Foreword

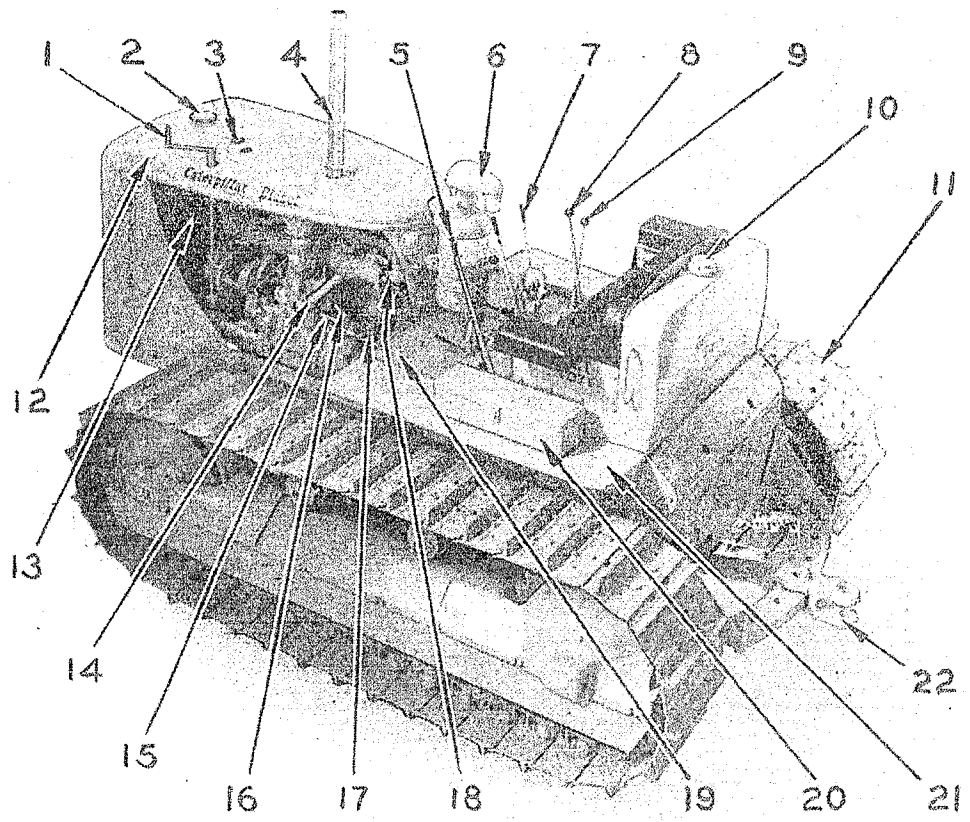
"Caterpillar" products are a combination of advanced engineering, skilled manufacturing, and the finest materials metallurgical science can select. Thousands of satisfying, economical working hours are built into each machine.

Whether or not the owner derives the maximum of service from his machine depends largely on the care exercised in its operation and maintenance. This book is written to give the operator essential information regarding the day-to-day operation, lubrication and adjustment of the machine. Careful adherence to these instructions will result in assured economy.

A great many "Caterpillar" owners depend upon their dealer for service other than the care and adjustments described in this book. This practice is recommended because "Caterpillar" dealers have stocks of genuine "Caterpillar" parts and are equipped with tools designed and built by "Caterpillar". Their servicemen are factory-trained and are kept closely informed by the factory regarding advanced methods of servicing "Caterpillar" products — thus, in all ways they are equipped to render the best of service.

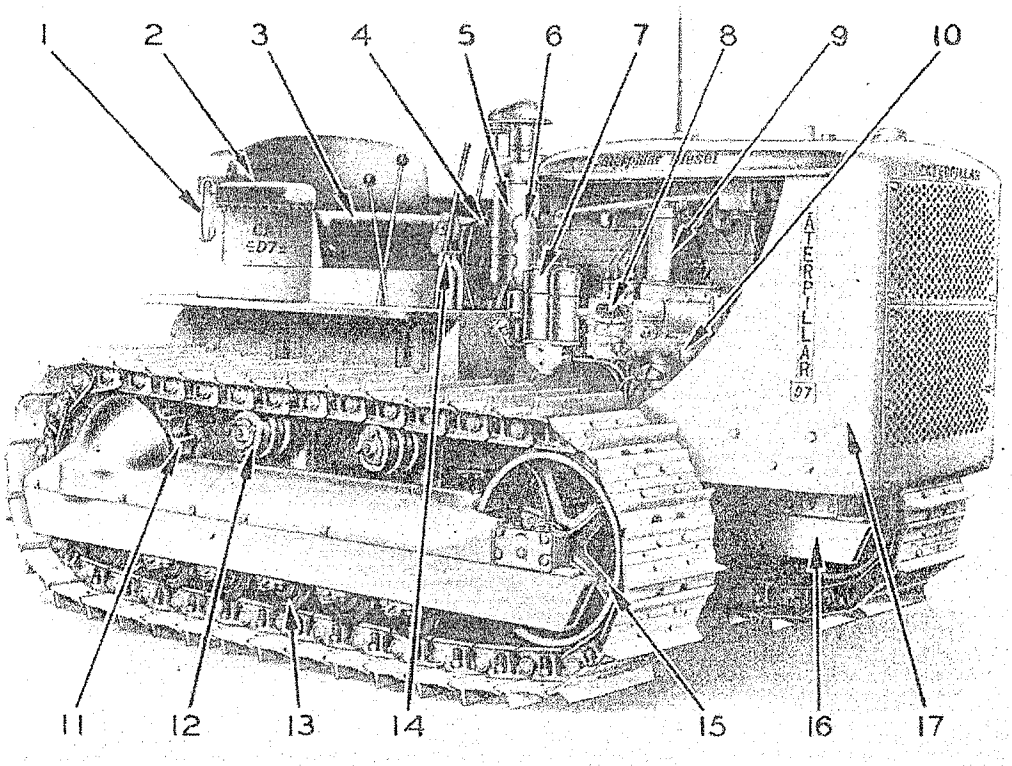
T 2647

Table of Contents



MODEL VIEW (Left Rear)

1—Starting engine crank. 2—Radiator filler cap. 3—Starting engine fuel tank filler cap. 4—Diesel engine exhaust pipe. 5—Flywheel clutch control lever. 6—Precleaner. 7—Steering clutch control levers. 8—Speed selector lever. 9—Forward and reverse lever. 10—Diesel fuel tank filler cap. 11—Track. 12—Hood. 13—Fan. 14—Starting engine exhaust manifold. 15—Starting engine clutch lever. 16—Starting engine pinion lever. 17—Starting engine transmission control lever. 18—Compression release lever. 19—Floor plate. 20—Tool box. 21—Fender. 22—Drawbar.



T9801

MODEL VIEW (Right Front)

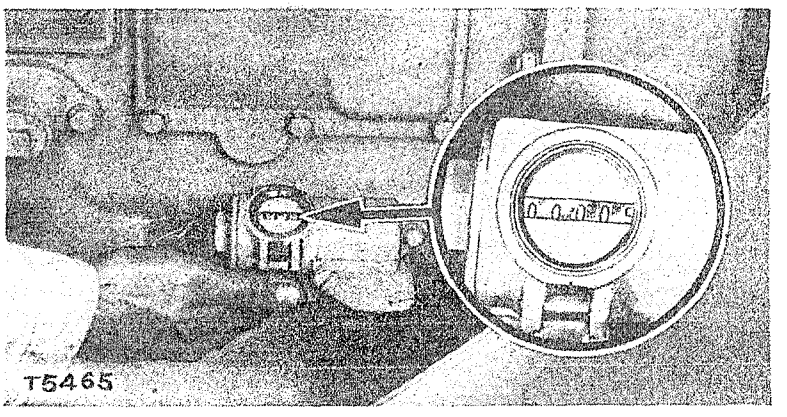
1—Handle. 2—Arm rest. 3—Seat cushion. 4—Governor control lever. 5—Diesel engine air cleaner. 6—Gauges. 7—Lubricating oil filter housing. 8—Fuel injection pump housing. 9—Fuel filter housing. 10—Hour meter. 11—Sprocket. 12—Track carrier roller. 13—Track roller. 14—Steering clutch brake pedal. 15—Front Idler. 16—Track roller frame. 17—Heavy duty radiator guard.

Lubrication Instructions

GENERAL LUBRICATING INFORMATION

Careful attention to the following information on lubricants and their proper selection will add much to performance, economy and long life of your tractor. The lubrication chart specifies the lubricants to be used, the points to be serviced and the hourly intervals of servicing according to "Hour Meter" hours.

All time intervals in the lubrication chart and maintenance instructions are for "Hour Meter" hours, therefore, daily reading will tell when to service the tractor. The "Hour Meter" is located on the right side of the engine near the bottom of the governor housing. It does not keep pace with the clock but when the crankshaft turns as many revolutions as are made in an hour at normal operating speed, the dial advances one number.



COVER ON HOUR METER RAISED TO OBSERVE DIAL READING

Drain oil, check oil levels and refill compartments with the tractor level. It is best to drain oil when it is warm, after the tractor has run for some time. Then, most of the sediment will be in suspension and therefore, will readily drain.

Use the brush supplied in the tool equipment when removing dirt from fittings and cleaning around air cleaners, breathers, and inspection covers. Lubricate all miscellaneous points, not equipped with fittings, with crankcase lubricating oil every 60 hours.

Naturally, any precautions taken during cold weather to house the tractor, cover it with a tarpaulin, or warm it before starting, will cause more rapid oil distribution and contribute to quicker starting. The engine should always be allowed to idle at not less than half engine speed for several minutes after starting to assure adequate lubrication before operating at normal load.

All oil companies have adopted the S.A.E. (Society of Automotive En-

oils and transmission oils in terms of viscosity or fluidity. The oils with the lower numbers are lighter, and flow more readily than do the oils with the higher numbers. The S.A.E. number refers only to the viscosity of the oil, and has reference to no other characteristic or property.

The following topic recommends the types, viscosities and grade of lubricants best suited for use in your tractor for various operating temperatures.

CRANKCASE LUBRICATING OIL
(Abbreviated CO)

At temperatures above freezing, S.A.E. No. 30 oil should be used in all compartments.

At temperatures below freezing S.A.E. No. 10W oil should be used to provide better lubrication at low temperatures and also to make cranking easier. For a number of years S.A.E. No. 10 grade crankcase lubricating oil as classified by the Society of Automotive Engineers was recommended. A change in S.A.E. specifications for crankcase lubricating oil eliminates the S.A.E. No. 10 grade which is replaced by S.A.E. No. 10W grade.

S.A.E. No. 10W oil should be fluid enough for easy cranking at temperatures down to at least −10°F. In lower temperatures it may be necessary to dilute S.A.E. No. 10W oil with kerosene (except in air cleaners) so it will be fluid enough to insure free circulation. Evaporation in the engine crankcase under steady operation may make it necessary to again add kerosene to maintain proper fluidity. This should be done before stopping, then operate the engine for a few minutes to mix the kerosene and oil.

For an approximate check to determine if the oil will flow, remove the oil level gauge and if the oil on it will flow off, the oil is fluid enough to properly circulate in the engine.

NOTE

Detergent type oils that are recommended for use in "Caterpillar" Diesel Engines will, within a short period of operation, become much darker in color. This should not be any cause for concern. The darkening of the oil is due to minute particles of carbon, resulting from the combustion process, being held in suspension in the oil. This ability to hold carbon particles in suspension is one of the primary functions of a detergent type lubricant. Otherwise, these particles would settle out, eventually leading to objectionable deposits in the engine. When the oil darkens, therefore, it is an indication that it is keeping the engine clean and insuring satisfactory lubrication performance.

(CO) Superior Lubricants (Series 2): Lubricating oils known as Superior Lubricants (Series 2) for "Caterpillar" Diesel Engines should be used in the Diesel Engine crankcase for most satisfactory service. The exceptional value of these oils is in the fact that they have long service life. Long service life of the oil provides for less frequent oil change periods as well as extending engine service life. In addition to having the quality of long service life they combat detrimental effects of high sulphur fuels.

See the following chart for recommended oil change periods.

SUPERIOR LUBRICANTS (SERIES 2) CHANGE PERIOD CHART

FUEL SULPHUR CONTENT	OIL CHANGE PERIOD	FILTER ELEMENT CHANGE PERIOD	
		FULL FLOW	BY-PASS
1.0% OR LESS	480 HRS.	240 HRS.	240 HRS. **
1.0% TO 1.5%	480 TO 240 HRS. *	240 HRS.	240 HRS. **
ABOVE 1.5%	240 HRS.	240 HRS.	240 HRS. **

* As the fuel sulphur content increases between 1.0% and 1.5% it may be necessary to make oil change periods more frequently.

** Change by-pass filter elements every 240 hours except under severe dusty operating conditions when changes should be made at 120 hour intervals. T16830

If Superior Lubricants (Series 2) are not available crankcase lubricating oils meeting the requirements of MIL-L-2104A specifications can be used successfully in the Diesel engine crankcase when the fuel sulphur content is less than 0.4%. For the recommended oil change periods see the following chart.

MIL-L-2104A OIL CHANGE PERIOD CHART

FUEL SULPHUR CONTENT	OIL CHANGE PERIOD	FILTER ELEMENT CHANGE PERIOD	
0.4% OR LESS	240 HRS.	FULL-FLOW 240 HRS.	BY-PASS 240 HRS. †

† Change by-pass filter elements every 240 hours except under severe dusty operating conditions when changes should be made at 120 hour intervals. T16831

(CO) Straight Mineral, MIL-L-2104A Oils Or Superior Lubricants (Series 2): In compartments other than the Diesel engine crankcase where crankcase lubricating oil is recommended (such as starting engine crankcase, Diesel and starting engine air cleaners† and fuel injection pump housing) use either straight mineral crankcase lubricating oil, an oil conforming to the requirements of MIL-L-2104A Specification or Superior Lubricants (Series 2) whichever is most convenient and economical.

† For air cleaners it is permissible to use clean reclaimed oil or the most inexpensive straight mineral oil. Be sure to change oil in the air cleaners regularly

BALL AND ROLLER BEARING LUBRICANT
(Abbreviated BR)

(BR) This grease is mixture of mineral oil and metallic soaps. Use No. 2 grade for most temperatures. For extremely low temperatures use No. 0 or No. 1 grade.

This grease can be applied to all bearing points — plain bushings, ball bearings and roller bearings — where equipped with hydraulic pressure fittings or when bearings are hand packed.

Use only a high grade Ball and Roller Bearing Grease of short fiber. This grease must be satisfactory in anti-friction bearings at speeds up to 3000 RPM at a maximum temperature of 300° F. It is a lubricant with sufficient adhesive qualities to cling to the bearings in all extremes of high and low operating temperatures. Greases of this kind have been classified by grades by the N.L.G.I. (National Lubricating Grease Institute) designated in order of "worked" penetration or consistency.

TRACK ROLLER LUBRICANT
(Abbreviated RL)

(RL) This is a stringy, tacky lubricant of a semi-fluid consistency at the prevailing atmospheric temperature. This lubricant developed for track rollers is recommended for use at points provided with button head fittings. It can be handled readily in the standard volume compressor.

In sub-zero weather, crankcase lubricating oils may be used when track roller lubricant is too heavy to be handled in the compressor.

TRANSMISSION OIL
(Abbreviated TO)

(TO) Use a straight mineral transmission oil that will flow and will not channel at existing operating temperatures. For temperatures above freezing use S.A.E. No. 90 oil. When operating continuously in extremely hot temperature use S.A.E. No. 140 oil. Below freezing, an oil of lower viscosity S.A.E. No. 80, will be required. In extremely cold weather the oil should be diluted with sufficient kerosene to provide fluidity.

CAUTION

Under no circumstances should the track be lubricated. The stiffness noted between the links of a new track is not caused by a lack of clearance between the track pins and bushings, and it will disappear as the track wears in.

LUBRICATION CHART

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL D7 TRACTOR

The folded page is arranged to serve two purposes:

First, it is a complete outline of all the information required to lubricate the tractor.

Second, the illustration and identification of points of lubrication can be used with the detailed illustrations and information on the pages following the chart as a reference and service information.

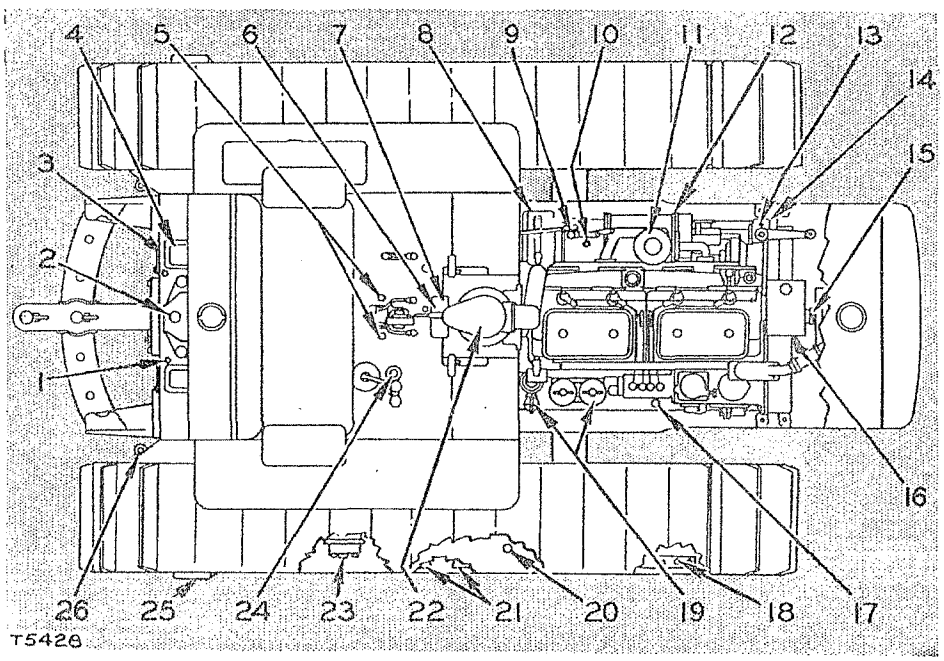
Key To Lubricants

CO Crankcase Lubricating Oil. **TO** Transmission Oil.
BR Ball and Roller Bearing Lubricant. **RL** Track Roller Lubricant.

Identification Of Points Of Lubrication, Lubricant To Apply And Interval Of Service

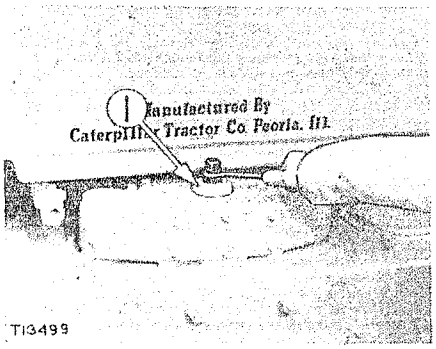
Point	Identification	Lubricant	5 HRS.	10 HRS.	20 HRS.	60 HRS.	120 HRS.	240 HRS.	480 HRS.	900 HRS.	2000 HRS.
1	Steering Clutch Release Bearing	BR		***X							
2	Hydraulic Steering Clutch Housing	CO						X		X	
3	Track Roller Frame Inner Bearings	BR	†X		X						
4	Steering Clutch Release Arm Bearings	BR						X			
5	Shaft Bearings For Steering Clutch Controls, Flywheel Clutch Control and Brake Pedals	BR			X						
6	Universal Joint	BR								X	
7	Flywheel Clutch Compartment	CO		X						X	
8	Starting Engine Transmission	TO						X		X	
9	Starting Engine Clutch and Pinion Lever Bearings	BR					X				
10	Starting Engine Clutch Shift Collar	CO			X						
11	Starting Engine Air Cleaner	CO				X					
12	Starting Engine Crankcase	CO		X			X	X			
13	Top Starting Crank Shaft Housing	BR				X					
14	Starting Engine Crank Gear Housing	CO					X			X	
15	Fan Bearings	BR						X			
16	Engine Front Support Bearing	BR					††X				
17	Fuel Injection Pump Housing	CO					X	X			
18	Front Idlers	RL	†X				X				
19	Diesel Engine Crankcase	CO		X				X	X		
20	Track Adjusting Nut	BR							**X		
21	Track Rollers	RL	†X				X				
22	Diesel Engine Air Cleaner	BR		X		X					
23	Track Carrier Rollers	RL	†X				X				
24	Transmission	TO					X			X	
25	Track Roller Frame Outer Bearings	BR	†X		X						
26	Final Drive Cases	TO					X		*†X	X	

Location of Points of Lubrication



*Only when operating in extremely dusty conditions.
**Only on tractors after 3T4931.
†Only when operating in deep mud and water.
††On tractors before 3T7641.
***On earlier tractors where oil cups are provided.

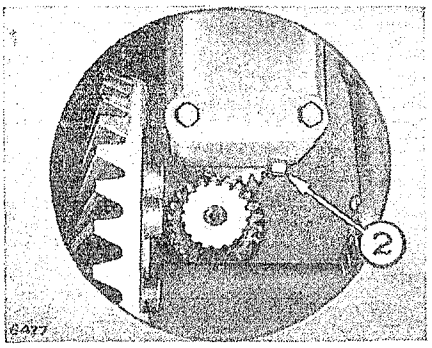
CO Crankcase Lubricating Oil



2

HYDRAULIC STEERING CLUTCH HOUSING

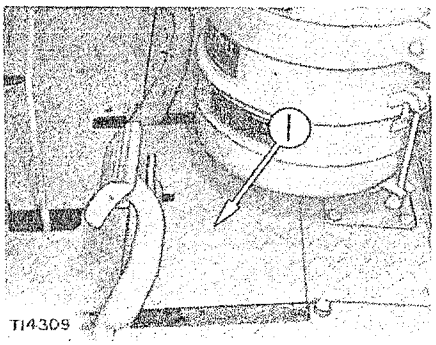
Check oil level at filler opening (1) every 240 hours. Keep oil level up to 1 inch (2.54 cm.) of top of housing. After filling housing to above level, move steering clutch control levers back and forth a few times to force out entrapped air; add lubricant to bring oil to proper level. Prevent any dirt from entering the housing.



2

HYDRAULIC STEERING CLUTCH HOUSING

Every 900 hours, drain the housing by removing the center cover on the back of the steering clutch case and the plug (2) in the bottom of the hydraulic steering pump housing. If rear mounted equipment interferes with removing the drain plug, suck out the oil through the filler opening. Use care to prevent dirt entering the housing. Fill the housing to the proper level.



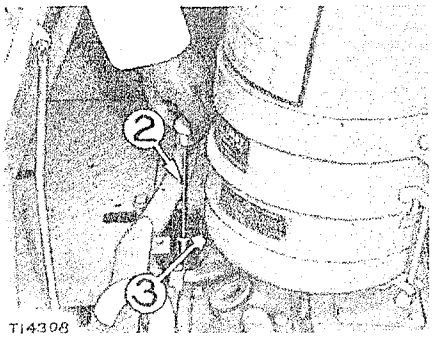
7

FLYWHEEL CLUTCH COMPARTMENT

(Effective with Tractors 3T23647)

Remove inspection cover (1) and check oil level in the clutch compartment every 10 hours with the engine stopped. Oil should be kept up to the full mark on gauge (2).

Every 900 hours remove clutch inspection floor plate cover, then remove and disassemble breather (3) and wash the element by shaking it in some non-inflammable cleaning fluid that will dry free of oil film.



CO Crankcase Lubricating Oil

7

FLYWHEEL CLUTCH COMPARTMENT

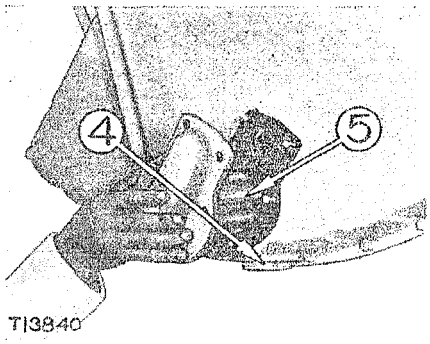
(Effective with Tractors 3T23647)

Every 900 hours drain the clutch compartment by removing drain plug (4).

Remove and wash oil pump suction screen (5) at each oil change period.

Clean the magnetic drain plug.

When removing the suction screen be careful not to damage the gasket. Install the suction screen and drain plug.



7

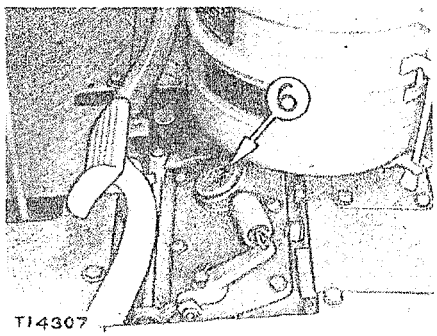
FLYWHEEL CLUTCH COMPARTMENT

(Effective with Tractors 3T23647)

Extreme care should be taken to prevent dirt getting into the clutch compartment when removing the filler plug (6) for filling.

Remove clutch inspection floor plate cover. Remove filler plug and fill compartment to full mark on gauge.

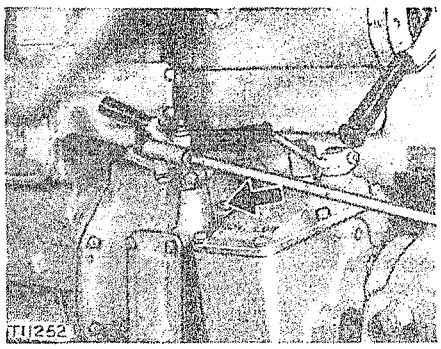
Approximately 18 qts. of oil is required to fill the compartment. Install filler plug tightly.



10

STARTING ENGINE CLUTCH SHIFT COLLAR

Fill oil cup every 20 hours.

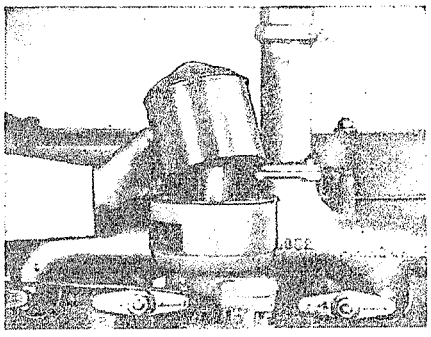


11

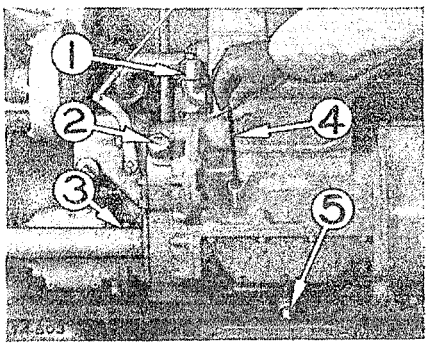
STARTING ENGINE AIR CLEANER

Inspect the oil in the air cleaner cup every 60 hours. Wash and refill cup to oil level bead when oil will not flow freely or if the sediment in the cup is 1/4 inch deep. See the topic, "Air Cleaners."

Refill the cup with the same S.A.E. grade of oil as is used in the Diesel engine crankcase and the same type of oil may also be used. However, it is permissible to use clean, undiluted reclaimed oil or the most inexpensive straight mineral oil. See the topic, "Lubricants."



CO Crankcase Lubricating Oil



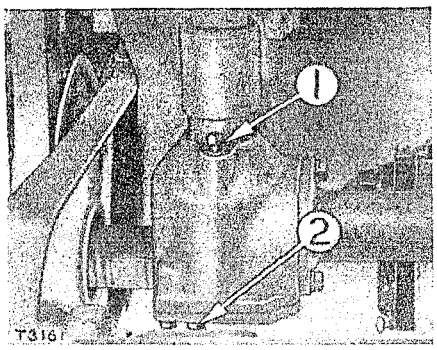
12

STARTING ENGINE CRANKCASE

Every 10 hours check oil level (4).

Every 120 to 240 hours, depending on dust, drain crankcase (5), (two drain plugs on tractors before 3T7246) wash and refill (2) to oil level (4). At every oil change wash and oil breather (1).

Every 900 hours oil impulse starter located at (3) on engines equipped with Eisemann magnetos.

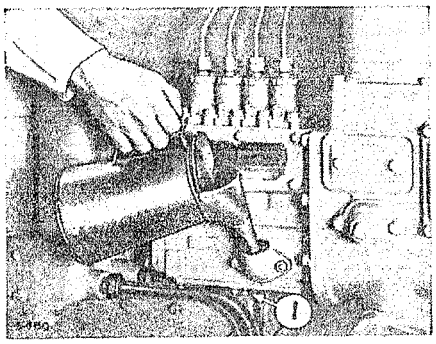


14

STARTING ENGINE CRANK GEAR HOUSING

Check lubricant level at filler plug (1) every 120 hours. Keep level to filler plug opening. Drain housing by removing plug (2) every 900 hours.

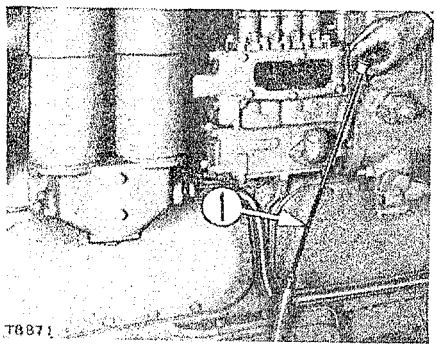
The top starting crank on tractors before 3T11973 is special equipment.



17

FUEL INJECTION PUMP HOUSING

Check level every 120 hours. Keep filled to top of filler elbow. Drain (1) and refill every 240 hours.



19

DIESEL ENGINE CRANKCASE

Check oil level with engine running, every 10 hours. Oil should be up to full mark (1) on gauge. See topic, "Crankcase Lubricating Oil"–also see Note A.

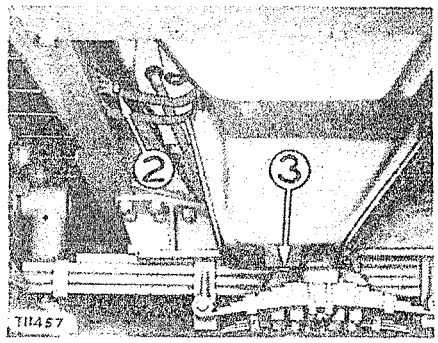
NOTE A: "Caterpillar" Diesel Engines are built in a clean modern Diesel engine factory and each crankcase is filled with a good quality of new crankcase oil. For these reasons the initial crankcase oil change period for this engine should be at 240 hours.

CO Crankcase Lubricating Oil

19

DIESEL ENGINE CRANKCASE

Every 240 or 480 hours depending on type of crankcase lubricating oil used, drain crankcase (3) and oil cooler at (2) while the engine is hot. See the topics, "Crankcase Lubricating Oil" and "Crankcase Lubricating Oil System".



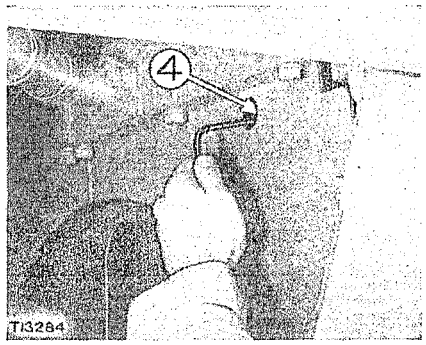
19

DIESEL ENGINE CRANKCASE

Open oil cooler vent valve (4) so the oil will drain more rapidly from the oil cooler each time the crankcase is drained.

On tractors 7M2169 to 3T19336 the oil cooler is vented by removing a plug on the back side of the radiator in the upper right corner.

On tractors before 7M2169 the oil cooler is vented by removing a plug at upper right side of radiator.

