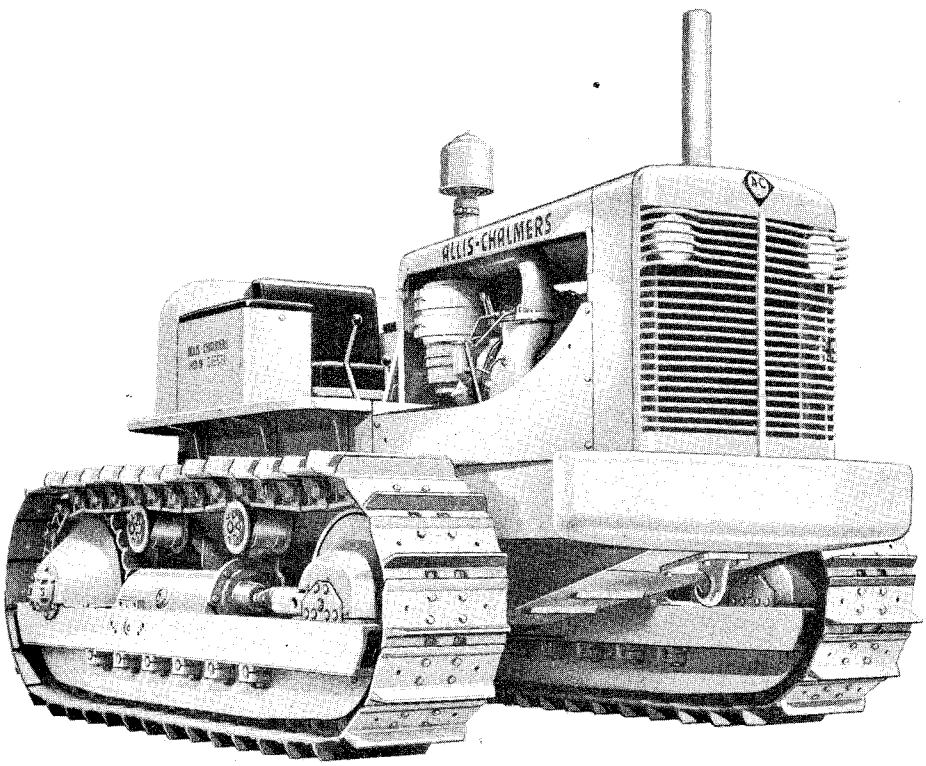
OPERATORS MANUAL

MODEL HD 9 TRACTOR



ALLIS-CHALMERS MFG. CO.

TRACTOR DIVISION

MILWAUKEE, WISCONSIN, U. S. A.

LITHO. IN U. S. A.

FORM TM-61B

THIS MANUAL SHOULD BE KEPT WITH THE TRACTOR

TRACTOR MODELS

Several distinct models of the HD9 Tractor are available and this Repair Parts Catalog has been prepared to show the parts for each. All parts listed herein, which have no specific usage indicated, are applicable to all models. Those parts which are used only on specific models are so indicated.

The currently available models and their identifying symbols are indicated below. This symbol is stamped in front of the tractor serial number on each model.

	MODEL SYMBOL
Short Track (38 links), Oscillating Truck Frames, 74" Tread*	HD9
Long Track (41 links), Rigid Truck Frames, 74" Tread*	HD9F
Long Track (41 links), Rigid Truck Frames, 74" Tread*, equipped with **TRACTOMOTIVE Front Shovel	HD9G

* Measurement from center to center of tracks.

** Order all parts for TRACTOMOTIVE SHOVEL and Hydraulic System from Tractomotive Corporation, Deerfield, Illinois or from nearest authorized Dealer.

SERIAL NUMBERS

The tractor serial number is stamped on the rear face of the steering clutch housing at the upper right hand corner and on a small plate attached to the cowl, facing the operator.

The engine serial number is stamped on the right hand side of the cylinder block [illegible] front corner.

AVOID ACCIDENTS

MOST ACCIDENTS, WHETHER THEY OCCUR IN INDUSTRY, ON THE FARM, AT HOME OR ON THE HIGHWAY, ARE CAUSED BY THE FAILURE OF SOME INDIVIDUAL TO FOLLOW SIMPLE AND FUNDAMENTAL SAFETY RULES OR PRECAUTIONS. FOR THIS REASON MOST ACCIDENTS CAN BE PREVENTED BY RECOGNIZING THE REAL CAUSE AND DOING SOMETHING ABOUT IT BEFORE THE ACCIDENT OCCURS.

REGARDLESS OF THE CARE USED IN THE DESIGN AND CONSTRUCTION OF ANY TYPE OF EQUIPMENT, THERE ARE MANY CONDITIONS THAT CANNOT BE COMPLETELY SAFEGUARDED AGAINST WITHOUT INTERFERING WITH REASONABLE ACCESSIBILITY AND EFFICIENT OPERATION.

A careful operator is the best insurance against an accident. The complete observance of one simple rule would prevent many thousand serious injuries each year. That rule is:
Never attempt to clean, oil or adjust a machine while it is in motion.

NATIONAL SAFETY COUNCIL

FOREWORD

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 assured if these instructions are followed.

The instructions given in this book cover the operation of the "Allis-Chalmers" HD-9B Tractor. A close adherence to these instructions will result in many hours of trouble-free operation and a longer operating life for the unit.

Many owners of "Allis-Chalmers" equipment employ the Dealer's Service Department for all 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.

INDEX

GENERAL DESCRIPTION

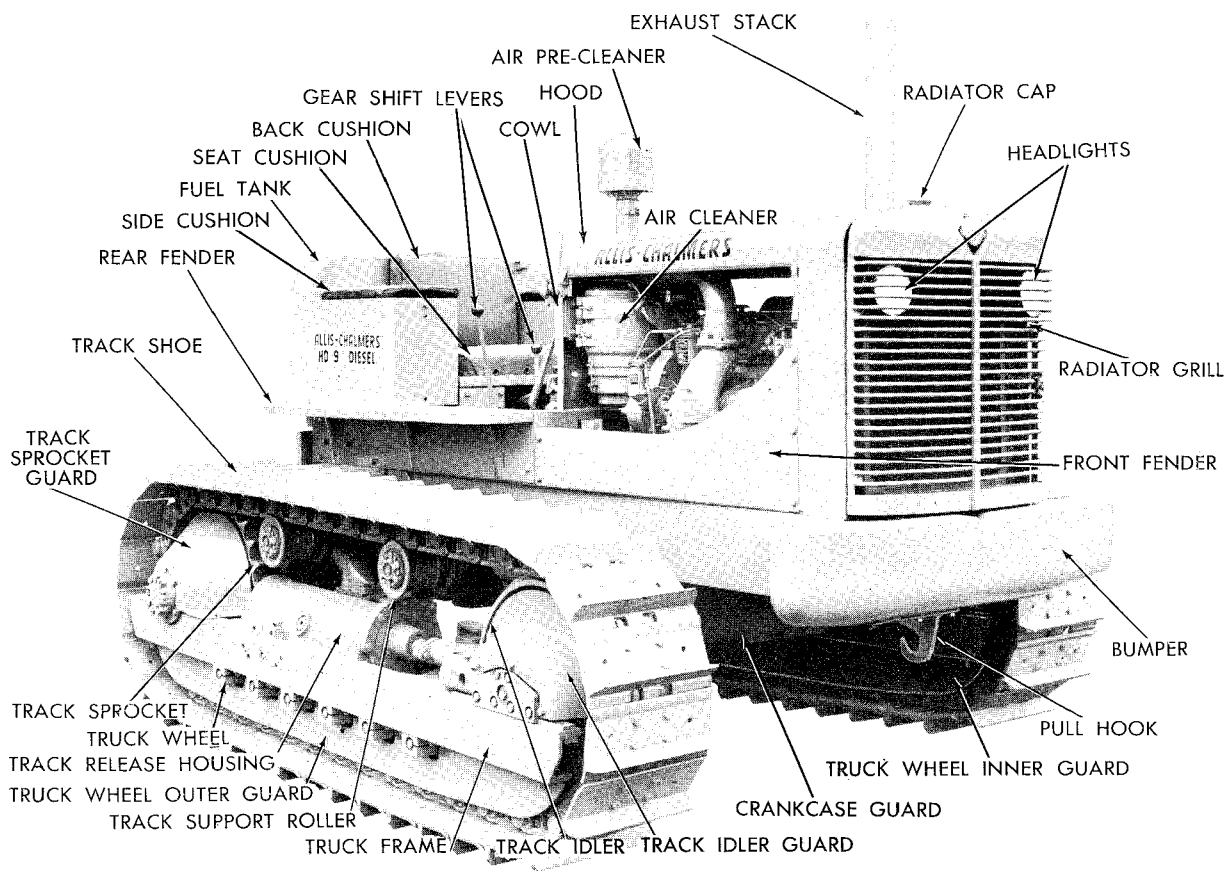
The Model "HD-9B" Tractor is an 18,800 pound track-type tractor powered with a 4 cylinder, 2 cycle "DIESEL" engine.

Power from the engine is transmitted through a single plate, over-center type engine clutch to the transmission through a universal joint drive shaft assembly. From the transmission the power is transmitted to the bevel gear and from the bevel gear through the steering clutches to the final drives and the track drive sprockets.

The transmission provides 6 forward speeds ranging from 1.4 M.P.H. in low gear to 5.7 M.P.H. in high gear and 3 reverse speeds ranging from 1.6 M.P.H. in low reverse to 4.4 M.P.H. in high reverse, under full governed engine speed of 1600 R.P.M.

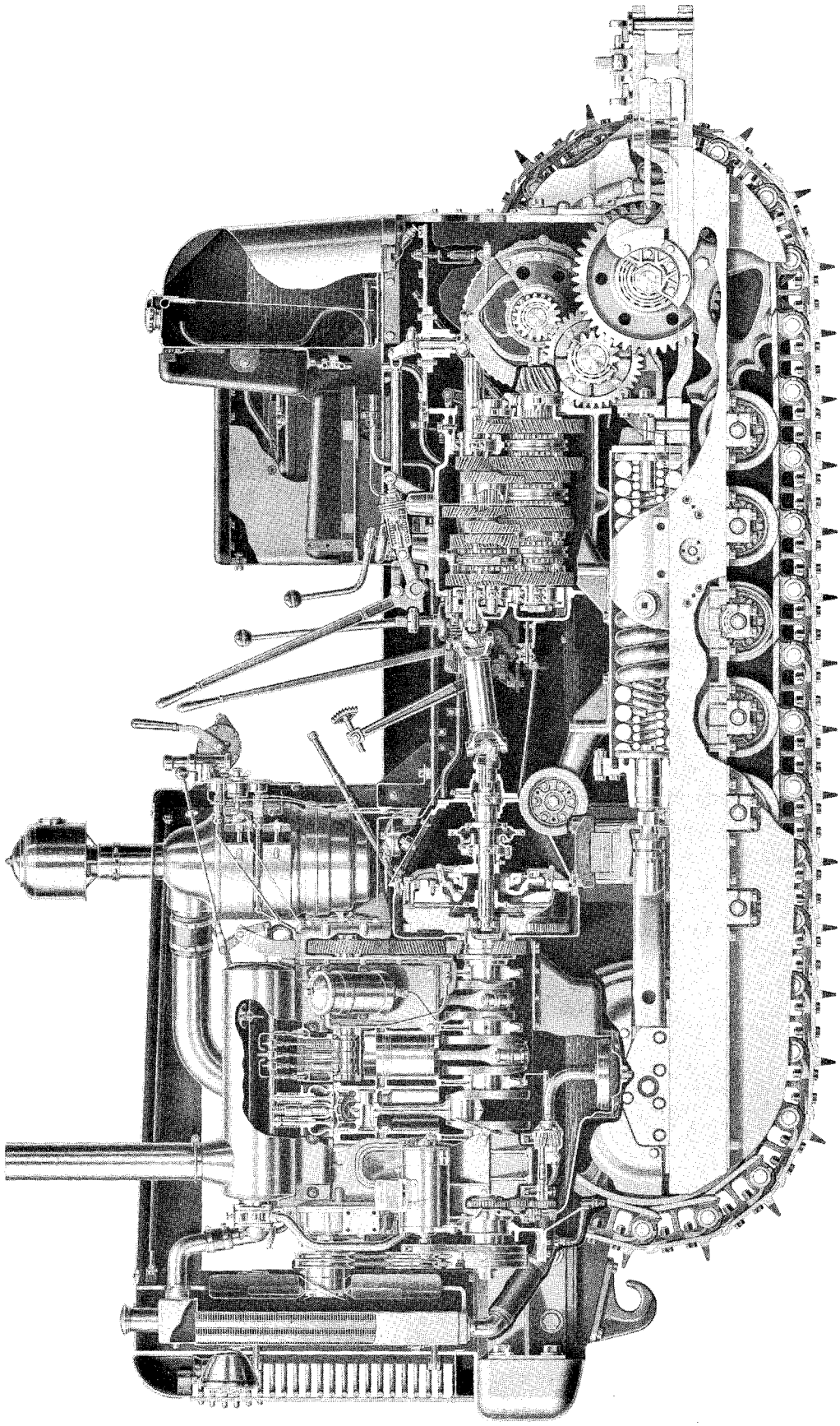
Mechanical "Booster Type" steering clutch controls, mechanical self energizing brakes, wide operator's seat, and unobstructed vision of the front of both tracks assure easy, positive control of the tractor at all times.

The tractor is equipped with electrical starting and lighting equipment, muffler, full width crankcase guard, front pull hook, bumper, and hinged radiator guard. The truck wheels, track idlers, and support rollers have positive type seals and are protected by guards.



Model HD-9B Tractor

FIG. 1



HD-9B Tractor (Sectional View)

FIG. 2

GENERAL SPECIFICATIONS

(STANDARD TRACTOR)

General Dimensions and Weight

Overall Length	12 ft. 6 in.
Overall Height (without stacks)	6 ft. 1⅛ in.
Overall Width (standard shoes)	7 ft. 11-1/16 in.
Ground Clearance	13-5/16 in.
Drawbar Height (center line of jaw)	16-17/32 in.
Lateral Drawbar Movement	26⅜ in.
Shipping Weight	18,800 lbs.

Tracks

Width of Standard Track Shoes	16 in.
Maximum Width Track Shoes Available	22 in.
Tread Width (center-to-center)	74 in.

Engine Speed

High Idle	1725 R.P.M. + or − 15
Governed at Full Load	1600 R.P.M.

Steering

Turning Radius	103⅝ in.
Controls	Mechanical "Booster Type"

Capacities (Approximate)

(U. S. Standard Measure)

Cooling System	7¼ gals.
Crankcase and Filter	4 gals.
Transmission	6¾ gals.
Final Drives (each)	3¼ gals.
Fuel Tank	55 gals.
Track Release Housing (each)	2 gals.
Air Cleaner	1 gal.
Support Roller (each) (grease)	1 lb.
Truck Wheel (each) (grease)	1 lb.
Track Idler (each) (grease)	2 lbs.

Speeds (at Rated Engine Speed)

1st Gear	1.4 M.P.H.
2nd Gear	2.1 M.P.H.
3rd Gear	2.9 M.P.H.
4th Gear	3.8 M.P.H.
5th Gear	4.4 M.P.H.
6th Gear	5.7 M.P.H.
1st Reverse	1.6 M.P.H.
2nd Reverse	3.5 M.P.H.
3rd Reverse	4.4 M.P.H.

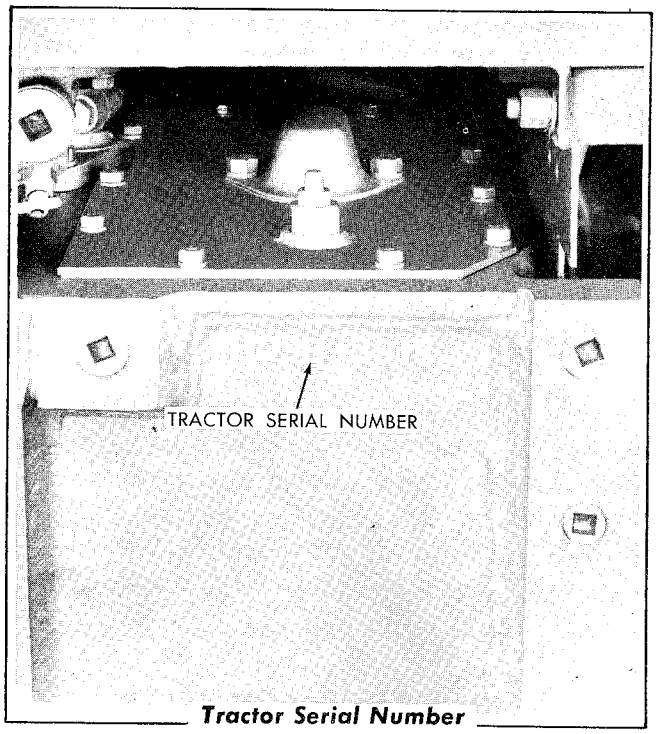
The Allis-Chalmers Manufacturing Company reserves the right to make changes in the above specifications or to add improvements at any time without notice or obligation.

TRACTOR AND ENGINE SERIAL NUMBERS

On all parts orders and in all correspondence relative to the tractor, it is necessary that both the tractor and engine serial numbers be given. This will properly identify the particular machine and will assure obtaining the correct replacement parts for it.

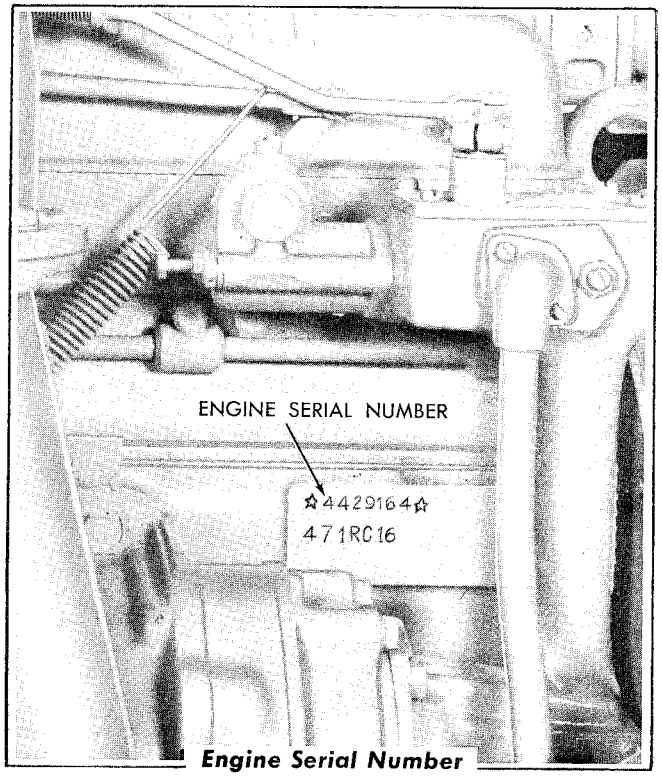
The tractor serial number is stamped in the rear face of the steering clutch housing near the upper right corner and is also stamped on a serial number plate attached to the cowl.

The engine serial number is stamped on the upper right side of the cylinder block below the governor control housing.



Tractor Serial Number

FIG. 3



Engine Serial Number

FIG. 4

SPECIFICATIONS OF LUBRICANTS

A. Engine Crankcase Lubricant

USE NON-CORROSIVE "DIESEL" ENGINE LUBRICATING OIL CONTAINING ADDITIVES WHICH WILL PREVENT SLUDGE OR GUM DEPOSITS. UNDER NO CIRCUMSTANCES SHOULD A CORROSIVE ENGINE LUBRICATING OIL EVER BE USED.

Use oils of the following viscosities:

Atmospheric Temperature	Viscosity
Above 32° F.	Use SAE 30
0° F. to 32° F.	Use SAE 20W
0° F. and below	Use SAE 10W

Manufacturers of lubricants recognize the importance of the qualities required for use in our equipment and they are cooperating fully to assure 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.

The outstanding lubricating requirements for efficient operation of the engine are: The maintaining of piston rings in a clean, free condition; absence of hard carbon and "varnish" deposits on or within engine parts; the prevention of bearing corrosion; and the promotion of general cleanliness within the engine.

Proper operation and maintenance of the engine are necessary to obtain the desired results from the lubricating oil.

B. Transmission and Final Drive Lubricant

Lubricate these assemblies with any good grade of engine lubricating oil purchased from a reputable oil company.

Use oils of the following viscosities:

Atmospheric Temperature	Viscosity
Above 32° F.	Use SAE 50
32° F. and below	Use SAE 30

C. Track Release Housing Lubricant

Lubricate with SAE 50 engine oil in all seasons.

D. Truck Wheel, Track Idler, and Track Support Roller Lubricant

Lubricate these assemblies with a grease that has been tested and found satisfactory for use by the Allis-Chalmers Manufacturing Company.

A revised list of approved greases is issued every six months. Ask your nearest "Allis-Chalmers" authorized Dealer for the latest list.

E. Pressure Gun Lubricant

Use a ball and roller bearing lubricant with a minimum melting point of 300° F. This lubricant should have a viscosity range so as to assure easy handling in the pressure gun at prevailing air temperature. This lubricant must be waterproof.

F. Air Cleaner

Use the same viscosity oil that is used in the engine at prevailing air temperatures. CAUTION: *Do not use an oil that foams.*

SPECIFICATIONS OF FUEL

Use a No. 1 "DIESEL" Fuel purchased from a reputable oil company. In warm weather a No. 2 "DIESEL" Fuel may be used. This fuel must be within the classification limits as established by the American Society for Testing Material, Tentative "DIESEL" Fuel Oil Specifications (ASTM-D975).

For longer engine life and performance, fuel requirements must comply with four basic qualifications:

1. Physical cleanliness
2. Absence of chemical contamination
3. Proper burning characteristics
4. Cold starting ability

Physical cleanliness means freedom from water, dirt, and other incombustible ingredients. Since all present day high speed "DIESEL" engine fuels are completely distilled, they leave the refinery in a clean condition.

The most objectionable chemical contaminants are free sulphur and gum, which, even in relatively small quantities are largely responsible for harmful internal engine deposits. The fuel must also be free from alkali and mineral acids.

Proper burning characteristics are dependent upon ignition quality and volatility.

All fuels meeting the requirements of the No. 1-D and also the lighter types of fuel in the No. 2-D grade of the ASTM-D975 "DIESEL" Fuel Oil specifications are satisfactory. The more volatile grade (ASTM No. 1-D) is recommended for all types of service where frequent speed and load changes occur, while fuels in the heavier grade (ASTM No. 2-D) may be used with sustained high loads.

Prolonged use of fuels combining low ignition quality (less than 45 Cetane Number) with high boiling temperatures (more than 675° F. end point) should be avoided, particularly in cold weather.

CAUTION: *The sulphur content of "DIESEL" fuel should be as low as possible. For warm weather conditions, the fuel should contain not more than 0.5% sulphur. For cold weather operation, fuel with not more than 0.3% sulphur is preferable.*

FUEL STORAGE

The importance of proper storage of fuel cannot be too strongly stressed. Storage tanks, drums, or service tanks must be free from rust, scale, sediment, or any other foreign matter which will contaminate the fuel. Dirty fuel will clog the fuel filters and eventually damage the fuel pump and injectors.

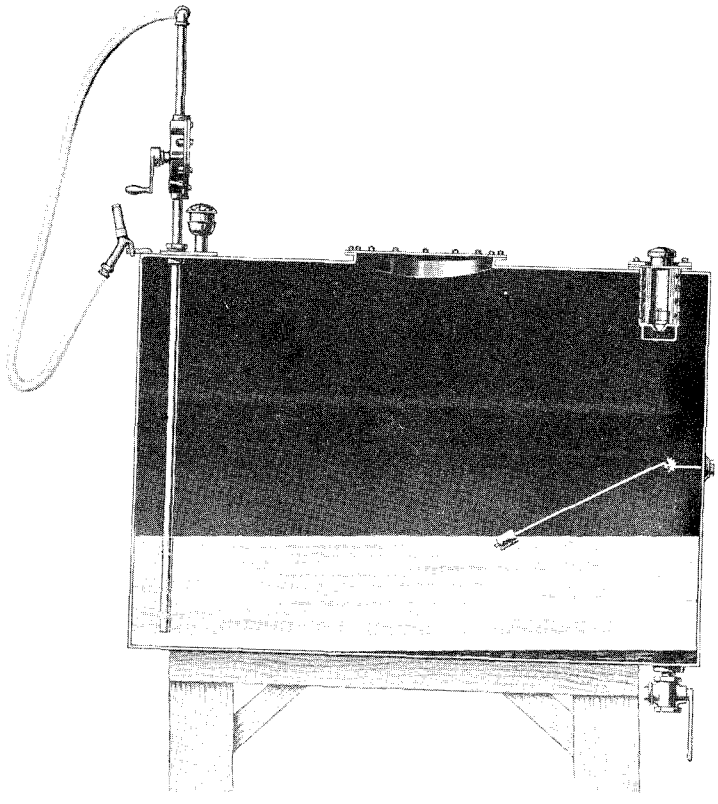
A portable storage tank provides the best method for storing fuel on the job. In such a tank, the sediment and water can be drained easily and the fuel can be pumped into the tractor fuel tank with a minimum of handling. Consult your nearest "Allis-Chalmers" Dealer for details about this type of storage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

Since condensation will occur in the storage tank, it is very important that a sediment sump be provided so that water and settlings can be drained daily.

Fuel should be allowed to settle at least 48 hours in the storage container before it is put into the fuel tank of the tractor. It is advisable to use a pump and draw the fuel from the container rather than to drain it from the bottom of the container.

Where conditions are such that drums must be used to supply fuel, it is advisable to have enough drums to allow sufficient time for the fuel to settle. The fuel should be withdrawn only to within about three inches from the bottom of the drums. 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 fuel storage, they should be covered or placed under shelter to avoid contamination of the fuel by water which will enter through the filler plugs, even though the plugs are tight.

The fuel tank of the tractor should be filled at the end of the day's run rather than in the morning. This will reduce the water content, as a full tank is



Fuel Oil Storage Tank

FIG. 5

less subject to condensation. The tractor fuel tank is provided with a drain elbow and drain cock for draining accumulated water and sediment.

PERIODIC LUBRICATION AND PREVENTIVE MAINTENANCE

Lubrication is an essential part of preventive maintenance, controlling to a great extent the useful life of the tractor. Different lubricants are needed and some units in the tractor require more frequent lubrication than others. Therefore, it is important that the instructions regarding types of lubricants and the frequency of their application, as given in this manual and on the "LUBRICATION CHART," be explicitly followed. Periodic lubrication of the moving parts reduces to a minimum the possibility of mechanical failures.

