

Operating instructions
and
Field maintenance
Manual
for
HD16DP
TRACTOR



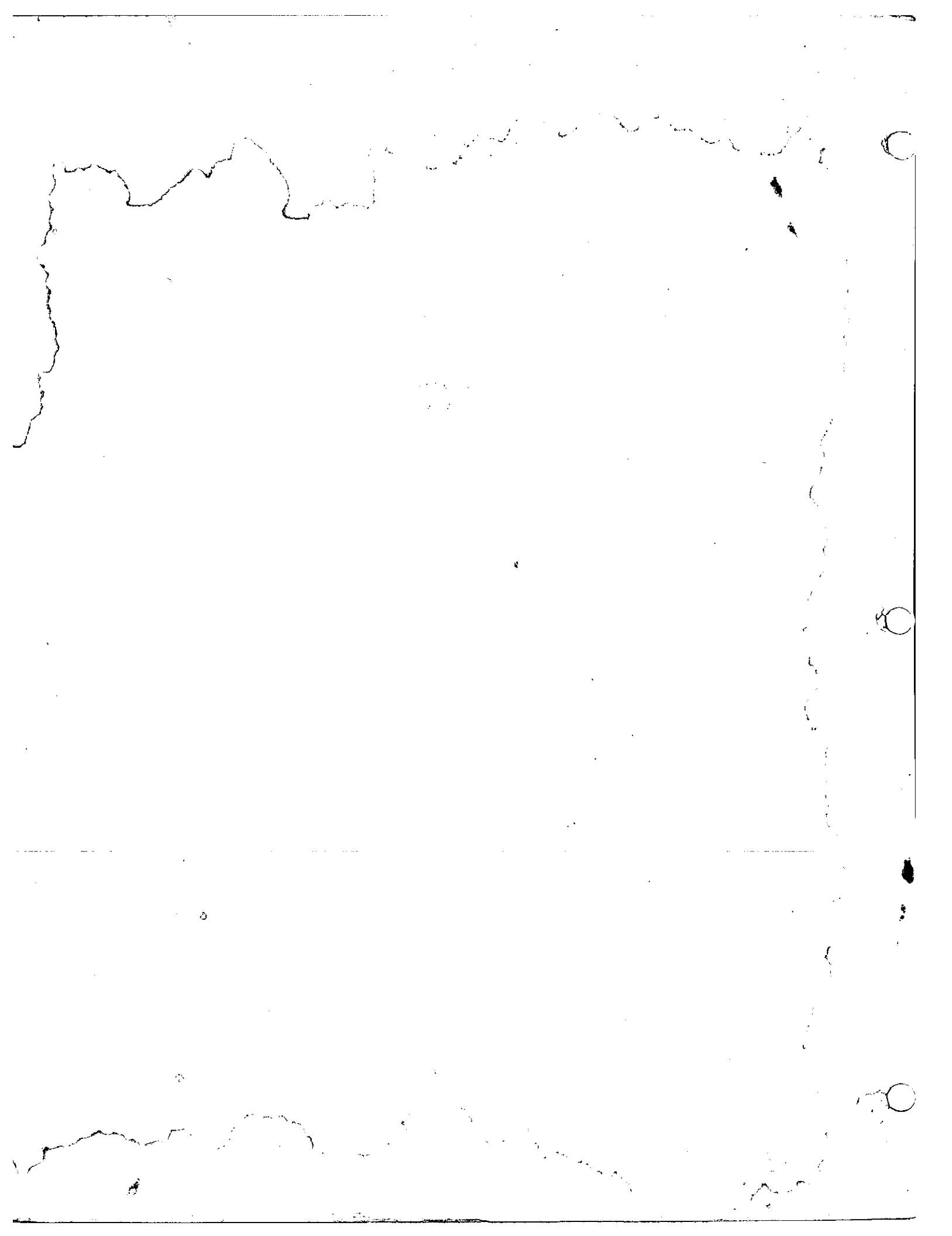
ALLIS-CHALMERS

Milwaukee, Wisconsin, U.S.A.

Price \$1.00

Litho in U.S.A.

FORM 633934 (3-65)



SUPPLEMENT NO. 4

TO

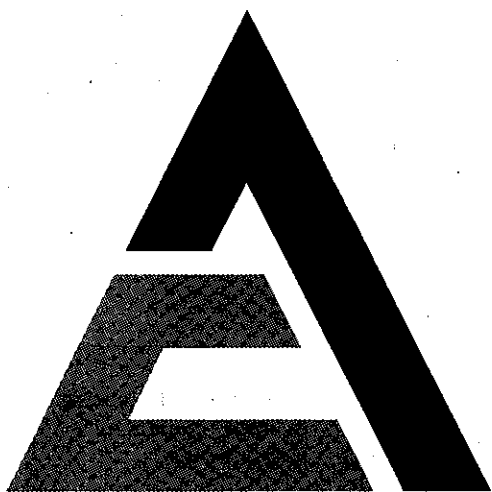
OPERATING INSTRUCTIONS AND FIELD MAINTENANCE

MANUAL FORM 633934 (3-65)

HD-16DP

CRAWLER TRACTOR

NOTE: Effective with tractor S/N 8399, one heat exchanger was removed from engine clutch, torque converter, and transmission hydraulic system, and a new torque converter pressure regulating valve installed; oil lines were also re-routed to facilitate changes. Information in this supplement pertains to these changes and must be used in place of corresponding information in existing manual. All other information in existing manual remains the same.



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(11-67)

ENGINE COOLING SYSTEM

A. DESCRIPTION

The engine cooling system, Fig. 1, includes the water pump; radiator; engine oil cooler; heat exchanger for

engine clutch, torque converter and transmission hydraulic system; water inlet manifold; thermostats; water outlet manifold; engine temperature gauge; cooling fan; water passages in cylinder block and cylinder heads, and the cooling system filter.