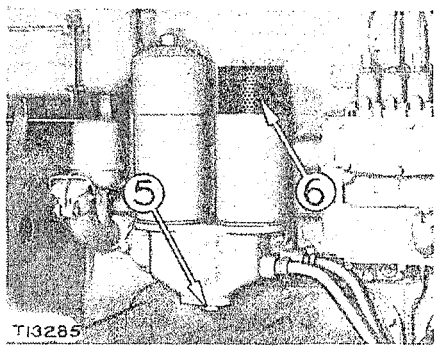


19

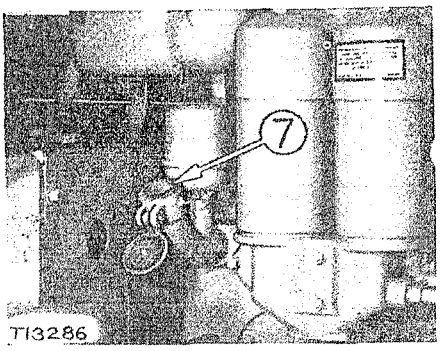
DIESEL ENGINE CRANKCASE LUBRICATING OIL FILTER

On tractors effective with 3T15942 or those equipped with full-flow crankcase lubricating oil filter change-over groups, remove the plug (5) from the filter base to drain the unfiltered oil from the base and replace the filter elements (6) with new elements at every 240 hour interval. See the topic, "Crankcase Lubricating Oil System".

On tractors before 3T15942 not equipped with full-flow crankcase lubricating oil filters, wash the metallic strainer elements and replace the inner elements with new elements at 240 hours. When operating in extremely dusty conditions, wash the metallic strainer elements and replace the inner elements every 120 hours. See the topic, "Crankcase Lubricating Oil System".



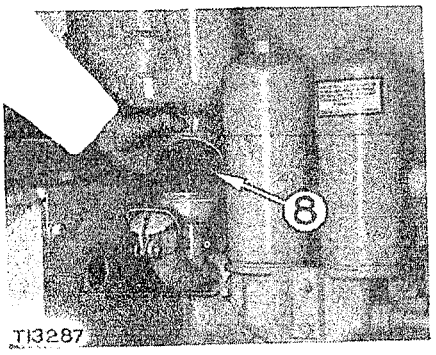
CO Crankcase Lubricating Oil



19

DIESEL ENGINE CRANKCASE

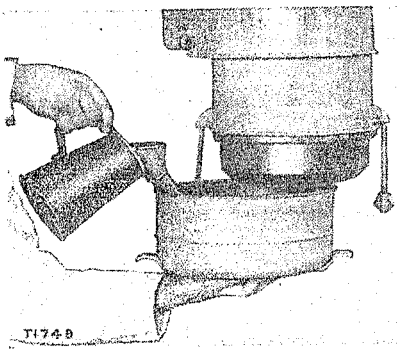
After draining crankcase refill at (7) and start the Diesel engine. Run engine for two minutes then add oil to bring level to full mark on gauge.



19

DIESEL ENGINE CRANKCASE BREATHER

Wash breather element (8) each time crankcase oil is drained. Pour 1/4 pint (0.12 liter) oil through element and install.

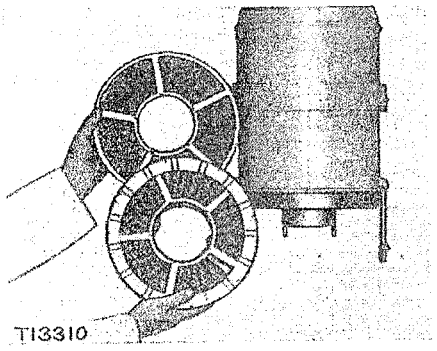


22

DIESEL ENGINE AIR CLEANER CUP

Inspect the oil in the air cleaner cup every 10 to 60 hours depending upon dust conditions. Wash and refill cup to oil level bead either when the oil will not flow freely, the sediment in the cup is 1/2 inch deep, or every 60 hours, whichever occurs first. See the topic, "Air Cleaners".

Refill the cup with the same S.A.E. grade of oil as is used in the Diesel engine crankcase and the same type of oil may also be used. However, it is permissible to use clean, undiluted reclaimed oil or the most inexpensive straight mineral oil. See the topic, "Lubricants."



22

DIESEL ENGINE AIR CLEANER SCREENS

When the oil cup is removed for inspection, remove the air cleaner screens inspect and wash if dirty. Inspect the inside of the air cleaner inlet pipe and clean if necessary. Clean the inside of the air cleaner inlet pipe every 60 hours. See the topic, "Air Cleaners."

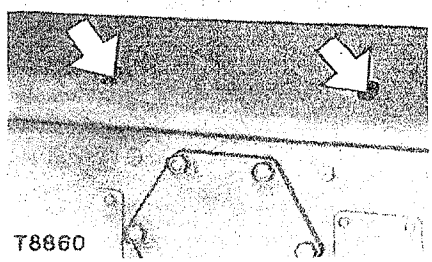
BR Ball And Roller Bearing Lubricant

1

STEERING CLUTCH RELEASE BEARINGS

Lubricate each bearing sparingly every 10 hours.

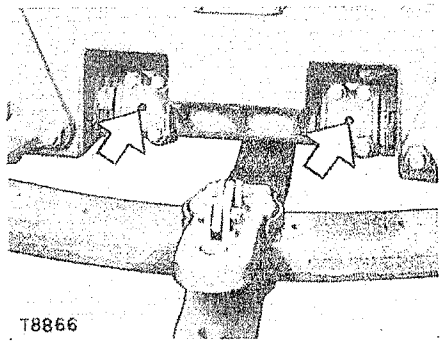
On tractors before 7M5054 lubricate steering clutch release bearings by filling oil cups with CO every 10 hours.


T8860

3

TRACK ROLLER FRAME INNER BEARINGS

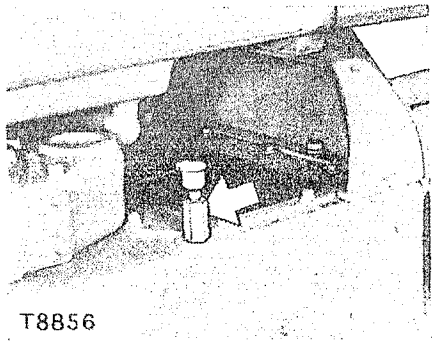
Lubricate two bearings every 20 hours. One fitting for each bearing. If operating in deep mud or water, lubricate every 5 hours.


T8866

4

STEERING CLUTCH RELEASE ARM BEARINGS

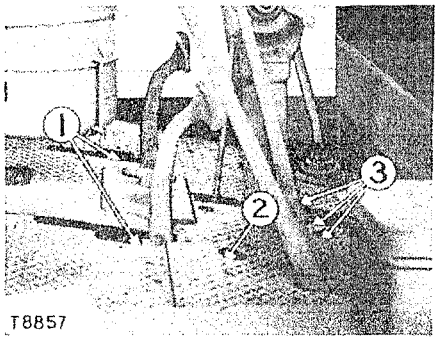
Every 240 hours lubricate top and bottom Steering Clutch Release Arm bearings on tractors before 7M5054. See Note B.


T8856

NOTE B: Steering Clutch Release Arms: Tractors effective with 7M5054 are equipped with a steering clutch releasing mechanism that does not incorporate the release arms, making lubrication at this point unnecessary.

NOTE C: Flywheel Clutch Sliding Collar: Tractors 7M965 to 7M6347 the fitting lubricates only the sliding collar. Tractors before 7M965 are not equipped with a fitting at this point. Tractors 3T8955 to 3T23646 have two fittings on collar. Tractors effective with 3T23647 are equipped with an oil type flywheel clutch.

BR Ball And Roller Bearing Lubricant

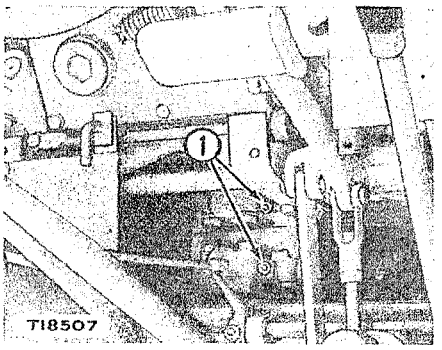


T8857

5

FLYWHEEL CLUTCH, BRAKE PEDAL AND STEERING CLUTCH LEVER SHAFT BEARINGS

Effective with 3T23647 lubricate two fittings at (3) every 20 hours. Tractors equipped with fittings at points (1), (2) and (3) require lubrication every 20 hours.



T18507

6

UNIVERSAL JOINTS

Every 900 hours remove inspection floor plate cover and lubricate universal joints through fittings (1).

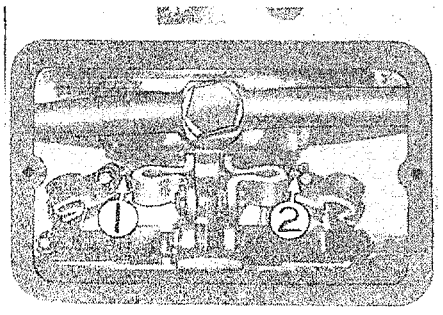
Care must be taken when lubricating the universal joint bearings so that the internal sealing rings are not damaged by excessive pressure. Floor plate removed for illustration purpose only.

FLYWHEEL CLUTCH SLIDING COLLAR AND RELEASE BEARING

(Tractors before 3T23646)

Every 10 hours remove cover and lubricate flywheel clutch sliding collar (1) and release bearing (2) through two fittings on collar. Replace cover gasket if damaged.

Tractors 7M6347 to 3T8955 lubricate collar and bearing through one fitting. Tractors before 7M6347 shift collar was used instead of release bearing. Tractors 7M4325 to 7M6347 lubricant is applied through fitting on outside of clutch enclosure. Tractors 7M2108 to 7M4325 lubricate through oil cup on clutch yoke with transmission oil. See Note C.

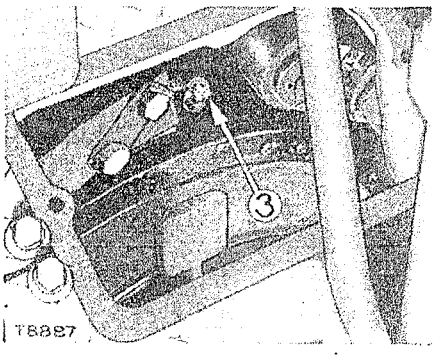


T8886

FLYWHEEL CLUTCH DRIVE PLATE BEARING

(Tractors before 3T23646)

Lubricate sparingly through fitting (3) every 10 hours. Rotate flywheel to reach fitting. See NOTE D. Replace cover gasket if damaged.



T8887

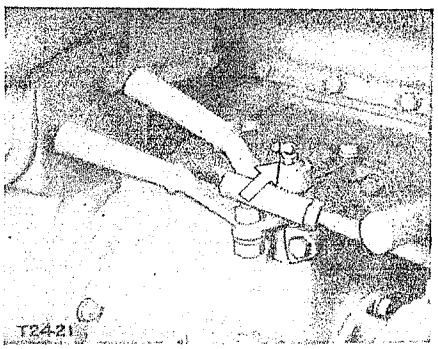
NOTE D: Flywheel Clutch Driving Plate Bearing: On tractors before 7M4325, that are equipped with open clutch, it is necessary to remove center section of the floor plate to lubricate this bearing.

BR Ball And Roller Bearing Lubricant

9

STARTING ENGINE CLUTCH AND PINION LEVER BEARINGS

Lubricate every 120 hours.

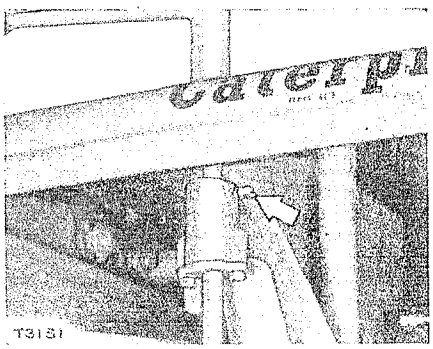


13

TOP STARTING CRANK SHAFT BEARING

Lubricate bearing every 60 hours.

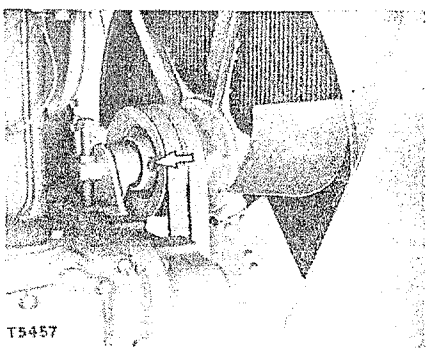
Tractors before 3T11973 the top starting crank is special equipment.



15

FAN BEARING

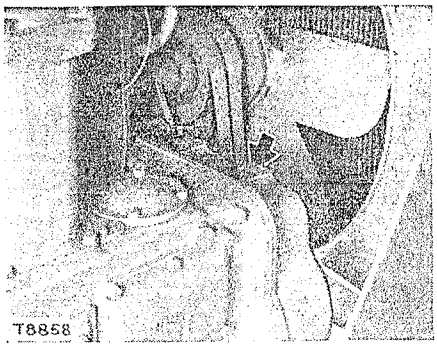
Lubricate every 240 hours.



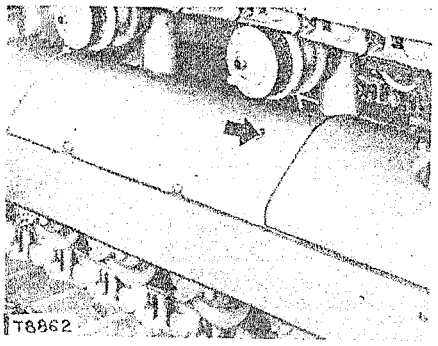
16

ENGINE FRONT SUPPORT BEARING

Lubricate bearing every 120 hours on earlier tractors equipped with lubricant fitting.



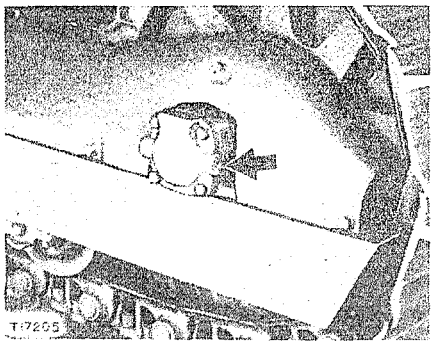
BR Ball And Roller Bearing Lubricant



20

TRACK ADJUSTING NUT

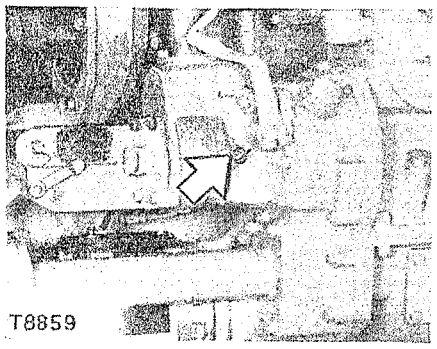
Lubricate nut every 240 hours where fitting is provided.



25

TRACK ROLLER FRAME OUTER BEARINGS

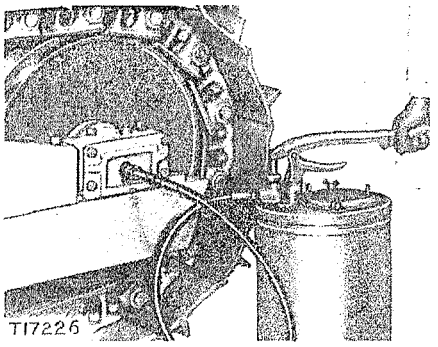
Lubricate two bearings every 20 hours, one fitting on each side of the tractor. When operating in deep mud or water lubricate every 5 hours.



STARTING ENGINE WATER PUMP DRIVE SHAFT BEARING

On earlier models, lubricate bearing every 120 hours.

RL Track Roller Lubricant



18

FRONT IDLERS

Lubricate through fitting on both sides of tractor every 120 hours. If operating in deep mud or water, lubricate every 5 hours. See Note E.

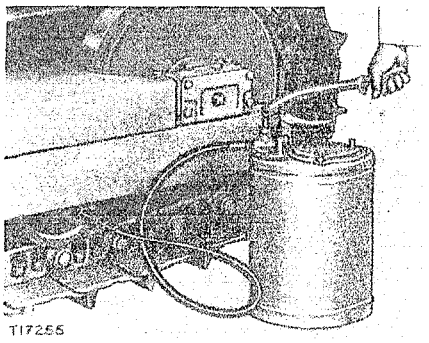
NOTE E: Apply grease with the volume compressor only until resistance is felt on the handle of the compressor. Further pumping may damage the seals.

RL Track Roller Lubricant

21

TRACK ROLLERS

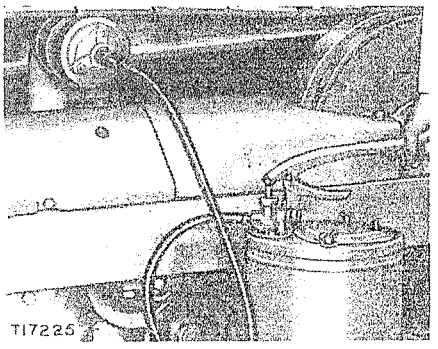
Lubricate each roller on both sides of tractor every 120 hours. If operating in deep mud or water, lubricate every 5 hours. See Note E.



23

TRACK CARRIER ROLLERS

Lubricate rollers on both sides of tractor every 120 hours. If operating in deep mud or water, lubricate every 5 hours.

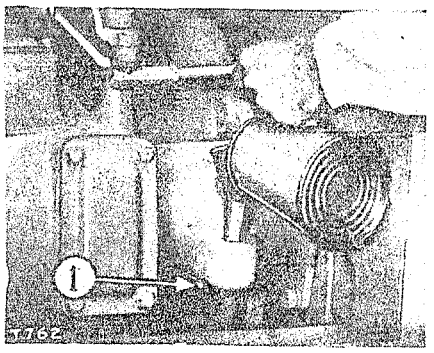


TO Transmission Oil

8

STARTER PINION SHAFT HOUSING

On tractors not equipped with starting engine transmission, drain housing at (1), wash and refill every 900 hours. See the topic, "Washing Gear Compartments".

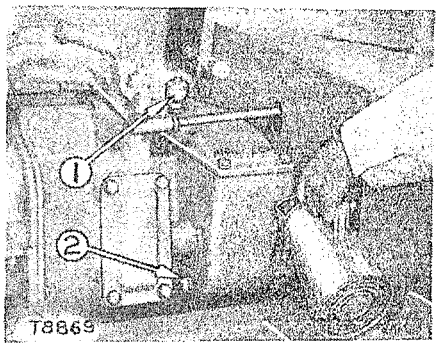


8

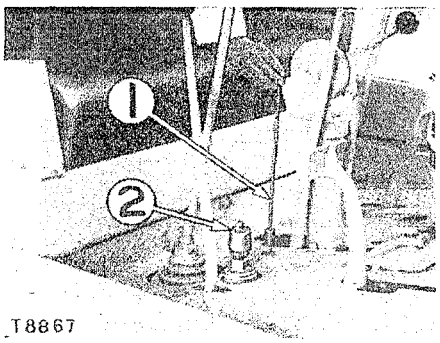
STARTING ENGINE TRANSMISSION

Every 240 hours check oil level. Fill to filler opening, remove breather (1), disassemble and wash.

Drain at (2), wash, and refill starting engine transmission every 900 hours. See topic, "Washing Gear Compartments"



TO Transmission Oil

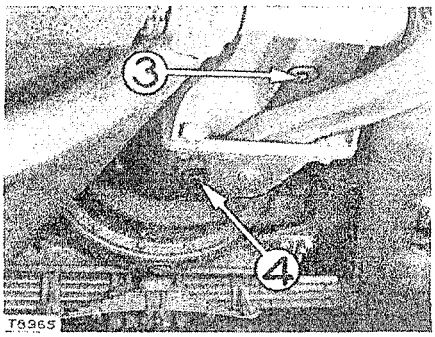


T8867

24

TRANSMISSION

Check oil level every 120 hours and keep filled to full mark (1) on gauge. Oil in bevel gear compartment adjusts itself to level in speed change compartment. See the topic, "Continuous Operation on Stationary Work."



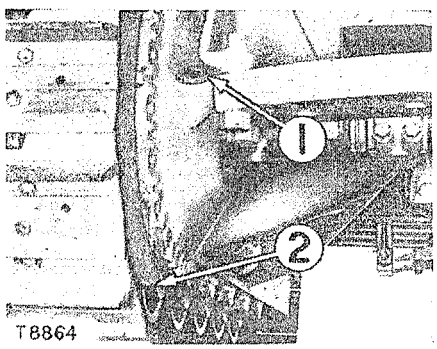
T8965

24

TRANSMISSION

Drain bevel gear compartment at (3) and speed change compartment at (4) every 900 hours, wash and refill at (2) to level mark an gauge. On later tractors equipped with breather on filler cap, disassemble breather and wash the element by shaking it in gasoline.

Clean the collected particles from the magnetic drain plugs before installing them. See the topic "Washing Gear Compartments."



T8864

26

FINAL DRIVE

Check oil level at (1) by removing the filler plug, one for each side, every 120 hours. Keep lubricant to level of filler opening. Drain compartment at (2), wash and refill it every 900 hours (480 hours when operating in extremely dusty conditions). See topic, "Washing Gear Compartments".

Lubrication Of Attachments

(For further attachment information see page 86)

The following list of identifying letters, names of attachments requiring lubrication, and type of lubricant required will help in lubrication of attachments.

A. STARTING ENGINE ELECTRIC STARTER . . . . . CO
B. GENERATOR . . . . . CO
C. FRONT POWER TAKE-OFF BEARING AND COUPLING . . . . BR
D. REAR POWER TAKE-OFF HOUSING (DIRECT DRIVE) . . . . TO
E. REAR POWER TAKE-OFF AND BELT PULLEY DRIVE CONTROL SHAFT . BR
F. BELT PULLEY DRIVE HOUSING . . . . . TO
G. BREATHER FOR BELT PULLEY DRIVE HOUSING . . . . . CO
H. REAR POWER TAKE-OFF HOUSING (REDUCTION DRIVE) . . . TO

Lubrication Points Charted Under Hourly Intervals By Lubricants

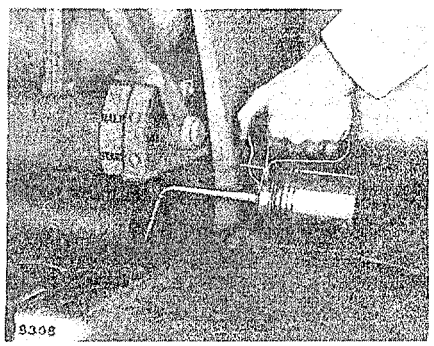
INTERVALS / LUBRICANTS	Every 60 HRS.	Every 120 HRS.	Every 240 HRS.	Every 900 HRS.
CO		A-B	G	
BR	C-E			
TO		D-F-H		D-F-H

CO Crankcase Lubricating Oil

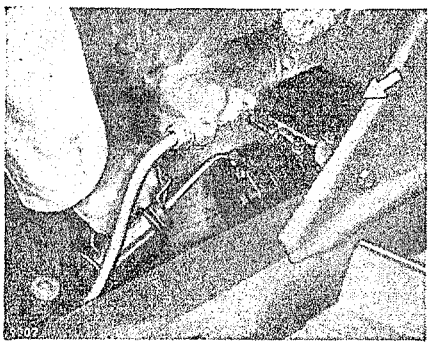
A

STARTING ENGINE ELECTRIC STARTER

Lubricate bearing with two or three drops of oil every 120 hours.



CO Crankcase Lubricating Oil

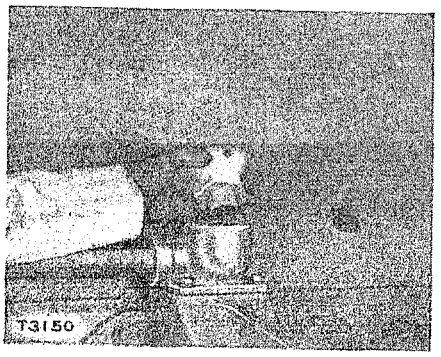


B

GENERATOR

Lubricate rear bearing and front bearing with two or three drops of oil every 120 hours.

Some generators have bearings packed with ball and roller bearing grease making lubrication necessary only when the generator is disassembled for cleaning or servicing.

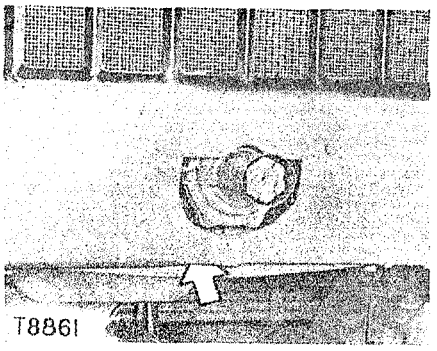


G

BREATHER FOR BELT PULLEY DRIVE HOUSING

Remove the breather every 240 hours and wash it with kerosene. Saturate element with oil and reinstall breather.

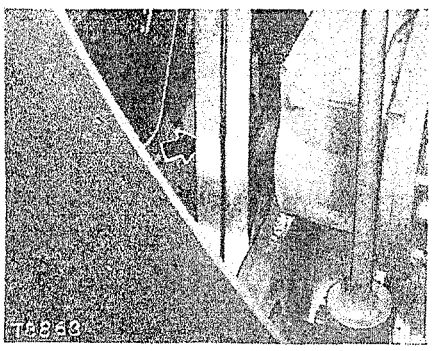
BR Ball And Roller Bearing Lubricant



C

FRONT POWER TAKE-OFF BEARING

Lubricate bearing every 60 hours. Do not over lubricate. Excess lubricant may work out on belts resulting in excessive wear.



C

FRONT POWER TAKE-OFF COUPLING

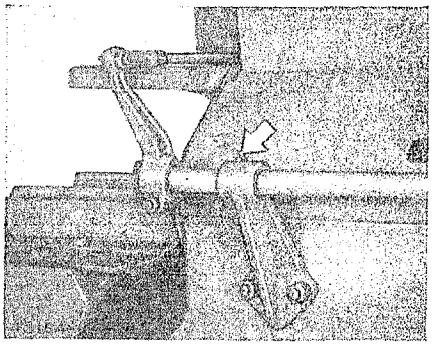
Lubricate sparingly every 60 hours. Excess lubricant may work out on to fan belts resulting in excessive wear.

BR Ball And Roller Bearing Lubricant

E

REAR POWER TAKE-OFF AND BELT PULLEY DRIVE CONTROL SHAFT

Lubricate bearing every 60 hours.



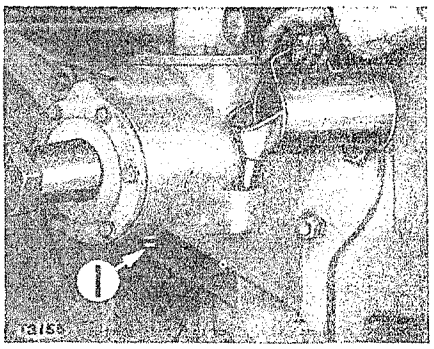
TO Transmission Oil

D

REAR POWER TAKE-OFF HOUSING (Direct Drive)

Check oil level at filler opening every 120 hours and bring level to opening. Over filling will cause excessive heat.

Drain housing by removing plug (1) every 900 hours. Wash housing and refill. See the topics, "Washing Gear Compartments" and "Continuous Operation on Stationary Work".

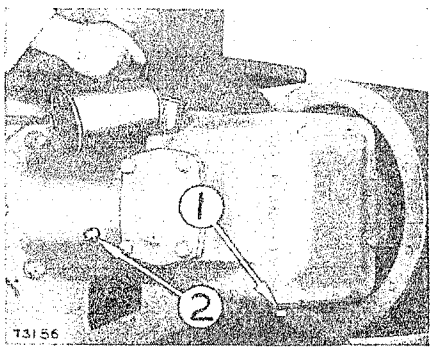


F

BELT PULLEY DRIVE HOUSING

Check oil level at level plug (2) every 120 hours. Keep lubricant to level of plug opening. Over filling will cause excessive heat.

Remove plug (1) to drain housing every 900 hours, wash housing and refill. See the topics, "Washing Gear Compartments" and "Continuous Operation on Stationary Work".

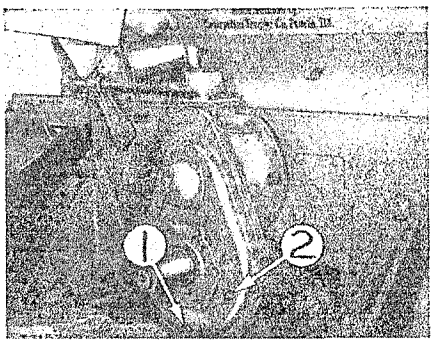


H

REAR POWER TAKE-OFF HOUSING (Reduction Drive)

Check oil level at level plug (2) every 120 hours and bring level to plug opening. Over filling will cause excessive heat.

Drain housing by removing plug (1) every 900 hours, wash housing and refill to level plug opening. See the topics, "Washing Gear Compartments" and "Continuous Operation on Stationary Work".



Operation Instructions

Information on Attachments for This Tractor Begins on Page 86

PREPARING THE TRACTOR FOR USE

New Tractor Initial Service: The first duty of anyone charged with the care and operation of a tractor is to give it a detailed inspection, and to lubricate all parts as directed in the LUBRICATION INSTRUCTIONS section of this book.

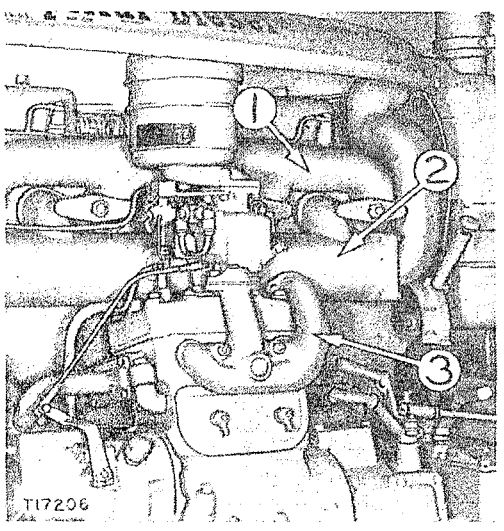
Fill the Diesel fuel tank, taking care no dirt, water, or other foreign substances are admitted with the fuel. Give particular attention to the details of fuel handling as outlined under the topic, CARE OF THE FUEL SUPPLY. Fill the starting engine fuel tank with gasoline.

Fill the cooling system with clean soft water, or with the correct antifreeze solution if temperatures below freezing are likely to be encountered. See the topic, COOLING SYSTEM.

During the initial operation of the tractor, the capscrews of the track roller end collars, the track shoe bolts, the inlet manifold stud nuts and the equalizer spring clips should be checked and tightened if necessary. Since these parts are subjected to continued stress, periodic checks should be made to prevent forced stops. See the topic, DAILY CARE.

New Tractor Recheck: After the first thirty days of operation, it should be the duty of anyone charged with the care and operation of the tractor to tighten the Diesel engine exhaust manifold **(1)**, the inlet manifold **(2)** and the starting engine manifold assembly **(3)**.

After the first 240 hours of operation, the valve clearances should be checked, and adjusted if necessary, as described in the topic, VALVE CLEARANCE ADJUSTMENT.



POINTS TO BE SERVICED AT RECHECK PERIOD

1–Diesel engine exhaust manifold. 2–Diesel engine inlet manifold. 3–Starting engine manifold assembly.

◆

During the initial operation of the tractor the sprocket hub bearings are likely to require some adjustment. See the topic, FINAL DRIVE SPROCKET HUB BEARINGS.

New Operator's Responsibility: The operator who is given the responsibility of care and operation of a tractor already in service, should first, check it for necessary lubrication, fuel supply and coolant in the radiator.

Second, the tractor should have any necessary adjustments made to obtain satisfactory performance.

Third, if the tractor has been stored with oil in the cylinders, comply with the starting procedure under the topic, STORAGE.