To prevent minor irregularities from developing into serious conditions that might involve shut-down and major repair, several other services are recommended for the same intervals as the periodic lubrication. The purpose of these services or inspections, which require only a few minutes, is to assure the uninterrupted operation of the tractor by revealing the need for adjustment caused by normal wear. The need for some minor adjustment, if neglected, could result in failure and shut-down. Refer to the "LUBRICATION CHART" for relative location of the various units to be serviced.

LUBRICATION CHART

SPECIFICATIONS OF LUBRICANTS

Engine Crankcase

USE NON-CORROSIVE "DIESEL" ENGINE LUBRICATING OIL CONTAINING ADDITIVES WHICH WILL PREVENT SLUDGE OR GUM DEPOSITS. UNDER NO CIRCUMSTANCES SHOULD A CORROSIVE ENGINE LUBRICATING OIL BE USED.

Use oil of the following viscosity:

Atmospheric Temperature	Viscosity
Above 32° F.	Use SAE 30
0° F. to 32° F.	Use SAE 20W
0° F. and below	Use SAE 10W

Engine Air Cleaner

Use the same viscosity oil as used in the engine crankcase for the prevailing air temperature.

NOTE: SOME "DIESEL" ENGINE LUBRICATING OILS MAY FOAM WHEN USED IN THE AIR CLEANER. DO NOT USE AN OIL THAT FOAMS AS IT REDUCES AIR CLEANER EFFICIENCY AND IN SOME CASES ALLOWS THE OIL TO BE PULLED OVER INTO THE ENGINE, CAUSING SERIOUS DAMAGE.

Transmission and Final Drive

Lubricate these assemblies with a good grade of engine oil purchased from a reputable oil company.

Use oil of the following viscosity:

Atmospheric Temperature	Viscosity
Above 32° F.	Use SAE 50
32° F. and below	Use SAE 30

Track Release Housing

Lubricate with SAE 50 engine oil in all seasons.

Truck Wheels, Track Idlers, and Track Support Rollers

Lubricate these assemblies with a grease that has been tested and found satisfactory for use by the Allis-Chalmers Manufacturing Company.

A revised list of approved greases is issued every six months. Ask your nearest "Allis-Chalmers" authorized Dealer for the latest list.

Pressure Gun Lubricant

Use a ball bearing and roller bearing lubricant with a minimum melting point of 300° F. This lubricant should have a viscosity range to assure easy handling in the pressure gun at the prevailing air temperature. This lubricant must be water proof.

IMPORTANT: **THOROUGHLY CLEAN ALL LUBRICATION FITTINGS, CAPS, FILLER AND LEVEL PLUGS AND THEIR SURROUNDING SURFACES BEFORE SERVICING. PREVENT DIRT FROM ENTERING WITH THE LUBRICANT.**

LEGEND

○ 10 Hour Service
□ 75 Hour Service
● 200 Hour Service
■ 1000 Hour Service
▲ Periodic Service

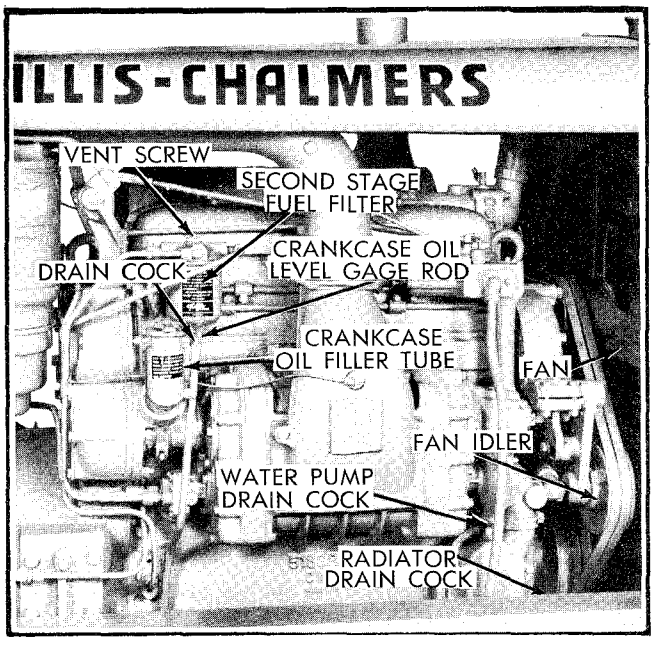


FIG. A

○ **CRANKCASE OIL LEVEL GAGE ROD** — 10 Hour Service. Check oil level and add oil if necessary to raise level to "FULL" mark on gage rod.

□ **CRANKCASE OIL FILLER TUBE AND DRAIN PLUG** — 75 Hour Service. Change oil. Operating conditions may necessitate this service at shorter intervals. Remove the small plate in the bottom of the crankcase guard to reach the drain plug. Remove the drain plug and allow the oil to drain; reinstall and tighten the drain plug. Reinstall the plate in the crankcase guard. Fill the crankcase with new oil to the "FULL" mark on the gage rod. Refer to "Specifications of Lubricants" on this chart. Cap. 4 Gal.

○ ▲ **SECOND STAGE FUEL FILTER** — 10 Hour Service. Loosen the vent screw at top of the filter, then open the drain cock at bottom of the filter, before the engine is started at the beginning of an operating period in warm weather, or shortly after stopping at the end of an operating period in freezing weather, and allow the water and sediment to drain. Tighten the vent screw and drain cock when clean fuel runs out.

● **FAN** — 200 Hour Service. 1 Lube point. Lubricate with pressure gun lubricant.

● **FAN IDLER** — 200 Hour Service. 1 Lube point. Lubricate with pressure gun lubricant.

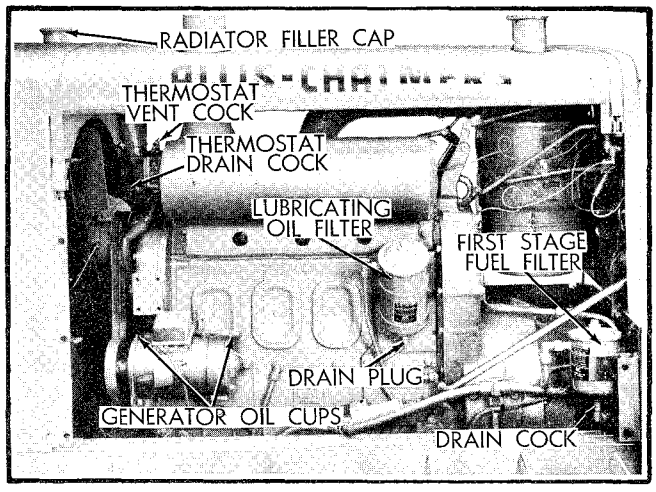


FIG. B

○ ▲ **FIRST STAGE FUEL FILTER** — 10 Hour Service. Open the filter drain cock before the engine is started at the beginning of an operating period and allow the water and sediment to drain. Close the drain cock when clean fuel runs out. In freezing weather, drain at the end of an operating period.

□ **LUBRICATING OIL FILTER** — 75 Hour Service. Drain filter shell, remove old element, clean filter shell, and install new element kit. Refer to "ENGINE LUBRICATION SYSTEM" in OPERATORS MANUAL for detailed instructions.

● **GENERATOR OIL CUPS** — 200 Hour Service. (2 oil cups on early models — 1 oil cup on later models.) Lubricate with 10 drops of light engine oil in each oil cup.

○ **RADIATOR FILLER CAP** — 10 Hour Service. Check level of coolant and add if necessary. Keep the system filled with clean coolant or anti-freeze solution. Refer to "COOLING SYSTEM" in OPERATORS MANUAL for detailed information.

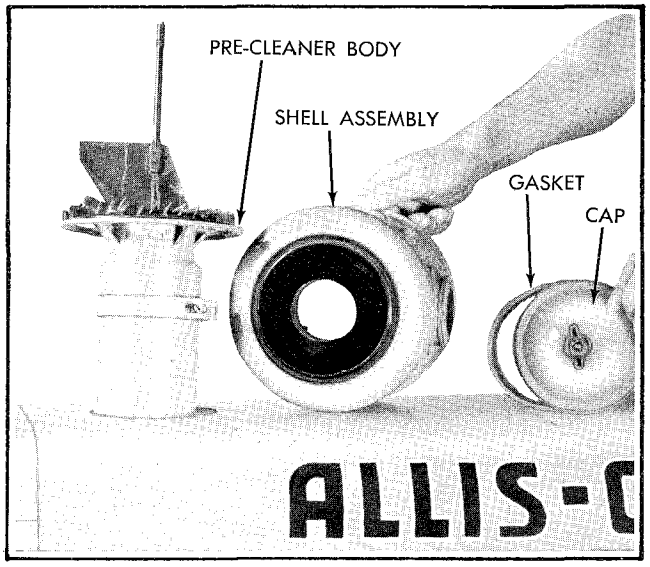


FIG. C

○ **AIR PRE-CLEANER** — 10 Hour Service. Empty the dirt from the pre-cleaner shell when the dirt level reaches half-way up on the inspection glass. Remove the cap, lift the shell from the body, and clean the shell thoroughly. Reinstall the shell, gasket, cap, and tighten the wing nut. Make certain that the gasket is in good condition and properly installed.

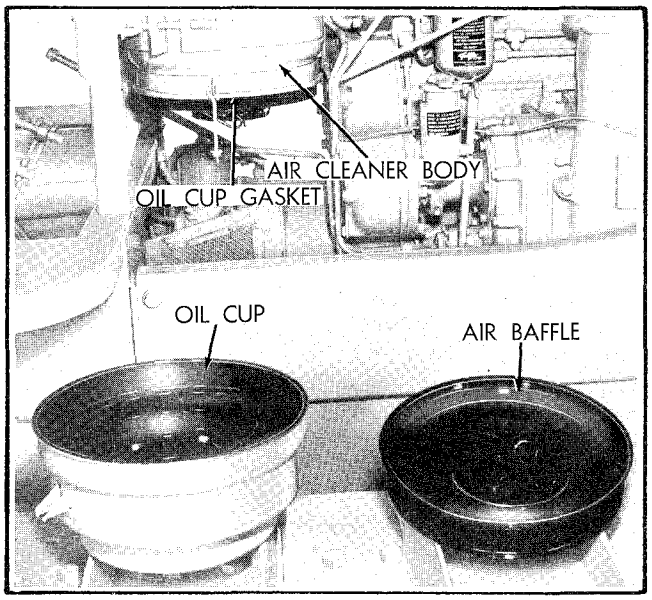


FIG. D

○ **AIR CLEANER** — 10 Hour Service. Remove oil cup from bottom of the air cleaner and inspect condition and quantity of oil. Keep oil level to top of cone in center of baffle. DO NOT OVERFILL. Oil MUST be changed if it is discolored or there is a layer of dirt in the cup or on the baffle. Use the same viscosity oil in the cleaner as is used in the engine crankcase at prevailing air temperatures. DO NOT USE OIL THAT FOAMS. Refer to "AIR CLEANER" in OPERATORS MANUAL for detailed information.

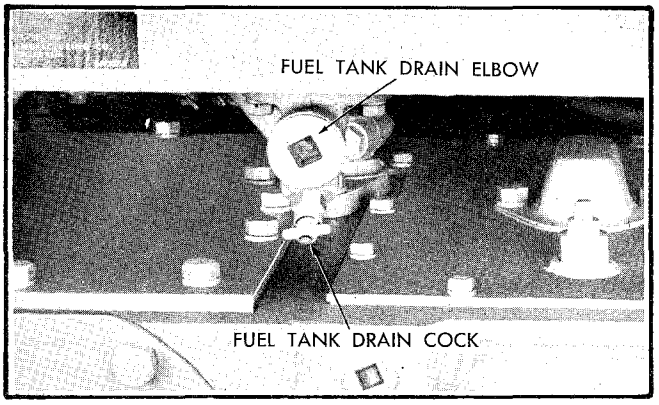


FIG. E

○ **FUEL TANK DRAIN COCK** — 10 Hour Service. Open the drain cock before the engine is started in warm weather or shortly after the end of the day's operation in freezing weather and allow water and sediment to drain. Close drain cock.

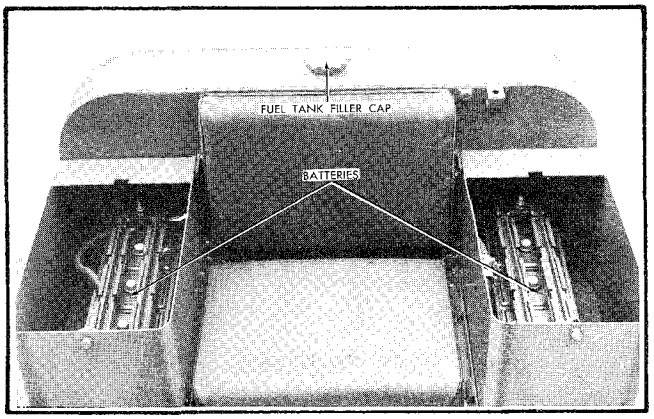


FIG. F

○ **FUEL TANK FILLER CAP** — 10 Hour Service. Fill the tank at the end of each operating period to keep condensation in the tank to a minimum. Refer to "SPECIFICATIONS OF FUEL" in OPERATORS MANUAL.

□ **BATTERIES** — 75 Hour Service. 3 Points each battery. Inspect electrolyte level and test with hydrometer. Add clean distilled water to keep level ⅜ inch above plates. Keep tops of batteries clean and terminals free from corrosion. Refer to "ELECTRICAL SYSTEM" in OPERATORS MANUAL for detailed information.

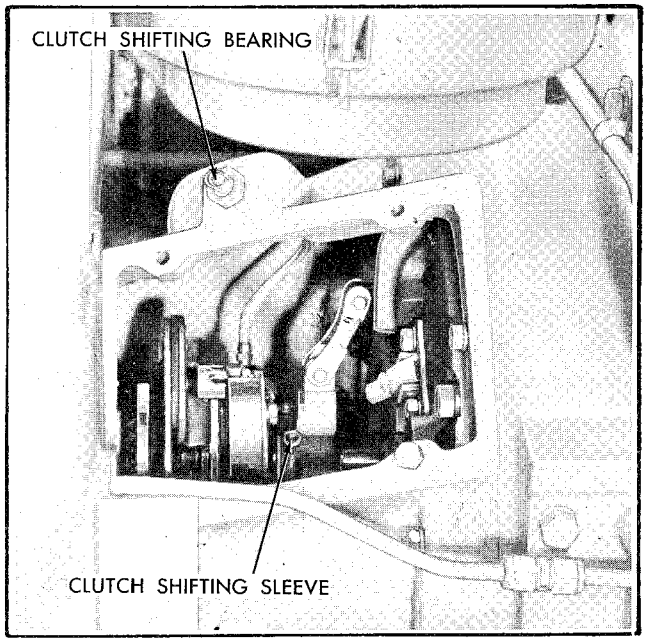


FIG. G

ENGINE CLUTCH:

☐ **CLUTCH SHIFTING BEARING** — 75 Hour Service. 1 Lube point. Lubricate with pressure gun lubricant. CAUTION: DO NOT LUBRICATE EXCESSIVELY.

● **CLUTCH SHIFTING SLEEVE** — 200 Hour Service. 1 Lube point. Remove the clutch inspection plate to reach fitting. Lubricate with pressure gun lubricant. NOTE: For accessibility, the shifting sleeve has 4 lube fittings (equally spaced around sleeve). Lubricate the sleeve through any 1 of these fittings.

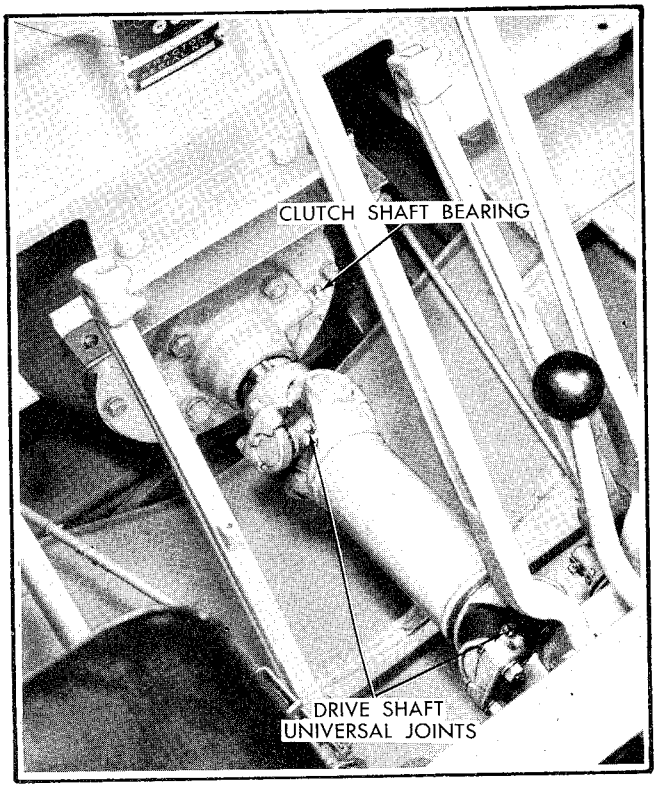


FIG. H

● **CLUTCH SHAFT BEARING** — 200 Hour Service. 1 Lube point. Lubricate with pressure gun lubricant.

■ **DRIVE SHAFT UNIVERSAL JOINTS** — 1000 Hour Service. 2 Lube points. Remove the floor plate to reach the lube fittings. Lubricate with pressure gun lubricant.

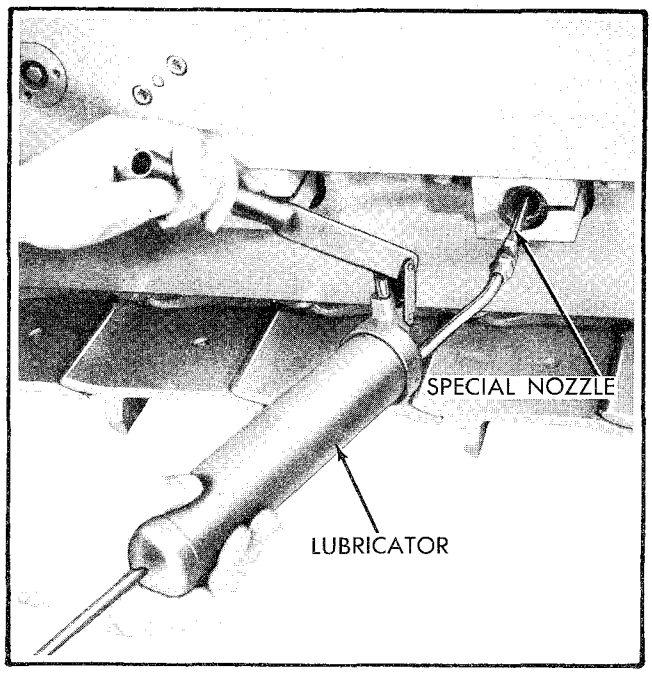


FIG. L

■ **TRUCK WHEELS** — 1000 Hour Service. 6 Truck wheels on each side on HD 9B model. The HD 9F and HD 9G models have 7 truck wheels on each side. Lubricate with the specified truck wheel grease. A lubricator and special nozzle are included in the tool equipment shipped with each tractor. This lubricator and special nozzle MUST be used to inject grease into the truck wheels, track idlers, and track support rollers as the use of "high pressure" lubricating equipment will damage the seal boots which are a part of the positive seal assemblies. Pump the hand lubricator slowly when servicing.

Service each wheel as follows:

1. Wash the outer end of the wheel shaft and the special nozzle of the lubricator so that no dirt will enter with the grease.

2. Remove the plug and copper gasket from end of shaft.

3. Insert the special nozzle of the lubricator into the shaft as far as it will go and hold it in that position.

4. Pump grease into the wheel until clean grease is forced out the end of the shaft around the special nozzle. This will indicate that the wheel is full of clean grease.

5. Remove the special nozzle and install the shaft plug and gasket. Tighten the shaft plug securely.

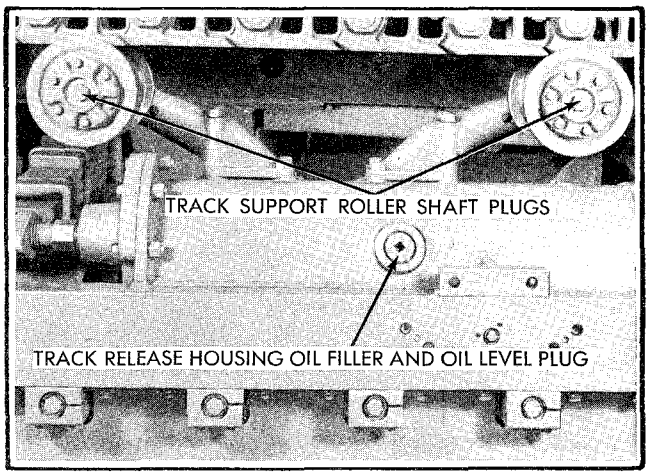


FIG. M

■ **TRACK SUPPORT ROLLERS** — 1000 Hour Service. 2 Rollers each side. Lubricate with the specified truck wheel grease. Use the same lubricator and special nozzle as used for lubricating the truck wheels. Refer to Fig. L. Follow steps 1 through 5 under "Truck Wheels" and lubricate the track support rollers in the same manner.

● **TRACK RELEASE HOUSINGS** — 200 Hour Service. Remove oil level plug from each housing and add oil if necessary. Change oil if it becomes contaminated with dirt or water. Cap. 2 Gal. each.

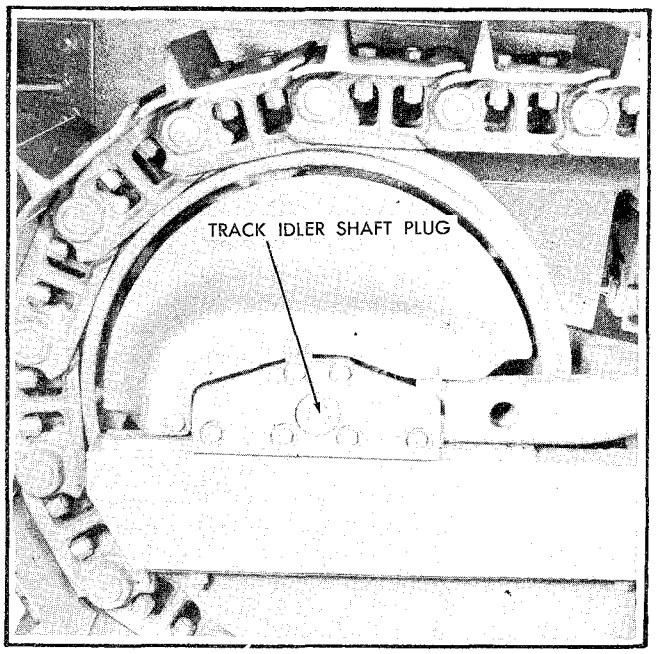


FIG. N

■ **TRACK IDLERS** — 1000 Hour Service. 1 Idler each side. Lubricate with the specified truck wheel grease. Use the same lubricator and special nozzle as used for lubricating the truck wheels. Refer to Fig. L. Follow steps 1 through 5 under "Truck Wheels" and lubricate the track idlers in the same manner.

PERIODIC SERVICES

▲ **ENGINE CLUTCH ADJUSTMENT** — Check the pounds pull required on the clutch operating lever to engage the engine clutch. Keep the clutch adjusted so that a maximum pull of 50 pounds is required on the operating lever for its engagement (engine stopped). As the clutch wears, the pull on the clutch operating lever diminishes. When the pull on the lever diminishes to 30 pounds, the clutch MUST be adjusted. Refer to "ENGINE CLUTCH" in the OPERATORS MANUAL for detailed information.

▲ **ENGINE CLUTCH BRAKE ADJUSTMENT** — After each adjustment of the "ROCKFORD" engine clutch, the setting of the clutch brake should be checked and adjusted if necessary. The clutch brake is properly adjusted when there is a clearance of 1⅜" between the brake facing and the clutch shaft brake disc. Refer to "ENGINE CLUTCH AND CLUTCH BRAKE" in OPERATORS MANUAL for detailed information.

▲ **FAN BELTS** — The fan belts are correctly adjusted when the straight left side of the belts can be pressed inward approximately 1¼" at a point half-way between the fan and the crankshaft pulleys. Adjust belts when slippage is evident. Refer to "COOLING SYSTEM" in OPERATORS MANUAL for detailed information.

▲ **GENERATOR BELT ADJUSTMENT** — The generator belt is properly adjusted when the top side of the belt can be pressed inward approximately 1¼" at a point half-way between the crankshaft and the generator pulleys. Adjust the belt when slippage is evident. Refer to "ELECTRICAL SYSTEM" in OPERATORS MANUAL for detailed information.

▲ **STEERING CLUTCH LINKAGE ADJUSTMENT** — Check the adjustment of each clutch. Keep the clutches adjusted so that each steering lever has 3" free travel when measured at the top of the lever. Readjustment MUST be made when the free travel has decreased to 1". Refer to "STEERING CLUTCHES" in OPERATORS MANUAL for detailed information.

▲ **BRAKE ADJUSTMENT** — Check the adjustment of each brake. Keep the brakes adjusted so that each brake pedal has 2" free travel before brake application begins. Refer to "STEERING BRAKES" in OPERATORS MANUAL for detailed information.

▲ **TRACK ADJUSTMENT** — Check the adjustment of each track. Keep the tracks adjusted so that the upper part of each track can be lifted 1½" to 2" above the support rollers with the use of a pry bar. Refer to "TRACK AND TRACK IDLER ADJUSTMENT" in OPERATORS MANUAL for detailed information.

▲ **FIRST STAGE AND SECOND STAGE FUEL FILTERS** — Install a new element in each filter when fuel pressure drops below normal range (20 to 55 P.S.I.) due to filters clogging. Do not attempt to clean clogged filter elements. Refer to "FUEL SYSTEM" in OPERATORS MANUAL for detailed information.

▲ **ENGINE COOLING SYSTEM** — Drain and flush periodically. Keep the cooling system filled with clean soft water or rain water. In freezing weather use a standard ethylene glycol antifreeze solution.

To drain system, open radiator drain cock located at lower right front corner of engine. Open the water pump drain cock and the thermostat drain and vent cocks (shown in Figs. A & B).