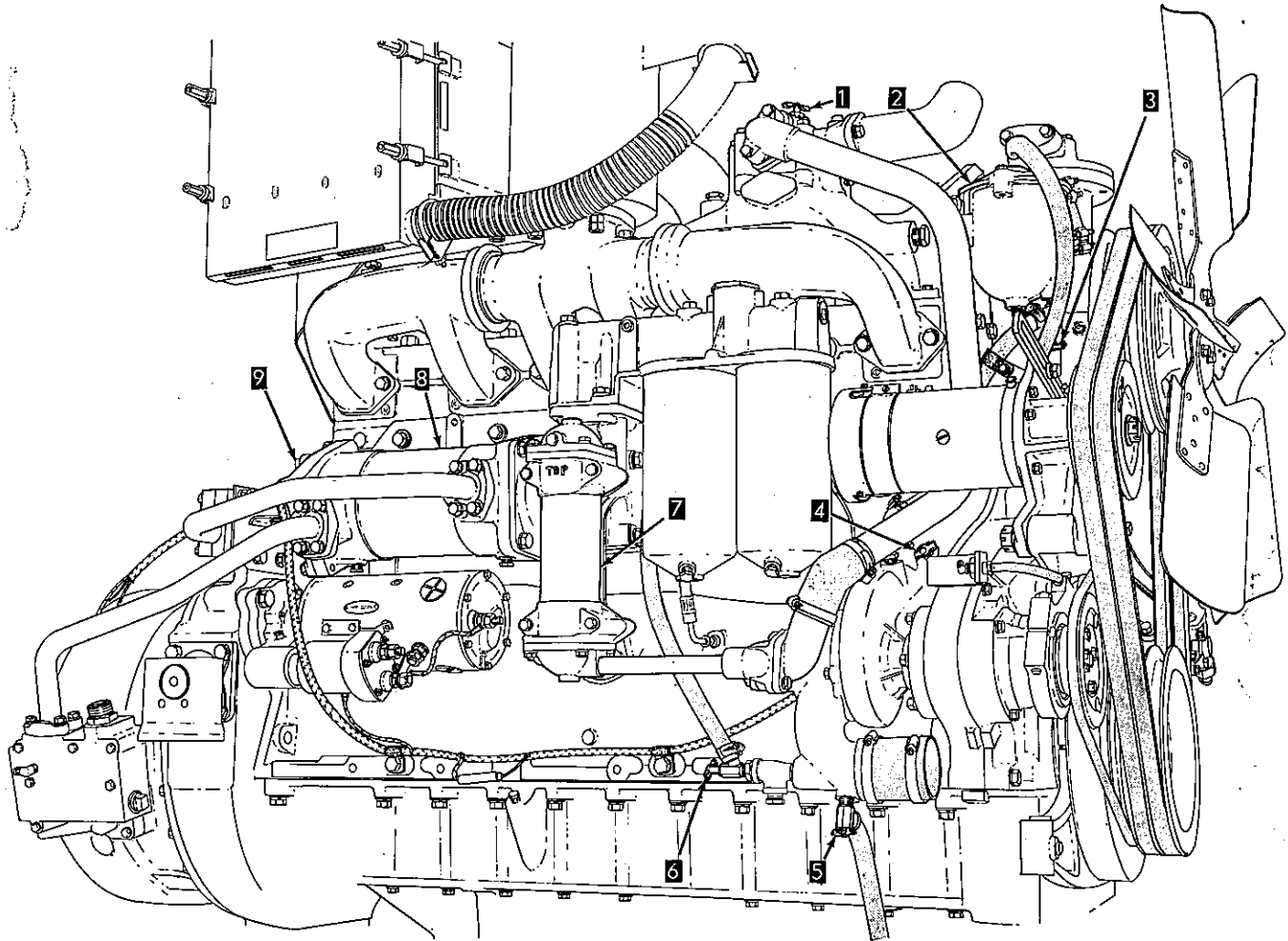


Fig. 1 Cooling System (Eff. with S/N 8399 - up)
(T-73833)

- | | | |
|---|--|----------------------------------|
| 1. Vent cock | 4. Cylinder block drain cock | 7. Engine lubricating oil cooler |
| 2. Coolant filter | 5. Cooling system drain cock | 8. Heat exchanger |
| 3. Cooling system filter inlet shut-off valve | 6. Cooling system filter outlet shut-off valve | 9. Vent plug |

ENGINE CLUTCH, TORQUE CONVERTER AND TRANSMISSION

A. DESCRIPTION

2. HYDRAULIC SYSTEM

This system has a common oil sump, located in bottom of transmission case. The hydraulic system, Fig. 2, consists of a dual-type hydraulic oil pump, two oil pressure gauges, full-flow oil filter, heat exchanger, oil pressure regulating valves, speed range selector valve, engine clutch modulating valve, flow sensing valve, engine clutch, torque converter, transmission (and transmission clutches), and the necessary lines and hoses.

B. HYDRAULIC SYSTEM OIL PRESSURES

4. TORQUE CONVERTER PRESSURE (Torque Converter Charging)

At high idle speed - 35 - 45 psi

5. TRANSMISSION LUBRICATING PRESSURE (Lubrication and Cooling)

At high idle speed - 35 - 45 psi

SEE NEW SCHEMATIC ILLUSTRATION ON PAGE 4

1. ENGINE CLUTCH COMPARTMENT
2. FRONT PUMP GEARS
3. REAR PUMP GEARS
4. TRANS. OPERATING PRESS. GAUGE
5. FULL FLOW OIL FILTER
6. TORQUE CONV.; TRANS. LUBE. PRESS. REG. VALVE
7. TRANS. LUBE. PRESS. GAUGE
8. HEAT EXCHANGER
9. MAIN PRESS. REG. VALVE
10. FLOW SENSING VALVE
11. .040" RESTRICTOR
12. TRANS. CLUTCH SELECTOR VALVE
13. TRANS. CLUTCHES
14. 250" RESTRICTOR
15. TRANS. SUMP
16. OIL SCREEN
17. ENGINE CLUTCH MODULATING VALVE
18. MODULATING VALVE CAP
19. INTERNAL PLUNGERS
20. BALANCE WHEEL
21. TURBINE WHEEL
22. IMPELLER (PUMP) WHEEL
23. GUIDE WHEEL (STATOR)
24. ENGINE CLUTCH APPLY PISTON
25. ENGINE CLUTCH RETURN PISTON