STARTING THE ENGINES

Starting Engine

Before attempting to start the starting engine check the Diesel engine and tractor controls as well as the starting engine controls to see that they are in the correct position for starting. **Be sure to check the crankcase oil level of the Diesel Engine and starting engine to make certain the oil is up to the full mark on the gauge.**

Position Controls for Starting:

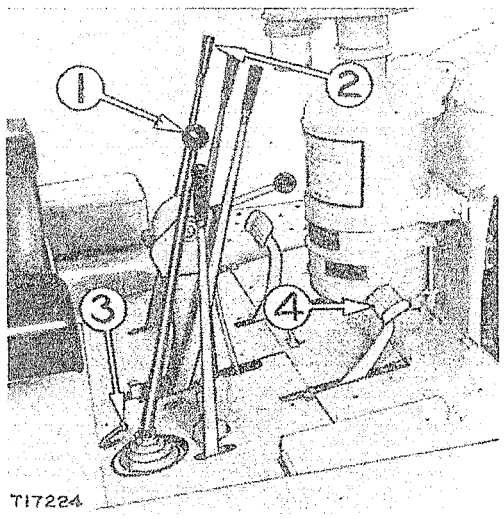
Disengage the flywheel clutch (lever **(2)** pushed forward).

Shift the speed selector lever **(1)** to the neutral position.

Shift the forward and reverse lever to neutral.

Push the governor control lever forward as far as possible.

Apply the right steering clutch brake **(4) and lock with the brake lock (3)**.



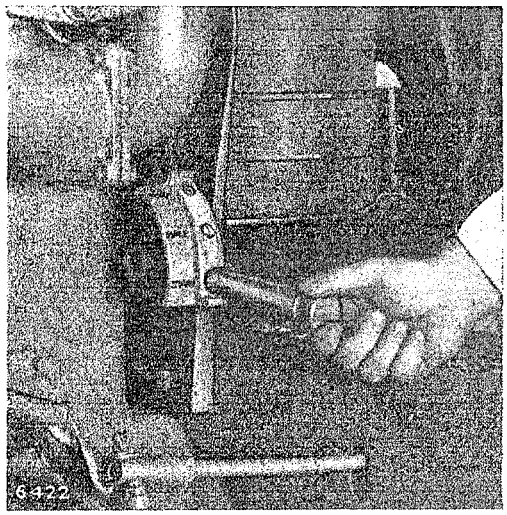
CONTROLS IN STARTING POSITION

1–Speed selector lever. 2–Flywheel clutch control lever. 3–Brake lock control. 4–Steering clutch brake.

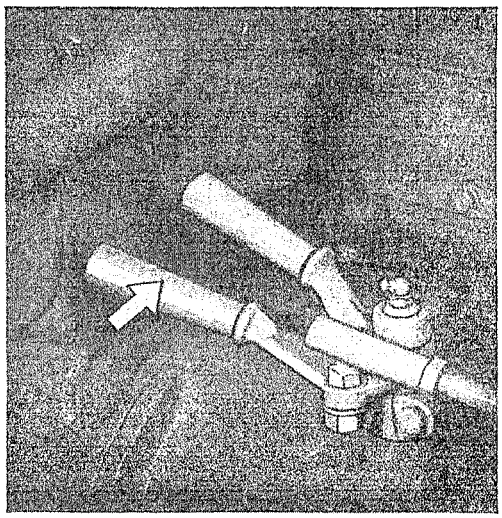
See that the starting engine transmission control lever is in HIGH speed position.

Move the compression release lever to the START position.

Disengage the starting engine clutch by pushing the lever in toward the Diesel engine block.



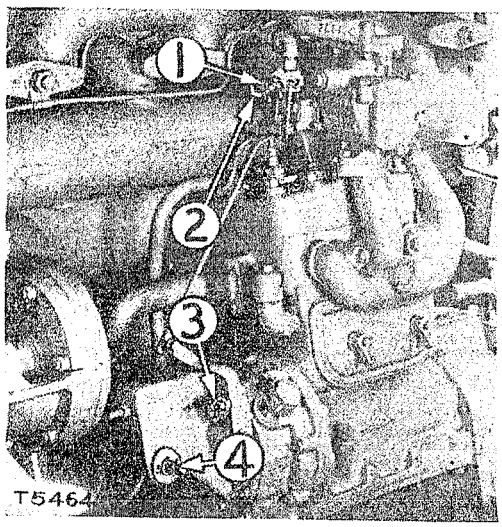
COMPRESSION RELEASE LEVER IN START POSITION



STARTING ENGINE CLUTCH IN DISENGAGED POSITION

Open the starting engine fuel valve by unscrewing the fuel valve control **(1)**. On earlier tractors this valve is located at the starting engine fuel tank.

Pull out the starting engine choke control rod **(2)**.



STARTING ENGINE CONTROLS

1—Fuel valve control. 2—Choke control rod. 3—Idling latch. 4—Ignition switch.

Move the idling latch **(3)** to hold the starting engine governor lever in idling position.

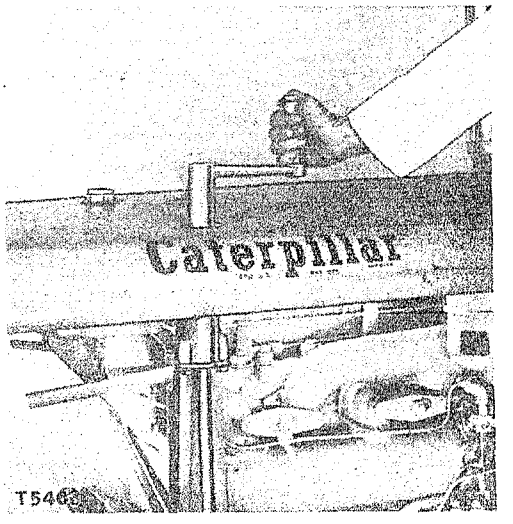
Turn ON the ignition switch **(4)**.

On earlier engines if the engine is cold move the spark control lever to the ADVANCE position; if the engine is warm move the lever to the RETARD position.

Insert the crank in position and crank until the engine starts.

Pull the crank through a compression stroke. Do not attempt in any manner to spin or push the crank through a cranking arc.

CORRECT POSITION FOR CRANKING STARTING ENGINE



Temperature will vary the length of time it is necessary to have the choke ON. Actual experience in starting will determine this interval. Push in the choke control rod as soon as the engine will run with the choke OFF.

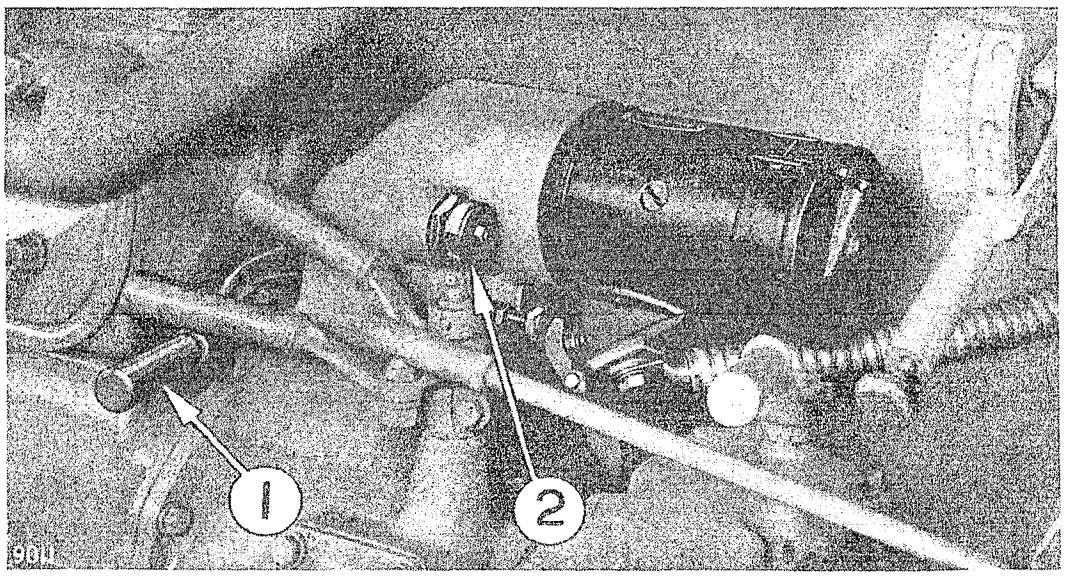
When the engine starts keep the speed low until the crankcase lubricating oil has a chance to warm up and better lubricate the engine.

Helpful suggestions for starting the starting engine in cold weather are in the topic, OPERATING IN COLD WEATHER.

Operating Starting Engine Electric Starter: To start the starting engine with the electric starter, place the Diesel and starting engine controls in the same position described in the preceding topic. Then crank the engine with the electric starter by moving the control lever **(1)** back to engage the drive gear and contact the starter switch.

In some instances, when attempting to engage the starter drive, it will be found that resistance to movement of the control lever occurs before the starter switch is contacted. This is due to the starter sliding gear failing to mesh properly with the mating gear on the flywheel of the starting

engine. To correct, pull out the knurled knob **(2)** of the gear rocker, located in the starter mounting bracket, and turn the knob until the sliding gear meshes, permitting continued movement of the control to contact the starter switch.



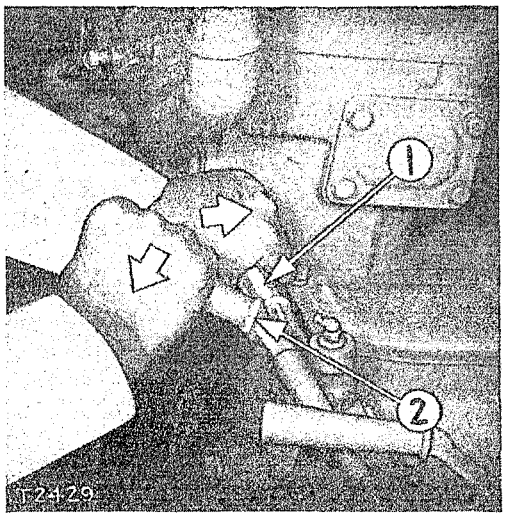
ELECTRIC STARTER CONTROLS
1—Control lever. 2—Gear rocker knob.

Diesel Engine

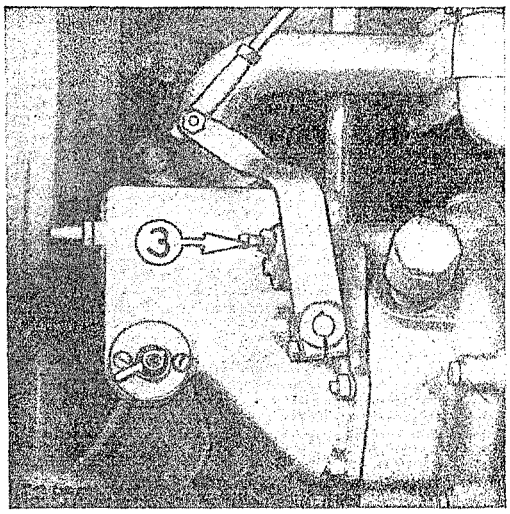
The following four steps should be carefully followed to prevent damage to the starter pinion or flywheel ring gear.

1. Check to see that the starting engine clutch and flywheel clutch are disengaged.
2. Check to see that the starting engine is running at idle speed.
3. Apply the starting engine clutch brake to stop the starter pinion from rotating by pushing the clutch control lever **(1)** all the way in toward the Diesel engine and holding it there.
4. Engage the starter pinion with the flywheel ring gear by pulling the starter pinion control lever **(2)** away from the Diesel engine, then release the clutch brake and partially engage the clutch to be sure of full engagement of the starter pinion.

Move the idling latch **(3)** up to let the starting engine run at full governed speed. Engage the starting engine clutch by pulling out the lever as far as possible. If the engine slows to the stalling point when the clutch is engaged, as it might in cold weather, disengage the clutch and let the engine pick up speed again. See the topic, OPERATING IN COLD WEATHER.



ENGAGING STARTER PINION
1—Clutch control lever.
2—Pinion control lever.

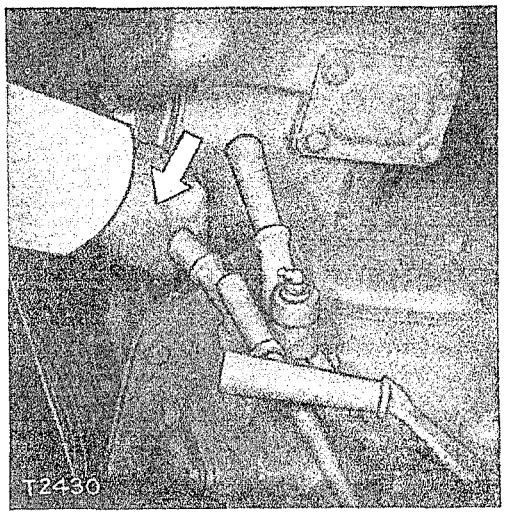


STARTING ENGINE GOVERNOR LEVER RELEASED
3—Idling latch.

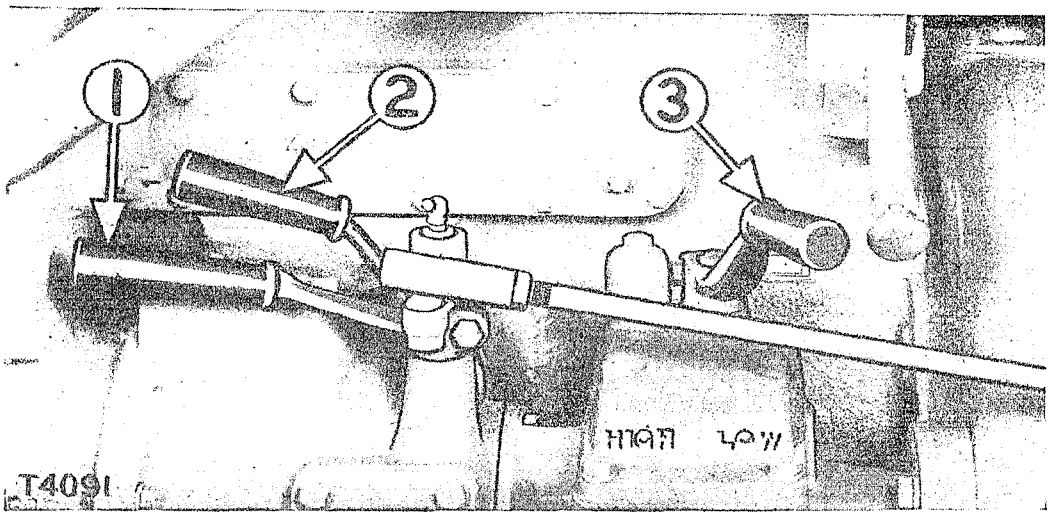
During cold weather, or whenever the normal cranking speed cannot be reached with the transmission control lever in HIGH position, the starting engine transmission, if so equipped, will be found quite beneficial.

To use the starting engine transmission for starting a cold engine disengage the starting engine clutch by pushing the control lever **(1)** in toward the Diesel engine and shift the starting engine transmission into

ENGAGING STARTING ENGINE CLUTCH



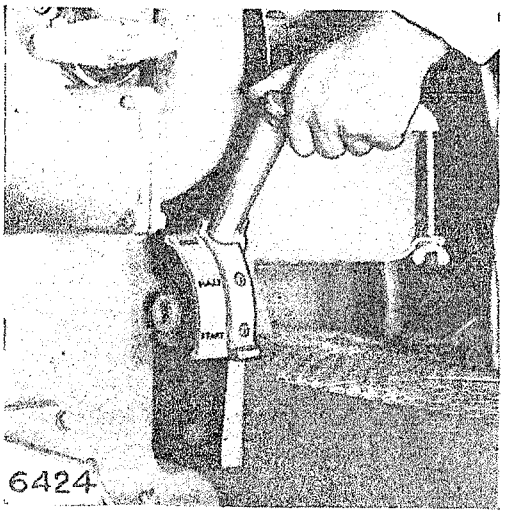
LOW as shown at **(3)**. The transmission can be shifted from one speed to the other when the starter pinion lever **(2)** is in either engaged or disengaged position. Engage the starting engine clutch and after the cranking effort required is reduced, move the compression release lever to the RUN position and allow the starting engine to turn the Diesel engine for several minutes as the heat of compression will assure easy starting.



USING STARTING ENGINE TRANSMISSION
1—Starting engine clutch control. 2—Starter pinion control. 3—Starting engine transmission control in LOW speed position.

Then move the compression release lever to the START position, disengage the starting engine clutch, shift the starting engine transmission to HIGH and engage the clutch.

Move the compression release lever to the RUN position as soon as the starting engine is cranking the Diesel at normal cranking speed. The heat generated when the starting engine is cranking the Diesel engine against compression, and the circulation of the starting engine exhaust through the tube in the Diesel engine air inlet pipe warms the cylinders, pistons, and combustion chambers to the starting temperature.



COMPRESSION RELEASE LEVER IN RUN POSITION

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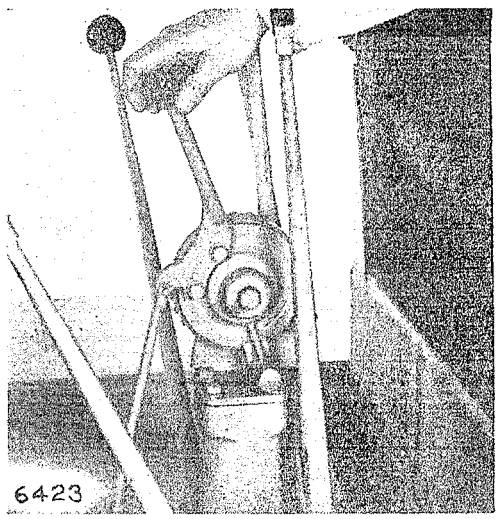
If in cold weather, or at any time, the compression of the Diesel engine prevents the starting engine from turning the Diesel engine fast enough to start it, move the compression release lever to HALF position. When the lever is in this position, the compression is released on half of the

cylinders and allows faster cranking. Move the compression release lever to RUN position as soon as the starting engine can turn the Diesel engine with the lever in that position.

Allow the starting engine to crank the Diesel engine against compression for a few minutes to add heat to the Diesel engine before starting it. Actual experience will determine the length of time necessary to crank the Diesel engine to warm it sufficiently to assure easy starting. Altitude and temperature cause a variation in the length of time required to warm the engine before starting. In cold weather the cylinders and pre-combustion chambers must absorb more heat before reaching starting temperature than in warm weather. Even in warm weather some heat must be added by turning the engine against compression a few minutes before injecting fuel.

POSITION OF GOVERNOR CONTROL LEVER FOR STARTING



After the starting engine has cranked the Diesel engine against compression until the Diesel is sufficiently warm, pull out the plunger and move the governor control lever back to approximately half engine speed position. If the engine does not run after it has turned several revolutions, move the governor control lever to the extreme forward position with the plunger locked and let the starting engine turn the Diesel engine a little longer to raise its temperature.

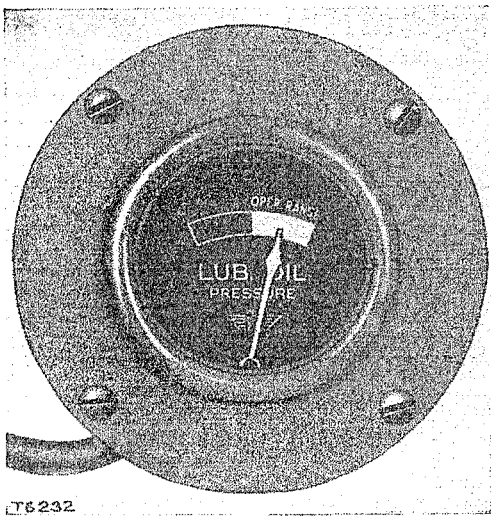
If the Diesel engine is thoroughly heated but does not start, make an inspection to see that everything is correctly set for starting. If smoke has been coming from the Diesel exhaust, fuel has been reaching the cylinders. If no smoke has been evident when the governor control lever was in the RUN position, check the fuel supply. If the Diesel fuel tank is empty or the fuel tank valve is closed, it will be necessary to prime the system as outlined under the topic, PRIMING THE FUEL SYSTEM. In case there may be water or dirt in the fuel system, or if the fuel injection equipment is suspected, see the topic, FUEL INJECTION EQUIPMENT.

When the Diesel begins to run the starter pinion disengages automatically but it is necessary to disengage the starting engine clutch by pushing the clutch control lever in toward the engine.

Stop the starting engine by closing the valve at the carburetor, allowing the engine to burn all the fuel in the carburetor. (On earlier tractors this valve is located under the starting engine fuel tank.) Then turn off the ignition switch.

When the engine is warm and running at rated engine speed the lubricating oil pressure gauge should register midway in the "Operating Range". A lower pressure reading is normal at low idling speeds. If no pressure is indicated, investigate at once.

The temperature regulators within the Diesel engine cooling system are designed to give an approximate minimum coolant temperature of 160° F. (71° C.). The maximum operating temperature will vary according to the air temperature and load factor, but should never exceed boiling temperature at the prevailing altitude.



LUBRICATING OIL PRESSURE GAUGE

Allow the Diesel engine to idle 5 minutes with the governor control lever in half engine speed position before applying the load.

DRIVING THE TRACTOR

When the engine has been running long enough to warm up, move the governor control lever to reduce engine speed. Disengage the flywheel clutch by pressing the clutch control lever forward as far as it will go. This applies the clutch brake. Continue to press forward on the lever until the clutch stops turning. Carefully move the speed selector lever into position for the speed desired. The speed selector lever is the inside lever and the forward and reverse lever is the outside lever.

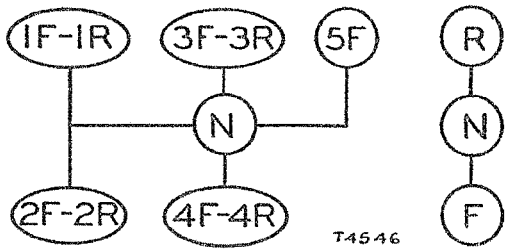
The clutch lever controls the locking mechanism that holds the sliding transmission gears in position. So the gears cannot be shifted into or out

of mesh with the clutch engaged. Always shift gears completely into mesh.

Pull the governor control lever back and carefully engage the flywheel clutch until the slack is taken up between the tractor and the load. Then, as soon as the tractor begins to move the load, pull the clutch lever all the way back so that it will snap over center and remain fully engaged. Never move a load with the flywheel clutch only partially engaged as this causes heating and rapid unnecessary wear on the clutch plates.

There are five forward and four reverse speeds in the transmission. Each of the four lower forward speeds has a comparable, slightly higher, reverse speed. Shifting from forward to reverse or reverse to forward in any of these four speeds is accomplished without shifting the speed selector lever. It is accomplished by disengaging the flywheel clutch and shifting the forward and reverse gear shift lever forward to operate in reverse, and backward for forward travel.

SPEED SELECTION DIAGRAM



The tractor will move forward in fifth gear without the forward and reverse lever being in forward direction position. However, to insure adequate lubrication of the transmission gears and bearings, the forward and reverse lever should be in the forward direction position when operating the tractor in fifth speed.

STEERING THE TRACTOR

The tractor is steered by hand levers that operate the steering clutches, and by pedals that control the steering clutch brakes. The hydraulic control arrangement operates in conjunction with the steering clutch controls and minimizes the effort required to release the clutches during operation of the tractor. Release the steering clutch on the side toward which the turn is to be made by pulling back on that steering clutch lever. Apply the brake on the same side by pressing down on the pedal just hard enough to turn at the desired angle. Both controls should be handled smoothly so the turn will be made evenly and not as a series of jerks. Just before the turn is completed, release the brake. Then engage the steering clutch by releasing the control lever quickly but gently.

When the tractor is pulling a load it is seldom necessary to use the brakes in steering, except for sharp turns, since the load acts as a brake.

The brakes may also be used to hold the tractor back when going down grade, and one pedal may be locked in position to hold the tractor on slopes or when doing stationary work.

Steering Down Grade: When going down grade with the tractor pulling the load, steer in the usual manner. If the load is pushing the tractor, the operation of the steering clutches is reversed. For example, to turn to the right under these conditions, release the steering clutch on the left, but do not apply the brake. This allows the left track to travel faster while the right track is held back by the engine which acts as a brake.

The pedals must be in the fully released position during normal operation of the tractor. **Keep the feet off the pedals except when it is necessary to apply the brakes.**

OPERATING OVER AN OBSTRUCTION

The fact that the steering clutches are controlled by separate levers may be used to advantage in running over an obstruction, such as a log or a ditch bank. Both of the clutches may be released slightly until the tractor balances on top of the obstruction. Then one clutch may be engaged gradually so that the tractor moves forward at an angle, over and down. If the tractor is being operated without a load it may be necessary to use the brakes.

OPERATING IN DEEP MUD OR WATER

If the tractor must be operated for any length of time in deep mud or water, certain precautions are necessary. See that the plugs are in place under the steering clutch compartments. Lubricate the track rollers, carrier rollers, track roller frame inner and outer bearings, and the front idlers every 5 hours. Inspect the oil in the final drives frequently for mud or water and drain, wash and refill if the oil shows the presence of any mud or water. The presence of mud in the final drives or the excessive leakage of oil indicates the seals should be repaired. See the topic, LUBRICATION CHART.

DRAWBAR ADJUSTMENT

The tractor drawbar is provided with a pin which may be removed, allowing the drawbar to swing sideways, thus lining up with the draft.

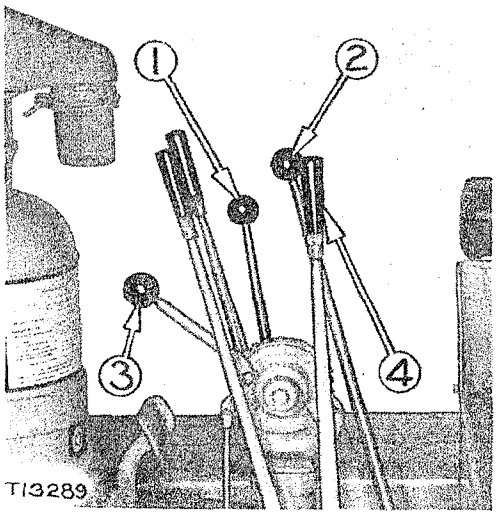
There are three drawbar adjustments possible—fixed, full swing and modified swing. Whenever the tractor is pulling a free load or scraper type equipment the drawbar must be used in the fixed position, pinned in the center. The full swing drawbar allows the tractor to turn much easier and shorter because the load pivots freely from a point near the center of the tractor. The modified swing is recommended where an offset load is imposed such as pulling a moldboard plow. It will be desirable

to let the drawbar swing between limits of four or five inches as this will hold the plow to its proper course.

All implement hitches produce individual problems that affect the operation of the implement and tractor. Your "Caterpillar" dealer is available for suggestions to help solve these problems.

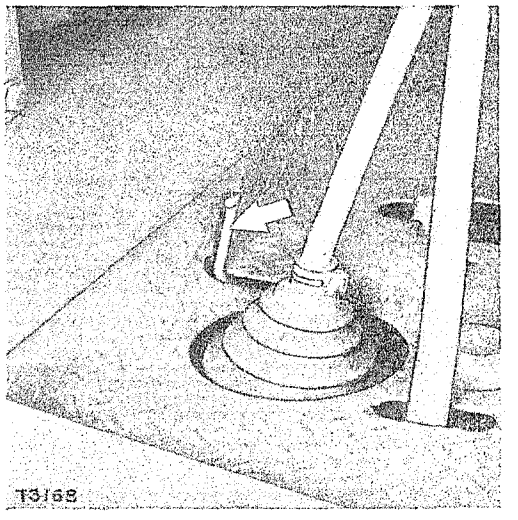
STOPPING THE TRACTOR

To stop the tractor when it is desired to allow the engine to continue to run, disengage the flywheel clutch, and move the governor control lever **(3)** to reduce engine speed. Place the speed selector lever **(2)** in neutral position. **With the forward and reverse lever (1) in either forward or reverse position engage the flywheel clutch (4).**



TO STOP THE TRACTOR

1—Forward and reverse lever. 2—Speed selector lever. 3—Governor control lever. 4—Flywheel clutch engaged.



BRAKE LOCK CONTROL

The brake lock control is provided to lock one steering clutch brake in the applied position to hold the tractor on slopes or when doing stationary work. To lock the brake apply the right steering clutch brake and push forward the brake lock control.

CONTINUOUS OPERATION ON STATIONARY WORK

When operating any attachment which calls for stationary tractor power, or when allowing the tractor to stand with the engine running for any long period of time, these important instructions should be followed:

1. Place the speed selector lever in neutral position.

2. Pull the forward and reverse lever back to the forward direction position.
3. Engage the flywheel clutch.

When these instructions are followed all the transmission gears, shafts and bearings are lubricated.

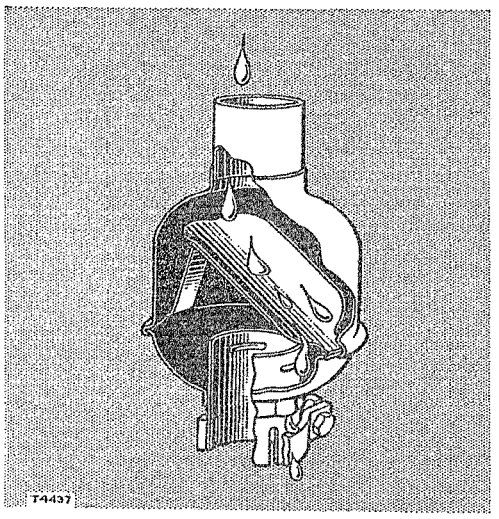
When a tractor that is equipped with a rear power take-off is being used for work other than stationary work, refer to the topic, REAR MOUNTED EQUIPMENT.

STOPPING THE DIESEL ENGINE

After the normal load is removed from the engine allow it to idle five minutes with the governor control lever at half engine speed position before stopping.

Move the governor control lever to the extreme forward position. Leave the Diesel fuel tank valve open.

If the tractor must stand without shelter, cover the exhaust pipes to exclude rain or snow. Rain traps for this purpose may be obtained from your "Caterpillar" dealer. If the temperature is below freezing, or if freez-



RAIN TRAP FOR EXHAUST PIPES

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ing weather is expected before the engine will be started again, drain the cooling system or protect it with an anti-freeze solution. See the topic, COOLING SYSTEM.

DAILY CARE

A daily check of the tractor should be made to see if there are any loose nuts, bolts, capscrews, or parts worn to such an extent that they are no longer serviceable. The capscrews of the track roller end collars, the inlet manifold stud nuts, and the equalizer spring clip nuts are typical

of points which should be checked frequently and kept tight, since these parts are subjected to continued pounding. Particular attention should also be given to keeping the gasketed joints of the final drive cases drawn up tight to prevent leakage and possible damage to parts through excessive movement. If corrective steps are taken immediately upon discovery of loose or worn parts, fewer enforced stops and more economical operation will result.

Check the cooling system each day, and if necessary, add water or anti-freeze solution.

Fill the fuel tank at the end of the day's run. See the topic, CARE OF THE DIESEL FUEL TANK for other periodic care.

When the Diesel engine is operating continuously, the starting engine should be run for a few minutes each day to dissipate condensation and renew the oil film on the bearing surfaces and cylinder walls.

Dirt should not be allowed to accumulate on the tractor. A few minutes spent daily in keeping it clean are well repaid in improved appearance, and greater ease and safety in operation, lubrication and maintenance.

The "Hour Meter" which is located on the right side of the engine near the bottom of the governor housing, should be read daily. From the daily readings, the lubricating time of all parts as directed under the topic, LUBRICATION CHART, can be determined. The "Hour Meter" readings should also be used in determining maintenance service periods.

