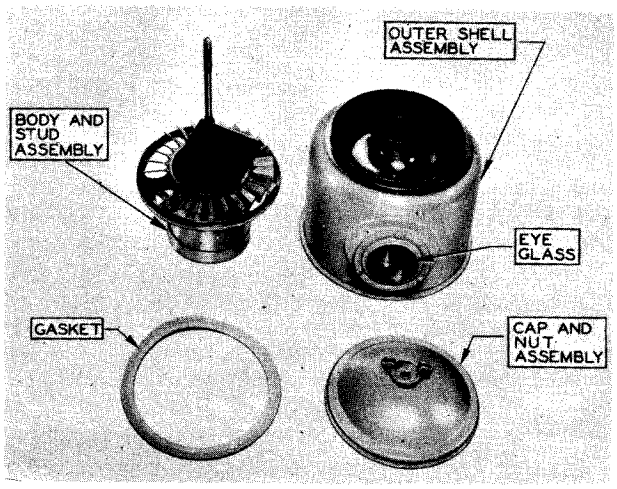
The SECOND STAGE FUEL FILTER between transfer pump and the injectors is a replaceable element type. When clean fuel is used under normal operating conditions, the element should last from 300 to 500 operating hours. When clogging of this filter occurs, install a new element. Do not attempt to clean the clogged filter elements.

Open the drain at the bottom of the SECOND STAGE 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 25 TO 65 ON GAUGE AT HIGH IDLE. DO NOT OPERATE ENGINE WHEN FUEL PRESSURE IS NOT WITHIN THIS RANGE.

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, it will cause serious damage to the injectors because of their becoming overheated. As the fuel filters begin to clog, 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 clog 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 of fuel being used and the method of handling fuel oil on the job. In accordance with the above paragraphs, change the filter elements in the FIRST AND SECOND STAGE FUEL FILTERS after a reasonable number of hours of operation even though they are not completely clogged, in order to safeguard the injection system.



PRE-CLEANERS

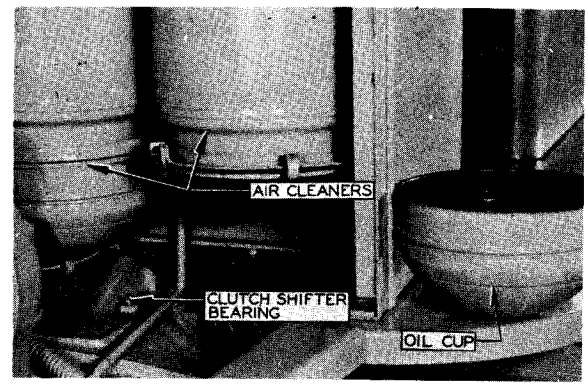
The purpose of the pre-cleaners must not be underestimated, as their duty is to remove a large percentage of the foreign material before it enters the air cleaner. Dirt is trapped in the pre-cleaner shells where it can easily be removed. The pre-cleaners are provided with an eye glass through which the dirt accumulation may be seen. The pre-cleaners will not function properly if the dirt level in the shell covers over one-half the eye glass.

To service pre-cleaners remove wing nut and cap assembly. Lift pre-cleaner shell from cleaner body and remove dirt from shell by shaking. Be sure louvers on cleaner body are not bent or clogged with leaves or other foreign material.

CAUTION: When replacing cap and nut assembly be sure gasket is in good condition and in proper place with wing nut tight to prevent leakage so purpose of pre-cleaner will not be defeated.

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. The oil must be kept level with the top of the cone in the oil cup. Use SAE 40 in the summer and SAE 30 in the winter. Do not use anything lighter and DO NOT USE A DIESEL ENGINE LUBRICATING OIL IN THE AIR CLEANER. These lubricating oils are likely to foam thus reducing air cleaner efficiency and possible oil pull-over with serious injury to the engine



In extreme dusty conditions the air inlet tube of the air cleaner must be swabbed out every ten hours of operation. Oil from the oil cup splashes up on the inside of the tube 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 of blower, rings, pistons and cylinder liners.

GENERAL OPERATING INSTRUCTIONS-PREPARING 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. Refer to topic, "Care of Air Cleaner".

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

The truck wheels, track support rollers and front idlers, have been lubricated at the factory for test purposes only. It is essential that all parts be lubricated before the tractor is put into service.

Inspect 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 alkalines, and remove plug in thermostat housing to release the air that is trapped in housing. In freezing 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 recommended operating temperature of the engine (175 - 185°F).

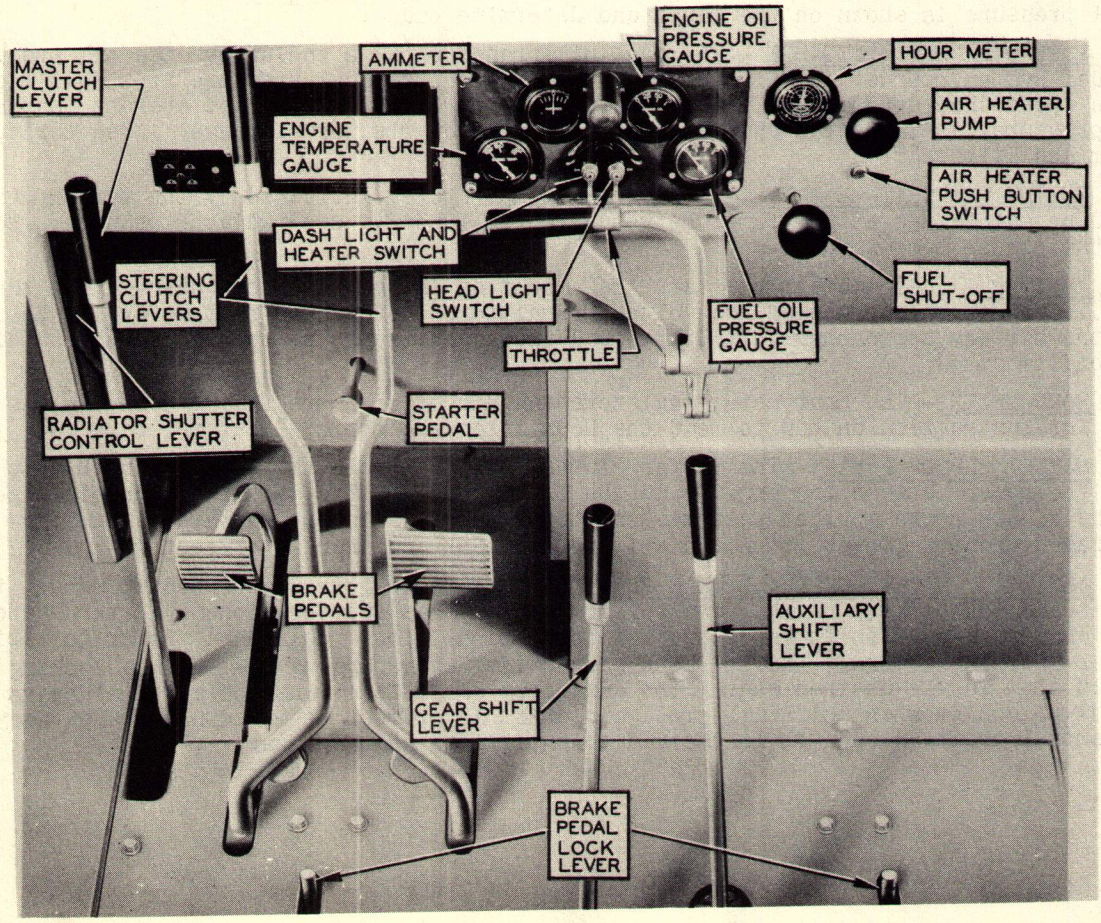
OPERATE A NEW TRACTOR WITH A LIGHT LOAD DURING THE FIRST SIXTY HOURS.

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

The valve lash, injector equalizing and injector timing should be inspected and adjusted if necessary after sixty hours of light load operation.

USE OF CONTROLS AND INSTRUMENTS

The first thing the operator of a new tractor must do is to familiarize himself with the various controls provided for its proper operation. This does not apply to the beginner alone, as, although there are many points of similarity among all tractors, there are also important differences, and it is not wise, regardless of previous experience, to operate a new tractor before fully understanding what each control is for and how to use it.



FUEL SHUT-OFF - The fuel shut-off knob controls the air and fuel to the engine. To stop engine, pull shut-off knob all the way out thus shutting off the flow of air and fuel to the engine. Leave knob in this position until engine is again to be started, at which time shut-off knob must be pushed in as far as it will go.

STARTER PEDAL - Push on the starter pedal to engage the starter pinion with the flywheel ring gear and to operate the starter switch. Each time the starter pedal is depressed it must be allowed to return to its original position (all the way out), and starter given time to cease spinning before the starter can again be used. Otherwise starter runs but will not turn engine. NOTE: If the engine does not start in less than one half minute allow the starter and battery to cool for 15 minutes before it is used again. See Topic - "Starting Engine".

DASH LIGHT AND HEATER SWITCH - The "dash light and heater" switch completes the circuit between the battery and the air heater push button switch. Turn the switch lever to the left for the ON position and to the right for OFF position.

AIR HEATER PUSH BUTTON SWITCH - The air heater push button switch completes the circuit between the dash light switch and the air heater coil. To operate, turn the dash light switch lever ON and depress the push button switch while operating the air heater pump.