To fill system, close the drain cocks, and, with the thermostat vent cock open, fill the system through the radiator. When coolant flows from the vent cock, close the vent cock, and complete the filling of the system. Refer to "COOLING SYSTEM" in OPERATORS MANUAL for detailed information.

PREPARATION OF TRACTOR FOR USE

Make a complete inspection of the tractor to make sure that no parts have been lost or damaged while in transit or storage.

Fill the fuel tank with the correct grade of fuel (refer to "SPECIFICATIONS OF FUEL"). Use care to prevent entrance of dirt or foreign matter while filling the tank.

Check the oil levels in the engine crankcase, transmission, and final drive compartments. Lubricate all points where fittings are provided for use of a pressure grease gun (refer to "LUBRICATION CHART"). Be sure the truck wheels, track idlers, and track support rollers are completely filled with grease (refer to "TRUCK WHEEL, TRACK IDLER, AND TRACK SUPPORT ROLLER LUBRICANT").

NOTE: *To minimize movement of the tractor on its blocking while in transit, the tracks were purposely adjusted "tight" at the factory. Before unloading the tractor from its carrier, the tracks must be properly adjusted (refer to "TRACK AND TRACK IDLER ADJUSTMENT").*

Remove the oil cup from the air cleaner to be sure that the oil in the cup is at the prescribed level. Make certain the air pre-cleaner is properly installed (refer to "AIR PRE-CLEANER AND AIR CLEANER").

Fill the cooling system with clean water which is free from lime or alkali. IMPORTANT: *Open the vent cock located in the top of the thermostat housing, then fill the system through the radiator until coolant flows from the thermostat vent cock. This allows the air trapped in the cylinder block to escape. Close the vent cock and complete the filling of the system. Screw the radiator cap on tightly by hand.*

Operate the tractor with a light load for the first 60 hours. The most efficient engine operation is obtained with the coolant temperature held within a range of 160° to 185° F. Operating the engine with the coolant temperature below this range will result in incomplete combustion of the fuel and higher fuel consumption with less power, and will also cause harmful gummy deposits within the engine. Maintaining the correct engine coolant temperature depends mostly on the proper functioning of the thermostat. If the engine coolant temperature remains consistently below normal, the thermostat should be removed and inspected. If the thermostat is corroded or stuck, or if the bellows of the unit leaks, install a new unit.

When operating in cold weather, provide a cover for the radiator and for the sides of the engine compartment if the thermostat proves inadequate to maintain the normal operating coolant temperature of 160° to 185° F.

Inspect the entire tractor after the first 10 hours of operation. Tighten all loose bolts and check the adjustment of the engine clutch, steering clutch linkage, brakes, and tracks. Tighten all the track shoe bolts. By tightening these bolts at this time and again at the end of 60 hours, the possibility of their becoming loose and enlarging the bolt holes will be minimized.

Check the engine for proper adjustment of the exhaust valves, timing and equalizing of injectors, and make any other adjustments that may be necessary as explained in corresponding sections of this book.

OPERATING CONTROLS AND INSTRUMENTS

The operator of the tractor must familiarize himself with the various controls and instruments provided for its operation. Although many of these controls are similar to those of other tractors, there are important differences, and it is not wise, regardless of previous experience, to operate the tractor before fully understanding the purpose of each control and instrument.

A. Operating Controls

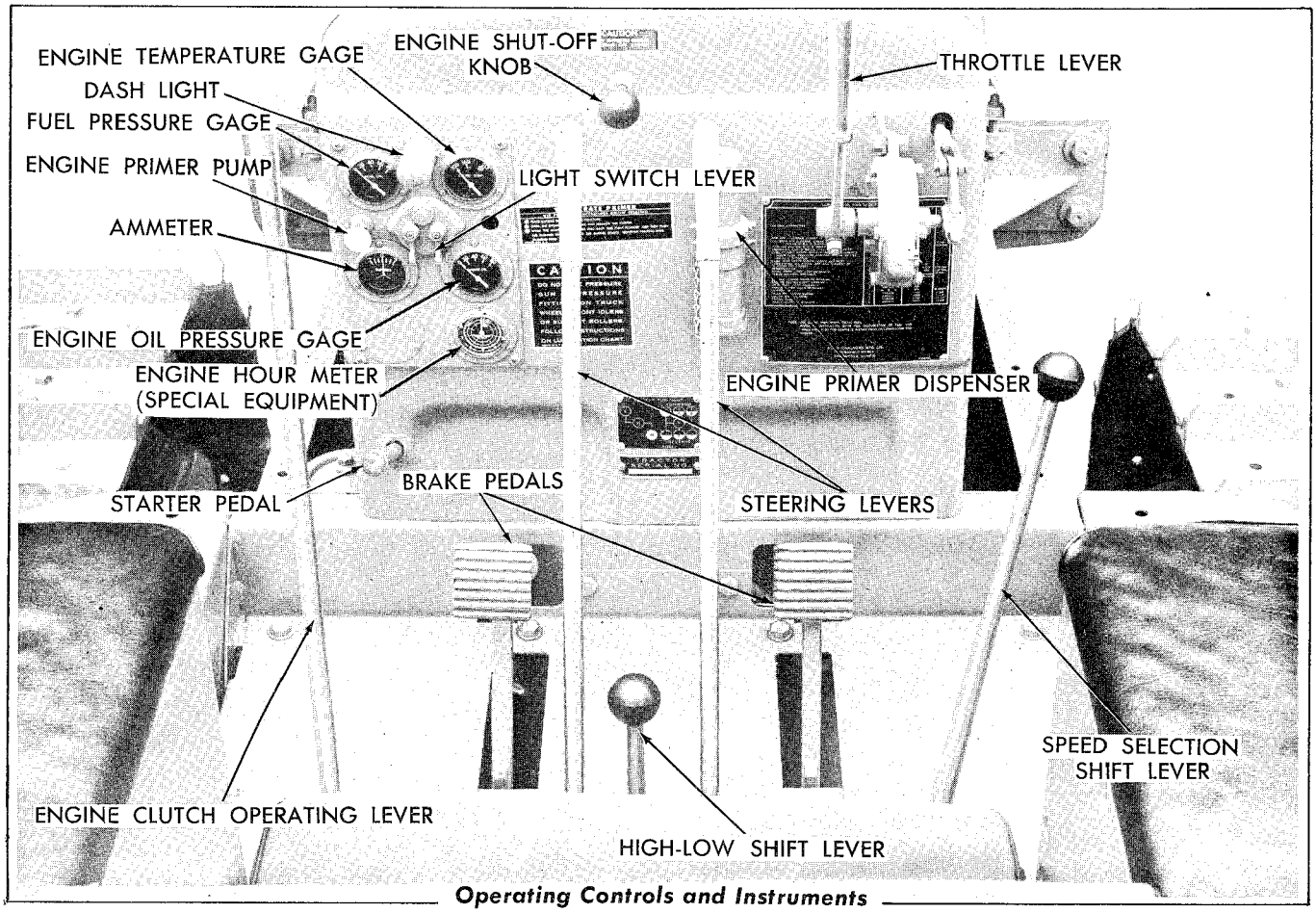
1. Engine Shut-Off Knob. The engine shut-off knob actuates the governor fuel shut-off lever and the air valve in the blower air inlet elbow. Push the shut-off knob all the way in when the engine is to be started; pull it all the way back to stop the engine. *CAUTION: Move the throttle lever to the low idle position before stopping the engine.*

2. 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 the starter given time to cease spinning before it can again be used; otherwise, the starter will run but will not turn the engine. NOTE: *If the engine does not start within a half minute allow the starter to cool for 2 minutes before it is used again (refer to "STARTING ENGINE").*

As a safety precaution, a hole is provided in the starter pedal rod so that a lock may be used to prevent the starter pedal from being depressed when the tractor is parked or stored.

3. Throttle Lever. The throttle lever is connected to the variable speed control lever of the governor. The engine will run at idling speed with the lever all the way forward; pull the lever back to increase the engine speed as desired.

4. Engine Clutch Operating Lever. The engine clutch operating lever controls the engine clutch which transmits the power from the engine to the transmission. Push the lever forward to dis-



Operating Controls and Instruments

FIG. 6

engage the clutch; pull it back to engage the clutch.

The engine clutch operating lever also operates two shifting shaft locking devices in the transmission. When the lever is pulled back to engage the engine clutch it locks the shifting shafts in the position to which they have been moved by the gear shift levers. The clutch must be disengaged before the gear shift levers can be moved to shift the gears into neutral or into another position.

5. Gear Shift Levers. The gear shift levers are used to select the proper transmission gear ratio for the desired power or speed. The position to which the levers must be moved for each of the 6 forward and 3 reverse speeds is indicated on the gear shift instruction plate located on the cowl.

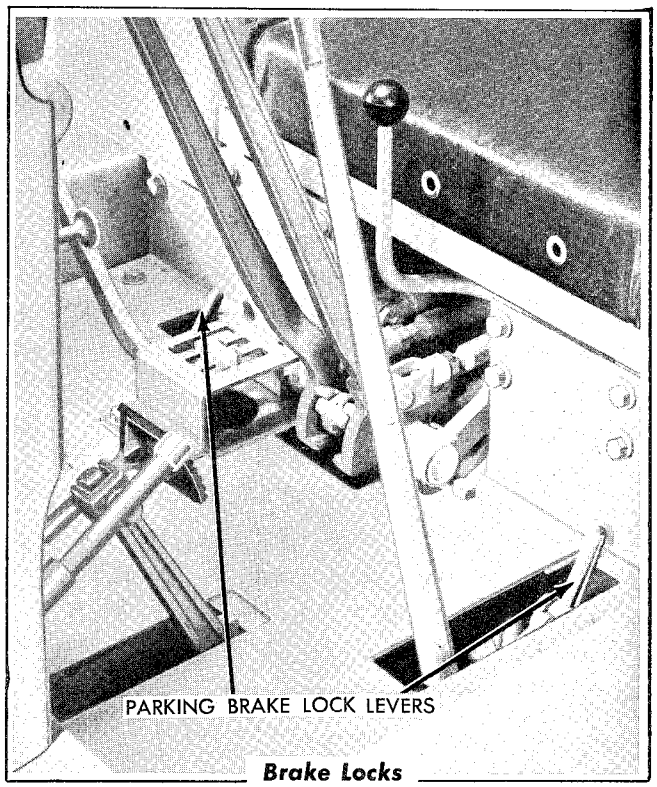
6. Steering Levers. The steering levers control the two steering clutches which connect the transmission with the final drive gears and track drive sprockets. These levers are used to steer the tractor by disengaging the left or right steering clutch. Pull the right hand lever back to make a right turn; pull the left hand lever back to make a left turn (refer to "DRIVING INSTRUCTIONS").

7. Brake Pedals. The brakes are used to retard the speed or to facilitate turning the tractor. To turn the tractor to the right, pull the right steering lever all the way back and press on the right brake pedal. After the desired turn has been made, release the brake pedal and return the steering lever to its forward position. A left turn may be made in the same manner by the use of the left steering lever and the left brake pedal.

CAUTION: *Never attempt to use the brakes to turn the tractor without first pulling the steering clutch lever back as far as possible on the side toward which the turn is to be made.*

8. Parking Brake Lock Levers. The parking brake lock levers provide a means of holding the brake pedals in the applied position. To engage the parking brake lock levers, depress the brake pedals and move the lock levers forward. To disengage the parking brake lock levers, further depress the brake pedals and move the lock levers toward the rear.

9. Cold Weather Engine Primer Dispenser. The dispenser, located on the cowl (to the right of the instrument panel), is used to hold and to puncture a capsule containing starting fluid used as an aid in starting the engine in cold weather.



Brake Locks

FIG. 7

10. Cold Weather Engine Primer Pump. The primer pump, mounted in the left side of the instrument panel, is used to force the starting fluid through a small nozzle and into the air inlet elbow of the engine blower. Refer to "STARTING ENGINE" for full instructions on the use of the Cold Weather Engine Primer Pump and Primer Dispenser.

11. Light Switch Lever. Turn the switch lever to right to turn on the lights.

B. Operating Instruments

1. Engine Temperature Gage. This gage indicates the engine coolant operating temperature, which should be maintained between 160° and 185° F. at all times.

2. Engine Oil Pressure Gage. This gage indicates the pressure at which the engine oil is circulated through the engine. At full throttle, the oil

pressure should be between 25 and 45 pounds at normal engine operating temperature (160°-185° F.). CAUTION: *If no oil pressure is indicated by the gage, the engine must be stopped immediately and the cause determined.*

3. Fuel Pressure Gage. This gage indicates the pressure at which the fuel is circulated through the fuel system. Under normal conditions, with the engine operating at full governed speed, the fuel pressure should be from 20 to 55 pounds. CAUTION: *Do not operate the engine when the fuel pressure is above or below this range. Investigate for clogged fuel filters, clogged or leaking fuel lines or connections, or improper fuel pump and pump pressure relief valve operation. Refer to "FUEL SYSTEM."*

4. Ammeter. The ammeter indicates the charging rate of the generator. When the batteries are in a discharged condition, the ammeter should indicate from 4 to 8 amperes until the batteries approach a fully charged condition. When the batteries are fully charged the ammeter will indicate nearly zero except for a short time after the starter has been used.

5. Engine Hour Meter. The hour meter is installed as special equipment.

All hands move clockwise. The small indicator (upper left) visibly turns when the meter is recording.

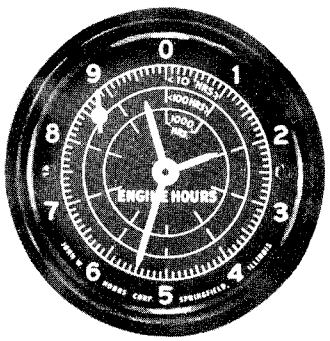
The meter records up to 10,000 hours and repeats. The four figures of the hours of operation are read from the three hands as follows:

Use number passed on 1,000 hour (inner) track here — 1 9 5 5

Use number passed on 100 hour (middle) track here

Use number passed on 10 hour (outer) track here

Use number of marks passed beyond last figure on 10 hour track here



Engine Hour Meter (Reading — 1955 Hours)

FIG. 8

STARTING AND STOPPING ENGINE

A. Starting Engine

1. Before starting the engine, check the fuel level, crankcase oil level, and the level of the water or anti-freeze solution in the cooling system. If repairs have been made since the last operating period, be sure all nuts and bolts affected by the repairs have been tightened and the parts have been properly adjusted.

2. Push the engine clutch operating lever forward and move the speed selection shift lever to its neutral position.

3. Push the engine shut-off knob all the way forward.

4. Pull the throttle lever all the way back (wide open position).

5. Press forward on the starter pedal. If the starter spins but does not crank the engine, pull the starter pedal back to its original position (all the way back), and wait until the starter stops spinning before pressing on the pedal again. CAUTION: *If the engine does not start within 30 seconds, allow the starter to cool for 2 minutes before using it again.*

6. As soon as the engine begins to run, push the throttle lever forward enough to slow engine down to about ¾ of full speed and allow the engine to warm up.

7. Observe the engine oil pressure indicated on the gage. At full governed speed and with the engine coolant at normal operating temperature (160° to 185° F.), the oil pressure should be between 25 and 45 pounds. If the oil is cold, no pressure may be indicated on the gage for about 15 seconds after the engine starts, but if the pressure does not then rise to normal or above, the engine must be stopped immediately and the cause determined.

8. Observe the fuel pressure indicated on the gage. With the engine operating at full governed speed, the fuel pressure should be between 20 and 55 pounds. CAUTION: *Do not operate the engine with fuel pressure above or below this range.*

9. Move the throttle lever to obtain the desired engine speed.

10. In cold weather, when it is necessary to use a starting aid in starting the engine, proceed as stated above in the first four (4) operations, then proceed as follows:

    a. Unscrew the upper chamber of the engine primer dispenser.

    b. Place a capsule of fluid, small or large, depending upon the air temperature and the requirements established by trial, in the lower chamber or body of the dispenser. In extremely low temperatures, one large and one small capsule may be necessary.

    c. Pull the plunger to the top of the upper chamber and screw the chamber tightly onto the body.

    d. Push the plunger to the bottom, thereby puncturing the capsule and releasing the fluid so that it can be picked up by the engine primer pump.

    e. Push the engine shut-off knob all the way forward (operating position) and pull the throttle lever all the way back (wide open position).

    f. Depress the starter pedal to crank the engine, and at the same time operate the primer pump to force the starting fluid into the engine air system. Continue pumping, after the engine starts and runs on regular fuel, until all of the fluid in the dispenser has been injected into the engine.

    g. While the engine is warming up, unscrew the upper chamber of the engine primer dispenser and remove the empty capsule. Reinstall the upper chamber.

CAUTION: *The starting fluid contained in the capsule is essentially ethyl ether, highly inflammable and should be treated with the same caution as high octane gasoline. Gelatine capsules dissolve in water and soften at high temperatures.* Therefore the following precautions must be taken:

1. Avoid breathing large quantities of the fumes from the fluid.
2. Avoid cutting of hand by barbs on the puncturing plunger.
3. Avoid proximity of fluid and capsules to open flames,sparks, or hot surfaces.
4. Avoid contact of capsules with water.
5. Avoid subjection of capsules to high temperatures (above approximately 120° F.).

B. Stopping Engine

Push the throttle lever all the way forward (idle position) and allow the engine to idle for a few minutes so that the engine temperature will level off, then pull the engine shut-off knob all the way back to stop the engine. Cover the exhaust pipe at the end of each day's operation to prevent rain from entering while the tractor is idle. IMPORTANT: *ALWAYS SLOW THE ENGINE TO IDLING SPEED BEFORE PULLING THE ENGINE SHUT-OFF KNOB TO STOP THE ENGINE.*

AVOID UNNECESSARY ENGINE IDLING

Prolonged engine idling causes the engine coolant temperature to fall below the specified operating range of 160° to 185° F. Operating with a coolant temperature below this range is detrimental to the engine, causing incomplete combustion of fuel, which in turn causes crankcase dilution and lacquer or gummy deposits to form on valves, pistons, rings, etc. It also causes rapid accumulation of sludge within the engine.

Since starting the engine is accomplished with no more effort than starting the average automobile engine, there should be no reason for prolonged engine idling. Stop the engine, as you would your automobile engine, when prolonged idling periods would otherwise occur.

DRIVING INSTRUCTIONS

A. Starting Tractor

Start the engine and allow it to warm up then slow the engine to idling speed. If the engine clutch has been engaged, disengage it and push forward on the clutch operating lever to force the clutch brake facing against the brake disc thus stopping the rotation of the transmission gears. Move the gear shift levers into the required position for the desired speed or power. Pull the throttle lever about half-way back and pull back steadily on the engine clutch operating lever until all slack is taken up between the tractor and the load, then pull the lever back quickly to fully engage the clutch. After the engine clutch is engaged move the throttle lever to meet the operating requirements. Engagement of the engine clutch with the engine running at half throttle and starting the load in the above manner will prevent excessive slippage of the clutch, thus prolonging the clutch life. It will also prevent "shock loading" of the tractor.

To shift gears, push the engine clutch operating lever forward and shift gears for the desired speed or power. When the engine clutch operating lever is pushed forward it forces the clutch brake facing against the brake disc, thus stopping the rotation of the transmission input shaft. Stopping the input shaft rotation enables the operator to shift without clashing the gears.

To shift to a higher gear after the tractor is in motion, push the throttle lever forward to the idle position and disengage the engine clutch. At the same time, shift to the higher gear then engage the engine clutch and pull the throttle lever back to obtain the desired speed. Refer to the gear shift instruction plate, located on the cowl of the tractor, for the gear shift lever positions.

The engine clutch operating lever controls the engine clutch which transmits the power from the engine to the transmission. Push the lever forward to disengage the clutch; pull it back to engage the clutch.

The engine clutch operating lever also operates two shifting shaft locking devices in the transmission. When the lever is pulled back to engage the engine clutch it locks the shifting shafts in the position to which they have been moved by the gear shift levers. The clutch must be disengaged before the gear shift levers can be moved to shift the gears into neutral or into another position.

Satisfactory and efficient operation depends largely on the operator's judgment in selecting the proper gear ratio and speed for the various loads or operation. Always operate the tractor in the gear that will permit the engine to operate at full speed. This will not only assure the most power from the engine but will also allow the engine to operate at its highest efficiency. CAUTION: *DO NOT SLIP THE ENGINE CLUTCH IN AN EFFORT TO PULL AN OVERLOAD; SHIFT TO A LOWER GEAR.*

The engine clutch should engage with a definite overcenter "snap" and should require an appreciable pull on the operating lever for its engagement. If this "snap" is not evident, or if the clutch slips when under a load, adjustment must be made immediately (refer to "ENGINE CLUTCH ADJUSTMENT").

B. Steering Tractor

The tractor is steered by disengaging the steering clutch on the side of the tractor towards which the turn is to be made. This is done by using the steering levers located directly in front of the operator. To make a right turn, pull back the right hand steering lever; to make a left turn, pull back the left hand steering lever. With the left steering clutch disengaged, the power is not delivered to the left track and the track will slow down or stop. Since the power is still being delivered to the right track, the right track will keep turning and cause the tractor to turn to the left. When the right steering clutch is disengaged the tractor will turn to the right in a similar manner.

If a short turn is to be made, pull the steering lever back on the side towards which the turn is to be made and press down on the corresponding brake pedal; this will stop the track completely.

Always pull the steering lever all the way back when turning. When the tractor has turned as desired, return the lever immediately to its forward position. Disengage and engage the steering

clutches smoothly and completely to avoid excessive wear on the clutch friction discs.

When steering the tractor down steep grades with the load pushing the tractor, the use of the steering levers is opposite to that when pulling a load. In this case, the left hand steering lever is used to make a right turn and the right hand lever to make a left turn. Disengaging either steering clutch will allow the track on that side to travel faster, since the braking power of the engine is released from it, while the steering clutch remaining engaged will act as a brake for the opposite track.

During operation, observe the amount of free travel of the steering levers (the distance the levers move before pressure is felt and disengagement of clutch begins). This free travel, which assures complete engagement of the steering clutches, should be from 1 to 3 inches, measured at the tops of the levers. When the free travel of either lever becomes less than 1 inch, the steering clutch linkage requires adjustment (refer to "STEERING CLUTCH ADJUSTMENT").

C. Stopping Tractor

To stop the tractor, push the throttle lever forward and disengage the engine clutch by pushing the clutch operating lever forward, then press down on the brake pedals to apply the brakes. If the tractor is parked on a grade where there is a possibility of its rolling, lock the brake pedals in their applied position by the use of the parking brake lock levers.

IMPORTANT: *ALWAYS SHUT OFF THE ENGINE WHEN STOPPING THE TRACTOR EVEN IF THE TRACTOR IS TO REMAIN IDLE ONLY A FEW MINUTES.*

This will not only save fuel and unnecessary wear on the engine but will also avoid operating the engine below normal temperature. If it is necessary to keep the engine running, it should be run at a speed fast enough to maintain normal engine oil and fuel pressure and with the engine clutch engaged.

While operating the tractor, observe the action of the brakes. The brakes are correctly adjusted when the brake pedals each have approximately 1¾ to 2 inches of free travel (refer to "STEERING BRAKES").

The brakes require adjustment before they become loose enough to allow the brake pedals to strike the floor plate when the brakes are fully applied. If the brakes are properly adjusted, and still do not hold, it may be due to grease on the brake linings and the brakes will require washing. Refer to "WASHING STEERING CLUTCHES" for instructions on washing the brakes and steering clutches.

OPERATING IN MUD OR WATER

The engine clutch and steering clutch compartments are dry compartments. These compartments are provided with drain holes to allow drainage of any oil that might leak into them. These drain holes should be left open (plugs removed) during normal operation. When operating in mud or water, or extremely dusty or sandy conditions, the plugs (furnished with the tractor) should be installed to prevent the entrance of dirt or water. The steering clutch drain holes are located in the bottom of the steering clutch compartments. The engine clutch compartment drain hole is located at the bottom of the front side of the flywheel housing.

When operating with the drain plugs installed, remove the drain plugs daily to drain any water, oil, or grease that might have accumulated in the compartments, thus preventing it from getting on the brake linings or clutch facings. If the tractor remains idle at night, it is good practice to remove the drain plugs at the end of the day and install them again before starting the tractor the next day.

Inspect the oil in the final drive housings frequently when operating in mud or water. Drain, flush, and refill the housings if the oil shows presence of any mud or water.

COLD WEATHER OPERATION

When atmospheric temperature drops to the freezing point or below, the engine crankcase and other oil compartments must be drained and refilled with oil of lighter viscosity (refer to "SPECIFICATIONS of LUBRICANTS"). The air cleaner will also require the use of lighter oil (refer to "AIR CLEANER SERVICE"). The cooling system must be checked for leaks and filled with an anti-freeze solution to protect it from freezing (refer to "COOLING SYSTEM"). All leaking hoses and gaskets must be replaced.

Test and prepare the "COLD WEATHER ENGINE PRIMER" for use as soon as lowering atmospheric temperatures indicate that aid in engine starting will be required. Provide a cover for the radiator and for the sides of the engine compartment if the thermostat proves inadequate to maintain the engine coolant operating temperature within the range of 160° to 185° F. If the engine is operated with the coolant below this temperature range, sludge will build up in the engine, engine efficiency will drop, and conditions may develop which will cause damage to engine parts.

Dependable starting of a "DIESEL" engine by any means can be obtained only with adequate cranking speed. For this reason, it is necessary that the batteries, starter, electrical cables, generator, and generator regulator be inspected and put in first-class condition at the onset of cold weather (refer to "ELECTRICAL SYSTEM").

If the tractor is to be operated in arctic temperature, consult your nearest authorized dealer or write the factory for information regarding availability of special cold weather equipment.

CAUTION: *If mud or snow collects on the tracks during the operating period and is allowed to freeze solid while the tractor is idle, or if the tracks freeze solidly to the ground, apply heat to loosen the frozen material or tracks. Serious damage will be caused by an attempt to break the tracks loose under engine power or by moving the tractor with large frozen lumps of material in the tracks.*

COOLING SYSTEM

A. Description of System

The cooling system includes the water pump, radiator, engine oil cooler, thermostat, cooling fan, and water passages in the cylinder block and head. The water pump draws the coolant from the bottom of the radiator and circulates it through the engine oil cooler housing and the water passages in the engine. The coolant is discharged from the cylinder head into the water manifold and passes through the thermostat housing and upper radiator hose to the upper part of the radiator. The coolant is cooled as it passes from the top to the bottom of the radiator by air drawn through the radiator core by the cooling fan.