SEAT CUSHION TIPPED TO PROTECT PADDING

If the tractor must stand without shelter the operators seat cushion should be tipped as shown. When this is done the water proof covering prevents moisture entering the padding under the covering. If the cushion is turned bottom side up in rainy weather the padding under the water proof covering will become damp. This moisture with accumulated dirt and heat will shorten the life of the cushion.

OPERATING IN COLD WEATHER

If the starting engine and the Diesel engine are both in good mechanical condition, and precautions necessary for cold weather operation are taken, ordinary cold weather will not cause difficulty in starting or loss of efficiency.

Lubricants: As the atmospheric temperatures become lower, where warm housing facilities are not available, lubricants of lower viscosity should be used. See the topic, LUBRICANTS.

Coolant: When the temperature is below freezing, sufficient anti-freeze solution should be used in the cooling system to prevent freezing. See the topic, COOLING SYSTEM.

The liquid in the cooling system may be warmed to make starting easier and quicker. When warming anti-freeze solutions, keep away from flames, as some of these solutions may be inflammable. Avoid getting the solution hot, and even a warm solution should be poured very slowly into a cold cooling system to prevent damage by sudden expansion.

Fuel: Fuel must be "free flowing" enough to flow readily through the fuel lines at the lowest temperature at which the tractor will be started and operated. For additional information, see the topic, FUELS.

Starting the Starting Engine: If the tractor has been standing without shelter in extremely cold weather, the following suggestions will materially assist starting.

It is very important to keep low viscosity crankcase lubricating oil up to the full mark on the gauges, in the Diesel engine, starting engine and flywheel clutch compartment to provide proper lubrication when starting. Refer to the topic, LUBRICANTS.

Crank the starting engine several revolutions with the ignition switch off, and the starting engine clutch disengaged. This will better distribute oil to the bearings and cylinder walls.

Sometimes moisture, or fuel which has not vaporized, collects on the starting engine spark plugs. They may be dried out by removing them and pouring gasoline over the electrodes. Ignite the gasoline and allow it to burn. **Use care to prevent fire.**

Pouring a small amount of gasoline on the electrodes before they are replaced in the engine is more effective in promoting combustion than priming the cylinders with gasoline. A small amount of gasoline in the cylinders will remove the film of oil from the cylinder walls and interfere with compression.

Avoid over-choking and over-priming the starting engine when attempting to start it.

Sometimes the starting engine can be started more quickly by leaving the idling latch free of the governor control lever. **When the engine starts lock the idling latch under the governor control shaft to keep the engine speed low until the crankcase lubricating oil has a chance to warm up and better lubricate the engine.**

STORAGE

Lubricate all points mentioned in the lubrication chart if the tractor is to be stored or left standing for any length of time. This will protect against rusting.

Diesel Engine: If the tractor is to be stored or left standing for a long period of time, the lubricating oil may drain away from the cylinder walls and piston rings. This lack of lubricant permits the rings and liners to rust. It also permits unnecessary wear caused by metal-to-metal contact between the pistons, rings and liners, when the engine is started before fresh oil has reached these surfaces. The lack of lubricant may not cause any noticeable change in engine operation after it has been started but it does contribute to shorter engine life.

On the Diesel engine the oil film should be renewed by running the engine once a week until it is thoroughly warm. This will circulate the oil and prevent rusting from condensation. If it is not convenient to start the engine, remove the injection valves once a month and pour about 3/8 pint (0.18 liter) of crankcase lubricating oil into each cylinder. Then turn the engine several revolutions with the compression release lever in the START position and the governor control lever in the STOP position. Replace the injection valves. Thereafter, turn the engine once a week between monthly oiling intervals to distribute the oil on the cylinder walls and pistons.

CAUTION

If rusting in the Diesel engine has been guarded against by pouring oil into the cylinders rather than by running the engine, the following precaution should be observed before starting.

Move the compression release lever to the START position to release the compression, then turn the engine to dissipate oil that may have accumulated in the cylinders.

If excess oil is not removed, compressing it in the small space between the piston and cylinder head will cause damage to the engine.

Starting Engine: The oil film should be renewed in the starting engine by running the engine once a week until it is thoroughly warm. If it is not convenient to start the engine, remove the spark plugs once a month

and pour about 1/8 pint (0.06 liter) of oil into each cylinder. Then crank the engine several revolutions and replace the spark plugs. Thereafter, turn the engine once a week between monthly oiling intervals to distribute the oil on the cylinder walls and pistons.

Final Drive: Allowing the tractor to stand idle for lengthy periods may permit the gasket on the final drive seals to become lightly stuck to the washer on which it operates. When this occurs the gaskets may be damaged when the tractor is operated, causing the seals to leak. For this reason, the tractor should be driven backward and forward, at a time when starting the engine to renew the oil film on the cylinder walls and piston rings.

Cooling System: If the temperature will be below freezing, the cooling system should be drained if it has not been serviced as instructed in the topic, COOLING SYSTEM.

Maintenance Instructions

The foregoing paragraphs have been devoted to instructions which are necessary for day-to-day operation of the tractor. The following topics give detailed instructions regarding the care and adjustment of the various parts.

AIR CLEANERS

The air cleaners do their work efficiently only as long as the oil in the cups flows freely at operating temperature, so it will spray into the filter sections and wash back the dirt collecting there. For this reason, the air cleaners should be inspected frequently and serviced according to the following instructions.

Diesel Engine Air Cleaner: The air cleaner on a Diesel engine will clean and pass a greater volume of air in a day's run than the air cleaner on a spark ignition engine doing the same work under like conditions. Each Diesel cylinder draws in a full charge of air on every inlet stroke, regardless of the engine speed or the amount of work the engine is doing; whereas the total volume of air taken in by a spark ignition engine is regulated by the position of the throttle plate in the carburetor and changes with varying loads.

The interval between the oil changes and cleaning will vary with the weather and the working conditions. During the dry, dusty months and on jobs where dust conditions are severe, it may be necessary to service the Diesel engine air cleaner frequently, possibly every 10 hours. In damp weather, and on jobs where there is little or no dust, this operation may be necessary only once every 60 hours. However, dependence should not be placed in visible detection of dust, or lack of dust in the surrounding air as a basis for servicing the air cleaner. The oil in the air cleaner may become saturated with dust, due to its fineness, much more rapidly than in instances where dust is more apparent in the incoming air.

Accumulations of sediment in the oil cup indicate that the heavier particles of dust have been satisfactorily removed from the incoming air. Some fine particles of dust become suspended in the oil without leaving any noticeable sediment in the cup. The oil in the cleaner cup should be changed when it will not flow freely at operating temperatures because of fine dust particles in it or an oil of too high a viscosity, when the accumulated sediment in the bottom of the cup is approximately 1/2 inch deep or every 60 hours, whichever occurs first.

If any great amount of chaff, lint, leaves or other similar materials are present in or floating on the oil, the oil should be changed regardless of the amount of sediment in the cup. The presence of these materials in the air and oil tends to plug the separable tray screens and cause ex-

cessive oil loss from the air cleaner to the air inlet manifold. Evidence of this condition is indicated by a wet but clean air cleaner outlet and manifold. This condition should be avoided as it will shorten engine service life.

When a cleaner is operating in its normal manner, there is generally a very small amount of very fine dust which may pass through the cleaner. There may also be a slight amount of oil lost. The combination of these in time will produce a dusty dry or dirty damp air cleaner outlet. This condition is normal. It is much better than the outlet which is running with oil but clean.

Inspect the Oil in the Diesel and Starting Engine Air Cleaner Cups: Every 10 to 60 hours, depending upon operating conditions, inspect the oil in the Diesel engine air cleaner cup. The air cleaner cup should be washed and refilled every 60 hours or when the oil in the cup will not flow freely at operating temperature, or if the sediment in the cup is 1/2 inch deep (1/4 inch in starting engine air cleaner), whichever occurs first. It may be necessary to inspect the oil in the starting engine air cleaner cup only every 60 hours.

1. Loosen the wing nuts and take off the Diesel engine air cleaner cup.
   a. On starting engine air cleaners the oil cup is removed by unscrewing the fastening bolt.

Some thickening of the oil in the cup should be no cause for alarm, actually it can be considerably thicker than the S.A.E. grade that was last put in the cup, as long as the oil at operating temperatures will flow freely. For a check to determine if the oil will flow freely, dip into the oil with a finger and if the oil on it will flow off, the oil is fluid enough to flow freely.

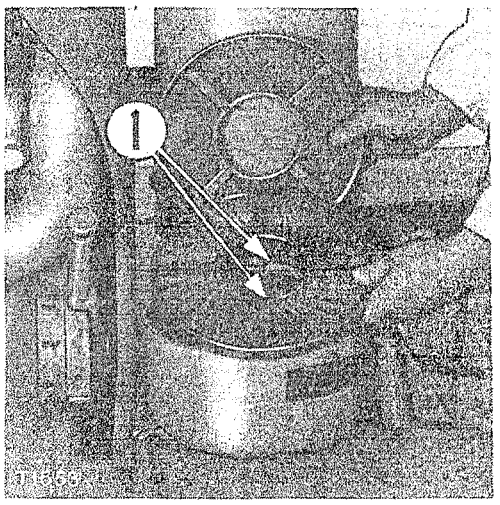
2. Service other parts of the air cleaner while the oil cup is removed, as indicated in the following topics.
3. When refilling the oil cup, care should be taken to see that both the inner and outer cups are filled to the oil level bead. In temperatures above freezing S.A.E. No. 30 oil should be used. In temperatures below freezing use S.A.E. No. 10W oil. Do not dilute S.A.E. No. 10W oil.
4. When replacing the oil cup on later air cleaners, check to see that the seal between the air cleaner cup and body is in place and in good condition. This seal prevents oil running over the cup during hillside operations, and air leakage at this point can possibly upset proper air cleaner action.

Never attempt to change the oil in the air cleaner cup when the engine is running. This will cause dirty oil to be held in the filter section by intake action. The dirty oil held in the filter section will contaminate the fresh oil and also cause an abnormally high oil level which may allow oil in the screens to be carried into the engine resulting in overspeeding.

Wash Air Cleaner Screens: At every air cleaner cup service period, between 10 and 60 hours depending on operating conditions, wash the air cleaner screens.

1. Remove the two wing nuts and remove the lower screen from the air inlet pipe. Then remove the other screens one at a time. When a screen is found that is perfectly clean, there is no need to remove the screens above it. There are six screens that are removable.

2. Wash the screens with a brush in kerosene or some non-inflammable cleaning fluid.



REPLACING AIR CLEANER SCREENS

1–Holes in lower screen for clamp bolts.

3. Install the screens onto the air inlet and fasten with the wing nuts.

4. Make sure all connections are tight and install the oil cup.

Inspect the Inside of the Air Cleaner Inlet Pipe: Every 10 to 60 hours, depending on operating conditions, when the air cleaner cup is removed to clean the screens, inspect the inside of the air cleaner inlet pipe by reaching up from the bottom of the pipe. If heavy accumulations of dirt are noticed, clean the pipe.

Every 60 hours clean the inside of the air inlet pipe by pushing a clean rag through the opening in the pipe. Where the air cleaner inlet pipe extension is used, disconnecting the pipe from the air cleaner instead of removing the pre-cleaner will be satisfactory.

Wash the Entire Air Cleaner: At least once a year—more often in dusty conditions—wash the entire air cleaner.

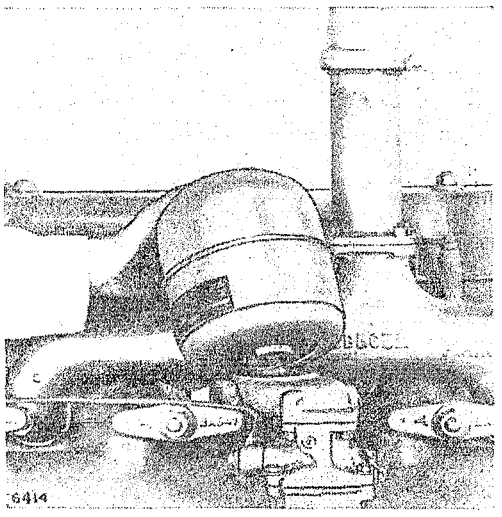
1. The entire air cleaner should be removed from its support in order to thoroughly clean the upper filter section in the cleaner body.

2. Remove the oil cup and screens.

3. Immerse the entire cleaner in kerosene or some non-inflammable cleaning fluid. Steam cleaning is not recommended because some forms of dust rolls into small balls when steam is applied, and these balls cannot be washed out of the screens.
4. Wash the oil cup and screens as outlined in the preceding topics.
5. Dry the air cleaner parts thoroughly and reassemble them, making certain all connections are air tight.

Wash Starting Engine Air Cleaner: Twice a year wash the starting air cleaner.

1. Unscrew the wing nut at the top of the hood assembly and lift off the entire air cleaner.
2. Disassemble and wash the filter and hood assemblies by shaking them in a pan of kerosene or some non-inflammable cleaning fluid.
3. Wash and refill the oil cup.

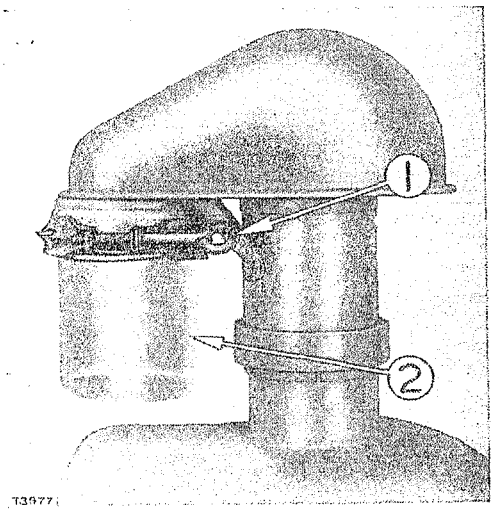


REMOVING STARTING ENGINE AIR CLEANER

4. Assemble and install the air cleaner, but be sure the mating faces of the air cleaner and the cleaner pipe are clean, the gasket between them is in place and all connections are air tight.

Pre-Cleaner Care: The pre-cleaner is recommended to lengthen air cleaner service periods because it removes some of the dirt from the inlet air. For this reason, always install the jar **(2)** correctly and replace either a broken jar or gasket immediately, because the pre-cleaner will not work properly without them. Remove and empty the jar before it becomes three-fourths full by loosening the screw clamp **(1)** that holds

it in place. Inspect the fins in the pre-cleaner regularly and when they are dirty remove the entire pre-cleaner and wash it in water.



PRE-CLEANER

1—Screw clamp. 2—Jar.

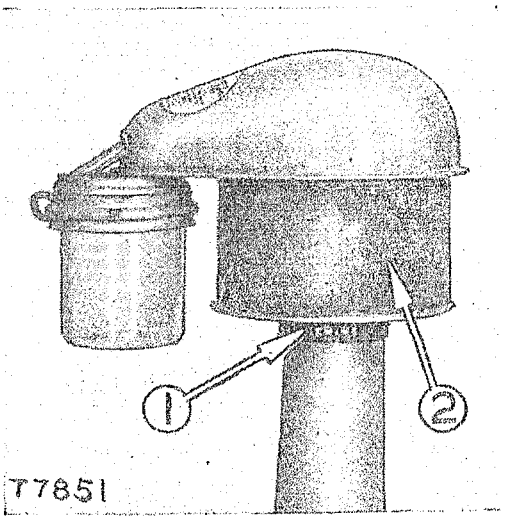
◆

Prescreener Care: Where the air contains objectionable foreign material, such as, cotton lint, small leaves or other particles the special prescreener should be used to prevent these materials entering the air cleaner. When the prescreener is used, inspect the screen **(2)** regularly and when it is dirty remove by loosening the clamp bolt **(1)** which holds it in place. Clean the screen with a dry brush or wash it in water.

PRESCREENER

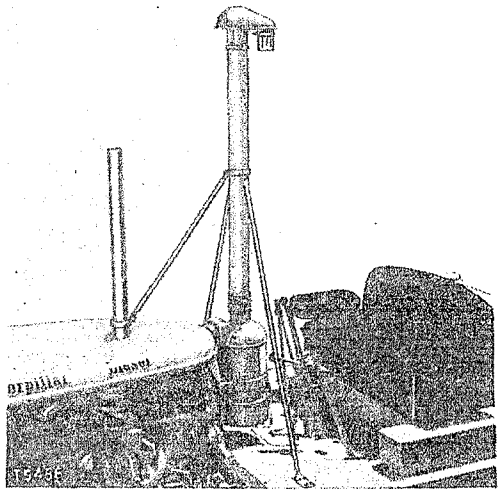
1—Clamp bolt. 2—Screen.

◆



Air Inlet Pipe Extension: Where dust conditions are severe, dust and abrasives may be carried in a heavy cloud rising to the height of the air inlet. In these conditions an air inlet pipe extension will put the precleaner up where the air is cleaner, reducing engine wear and the frequency of air cleaner service.

AIR INLET PIPE EXTENSION



CRANKCASE LUBRICATING OIL SYSTEM

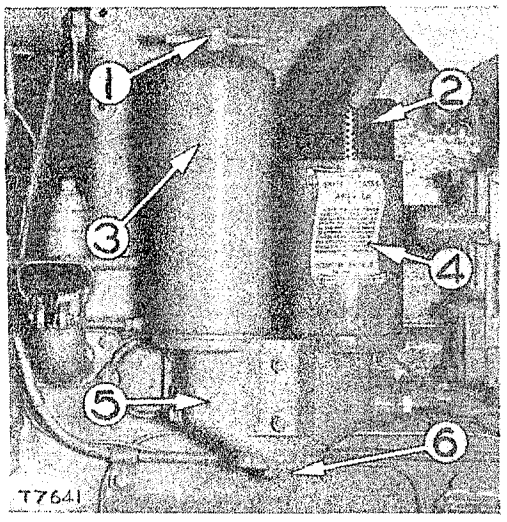
Two types of crankcase lubricating oil filter systems are covered in this topic. Tractors effective with 3T15942 are equipped with full-flow crankcase lubricating oil filters. The full-flow filter has one large full-flow filter element only in each filter housing. Tractors before 3T15942 were equipped at the factory with a by-pass crankcase lubricating oil filter system which may be converted to the full-flow system by the installation of the field change-over group. The by-pass filter has an inner element and an outer metallic strainer element in each filter housing.

Full-Flow System

The full-flow filter elements should be replaced with new "Caterpillar" elements at every 240 hour interval.

To service the filter:

1. Remove the drain plug **(6)** from the oil filter base **(5)**. Then loosen the clamp screw **(1)** and remove the cover **(3)** and screw as a unit.



FULL-FLOW CRANKCASE LUBRICATING OIL FILTER

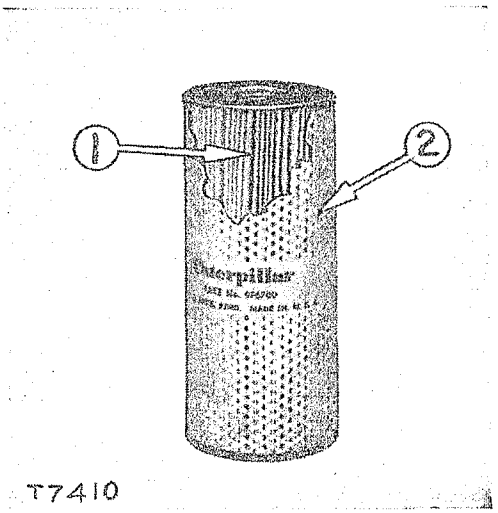
1—Clamp screw. 2—Full-flow element. 3—Cover. 4—Housing. 5—Filter base. 6—Drain plug.

2. Lift out the full-flow elements **(2)** and discard them.

3. Install new "Caterpillar" full-flow elements in the housings **(4)**.

4. Reinstall the cover, tighten the clamp screws and replace the drain plug.

Full-Flow Crankcase Lubricating Oil Filter Element: The full-flow element is of the plastic impregnated paper type. The impregnated paper **(1)** is pleated around a center core and encased within a perforated cover **(2)**.



FULL-FLOW FILTER ELEMENT

1—Impregnated paper. 2—Perforated cover.

The filter housing, cover and element are designed to seal unfiltered oil from the filtered oil side of the element. Sealing is accomplished by a spring loaded flat plate in the cover which holds the element against the flat plate at the bottom of the housing.

By-Pass System

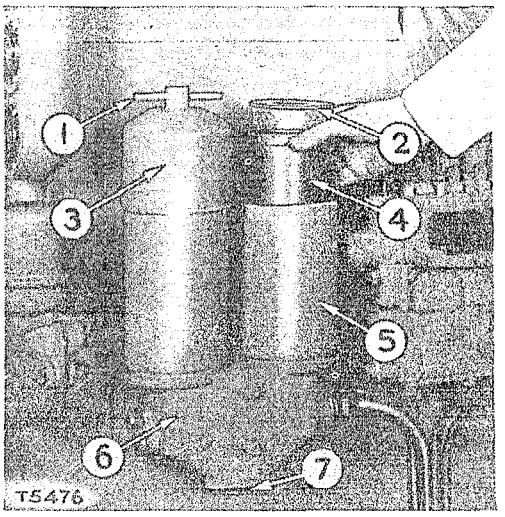
The by-pass filter inner elements should be replaced with new elements at every 240 hour interval. In extremely dusty operations, they should be replaced at every 120 hour interval.

To service the filter:

1. Remove the drain plug **(7)** from the oil filter base **(6)**. Then loosen the clamp screw **(1)** and remove the cover **(3)** and screw as a unit.

2. Lift out the inner elements **(2)** and discard them.

3. Remove the metallic strainer elements **(4)** and wash them in kerosene or some non-inflammable cleaning fluid. If the sludge must be brushed off, use the brush supplied in the tool equipment and stroke



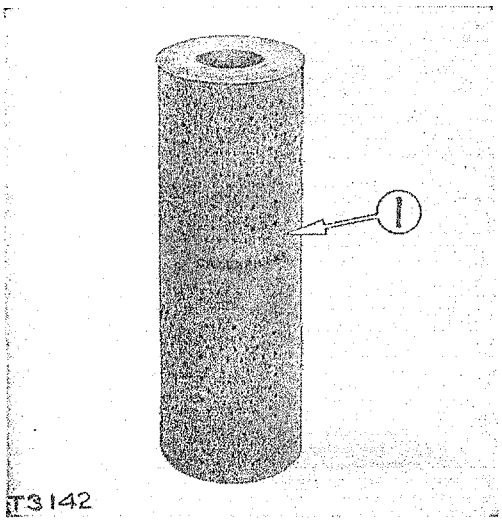
BY-PASS CRANKCASE LUBRICATING OIL FILTER

1—Clamp bolt. 2—Inner element. 3—Cover. 4—Metallic strainer element. 5—Housing. 6—Filter base. 7—Drain plug

parallel to the winding. Eventually, gums and lacquers may clog the metallic strainer elements, even though they appear clean on the outside. The openings between the windings and the internal condition of an element can be checked by comparing it with a new one. Plug the holes in the bottom of both old and new metallic strainer elements and immerse them to the top rim in Diesel fuel. Compare the rate at which the fuel rises inside the elements. Discard the used one if it is not at least three-fourths full by the time the new one is completely filled.

4. Install the metallic strainer elements and new inner elements in the housings **(5)**.
5. Reinstall the cover, tighten the clamp screws and replace the drain plug.

By-pass Crankcase Lubricating Oil Filter Element: The by-pass filter element is the plastic impregnated paper type. The perforated cover **(1)** encases the impregnated paper which is pleated around a center core.

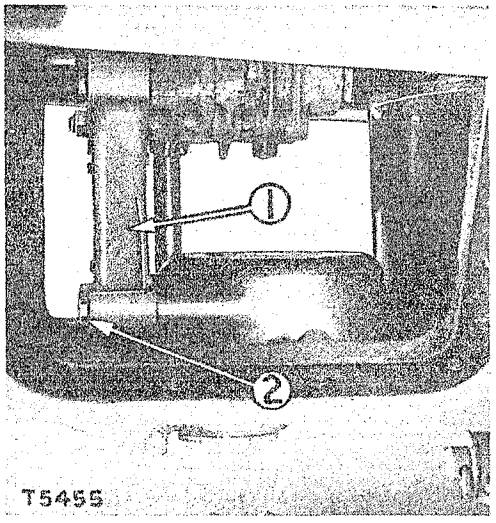


BY-PASS LUBRICATING OIL FILTER INNER ELEMENT

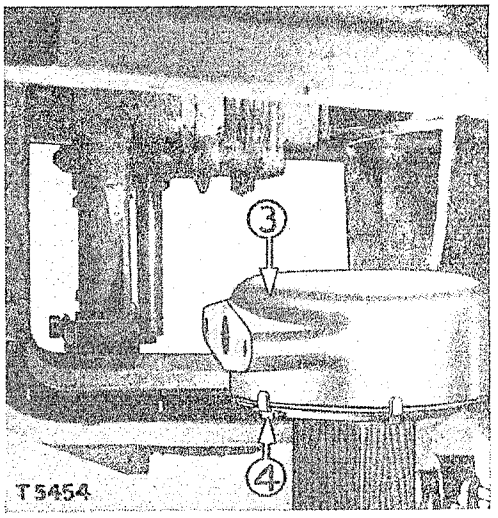
1—Perforated cover type.

A self-sealing action at the ends of the element is developed by a spring loaded plate in the cover which holds the element against the flat plate at the bottom of the housing.

Wash The Diesel Engine Crankcase: Wash or flush out the crankcase occasionally to remove the foreign particles that accumulate there. At a time when it is necessary to change the crankcase lubricating oil, drain the crankcase, oil filter housing and oil cooler while the engine is hot. Replace the drain plugs and pour two gallons (7.6 liters or 1.7 Imp. Gal.) of flushing oil into the crankcase. Run the engine for three minutes, noting that the lubricating oil pressure gauge shows pressure. Then drain the flushing oil from the crankcase compartment in the filter base and the oil cooler.



SUCTION BELL REMOVAL



REMOVING SUCTION BELL SCREEN FOR CLEANING

1—Pump case. 2—Capscrews. 3—Suction bell. 4—Capscrews.

If sludge is noticeable when draining the crankcase, the oil pump suction bell screen should be removed and cleaned. The suction bell can be removed after removing both side plates from the oil pan. Remove the capscrews **(2)** which hold the bell to the pump case **(1)**. The bell **(3)** can now be removed from the crankcase pan through the left opening. Remove the capscrews **(4)** which hold the cover and screen in position on the bell and wash the screen in kerosene or some non-inflammable cleaning fluid. When installing the bell be sure the spring and gasket are in their correct position between the pump case and bell.

NOTE

The flushing oil may be used over again if the foreign matter is allowed to settle and then removed.

Wash The Starting Engine Crankcase: Remove the drain plugs while the engine is warm. Replace the plugs and refill the crankcase with 1½ quarts (1.4 liters, or 0.31 Imp. Gal.) of flushing oil. Run the engine 3 minutes and drain. Refill with fresh oil of the correct viscosity. See topic, LUBRICATION INSTRUCTIONS.

FUELS

As a source of power the Diesel engine has two outstanding advantages over the gasoline engine. The first is its lower rate of fuel consumption—and second its ability to use cheaper fuels. Customers should always buy the **lowest priced fuel giving satisfactory operation.**

Your "Caterpillar" dealer is familiar with fuels that are giving good results in "Caterpillar" Diesel Engines in his territory. If necessary, consult him for his recommendations. He will be glad to advise you.

Because of the lack of world-wide standardization of Diesel fuel classifications, it is not possible to make specific recommendations for export territories. For best results see your "Caterpillar" dealer for brand names of satisfactory fuels in your particular area.

In the United States and Canada, Diesel fuels are available under two general classifications. One is "premium" fuel and the other is "domestic furnace oil" No. 2 grade.

"Caterpillar" Diesel engines are designed to operate on the less expensive domestic furnace oils. For a number of years, No. 3 domestic furnace oil as classified by the American Society For Testing Materials, was recommended. A change in furnace oil specifications eliminates the No. 3 grade which is now described as No. 2 grade. Fuels falling within this general class are widely available, give satisfactory results and cost considerably less than "premium" fuels.

There is appreciable variation in the composition of fuels furnished under the domestic furnace oil classification. For desirable engine service, it is most important to give special attention to two properties of the fuel which are: pour point and surphur content.

Pour Point

In subzero (—18° C.) weather, where warm storage is not provided, fuels with unusually low pour points may be required. It is necessary that it be fluid enough to flow from the Diesel fuel tank to the engine transfer pump at the lowest temperature at which the engine must start and operate.

Sulphur Content

As the sulphur content of the fuel increases, the oil change periods should be reduced as indicated in the topic, CRANKCASE LUBRICATING OIL.

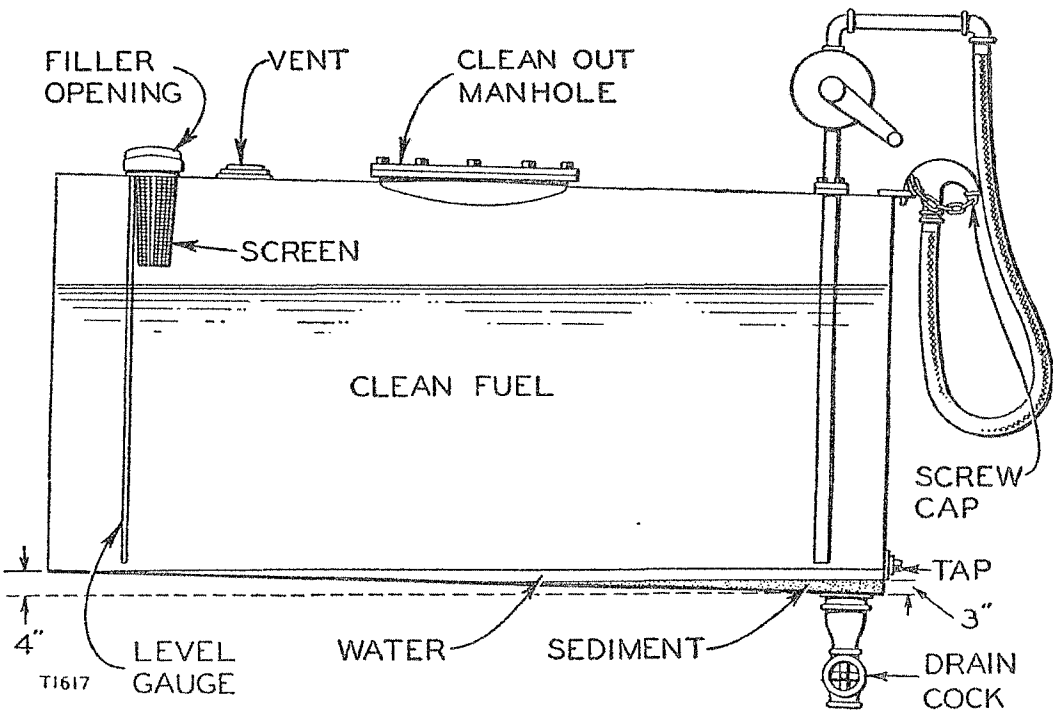
CARE OF THE FUEL SUPPLY

Keep The Fuel Clean: Too much emphasis cannot be placed on the importance of using only clean Diesel fuel. In selecting a fuel, it should be pointed out that distillates are especially desirable because, in refining, they are heated to a vaporous state and condensed in another container; thus, all the sediment and residue remain in the still.

It is important to buy clean fuel, and keep it clean. The best fuel can be rendered unsatisfactory by inadequate storage facilities or careless handling. The clearance between the fuel injection pump plunger and the barrel is very small, actually less than .0001 inch (0.00254 mm.) which makes it evident that the invisible particles of dirt which might pass through the filters can damage these finely finished parts.

Effort should be constantly expended to prevent contamination of the fuel. An important step is to reduce the number of times the fuel must be handled. When the fuel can be delivered by the distributor to storage tanks and then pumped from the storage tank to the Diesel fuel tank, the handling is reduced to a minimum.