AIR HEATER PUMP - The air heater pump delivers the fuel oil under pressure to the air heater spray nozzle where it is ignited by a continuous spark, thus heating the air box to aid cold weather starting. To operate the air heater pump the dash light and heater switch must be ON and the air heater push button switch held in. Then pump the heater pump handle slowly, with the starter turning engine until it starts. For further instructions see Topic "Starting Engine".

THROTTLE LEVER - The throttle lever is connected to the variable speed governor. Push the throttle lever forward to decrease, and pull back to increase the engine speed.

RADIATOR SHUTTER CONTROL LEVER - The radiator shutters aid in maintaining proper engine temperature (175° to 185°F.) and are adjusted by means of the lever under the left hand side of the cowl. The shutters are fully open when the control lever is moved forward as far as it will go. To close the shutters, pull the lever back.

HEAD LIGHT SWITCH - To turn headlights on move head light switch lever to the right. (Picture shows ON position)

ENGINE OIL PRESSURE GAUGE - The oil pressure gauge indicates the oil pressure in the engine lubricating system. At full throttle and under normal operating conditions, the pressure should be between 25 and 35 on the gauge. CAUTION: STOP engine immediately if no oil pressure is shown on the gauge and determine cause.

FUEL OIL PRESSURE GAUGE - The fuel oil pressure gauge indicates the oil pressure in the fuel system. Under normal operating conditions, the fuel pressure at full governed engine speed should be from 35 to 65 on the gauge. CAUTION: Do not operate engine when fuel pressure, as indicated on the gauge, falls below its normal range. See topic, "Fuel System and Filters".

ENGINE TEMPERATURE GAUGE - The engine temperature, indicated by the temperature gauge, should be maintained at all times between 175° to 185° F. Use radiator shutters to maintain the proper temperature.

AMMETER - The ammeter registers the amount of charging current delivered to the batteries. Through the action of the voltage regulator, the ammeter reading will be reduced when the battery approaches full charge and increased as the battery approaches a discharged condition.

HOUR METER - The hour meter registers the number of hours that the engine has operated. For instruction on how to read the hour meter see topic, "Hour Meter".

MASTER CLUTCH LEVER - The master clutch lever controls the master clutch which transmits the power between the engine and the transmission. The master clutch is disengaged and the clutch brake applied when master clutch lever is in the forward position. The clutch is engaged when the lever is pulled all the way back and snaps over center.

AUXILIARY SHIFT LEVER AND GEAR SHIFT LEVER - These levers are used to select the desired transmission gear ratio. The auxiliary shift has two positions - forward and backward, while the gear shift lever has the conventional four positions. Refer to topic "Use of Gear Shifting Levers." NOTE: Both gear shift levers are provided with a locking device to hold them in the desired gear. The auxiliary shift lever must be moved sideways to the left to unlock it when shifting. The gear shift lever must be moved sideways away from the neutral position when it is desired to shift into another gear.

STEERING CLUTCH LEVERS - The steering clutch levers control the two steering clutches which transmit the power from transmission to the track. These levers are used for steering the tractor. Pull the right lever all the way back to turn the tractor to the right. Allow the lever to return to its forward position when turn is completed. Operation of left steering clutch lever will turn tractor to left. CAUTION: The steering clutch levers should always be pulled back as far as possible when making a turn. NEVER hold lever in an intermediate position. Refer to Topic "Steering".

BRAKE PEDALS - The brakes are used to retard the speed of, or facilitate turning the tractor. To turn the tractor to the right press on the right brake pedal and to turn to the left press the left brake pedal with the corresponding steering clutch released. CAUTION: Never use brakes for turning tractor with first pulling steering clutch lever as far back as possible on side toward which turn is being made.

BRAKE PEDAL LOCK LEVER - The brake locks are used to hold the brakes in their applied or ON position. To hold the brakes in the locked position the brake pedal lock lever will have to be held forward while applying the brakes. To release the brake locks press the brake pedal and it will automatically release the lock.

PUTTING TRACTOR TO WORK

A. Starting the Engine

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

1. Inspect the fuel supply.
2. Inspect the crankcase oil level.
3. Inspect the water or anti-freeze solution in the cooling system.
4. Inspect the entire unit for loose bolts or nuts. This is especially necessary when repairs have been made since the previous operating period.
5. Disengage master clutch. (Lever forward) and put gear shift lever in neutral position.
6. Close the radiator shutter by pulling on the shutter control lever.
7. Push the fuel shut-off knob in.
8. Open the throttle control to the fullest extent.
9. Push the starter pedal. WARNING: If the engine does not start in less than one half minute, allow the starter and battery to cool for 15 minutes before it is used again.
10. 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 175°F open the shutter; the shutter should be adjusted so that an operating temperature of 175° to 185°F is maintained at all times.
11. Inspect 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 then rise to between 25 and 35, the engine should be stopped and the cause determined.
12. Inspect the fuel oil pressure. The fuel pressure at full governed speed should be between 25 and 65 on the gauge.
13. Open the throttle to meet the operating conditions.
14. In cold weather (+32°F to 0°F) when it is necessary to use the Air Heater, proceed as stated above for the first eight operations. Then turn the dash light switch on, press on the air heater switch, pump the air heater pump handle slowly, and press on the starter pedal all at the same time. The air heater will heat the air box and aid starting. Then proceed as stated above.

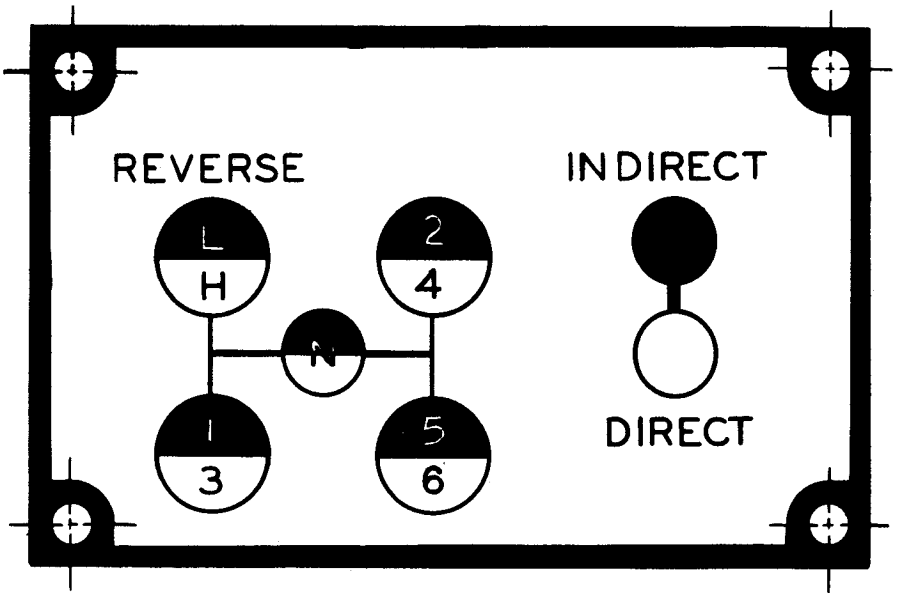
WARNING: Do not operate the air heater before stepping on the starter pedal.

B. Use of Gear Shifting Levers

1. Two levers are used to shift the gears. The left lever (looking forward) has four positions and is called the gear shift lever; the right lever is an auxiliary lever for shifting the auxiliary gears in the front part of the transmission case and has two positions, indirect (forward) and direct (backward). When the auxiliary lever is in the direct position, the tractor can be run in third, fourth, sixth and high reverse; when the lever is in indirect position the tractor can be run in first, second, fifth and low reverse.

2. Both gear shift levers are provided with a locking device to hold them in the desired gear. The auxiliary shift lever must be moved sideways to the left to unlock it when shifting. The gear shift lever must be moved sideways away from the neutral position when it is desired to shift into another gear.

3. The following chart shows the position of the two gear shift levers to obtain any of the six forward and two reverse speeds:



GEAR	GEAR SHIFT LEVER	AUXILIARY SHIFT LEVER
First	Left and Back	Indirect
Second	Right and Forward	Indirect
Third	Left and Back	Direct
Fourth	Right and Forward	Direct
Fifth	Right and Back	Indirect
Sixth	Right and Back	Direct
Low Reverse	Left and Forward	Indirect
High Reverse	Left and Forward	Direct

4. 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 stop. This stopping of the gears enables the operator to shift without clashing the gears.

C. Use of Master Clutch

1. The Master clutch is of highest quality and workmanship and if given proper care and operated correctly it will give many hours of carefree operation.

2. To obtain maximum clutch life it is important that in starting a load, operator must select a gear low enough to insure easy pick up without clutch slippage. When the correct gear is engaged to handle the load open throttle approximately half way and pull back steadily on master clutch lever until all slack is taken up between tractor and load. Then pull back firmly on clutch lever to lock clutch in its engaged position at the same time opening throttle to attain desired speed. To shift to a higher gear with tractor in motion close throttle at the same time master clutch is disengaged, select desired higher gear, engage master clutch and at the same time open throttle.

3. If conditions are such that the tractor can negotiate in sixth gear with load, start tractor in fifth gear and then shift into sixth gear after tractor has obtained rated speed. Do not slip the master clutch in an effort to pull an overload. Avoid excessive wear on the clutch disc facings by using a lower speed being sure to close throttle to half-way position every time master clutch is disengaged. When it is necessary to let engine idle for short periods do not idle engine with master clutch disengaged but shift gears into neutral position and engage the master clutch.

D. Steering

1. 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."

2. 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.

E. Use of Steering Clutch Brakes

1. 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.