The thermostat, located in the housing on the front of the water manifold of the engine, operates automatically to maintain a normal engine coolant operating temperature of 160° to 185° F.

B. General Maintenance

In warm weather, keep the cooling system filled with clean soft water or rain water whenever possible. If soft water is not available and hard water must be used, the hard water should first be treated with a water softener. A commercially reliable rust inhibitor should be added to the cooling system for warm weather operation. A rust inhibitor (soluble oil), available in half pint or quart containers, can be obtained from "Allis-Chalmers" Dealers and should be added to the cooling system in proportions of one pint of soluble oil to every fifteen (15) quarts of water. CAUTION: *NEVER ADD AN ANTI-FREEZE SOLUTION TO A COOLING SYSTEM THAT CONTAINS A RUST INHIBITOR.* Drain, flush, and refill the cooling system with clean water before adding an anti-freeze solution for cold weather operation.

In winter weather, use an ethylene glycol anti-freeze solution in the system to protect against damage from freezing. This type of anti-freeze has a much higher boiling point than water. After any addition of water or anti-freeze compound, test the solution after the added quantity has become thoroughly mixed to make sure it will withstand prevailing or anticipated temperature. A mixture of 60% ethylene glycol and 40% water will provide maximum protection; the use of more than 60% ethylene glycol in the solution will raise the freezing point and provide less protection against freezing.

Keep the radiator air passages free from leaves, trash, and other material which will restrict the flow of air through the radiator. All leaks in the cooling system must be corrected as soon as they are evident and the fan belts must be kept properly adjusted. The most efficient engine operation is obtained with the coolant temperature held within a range of 160° to 185° F. Operating the engine with coolant temperature below this range will result in incomplete combustion of fuel, higher fuel consumption with less power, and will cause harmful deposits within the engine.

Maintaining the normal engine coolant temperature (160° to 185° F.), depends mostly on proper functioning of the thermostat. If the engine coolant temperature remains consistently below normal, the thermostat should be removed and inspected. If the thermostat is corroded or stuck, or if the bellows of the unit leaks, install a new unit.

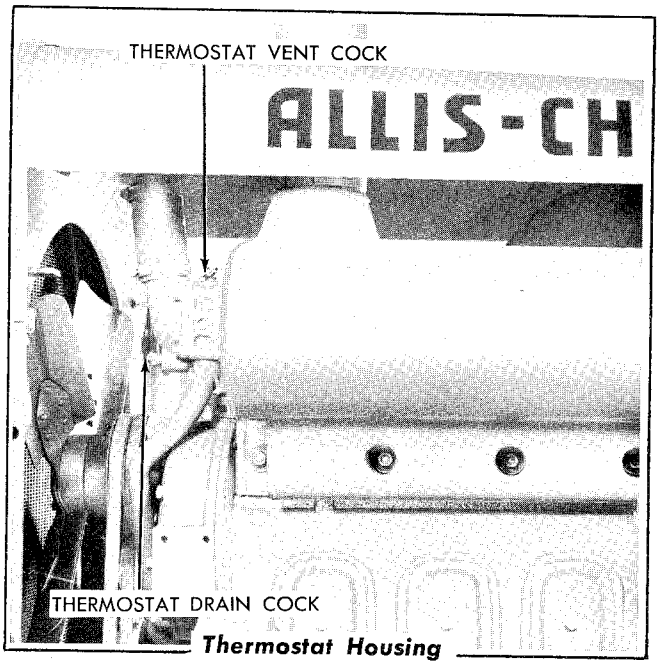
C. Filling Cooling System

Close the three (3) cooling system drain cocks, one located in the bottom of the water pump, one in the bottom of the engine oil cooler housing, and one in the bottom of the thermostat housing. Remove the radiator cap from the top of the radiator and fill the cooling system through the radiator cap opening. IMPORTANT: *Open the vent cock located in the top of the thermostat housing then fill the system through the radiator until coolant flows from the vent cock. This allows air trapped in the engine block and cylinder head to escape. Close the vent cock and complete the filling of the system.*

D. Draining Cooling System

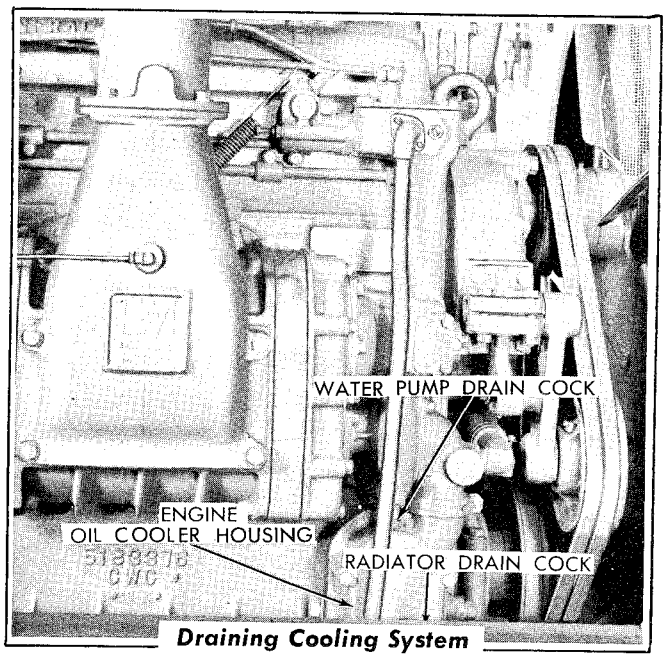
Open the drain cocks in the bottom of the water pump and in the bottom of the engine oil cooler housing. Open the drain cock in the bottom of the thermostat housing, then open the vent cock in the top of the thermostat housing.

CAUTION: *When draining the cooling system in freezing weather, make certain that the coolant flows freely from all the drain cocks and that the system drains completely.*



Thermostat Housing

FIG. 9



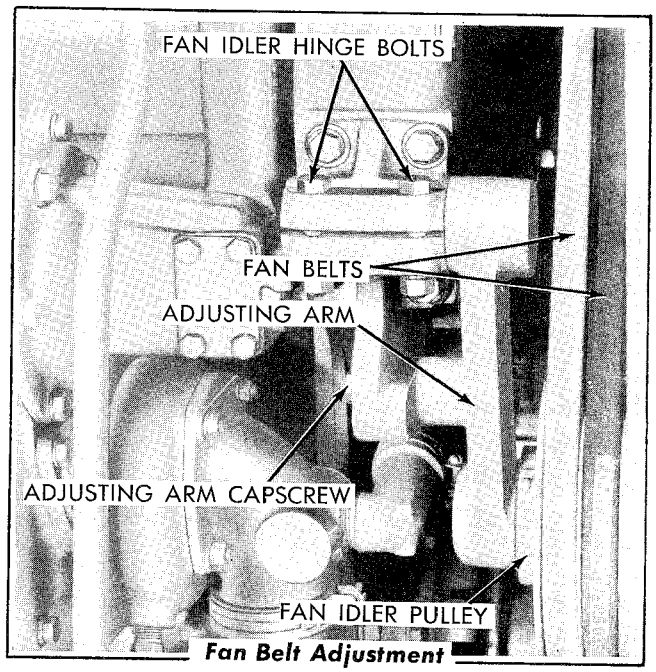
Draining Cooling System

FIG. 10

E. Fan Belt Adjustment

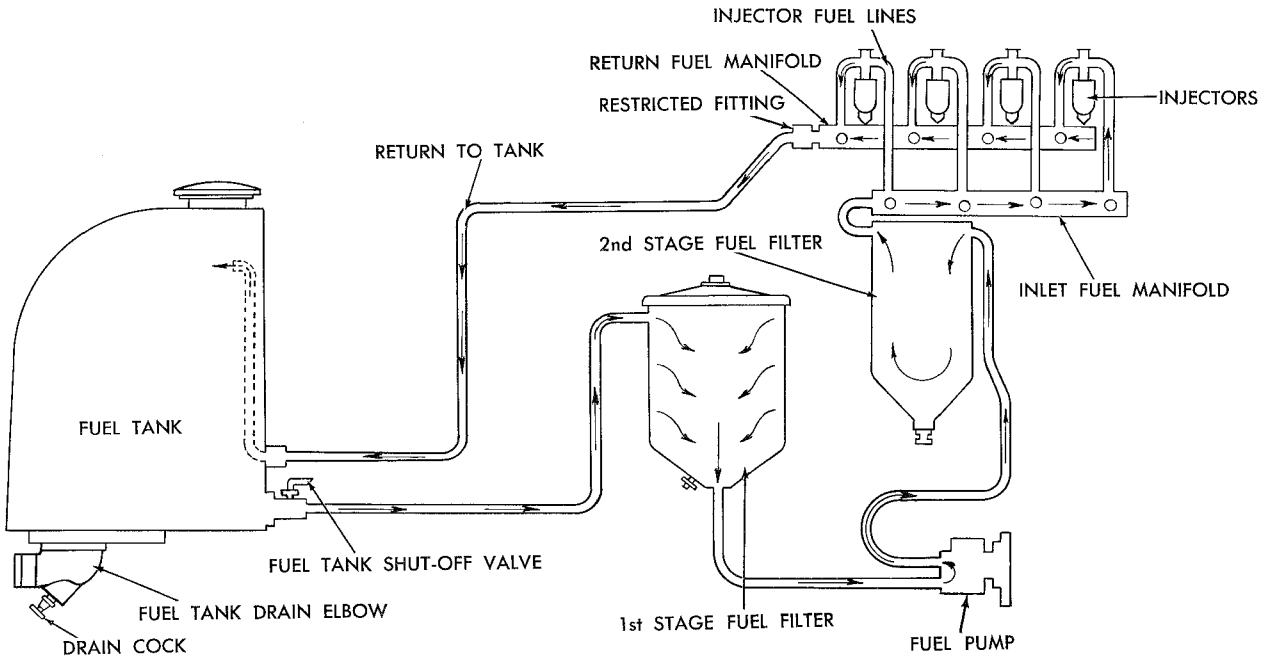
The fan belts are correctly adjusted when the straight (left) side of the belts can be pressed inward approximately 1¼ inches at a point halfway between the crankshaft and fan pulleys.

To adjust the fan belts, loosen the capscrew in the adjusting arm at the idler pulley, and loosen the two (2) fan idler hinge bolts. Move the fan idler in or out until the correct tension on the belts is obtained, then tighten the capscrew in the adjusting arm and the fan idler hinge bolts.



Fan Belt Adjustment

FIG. 11



Schematic Fuel Flow Diagram

FIG. 12

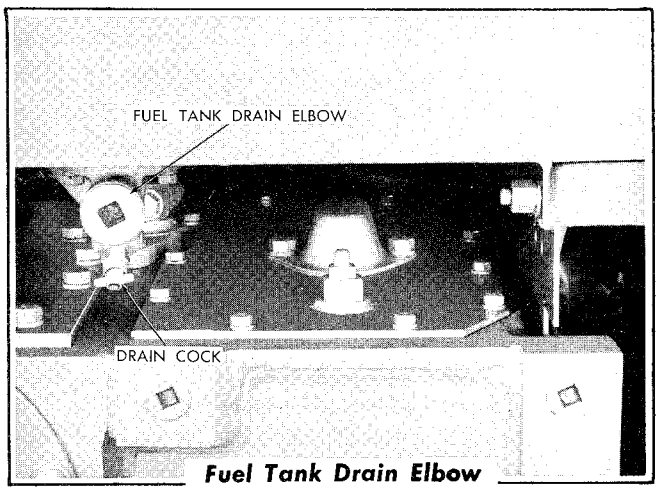
A. Description of System

The engine fuel system consists of the fuel tank, first stage and second stage fuel filters, fuel pump, injectors, and fuel lines. The fuel is drawn from the bottom of the fuel tank and through the first stage fuel filter by the fuel pump. The pump then circulates the fuel under pressure through the second stage fuel filter, into the inlet fuel manifold, and through the injectors. As the fuel enters each injector it passes through a small porous metal filter in the injector body. The amount of fuel required by the engine is injected into the cylinders by the injectors; surplus fuel, not required for combustion, leaves each injector through another porous metal filter, enters the return fuel manifold, and is returned to the fuel tank.

A pressure of 20 to 55 pounds is maintained within the fuel system by a restricted fitting located in the rear of the return fuel manifold. The continuous circulation of fuel helps to cool the injectors and eliminates the possibility of air pockets in the fuel system.

B. Fuel Tank and Drain Elbow

The drain elbow at the bottom of the fuel tank provides a means for draining the tank when flushing and also acts as a sediment sump. Open the drain cock in this elbow before the engine is started at the beginning of the day's operation in warm weather or shortly after the end of the day's operation in freezing weather. Close the drain cock when clean fuel runs out. Drain and flush the fuel tank if a large accumulation of rust and scale is evident. To drain the fuel tank, remove the plug in the end of the drain elbow.



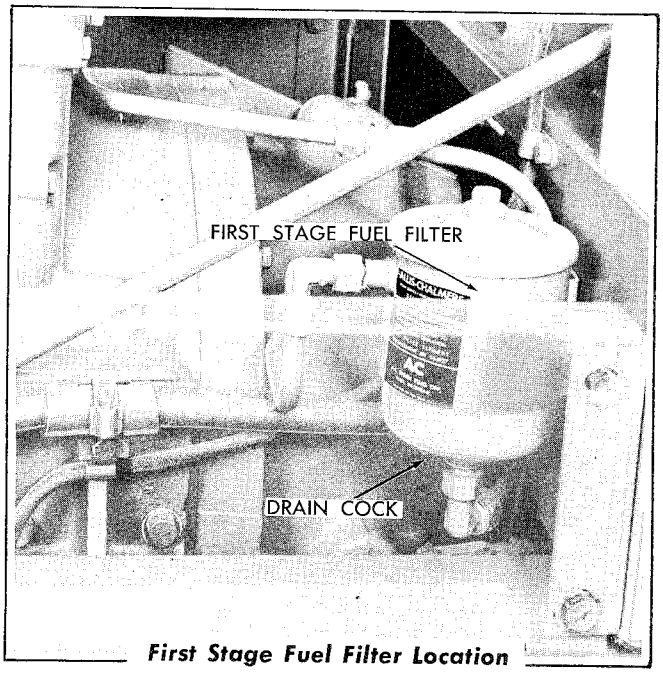
Fuel Tank Drain Elbow

FIG. 13

C. First Stage Fuel Filter

This filter, mounted at the left rear side of the en-

gine, contains a replaceable element. Dirt and sediment in the fuel is collected by this filter and is prevented from passing to the fuel pump. A drain cock in the bottom of the fiter shell allows drainage of the sediment collected.



First Stage Fuel Filter Location
FIG. 14

D. Service

Open the filter drain cock daily, before the engine is started at the beginning of the day's operation in warm weather or shortly after the end of the day's operation in freezing weather, and allow the water and sediment to drain. Close the drain cock when clean fuel runs out. Remove and discard the oil filter element and install a new element after every 300 to 500 hours of operation (more often if conditions warrant) or when the filter becomes clogged and a pressure of less than 20 pounds is indicated by the engine fuel pressure gage. A clogged filter is usually indicated by irregular engine performance.

E. To Change Filter Element

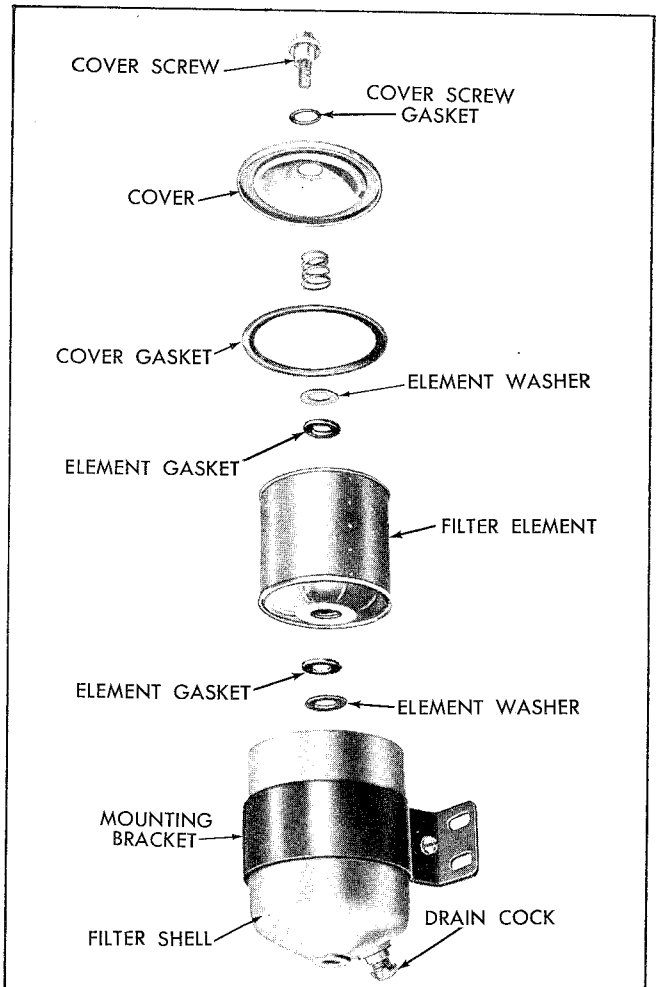
1. Close the fuel tank shut-off valve.

2. Thoroughly clean the filter cover and the surrounding area. Loosen the drain cock, located in the bottom of the filter shell, and allow the filter to drain.

3. Loosen the cover screw and remove the cover screw, cover screw gasket, cover, cover gasket, and spring as a unit. Remove the cover gasket from the cover and discard the gasket.

4. Remove and discard the element washer, element gasket, and the filter element.

5. Reaching inside the filter shell, remove the element gasket and element washer from the shell centerbolt and discard.



First Stage Fuel Filter Details
FIG. 15

6. Thoroughly wash and dry the interior of the filter shell. Close and tighten the drain cock located in the bottom of the filter shell.

7. Install a new element washer in position on the shell centerbolt, then install a new filter gasket and press the gasket down firmly onto the element washer.

8. Install a new element in position in the filter shell. Place a new element gasket and an element washer in position on the shell cen-

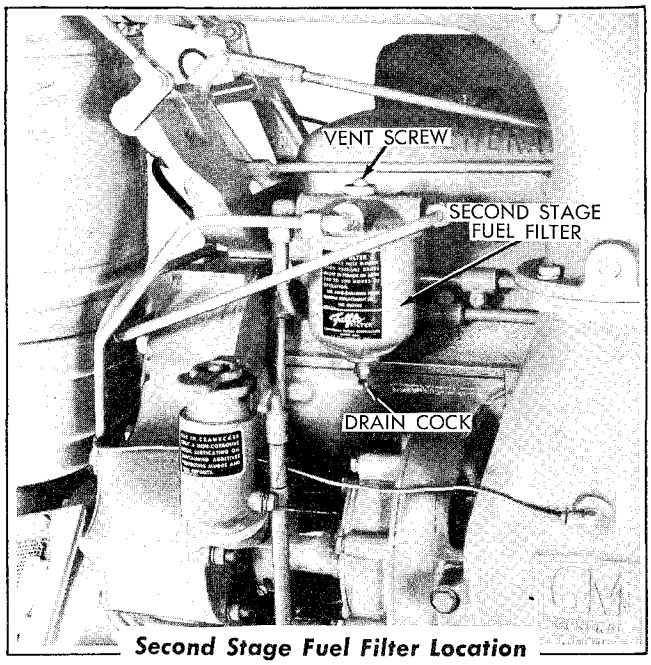
terbolt and press the gasket down firmly onto the top of the filter element.

9. Install a new cover gasket in position in the cover.

10. Open the fuel tank shut-off valve and allow the filter to fill with fuel, then install the cover in position on the filter shell and tighten the cover screw securely. Start the engine and check for leaks around the cover and filter shell.

F. Second Stage Fuel Filter

This filter, mounted on the right side of the engine, contains a replaceable element. Any small particles of dirt, which may have passed through the first stage fuel filter, are filtered from the fuel by this filter and prevented from entering the fuel injectors. A drain cock in the bottom of the filter shell allows drainage of the sediment collected.

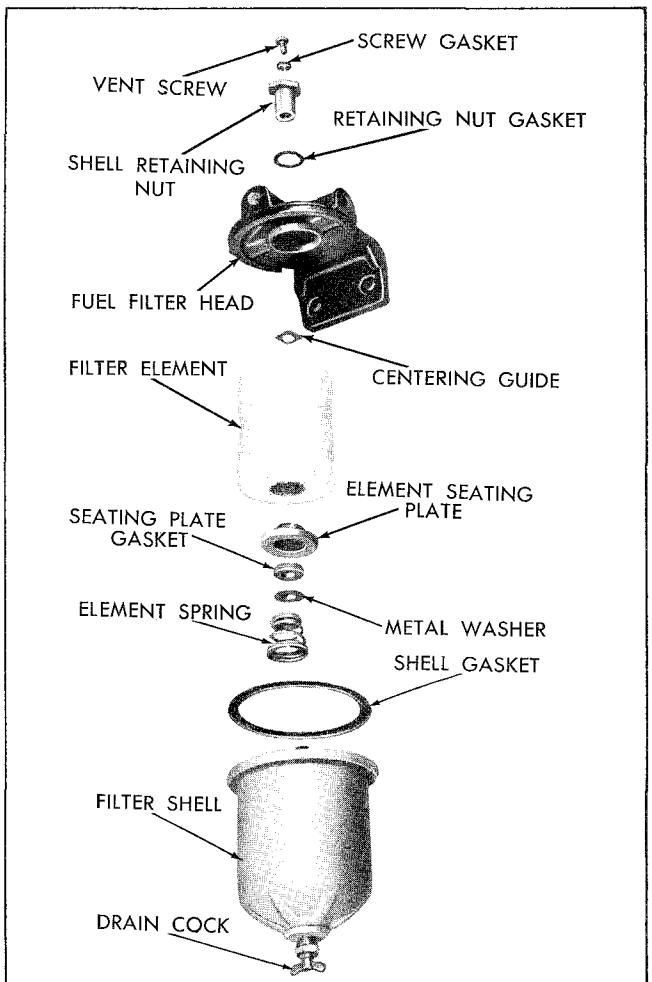


Second Stage Fuel Filter Location

FIG. 16

G. Service

Open the filter drain cock daily, before the engine is started at the beginning of the day's operation in warm weather or shortly after the end of the day's operation in freezing weather, and allow the water and sediment to drain. Close the drain cock when clean fuel runs out. Remove and discard the old filter element and install a new element after every 300 to 500 hours of operation (more often if conditions warrant) or when the filter becomes clogged. A clogged filter is usually indicated by irregular engine performance.



Second Stage Fuel Filter Details

FIG. 17

H. To Change Filter Element

1. Thoroughly clean the fuel filter head and the surrounding area. Loosen the drain cock, located in the bottom of the filter shell, and allow the filter to drain.

2. Remove the filter shell (with its components) from the fuel filter head by loosening the shell retaining nut.

3. Remove and discard the filter element. Remove the centering guide, element seating plate, seating plate gasket, metal washer, and element spring from the shell centerbolt. Discard the seating plate gasket, metal washer, and shell gasket.

4. Thoroughly wash and dry the interior of

the filter shell. Close and tighten the drain cock located in the bottom of the filter shell.

5. Place the element spring (large end downward) in position on the shell centerbolt and install a new metal washer over the shell centerbolt and down against the element spring.

6. Install a new seating plate gasket in position in the element seating plate, then install the gasket and element seating plate in position on the shell centerbolt.

7. Install the centering guide in position on the shell centerbolt and install a new filter element in position in the filter shell. Install a new shell gasket in position in the filter shell.

8. Hold the filter shell in position under the fuel filter head and tighten the shell retaining nut. Remove the vent screw and screw gasket from the shell retaining nut.

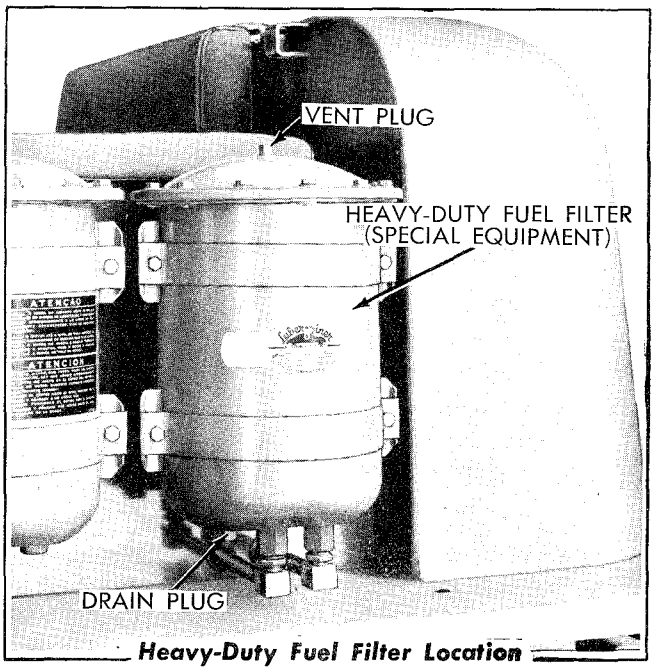
9. With the engine shut-off knob pulled back (stop position), crank the engine momentarily with the starter until fuel emerges from the vent screw opening in the shell retaining nut. Install the vent screw and screw gasket and tighten the vent screw securely.

10. Start the engine and observe for fuel leaks; correct any leaks found.

I. Heavy Duty Fuel Filter (Special Equipment)

On tractors equipped with a Heavy-Duty Fuel Filter, service as follows:

Remove the drain plug located in the bottom of the fuel filter housing, before the engine is started at the beginning of the day's operation in warm weather or shortly after the end of the day's operation in freezing weather and allow the water or sediment to drain. Install the drain plug when clean fuel runs out. Remove and discard the old filter element and install a new one after every 300 to 500 hours of operation or when the fuel pressure drops below 20 pounds per square inch.



Heavy-Duty Fuel Filter Location

FIG. 18

J. To Change the Heavy-Duty Fuel Filter Element

1. Close the fuel tank shut-off valve.

2. Remove drain plug from bottom of fuel filter housing and allow fuel to drain from filter. Remove the cover capscrews and lift the cover from the housing.

3. Unscrew the T-handle hold-down assembly from the center-tube and remove the T-handle hold-down assembly and the element centering plate. Remove the filter element from the housing by lifting with the pull-out bail. Discard the filter element and the cover gasket.