The illustration of a fuel storage tank is a typical, satisfactory installation. Since natural settling is an effective method of cleaning Diesel fuel, the fuel should be allowed to stand at least 24 hours in the storage tank after it has been filled before fuel is transferred to the Diesel fuel tank. Be sure to drain all water and sediment that has settled to the bottom of the tank before the tank is refilled. Occasionally, drain all of the fuel and clean the tank thoroughly.



The use of cans, funnels and drums should be discouraged since it is practically impossible to keep this equipment absolutely clean. If drums must be used, they should be allowed to stand for at least 24 hours before drawing off fuel. A pump installation similar to that shown with the storage tank should be used. The drum should stand on end and the inlet for the pump be kept several inches above the bottom to prevent stirring up the sediment that settles to the bottom.

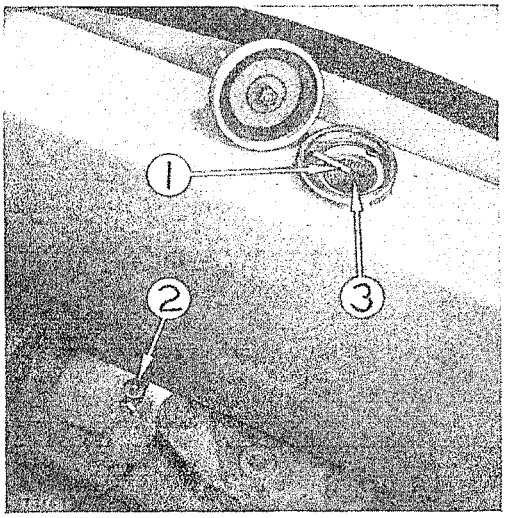
Whatever method is used, see that only clean fuel enters the Diesel fuel tank.

CARE OF THE DIESEL FUEL TANK

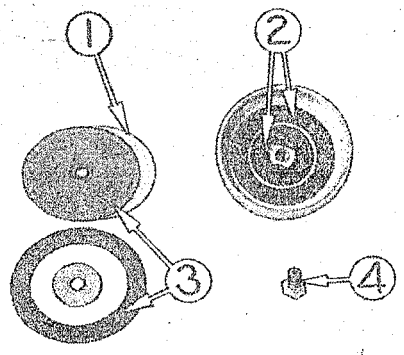
Fill the Diesel fuel tank at the end of the day, because the incoming fuel will drive out the moisture-laden air and prevent condensation.

Diesel Fuel Tank: The fuel level in the Diesel fuel tank may be checked with the plunger gauge **(1)** in the filler opening.

Every 120 hours, before starting the engine, open the drain cock **(2)** under the Diesel fuel tank and drain off any sediment or water which may have accumulated. The strainer **(3)** in the fuel tank filler opening should be removed and cleaned regularly. Remove the snap ring and lift out the strainer.



DIESEL FUEL TANK
1—Plunger gauge. 2—Drain cock. 3—Strainer.



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FUEL TANK FILLER CAP
1—Baffle plate. 2—Elements. 3—Gaskets. 4—Capscrew.

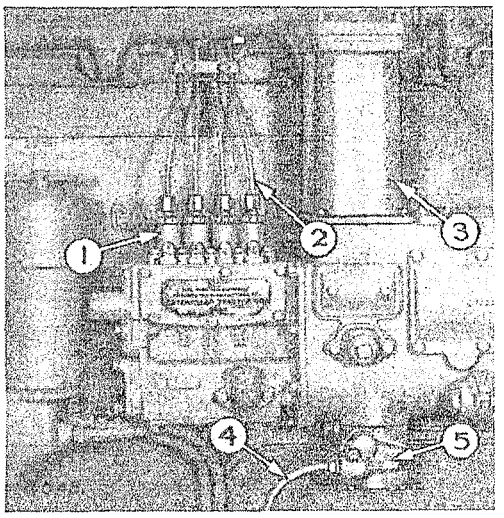
Diesel Fuel Tank Filler Cap: The Diesel fuel tank filler cap elements **(2)** should be washed every 60 to 240 hours depending upon the amount of dust in the air. To do this, remove the capscrew **(4)** and take out the baffle plate **(1)** and gaskets **(3)**. Wash the cap and elements in kerosene or some non-inflammable cleaning fluid. After the cap is washed pour a small amount of crankcase lubricating oil on the filter elements.

FUEL SYSTEM

The fuel flows from the Diesel fuel tank through the fuel line **(4)** to the fuel transfer pump **(5)**. The fuel transfer pump supplies the fuel under pressure to the fuel filter housing **(3)**, the filters remove the dirt and other foreign particles. From here the fuel is supplied to the fuel pump manifold for the individual fuel injection pumps. The fuel injection pumps **(1)** meter and force the fuel through the fuel injection lines **(2)** to the fuel injection valves in the cylinder head, into the pre-combustion chamber where it is ignited and passed into the main combustion chamber or cylinder.

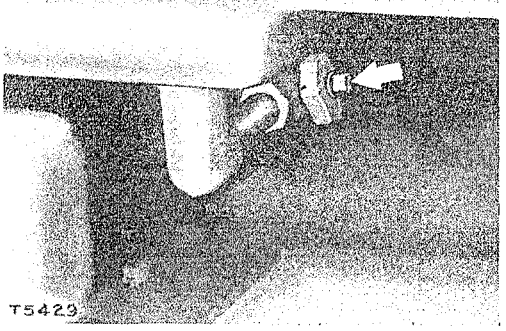
FUEL SYSTEM

1—Fuel injection pumps. 2—Fuel injection lines. 3—Fuel filter housing. 4—Diesel fuel line. 5—Fuel transfer pump.

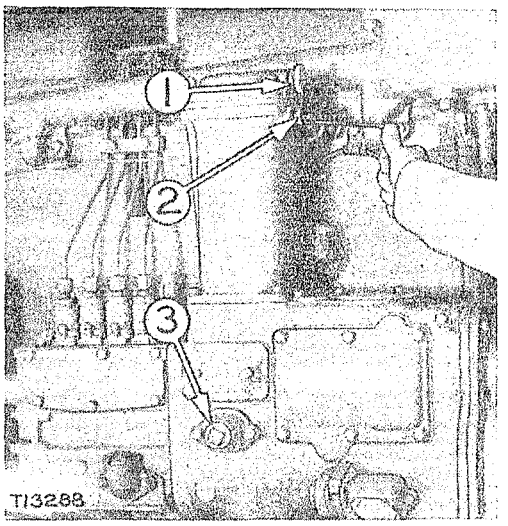


CARE OF THE FUEL FILTER

Draining Fuel Filter Housing: Every 60 hours, drain the filter housing of sediment and water which settles to the bottom of the compartment.



DIESEL FUEL TANK VALVE



DRAINING FILTER HOUSING

1—Upper vent. 2—Lower vent. 3—Drain plug.

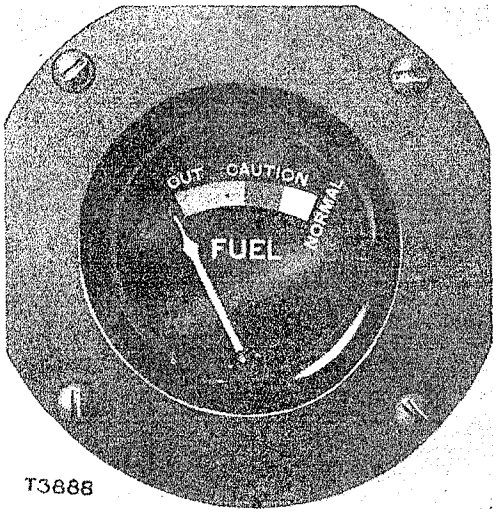
To do this close the Diesel fuel tank valve, remove the filter housing drain plug **(3)** and open the lower vent **(2)** and then the upper vent **(1)** in the housing. Replace the drain plug, and prime the system. See the topic, PRIMING THE FUEL SYSTEM.

Fuel Filter Elements: When the absorbent filter elements have collected enough contamination to interfere with free flow of fuel, they must be replaced with new elements. These elements will continue to absorb particles until fuel will no longer flow through them at a rate to maintain maximum engine performance. They will not discharge their burden into the clean fuel; this is prevented by the fine grade filter paper at the core.

Because these filter elements absorb and hold contaminants, they cannot be washed or otherwise restored.

As the filters gradually become clogged with foreign material, the position of the fuel gauge indicator will work back from the original position in the NORMAL (white) range, to the CAUTION (green) range, and later into the OUT (red) range.

When the indicator shows in the OUT (red) range the filters should be changed and all new filter elements installed — never only one.

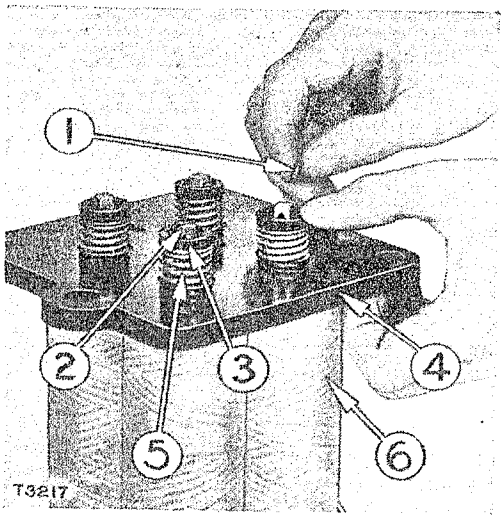


FUEL PRESSURE GAUGE

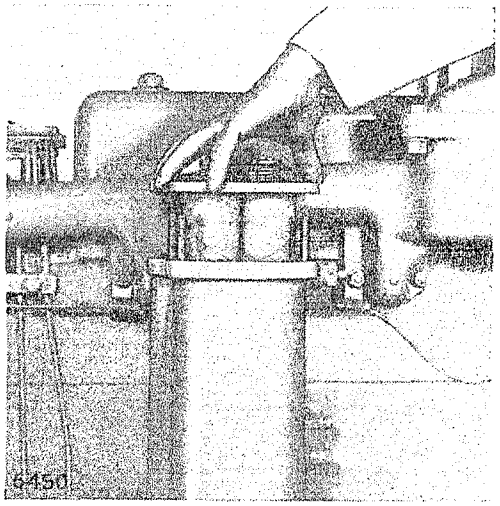
Removing Used Filter Elements: Thoroughly clean the top of the filter cover and around the edges of the gasket joint between the filter body and cover, to guard against loose dirt dropping into the filter housing when the cover is removed. Close the Diesel fuel tank valve, remove the filter housing drain plug, open the lower and then the upper filter housing vents.

Remove the cover, and lift the assembly of filter element plate and filter elements out of the housing.

To remove the used filter elements, set the assembly on a flat surface and compress each spring **(5)** until the retainer **(3)** will permit removal of the pin **(1)**. Lift off the filter element plate **(4)** and remove the elements **(6)** from the retainer rods **(2)**.



REMOVING FILTER ELEMENT
1—Pin. 2—Retainer rod. 3—Retainer. 4—Filter element plate. 5—Spring. 6—Filter element.



REMOVING FUEL FILTER ASSEMBLY

Attaching New Filter Elements To Filter Element Plate: Thoroughly wash the plate, retainer rods, retainers, pins and springs in clean kerosene, Diesel fuel or a non-inflammable cleaning fluid. Make sure that the hands are clean before attempting to install the new parts. Place the retainer rods into each one of the four new filter elements (earlier models require six filter elements, two of which should be placed on each of the two back retainer rods). Attach the elements to the plate individually by compressing the spring and inserting the pin so it is held securely in the counterbore of the retainer. Grasp each element at the bottom end and give it approximately a half turn under light pressure to seat the ends of the element against the plate and against the disc on the bottom of the retainer rod. Keep the elements parallel and square with the plate while performing this operation.

Installing Filter Elements In Housing: Exercise extreme care to see that the top side of the retainer plate, retainer assembly, and the inside of the housing cover are clean. These parts are on the clean side of the elements and if dirt is not completely removed, it will find its way into the fuel injection equipment. To install the elements in the housing proceed as follows:

1. Flush out the housing with clean fuel and replace the drain plug.
2. Install a new gasket on the housing.

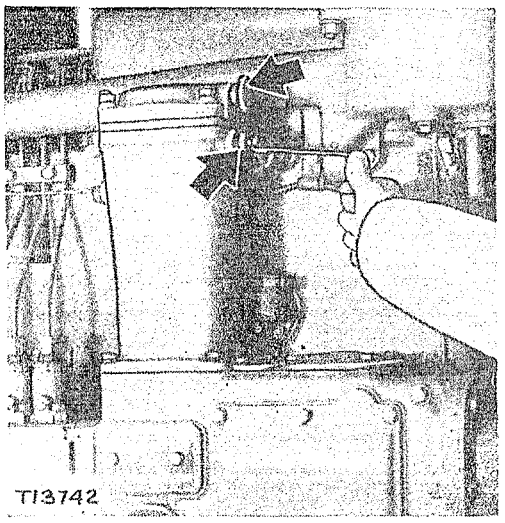
3. Fill the housing approximately half full with clean fuel, so that a minimum of cranking is required to prime the system.
4. Install the elements in the housing.
5. Install a new gasket on the plate.
6. Replace the cover and follow the instructions given in the topic, PRIMING THE FUEL SYSTEM.

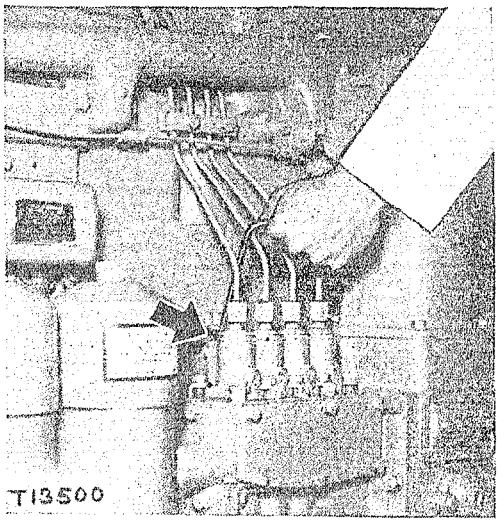
Keep New Filter Elements On Hand: An extra set of filter elements should be kept on hand for replacement. Always keep the elements wrapped in their original cartons to insure against dust and dirt accumulations which will shorten the life of the elements if it gets on the outside or may cause damage to the fuel injection equipment if it gets on the inside.

PRIMING THE FUEL SYSTEM

Any time the fuel flow is broken and air is allowed to get into the fuel system, the fuel system must be primed. If air is left in the lines, the fuel system may become air bound, resulting in inability to start the Diesel engine or the misfiring of one or more cylinders.

To Prime The Fuel System: Check to see that the Diesel fuel tank valve is open. Open the fuel filter vent valves and the vents on the fuel injection pumps. The governor control lever should be in the extreme forward position, so the pumps are shut off. Then, start the starting engine, engage the starter pinion, and the starting engine clutch. Allow the starting engine to crank the Diesel engine at starting engine idle speed, with the compression release lever in the START position. This will allow the fuel transfer pump to force the air and fuel through the fuel filters and the fuel pump vents. When the flow of fuel through the vents becomes





continuous and contains no air bubbles, close the vents. Open and close the vents several times in succession to be sure all of the air is bled from the system.

FUEL INJECTION EQUIPMENT

When improper fuel injection is affecting the Diesel engine operation, a systematic check should be made to determine the cause. The most likely cause is dirt or water in the fuel. Drain the sediment from the Diesel fuel tank and drain the fuel filter housing. Check the fuel pressure gauge as mentioned in the topic, CARE OF THE FUEL FILTER. Replace the absorbent filters if necessary. Then prime the fuel system until clean fuel passes through the vents on the fuel injection pumps. If the fuel system is air bound, priming the system will overcome the difficulty.

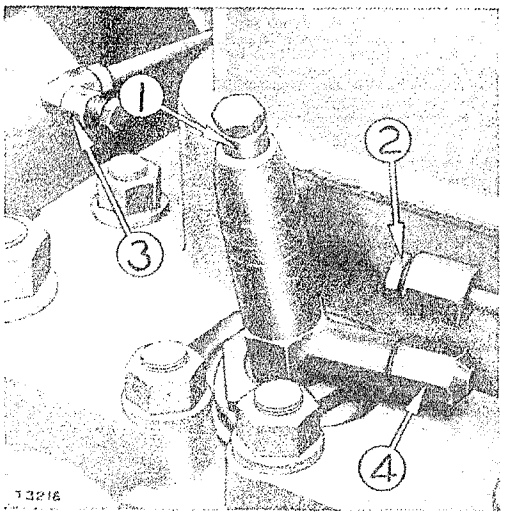
When the engine is running irregularly, and smoking, a fuel injection valve may not be spraying the fuel properly.

As the clearance between the plunger and the barrel of a fuel injection pump increases, due to wear, fuel leakage occurs. When the leakage increases to the point where insufficient fuel is iniected into the cylinder, a loss of power is noticeable. With the loss of power, hard starting is also encountered.

Fuel Injection Valves

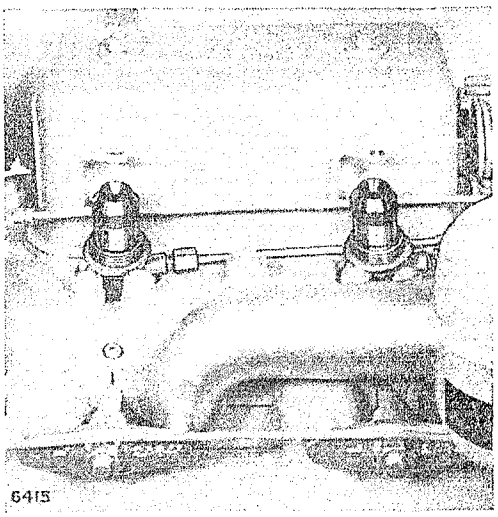
Testing Fuel Injection Valves: Whenever an engine performs in such a manner that a fuel injection valve is suspected of causing trouble, test all fuel injection valves. To test the injection valves, loosen the fuel injection line nuts at the fuel injection pumps, one at a time, while the engine is running. When a nut is loosened and the exhaust smoking is completely or partially eliminated and the irregularity in running is not affected, this identifies the defective valve and a new one should be installed in that cylinder. Remove the fuel injection valve and test it for spray characteristics as instructed in the following paragraphs. A defective valve should be replaced. Be sure that the fuel injection pumps have been installed correctly. See the topic, INSTALLING FUEL INJECTION PUMPS. These valves can be checked by your "Caterpillar" dealer.

Removing Fuel Injection Valves: Valves can be checked for producing proper spray characteristics. After cleaning all dirt from around the valves, using the brush supplied in the tool equipment, disconnect the fuel injection lines and injection valve overflow tube from the valves. Immediately cap and plug the openings with the seals **(1)**, covers **(4)** and plugs **(2)** as shown. Unscrew the retaining nuts that hold each valve in place.



PREPARING TO REMOVE INJECTION VALVE

1—Valve seal. 2—Line plugs.
3—Overflow tube elbow. 4—Valve covers.



TESTING FUEL INJECTION VALVE SPRAY CHARACTERISTICS

Checking Injection Valve Spray Characteristics: Remove the valves, turn them upside down and connect the injection lines. Disconnect and plug the overflow tube at either the overflow tube elbow **(3)** or the transfer pump on tractors after 7M4747 which have a overflow tube from the valves to the transfer pump. Start the starting engine and engage the starter pinion and clutch. Allow the starting engine to turn the Diesel engine at low idle speed. Move the governor control lever to full governed speed position and notice the fuel spray that comes from the fuel injection valves.

If the fuel injection valves give a fine, even spray, it can be assumed that they are in good condition. On the other hand, a fuel injection valve should be replaced if it exhibits any of the following characteristics:

Fuel discharged in a solid stream or jet.

Fuel spray emitted all on one side of the nozzle.

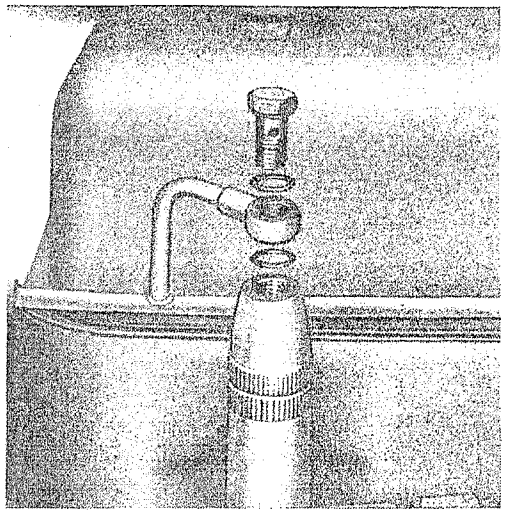
Cut-off at the end of the fuel discharge is sluggish or erratic.

Severe dribble from the nozzle, indicated by large drops of oil wetting the cone nut on the bottom side of the nozzle.

In checking fuel injection valves remember that the **quantity** of the fuel is determined by the condition of the fuel injection pump and the **quality** of the spray characteristic is determined by the condition of the fuel injection valve. Occasionally, a single fuel injection valve may be affected by dirty fuel and require replacement, while the other valves in the engine are satisfactory.

Installing Fuel Injection Valves: When installing fuel injection valves, the retaining nuts should be drawn down evenly and only tight enough to prevent leaks between the valves and the valve seats. On engines

LOCATION FOR WASHERS ON INJECTION VALVE DRAIN LINE



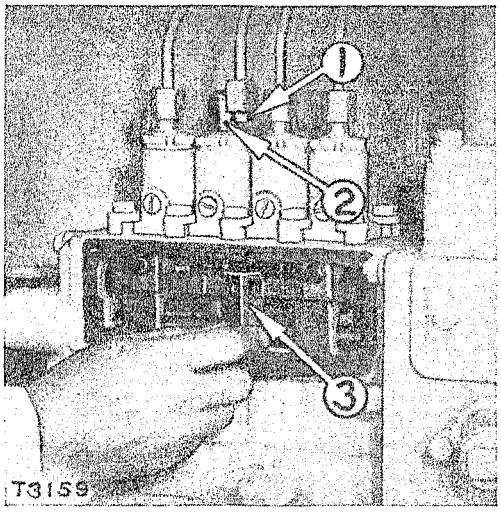
after 7M4747 when attaching the overflow tube to the top of the injection valve be sure to place a washer above and below the fitting. Tighten the screw moderately.

Fuel Injection Pumps

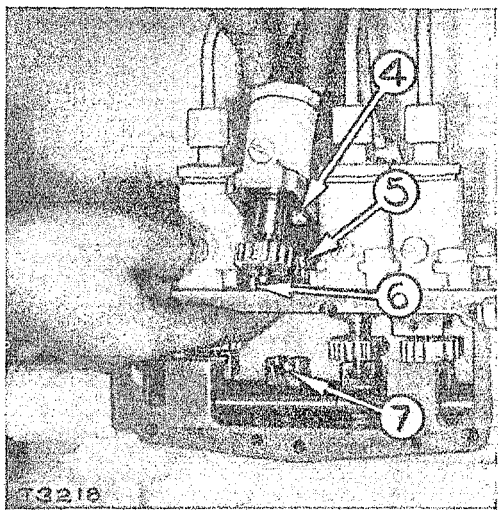
Testing Fuel Injection Pumps: It is not usual for one pump on an engine to require replacement unless all the pumps are worn. Worn fuel injection pumps will result in loss of power and hard starting. When loss of power and hard starting is accompanied with a clear exhaust, good compression and no blow-by gases from the crankcase breather it indicates worn injection pumps. These pumps can be checked by your "Caterpillar" dealer.

Removing Fuel Injection Pumps: Every precaution should be taken to prevent dirt from getting into the fuel injection pumps or housing. Use the brush supplied in the tool equipment to clean the top of the housing and around the inspection plate before removing. When fuel injection pumps are removed the pump plungers must not be taken from the barrels as any dust or dirt will scratch these finely finished parts.

After cleaning the top of the housing, and around the inspection plate, remove the fuel injection lines from the pumps and immediately cap the openings with covers **(2)** and plugs **(1)** provided in the tool equipment. Remove the inspection plate. Remove the fork **(3)** that fastens the rack to the slide bar. Remove the two capscrews and plates that hold the rack in place and pull the rack out of the housing.



REMOVING RACK FORK
1—Fuel line plug. 2—Pump cover.
3—Fork.



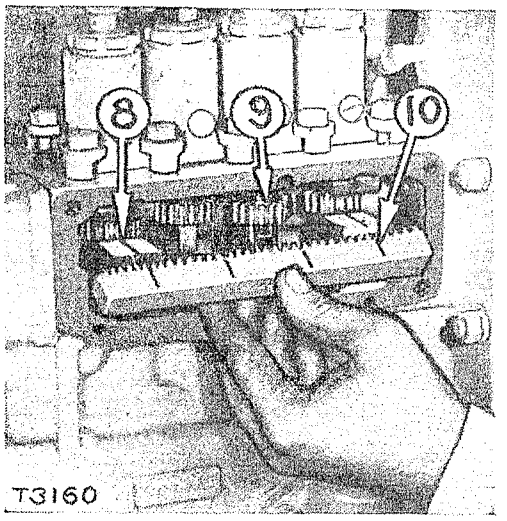
REMOVING FUEL INJECTION PUMP
4—Stopper. 5—Ferrule cap seal.
6—Dowel. 7—Slot in lifter.

Remove the capscrews and clamps that hold the fuel injection pump to the housing and lift the pump straight up only enough to clear the dowels **(6)**. Then insert a finger through the inspection hole to hold the plunger from dropping out and shift the pump to one side so that the end of the pump plunger will free itself from the slot **(7)** in the lifter; then remove the pump. Place the ferrule cap seals **(5)** and stoppers **(4)** furnished in the tool equipment over the fuel outlet of the fuel injection pump housing and in the inlet of the pump to keep out dirt.

Should the plunger accidentally be removed from the pump barrel, take every precaution to avoid nicking or scratching it since the slightest rough spot will cause undue wear in the barrel and shorten the life of the pump. The plunger should be rinsed in clean fuel before putting it back in the barrel. Be sure the plunger is replaced in the barrel from which it was withdrawn. **Each fuel injection pump assembly (plunger and barrel) is machined as a unit and finished to such exact limits that it must be used, removed, and replaced as a unit.**

Installing Fuel Injection Pumps: Lower the pump and plunger into the housing, taking care that the pump plunger does not slide out of the pump. Slide the end of the plunger into the slot in the lifter. Lower the pump onto the dowel and fasten in place.

Turn the gears on the pump plungers until the marked tooth of each gear faces outward toward the pump rack. Replace the pump rack engaging the marked teeth **(9)** of the pump plunger gears with the marks **(10)** on the rack. The end pump plunger gears can be aligned with the marks **(8)** on the fuel pump housing. The other two pump gears can be aligned quite easily as the rack is slid into position. It is advisable to pull the rack out part way to see that the marks are correctly aligned. Install the capscrews and plates holding the rack in place. Move the governor



INSTALLING PUMP RACK

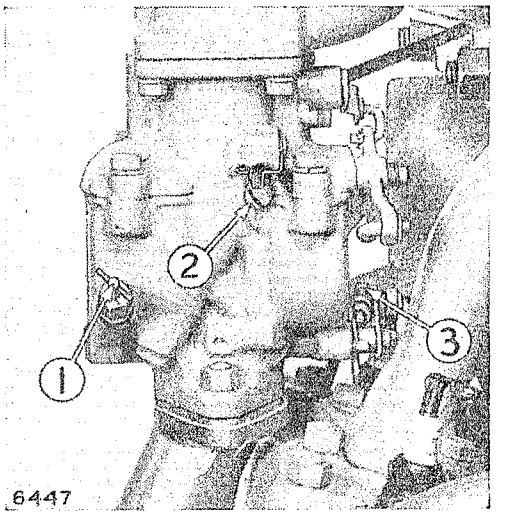
8—Marks on housing. 9—Marked teeth on gears. 10—Marks on rack.

control lever to the full engine speed position and fasten the fork in place. Replace the inspection cover and connect the fuel lines.

STARTING ENGINE FUEL SYSTEM

Carburetor Adjustment: To obtain an approximate adjustment, turn the high speed adjusting screw one and one-half turns from the closed position. Turn the idling speed adjusting screw one and three-eighths turns from the closed position.

A more accurate adjustment can be made with the engine running. Lock the governor shaft lever in the idling position by dropping the idling latch in front of the lever. Start the engine and allow it to warm up. Turn the idling adjusting screw **(2)** until the engine idles evenly without emitting black smoke from the exhaust. Lift the idling latch and let the engine run at full governed speed. Turn the high speed adjusting screw **(1)** until the engine runs evenly without surging and does not emit black smoke from the exhaust. Turn the idling speed control screw **(3)** to the left (out) to decrease the idling speed or to the right (in) to increase it.



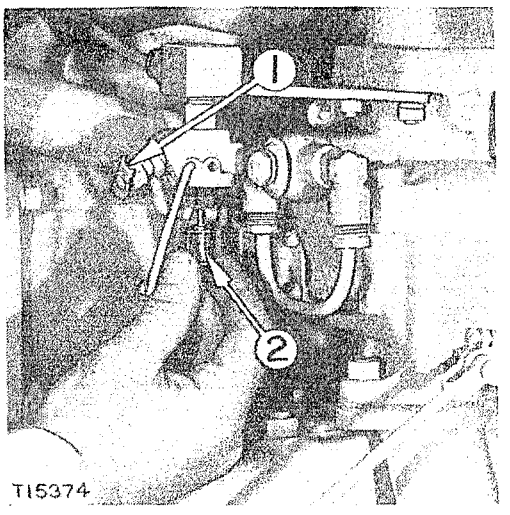
CARBURETOR ADJUSTMENTS

1—High speed adjustment. 2—Idling speed adjustment. 3—Idling speed control screw.

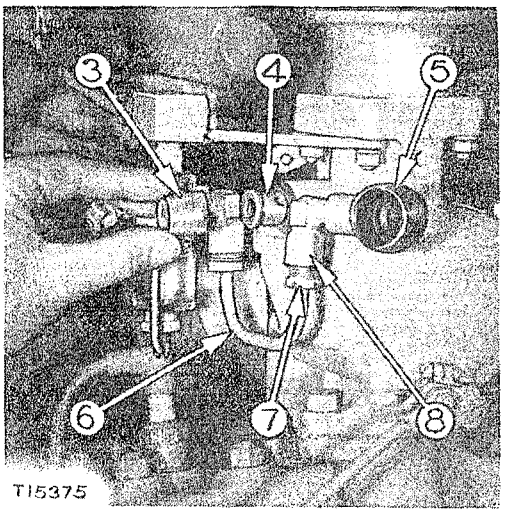
Sediment Bowl Filter and Fuel Line Screen: The sediment bowl collects water and sediment that may be in the fuel. To remove the collected water and sediment, close the valve **(1)** and remove the bowl by unscrewing the nut that clamps it to the body of the valve. Unscrew the edge-type filter **(2)** and shake it in kerosene or some non-inflammable cleaning fluid. When the bowl is replaced see that the gasket is clean, is in the correct position, and is not broken.

STARTING ENGINE SEDIMENT BOWL FILTER

1–Fuel shut-off valve.
2–Edge-type filter.



The fuel line screen in the carburetor should be removed and cleaned whenever the sediment bowl is serviced. This is done by loosening the nut **(7)** that holds the fuel line **(6)** into the body fitting **(8)**. Remove the capscrew that holds the body assembly **(5)** in place over the screen **(3)** and stud **(4)**. Turn the body assembly off the stud and screen, then slide the screen off the stud.



REMOVING FUEL LINE SCREEN

3–Screen. 4–Stud. 5–Body assembly.
6–Fuel line. 7–Nut. 8–Body fitting.

Occasionally remove the drain filter on the starting engine inlet manifold and inspect the filter element. If it is deteriorated, replace it.