2. The brakes can be locked and used as parking brakes when parking the tractor. To hold the brakes in the locked position the brake pedal lock lever will have to be held forward while applying the brakes. When the brakes are to be released again a slight pressure on the brake pedal will automatically release the pedal lock lever.

F. Stopping the Tractor

1. Stopping the tractor is accomplished by disengaging the master clutch (push lever forward) and applying the steering clutch brakes. Then SHUT OFF motor. (See topic "Stopping Engine") DO NOT allow tractor to stand with engine idling. If tractor is to be stopped for ONLY a few minutes, let the engine run at not less than TWO-THIRDS throttle (approximately 1000 r.p.m.) with gear shifting lever in neutral position and Master Clutch engaged to eliminate unnecessary wear on master clutch parts and pilot bearing. If tractor is to be stopped longer than a few minutes, STOP ENGINE.

F. Stopping Engine

1. To stop engine, close the throttle control and pull the fuel shut-off control out as far as possible

OPERATING IN MUD OR WATER

The master and steering 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 thus 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.

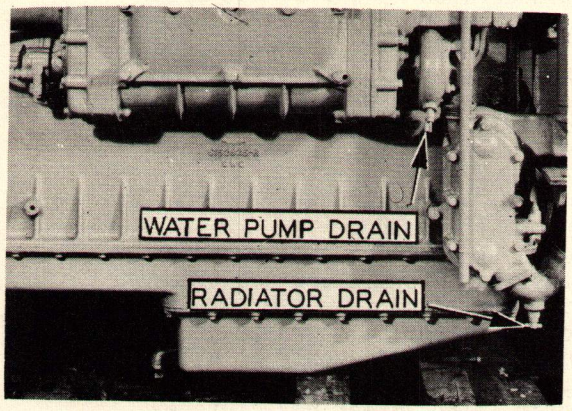
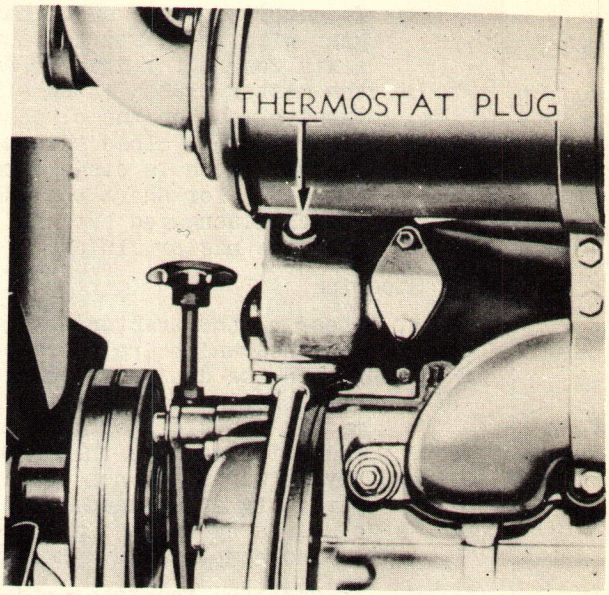


FIG. 1



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 temperatures of the engine (175° to 185°F).

The cooling system has two drain points and both of these should be opened when the unit is drained. One drain point is in the bottom of the water pump housing; the other is in the elbow at the bottom of lubricating oil cooler assembly.

CAUTION: Before filling the radiator remove the thermostat plug to release the air that is trapped in the thermostat housing. Replace the thermostat plug when the water reaches the plug hole level.

CARE OF BATTERIES AND GENERATOR

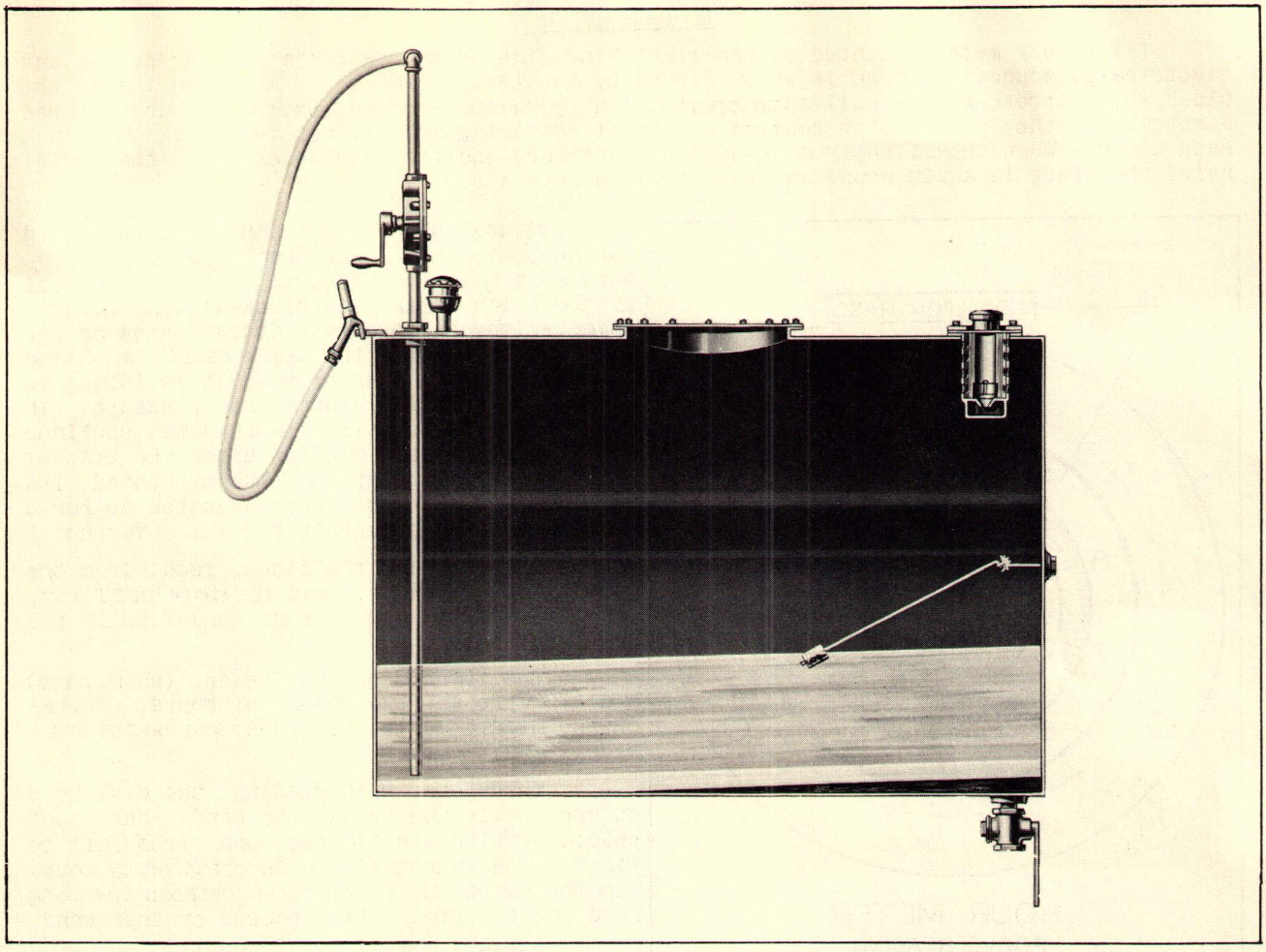
Keep the tops of the batteries clean and dry. Add only distilled water regularly to keep water 3/8 inch above separators. Do not allow the solution level to get below the top of the separators.

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 of batteries might result in freezing weather.

The generator is adjusted 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.

Through the action of the voltage regulator, the ammeter reading will be reduced when the battery approaches full charge and increased as the battery approaches a discharged condition.

See an authorized Delco Remy Service Station for repairs or adjustments.



STORAGE OF FUELS

A large percentage of Diesel engine difficulties can usually 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 clog 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.

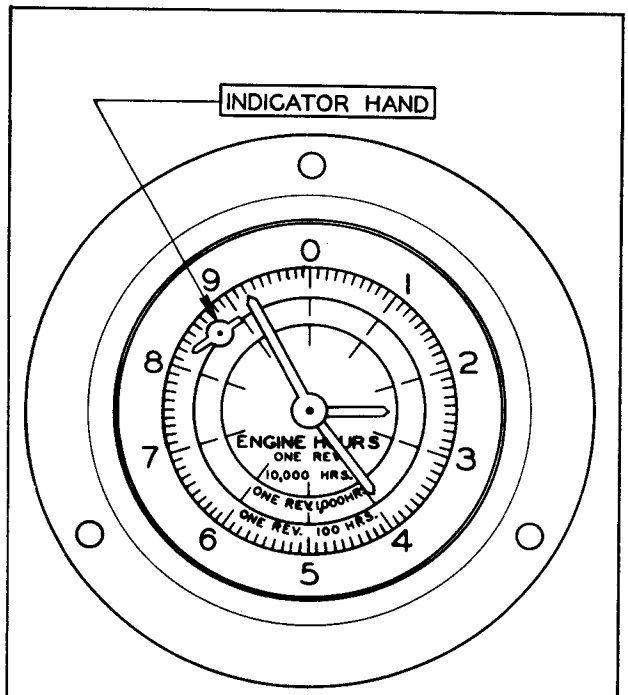
A storage tank provides the best method of storing fuel oil on the job. In a tank the sediment and water can easily be drained and the fuel oil can be pumped into the tractor with the minimum of handling. Consult your local Allis-Chalmers dealer for details about this type of storage tank.

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 filler 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 two sediment traps at the bottom which are to be drained daily.