4. Clean the interior of the fuel filter housing thoroughly and install the drain plug.

5. To assure leak-proofing sealing, examine the center-tube seal at each end of the new filter element to see that the seals are in good condition and clean. Insert the new filter element into position in the filter housing and press the filter element down firmly.

6. Place the element centering plate in position on the top of the filter element and install the T-handle hold-down assembly and tighten securely.

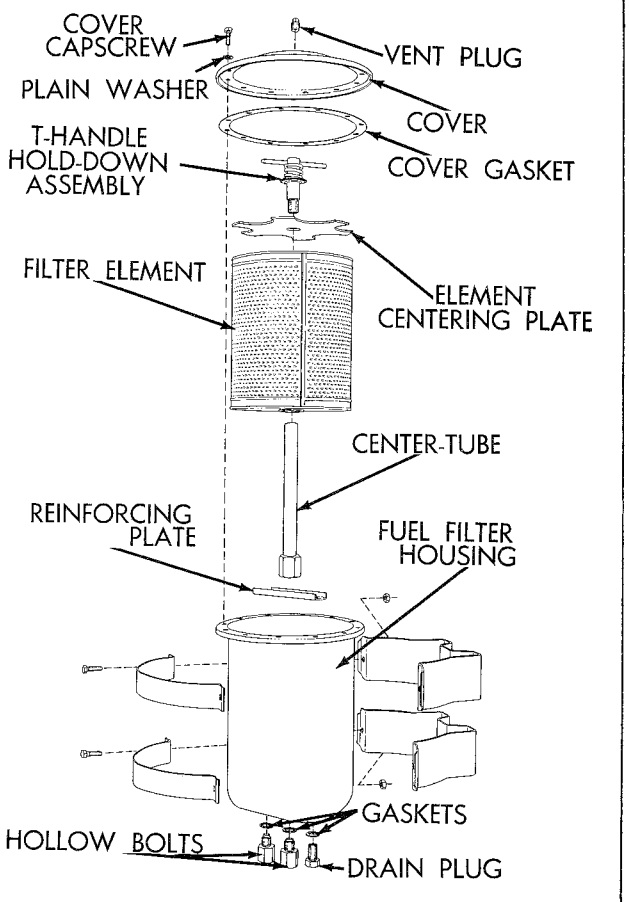
7. Install a new cover gasket in position in the cover and place the cover in position on the filter housing. Install the cover capscrews and tighten evenly and securely.

8. Fill the fuel tank so that there will be sufficient fuel in the tank to fill the fuel filter by gravity. Open the fuel tank shut-off valve.

9. Remove the vent plug from the filter cover and allow the filter to fill with fuel by gravity. Install and tighten the vent plug when fuel emerges from the vent plug opening.

10. Start the engine and observe for fuel leaks at the filter cover, vent plug, and drain plug.

CAUTION: *Use only a "DIESELPAK" filter element in the Heavy Duty Filter.*



Heavy-Duty Fuel Filter Details

FIG. 19

K. Checking Fuel Supply System

Fuel pressure below normal, uneven running of the engine, excessive vibration, stalling when idling, and a loss of power are indications of insufficient fuel supply to the injectors. To determine cause for the above conditions, check for the following:

1. Air being drawn into the fuel system on the suction side of the fuel pump.

2. Clogged fuel filter elements.

3. Partially clogged fuel lines.

4. Clogged injector fuel filters.

5. Inoperative fuel pump.

To check the flow of fuel through the system, disconnect the fuel return line at the fuel tank. With the engine operating at high idle, the system will be functioning properly when a full stream of fuel with considerable pressure can be observed returning to the fuel tank through the return fuel line. If only a small stream is observed returning to the tank, all causes listed above must be checked and eliminated in turn.

1. Check for Admission of Air Into System and Clogged Fuel Filter Elements

To check for air being admitted into the system, follow the same procedure used in checking for flow of fuel. If air is entering into fuel system, foam or bubbles will be observed in the fuel that emerges from the loosened connection. Correct this condition by tightening any loose fuel lines and filter connections between the fuel tank and the fuel pump. Start the engine and test for smooth operation and full flow of fuel.

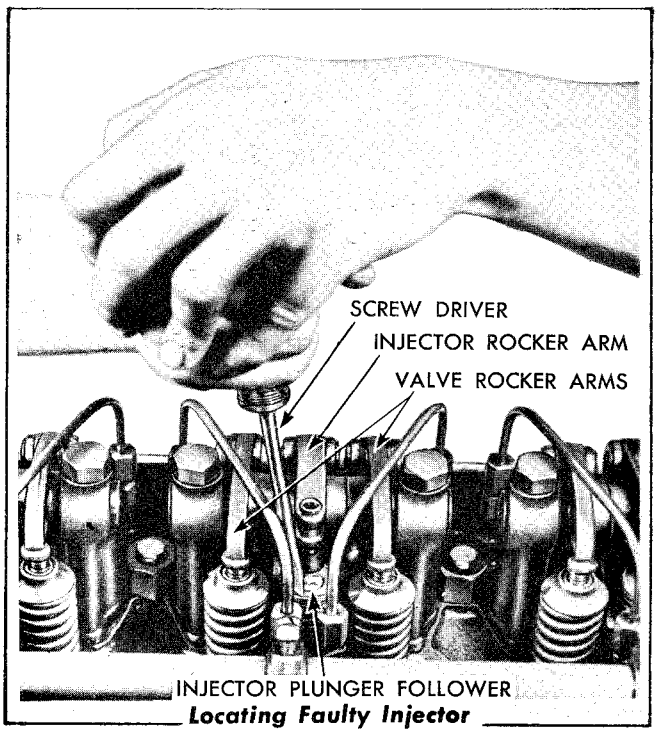
If the fuel lines or filters are clogged, clean the first stage or second stage fuel filter, or both, install new elements, and blow out the lines while they are disconnected. This should eliminate the difficulty. Check for full flow of fuel after engine is again started.

2. Check for Clogged Fuel Injector Filters

If the engine still runs "ragged" with suitable fuel return, the injector filters for one or more of the cylinders may be partially clogged. Locate the

faulty injector as follows: Run the engine at low idle speed and cut out each injector in turn by holding the injector follower down with a screwdriver or small block of wood. CAUTION: *Do not allow the screwdriver to slip off the follower as damage to valve assemblies can easily result.* A decrease in engine speed with the follower held down will indicate that the injector for that cylinder is functioning properly.

If the engine speed does not decrease, the injector is inoperative and should be removed for further inspection. To determine whether or not the faulty injector is obtaining sufficient fuel, stop the engine and remove the fuel feed line that connects the injector to the return fuel manifold. Hold a finger over the injector fuel outlet and crank the engine with the starter. If fuel gushes from the injector while the starter is cranking the engine, an ample fuel supply is indicated.



Locating Faulty Injector

FIG. 20

3. Check for Inoperative Fuel Pump

If all the possible causes for insufficient supply of fuel, as explained in the above paragraphs, have been eliminated and the fuel pressure is still below normal, the fuel pump will be considered inoperative and must be removed and repaired or replaced.

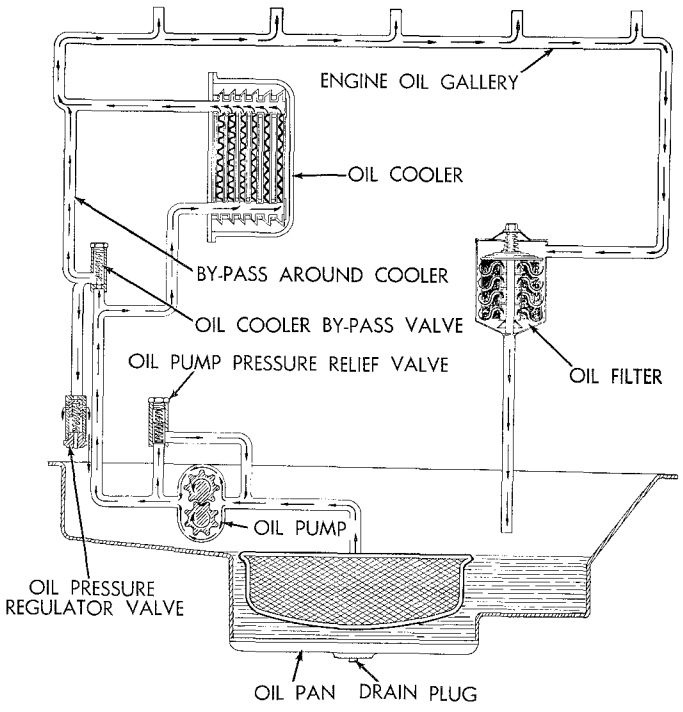
4. Excessively High Fuel Pressure

A relief valve is installed in the fuel pump to prevent high fuel pressure. If the relief valve sticks, high pressure will develop and will be indicated on the fuel pressure gage.

When this occurs, the valve in the fuel pump should be inspected and the reason for its sticking eliminated. The second stage fuel filter, the restricted fitting installed in the rear of the return fuel manifold, and all fuel lines should be inspected for clogged passages.

Continued operation with excessively high pressure (over 55 pounds) may result in damage to the fuel system.

ENGINE LUBRICATION SYSTEM



Schematic Diagram Showing Oil Flow

FIG. 21

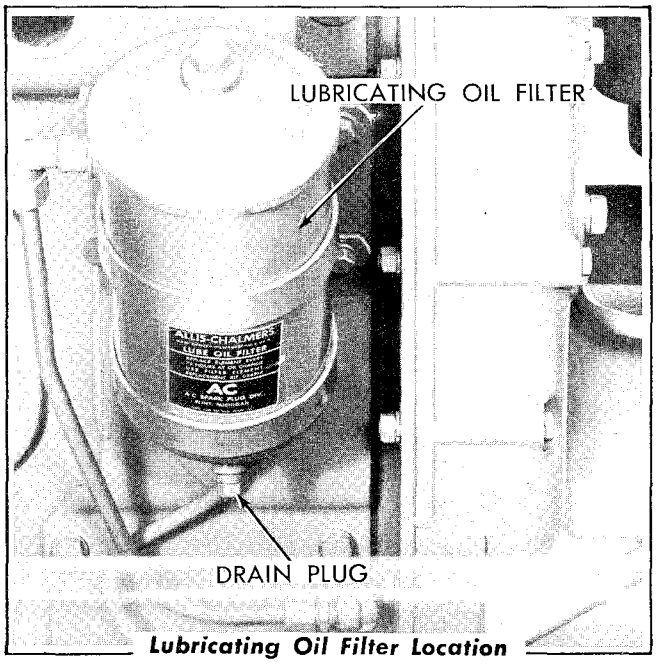
A. Description of System

The engine lubrication system shown schematically, includes the gear driven oil pump, oil pump pressure relief valve, oil cooler, oil cooler by-pass valve, oil pressure regulator valve, oil filter, and the oil passages in the engine block and the cylinder head.

The oil pump draws the oil from the engine crankcase and circulates it under pressure through the oil cooler, engine, and the oil filter. An oil pump pressure relief valve, located in the oil pump body, limits the oil pump discharge pressure. An oil cooler by-pass valve, located in the engine oil cooler adapter, by-passes the oil directly from the oil pump to the lubrication system in the engine if the oil passages in the oil cooler core become clogged, or if in cold weather the oil is too thick to circulate freely through the oil cooler core. Stabilized oil pressure is maintained within the engine by an oil pressure regulator valve, located in the oil gallery at the front end of the engine block.

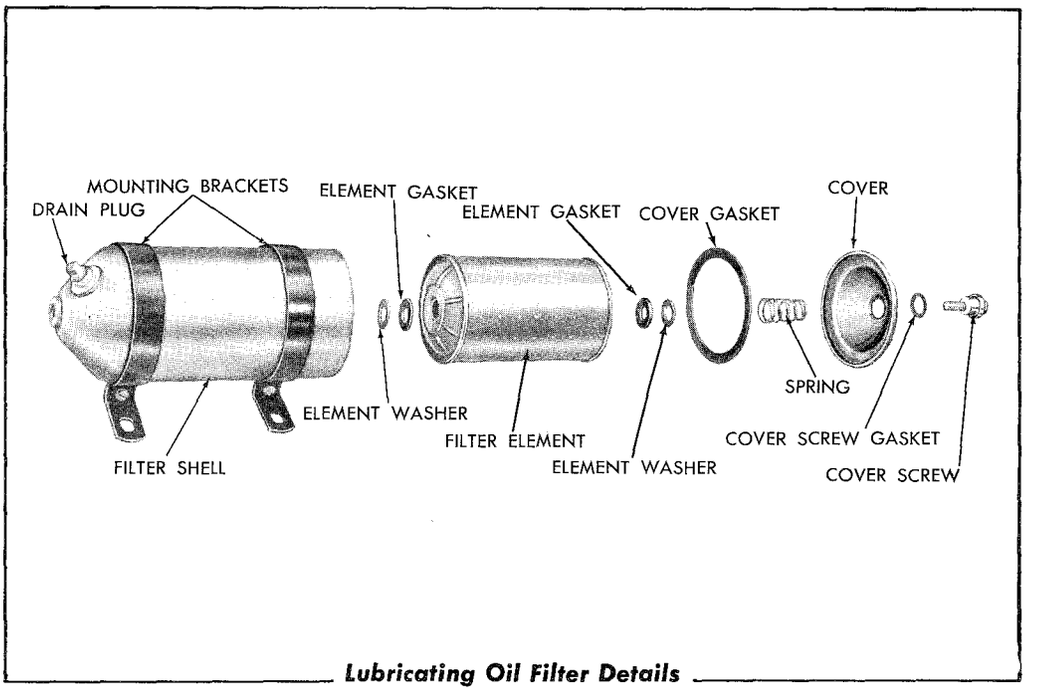
B. Lubricating Oil Filter

The lubricating oil filter, mounted on the left side of the engine, contains a replaceable element. A drain plug in the bottom of the filter shell permits draining of the filter for replacement of the element. A new element must be installed each time that the oil in the crankcase is changed, or more often if conditions warrant.



Lubricating Oil Filter Location

FIG. 22



Lubricating Oil Filter Details
FIG. 23

C. To Change Filter Element

1. Thoroughly clean the filter cover and the surrounding area. Remove the drain plug from the bottom of the filter shell and allow the filter to drain.

2. Loosen the cover screw and remove the cover screw, cover screw gasket, cover, cover gasket, and spring as a unit. Remove the cover gasket from the cover and discard the gasket.

3. Remove and discard the element washer, element gasket, and the filter element.

4. Reaching inside the filter shell, remove the element gasket and element washer from the shell center-tube and discard.

5. Thoroughly wash and dry the interior of the filter shell. Install and tighten the filter drain plug.

6. Install a new element washer in position on the shell center-tube, then install a new element gasket and press the gasket down firmly onto the element washer.

7. Install a new filter element in position in the filter shell. Place a new element gasket and element washer in position on the shell center-tube and press the gasket down firmly onto the top of the filter element.

8. Install a new cover gasket in position in the cover, install the cover in position on the filter shell and tighten the cover screw securely.

9. Start the engine and observe for oil leakage at the filter cover.

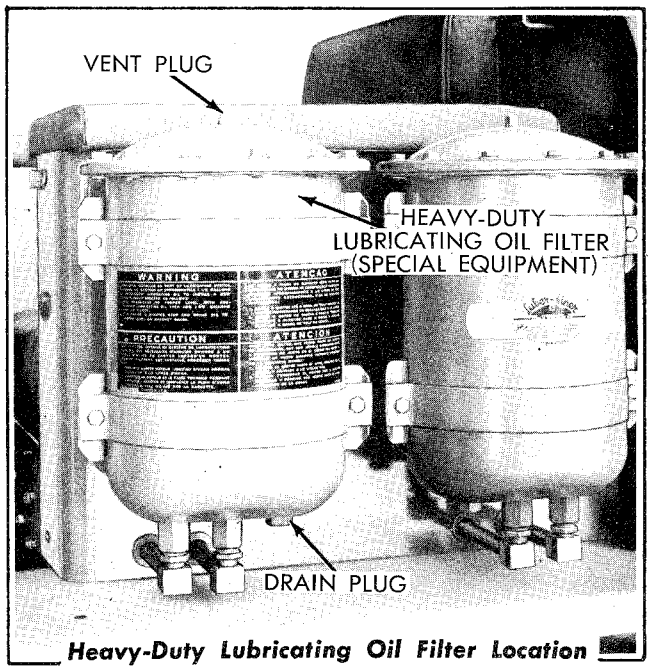
D. Heavy-Duty Lubricating Oil Filter (Special Equipment)

On tractors equipped with a Heavy-Duty Lubricating Oil Filter, the filter element must be changed at each engine oil change.

E. To Change the Heavy-Duty Lubricating Oil Filter Element

1. Remove the drain plug, located in the bottom of the filter housing, and allow the filter to drain. Remove the cover capscrews and lift the cover from the housing.

2. Unscrew the T-handle hold-down assembly from the center-tube and remove the T-handle hold-down assembly and the element centering plate. Remove the filter element



Heavy-Duty Lubricating Oil Filter Location

FIG. 24

from the housing by lifting with the pull-out bail. Discard the filter element and the cover gasket.

3. Clean the interior of the filter housing thoroughly and install the drain plug.

4. To assure leak-proof sealing, examine the center-tube seal at each end of the new filter element to see that the seals are in good condition and clean. Insert the new filter element into position in the filter housing and press the filter element down firmly.

5. Place the element centering plate in position on the top of the filter element. Make certain that the hole in the orifice plug, located in the T-handle hold-down assembly, is open. Install the T-handle hold-down assembly and tighten securely.

   CAUTION: *When servicing the Heavy Duty Filters, make certain that the T-handle hold-down assemblies are reinstalled in their respective filter as the T-handle hold-down assembly for the engine lubricating oil filter contains an orifice plug. The T-handle hold-down assembly for the fuel filter does not contain an orifice plug.*

6. Install a new cover gasket in position in the cover and place the cover in position on the filter housing. Install the cover capscrews and tighten evenly and securely.

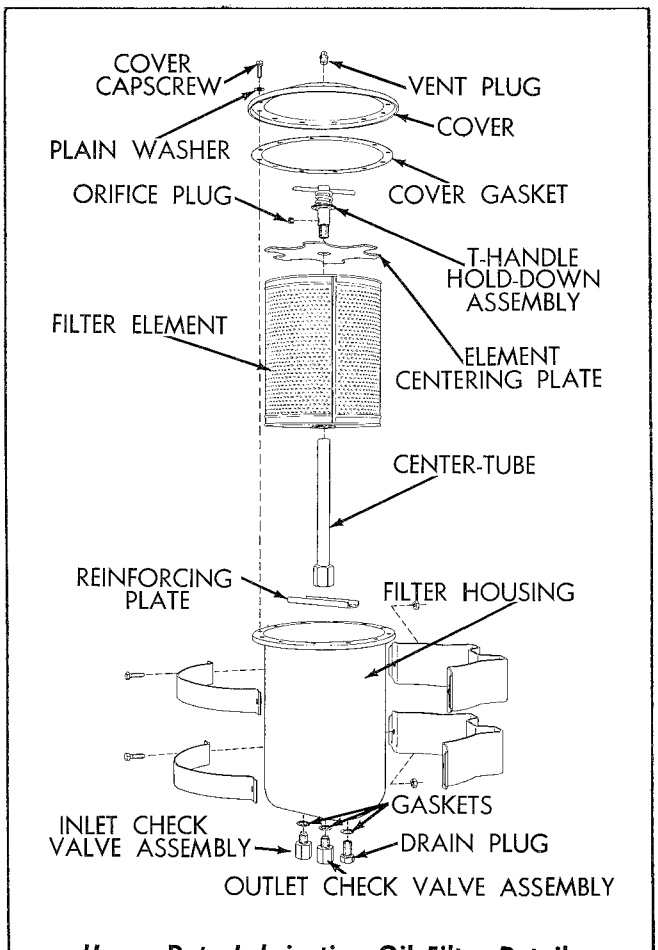
7. Fill the engine crankcase to the proper level with the specified lubricating oil.

8. Remove the vent plug from the filter cover.

9. Start the engine and operate it at low idle speed until oil emerges from the vent plug opening in the filter cover, then stop the engine. Install and tighten the vent plug.

10. Check the oil level of the engine crankcase and add oil as necessary to raise the oil level to the "FULL" mark on the oil level gage rod.

    CAUTION: *Use only a "DIESELPAK" filter element in the Heavy-Duty Filter.*



Heavy-Duty Lubricating Oil Filter Details

FIG. 25

F. Engine Oil Cooler

The engine oil cooler, located on the right side of the engine, consists of a corrosion resistant cooling core contained in a cast iron housing. The engine lubricating oil pump circulates oil through the core and the water pump circulates water through the cooler housing, around the outside of the plates of the core, thereby controlling the oil temperature.

The oil cooler is lined with small fins which dissipate heat from the oil to the cooling water. If proper lubricating oil maintenance procedure is followed, the cooler will function efficiently. However, if the oil in the engine is not changed at the recommended intervals, impurities will be deposited in the cooler core; consequently causing restriction or clogging of the oil passages in the cooler core. Clogging of the oil cooler core is usually indicated by a drop in oil pressure. If this occurs, the core must be cleaned or a new one installed.

IMPORTANT: *IT IS ABSOLUTELY NECESSARY THAT THE OIL COOLER UNIT BE KEPT CLEAN FOR PROPER OIL COOLING.*

G. Cleaning of Engine Oil Cooler

Cleaning the engine oil cooler requires the use of special solvents. The following solvents have been found effective when used according to the manufacturer's direction:

Excello Floor Cleaning Compound

Turco Cleaning Compound

No. 70 Stripper

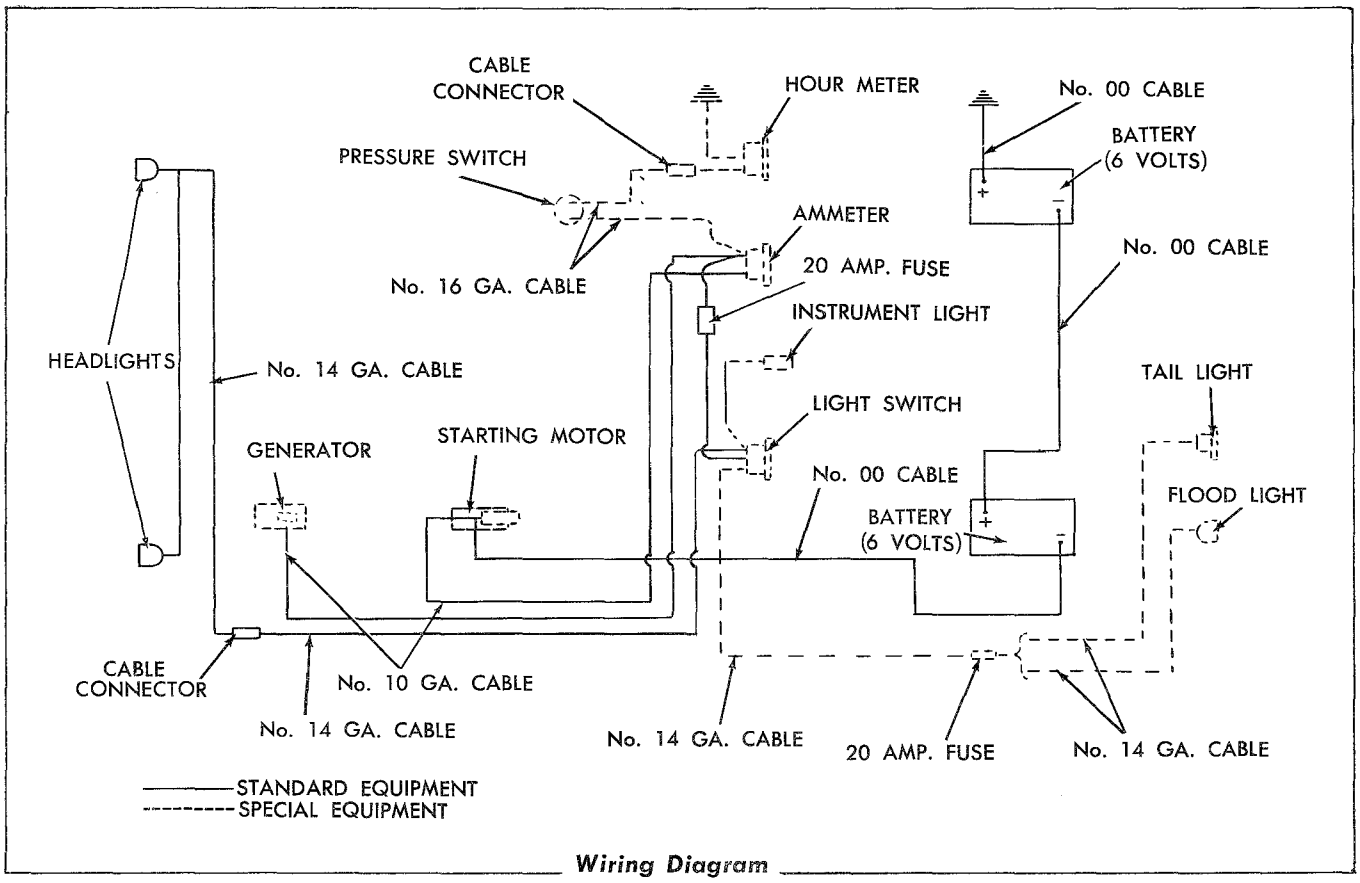
Mixture of 3 parts Oakite No. 7 and 5 parts fuel oil

Bendix Cleaning Compound

To use the last named solvent, merely submerge the cooler core into the solution for a sufficient length of time to allow the chemical action of the solvent to dissolve or loosen the sludge or other foreign matter from the cooler core.

Flush the cooler core thoroughly with live steam or spirits after cleaning, regardless of type of cleaner used. NOTE: *If the core of the oil cooler is badly clogged, a new core must be installed.*

Cement a gasket to each side of the flange of the cooler core and coat the other side of the gaskets with gasket cement when the core and housing are again installed after cleaning.



Wiring Diagram

FIG. 26

A. Description

The electrical system, which includes the starter, generator, generator regulator, batteries, headlights, and wiring is a 12 volt system throughout. Current is supplied by two 6-volt wet cell storage batteries carried in compartments at the ends of the seat.

Electrical energy drained from the batteries through the operation of the above named units is replaced by the generator. The output of the generator is controlled by the generator regulator to prevent overcharging of the batteries.