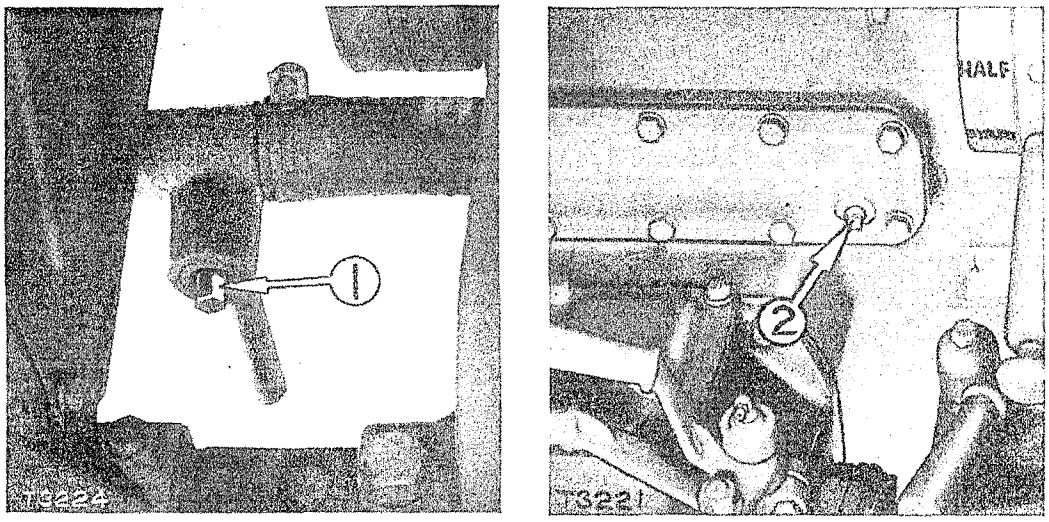
COOLING SYSTEM

Coolants: Water used in the cooling system should be soft, or as free as possible from scale forming minerals. If it is impossible to obtain soft water it is advisable to treat the available water with "Caterpillar" Rust Inhibitor. The use of this rust inhibitor in the cooling system will prevent the formation of rust. It will also retard, and in some cases completely eliminate mineral deposits within the engine. Most commercial anti-freeze solutions contain rust inhibitors, therefore, it is not necessary to use rust inhibitors with those anti-freeze solutions which do contain inhibitors. Your "Caterpillar" dealer stocks "Caterpillar" Rust Inhibitor in convenient one quart cans. Directions for its use are printed on each can.

When the temperature is below freezing sufficient anti-freeze should be used in the cooling system to prevent freezing. Various anti-freeze mixtures such as ethylene glycol (Prestone, G.M., Permaguard, Zerex, etc.) denatured ethyl alcohol, methanol (synthetic wood or methyl alcohol) and glycerine are all suitable for use. Alcohol can be used successfully but, because it readily evaporates at the normal operating temperature of the Diesel engine the solution should be tested frequently —even daily—and kept up to correct strength. This loss by evaporation is objectionable **but the temperature regulator should not be removed.** Doing so might make the solution run cooler and save the alcohol, but is not desirable for good performance. It is essential, therefore, that the coolant be tested frequently to assure adequate protection.

Filling: Fill the starting and Diesel engine cooling system by pouring the coolant into the radiator filler opening.

Draining: The cooling system is drained by opening the valve **(1)** on the radiator water outlet elbow on the left side and by removing the Diesel cylinder block drain plug **(2)** at the rear of the water manifold



COOLING SYSTEM DRAINING
1—Radiator drain valve. 2—Diesel cylinder block drain plug.

on the same side of the Diesel engine. This should be done at the end of the day's run when all the material is in suspension and will drain with the liquid.

If draining is being done for the purpose of cleaning sediment from the system, the plate at the rear of the starting engine cylinder block should be removed so that the sediment can be cleaned out of the water jacket. During the time the starting engine is not running the velocity of the water around its cylinder block is low allowing the sediment in the water to settle.

Cleaning The Radiator: Dirt in between the tubes of the radiator and oil cooler may cause excessively high operating temperature. This dirt may be easily removed by removing the capscrews which hold the radiator perforated guard in place (earlier models have a screen). Then wash, brush or blow the dirt out with whichever method is available and most effective.

Cleaning The Cooling System: The cooling system should be drained occasionally to remove dirt and sediment which accumulates. The draining should be done at the end of the day's run, when the foreign material is in suspension and will easily drain with the liquid.

The cooling system should be washed out occasionally. To do this, run the engine until the liquid in the cooling system is at operating temperature, and the loose foreign material is stirred up. Then stop the engine, and drain as quickly as possible before the sediment has time to settle. Close the drain and pour in kerosene equal to about one-tenth the capacity of the cooling system and fill the remainder with a solution of one-half pound (226.8 grams) of washing soda to each gallon (3.8 liters or .8 Imp. Gal.) of water. Run the engine for about one-half hour, and again drain and flush the system with clean water.

In more obstinate cases, if the above treatment does not prove effective, an acid solution may be used, but acid must be used with extreme care and only after other means have proved ineffective. Immediately after the system has been washed with the soda solution as described above, fill the cooling system with a solution of five parts hydrochloric (commercial muriatic) acid, one part formaldehyde and forty-eight parts of water and allow it to remain in the cooling system for a few hours at operating temperature. The formaldehyde should first be mixed with the water, then the acid added to the solution. Drain immediately after stopping the engine and thoroughly flush the system with clean water to which has been added a handful of washing soda which acts as a neutralizing agent.

After using the acid treatment, the cooling system should be drained and flushed with clean water the second time at the end of the day's run

CAUTION

The acid solution is also a solvent of the metals of which radiators are made, therefore, great care must be exercised to avoid continuing the operation beyond the point where the scale is dissolved. It is highly important that no trace of the acid be left in the cooling system.

RADIATOR SEALED PRESSURE OVERFLOW UNIT

The sealed pressure overflow unit, effective with tractors 7M5226, should be cleaned periodically to remove lime deposits and other accumulations which might hold the valve in the "open" position. Such deposits are not so noticeable where inhibitors are used in the cooling system but, even so, regular cleaning of the unit should be encouraged.

To clean the unit, disassemble it by removing the screws which hold the cover in position. Lift off the cover, then the seal assembly and brush the parts thoroughly until all of the foreign matter has been removed.

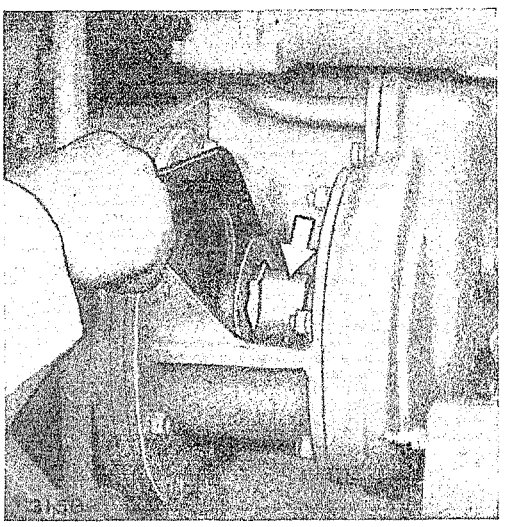
CAUTION

Do not wash the unit in any kind of cleaning solution because so doing may damage the seat.

WATER PUMP PACKING NUT ADJUSTMENT

With the Diesel engine running at low idle speed tighten the water pump packing nut by turning it in the direction the shaft turns until the leak stops and then back off 1/6 turn. The packing should be only tight enough to stop any leak but not tight enough to bind the shaft.

As instructed in the topic, DAILY CARE it is important to keep the tractor clean. Daily or oftener in some operations, a check should be made of the area around the water pump shaft. Any accumulation of dirt, sticks, leaves or gravel under the shaft which may cause damage to the shaft and packing should be removed.



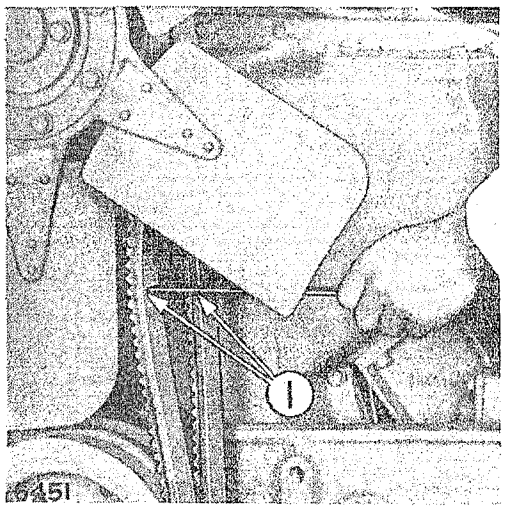
WATER PUMP
PACKING NUT ADJUSTMENT

◆

FAN BELT ADJUSTMENT

If the fan belts are operated too loose, they will slap against the pulleys, causing unnecessary wear to the belts and possibly slipping to the extent that the engine will overheat. If the belts are too tight, unnecessary stresses are placed upon the fan bearings and belts, which might shorten the life of both. Correct adjustment exists when the belts can be pushed inward approximately 1½ inches (3.81 cm.) as shown at **(1)**.

When a belt (or belts) need replacing, a matched set which is available from your "Caterpillar" dealer should be used. Always install a matched set—never only one.

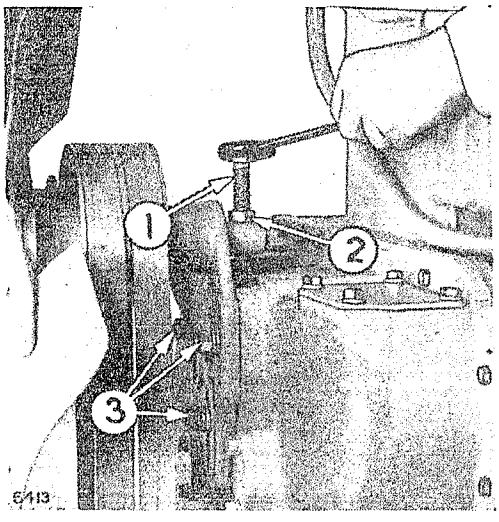


CHECKING FAN BELT TENSION

1—Correct adjustment allows approximately 1½ inch (3.81 cm.) slack at this point.

◆

Adjusting Belts: Loosen the three retaining nuts **(3)** which hold the fan hub bracket to the timing gear cover. Loosen the lock nut **(2)** on the adjusting screw **(1)** and turn the screw until the belts can be pushed inward approximately 1½ inches (3.81 cm.). Recheck the adjustment after tightening the lock nut and bracket nuts.



FAN BELT ADJUSTMENT

1—Adjusting screw. 2—Lock nut. 3—Retaining nuts.

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VALVE CLEARANCE ADJUSTMENT

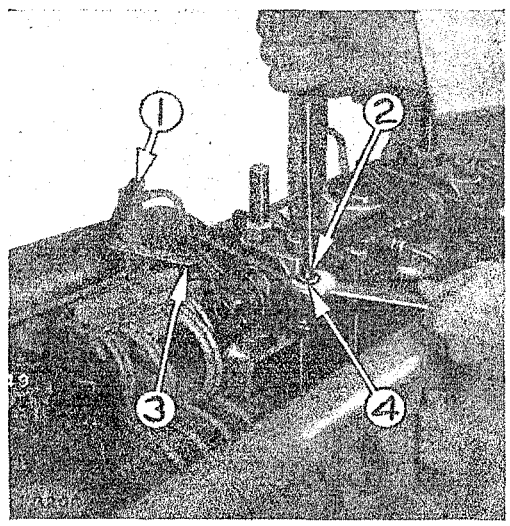
The initial valve clearance adjustment should be made at the time the cylinder head stud nuts are tightened after the first thirty days of operation. Thereafter, the clearances should be checked and adjusted if necessary after every 480 hour operating interval.

The valve clearance adjustment should be made while the engine is hot, either while the engine is running or before it has been stopped twenty minutes after having run long enough to thoroughly warm up. If the adjustment is made with the engine stopped and is not completed during this twenty minute interval, start the engine and allow it to warm up. The valve clearance adjustment and the compression release clearance adjustment must be made, or the clearances checked, with the compression release lever in the RUN position.

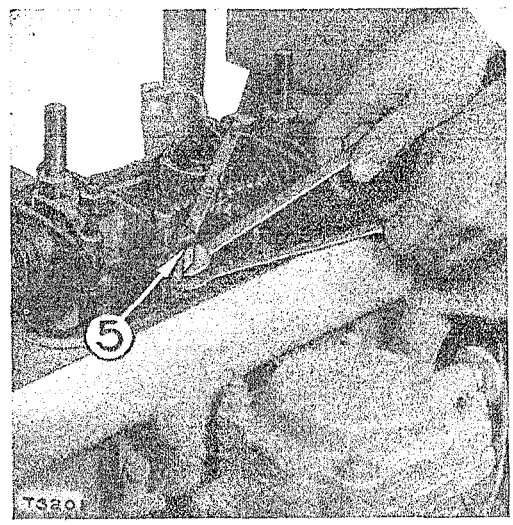
To Adjust: Loosen the valve adjusting screw lock nut **(4)**, turn the adjusting screw **(2)** to allow a thickness gauge **(1)** to pass between the top of the valve sleeve **(3)** and the end of the valve rocker at the correct clearance. Set this clearance at 0.012 inch (0.30 mm.) for exhaust and inlet valves. Tighten the adjusting screw lock nut and check the adjustment.

If adjustment is made with the engine stopped, turn the engine until the valve closes and the push rod is at its lowest point.

After adjusting the clearances on the valves, and while the compression release lever is still in the RUN position with the engine stopped, check the clearance at **(5)** between the upper end of the compression release push rod and the end of the valve rocker. This clearance should be .025 to .030 inch (0.64 to 0.76 mm.). To adjust, loosen the lock nut on the compression release push rod and turn the adjusting nut until the



VALVE CLEARANCE ADJUSTMENT
1—Thickness gauge. 2—Adjusting screw. 3—Valve sleeve. 4—Lock nut.



COMPRESSION RELEASE PUSH ROD ADJUSTMENT
5—Measure clearance at this point.

correct clearance is obtained. If the compression release push rod turns when adjusting, hold the push rod with a wrench on the flat surfaces below the lock nut. Recheck the adjustment after the lock nut is tightened. Check this clearance every time the valve clearances are changed or checked.

When adjusting the valves on early tractors equipped with one piece valve covers, the engine hood must be removed to make adjustment possible.

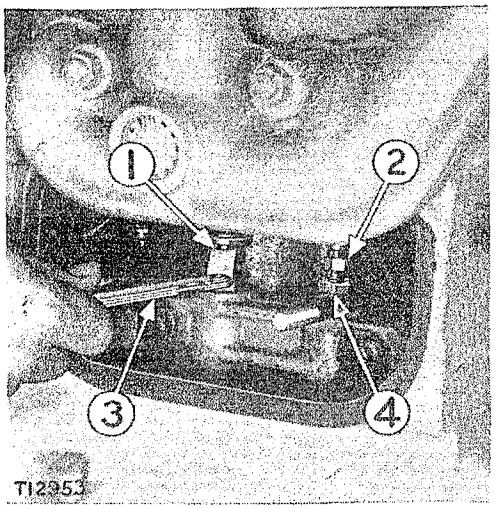
Later tractors, beginning with 7M1565, are equipped with two-piece valve covers. These covers permit checking and adjusting valves without removing the engine hood.

STARTING ENGINE VALVE CLEARANCE ADJUSTMENT

The valve clearance adjustment should be made when the engine is hot. To adjust, crank the engine until the valve closes and the valve lifter is ot its lowest position.

On later engines turn the adjusting screw **(2)** while holding the valve lifter **(4)** until there is .008 inch (0.2 mm.) clearance at **(1)** between the adjusting screw and the end of the valve stem. Check this clearance with a thickness gauge **(3)**.

On earlier engines loosen the lock nut on the adjusting screw. Turn the adjusting screw until there is .008 inch (0.2 mm.) clearance between the adjusting screw and the end of the valve stem. Check this clearance with a thickness gauge. Tighten lock nut and recheck the valve clearance.



STARTING ENGINE VALVE CLEARANCE ADJUSTMENT

1—There should be .008 inch (0.2 mm.) clearance at this point. 2—Adjusting screw. 3—Thickness gauge. 4—Valve lifter.

◆

STARTING ENGINE MAGNETO

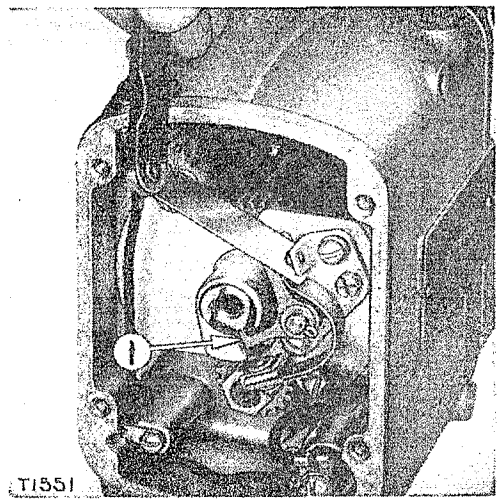
Current engines are equipped with Bosch magnetos and earlier ones were equipped with Eisemann magnetos. Information pertaining to these magnetos is presented in two topics that follow.

Bosch Magneto

Do Not Lubricate The Magneto At Any Point: The bearings are packed with a Ball and Roller Bearing Grease when assembled, and this should be replaced only when the magneto is taken to your "Caterpillar" dealer for checking or reconditioning.

Checking Contact Point Opening: Every 1,200 hours check the contact point opening.

Remove the distributor plate which is held in place by four screws. Care should be taken in removing the plate not to damage the gasket.



CHECKING CONTACT POINT OPENING

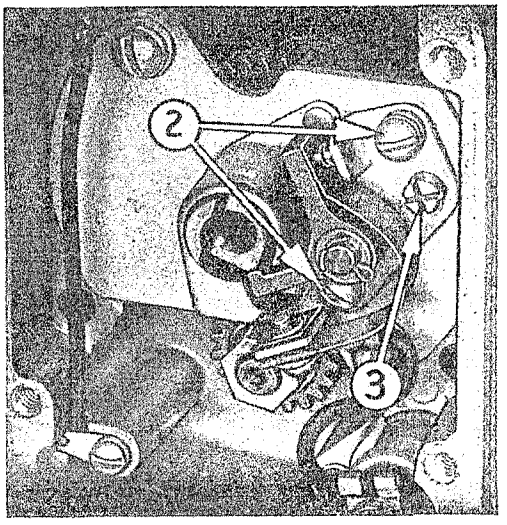
1—Contact point bumper block on one of the highest elevations of the cam.

Clean any carbon dust from the inside of the plate using a soft cloth, dampened with a non-inflammable cleaning fluid. Remove the distributor rotor, then turn the engine until the contact point bumper **(1)** is on one ot the highest elevations of the cam. Check the clearance with a thickness gauge between the contact points as illustrated. This clearance should be .014 to .018 inch (.36 to .46 mm.).

Adjusting Contact Point Opening: Loosen the screws **(2)** which hold the adjustable contact point bracket and move the bracket by inserting

ADJUSTING CONTACT POINT OPENING

2—Bracket fastening screws. 3—Eccentric slotted-head screw.

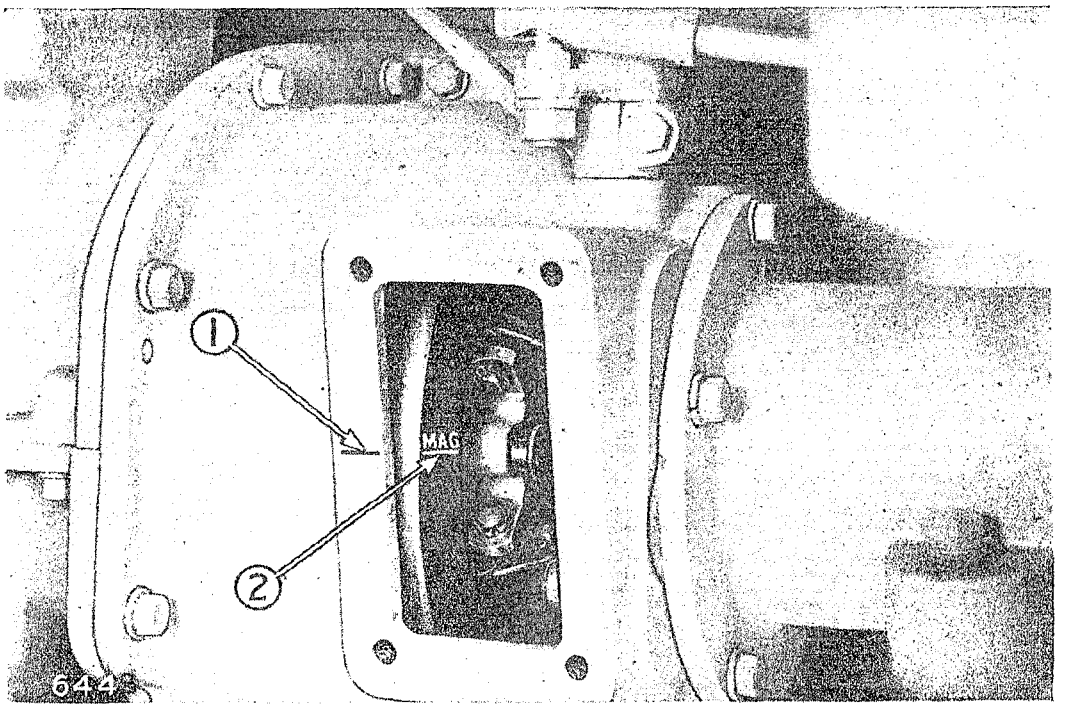


a screw driver in the eccentric slotted-head screw **(3)** and turn either clockwise or counterclockwise until the correct point opening is obtained. Then tighten the fastening screws and recheck the adjustment.

Testing: A magneto may be tested when coupled to the engine by turning the switch, ON, removing the cable from a spark plug, and fastening it so the terminal is 1/8 inch (3.17 mm.) away from the metal base of the plug while cranking the engine. If no spark passes from the terminal to the metal base, disconnect the magneto switch wire from the magneto where it is connected to the terminal on the top of the magneto housing and test again. If a spark passes from the terminal to the base with the switch wire removed, the wire running from the magneto to the switch has become grounded or the switch requires replacement. If, with the switch wire off, the magneto still does not fire, remove the magneto as instructed in the next paragraph and take it to your "Caterpillar" dealer for testing.

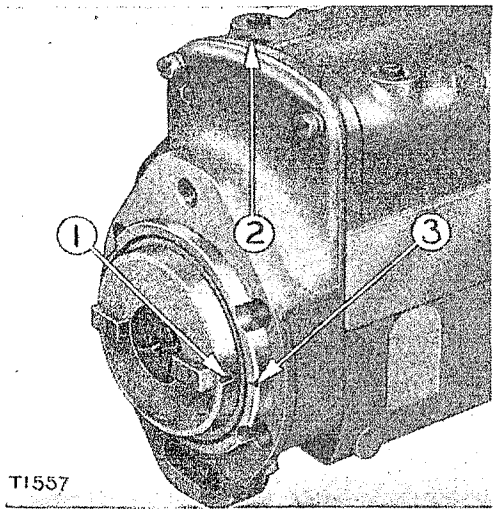
To Remove Magneto For Testing: Disconnect the cables from the magneto. (One of the cables should be tagged or marked in some convenient manner which will designate the proper position of these cables). Remove the two capscrews that hold the magneto to the timing gear cover and lift off the magneto.

To Time The Magneto To The Engine: Check the adjustment of the contact points. Locate the firing point of No. 1 cylinder by removing the cover from the side of the starting engine clutch housing and the spark plug from No. 1 cylinder. Crank the engine slowly until air is forced

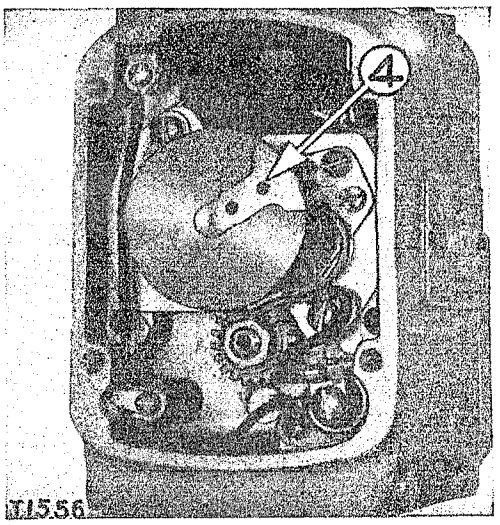


STARTING ENGINE FLYWHEEL AND HOUSING TIMING MARKS
1—Timing mark on the housing. 2—Timing mark on the flywheel.

from the spark plug opening. This indicates the piston is coming up on the compression stroke. Continue to turn the crank until the "M" or "MAG" mark **(2)** on the flywheel is even with the mark **(1)** on the housing. The crank on No. 1 cylinder is now 25° ahead of top center on the compression stroke which is the correct firing point.



TIMING MARKS
1—Timing marks on coupling. 2—Arrow. 3—Timing mark on housing.



ROTOR POSITION TO TIME MAGNETO TO ENGINE
4—Rotor contact.

Remove the distributor plate from the magneto and rotate the impulse coupling in the opposite direction from drive (this will prevent the impulse coupling weights catching). Drive direction is indicated by an arrow **(2)** on the top of the magneto housing. Continue to turn the coupling until the red mark **(1)** on the coupling lines up with the red mark **(3)** on the housing and the distributor rotor contact **(4)** is in the position as shown. The contact points should be just beginning to open, with the coupling rotating in the driven direction.

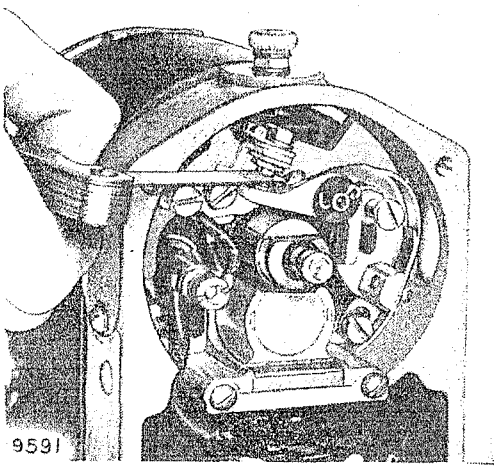
Replace the distributor plate and install the magneto on the engine.

Eisemann Magneto

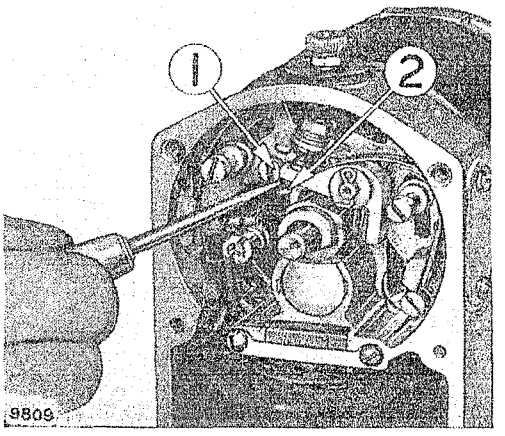
Every 900 hours of operation, oil the impulse starter. Later machines are equipped with an oil cup for this purpose. One or two drops of oil are ample.

Do Not Lubricate The Magneto At Any Point: The bearings in this magneto are packed with a Ball and Roller Bearing Grease when assembled, and this should be replaced only when the magneto is taken to your "Caterpillar" dealer for checking or reconditioning.

Checking The Contact Point Opening: Every 1200 hours check the contact point opening. To check, first remove the distributor plate and lift out the distributor rotor. Then turn the crank until the bumper block



CHECKING CONTACT POINTS



ADJUSTING GAP
1—Screw. 2—Lip on bracket.

is on the highest elevation of the cam. Check the clearance, which should be .020 inch (0.51 mm.) with a thickness gauge.

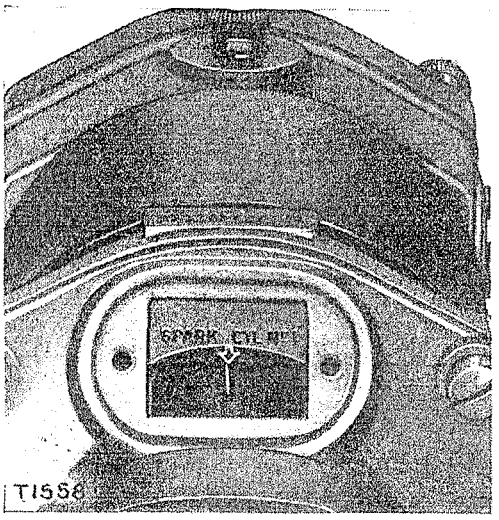
Adjusting The Contact Point Opening: Loosen the screw that holds the contact point bracket and move the bracket by inserting a screwdriver in the space between the head of the screw **(1)** and the lip **(2)** on the bracket. Then tighten the screw and recheck the adjustment.

Testing: A magneto may be tested when coupled to the engine by turning the switch ON, removing the cable from the spark plug, and holding the terminal 1/8 inch (3.17 mm.) away from the metal base of the plug while the engine is being cranked. If no spark passes from the cable to the metal base, disconnect the magneto switch wire from the magneto and test again. If the magneto fails to fire, remove the magneto, cables, sparkplugs, and switch and take them to your "Caterpillar" dealer for testing.

To Remove Magneto For Testing: Disconnect the cables from the spark plugs and the wire from the switch. Remove the ignition wire conduit by removing the clips holding it to the engine. Remove the magneto by removing the nuts or capscrews holding it in place.

To Time The Magneto To The Engine: Carefully check the contact points for the proper opening. Locate the firing point of No. 1 cylinder by removing the cover from the side of the starting engine clutch housing and the spark plug from No. 1 cylinder. Crank the engine slowly until air is forced from the spark plug opening. This indicates that the piston is coming up on the compression stroke. Continue to turn the crank until the mark "M" or "MAG" on the flywheel is even with the mark on the housing. The crank on No. 1 cylinder is now 25° ahead of top center on the compression stroke which is the correct firing point.

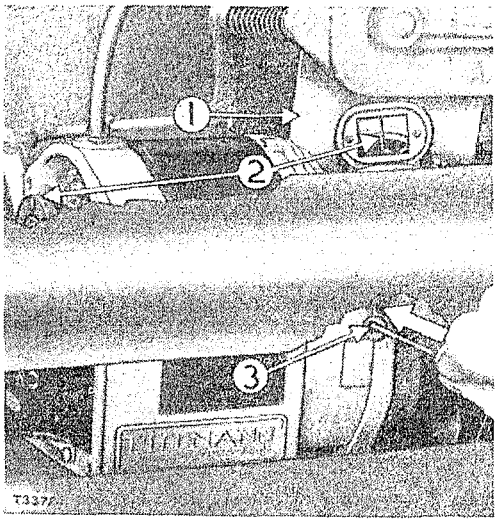
Remove the small cover at the end of the magneto by taking out the two small fastening screws. Turn the magneto shaft backwards (to prevent the impulse from catching) until the white line on the distributor gear lines up with the pointer in the end plate casting. At this point the distributor rotor should be in contact with the conductor which is connected by wire to the spark plug of No. 1 cylinder, and the contact points should be barely separated.



MAGNETO TIMING MARKS

Slide the magneto into position and bolt into place. Check the location of the rotor before replacing the rear cover to be sure it has not changed its position.

To Check Timing With Magneto In Place: If the timing is being checked with the magneto in place on the engine it will be necessary to trip the impulse on the magneto before the alignment of the magneto marks can be accurately determined. Remove the screw in the side of the impulse housing and push a nail or stiff wire into the hole **(3)** to trip the impulse. The magneto marks **(2)** can be seen with a mirror **(1)**. On later engines a notch on the rotor will be up.