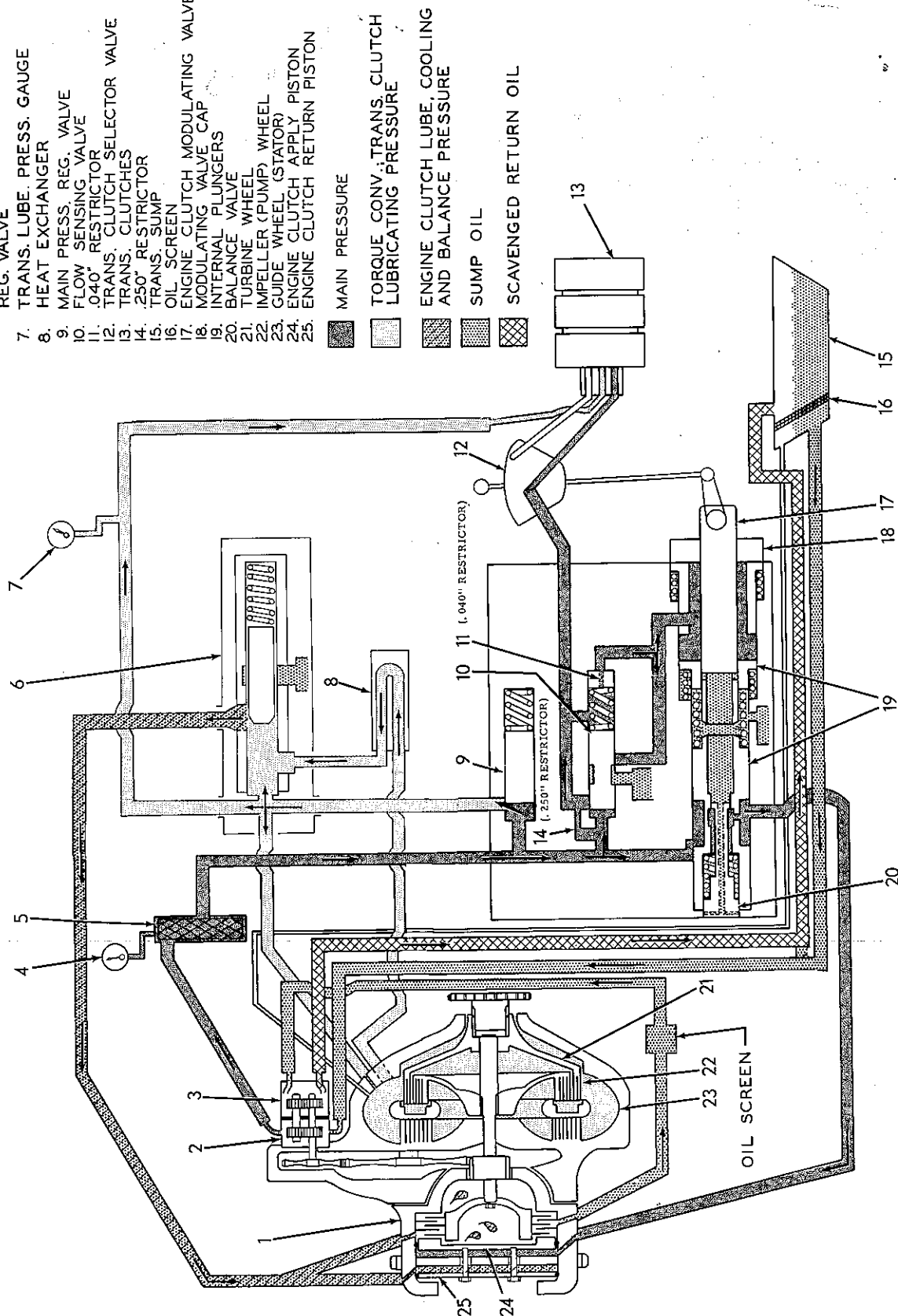


Fig. 2 Hydraulic System Oil Flow Schematic (Eff. with S/N 8399 - up)
(T-42196)

AVOID ACCIDENTS

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

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

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

NATIONAL SAFETY COUNCIL

WARNING

ON MACHINES HAVING HYDRAULICALLY, MECHANICALLY, AND/OR CABLE CONTROLLED EQUIPMENT (SUCH AS SHOVELS, LOADERS, DOZERS, SCRAPERS, etc.) BE CERTAIN THE EQUIPMENT IS LOWERED TO THE GROUND BEFORE SERVICING, ADJUSTING AND/OR REPAIRING. IF IT IS NECESSARY TO HAVE THE HYDRAULICALLY, MECHANICALLY, AND/OR CABLE CONTROLLED EQUIPMENT PARTIALLY OR FULLY RAISED TO GAIN ACCESS TO CERTAIN ITEMS, BE SURE THE EQUIPMENT IS SUITABLY SUPPORTED BY MEANS OTHER THAN THE HYDRAULIC LIFT CYLINDERS, CABLE, AND/OR MECHANICAL DEVICES USED FOR CONTROLLING THE EQUIPMENT.

FOREWORD

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

The instructions given in this book cover the operation of the "Allis-Chalmers" HD 16DP Standard Tractor. A close adherence to these instructions will result in many hours of trouble-free operation and a longer operating life for the unit.

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

To assure the best results and to maintain the original quality built into the tractor, it is important that "Allis-Chalmers" Parts be used.

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. . .

SUPPLEMENT TO
OPERATING INSTRUCTIONS AND FIELD MAINTENANCE MANUALS

Subject: Steering Clutch and Brake Hydraulic System Oil Filter Change Interval, and
 Engine Fuel Filter Change Interval.

Effective: Immediately

Models Affected: All Crawler Tractors With Oil Type Steering Clutches and Brakes.

Include the following information in all Manuals indicated:

CHANGE STEERING AND BRAKE HYDRAULIC SYSTEM OIL FILTER AFTER
EACH 500 HOURS OF OPERATION; (oil change interval remains at 1000 hours).

CHANGE ENGINE FUEL FILTERS AFTER EACH 500 HOURS OF OPERATION,
OR WHEN FUEL PRESSURE DROPS BELOW NORMAL OPERATING PRESSURE
DUE TO CLOGGED FILTERS.

ALLIS CHALMERS
MILWAUKEE, WISCONSIN, U. S. A.



GENERAL SUPPLEMENT
TO
OPERATING INSTRUCTIONS AND FIELD MAINTENANCE MANUALS

Subject: Engine Coolant Mixture
Effective: Immediately
Models: All Springfield Plant Products

Refer to "Preparation of Tractors (or Graders) For Use" Topic in manuals indicated and make changes as follows:

Engine cooling systems are filled at factory with a 50/50 mixture of water and "Permanent-Type" (glycol-base) anti-freeze for protection to -30°F.; it is NOT NECESSARY to drain this solution before placing unit in service

CAUTION

Before placing unit in service, ALWAYS TEST cooling system solution and add "Permanent-Type" anti-freeze to provide additional protection (if necessary) for prevailing or anticipated temperature.

ALLIS CHALMERS
MILWAUKEE, WISCONSIN, U. S. A.



SUPPLEMENT TO
OPERATING INSTRUCTIONS AND FIELD MAINTENANCE MANUALS

Subject: "Cessna" Steering Control Valve Adjustments

Effective: Immediately

Models Affected: HD6E, EP effective S/N 19642 - up; HD7G effective S/N 24651 - up; HD11E, EC, EP S/N 11637 thru 12200; HD16D, DC, DP effective S/N 7550 - up (including S/N 7548); HD21A, P, GP effective S/N 14274 - up. Also, any earlier units which have been equipped with "Cessna" steering control valve. Affected manuals are listed below.

Disregard information in "STEERING CLUTCHES AND BRAKES" in affected manuals concerning steering control valve pressure setting and control linkage adjustment. For this information on models equipped with "Cessna" steering control valve refer to Steering Clutches and Brakes Service Manual, Form 648095 (HD6, 7, 11); Form 645549 (HD16, 21).



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633934-S3
(7-66)



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GENERAL DESCRIPTION

The Model HD16DP tractor is a 35,000 pound track-type tractor powered with a 6-cylinder, 4 cycle, open combustion chamber, direct injection, "Allis-Chalmers" Model 16000H Diesel Engine.

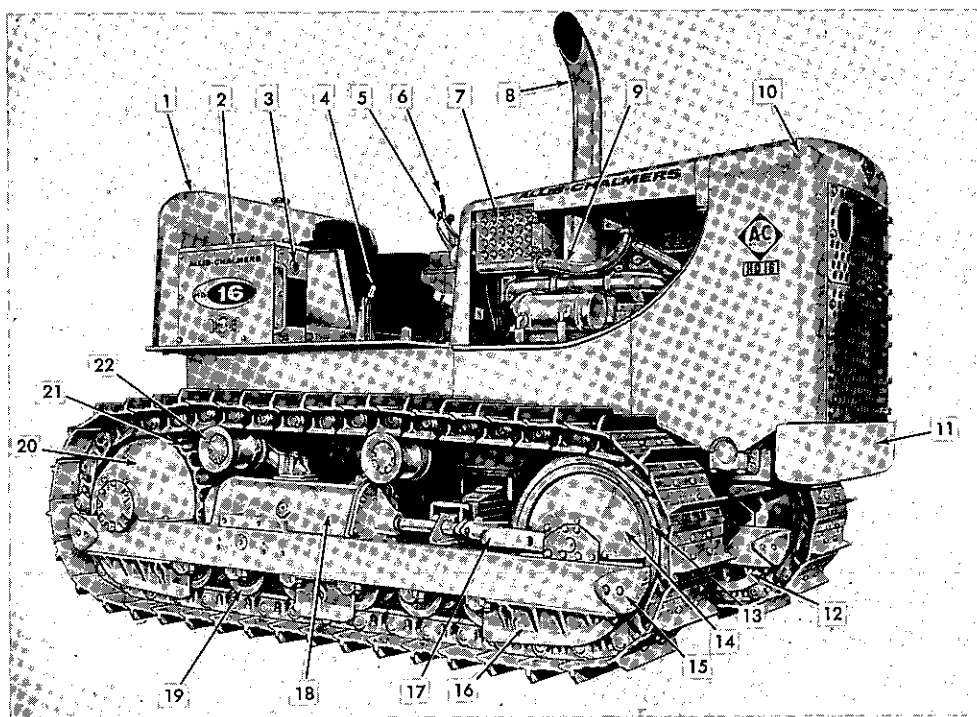
Power from the engine is transmitted to a splined drive ring (integral with engine flywheel) through a hydraulically operated, modulated, multiple disc, oil type, engine clutch, to a single stage torque converter. Power from turbine wheel (output wheel) of the torque converter is transmitted through a universal joint drive shaft assembly to the power shift transmission. From the transmission, power is transmitted to the bevel gear, and from bevel gear through multiple disc, hydraulically controlled, oil type steering clutches to the final drives and track drive sprockets.