THE HOUR METER

The hour meter, mounted on the right hand side of the dash, is spring driven and electrically wound. Winding is accomplished by an electro-magnet or solenoid inside the clock which stretches the coil spring sufficiently to operate the clock for about three minutes. As the spring loses tension a pair of contact points within the clock approach each other. When they finally make contact, another electric impulse excites the solenoid, the clock is again wound and the contacts separated.



HOUR METER
ABOVE READING
2392 HRS.

Since this clock is intended to record the number of hours the tractor works, a pressure switch is installed in the engine oil system which breaks the clock-winding circuit whenever the oil pressure drops below 5# per sq. in. Therefore, the clock cannot wind when engine is not running or when it is idling at a speed too low to maintain 5# pressure in the oil line. However, the clock may continue to run as much as 3 minutes after the tractor stops or until the spring has exhausted its energy. The clock has been adjusted to run a little slow to compensate for this overrun.

When reading the clock, read from the inside out, that is, read the short hand first, then the medium length hand and finally the the long one.

The figures on the inside, (short hand) scale, represent thousands of hours; figures on the middle scale, hundreds; and on the outside, tens.

Therefore, when reading the dial read on each scale the number the hand has just passed setting the figures down from left to right. The fourth figure is obtained by countingthe number of short marks between the long hand and the figure last passed by that hand.

Refer to figure Notice that the first three digits of the reading are the three figures just passed by the three hands reading from the inside out, 239 The fourth figure is obtained by counting the marks beyond nine, which gives "2" for the fourth place making reading 2392. The indicator hand rotates slowly, as a visual indication that the hour meter is operating.

STORAGE OF TRACTOR

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 and refill the engine crankcase with new oil.

Place a cover over exhaust pipe.

In a great many cases faulty operation of a Diesel engine at time of delivery is caused from a gummed or corroded injection system. This condition is often found where a Diesel engine is manufactured, tested with Diesel fuel, and then installed in a unit and stored for an unknown time with the system full or partially filled with Diesel fuel.

Because of the above fact, although all General Motors Diesel engines that we use are tested on Diesel fuel by General Motors, the injection system is then drained and filled with a 20% mixture of Mineral Seal Oil and 80% Perfection Kerosene which has no gumming or corroding effect on fuel systems. The engines are then shipped to us and when we install them in tractors the only fuel we use for our tractor test purposes is of the same mixture.

By using this type fuel, the injection system will be in good working condition at time of delivery to the customer.

It is not necessary to drain out this fuel at time of delivery. Use it up and refill with the proper Diesel fuel that has been selected for the engine.

STORAGE OF TRACTOR (Cont'd)

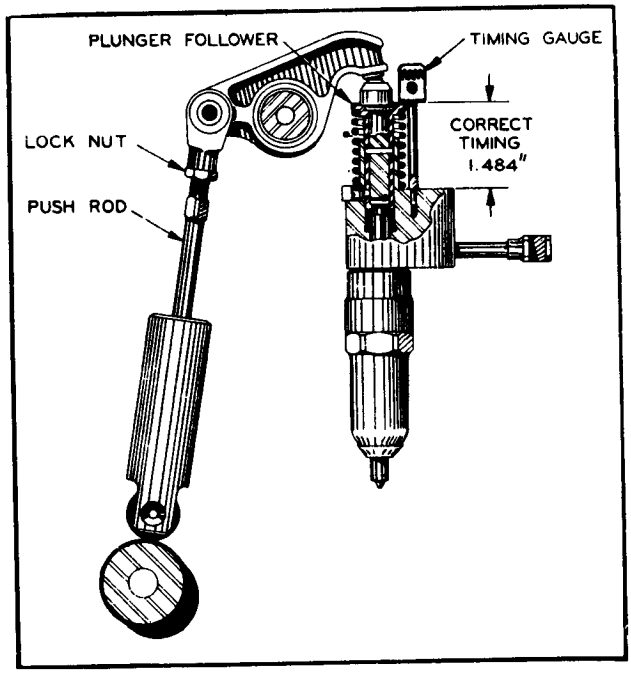
When a Diesel engine that has been using regular Diesel fuel is prepared for storage or is going to be out of operation for several weeks, we recommend that you drain the fuel system and place in the tank a large enough supply of the above mixture so that the engine can be run long enough to burn up all the remianing Diesel fuel. This will leave the injection system filled with the recommended mixture which will insure the customer against a corroded or gummed injection system when the unit is again placed in service.

We suggest you confer with your local major oil companies in securing a supply of this recommended storage fuel.

Remove the batteries and store in a cool, dry place or store at a regular battery service station. Keep the sides and tops 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 battery is fully charged, the specific gravity of the electrolyte is about 1.280 to 1.300.

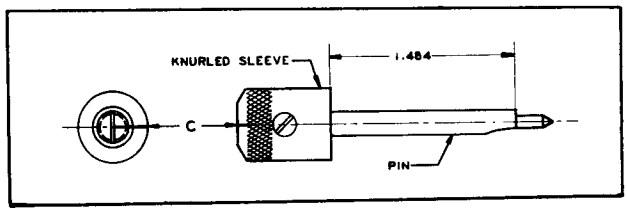
INJECTOR TIMING

The timing of an injector consisting of properly locating the top of the plunger follower in relation to the injector body. This must be done separately for each injector after it has been installed in the engine.



1. Remove cylinder head cover.
2. Rotate engine until valves of the same cylinder are down (fully opened).
3. Place timing gauge in hole of injector body. Adjust push rod so it is just possible to turn shoulder of gauge over the top of follower without lifting gauge. Tighten locknut on push rod and check adjustment to be sure it remained unchanged. This operation must be repeated for each injector.

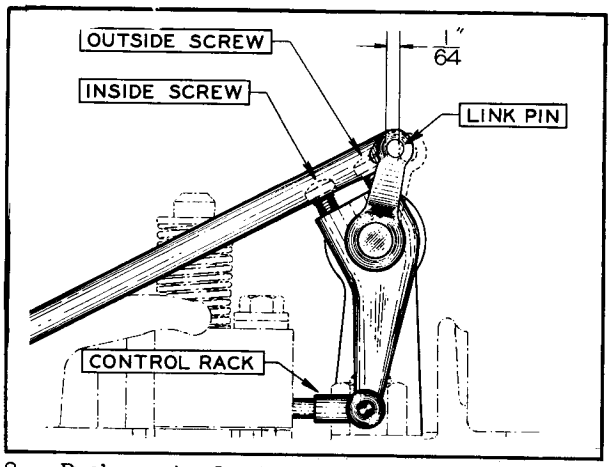
   NOTE: When checking timing, hold the gauge vertical. Be sure there is no dirt or obstruction in the hole in the injector body. When gauge with the sliding sleeve (2nd type) is used, adjust the push rod so the sleeve comes flush with the top of the center pin. When the top surface of the sleeve (3rd type - shown above) is flush with the top of the pin injector is properly timed. This is determined when the marks "C"on the sleeve and pin line up.
4. Injector timing must be checked whenever any injector is removed and replaced.



EQUALIZING INJECTOR

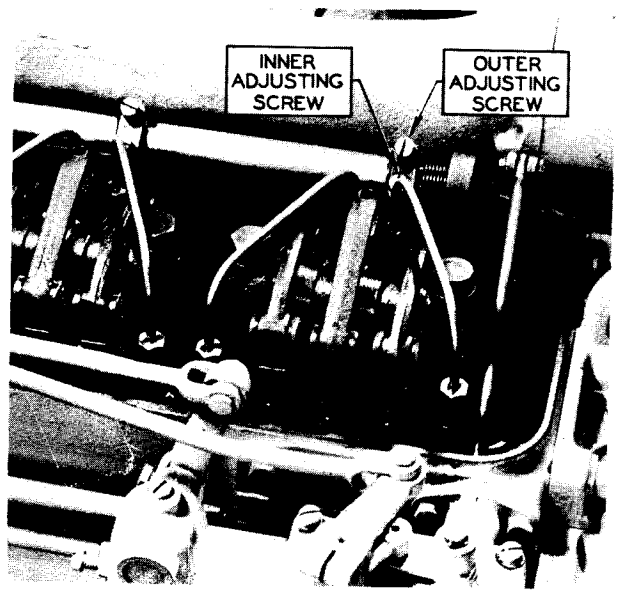
The amount of fuel injected into each combustion chamber is governed by the control rack position of the fuel injector. The maximum amount of fuel is injected when the the rack is way in -- no fuel is injected when the rack is way OUT.

If the injectors are not equalized, the engine will run unevenly and may detonate or knock. At any time when injector equalizing is found incorrect proceed as follows:



1. Remove link pin from governor control lever.
2. Be sure all operating lugs on injector control rack levers are engaged with injector control racks.
3. Loosen adjusting screws on all control rack levers and be sure the levers are free on the shaft and the shaft free in bearings.
4. Injectors must be timed before equalizing.
5. Set engine shut-off in running position.
6. Open throttle all the way.
7. Adjust inside screw on number 1 rack control lever so it pulls control tube lever hole 1/64" past hole in governor control link. Lock control lever in this position by tightening outside screw on lever.

8. Push control tube lever toward water manifold as far as possible and hold firmly in this position.
9. Using a medium sized screw driver, turn inner screw on number 2 rack control lever in until a pressure is felt on control tube lever. Now back screw out until this pressure is relieved (this is done to be sure that there is no binding between rack control lever and control tube.) With only two fingers on screw driver turn screw in again until a slight pressure is felt on screw driver. Turn in and out a few times in order to set screw at the exact position where pressure starts. Now lock by tightening outer screw.
10. Adjust remaining rack control levers as described above.
11. Still holding control tube lever in position as described in paragraph No. 8. Check control racks. These racks, when rack control levers are adjusted properly will all be tight. If any should be found loose at this point readjust by loosening outer screw and tightening inner screw. (Do not change adjustment of #1 rack control lever after it is once set).