B. Batteries

Check the level of the electrolyte in the batteries every 75 hours of operation, or as often as operating conditions prove it necessary. Maintain the level of the solution ⅜" above the plates by the addition of clean distilled water. Keep the battery and cable terminals tight and clean. If corrosion occurs, clean the battery posts and terminals with a strong soda solution and coat the terminals lightly with vaseline before connecting them again. The vaseline will prevent further corrosion.

When air temperature is below the freezing point, special attention should be given to hydrometer readings of the batteries. The electrolyte in fully charged batteries will have a hydrometer reading of 1.280 to 1.300 specific gravity when the electrolyte temperature is 77° F. Specific gravity readings without correction for temperature are practically meaningless. For each 30 degrees that the temperature of the electrolyte is above 77° F., add 10 points to the hydrometer reading and for each 30 degrees below 77° F., subtract 10 points to get the true specific gravity. For example, if the hydrometer reading is 1.250 and the electrolyte temperature is 17° F. (60 degrees below 77° F.), 1.250 minus 20 points equals 1.230 — the true specific gravity.

If the corrected readings are below 1.240, the batteries are not receiving sufficient charge. This might indicate that the generator or the generator regulator requires attention. If these units prove satisfactory, inspect the system for short circuits and

for loose or corroded connections. In zero weather there is danger of batteries freezing if the specific gravity is below 1.175. Batteries with a specific gravity of 1.225 will freeze at 35° below zero F. During freezing weather, any addition of water to the cells should be made after the engine is started at the beginning of an operating period to make certain that the water and electrolyte solution will be thoroughly mixed; otherwise it may freeze. The filler caps must be kept tight at all times and the tops of the batteries kept clean and dry.

C. Generator, Generator Regulator and Starter

The generator and regulator are set to charge the batteries at the rate of 4 to 8 amperes. Under normal conditions the ammeter should indicate this rate of charge for a short time after starting the engine or until the generator replaces the energy drained from the batteries during cranking; then it will show little or no charge. This is sufficient to keep the batteries fully charged under normal conditions.

It is important that the generator be maintained in good condition so that the batteries will be kept charged and provide the necessary cranking speed for starting the engine. This is especially important in cold weather when battery efficiency drops in proportion to the drop in temperature.

Any dependable electrical repair shop is equipped to test or rebuild the generator, generator regulator, or starter when these units require service.

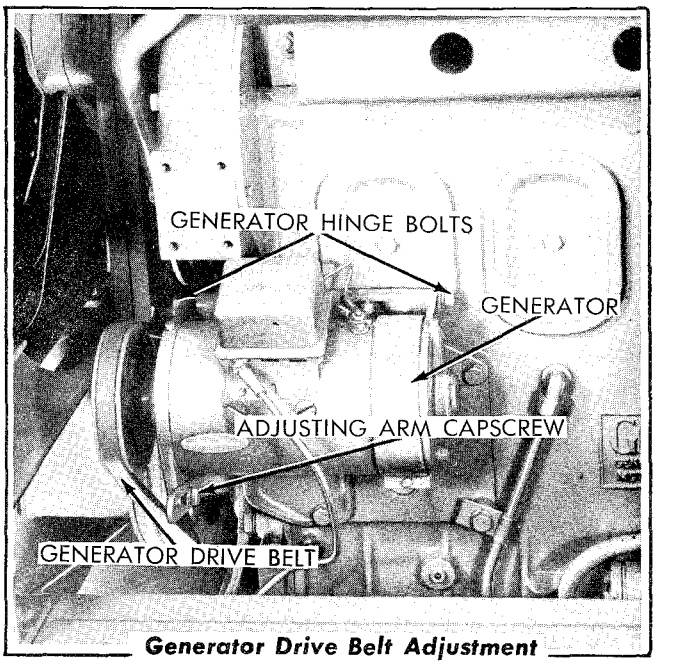
D. Electrical Cables

Heavy cables connect the batteries and the starter, 10 gage cables connect the ammeter and generator, and 14 gage cables connect the remaining units. A 20-ampere fuse, connected into the cable extending from the ammeter to the light switch, prevents burning out of the lights in the event of a short circuit. An additional fuse is provided in the electrical cable, near the rear of the tractor, for protection of special lighting equipment.

Inspect the electrical cables frequently to detect any loose connections or frayed insulation. Tighten the connections and wrap any frayed spots with friction tape to prevent short circuits.

E. Generator Belt Adjustment

The generator belt is correctly adjusted when one side of the belt can be pressed inward approximately 1¼ inches at a point half-way between the crankshaft and generator pulleys.



Generator Drive Belt Adjustment

FIG. 27

To Adjust Generator Belt

Loosen the adjusting arm capscrew at the front end of the generator and loosen the generator hinge bolts, then move the generator in or out until the correct tension of the belt is obtained. Tighten the adjusting arm capscrew and the generator hinge bolts.

AIR PRE-CLEANER AND AIR CLEANER

A. Description and Purpose

The purpose of the air pre-cleaner and air cleaner is to remove dust and other foreign material from the air used by the engine.

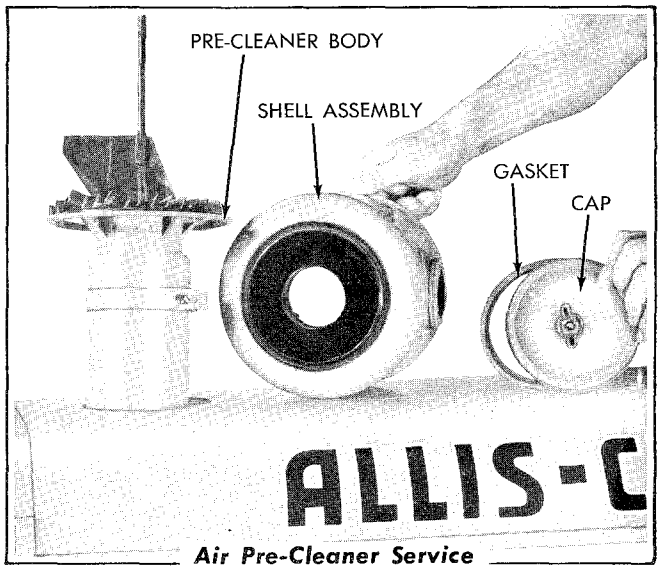
The life of the engine depends largely upon the efficiency of the air pre-cleaner and air cleaner. Fast wear on cylinder liners, pistons, and rings will result if these cleaners are not kept in good condition and properly serviced.

The air for the engine enters through the air pre-cleaner mounted on top of the air cleaner pipe. The pre-cleaner is designed to impart a rotary motion to the air. This causes the heavy particles of dirt to be thrown to the outside of the pre-cleaner shell and deposited therein. Approximately 85% of the dirt in the air drawn through the pre-cleaner is thus removed.

After passing through the air pre-cleaner the air enters the air cleaner through the pipe that extends down through the center of the air cleaner body. An oil cup filled to a specified level with engine oil is suspended on the lower end of the air cleaner body. As the air is drawn through the air cleaner, a portion of this oil is whipped up into screen mats in the main body of the cleaner. Dust still remaining in the air collects by these oily mats as the air passes through them. The oil, dripping back into the cup, carries this dust with it and deposits it in the cup. Thus, only clean air enters the blower for delivery to the cylinders.

A damaged hose, loose hose clamp, damaged blower gasket, or leak of any kind that allows air to enter the cylinders without first passing through the cleaners will defeat the purpose of the cleaners. Therefore, extreme care should be taken to prevent leaks.

Periodic inspection of the above parts and of the air cleaner body for dents, cracks, loosened solder connections, etc., should be made frequently. If any of the above mentioned conditions are found they must be corrected immediately.



Air Pre-Cleaner Service
FIG. 28

B. Air Pre-Cleaner Service

Empty the air pre-cleaner whenever the dirt level reaches half-way up on the inspection glass. Remove and clean as follows:

1. Unscrew the wing nut and remove the cap from the shell. Lift the shell from the pre-cleaner body.

2. Clean the dirt out of the shell and wipe the inside of the shell with a dry cloth. Make sure the fins in the pre-cleaner body are not bent, damaged, or clogged.

3. Wipe the dust off the cap gasket and reassemble the pre-cleaner. Replace the gasket if it is not in good condition. Tighten wing nut with fingers. *DO NOT USE A WRENCH.*

C. Air Cleaner Service

The filtering oil in the cup must be inspected daily or more often when operating under extremely dusty conditions. Keep the cup filled with clean oil to a level even with the top of the cone in the center of the air baffle. Empty and wash the cup and the air baffle whenever the oil becomes discolored; then refill the cup with clean oil.

Use the same viscosity of oil as is used in the engine at prevailing temperatures. NOTE: *SOME "DIESEL" LUBRICATING OILS MAY FOAM WHEN USED IN AN AIR CLEANER. DO NOT USE AN OIL THAT*

FOAMS AS IT REDUCES AIR CLEANER EFFICIENCY AND IN SOME CASES ALLOWS THE OIL TO BE PULLED OVER INTO THE ENGINE, CAUSING SERIOUS DAMAGE.

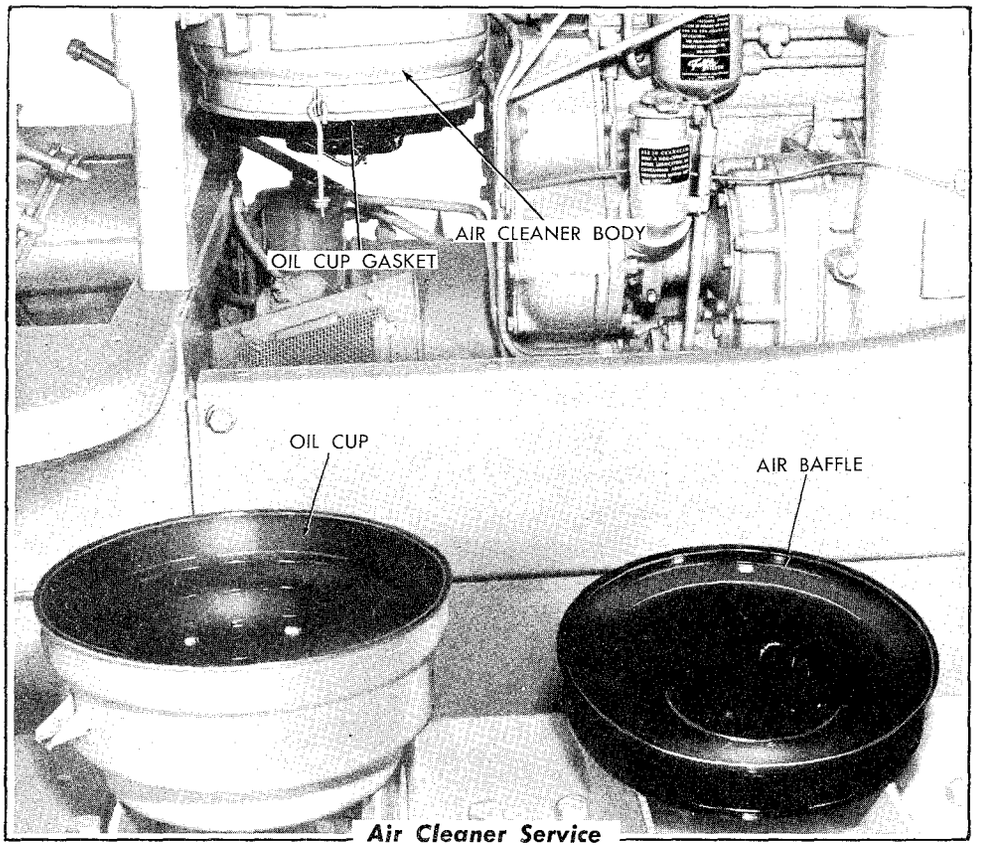
Service the Air Cleaner as Follows:

1. Remove the oil cup from the bottom of the cleaner body. Remove the air baffle and empty the oil from the cup.

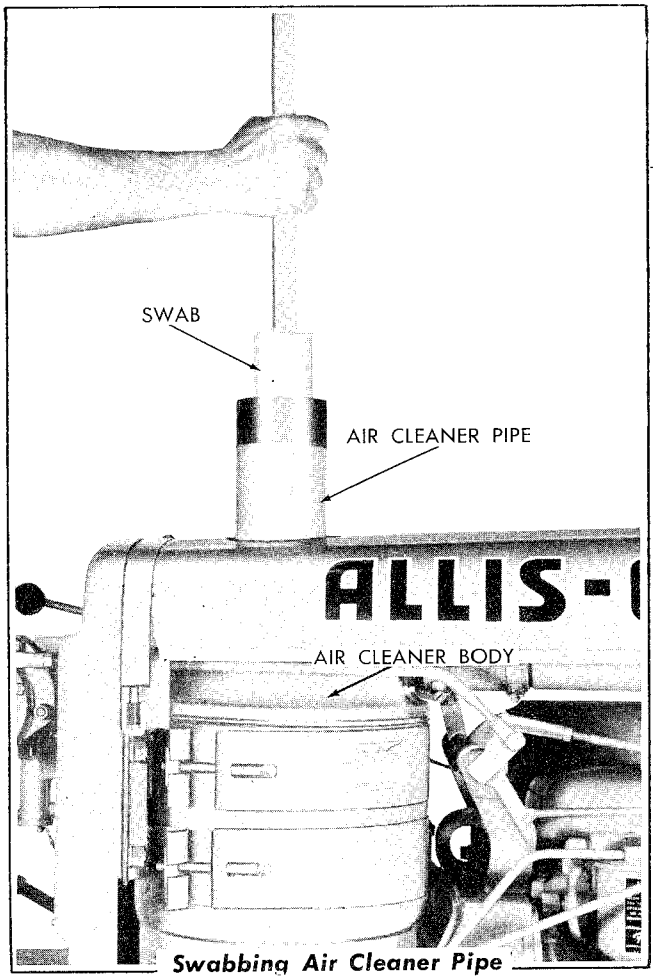
2. Wash the oil cup and the air baffle thoroughly with clean solvent or fuel. Remove the air pre-cleaner assembly from the top of the air cleaner and swab out the inside of the air cleaner pipe that extends from the pre-cleaner to the oil cup. Install the air pre cleaner assembly.

3. Install the air baffle in the cup and fill the cup to the proper level with clean oil.

4. Install the cup on the bottom of the air cleaner body. Check the clamps on the hose between the air inlet elbow and the air cleaner body and make certain that they are tight and that the hose is not crimped, allowing air to enter the engine without passing through the air cleaner. Make certain that the gasket above the cup makes a tight seal.



Air Cleaner Service
FIG. 29



Swabbing Air Cleaner Pipe

FIG. 30

COLD WEATHER ENGINE PRIMER

A. Purpose

In warm weather, sufficient heat is generated by the compression of the air in the cylinders to ignite the fuel and start the engine within a very short cranking period. However, in cold weather the "drag" caused by cold oil between the pistons and cylinder walls and in the bearings, reduces the cranking speed of the engine. A large part of the heat generated by compression of the air is absorbed by the pistons and cylinder walls. This heat loss and the reduced cranking speed may reduce the temperature of the air in the cylinders to a point too low to ignite the fuel. A starting aid must then be used in starting the engine.

B. Description

The cold weather engine primer consists of a dispenser assembly, which holds and punctures a capsule containing ethyl ether fluid, a primer pump to force the fluid through a small nozzle and into the air inlet elbow of the engine blower, a primer elbow assembly, and the necessary lines to complete the system. The dispenser is located on the cowl (to the right of the instrument panel) and the primer pump is mounted in the left side of the instrument panel. The vaporized starting fluid is forced through the primer elbow assembly and into the engine air inlet elbow, where it is picked up by the engine blower and is blown into the cylinders. Since the fluid is highly combustible, it is easily ignited by compression in the cylinders. The engine will start quickly at low ambient temperatures with the aid of the primer, even at a very low cranking speed. The starting fluid capsules, available in 7 c.c. and 17 c.c. sizes, can be obtained from "Allis-Chalmers" Dealers. Refer to "STARTING AND STOPPING ENGINE" for full instructions on the use of the Cold Weather Engine Primer.

C. Cold Weather Engine Primer Trouble Shooting

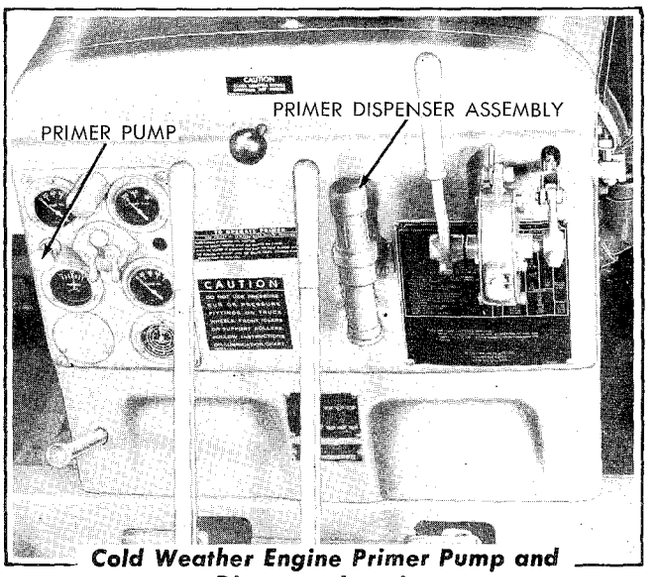
If the engine is cranked, with the throttle lever pulled all the way back, and does not start after two or three strokes of the primer pump, it is advisable to stop cranking and inspect the primer pump for the following possible causes of failure:

1. Primer Elbow Assembly Clogged

This condition will usually be indicated by excessive resistance on the primer pump. A partially clogged primer elbow assembly will prevent the delivery of sufficient starting fluid to the engine air inlet system. To clean the primer elbow assembly, remove the elbow assembly from the engine air inlet elbow and remove the small nozzle from the primer elbow assembly. Remove and clean the nozzle swirl pin and open the hole in the end of the nozzle, if clogged.

CAUTION: Do not enlarge the hole in the end of the nozzle.

After cleaning, reassemble the primer elbow assembly and install the assembly in the engine air inlet elbow.



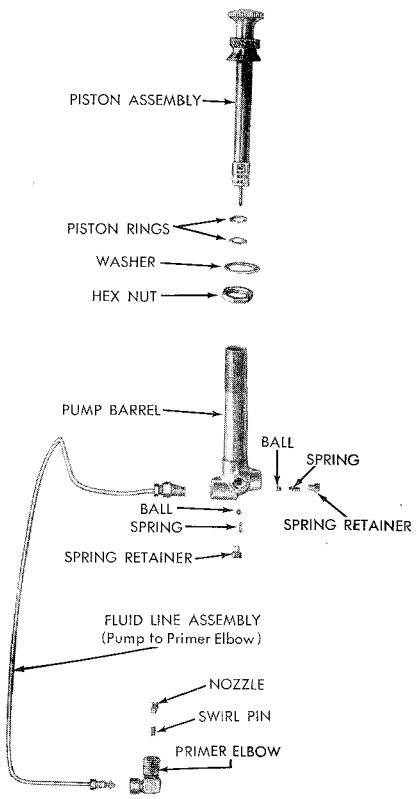
Cold Weather Engine Primer Pump and Dispenser Location

FIG. 31

2. Inoperative Primer Pump

Failure of the primer pump to function properly may be due to worn or damaged pump piston rings, a clogged dispenser filter screen, clogged fluid lines, or "frozen" or worn check valve balls. The piston rings on the piston are made of a special rubber composition and must be replaced by duplicate parts if worn or damaged.

To replace the pump piston rings, remove the knurled nut (under knob) from the pump barrel and withdraw the piston assembly from the barrel.



Primer Pump and Primer Elbow Details

FIG. 32

Remove the piston rings from the grooves in the piston assembly and install new rings. Lubricate the rings and piston with light engine oil and install the piston assembly in the pump barrel.

3. Ball Check Valves

The two spring loaded ball check valves, located in the inlet and outlet ports of the pump, are provided to close the pump ports at the proper time. When the pump piston is pulled out (suction stroke, drawing fluid from dispenser) the ball check valve at the inlet port opens, allowing the fluid to be drawn from the dispenser. When the pump piston is pushed in (delivery stroke, supplying fluid to the primer elbow assembly), the ball check valve at the outlet port opens, allowing the pump to force the fluid to the primer elbow assembly.

Worn or "frozen" ball check valves, or broken springs, will prevent the pump from operating properly. When this occurs, remove the spring retainers, springs, and balls from the inlet and outlet ports of the pump. Inspect the balls, ball seats, and springs for wear or damage. Clean the pump barrel and all components thoroughly and reassemble, using new parts where necessary.

4. Clogged Dispenser Strainer

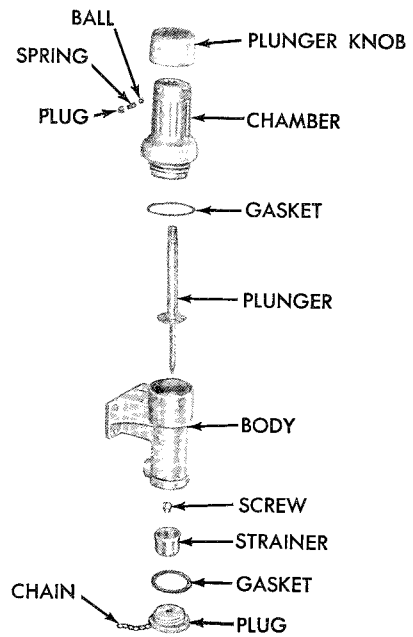
A strainer is attached to a plug which is screwed into the bottom of the dispenser body. If the gelatine capsules are not removed soon after puncturing, the gelatine will melt and clog the strainer screen.

To clean the strainer, unscrew the plug from the dispenser body and wash the strainer and plug in hot water.

The strainer may be removed for replacement if necessary by removing the screw attaching the strainer to the plug.

The dispenser body may be washed without removing it from the cowl by removing the upper chamber, the line connector, and the plug.

Reassemble the dispenser assembly by a direct reversal of the disassembly procedure.



Primer Dispenser Details

FIG. 33

VALVE ADJUSTMENT

A. General

The correct clearance between the ends of the exhaust valve stems and the valve rocker arms is very important in a "DIESEL" engine due to the high compression developed within the cylinders. Insufficient valve clearance will cause loss of compression, misfiring, and will eventually burn the valves and the valve seats. Excessive clearance will result in faulty engine operation and cause rapid wear on the valve operating mechanism. The proper valve clearance (lash) is .009" with the engine at normal operating temperature (160° to 185° F.).

After any mechanical work has been done which would disturb the valve setting, the valves may be set "cold" at .012" clearance so that the engine may be run and allowed to warm up to normal operating temperature in preparation to the final correct valve adjustment.

B. To Adjust Exhaust Valve Clearance

1. With the engine stopped, remove the air pre-cleaner, engine hood, and the rocker cover.

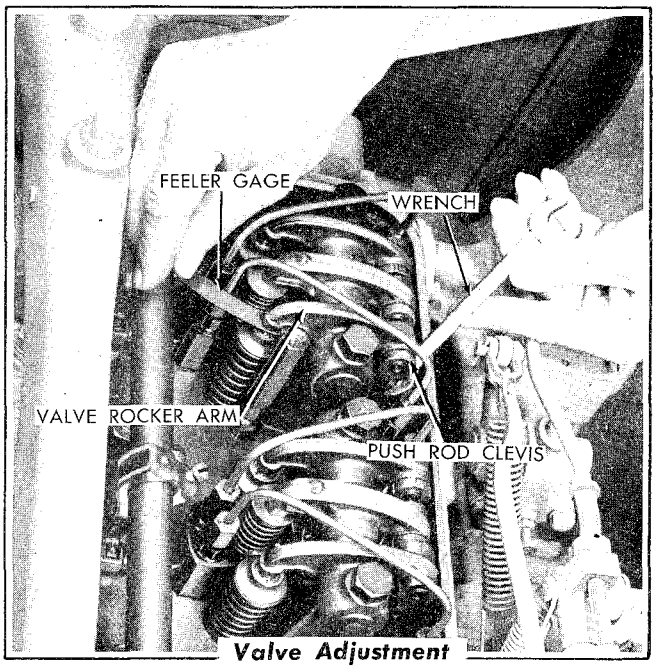
2. Crank the engine with the starter until the injector rocker arm of the cylinder to be adjusted is down and the injector plunger for that cylinder is at the bottom of its stroke. The exhaust valves for that cylinder will then be closed and the valve rocker arms will be raised off the valve stems.

3. Check the clearance between the valve stems and the rocker arms. When adjusted properly, a .009" thickness gage will pass between them with a slight drag when the engine is at normal operating temperature. With the engine at ambient temperature, a .012" feeler ribbon may be used and the valves adjusted to .012" clearance — cold. Adjust each valve by loosening the lock nut and turning the push rod into the push rod clevis as necessary to increase the clearance or out of the push rod clevis as necessary to decrease the clearance.

   When proper clearance (lash) is obtained, tighten the lock nut. Recheck the clearance to be sure it was not changed by tightening the lock nut.

4. Crank the engine with the starter and repeat the above operation on the valves for the other cylinders. Install the rocker cover, engine hood, and air pre-cleaner.

   CAUTION: *If for any reason a push rod was disconnected from a rocker arm, be sure when it is reinstalled, that the upper end of the push rod is flush with the inside of the clevis yoke before cranking the engine. If it is not, it is possible that the exhaust valve will be opened too far and the piston will strike the valve and damage the valve or piston.*



Valve Adjustment

FIG. 34

INJECTOR TIMING

A. General

Timing of each fuel injector consists of properly locating the top of the injector follower in relation to the injector body so that the fuel will be injected into the cylinders at the proper time. This is done with the injector installed in the engine.

The model HD-9B and HD-9F tractors are equipped with 55 cu. mm. fuel injectors which require that the top of the injector follower be set 1.484 inches above the injector body so that the fuel will be injected into the cylinders at the proper time.

The model HD-9G tractors prior to Serial No. 2698 are also equipped with 55 cu. mm. fuel injectors which require the same setting as given above for the HD-9B and HD-9F tractors. However, effective with HD-9G Serial No. 2698, all HD-9G tractors are equipped with 70 cu. mm. fuel injectors which require that the top of the injector follower be set 1.460 inches above the injector body so that the fuel will be injected into the cylinders at the proper time.