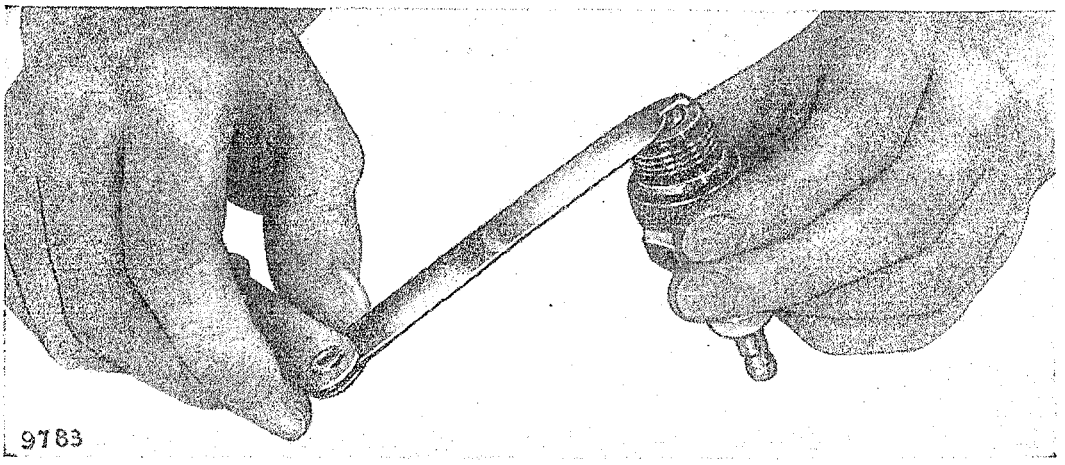


CHECKING TIMING WITH MAGNETO IN PLACE

1—Mirror. 2—Marks.
3—Hole.

SPARK PLUG ADJUSTMENT

The spark plugs should be examined often enough so the gap may be kept at approximately .025 inch (0.64 mm.). Measure this gap with a thickness gauge. To adjust the gap, bend the outer electrode.

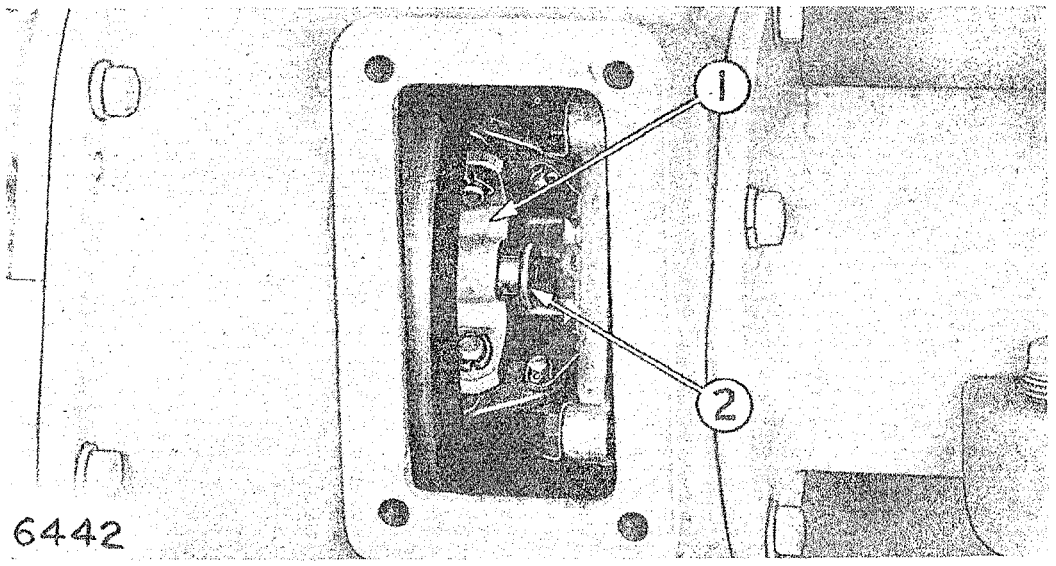


STARTING ENGINE SPARK PLUG ADJUSTMENT

STARTING ENGINE CLUTCH

To Test The Adjustment: Pull the clutch lever to the engaged position. The lever should go into this position with a distinct snap, and should require a reasonably hard pull.

To Adjust: Remove the plate from the side of the clutch compartment. Turn the clutch adjusting collar **(1)** until the lock pin **(2)** is accessible. On some tractors the clutch is equipped with two lock pins 180° apart. Where



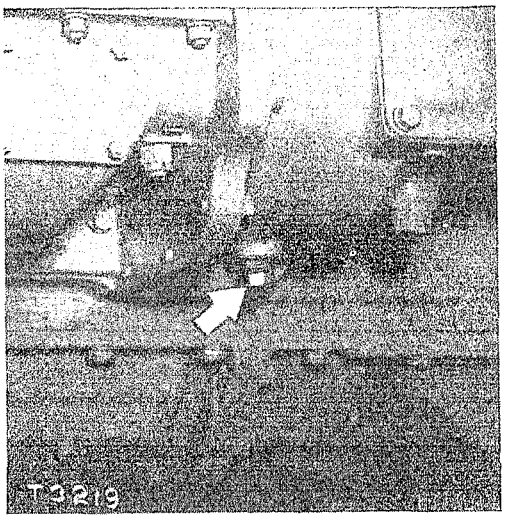
STARTING ENGINE CLUTCH ADJUSTMENT
1—Adjusting collar. 2—Lock pin.

there are two lock pins pull out the one pin which locks the adjustment. Turn the collar to the right until the other lock pin drops into lock position. On other tractors with one pin, pull the lock pin out and turn the collar to the right until the lock pin drops into the next hole.

Test the adjustment by engaging the clutch. If one hole gives a slightly loose adjustment and the next gives too tight an adjustment, use the looser adjustment.

Draining The Starting Engine Clutch Housing: The starting engine clutch is designed to operate in a dry compartment. Remove the drain plug every 60 hours to drain any lubricant which may have accumulated. Install the plug to keep out dirt and moisture.

STARTING ENGINE CLUTCH HOUSING DRAIN PLUG



FLYWHEEL CLUTCH

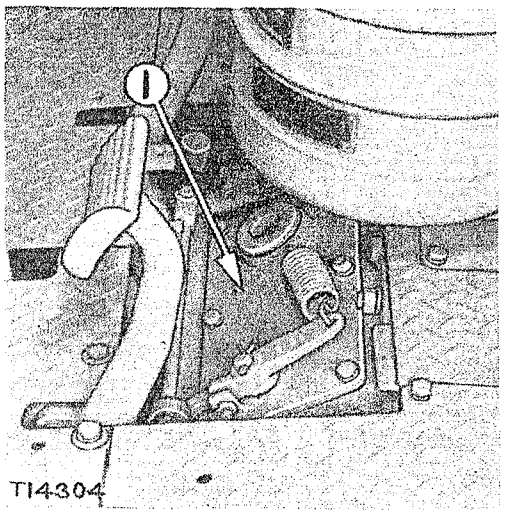
Tractors effective with 3T23647 are equipped with a double plate oil type clutch with the plates operating in oil circulated under pressure. The clutch is designed to give long life when operated with clean oil.

The proper clutch adjustment will give a clutch lever pull of approximately 55 pounds. This measurement is made with a spring scale placed at the bottom of the handle on the clutch control lever with the engine stopped and when the clutch is cold. Slightly higher pounds pull may be required when the clutch is warm. Clutch lever pull will reduce when the engine is running, but when the clutch is properly adjusted the lever should go into engaged position with a distinct snap.

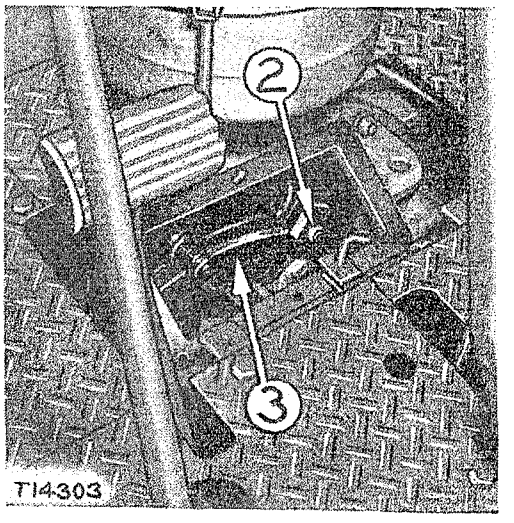
To Adjust: When clutch adjustment becomes necessary proceed as follows:

1. Remove the floor plate inspection cover. Care should be exercised to clean any dust or dirt from the top and around the edges of the clutch compartment cover **(1)**. Be sure all tools used to make the adjustment are clean. Remove the cover being careful not to damage the gasket under the cover.

2. Turn flywheel until one of the adjustment locknuts **(2)** is accessible. Loosen locknut about two turns. Tap plate slightly to be sure it is free on stud. Rotate flywheel 180° and loosen the other locknut in same manner.
3. Turn the adjusting ring **(3)** clockwise to tighten.
4. Tighten the locknuts to a torque of approximately 80 pounds feet. This can be accomplished with a steady pull on the end of the 3/4 inch box wrench supplied in the tool equipment.
5. Check to see that the clutch compartment cover is clean and the gasket is in good condition, then install the cover.



CLUTCH ADJUSTMENT
1–Clutch compartment cover.



ADJUSTING CLUTCH
2–Lock nut. 3–Adjusting ring.

Flywheel Clutch Brake: The tractor is equipped with a clutch brake, which stops the clutch from turning, and permits shifting gears without clashing. To apply the brake, press the flywheel clutch control lever forward as far as it will go. If the clutch is slow in stopping, the clutch brake should be checked for proper adjustment.

There are two adjustments for the clutch brake. One adjustment is provided to maintain proper clearance between the brake lining and brake drum when the clutch is engaged.

The other adjustment is provided to adjust the brake applied position of the flywheel clutch control lever.

To Adjust: If the brake lining has become worn and adjustment becomes necessary proceed in the following manner:

1. Engage the clutch.
2. Loosen the locknut on the adjusting screw **(4)**.

3. Turn the adjusting screw **(2)** in (clockwise) until there is clearance between the levers **(1)** and **(3)**. This clearance should exist when pushing lever **(3)** toward lever **(1)** as far as possible to place the brake lining against the brake drum.

4. Loosen the locknut on adjusting nut **(4)** and turn adjusting nut **(4)** out (counterclockwise) until there is clearance between the adjusting nut and the lever **(3)**.

5. Disengage the clutch and push the control lever to the extreme forward position, then release the control lever.

6. With lever **(3)** pushed as far as possible toward lever **(1)** to place the clutch brake lining against the brake drum, turn the adjusting nut **(4)** in (clockwise) until the adjusting nut contacts the lever **(3)**. Then turn the adjusting nut in (clockwise) two more complete turns and tighten the locknut.

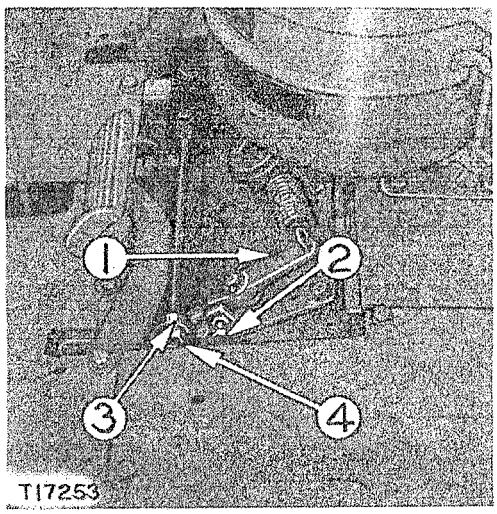
7. Engage the clutch. Push lever **(3)** as far as possible toward lever **(1)** to place the brake lining against the brake drum and turn adjusting screw **(2)** out (counterclockwise) until lever **(1)** touches lever **(3)**. Turn the adjusting screw out (counterclockwise) one more complete turn and tighten the locknut.

NOTE

If the brake is adjusted too tight the brake will be applied before the clutch is fully released and difficult shifting and high clutch brake lining wear will result.

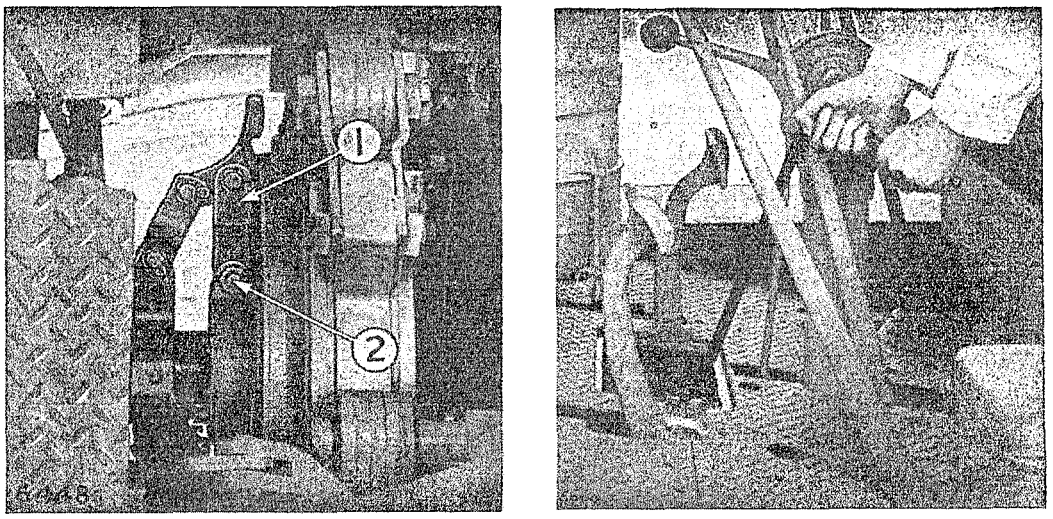
BRAKE APPLIED AND BRAKE CLEARANCE ADJUSTMENT

1–Lever. 2–Adjusting screw. 3–Lever. 4–Adjusting nut.



Flywheel Clutch before 3T23647: Tractors before 3T23647 are equipped with flywheel clutches designed to operate dry. To test the clutch adjustment, pull the clutch lever to the engaged position. For a desirable adjustment the lever should go into the engaged position with a distinct snap, and should require a reasonably hard pull.

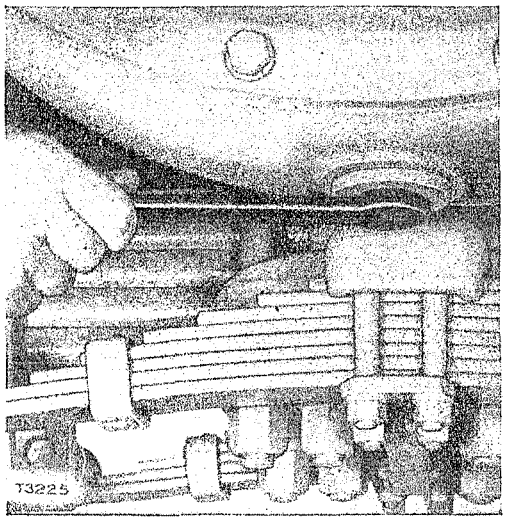
To Adjust: Disengage the clutch and remove the inspection cover from the clutch housing; on early tractors without enclosed clutch, lift up the hinged cover at the front of the floor plate. Loosen the nut on the adjusting collar clamp bolt **(2)** and with the transmission gears engaged, turn the collar **(1)** a few degrees in a clockwise direction; then tighten the clamp bolt with the clutch disengaged. Repeat this adjustment until the desired clutch snap is obtained. Replace the inspection cover and disengage the transmission gears.



FLYWHEEL CLUTCH ADJUSTMENT
1—Adjusting collar. 2—Clamp bolt.

The length of the adjustable rod between the flywheel clutch control lever and the crank assembly that actuates the clutch yoke should not be changed as its length, which is set at the factory, has a definite bearing on the timing and satisfactory operation of the transmission locking device.

Draining The Flywheel Clutch Housing: The clutch plates are designed to operate dry. The drain plug in the bottom of the flywheel housing,



REMOVING FLYWHEEL HOUSING DRAIN PLUG ON LATER TRACTORS

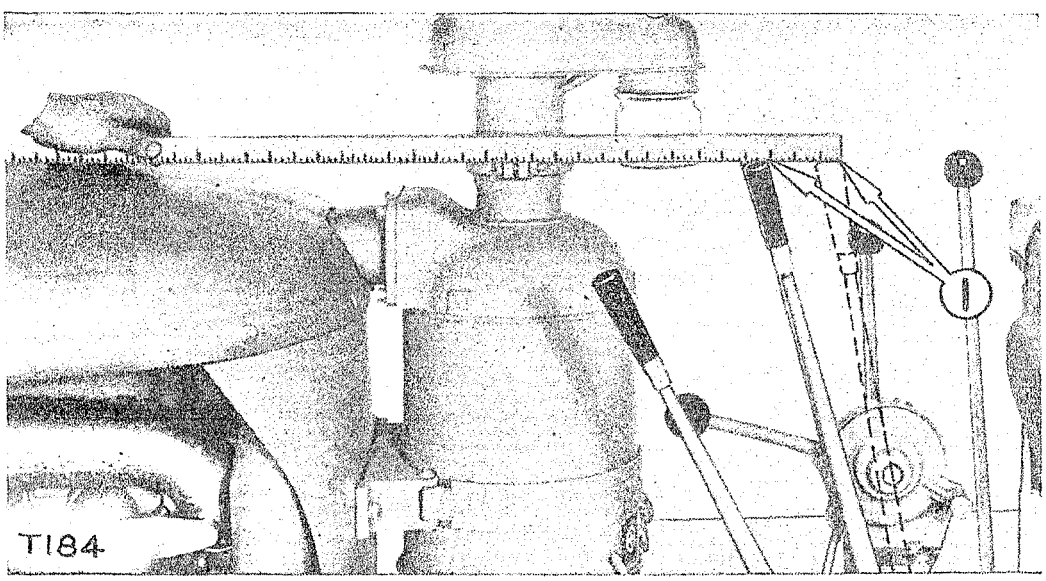
should be removed every 60 hours to drain any lubricant that may have seeped into the compartment from the engine, transmission, or clutch bearings. Lubricants from these points should not be allowed to accumulate in the housing. Any accumulation which will not drain from the housing should be washed out as instructed in the next paragraph.

Washing The Flywheel Clutch Housing: Remove the flywheel housing drain plug and the cover from the housing every 900 hours and wash or flush the clutch housing with a non-inflammable cleaning fluid when the engine is stopped. The cleaning fluid should be forced on the housing inside surfaces, not on the clutch, with a flush type grease gun and allowed to drain with the accumulations from the housing.

Wash The Flywheel Clutch Links: If difficult operation of the clutch is encountered it may be that the clutch engaging linkage has become dirty. This dirt can be removed by washing the linkage with some non-flammable cleaning fluid. When washing, care must be taken not to get greases and oils on the clutch plates and drive links. After washing the linkage the clutch release bearings, sliding collar and yoke screws should be lubricated as instructed in the LUBRICATION CHART.

STEERING CLUTCHES AND BRAKES

The steering clutches should be kept in proper adjustment to insure full engagement of the clutches when the levers are in the forward position. Obstructions such as rocks, sticks and the like which hinder the control levers traveling to the free forward position should be removed. If the tractor is operated with improper steering clutch adjustment or with obstructions to the control levers the release bearings may become damaged.



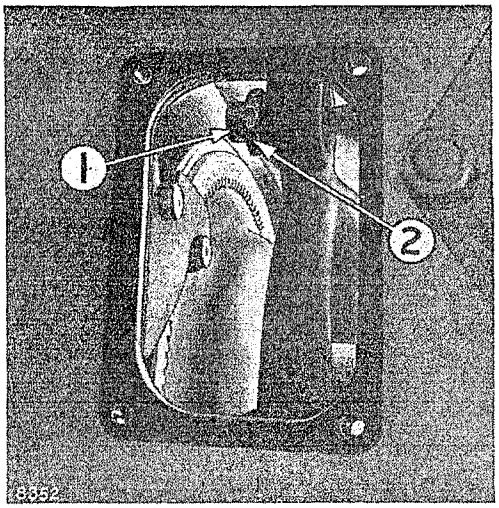
CHECKING STEERING CLUTCH CONTROL FREE LEVER MOVEMENT
1—There should be at least 3 inches (7.6 cm.) free motion at this point.

Steering Clutch Adjustment: When the steering clutch levers have 3 inches (7.6 cm.) free movement at **(1)**, the clutch adjustment is correct. This free movement reduces as the clutch facings wear and adjustment becomes necessary.

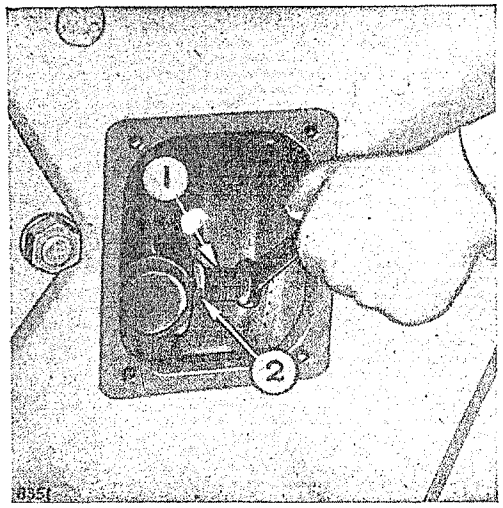
To Adjust: Stop the engine and remove the inspection plates (one for each steering clutch) from the back of the steering clutch case.

On tractors beginning with 7M5070, loosen the lock nut **(1)** and turn the adjusting nut **(2)** on the adjusting screw until the correct free movement is obtained at the top of the steering clutch levers. Then tighten the lock nut without altering the position of the adjusting nut.

On tractors before 7M5070, loosen the lock nut **(2)** on the adjusting screw **(1)** and turn the adjusting screw until the correct free movement is obtained.



STEERING CLUTCH CONTROL ADJUSTMENT (Later Tractors)
1—Lock nut. 2—Adjusting nut.



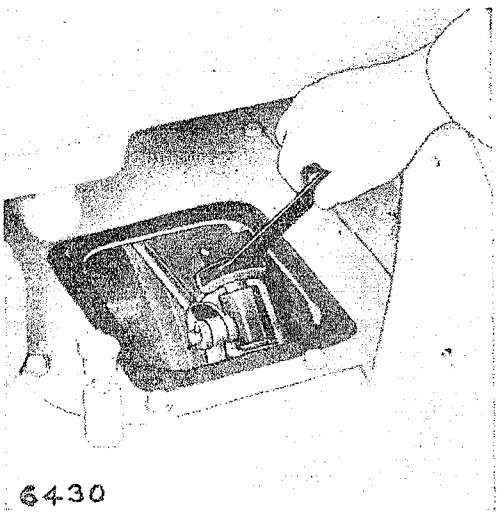
STEERING CLUTCH CONTROL ADJUSTMENT (Early Tractors)
1—Adjusting screw. 2—Lock nut.

Certain type of equipment mounted on the rear of the tractor prevents adjusting the steering clutch control through the openings on the back of the steering clutch case. On tractors beginning with 7M5070, this adjustment may also be made through the openings on top of the case through which the steering clutch brakes are adjusted.

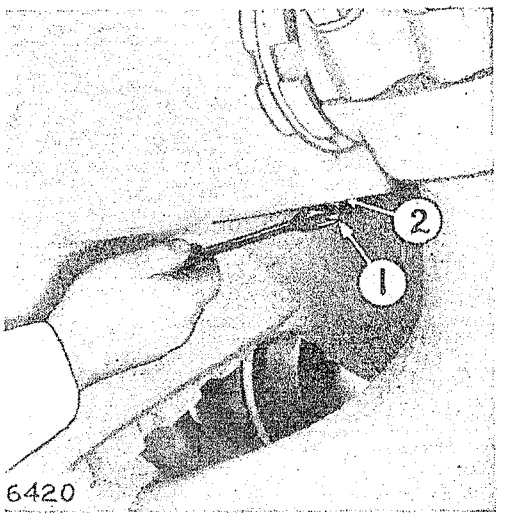
As the steering clutches become sufficiently worn through service to prevent restoring proper control adjustment, consult your "Caterpillar" dealer.

Steering Clutch Brake Adjustment: Keep the brakes adjusted just tight enough so the tractor will turn correctly when the steering clutch is released and the pedal is depressed between 3½ to 4½ inches (8.89 to 11.45 cm.). When the right brake is fully applied the brake lock latch should engage with the notches on the ratchet to lock the pedal. The

band should be entirely free from the drum when the pedal is in the released position.



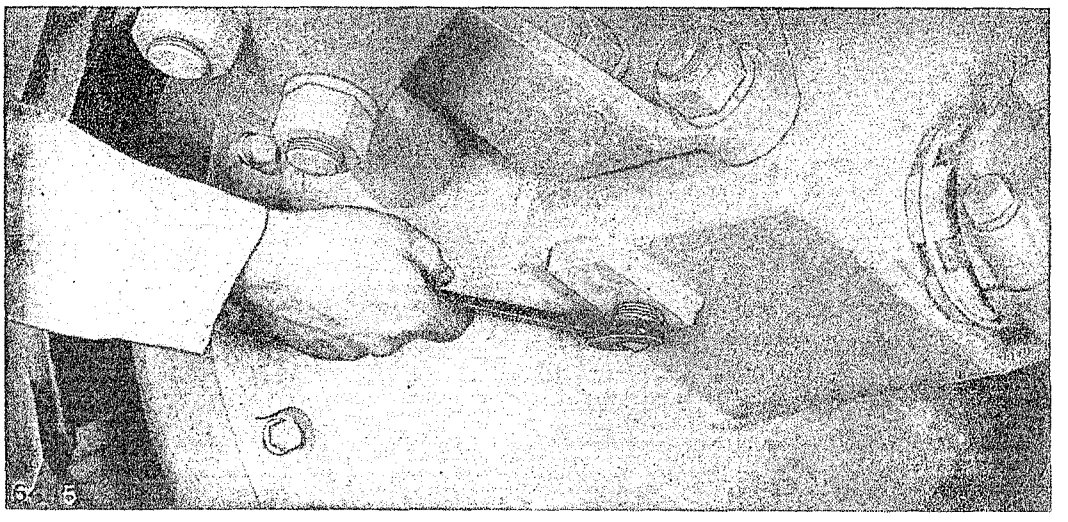
STEERING CLUTCH BRAKE ADJUSTMENT



ADJUSTING BRAKE SUPPORT SCREW
1—Screw. 2—Lock nut.

To Adjust: Remove the inspection plate located on either side immediately back of the seat and on top of the steering clutch case. Turn the head of the adjusting screw in a clockwise direction to tighten the brakes. Loosen the lock nut **(2)** on the support screw **(1)** on the under side of the steering clutch case below the brake drum. Turn the support screw up tight against the band then back off 1½ turns and tighten the lock nut. This screw supports the brake band and maintains the correct clearance between the lining and the drum.

Draining Steering Clutch Compartment: The steering clutches are designed to operate dry. Lubricant is used only to lubricate the release



REMOVING STEERING CLUTCH COMPARTMENT DRAIN PLUGS

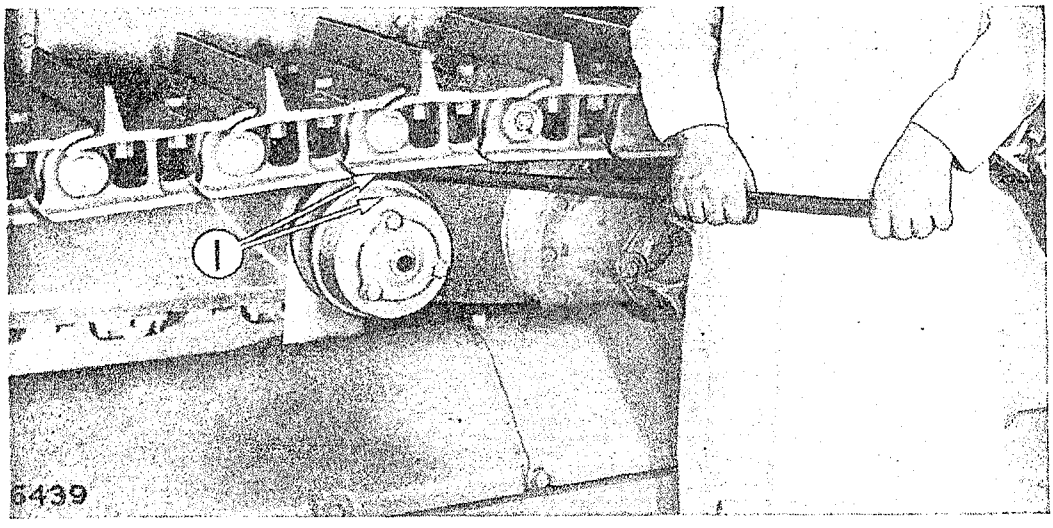
bearings. This lubricant, and any seepage from the adjoining compartments should be drained every sixty hours of operation by removing the plugs in the bottom of the case. Failure to observe proper draining periods may result in the clutches slipping or difficulty in steering the tractor. The drain plugs should be replaced to keep out dirt and moisture during operation.

Washing The Steering Clutch Brakes: If the steering clutch compartments have not been drained at the proper interval or lubricant has accumulated on the steering clutch brakes sufficiently to cause slippage or difficult steering, some improvement in operation will result by washing the brakes. To do this drain the compartments, replace the drain plugs, then remove the brake band inspection covers and pour enough non-inflammable cleaning fluid into each compartment so that the bottom of each steering clutch brake drum will dip in the fluid. Operate tractor back and forth for five minutes without releasing the steering clutches. This will prevent the oil and dirt on the outside of the clutches and the inside of the cases from being washed in between the clutch discs. Drain the clutch compartments, and repeat the operation of washing, this time applying the brakes occasionally. Drain the clutch compartments, replace the drain plugs and lubricate the steering clutch release bearings.

TRACK ADJUSTMENT

More information about track adjustment is in the Attachment section of this book.

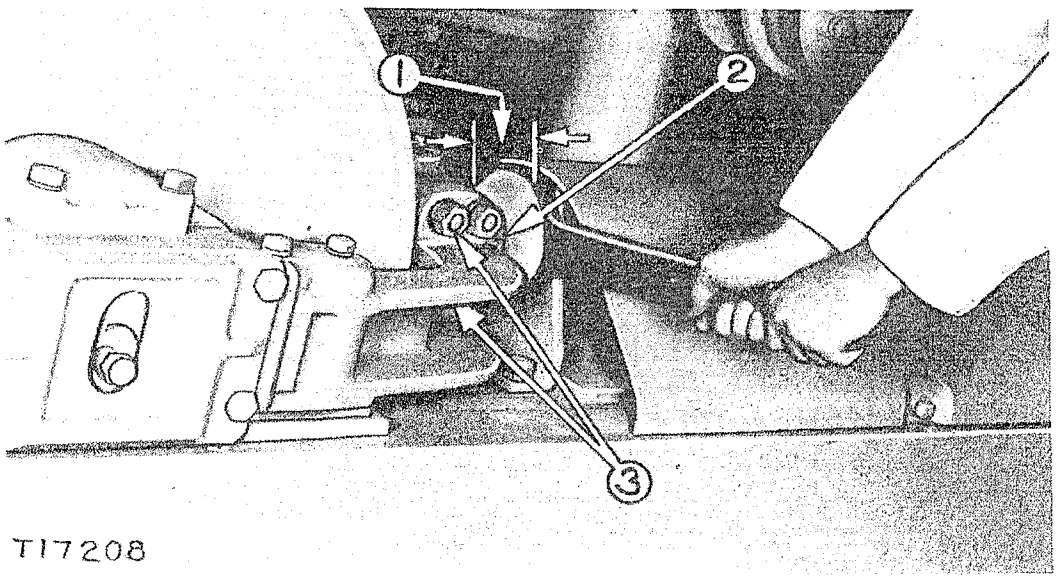
The track adjustment is correct when the track may be raised from 1½ to 2 inches (3.8 to 5.1 cm.) above the track carrier roller as shown at **(1)**.