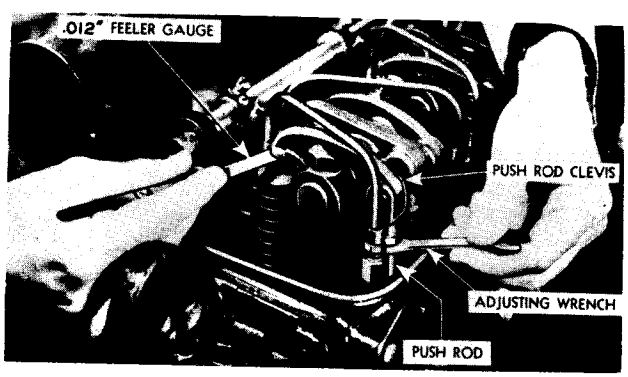


12. Replace pin in governor control link and control tube lever. Secure same with cotter pin.

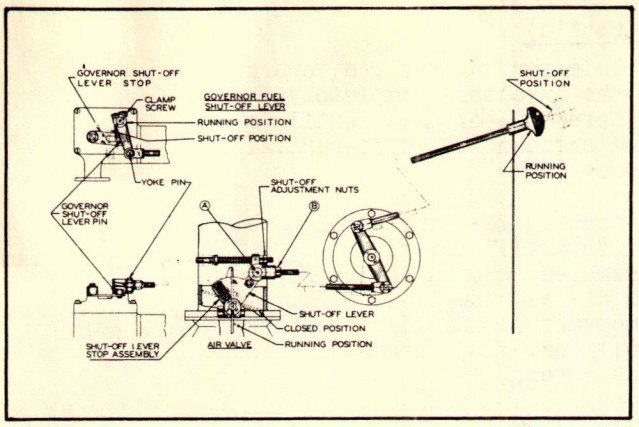
VALVE LASH

Owing to the high compression in this engine, it is very important that the correct valve lash be maintained. Too little clearance will cause a loss of compression, missing cylinders, and eventual burning of valves and seats. Too much clearance will result in noisy operation especially at idling speeds.

The valves should be adjusted to give .012" clearance between the valve stem and the rocker arm. This must be done with the engine at recommended operating temperature.



1. To adjust valves, rotate engine with starter until the injector is at the bottom of its stroke.
2. Use a .012" thickness gauge and adjust each push rod until gauge will just pass between valve stem and rocker arm with a slight drag.
3. Repeat this operation for each cylinder. CAUTION: If for any reason a push rod has been disconnected from a rocker arm, care must be taken to have the push rod screwed entirely through the clevis before any attempt is made to rotate engine. If the valve is held down owing to the push rod being adjusted too long, it will be damaged by the piston and will require replacement.

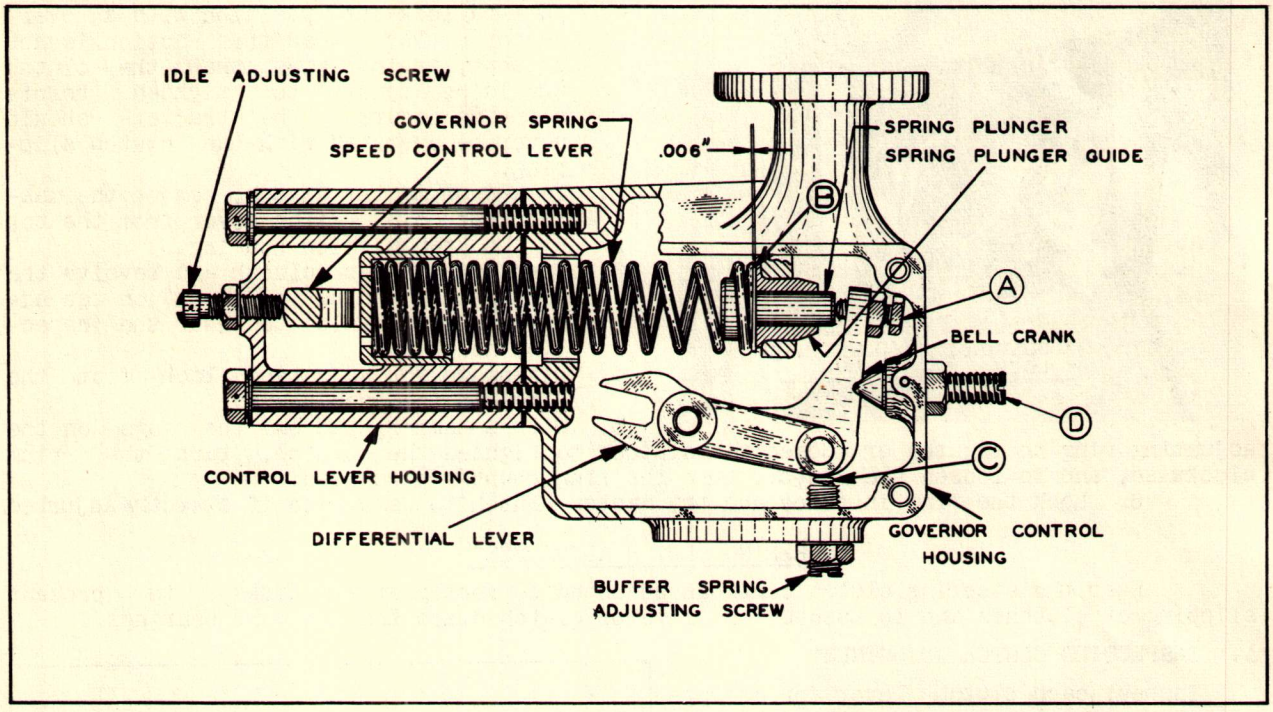


FUEL SHUT-OFF AND AIR VALVE CONTROL

Provided fuel oil pressure is normal, a loss of power in the engine is an indication that the fuel shut-off and air valve control linkage is incorrectly adjusted.

With the shut-off knob in running position check to see if the air valve shut-off lever stop assembly is in position as shown. The ball in the stop assembly should be centered in the hole in the shut-off lever as shown. If not, the shut-off knob is probably hitting the dash. To adjust, remove pin "A" and move shut-off lever until the ball is centered in the front hole in the shut-off lever. Now adjust linkage at "B" until the rod can be reconnected at "A".

With the linkage set in running position check to see if the governor shut-off lever pin contacts the rear of the slot in the shut-off lever stop. If not, loosen clamp screw on the governor fuel shut-off lever and position the lever pin until it contacts the rear end of the slot; tighten the clamp screw.



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.

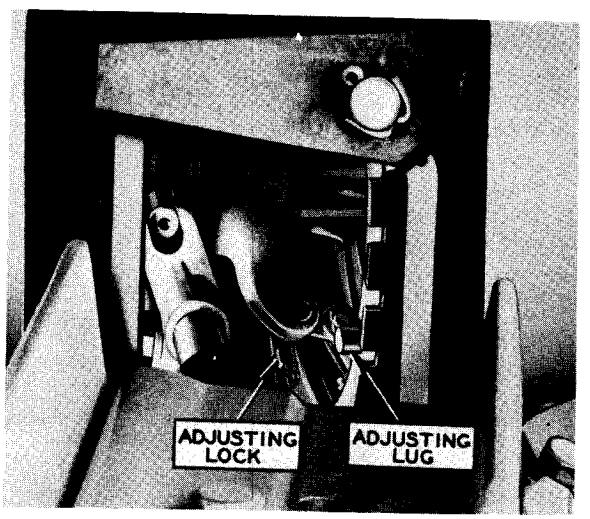
1. Remove the governor control housing cover.
2. Place the throttle control lever in the half open position.
3. Loosen lock nut on adjusting screw (A) and turn adjusting screw in or out until a .006" feeler gauge can be inserted between the spring plunger and springer plunger guide at (B).
4. Tighten lock nut.
5. Loosen lock nut on buffer spring adjusting screw.

GOVERNOR (Cont'd)

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.

MASTER CLUTCH ADJUSTMENT

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



1. The master clutch, when in proper adjustment, engages with a snap, and the control lever requires 50 to 60 pounds pull to lock into position with an over-center action. When this action is not present, it indicates that the clutch should be adjusted to tighten before slipping occurs. The tractor should never be operated with the clutch slipping.
2. To adjust master clutch, remove the master clutch inspection cover from the top of the transmission housing.
3. Disengage master clutch and revolve the clutch until adjusting lock on the adjusting ring is located near the inspection hole.
4. Disengage the adjusting lock from the slots in the back plate.
5. With a hammer, tap on the lugs 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 counter-clockwise.
6. Lock the ring in place and try master clutch to determine if correctly adjusted.