The power shift transmission provides 2 forward and 2 reverse speed ranges. At rated engine speed of 1750 rpm (governed full load), the transmission in combination with torque converter provides forward speeds in low (1 FORWARD) up to 3.4 mph and in high range (2 FORWARD) up to 6.5 mph; reverse speeds are: low

(1 REVERSE) up to 3.0 mph, and high (2 REVERSE) up to 6.1 mph.

Hydraulically controlled steering clutches; oil type, power brakes; adjustable-type operator's seat; and unobstructed view of the front of both tracks assure easy positive control of tractor at all times.

Standard equipment includes torque converter with modulated engine clutch; pressure lubricated power shift transmission; 20" heat treated grouser shoes, positive seal heavy duty truck wheels, front idlers and track support rollers; wrap-around radiator guard; armored radiator core; oil lubricated and cooled hydraulic powered steering clutches and brakes; decelerator pedal; dry type air cleaner and filter service indicator; 24 volt electric starting equipment; muffler, pusher type fan; engine oil pressure, fuel pressure, temperature, ammeter and transmission oil pressure gauges. Guards for the engine crankcase, transmission, track idlers, track sprockets, and truck wheels are available as special equipment, for a complete listing of all available equipment consult your local "Allis-Chalmers" Dealer.



- | | | |
|-----------------------------------|--|--|
| 1. Fuel tank | 10. Radiator guard | 16. Outer truck wheel guards (special equipment) |
| 2. Battery box | 11. Bumper | 17. Track idler yoke |
| 3. Hour meter (special equipment) | 12. Inner truck wheel guards (special equipment) | 18. Track release housing |
| 4. Parking brake lever | 13. Track idler | 19. Truck wheel |
| 5. Steering levers | 14. Track idler guards (special equipment) | 20. Sprocket guards (special equipment) |
| 6. Throttle control lever | 15. Truck frame end guards (special equipment) | 21. Track sprocket |
| 7. Air cleaner | | 22. Track support rollers |
| 8. Exhaust pipe | | |
| 9. Aspirator line | | |

Fig. 1 HD16DP Tractor
(T-70508)

GENERAL SPECIFICATIONS

(STANDARD TRACTOR)

GENERAL DIMENSIONS AND WEIGHT

Shipping Weight (Approximate) 35,000 lbs.
 Overall Length 182-9/16 in.
 Overall Height (Without Stack) 90-3/8 in.
 Overall Width (Standard Shoes) 96 in.
 Ground Clearance 14-13/16 in.
 Drawbar Height (Center Line of Jaw) . . . 17-1/2 in.
 Tipping Angle (Degrees) 57°
 Center of Gravity (Ahead of Sprocket
 Center) 52-7/8 in.

ENGINE

Make Allis-Chalmers Diesel
 Model 16000H
 Type 4 Cycle (Naturally Aspirated)
 Number of Cylinders 6
 Bore 5-1/4 in.
 Stroke 6-1/2 in.
 Crankshaft Rotation (When Viewed
 from Fan End) Clockwise
 Number of Main Bearings 7
 Piston Displacement 844 cu. in.
 Lubrication Full Pressure
 Fuel Used Diesel Fuel
 Fuel Injection Pump Multiple Plunger Type
 Low Idle Speed 500-600 rpm
 Governed at Full Load
 (Rated Speed) 1750 rpm
 High Idle Speed:
 Prior to Engine S/N 16-05321 1820 rpm*
 Eff. with Engine S/N 16-05321. . . 1840-1870 rpm
 *Tractors with engine S/N prior to 16-05321 that have
 been equipped with the new (#4389467) fuel injection
 pump, or a pump that has been reworked to the
 #4389467 specifications, have a specified High Idle
 Speed of 1840-1870 rpm

ENGINE CLUTCH

Type Oil
 Number of Friction Discs (Bi-metallic) 2
 Number of Friction Discs (Steel) 1
 Engaging Action Hydraulically, Modulated

TORQUE CONVERTER

Type Single Stage
 Torque Ratio Increase (at Stall) 5.07:1

TRANSMISSION

Type Power Shift
 Lubrication Full Pressure
 Maximum Tractor Speeds
 1st Forward 3.4 mph
 2nd Forward 6.5 mph

1st Reverse 3.0 mph
 2nd Reverse 6.1 mph

STEERING

Method Multiple Disc, Oil-Type Clutches
 Controls Hydraulic
 Turning Radius 9 ft. 6 in.

BRAKES

Method Bands and Drums
 Controls Hydraulic

FINAL DRIVES Double Reduction

TRACK

Tread Width (center-to-center of track) 74 in.
 Length of Track on Ground (center of track)
 sprocket-to-center of track idler . . . 107-9/16 in.
 Width of Standard Track Shoes 20 in.
 Maximum Width Track Shoes Available 24 in.
 Number of Track Shoes—Each track 41
 Height of Grouser 2-19/32 in.
 Ground Contact (standard shoes) sq. in. . . . 4303
 Ground Pressure (standard shoes) lbs. sq. in. . 8.3
 Track Pitch (center of pin-to-center
 of next pin) 7.85 in.
 Number of Truck Wheels (each track) 6
 Number of Support Rollers (each track) 2

CAPACITIES (APPROXIMATE)

Cooling System 19-1/2 gals.
 Engine Crankcase - Including Standard
 Filters (Oil and Filter Change) 10-1/2 gals.
 Brakes and Steering System 27 gals.
 Final Drives (Each) 5-1/2 gals.
 Track Release Housing (Each) 4-1/2 gals.
 Engine Clutch, Torque Converter, and
 Transmission System 16 gals.
 Fuel Tank 100 gals.

*On units having a Heavy-Duty Lubricating oil filter
 (Special Equipment) add one additional gallon of oil
 after replacement of Heavy-Duty oil filter element.