CHECKING TRACK ADJUSTMENT
1—There should be 1½ to 2 inches (3.8 to 5.1 cm.) clearance at this point.

Adjustment: To adjust the track, remove the cover back of the front idler and loosen the clamp nuts **(3)** on the front idler arms. Turn the ad-

justing screw **(2)** until the track is at the correct adjustment. When the adjustment has been made, drive the tractor backward and forward to equalize the adjustment. Then, recheck the adjustment. Tighten the clamp nuts and replace the cover.



ADJUSTING TRACK
1–This measurement should not exceed 8¼ inches (20.9 cm.).
2–Adjusting screw. 3–Clamp nut (two nuts on earlier tractors).

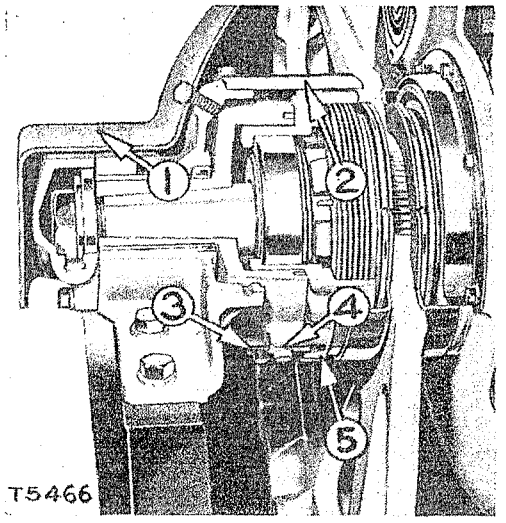
As continued track adjustment becomes necessary through service, the following precaution should be observed to prevent the adjusting screw being screwed out of the nut at the front of the recoil spring, with subsequent damage to the threads: A maximum measurement of 8¼ inches (20.9 cm.) should not be exceeded between the adjacent faces of the guide assembly and the front idler arms at **(1)**.

Tractors effective with 3T19863 are equipped with a two-position idler. The high position being for drawbar work and the low position for front mounted work. The idler will be set in the low position when leaving the factory. For further information, see your "Caterpillar" dealer.

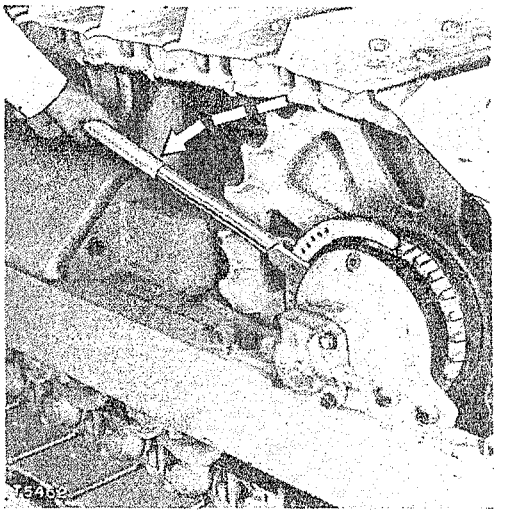
FINAL DRIVE SPROCKET HUB BEARINGS

During the initial operation of the tractor the sprocket hub bearings are likely to require some adjustment. By maintaining the proper adjustment bearing life can be increased. They should be checked on a new tractor and adjusted if necessary after the first 120 hours of operation, another check or two at 120 hour intervals is suggested but thereafter every 1200 hours should be sufficient. If leakage of lubricant is noticed around the sprocket hub on a new tractor before 120 hours of operation an adjustment of the bearing may stop the leak.

To check the bearing adjustment, place a four or five foot bar between the track roller frame and the sprocket. If any looseness in the sprocket hub bearings is noticed when prying with the bar, adjustment is necessary. This checking should be made when there are no objects under the track which might put the tractor weight on the sprocket.



CROSS-SECTION OF FINAL DRIVE



TIGHTENING SPROCKET HUB BEARINGS

1—Large guard plate. 2—Small guard plate. 3—Clamp bolt. 4—Lock. 5—Adjusting nut.

To Adjust: Remove the guard plates **(1)** and **(2)** from the track roller frame outer bearing. Loosen the clamp bolts **(3)** and remove the lock **(4)** from the notch in the adjusting nut **(5)**. Tighten the adjusting nut by turning it **counterclockwise.** Use a five foot extension on the wrench to be sure the nut is tight. Tighten the clamp bolt and replace the lock and the guard plates. A wrench for this purpose can be obtained from your "Caterpillar" dealer.

WASHING GEAR COMPARTMENTS

Washing The Transmission: Remove the drain plugs from the speed change and bevel gear compartments after a run, when the oil is warm. This drains the speed change compartment and the bevel gear compartment. Replace the plug and fill to the proper level with kerosene or some non-inflammable cleaning fluid. Drive the tractor back and forth for five minutes, if it is convenient. If not, start the engine and put the gears in the highest speed. Tie back the steering clutch levers and engage the flywheel clutch. Allow the gears to run five minutes, disengage the clutch, and shift into neutral. Drain the cleaning fluid, replace the drain plugs, and refill with fresh lubricant to the correct level as instructed in the LUBRICATION INSTRUCTIONS section of this book.

Washing The Final Drives: Remove the drain plugs from both cases after a run, when the oil is warm, and allow the old oil to drain. Replace

the plugs and fill the compartments to the proper level with kerosene or some non-inflammable cleaning fluid. Drive the tractor back and forth for five minutes. Drain the cleaning fluid, replace the drain plugs, and refill the final drives with fresh lubricant as instructed in the LUBRICATION INSTRUCTIONS section of this book.

Washing The Starter Pinion Shaft Housing: On earlier tractors not equipped with starting engine transmission, remove the drain plug from the under side of the housing and allow the old oil to drain. Replace the plug and fill the housing to the level of the top of the filler elbow with kerosene or some non-inflammable cleaning fluid. Allow the washing fluid to stand for 5 or 10 minutes then drain, replace the drain plug, and refill with fresh oil.

Washing The Starting Engine Transmission: Every 900 hours, wash the starting engine transmission. Remove the drain plug after the starting engine has been turning the transmission gears and has warmed the oil. After oil has drained, replace the plug and fill the compartment to the proper level with kerosene or some non-inflammable cleaning fluid. Allow the starting engine to turn the transmission gears for several minutes, then remove the drain plug. After all the cleaning fluid has drained, replace the plug and fill with fresh oil to the correct level.

Washing Belt Pulley Drive And Rear Power Take-Off Housings: Remove the drain plug from the housing when the oil is warm, and allow the oil to drain. Replace the drain plug and fill the housing to the correct level with kerosene or some non-inflammable cleaning fluid. Operate the gears for 5 minutes to wash the housing. Drain the cleaning fluid, replace the drain plug, and refill the housing to the proper level as instructed in the LUBRICATION INSTRUCTIONS section of this book.

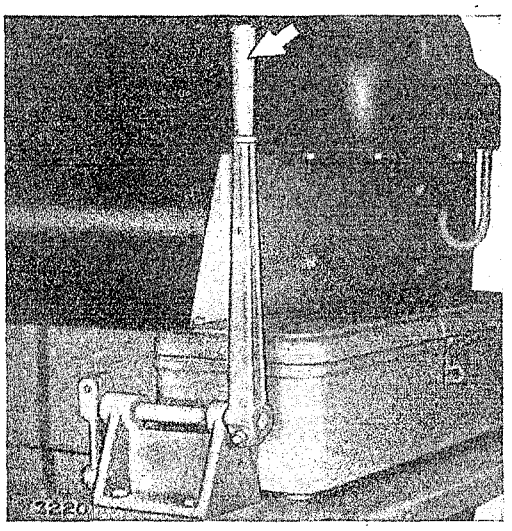
Attachment Instructions

Attachments are available from your "Caterpillar" dealer. Many of these attachments will add to operator comfort and convenience as well as increase the usefulness of your tractor.

REAR MOUNTED EQUIPMENT

Rear mounted equipment is driven with power from the transmission upper shaft whenever the flywheel clutch is engaged. When the forward and reverse lever is in either forward or reverse position the lower gears dip and throw oil in the transmission to lubricate the upper shaft bearings and gears. Therefore, always engage the forward and reverse lever in either forward or reverse positions when operating continuously on stationary work.

Direct Drive Rear Power Take-Off Operations: Disengage the flywheel clutch, shift the speed selector lever into neutral position and the forward and reverse lever in either forward or reverse position. Push forward the power take-off control lever to engage the sliding gear with the drive gear. Engage the flywheel clutch to deliver power through the transmission to the power take-off shaft.



REAR POWER TAKE-OFF AND
BELT PULLEY DRIVE CONTROL LEVER

Reduction Drive Rear Power Take-Off Operation: Disengage the flywheel clutch, shift the speed selector lever into neutral position and the forward and reverse control lever in either forward or reverse position. Pull back the power take-off control lever to engage the sliding gear with the driven gear. Engage the flywheel clutch to deliver power to the power take-off shaft.

The upper shaft of the power take-off turns whenever the tractor is in operation. If the power take-off is not used for long periods of time, the upper shaft bearings may become dry. Engage the power take-off for

2 or 3 minutes every four hours to assure adequate lubrication of the bearings.

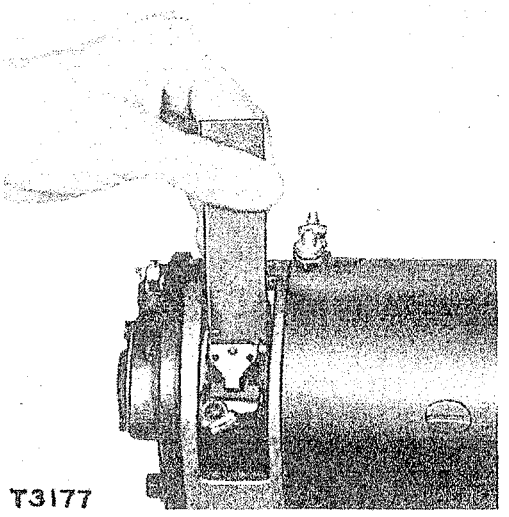
Belt Pulley Drive Operation: Disengage the flywheel clutch, shift the speed selector lever to neutral position and the forward and reverse lever in either forward or reverse position. Push the belt pulley drive control lever forward to engage the sliding gear with the drive gear. Engage the flywheel clutch to deliver power to the belt pulley.

GENERATOR AND STARTING ENGINE ELECTRIC STARTER

Never operate a generator with an open circuit between it and the battery.

Cleaning Generator Or Electric Starter: Approximately every 1,200 hours, the inspection cover should be removed from the generator and starter and a check made of the commutator. If it is glazed or darkened, polish it with "00" sandpaper. To polish, hold the sandpaper on the commutator with a stick while the commutator is turning. The polishing should be done on the generator when the Diesel engine is running at low idle speed. It should be done on the starter by pressing the starter switch with the magneto switch turned off. Turn the sandpaper over to clean the contact surfaces of the brushes. The commutator should not be turning when the brushes are being cleaned. Make sure all trace of sand particles is removed from the commutator, brushes, and brush holders by blowing out with air or an equally effective method.

SANDING GENERATOR BRUSH



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Brush Replacement: Brushes should be inspected and replaced if badly worn. When a new brush is installed, seat it properly with the contour of the commutator by using "00" sandpaper. Remove all sand particles and make certain the connections are all tight. A poor connection in the charging circuit will cause the generator to build up excessive voltage which may result in burned field or armature windings. A poor connection in the generator field circuit will cause a low voltage

General Reconditioning: Approximately every 4,000 hours, the generator and starter should be removed so that they may be completely disassembled, washed and have all parts replaced that show evidence of being unsatisfactory for reason of wear. It is suggested that this cleaning and reconditioning be entrusted to your "Caterpillar" dealer.

Starting Engine Starter Drive: If difficulty is experienced with the electric starter drive failing to engage with the sliding gear, dirt in the worm drive is probably responsible. To correct, remove the starter from the mounting bracket, then take off the starter drive housing. Carefully clean the spiral grooves of the drive of any dirt or grease accumulations. Wash the spiral sleeve upon which the pinion operates. Also the springs, gear teeth and drive housing. This washing should be done with kerosene or some non-inflammable cleaning fluid.

Before installing the drive, lubricate the spiral sleeve and housing bushing with a few drops of light oil. Then reassemble and install.

BATTERY CARE

Every 60 hours, or more often when continuous operation without the use of the battery is encountered, the following attention should be given to the battery to insure high efficiency and maximum operating life.

The battery should be tested with a hydrometer and kept within a margin of safety to a specific gravity above 1.275. A dangerously low point of charge is indicated by a hydrometer reading of 1.150 which will permit the battery to freeze. A specific gravity of 1.250 will permit the battery to withstand temperatures as low as—30° F. without freezing.

Water that escapes by evaporation should be replaced with distilled water or "approved water" (water free from impurities by analysis). The level should be maintained 3/8 inch (9.5 mm.) above the top of the separators or insulators. Do not overfill or underfill the cells of the battery as either has a detrimental effect on battery life.

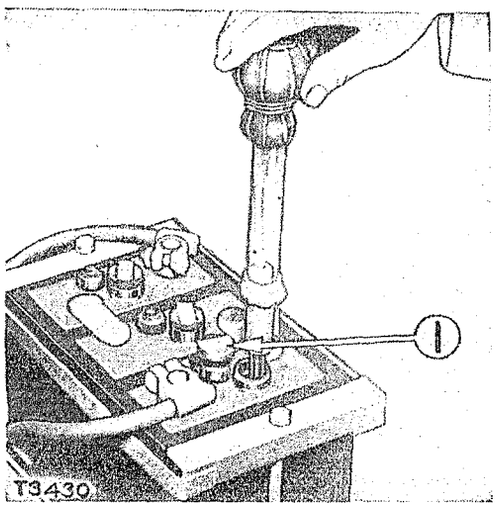
If it is necessary to add water too frequently to the battery, it is probably being overcharged and checks should be made to find and correct the trouble. Loose ground connections or a poorly functioning voltage regulator will cause overcharging of the battery.

Most batteries are provided with filler plugs **(1)** having special construction. These plugs, when removed for filling the battery, should be pressed on the raised portion of the vents. This prevents overfilling, as air entrapped in the top of the cells forces the excess water out through the filler openings. When the filler plugs are removed from the vents the entrapped air escapes, dropping the water to the proper level in the battery.

Always test a battery for degree of charge before adding water, otherwise, before an accurate reading can be obtained it will be necessary

TESTING SPECIFIC GRAVITY OF ELECTROLYTE

1—Plugs should be placed on rubber vents to prevent overfilling.



to operate the engine for a short period to charge the battery; thus allowing the water to mix with the electrolyte.

If when making weekly tests the battery shows evidence of becoming gradually discharged; that is, when the specific gravity reading drops below 1.250, the battery should be removed and completely recharged.

Check to determine the reason for the battery becoming discharged. Inspect the battery terminals and other points in the wiring. A loose connection or worn insulation may be the reason for the battery becoming discharged. Also check for an improperly functioning voltage regulator. Refer to the topic, VOLTAGE REGULATOR.

Keep the top of the battery clean and dry to prevent current losses and keep the terminals clean and tight. To clean corrosion from the battery terminals, scrub them with a weak solution of bicarbonate of soda (baking soda) and water. Dry the battery thoroughly, then coat the terminals with lubricant to prevent corrosion. Keep the battery securely fastened in its compartment at all times.

When replacing a battery that has been removed, make certain the negative post marked with a dash (—) or "N" is connected to the ground cable. Failure to connect the battery terminal to the correct post will damage the voltage regulator.

VOLTAGE REGULATOR

The voltage regulator is properly adjusted at the factory and should not be changed except in case of failure when both the regulator and generator should be taken to your "Caterpillar" dealer, where the output of the generator can be checked and the regulator adjusted accordingly.

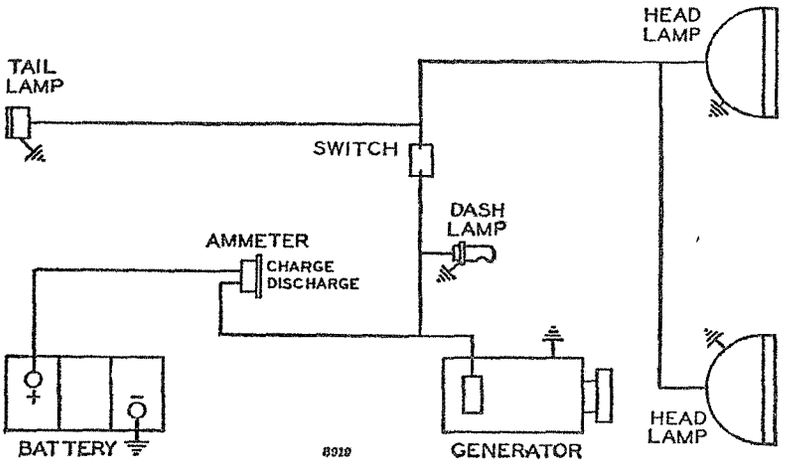
If the ammeter shows a low charging rate, it is not an indication that the equipment is at fault unless the battery shows a low reading when checked with the hydrometer. The regulator permits a heavy flow of

current from the generator to the battery only when the battery electrolyte has a low specific gravity. As the battery becomes charged, the ammeter reading decreases proportionately until at full charge practically no ammeter reading is evident.

If the hydrometer reading is low and no charge is evident on the ammeter, check the entire system for loose connections or broken wires. If all connections are satisfactory, check the generator for worn, broken or poorly seating brushes; also check the commutator to determine whether it is glazed or darkened. Refer to the topic, GENERATOR AND STARTING ENGINE ELECTRIC STARTER.

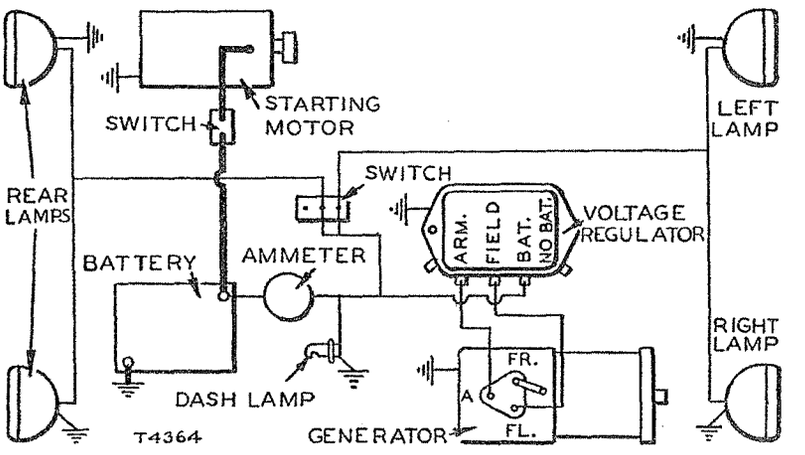
WIRING DIAGRAMS

These diagrams, covering wiring arrangements for use with and without battery and cab, are furnished so that when it becomes necessary to disturb the electrical equipment for purpose of repair or replacement, reassembling may be accomplished without difficulty.



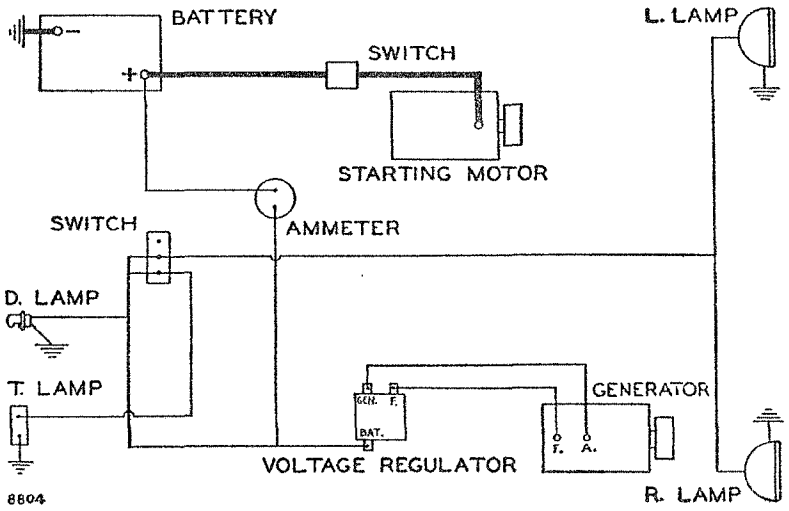
90 WATT GENERATOR — FOR USE WITH BATTERY AND CAB

For 90 watt generator—with battery; without cab use above diagram and move one head lamp to tail lamp location. No tail lamp is used in this group.



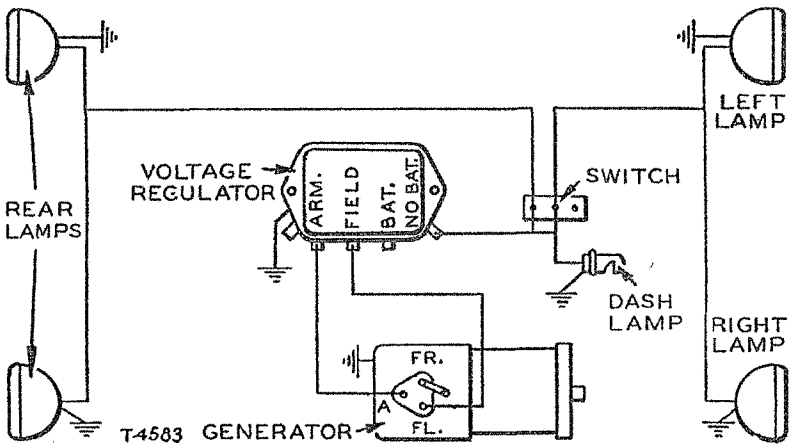
200 WATT GENERATOR — WITH BATTERY

With four sealed beam lamps.



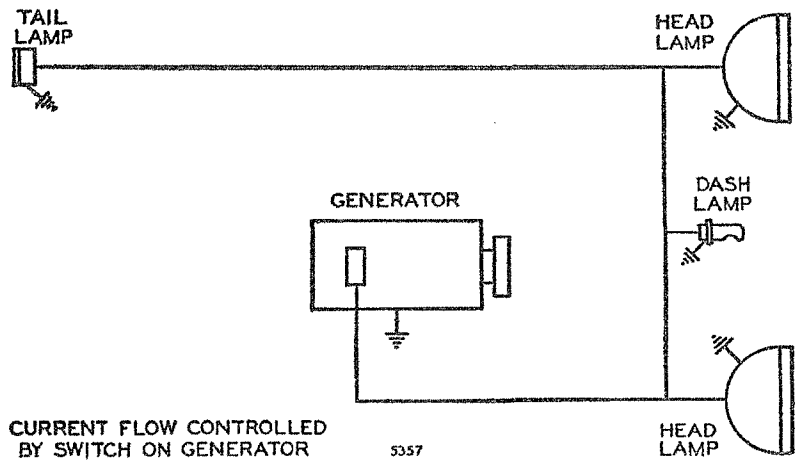
90 AND 115 WATT GENERATOR — WITH BATTERY, 6 VOLT STARTING MOTOR WITH CAB

With 175 watt generator add two rear lamps to the above diagram.



200 WATT GENERATOR — WITHOUT CAB; WITHOUT BATTERY

With four sealed beam lamps.



75 WATT GENERATOR — WITH CAB; WITHOUT BATTERY

With 130 watt generator add two rear lamps to above diagram.

For 75 watt generator—for use without battery or cab, use above diagram and

LIGHTING SYSTEMS

Two types of lighting systems are available for use on this tractor. They are lighting systems with and without battery. In either type the generator armature revolves whenever the Diesel engine is in operation.

The lights of the lighting system with battery will light whether the engine is in operation or stopped. The switch to turn these lights on or off is mounted on the dash or on the battery box. The lights of the lighting system without battery will light only when the Diesel engine is running. The switch for these lights is located on the generator where a 75 or 130 watt generator is used and is built in with the voltage regulator. When 200 watt generator is used without battery the light switch is located on the dash. To operate the switch on "Auto Lite" Generators: Turn it to **open** position then back to **on** position.

The generators used with lighting systems without batteries are automatically regulated to provide the amount of current required to operate the lights within the capacity of the generator.

Generators are plainly marked and those of 115 to 200 watt are most commonly used for lighting systems only. If watt rating is not indicated on the generator name plate, multiply volts by ampere rating to determine the watt rating. Mazda bulbs consume approximately 1 watt per candle power. Sealed beam lamps consume 6 to 8 amperes per lamp. This being the case it is easy to add up the candle power or ampere load of the various bulbs in the circuit to determine if the lights used are within the capacity of the generator.

For this reason, the generator size should always be checked before deciding to add additional lights or to increase the light intensity by replacing standard bulbs with those of higher candle power.

Track Adjustment
(Tractors with Hydraulic Track Adjusters)

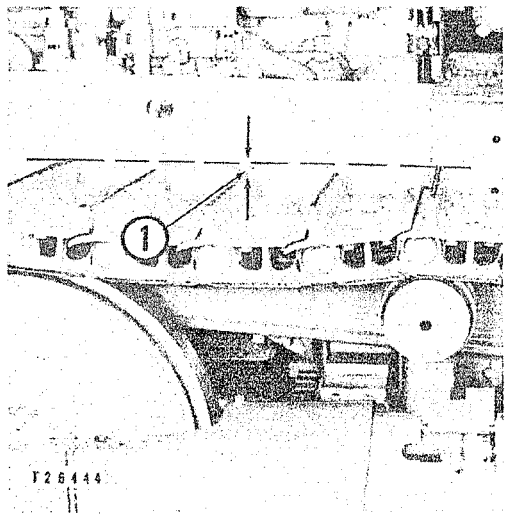
TRACKS

Proper care of the tracks, especially when operating the machine under adverse conditions, will greatly extend their service life.

After operating in mud or slush and below freezing temperatures are anticipated, park the machine on solid dry ground, planks, logs or brush to prevent the machine from freezing to the ground. Snow or mud should also be cleaned from around the track links, sprockets, idlers, rollers, and guards to prevent freezing of the tracks.

The tracks should be operated without tension, to avoid undue wear of moving parts. When properly adjusted, there should be no less than 1 to 1½ inches (2.5 to 3.8 cm.) slack measured at a point half way between the carrier roller and front idler as shown at (1). Looser adjustment may

be required to prevent tension on the tracks when operating in material which will pack around the track parts and between pins and bushings.



CHECKING TRACK ADJUSTMENT

1–There should be 1 to 1½ inches (2.5 to 3.8 cm.) sag at this point.

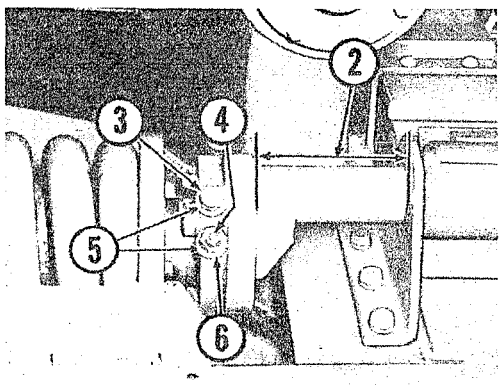
◆

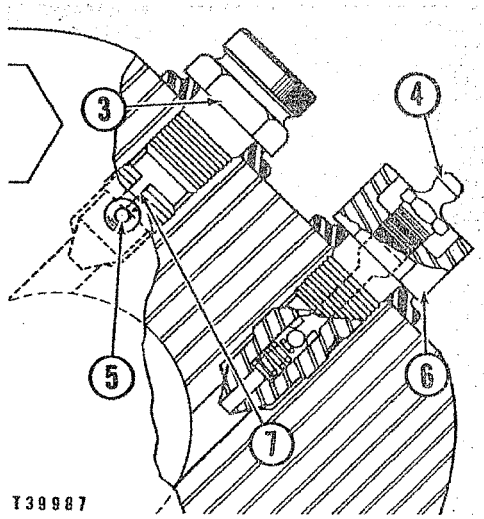
As continued track adjustment becomes necessary through service, the following precaution should be observed to prevent damage. The measurement (2) between the adjacent faces of the rod assembly flange and the equalizer spring support bracket should not be less than 2 inches (5.08 cm.)

To Adjust When Equipped With Ball Check Type Hydraulic Track Adjusters:

If the slack or sag in the track is greater than 1½ inches, proper adjustment can be obtained by proceeding as follows:

1. Raise the inspection plate on the track roller frame guard.
2. Apply ball and roller bearing lubricant, with a grease gun, into the





ADJUSTING TRACK

(Guards removed for illustration purpose only)

2–Minimum measurement. 3–Relief valve. 4–Fitting.. 5–Vent holes. 6–Ball check

fitting **(4)** until the track is at the correct adjustment.

3. Operate the machine backward and forward to equalize the adjustment.
4. Recheck the adjustment.

To Loosen Track Adjustment: If the track is too tight, release some of the pressure in the hydraulic track adjuster cylinder with caution as given in the following steps:

1. Turn the relief valve **(3)** one turn counterclockwise and allow grease to escape from the vent hole **(5)** just below the relief valve. If grease does not appear when this relief valve is backed off one turn, proceed to turn the ball check assembly **(6)** one turn counterclockwise. If grease does not apear at either vent hole and the vent holes appear to be open and the track appears to have tension, the machine should be started and moved forward slightly.

NOTE

If loosening both the relief valve and the ball check assembly one turn does not relieve track tension, then continue loosening the relief valve until the unthreaded portion between the upper and lower threaded section is exposed. Grease should then relieve through slot **(7)** in the lower section of threads.

2. Tighten the relief valve and the ball check assembly when sufficient slack has developed in the track.
3. Check the adjustment.
4. Repeat the above steps until the adjustment is correct.

To Adjust When Equipped With Earlier Type Hydraulic Track Adjusters:

1. Loosen the bolt, turn the lock and raise the inspection plate in back of the equalizer spring support bracket **(5)**.
2. Apply ball and roller bearing lubricant, with a grease gun through the fitting **(4)** until the track is at the correct adjustment.
3. Operate the tractor backward and forward to equalize the adjustment.
4. Recheck the adjustment.

To Loosen Track Adjustment: If the track is too tight, release some of the pressure in the hydraulic track adjuster cylinder with caution as given in the following steps:

1. Loosen the knurled cap in the track adjuster relief valve (3) no

ADJUSTING TRACK
(Guards removed for illustration purpose only)

2–Minimum measurement. 3–Relief valve. 4–Fitting. 5–Equalizer spring support bracket. 6–Rod assembly flange.

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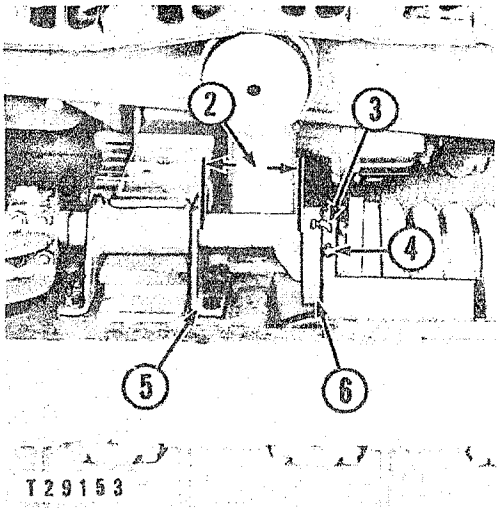

more than **one-half turn** and allow grease to escape from the passage on the side of the valve.

WARNING

To avoid the possibility of personal injury, do not loosen the knurled cap of the relief valve more than one-half turn.

2. Tighten the knurled cap on the relief valve.
3. Check the track adjustment.
4. Repeat the above steps until the adjustment is correct.

Index

INDEX—Continued

OPERATION AND MAINTENANCE INSTRUCTIONS

CATERPILLAR

DIESEL D7 TRACTOR

SERIAL NUMBERS

7M1-7M9999

3T1-3T28058

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