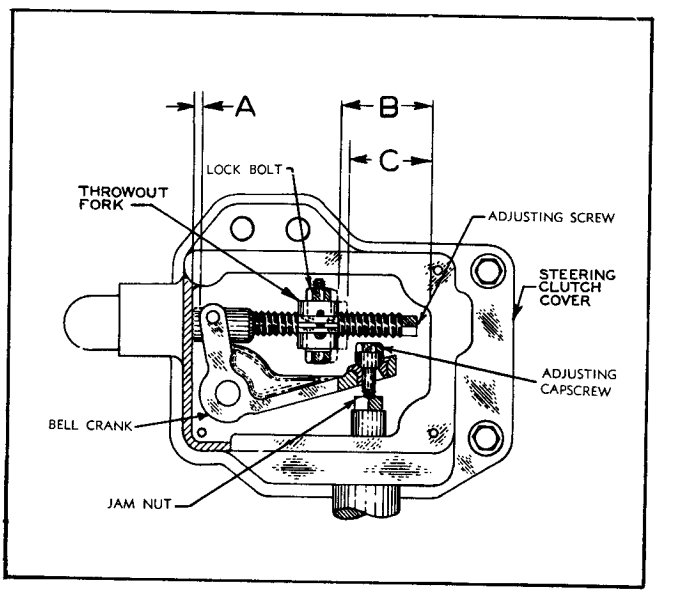
STEERING CLUTCH ADJUSTMENT

Keep the steering clutch controls adjusted correctly at all times, to prevent slipping of clutches and to assure long life of clutch discs and throwout bearings.

A. INSPECTING CLUTCH ADJUSTMENT

Inspect each clutch lever for adjustment separately. Perform the following steps for testing of steering clutch adjustment:

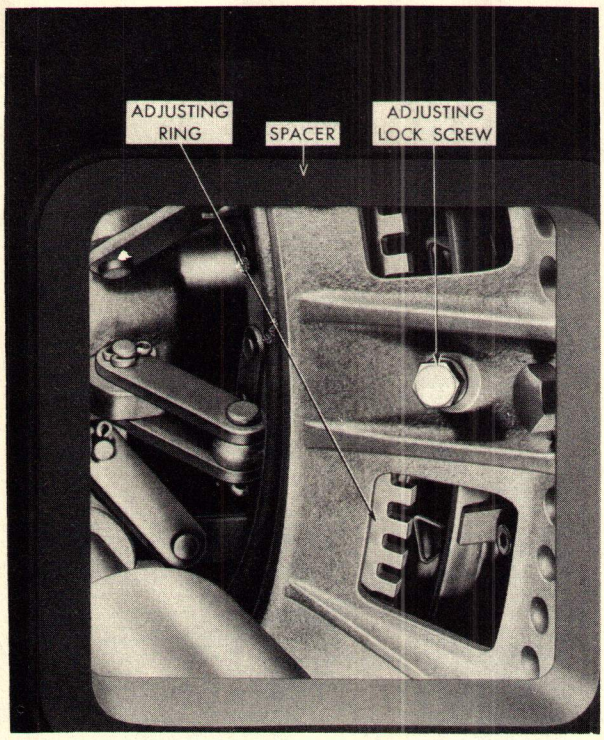
1. Place one end of a ruler or scale against the dash so it projects horizontally past the top of the steering clutch lever.
2. Push the lever forward as far as it will go; at this point the bottom end of the lever strikes a stop on the gear shifter housing and prevents it from going too far forward.
3. Pull the lever back until the lost motion is taken up. This can easily be felt by a definite increase in the pull required to release the clutch.
4. 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



SUPPLEMENT

MASTER CLUTCH

(Atwood Type - effective H.D.-14 - 2272 and up)



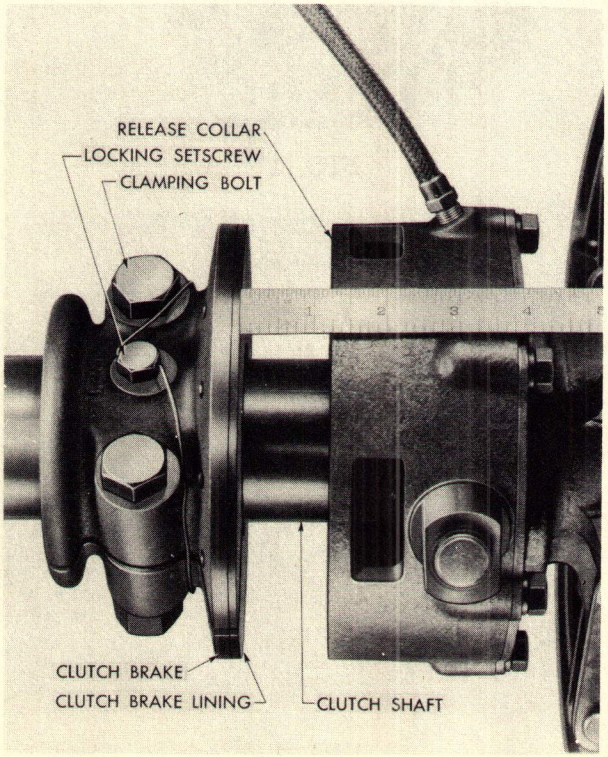
In order to obtain maximum clutch life, the master clutch should be kept adjusted so that a pull of approximately 80 pounds is required on lever to engage the clutch (with engine stopped). With the engine at rated governed speed this lever pull will be reduced to approximately 65 pounds.

A. Master Clutch Adjustment.

1. Remove the inspection covers from the rear fender and engine spacer on either right or left side of tractor.
2. Disengage the clutch and turn the engine until the "adjusting lock screw" may be reached through the inspection hole.
3. With a 9/16" wrench loosen "adjusting lock screw" but DO NOT REMOVE.
4. Using short pry bar, turn "clutch adjusting ring" clockwise to tighten. (Rotating the "adjusting ring" 3/4" to 1" is generally sufficient movement to make proper adjustment).
5. When proper clutch adjustment has been made (approximately 80 pounds lever pull) lock "adjusting ring" by tightening "adjusting lock screw".
6. Replace inspection hole cover plates.

NOTE: NEVER OPERATE A TRACTOR WITH THE CLUTCH SLIPPING.

MASTER CLUTCH BRAKE



A. Proper setting of the master clutch brake must be maintained to avoid gear clashing. With clutch properly adjusted and in engaged position set clutch brake with clearance of 1-1/8" to 1-1/4" between release collar and brake assembly. Inspect clutch brake lining periodically. Badly worn lining will score release collar face. Renew when necessary.

B. Master Clutch Brake Adjustment.

1. Remove locking wire.
2. Loosen locking screw and clamping bolts.
3. Engage master clutch.
4. Move brake assembly on shaft until space between clutch throw-out assembly and face of clutch measures 1-1/8" to 1-1/4".
5. Tighten clamping bolts and then tighten locking screw.
6. Install lock wire through head of set screw and around shaft.

SUPPLEMENT

STEERING CLUTCH: Ventilated, Adjustable Type (Effective with "HD 14" # 2079 and above)

DESCRIPTION: This is an adjustable ventilated type clutch, incorporating an adjustable plate that permits longer clutch life before clutches need rebuilding.

The adjustable plate is located next to the hub flange, which is tapped to accommodate the "adjusting screws" furnished. A slipping clutch indicates that friction discs have worn, allowing the working length of pressure springs to increase so they no longer apply sufficient pressure on friction discs.

The adjusting screws furnished should now be installed to restore normal spring pressure. Installation of the screws moves the disc stack to the outer end of clutch and the shifter plate returns to its original position in relation to clutch hub.

To determine when friction discs are worn enough to permit adjusting screw installation, inspect relation of shifter plate to clutch hub face, as shown. Screws can be installed without removing clutches from the tractor. Remove only steering clutch covers. The shifter plate must extend out beyond face of hub 1/8" before attempting to use the screws. For the first adjustment use the screws, furnished. If second adjustment is practical, longer screws can be obtained under part No. 048220.

FIELD INSTALLATION OF STEERING CLUTCH — ADJUSTABLE SCREWS:

1. Remove ventilating covers from top of steering clutch cover by taking out four capscrews.
2. Remove jam nuts from grease tubes which come up through steering clutch covers.
3. Loosen steering clutch adjusting screw lock bolts at top of throwout fork and back adjusting screw out far enough to pass by thrust pin. Unhook throwout fork spring from dowel in top of case.
4. Hold rod connector and loosen jam nut; back screw out of connector.
5. Remove steering clutch covers.
6. Inspect the shifter plate to see how far it extends out of the steering clutch hub. The shifter plate must extend out 1/8" or more beyond the face of the clutch hub before the adjusting screws can be installed. If this distance is less than 1/8" and the adjusting screws are installed, the clutch springs will be compressed so it will be impossible to fully release the clutch thus causing excessive heating and wear.
7. The tractor will have to be moved ahead or back as the adjusting screws are installed in order to bring the holes in the hub flange toward the top.
8. Install parts removed.
9. NOTE: The adjusting screws for field installation are located on the bottom side of the steering clutch top cover. They are held in place by a plate and a capscrew as shown on Fig. 2.