PRESSURE RELIEF VALVE SETTINGS

(Refer to Pertinent Topics)

U.S.—METRIC MEASURE CONVERSION FACTORS

Pints × .4732 = Liters
 Quarts × .9463 = Liters
 Gallons × 3.7853 = Liters
 Pounds × .4536 = Kilograms

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

SERIAL NUMBER LOCATIONS

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

A. TRACTOR SERIAL NUMBER

The tractor serial number (Fig. 2) is stamped in rear

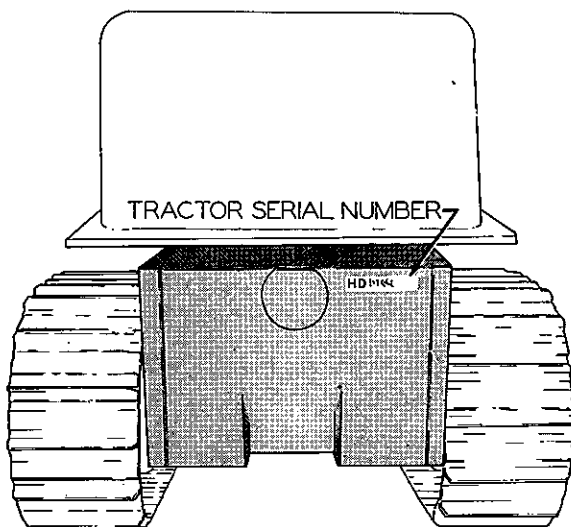


Fig. 2 Tractor Serial Number
(T-71242)

face of steering clutch housing (upper right corner) and is also on serial number plate attached to cowl.

B. ENGINE SERIAL NUMBER

The engine serial number is stamped on a serial number plate (Fig. 3) attached to left side of cylinder block. Engine serial number is also on serial number plate attached to cowl.

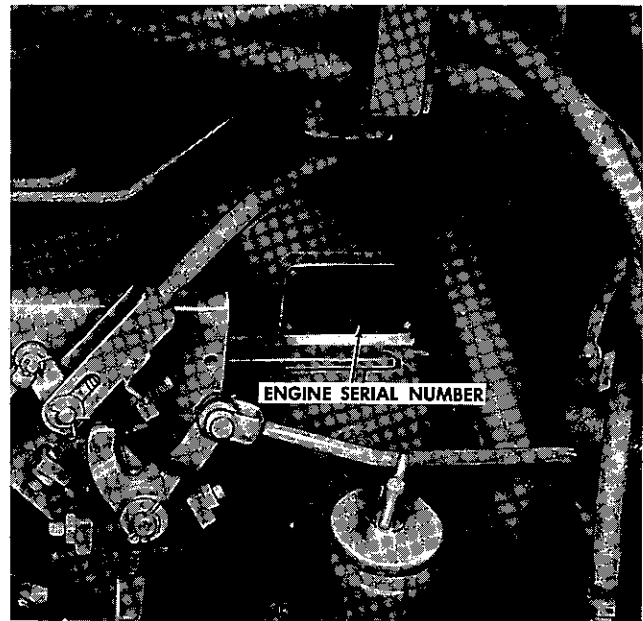


Fig. 3 Engine Serial Number
(T-70571)

RECORD YOUR SERIAL NUMBERS BELOW

TRACTOR SERIAL NO. _____

ENGINE SERIAL NO. _____

FUEL SPECIFICATIONS

The diesel fuel should be a natural distillate petroleum oil and must have certain qualities in order to ignite and burn at the proper rate and temperature. Field experience has shown that the fuel best suited for this engine closely approximates the following specifications:

Gravity API	30 - 35
Viscosity Saybolt Universal at 100° F. . .	35 - 40
Flash Point	150° F.
Diesel Index	48.5 to 65.5
Cetane Number	46 to 60
Pour Point	0° F.
Volatility 90%	650° F. Max.
End Point 98%	
Summer	700° F. Max.
Winter	600° F. Preferable
Sediment and Water	Trace
Ash02 of 1% Max.
Conradson Carbon03 of 1% Max.
Sulphur	1/2 of 1% Max.

For satisfactory fuel flow through lines and filters in cold weather, the pour point of the fuel must be at least 10° F. below the prevailing atmospheric temperature.

The API gravity of a fuel varies with its specific gravity. The low API fuels are desirable because they have a high specific gravity and more heat units per gallon. However, the higher the API gravity, the better will be the ignition quality of the fuel.

The ignition quality of a fuel is expressed as a "cetane number." The higher the cetane number, the higher the quality of the fuel. The higher cetane fuel shortens the

ignition delay period to facilitate starting and improve combustion. The diesel index number, which is a close approximation of the cetane number, is a field method to represent ignition quality.

The distillation 90% point and the endpoint are important. High volatility is required to enable complete vaporization of the fuel, clean combustion and low residue formation.

The flash point of the fuel has no quality significance, but it is important with respect to safety in storage and handling of the fuel.

It is important that the fuel be within the specified limits for ash, carbon, water and sediment content etc. to prevent excessive wear and damage to engine parts.

It is also important that the fuel has lubricating properties so that the fuel injection pump and fuel injection nozzles are adequately lubricated. In instances where fuel with inadequate lubricating properties must be used, one quart of SAE 10 engine oil must be added to every 10 gallons of fuel to provide the necessary lubrication. Contact the fuel supplier and follow his recommendations as to whether or not engine oil should be added to the fuel.

CAUTION

The sulphur content of diesel fuel should be as low as possible. The fuel should not contain a sulphur content of more than 1/2 of 1%.

Generally speaking, a No. 2 diesel fuel purchased from a reputable oil company will meet the above specifications.

FUEL STORAGE

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

A portable storage tank provides the best method for storing fuel on the job. In such a tank, the sediment and water can easily be drained and the fuel can be pumped into the tractor fuel tank with a minimum of handling. Consult your nearest "Allis-Chalmers" Dealer for details about this type of storage tank. Since condensation will occur in the storage tank, it is very important that a sediment sump be provided in bottom of tank so that water and sediment can be drained daily.

Fuel should be allowed to settle at least 48 hours in a storage container before being added to the fuel tank

of the tractor. It is advisable to use a pump and draw the fuel from storage tank, or barrel, rather than to drain it from bottom of fuel container. Where conditions are such that drums must be used to supply fuel, it is advisable to have enough drums to allow sufficient time for the fuel to settle. The fuel thus left in a number of drums can be collected into one drum and used after the usual time allowed for settling. In this manner, the sediment and foreign matter will be disposed of and no fuel will be wasted. Whenever drums are used for fuel storage, they should be covered or placed under shelter so that the fuel will not become contaminated by water, which will enter through the filler plugs when it rains, even though plugs are tight.

The fuel tank of the tractor should be filled at the end of the day's run rather than at the start; this will reduce the water content, as a full tank is less subject to condensation.

LUBRICANT SPECIFICATIONS

A. ENGINE CRANKCASE

The specified oil for use in the engine crankcase is a lubricating oil that meets both of the following specifications:

1. American Petroleum Institute (API) classification service "DS" or "Series 3"
2. Military Specifications "MIL-L-45199A"

Use oils of the following viscosities:

ATMOSPHERIC TEMPERATURE	VISCOSITY
32°F. and above	Use SAE 30
0°F. to 32°F.	Use SAE 20W
0°F. and below	Use SAE 10W

NOTE

The engine crankcase on a new unit, when shipped from the factory, contains SAE 20W engine lubricating oil meeting the proper API and Military Specifications. This oil is completely satisfactory for use until the first regular oil change.

For additional information regarding engine lubricating oil, contact your "Allis-Chalmers" Dealer.

B. ENGINE CLUTCH, TORQUE CONVERTER AND TRANSMISSION SYSTEM AND STEERING CLUTCHES, BRAKES AND BEVEL GEAR SYSTEM

The specified oil is SAE 10W lubricating oil meeting the following specifications:

1. Transmission Fluid "Type C-1",
2. American Petroleum Institute (API) classification service "MS", and
3. Military Specification "MIL-L-2104A" or "MIL-L-2104B" GRADE 10W.