B. To Time Fuel Injectors

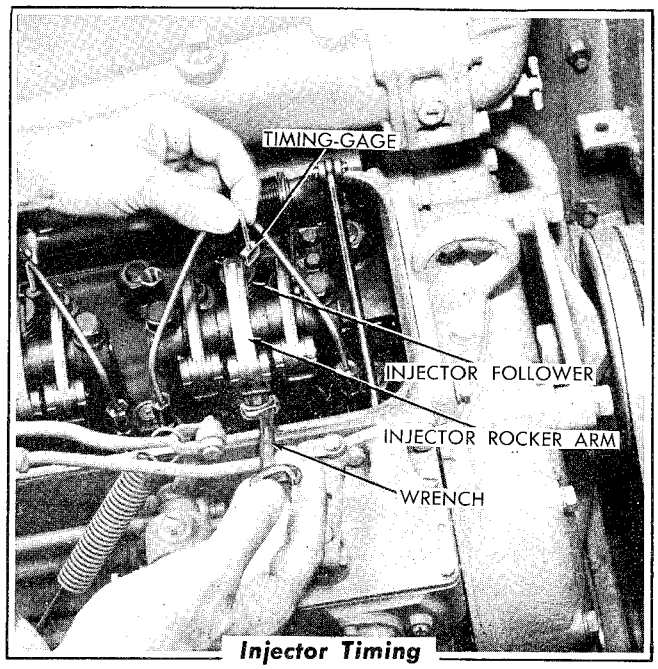
1. With the engine stopped, remove the air pre-cleaner, engine hood, and rocker cover.

2. Rotate the engine with the starter until the two exhaust valve rocker arms for the same cylinder are down and the valves are fully opened.

3. Use the correct timing gage (gage stamped 1.484 for 55 cu. mm. injectors and stamped 1.460 for 70 cu. mm. injectors) and place the timing gage in the hole in the injector body. Make certain that the shoulder at the bottom end of the gage rests on the injector body and that the gage is not held up by dirt in the hole. Turn the gage so that the extended head (flat portion) of the gage is toward the injector follower.

4. Loosen the injector push rod lock nut and turn the push rod into the push rod clevis as necessary to raise the follower or out of the push rod clevis as necessary to lower the follower until the proper timing is obtained. When the injector is properly timed, the bottom (flat part of the gage head) will just pass over the top of the injector follower. The timing gage must be held perpendicular to the top surface of the injector body while performing this adjustment.

5. Tighten the injector push rod lock nut and recheck to be sure the timing was not changed by tightening the lock nut. Install the rocker cover, engine hood, and air pre-cleaner.



Injector Timing

FIG. 35

INJECTOR EQUALIZING

A. General

Equalizing of the fuel injectors consists of adjusting the injector rack control levers so that an equal amount of fuel is delivered to each cylinder. The greatest amount of fuel is injected into the cylinders when the injector racks are moved all the way in; no fuel is injected when the racks are moved all the way out. The engine will run unevenly or detonate (knock) if the injectors are not equalized.

B. To Equalize Fuel Injectors

1. With the engine stopped, remove the air pre-cleaner, engine hood, and rocker cover.

2. Make certain that the injectors are properly timed and that the linkage for the governor and the engine controls are properly adjusted (refer to "GOVERNOR ADJUSTMENT" and "ENGINE CONTROL ADJUSTMENTS").

3. Loosen both adjusting screws on all of the rack control levers. Be sure the screws do no bind, that the levers are free on the rack control tube, and the tube rotates freely in its bearings.

4. Push the engine shut-off knob all the way in (run position) and pull the throttle lever all the way back (wide open).

5. Push the control tube lever toward the water manifold as far as possible and hold it firmly in that position.

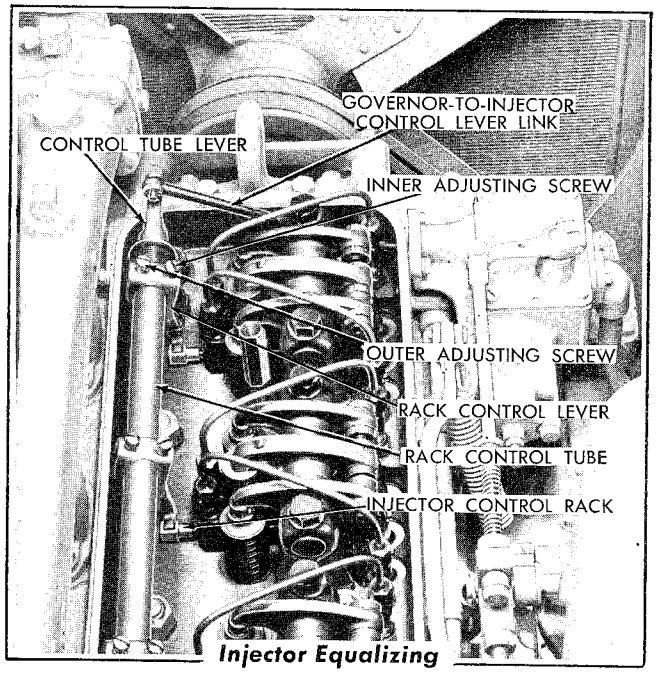
6. Use a medium sized screwdriver and turn down the inner adjusting screw on the No. 1 rack control lever until the No. 1 injector control rack moves in as far as it will go. At this point a slight pressure will be felt on the control tube lever. Roll the screwdriver back and forth with the finger tips to set the screw at the exact point where pressure starts (control rack just "bottoming" in injector — full open position).

7. Repeat this process on the remaining injector control racks.

8. Still holding the control tube lever firmly, as in paragraph 5, check each injector control rack to see that none have been missed in making the adjustments and that each rack is gently held in the full open position.

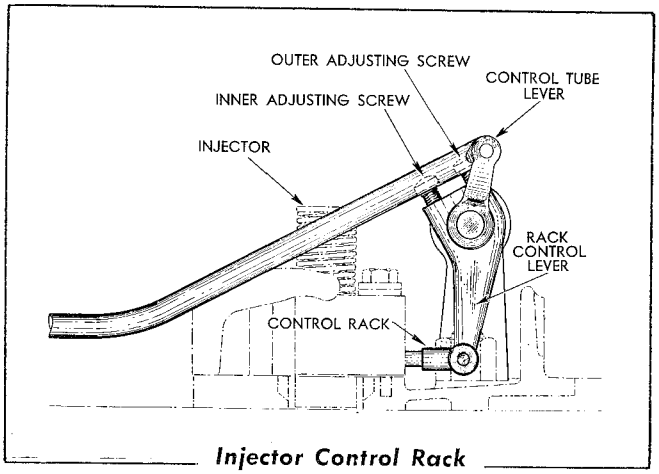
9. Now tighten each outer adjusting screw to lock the rack control levers in place on the control tube. This will also move the injector control racks outward a few thousandths of an inch to prevent "bottoming" of the injector control racks in the injectors during full load operation of the engine.

10. Install the rocker cover, engine hood, and air pre-cleaner.



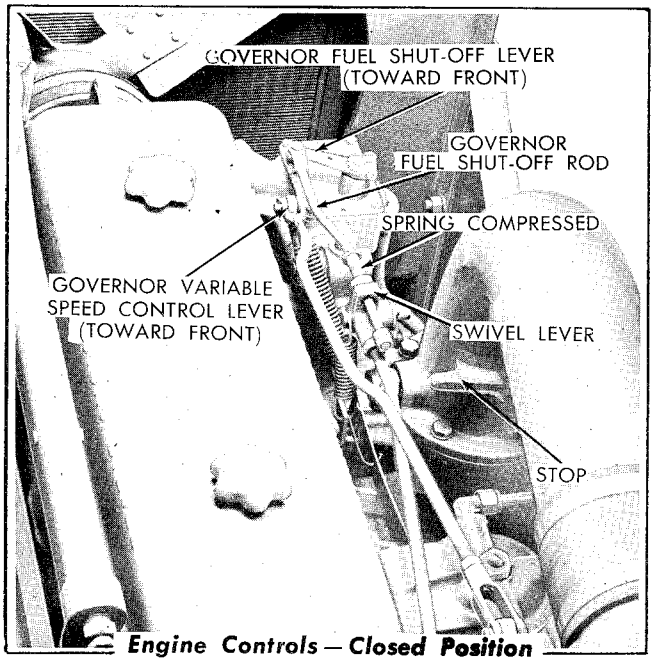
Injector Equalizing

FIG. 36



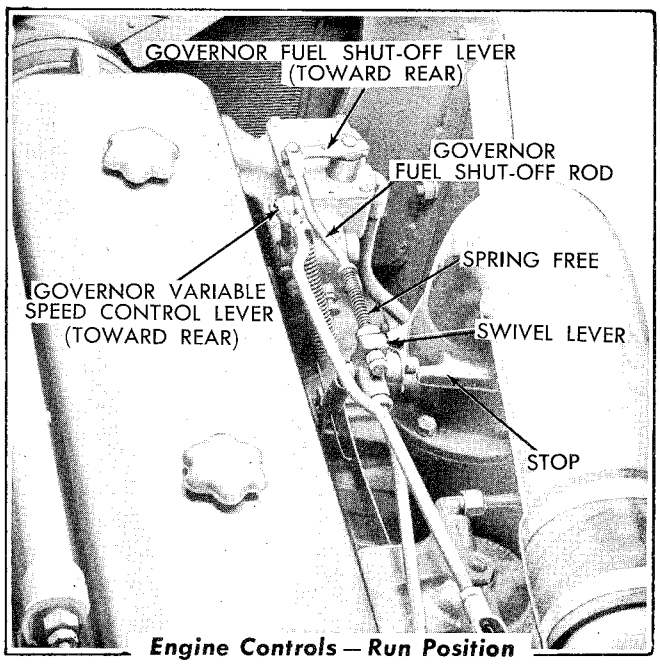
Injector Control Rack

FIG. 37



Engine Controls — Closed Position

FIG. 38

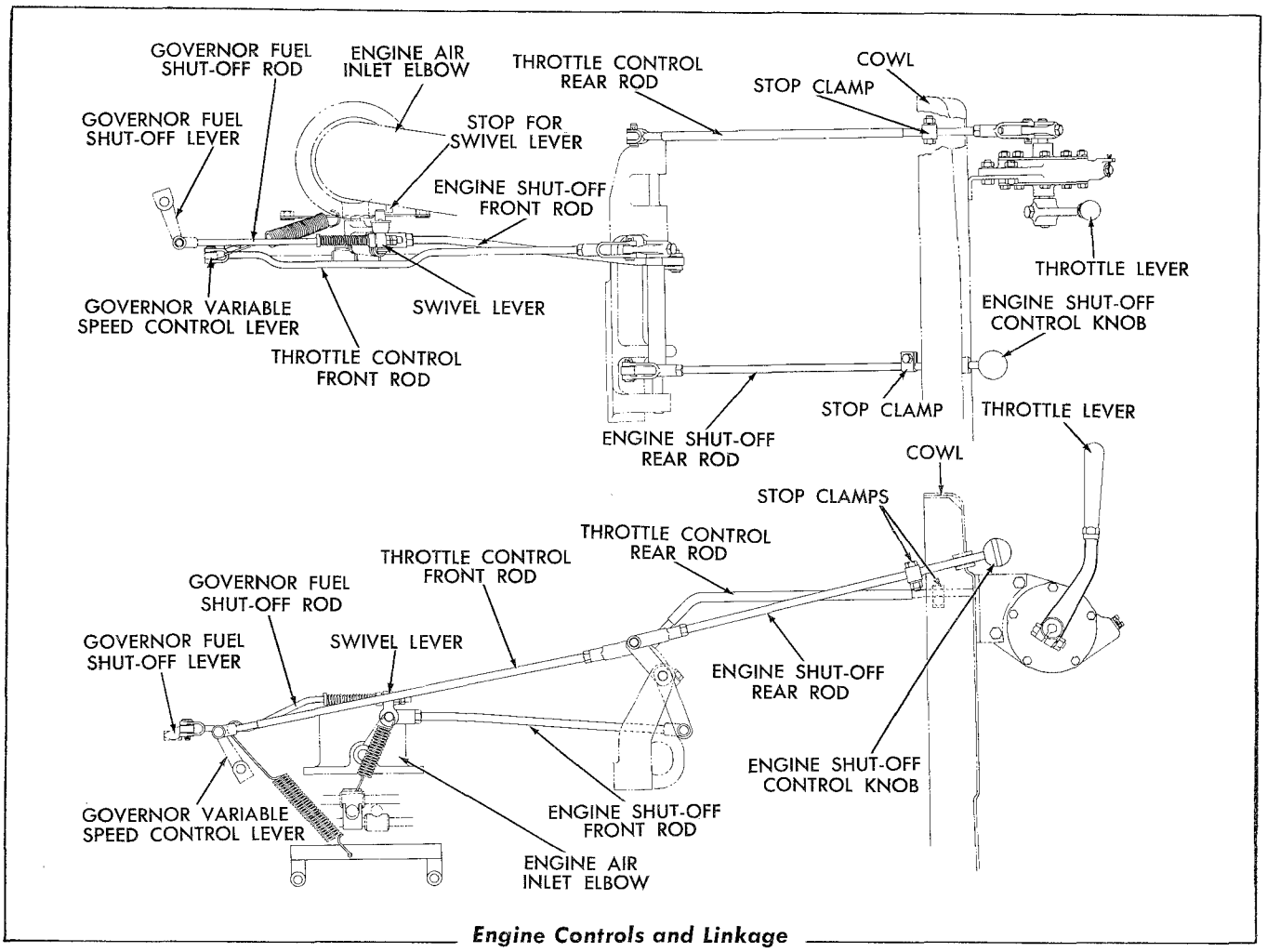


Engine Controls — Run Position

FIG. 39

A. General

The engine shut-off control rod opens and closes an air valve in the engine air inlet elbow and also moves the governor fuel shut-off lever to its open and closed positions. When the engine shut-off control knob is pushed in (forward) as far as it will go (running position), the air valve and the governor fuel shut-off lever are moved to their full open position. When the engine shut-off control knob is pulled out (back) as far as it will go, the air valve and the governor fuel shut-off lever are moved to their closed position. Improper adjustment may result in a loss of engine speed or power, failure of the engine to start with the shut-off knob pushed in, or failure of the engine to stop when the shut-off knob is pulled out. If the shut-off controls fail to operate properly, first be sure the linkage and levers are properly lubricated and the condition is not due to binding in the linkage or to broken springs.



Engine Controls and Linkage

FIG. 40

B. Adjustment

1. Push the engine shut-off control knob into running position (all the way in) and check the air shut-off valve swivel lever to see if it is moved back and contacts its stop (boss) on the engine air inlet elbow. If not, check and make certain the shut-off control knob is not striking the cowl. If the knob is striking, adjust the rear shut-off rod by turning it out of the yoke as necessary. If the air shut-off valve swivel lever still does not contact its stop, shorten or lengthen the front shut-off rod by turning it in or out of the yoke as necessary. Loosen the bolt in the stop clamp on the rear shut-off rod and pull the rod back as far as it will go. Push the shut-off rod forward 1/16", move the stop clamp back on the rear rod so that it contacts the cowl, and tighten the stop clamp bolt. With the stop clamp in this position, it will prevent the air shut-off valve from bottoming in the engine air inlet elbow when the shut-off control knob is pulled back to stop the engine.

2. To adjust the governor fuel shut-off control, push the engine shut-off control knob forward into the running position (all the way in) and remove the pin connecting the governor fuel shut-off rod to the governor fuel shut-off lever. Hold the governor fuel shut-off lever all the way back (towards the cowl) as far as it will go and check to see if the hole in the fuel shut-off rod lines up with the hole in the governor fuel shut-off lever. If not, loosen the capscrew clamping the governor fuel shut-off lever to the shaft, and move the position of the lever on the shaft so that the holes line up when the lever is all the way back. Tighten the capscrew used to clamp the lever to the shaft; then install the control rod pin and the cotter pin.

3. Loosen the bolt in the stop clamp on the throttle control rear rod. Pull the throttle lever all the way back (wide open) and make certain that the throttle linkage pulls the governor variable speed control lever back as far as it will go (high idle position); shorten or lengthen the throttle control front and rear rods by turning the control rod yokes, if necessary. Push the throttle lever forward 1/16", move the stop clamp back on the throttle control rear rod so that it contacts the cowl, and tighten the stop clamp bolt. With the stop clamp in this position, the clamp will serve as a stop when the throttle lever is pulled back to the high speed position.

GOVERNOR ADJUSTMENT

A. General

The governor was adjusted at the factory to provide the full governed engine speed (under load) of 1600 R.P.M. and an idling speed of 500 R.P.M. The governor very seldom gets out of working order. If the engine speed is irregular, check the fuel system and all other engine adjustments before changing the governor setting.

B. Checking Engine Speed

Operate the engine until normal operating temperature (160° to 185° F.) is indicated on the engine temperature gage. Hold a tachometer against the front end of the engine crankshaft. With the throttle lever all the way forward (idling position) and with the engine clutch disengaged, the engine speed should be 500 R.P.M. With the throttle lever all the way back (wide open position) the engine speed should be 1725 R.P.M.

NOTE: *If equipment on the tractor prevents the use of a tachometer at the front end of the engine crankshaft, remove the capscrews attaching the flywheel housing cover to the flywheel housing (at rear of the camshaft) and remove the cover and gasket. The tachometer may now be used at the rear of the camshaft to record the R.P.M. of the engine. The camshaft runs the same speed as the crankshaft.*

C. Governor Spring Plunger Gap Adjustment

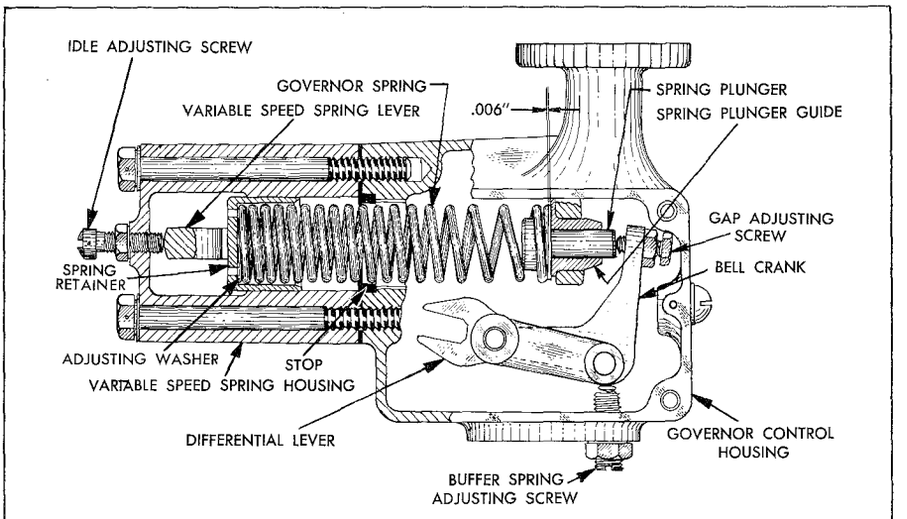
A clearance of .006" must be maintained between the spring plunger and the spring plunger guide. To adjust, stop the engine, remove the governor control housing cover, and pull the throttle lever half-way back. Loosen the lock nut on the gap adjusting screw and turn the screw in or out until a .006" gap is obtained between the spring plunger and the guide. Use a .006" feeler gage to measure this gap. Tighten the lock nut after the proper adjustment has been made and install the cover.

D. High Idle Engine Speed Adjustment

In most cases, the cause for the engine not reaching the proper high idle speed (1725 R.P.M.) will be found due to loose or incorrectly adjusted throttle linkage and not due to the governor being out of adjustment. For this reason, before changing the adjustment of the governor, check the following:

1. Be sure that the governor fuel shut-off lever on the governor control housing moves to its rear position (as far back as it will go) when the engine shut-off control knob is pushed to the running position.

2. If the injectors have been properly timed and equalized and all the adjustments and inspections listed above have been made, and the engine still fails to attain its proper



Governor Adjustment

FIG. 41

high idle speed of 1725 R.P.M., addition of adjusting washers between the governor spring and the spring retainer will be required.

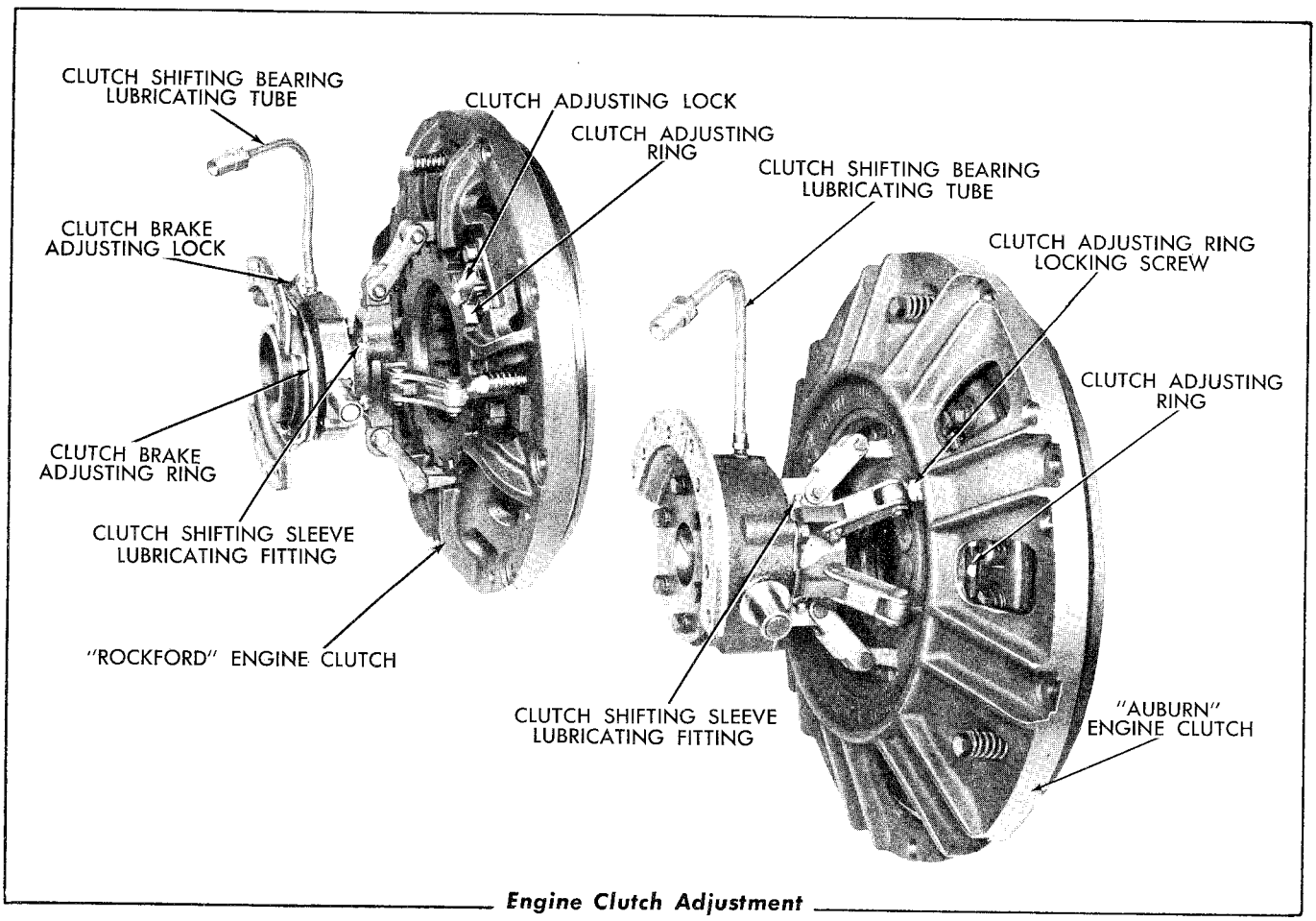
The adjusting washers are installed by removing the variable speed spring housing from the governor control housing, lifting the spring from the spring retainer, and inserting additional adjusting washers in the spring retainer. Each adjusting washer of .010" thickness will increase the high idle engine speed approximately 20 R.P.M. To decrease the high idle speed, remove the necessary amount of adjusting washers.

E. Low Idle Engine Speed Adjustment

After adjusting the governor for the correct high idle engine speed, the low idle engine speed should be checked and adjusted if necessary. Loosen the lock nut on the buffer spring adjusting screw and back the screw out (away from the differential lever) so that there is approximately ⅛" clearance between the spring and the differential lever. With the throttle control lever in "low idle" position, loosen the lock nut on the idle adjusting screw and turn the screw in as necessary to raise the low idle speed or out as necessary to lower the low idle speed. Tighten the lock nut when the correct low idle engine speed of 500 R.P.M. is obtained.

With the engine running at low idle speed, turn the buffer spring adjusting screw in until a very slight increase (not to exceed an increase of 20 R.P.M.) is noted in the low idle engine speed, then tighten the adjusting screw lock nut.

ENGINE CLUTCH AND CLUTCH BRAKE



Engine Clutch Adjustment

FIG. 42

A. Description

The engine clutch is a single plate, dry clutch with an over-center engaging action. A shifting sleeve and bearing mechanism, carried on the clutch shaft and connected by linkage to the clutch actuating levers, is operated by the engine clutch operating lever to engage or disengage the clutch. An adjusting ring provides a means of maintaining the necessary adjustment to compensate for normal wear on the clutch facing.

A clutch brake assembly, consisting of a lined disc attached to the clutch shifting bearing housing and a plain brake disc bolted to the clutch shaft, is provided for stopping the rotation of the transmission gears for shifting. The clutch brake is applied by pressing forward on the engine clutch operating lever after disengaging the clutch.

NOTE: *The tractor may be equipped with an "AUBURN" or a "ROCKFORD" engine clutch.*

B. Engine Clutch Adjustment

Attach a spring scale to the engine clutch operating lever (attach scale just below the lever hand grip) and weigh the pull required to engage the clutch. When the clutch is properly adjusted, a maximum pull of 50 pounds is required on the engine clutch operating lever for its engagement (engine stopped). The clutch should engage with a distinct over-center snap.