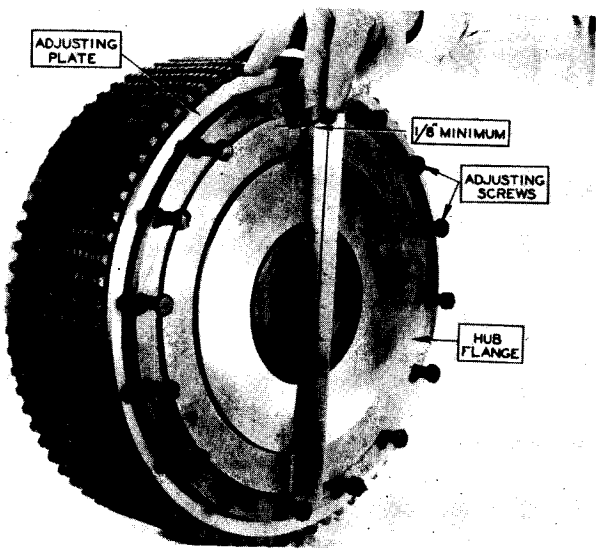


FIG. 1

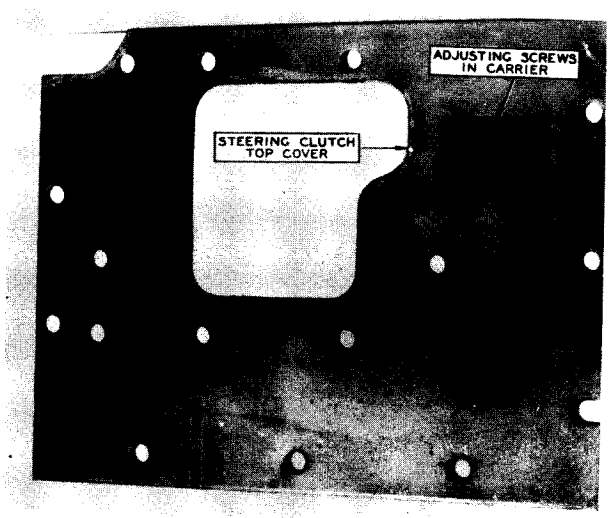
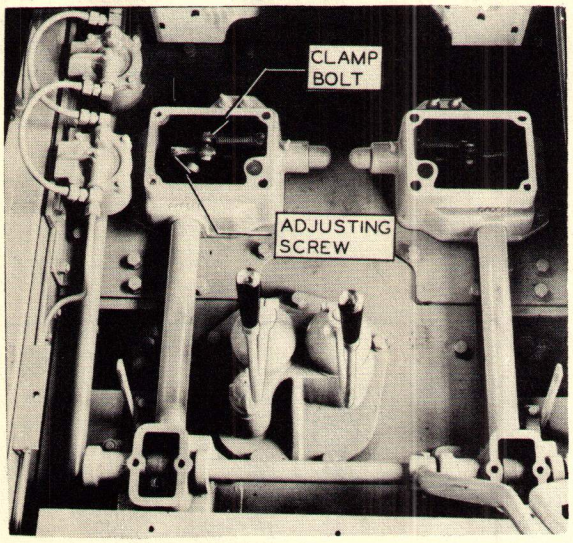


FIG. 2

4. where the lost motion is all taken up. The free motion or difference between these two measurements should not be less than 3" and not more than 5". As the steering clutches wear, the free motion of the levers becomes less. If the free motion of the levers does not come within the limits of 3" to 5" then proceed with adjustment.



B. ADJUSTMENTS

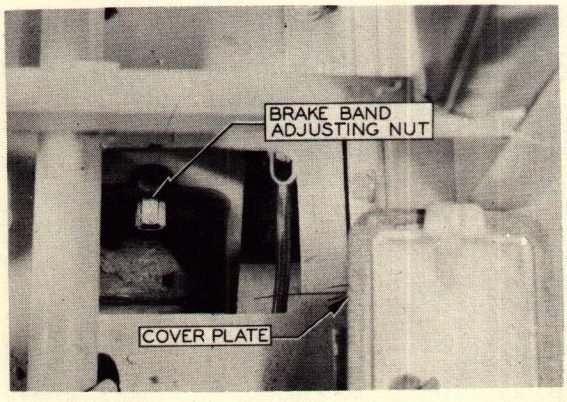
1. Remove steering clutch vent cover.
2. Inspect and adjust clearance between bell crank and clutch control bracket when the steering levers are as far forward as they will go. This clearance (A) should be 1/8". If this clearance is maintained, there will always be a sufficient amount of clearance between the throwout bearings and the shifter plate when the top of the steering levers and top of the throwout fork have the proper free motion. If there is not 1/8" clearance, proceed as follows to correct the adjustment:

   (a) Push the steering clutch levers as far forward as they will go and hold it in that position.

   (b) Loosen the jam nut and turn the adjusting capscrew in until the end of bell crank is moved away from the bracket 1/8". Tighten the jam nut.

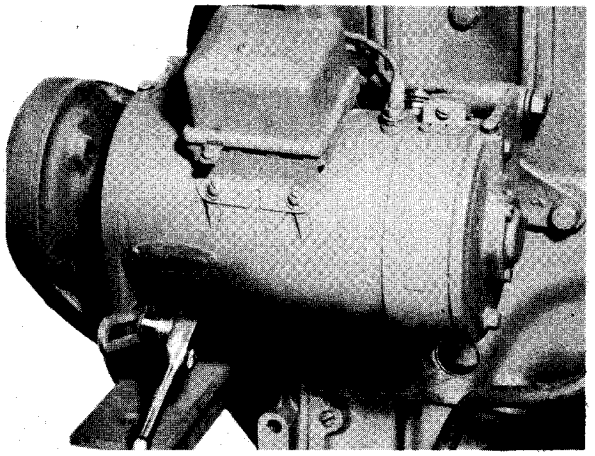
   NOTE: This adjustment is very important and it should be done carefully. If there is no clearance at (A) it is possible for the clutch throwout bearings to ride against the shifter plate even though the steering clutch levers have proper amount of free travel.

3. Inspect and adjust free travel of top of throwout fork. Measure the distance (B) between top of throwout fork and edge of steering clutch cover (steering levers held forward). Then pull steering lever back to end of its free travel or the point where pressure is felt and disengagement of clutch begins. Hold lever in that position and measure distance "C" (between top of throwout fork and edge of bracket). This distance should be 3/16" less than distance "B". This 3/16" free travel of top of throwout fork can be obtained by loosening nut on lock bolt and turning adjusting screw in or out to decrease or increase the distance "C". When the 3/16" free travel is obtained, tighten nut on lock bolt. The steering clutch lever should now have 5" of free travel at the top of steering lever before disengagement of clutch begins.



STEERING CLUTCH BRAKES

To adjust the brake bands, remove the seat cushion and the brake cover plates, Tighten the adjusting nut until the brakes are properly adjusted. Never adjust the nut so there is less than 4" of free motion in the foot pedal. CAUTION: WHEN TIGHTENING THIS NUT, ALWAYS TURN IT (1/2) TURN AT A TIME Before adjusting the brake bands, inspect the steering clutch throwout mechanism for proper clearance and equalization of the amount of release for each steering clutch. Tightening the brakes will not correct the steering of a tractor on short turns unless the steering clutches release properly.

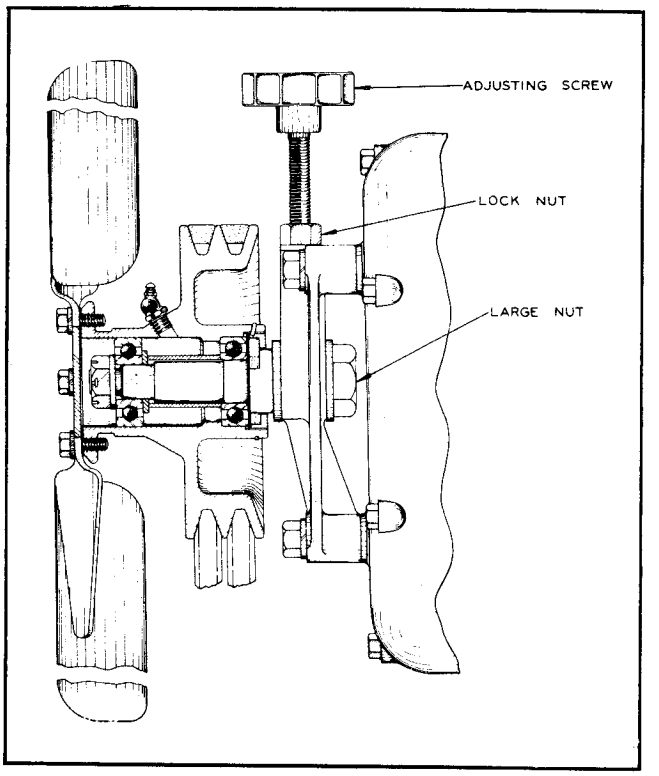


GENERATOR BELT

To adjust the generator **belt, loosen** the capscrew through the adjusting link as shown. Move the generator in or out as necessary to correct the adjustment. The adjustment is correct when the belt has about 1 inch slack measured halfway between the pulleys. Too tight a belt will cause bearing failure and undue wear on belt. When adjustment has been completed tighten adjusting link capscrew.

FAN BELT

To adjust the fan belts, loosen the large nut at the rear end of the fan shaft and loosen the lock nut on the adjusting screw. Turn the hand screw clockwise to tighten the belts or counter-clockwise to loosen the belts. Tighten large nut securely, then tighten the top lock nut 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. Fan belts too tight will cause bearing failure.