Automatic Transmission Fluid "Type A-Suffix A" may be used if desired. API classification service "DS" or "Series 3" oil is not recommended.

When atmospheric temperature is below -10°F., Automatic Transmission Fluid "Type A-Suffix A" or a lubricating oil meeting Military Specification "MIL-L-10295A OES" may be used if operating conditions warrant.

CAUTION

Do not use "MIL-L-10295A OES" if atmospheric temperature remains consistently above -10°F.

C. FINAL DRIVE AND TRACK RELEASE HOUSINGS

Lubricate these assemblies with SAE Regular Type Gear Lubricant (straight mineral oil) or a good quality engine crankcase oil purchased from a reputable oil company.

CAUTION

Do not use Extreme Pressure (EP) Gear Lubricant.

Use oils of the following viscosities:

ATMOSPHERIC TEMPERATURE	VISCOSITY
Above 32°F.	SAE 90 Gear Lube or SAE 50 Crankcase Oil
32°F. and below	SAE 80 Gear Lube or SAE 30 Crankcase Oil

D. TRUCK WHEEL, TRACK IDLER, AND TRACK SUPPORT ROLLER

The truck wheels, track idlers, and track support rollers contain positive type seals. These assemblies are filled with lubricant at time of assembly and do not require additional servicing unless removed for rebuild. If any of the above assemblies are removed for disassembly and rebuild, they must be lubricated (when reassembled) with a grease that meets certain definite specifications.

The type of grease used for lubricating these assemblies must:

1. Have good pumpability and cold temperature characteristics.
2. Have a minimum effect on synthetic rubber seal boots.
3. Be an extremely stable grease both mechanically and chemically that will not deteriorate excessively with long usage.

Detailed specifications of the grease are as follows:

Worked Penetration (60 strokes) (ASTM-D-217)	355 to 385
Worked Penetration (10,000 strokes)	400 max.
Dropping Point °F. (ASTM-D-566) . . .	180 min.
Water Content % (ASTM-D-128)	1.0 max.
Ash Content % (ASTM-D-128)	1.5 max.
Acidity or Alkalinity % (ASTM-D-128)	0.3 max.
Fillers	none
Corrosion (Federal Spec. 530.4)	none
Norma-Hoffman Oxidation Test: Pressure Drop, psi, 100 hours at 210°F.	5 max.
Viscosity of Oil S. U. S. at 210° F. . . .	45 to 58
Aniline Point of Oil, °F. (ASTM-611)	225 min.

Contact your local supplier for a grease which meets these specifications. The source of supply of lubricant used is to be held responsible for the results obtained from their products.

E. PRESSURE GUN LUBRICANT

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

F. HYDRAULIC SYSTEM

On tractors having a hydraulic system, such as a hydraulic dozer (Special Equipment), oils of the following specifications are recommended:

	ASTM Test Method
Viscosity @ 0°F., seconds, max.	12000 D343
Viscosity @ 100° F., seconds	150-190 D88

Viscosity Index, min.	90	D567
Flash Point, deg. F., min.	370	D92
Neutralization No., mgs. KOH/g. oil	0.10	D664
Aniline Point, deg. F.	180-220	D611
Oxidation Stability, hrs., min.	1000	D943
Pour Point, deg. F., min.	Minus 20	D97
Rust Test	Pass	D665
Foam Inhibited		

The hydraulic oil should be compatible in all proportions with SAE 10W engine crankcase oil of similar quality with prevailing detergency levels. The hydraulic oil, in its original state, should not contain any substances added to improve or increase the viscosity index. The oil should also be free of water, dirt, sediment and foreign matter and should not be corrosive or otherwise injurious to any of the materials commonly used in hydraulic systems.

In the event the atmospheric temperature is lower than the pour point of the hydraulic oil being used, the hydraulic oil must be diluted 20% with kerosene (do not use diesel fuel or furnace oil). For continuous operation at atmospheric temperatures 32° F. and higher, the diluted oil must be drained and the system refilled with hydraulic oil of the aforementioned general specifications.

If desired, SAE 10W engine crankcase oil of the classifications Service MM, MS, DG, DM, or DS can be used. Multi-viscosity oils such as SAE 10W-30 are not recommended. For operation at atmospheric temperatures below minus 10° F., the SAE 10W engine crankcase oil must be diluted 20% with kerosene. For continuous operation at atmospheric temperatures of 32° F. and above, the diluted oil must be drained and the system refilled with SAE 10W oil meeting the aforementioned classifications.

No specific brands of oil are recommended. Use only products qualified under the aforementioned oil viscosity specifications and classifications and recommended by reputable oil companies.

LUBRICATION AND SERVICE INSTRUCTIONS

To prevent minor irregularities from developing into serious conditions that might involve shut down and major repairs, several other checks and services must be included at the same intervals as lubrication. These checks and services will reveal the need for adjustment or change due to normal wear, which if neglected could result in failure and shut-down. Refer to Lubrication and Service Instruction Plate (Fig. 4) and the illustrations and instructions in this topic for points to be serviced and their relative locations.

Thoroughly clean all fittings, caps, plugs, etc. before servicing to prevent dirt from entering while performing the service.

Lubricants should always be at operating temperature when draining for oil changes.

Oil systems equipped with an oil level gauge rod having "Operating Range" marks, are safe to operate when oil level is anywhere within the "Operating Range".

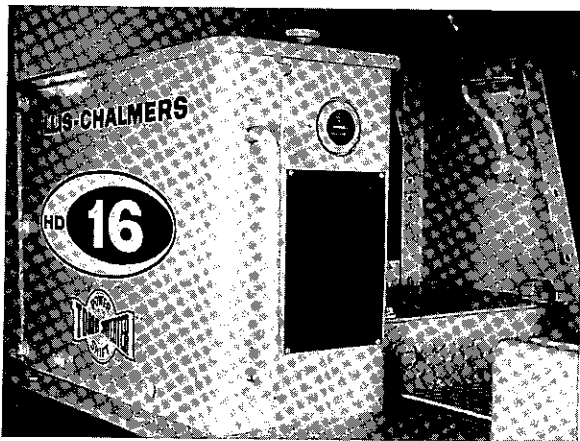


Fig. 4 Lubrication and Service Instruction Plate
(T-70834)

NOTE

Oil levels will raise higher within the "Operating Range" on oil level gauge rods (due to expansion of the oil) after unit has been placed in service and operating temperatures have stabilized.

The various hour intervals given in this Topic are based on normal operation; perform the service more often (as necessary) when operating under severe or abnormal conditions.

Proper operation and maintenance of the engine are necessary to obtain the desired results from the lubricating oil. The basic 100-hour engine lubricating oil and filter change interval, (refer to "100-HOUR SERVICES" in this Topic), assumes use of the proper grade of a good "Series #3" or "average" operating conditions including load factor, fuel (particularly sulphur content), temperatures, cleanliness and mechanical condition and many others. Where conditions are more severe than "average", 100-hour change interval may even be too long—Where operating conditions are less severe, the 100-hour change interval may safely be extended.

Many users of diesel engines have found use of laboratory analysis a practical and economical method of establishing lube oil change intervals tailored to their engines and their applications. Most major oil companies will test oils at periodic intervals and recommend the longest safe lube oil change interval. Where users feel their operations are unusual or they want to provide the best possible lubrication consistent with cost, the testing procedure is recommended.