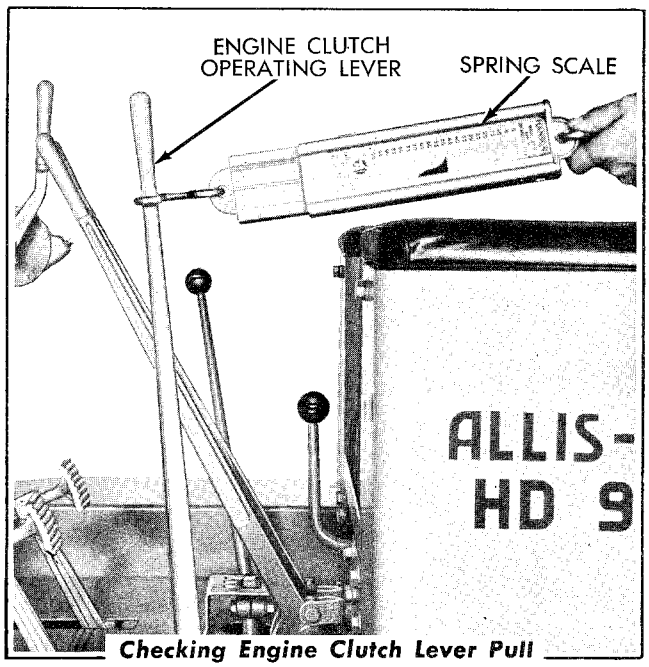
As the clutch wears, the pull on the engine clutch operating lever diminishes. When the pull on the lever diminishes to 30 pounds, an adjustment is necessary. CAUTION: *Do not operate the tractor when the pull on this lever is less than 30 pounds.*

IMPORTANT: *Since most clutch failures are the result of improper maintenance, it is very important that the clutch be kept properly adjusted at all times and that the clutch shifting bearing and the shifting sleeve are lubricated as recommended. Do not slip the clutch excessively when engaging.*

C. To Adjust the "ROCKFORD" Clutch

1. Remove the clutch inspection plate from the upper right side of the clutch housing.

2. Disengage the clutch and crank the engine with the starter until the clutch adjusting lock may be reached through the inspection hole. Disengage the adjusting lock from the slot in the clutch adjusting ring.



Checking Engine Clutch Lever Pull

FIG. 43

3. Using a hammer and punch, or a short pry bar, turn the clutch adjusting ring to tighten or loosen the clutch as necessary. Turn the clutch adjusting ring clockwise to tighten or counter-clockwise to loosen. Moving the clutch adjusting ring 2 or 3 notches is generally sufficient.

4. Lock the clutch adjusting ring in place by engaging the adjusting lock into the nearest slot in the adjusting ring. Attach a spring scale to the engine clutch operating lever (just below lever hand grip) and weigh the pull required to engage the clutch. When the clutch is properly adjusted, a pull of 48 to 50 pounds is required on the operating lever for its engagement.

5. After each adjustment of the "ROCKFORD" clutch, the adjustment of the clutch brake should be checked. The proper adjustment of the clutch brake must be maintained to avoid gear clashing when shifting. The clutch brake is properly adjusted when there is a clearance of 1⅜" between the clutch brake facing and the clutch shaft brake disc with the engine clutch engaged. Inspect the clutch brake disc facing periodically and replace the facing when badly worn. Check and adjust the clutch brake as follows:

   a. Engage the engine clutch and disengage the clutch brake adjusting lock.

   b. Turn the "notched" clutch brake disc adjusting ring in or out to obtain 1⅜" clearance between the brake facing and the clutch shaft brake disc.

   c. Lock the clutch brake disc adjusting ring in place by engaging the clutch brake adjusting lock into the nearest slot in the adjusting ring.

6. Clean and install the clutch inspection plate in position on the clutch housing.

D. To Adjust "AUBURN" Clutch

1. Remove the clutch inspection plate from the upper right side of the clutch housing.

2. Disengage the clutch and crank the engine with the starter until the clutch adjusting ring locking screw can be reached through the inspection hole.

3. Loosen the clutch adjusting ring locking screw just enough so that the clutch adjusting ring can be turned. CAUTION: *DO NOT REMOVE THE CLUTCH ADJUSTING RING LOCKING SCREW.*

4. Tighten the clutch by turning the "notched" clutch adjusting ring with a screw driver or a short pry bar until the proper adjustment is obtained. Moving the adjusting ring 1 or 2 notches is generally sufficient.

5. Tighten the clutch adjusting ring locking screw securely. Attach a spring scale to the engine clutch operating lever (just below lever hand grip) and weigh the pull re-

quired to engage the clutch. When the clutch is properly adjusted, a pull of 48 to 50 pounds is required on the operating lever for its engagement.

6. Inspect the clutch brake disc facing and replace the facing when badly worn.

7. Clean and install the clutch inspection plate in position on the clutch housing.

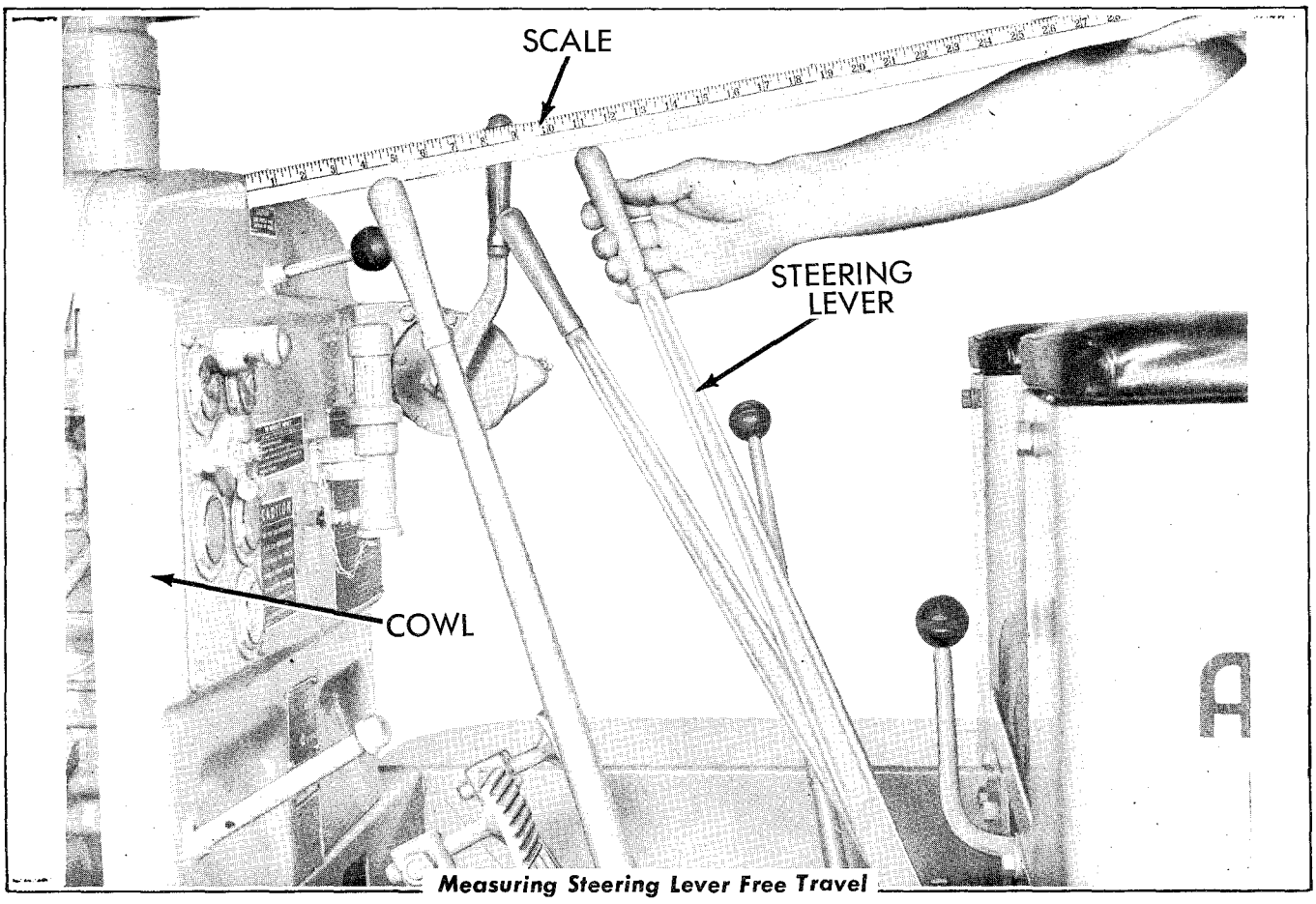
E. Washing Engine Clutch

Oil leaks or over-lubrication of the clutch shifting bearing and the shifting sleeve may cause the clutch facings to become coated with grease. This will cause the clutch to slip even though it is properly adjusted. In this event, the clutch must be washed.

Install the drain plug in the front of the flywheel housing and remove the engine clutch inspection plate. Pour cleaning solvent into the housing until the level is approximately 1¼ inches below the clutch shaft. Install the clutch inspection plate and operate the engine at low idle for approximately 5 minutes with the clutch disengaged. Stop the engine, remove the drain plug to drain the solvent, and if the solvent is excessively "oily," repeat the washing process.

CAUTION: *LUBRICATE THE CLUTCH SHIFTING BEARING, CLUTCH SHIFTING SLEEVE, AND THE CLUTCH SHAFT BEARING THOROUGHLY AFTER THE CLUTCH HAS BEEN WASHED AS THE LUBRICANT MAY HAVE BEEN WASHED FROM THESE PARTS DURING THE WASHING PROCESS.*

Operate the tractor with a light load in low gear for a short period until the clutch dries to prevent slippage due to the presence of solvent on the clutch parts.



Measuring Steering Lever Free Travel

FIG. 44

A. Description

The two steering clutches are multiple disc clutches. Each clutch contains 17 friction discs and 17 steel discs, assembled alternately, with springs holding the steel and friction discs tightly together. Pulling back on a steering lever disengages the corresponding steering clutch by forcing a throwout sleeve against a throwout plate in the steering clutch assembly and compresses the steering clutch springs. Compressing the steering clutch springs allows the steel discs and friction discs to separate, therefore no power is delivered to the corresponding track sprocket.

B. Steering Clutch Linkage Adjustment

The steering clutch linkage is properly adjusted when the steering levers each have 3" of free travel, measured at the tops of the levers. As the clutch discs wear, this free travel becomes less and an adjustment is required when the free travel has decreased to less than 1". Free travel of the steering levers is necessary to assure clearance between the clutch throwout sleeve and the clutch throwout plate and to assure full engagement of each clutch.

C. To Measure the Free Travel of Either Steering Lever

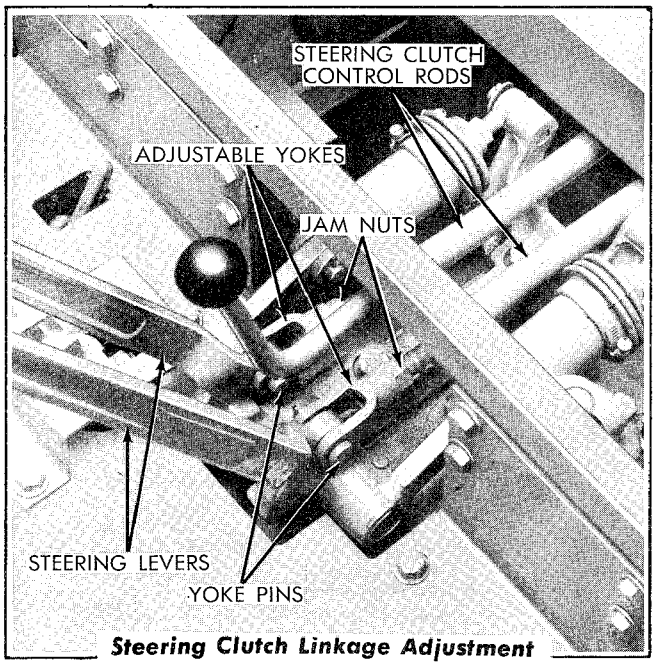
1. Place one end of a ruler or scale against the cowl so that it projects horizontally past the top of the steering lever.
2. With the lever forward against its stop, measure the distance from the cowl to the top of the lever.
3. Pull the lever back until pressure is felt, which is the point where disengagement of the clutch begins. NOTE: The distance between the cowl and the top of the lever. The difference between the two measurements is the free travel of the lever. If this distance is less than 1" or more than 3", an adjustment must be made.

D. To Adjust the Steering Lever Linkage for Each Clutch

1. Remove the seat cushion.

2. Loosen the jam nut of the adjustable yoke on the front end of the steering clutch control rod, extending from the steering lever to the control rod lever on the steering clutch throw-out shaft.

3. Remove the yoke pin connecting the steering clutch control rod to the steering lever, then turn the yoke to lengthen or shorten the rod as necessary to obtain 3" of free travel at the top of the steering lever. When the correct adjustment is obtained, connect the control rod to the steering lever, then tighten the jam nut.



Steering Clutch Linkage Adjustment
FIG. 45

E. Washing Steering Clutches

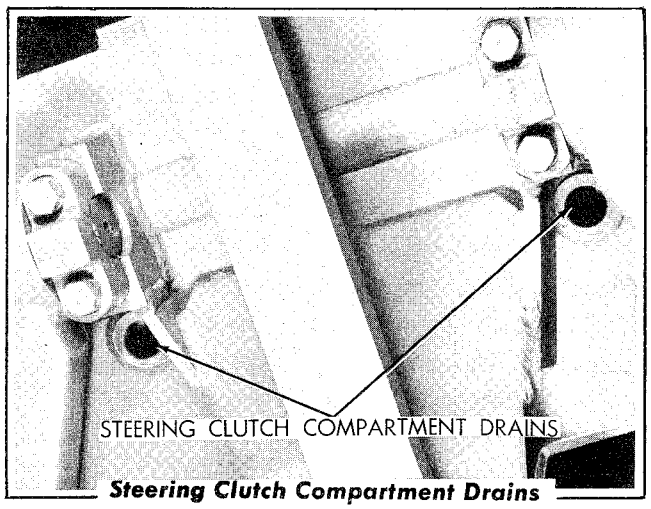
If the steering clutches slip due to oil getting on the clutch discs as a result of oil leaking into the steering clutch compartments, wash the clutches with cleaning solvent in the following manner:

1. Install a drain plug in the drain hole in the bottom of each steering clutch compartment.

2. Remove the brake adjusting hole covers from the top of the housing and pour about three gallons of solvent into each clutch compartment. A suitable funnel or trough is needed to do this. Drive the tractor back and forth in a straight line for five minutes, leaving the steering clutches engaged. The oil on the exterior of the clutches and brakes will be washed off in this operation.

3. Drain the compartments and refill with the same amount of solvent, then drive the tractor back and forth for another five minutes, disengaging one clutch and then the other continually during this period. Disengaging the clutches allows the clutch discs to separate so that the solvent can get between them to wash the oil from their friction surfaces.

4. Drain the compartments and allow the clutches to dry for a short time. Operate the tractor with a light load in low gear until the clutches become thoroughly dry, otherwise they may slip due to the presence of solvent on the discs.

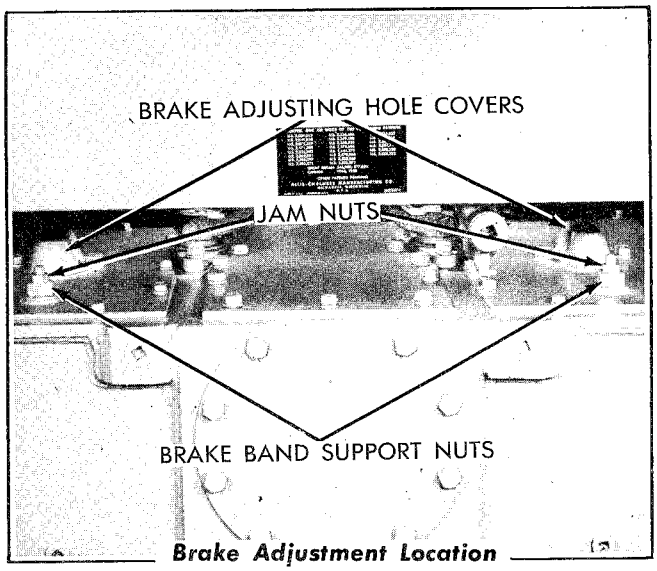


Steering Clutch Compartment Drains
FIG. 46

A. General

The steering brakes are properly adjusted when each brake pedal has 1¾" to 2" of free travel. As the brake linings wear, the brake pedals will move farther forward and eventually will strike the floor plate before the brakes are fully applied; the brakes then require adjustment. Brakes being adjusted too tightly will cause heating, unnecessary brake wear, and loss of power. When the brakes are too loose they will not hold properly and will wear more rapidly because of excessive slipping.

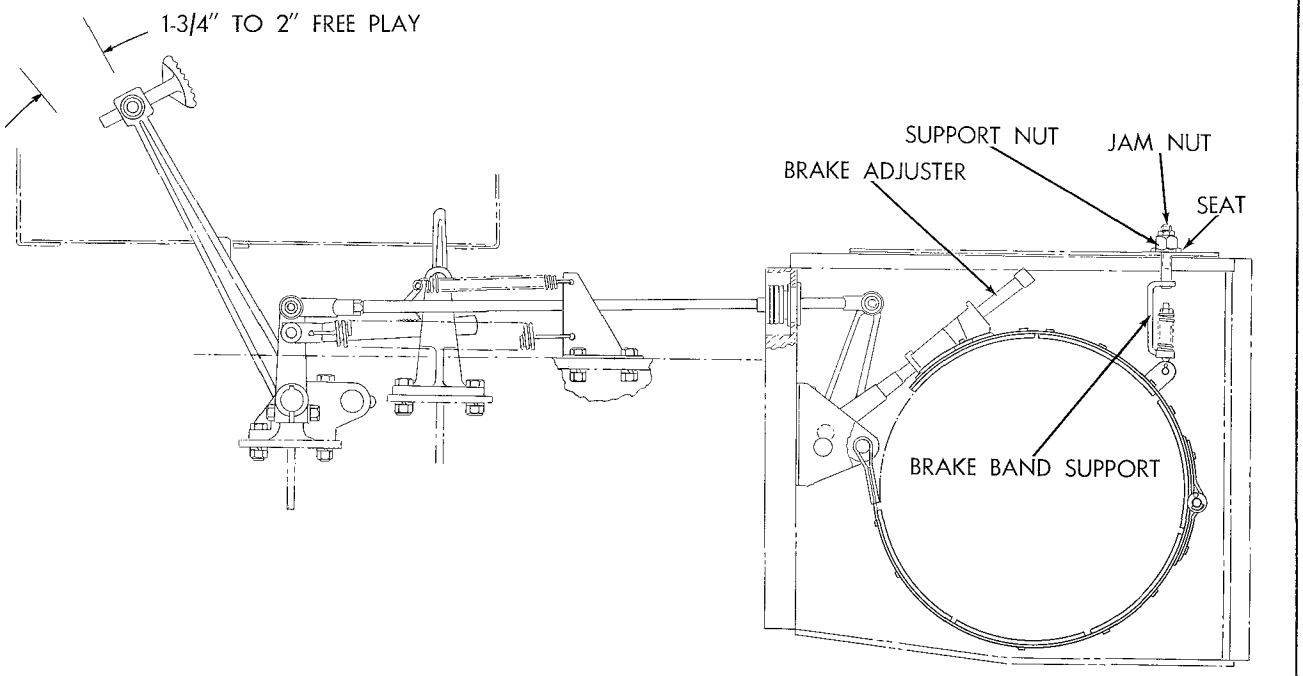
If the brakes are properly adjusted, yet fail to hold, this condition may be due to oil on the brake linings. Remove the steering clutch compartment covers, located over each steering clutch, and observe if oil is present on the brakes. If oil is present on the brakes, this condition can be corrected by washing the brakes in the same manner as washing the steering clutches. Refer to "WASHING STEERING CLUTCHES" and follow steps 1 and 2, then drain the compartments.



Brake Adjustment Location

FIG. 47

Where frequent brake adjustments have been necessary, periodically remove the steering clutch compartment cover, located over each steering clutch, and inspect the brake linings for wear. The brake linings must be replaced before the linings are worn to a point where the lining retaining rivets will contact and score the brake drums.



Steering Brake Adjustment

FIG. 48

B. To Adjust Each of the Steering Brakes

1. Remove the brake adjusting hole cover from the steering clutch compartment cover.

2. Turn the brake adjuster clockwise until the brake pedal has 1¾" to 2" of free travel. NOTE: *When adjusting the brakes it is necessary to turn the adjuster in ½ turn increments so that the lobes on the adjuster will center in the grooves of the spring loaded locking block.*

3. With the brake pedal free (pedal all the way back), loosen the jam nut on the brake band support, then back off the brake band support nut from its seat in the cover. Turn the support nut down until it contacts the seat in the cover and give the nut an additional ½ turn, then lock the support nut in this position with the jam nut; this centers the brake band on the brake drum. Install the brake adjusting hole cover.

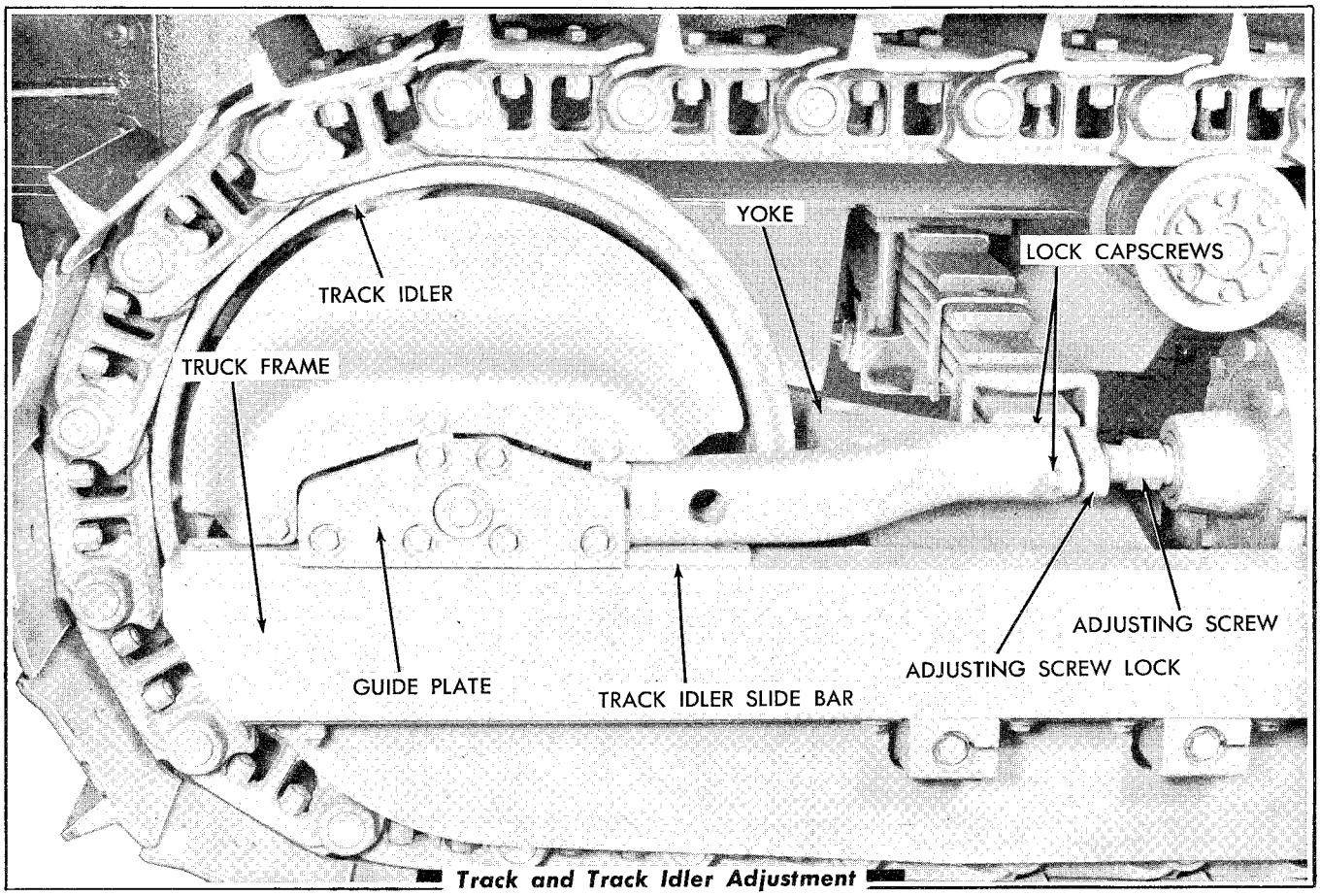
TRACK AND TRACK IDLER ADJUSTMENT

The tracks are correctly adjusted when the upper part of the tracks can be pried up 1½" to 2" above the support rollers with the use of a pry bar. Proper adjustment is important because rapid wear will occur on the tracks and other affected parts if the tracks are too tight or too loose.

To adjust each track, loosen the lock capscrews in the adjusting screw lock, then turn the adjusting screw out of the idler yoke as necessary to force the track idler ahead and tighten the track, or turn the screw into the yoke as necessary to loosen the track. Drive the tractor forward and backward a few times, then check the adjustment of the track. When the correct adjustment of the track is obtained, tighten the capscrews in the adjusting screw lock.

Inspect the upper and lower track idler slide bars. If they are worn excessively they must be replaced or turned to renew the wearing surfaces. Add or remove the shims between the lower slide bars and the truck frames to provide a sliding fit between the track idler brackets and the slide bars.

If the track idler flange is wearing unevenly or cutting on one side, because it is not centered in the track rail assembly, adjust. Remove the track idler guide plates and move sufficient shims from the side which shows no wear to the side which shows excessive wear. Reinstall the guide plates.



Track and Track Idler Adjustment

FIG. 49

PREPARATION OF TRACTOR FOR STORAGE

When the tractor is to be stored during the winter or slack season, make a complete inspection of the machine for loose, worn, or damaged parts and make the necessary repairs before it is stored.

Drain the engine crankcase and all other oil compartments, flush, and refill them with new oil. To protect the fuel injection system, drain the fuel tank, then pour about 10 gallons of a mixture of 40% mineral oil and 60% Perfection Kerosene in the fuel tank and run the engine for 15 minutes to circulate this mixture through the fuel system. This will leave the fuel system filled with the mixture and will prevent corrosion or gumming of the working parts. Major oil companies can supply this storage fuel mixture.

After the tractor has been stored, fill the fuel tank with regular "DIESEL" fuel to minimize condensation in the tank. NOTE: *This fuel need not be drained when the tractor is again placed in service.*

Remove the batteries, clean and store them in a cool, dry place. Test them once a month and recharge them if the specific gravity of the electrolyte falls below 1.250. Keep the specific gravity of the electrolyte above 1.250 to prevent the batteries from freezing.

Drain the cooling system or fill it with an anti-freeze solution that will withstand the lowest anticipated temperature. Cover the exhaust pipe.