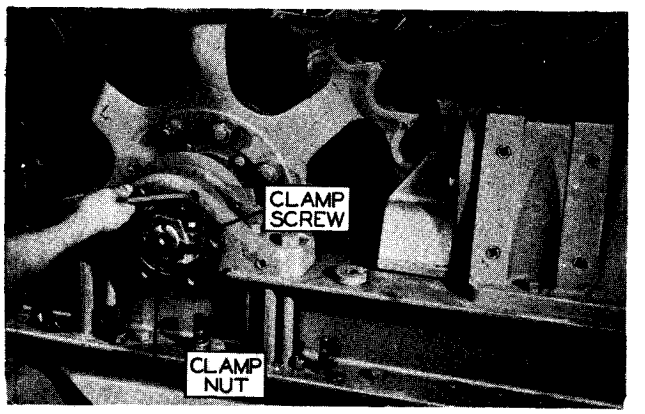
SPROCKET SHAFT BEARING ADJUSTMENT

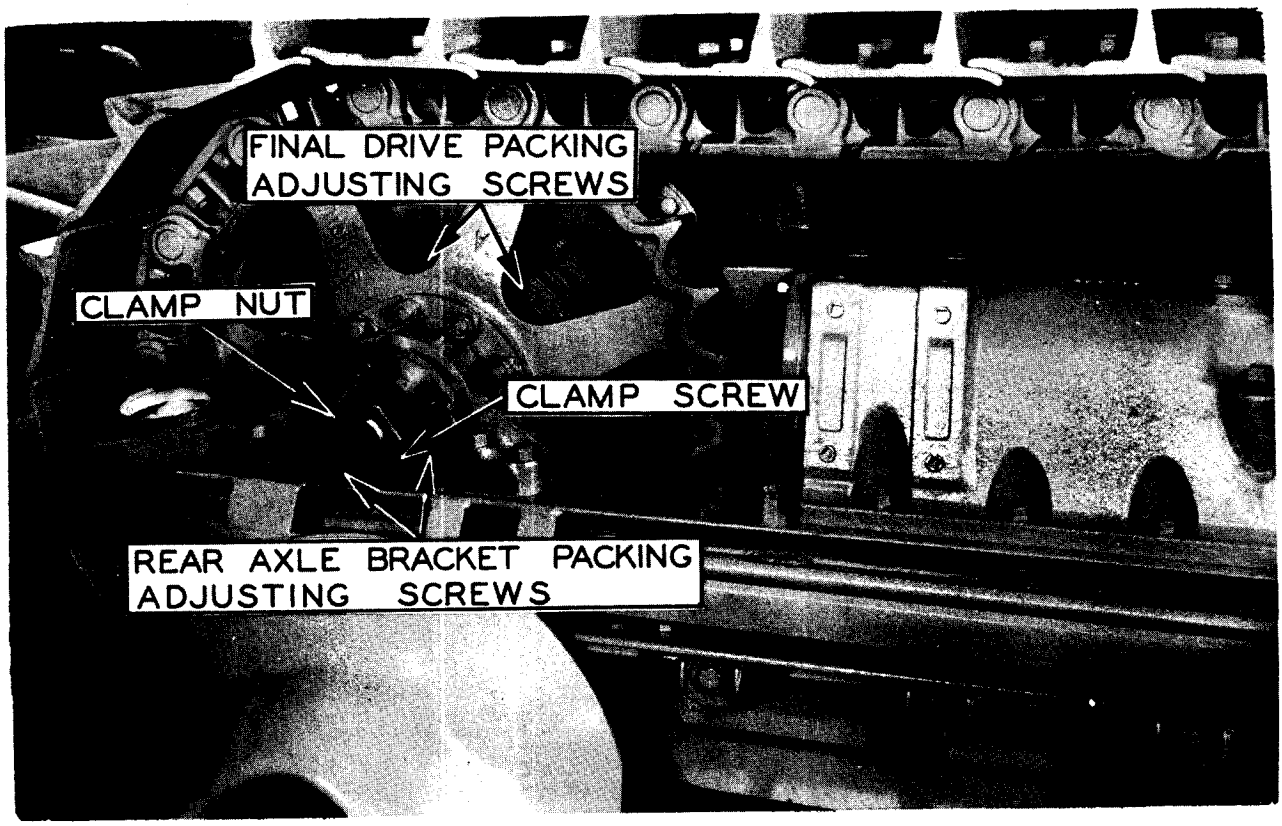
The sprocket shaft bearings should be adjusted every 800 hours. If the tractor is working under abnormal conditions such as in mud, water or dust, the bearings should be adjusted every 400 hours or less.

If the bearings are allowed to become loose the sprocket will not run in line and will cause serious damage to the sprocket shaft bearings and final drive oil seals.

For proper adjustment proceed as follows:

1. Loosen the clamp screw in the clamp nut only enough so that the nut still is hard to turn with the wrench.
2. Using a four foot extension on the wrench, tighten the nut until the bearings are tight.
3. Back off the clamp nut 1/6 of a turn for bearing clearance; tighten the clamp screw securely using an extension on the Allen-head wrench.





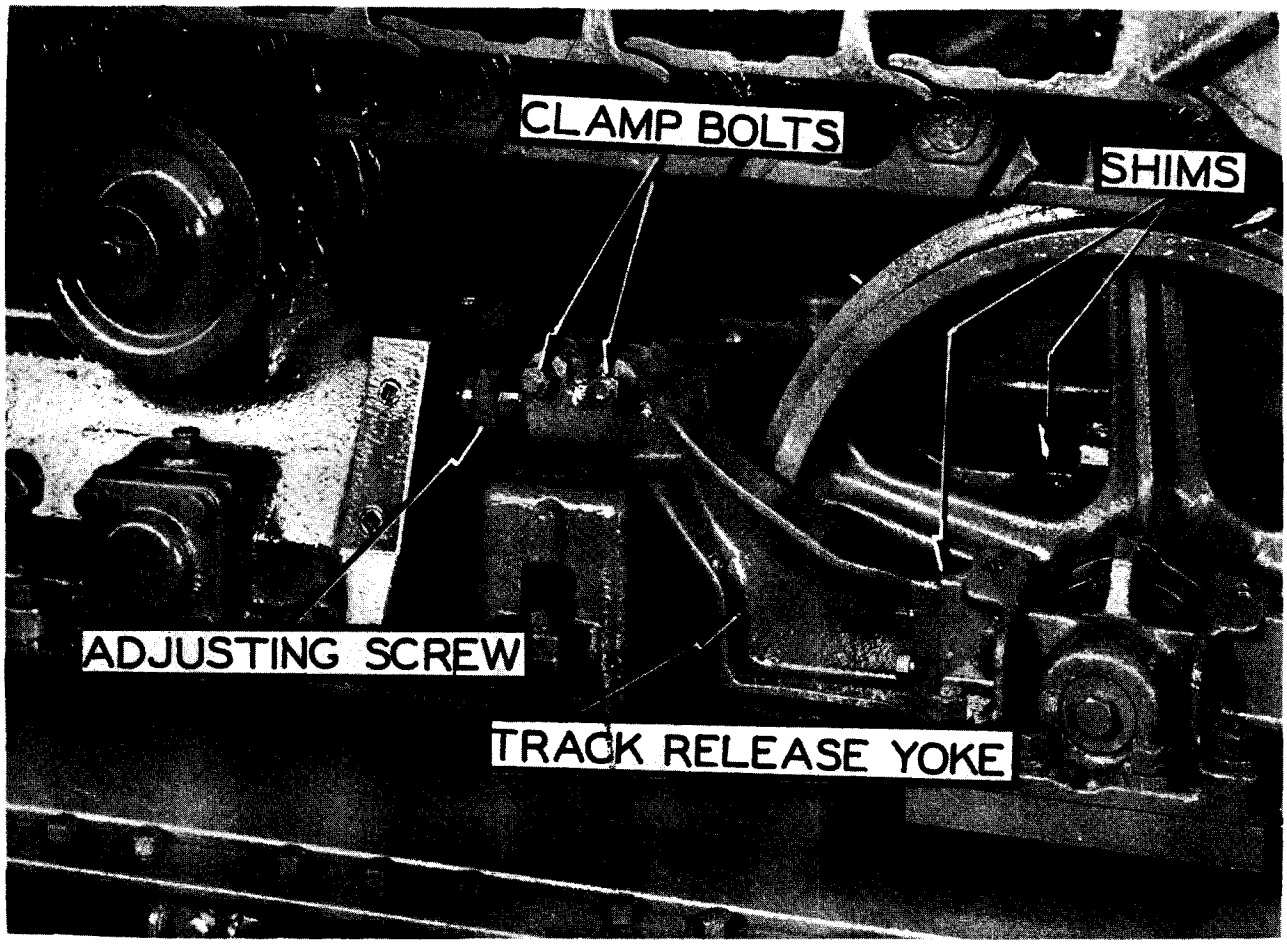
FINAL DRIVE PACKING

Remove end cover, sprocket guard, and wire in adjusting screws. Turn adjusting screws to the right to tighten packing. Adjust packing at regular intervals to prevent entrance of abrasive materials and water which would cause damage to the final drive assemblies.

This packing should be adjusted so a small amount of oil will seep past the packing rings; this is necessary to lubricate the packing rings and prevent them from wearing rapidly or scoring the hub. Tighten the cap screws evenly so that even pressure is exerted on all parts of the packing. Lock the cap screws with wire after the adjustment has been made.

REAR AXLE BRACKET PACKING

Remove the end cover; turn the adjusting screws to the right to tighten packing. This packing should be adjusted so a small amount of oil will seep past the packing rings. This is necessary to lubricate the packing rings and prevent them from wearing rapidly or scoring the hub. Tighten the capscrews evenly so that even pressure is exerted on all parts of the packing.



TRACK ADJUSTMENT

1. 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 track dragging on the final drive case.
2. To adjust the tracks, loosen the clamp bolts slightly and turn the adjusting screw until the tracks are properly adjusted to the dimensions above. Turning the adjusting screw clockwise or counter-clockwise forces the release yoke backward or forward, and this loosens or tightens the track.
3. After track has been properly adjusted, lock the adjusting screw by tightening the clamp bolts. Use an extension on the socket wrench provided and tighten clamp bolts as tight as possible.
4. The shims 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.
5. To adjust the idler for alignment, loosen the clamp bolts and the track adjusting screw. 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.