Crankcase oil samples should be taken with the oil at normal operating temperature, prior to adding "make-up" oil, and from the top portion of crankcase or from a line in the oil flow. Containers must be clean to avoid introduction of dirt and resulting false

analysis. Oil samples should not be taken from bottom of pan.

For additional information regarding engine lubricating oil, contact your "Allis-Chalmers" Dealer.

10-HOUR SERVICES

CHECK

ENGINE CRANKCASE - OIL LEVEL - With engine stopped, remove crankcase oil level gauge rod (Fig. 5) and check oil level. Add oil, through crankcase oil filler cap if necessary until oil level is within "Operating Range" marks on gauge rod. Install gauge rod.

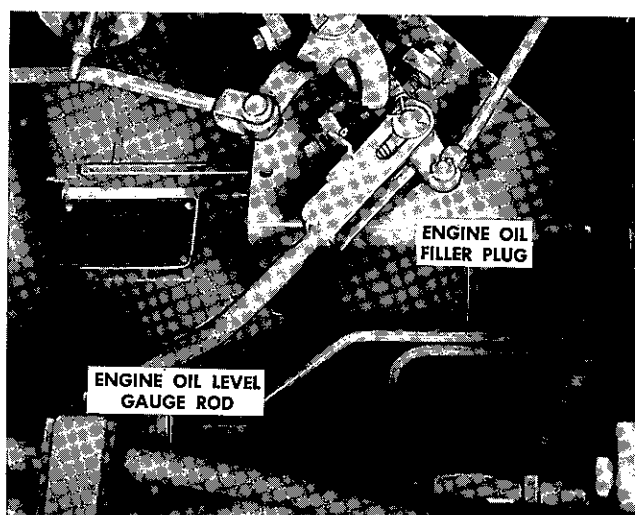


Fig. 5
(T-70571)

AIR CLEANER - CHECK AIR CLEANER - Observe air cleaner indicator (Fig. 6), located on cowl. When red indicator reaches the top and locks in position,

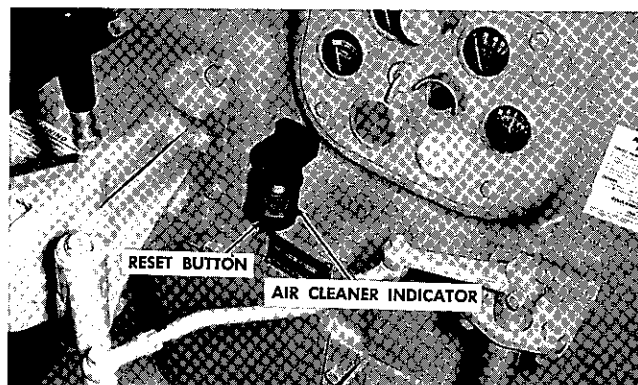


Fig. 6
(T-70573)

the air cleaner filter element must be replaced immediately. Reset indicator (push button on bottom of indicator) after changing element. Refer to "AIR CLEANER" for detailed information.

RADIATOR-COOLANT LEVEL - Remove radiator cap (Fig. 7), and check level of the coolant. Maintain coolant level approximately 1-1/2 inches below top of radiator. Refer to "ENGINE COOLING SYSTEM" for detailed information.

CAUTION

Do not remove the pressure type radiator cap when engine temperature gauge hand is in upper half of "Operating Range" or above, as the coolant will break into a boil and splash onto person removing the cap.

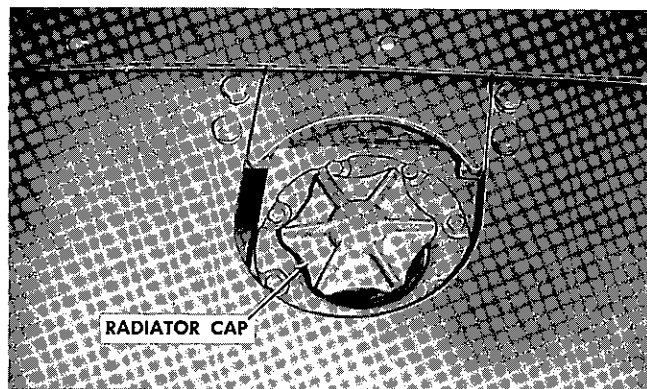


Fig. 7
(T-70574)

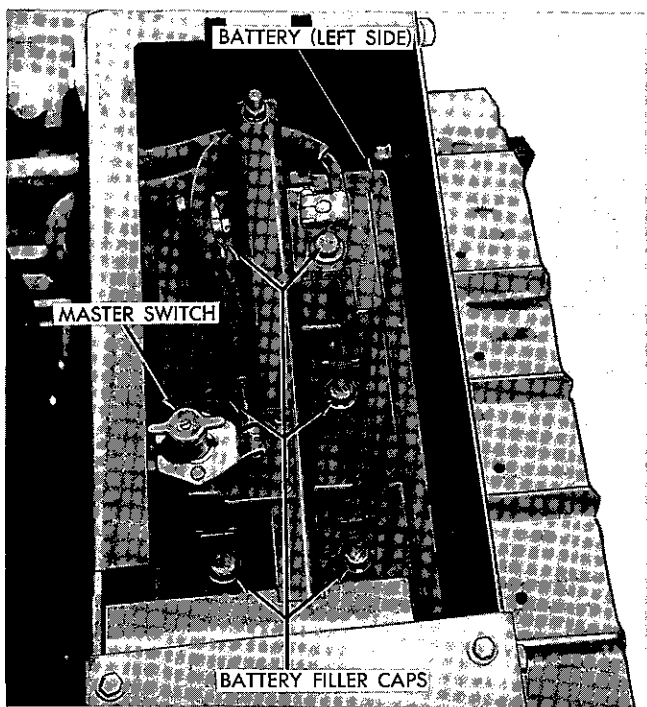


Fig. 8
(T-39445)

BATTERIES - 1 battery each side and 6 points each battery (Fig. 8). Inspect electrolyte level; add clean distilled water to keep the level 3/8 inch above plates. Keep tops of batteries clean and terminals free from corrosion. Test the batteries with a hydrometer after every 100 hours of operation. Refer to "ELECTRICAL SYSTEM" for detailed information.

SERVICE

FIRST AND SECOND STAGE FUEL FILTERS - Open drain cocks (Fig. 9) in first and second stage fuel filter shells daily (or as often as conditions warrant) and allow any water or sediment to drain; close drain cocks when clean fuel runs out. Perform this service before start of day's operation in warm weather or shortly after end of day's operation in freezing weather.

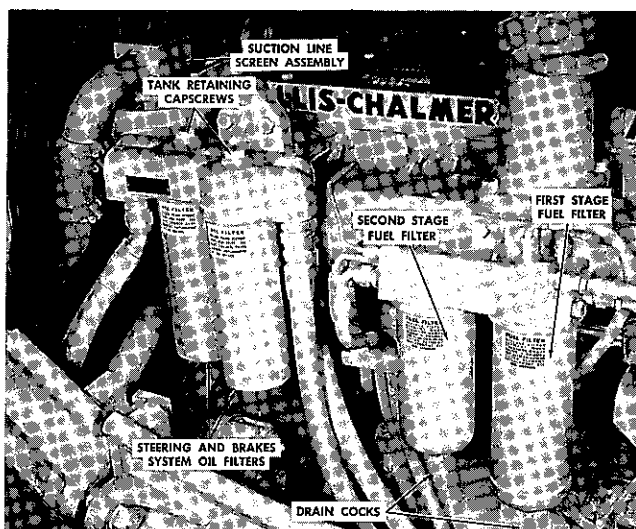


Fig. 9
(T-70576)



Fig. 10
(T-39534)

FUEL TANK - DRAIN SEDIMENT AND FILL TANK - Open the drain cock (Fig. 10) before engine is started in warm weather or shortly after end of day's operation in freezing weather and allow water and sediment to drain. Close drain cock when clean fuel runs out. Fill tank at end of each operating period to keep condensation in tank to a minimum.

100-HOUR SERVICES

NOTE

Also perform the 10-Hour Services.

CHECK

STEERING CLUTCH AND BEVEL GEAR COMPARTMENTS - CHECK OIL - With engine stopped, remove oil level gauge rod cap (Fig. 11) and check oil level. Add oil as necessary until oil level is within "Operating Range" marks on oil level gauge rod.

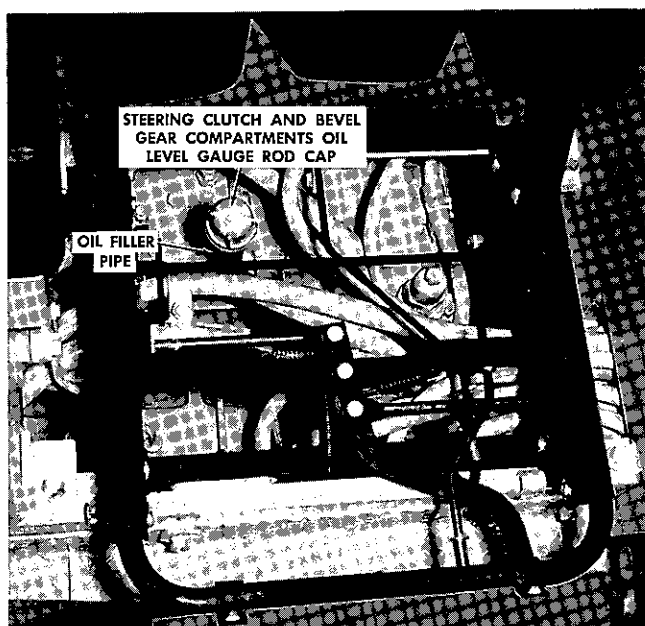


Fig. 11
(T-70835)

ENGINE CLUTCH, TORQUE CONVERTER AND TRANSMISSION HYDRAULIC SYSTEM - CHECK OIL - Check oil level before starting engine. If any oil is observed on gauge rod (Fig. 12), it will be safe to start engine. If no oil is observed on gauge rod, add only enough oil to show on gauge rod.

CAUTION

Do not add any more oil than necessary to show on gauge rod.

Start engine and observe pressure gauges. If all gauges indicate pressures within the "Operating Range", run

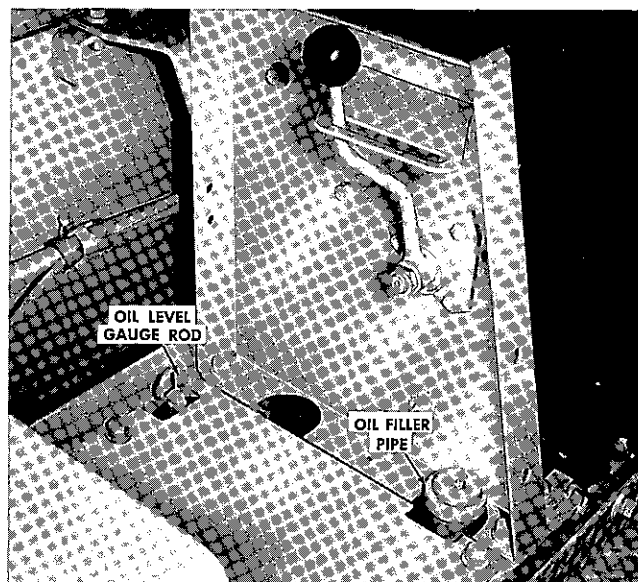


Fig. 12
(T-70836)

tractor long enough to heat the oil to a temperature of at least 150° F. With transmission range selector in 2nd forward position, modulated engine clutch **DIS-ENGAGED**, parking brake applied, and engine running at low idle speed, check oil level. Make certain the oil level is not above the upper end of "Operating Range" on gauge rod. Refer to "ENGINE CLUTCH TORQUE CONVERTER and TRANSMISSION" for detailed information.

FINAL DRIVES - OIL LEVEL - 1 oil level plug each side (Fig. 13). Check oil levels and add oil as necessary to raise levels even with filler plug openings.

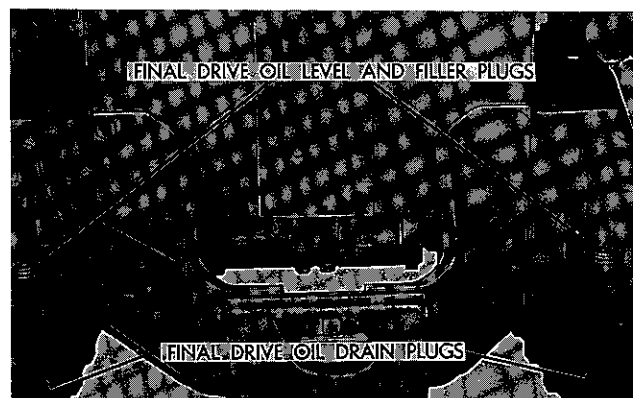


Fig. 13
(T-35062)

SERVICE

ENGINE CRANKCASE - CHANGE OIL - Remove front and rear drain plugs from oil pan (Fig. 14) and allow oil to drain. Install and tighten both drain plugs,

200-HOUR SERVICES

NOTE

Also perform the 10 and 100-Hour Services.

CHECK

TRACK RELEASE HOUSINGS - OIL LEVEL - Remove oil level plug (Fig. 16) in each housing and add oil if necessary. Change oil if it becomes contaminated with dirt or water.

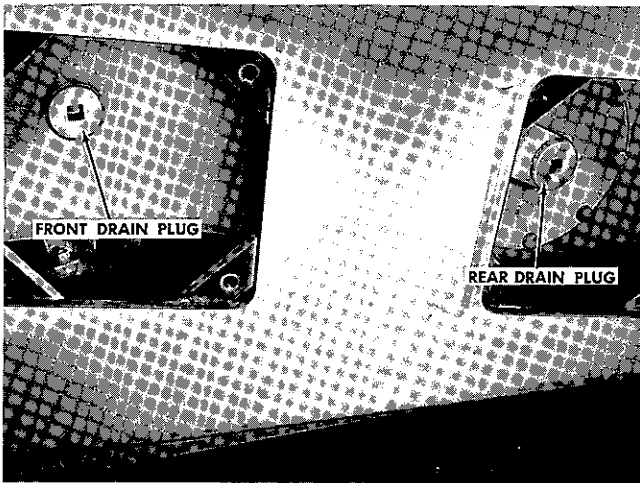


Fig. 14
(T-70587)

making certain drain plug gaskets are in good condition. Fill crankcase (Fig. 5) with specified lubricant to top of the "Operating Range" on oil level gauge rod. Refer to "ENGINE LUBRICATING SYSTEM" for detailed information.

ENGINE LUBRICATING OIL FILTERS - REPLACE ELEMENTS - (Fig. 15). Remove old elements, clean the bodies and install new element kits. Refer to "ENGINE LUBRICATING SYSTEM" for detailed information.

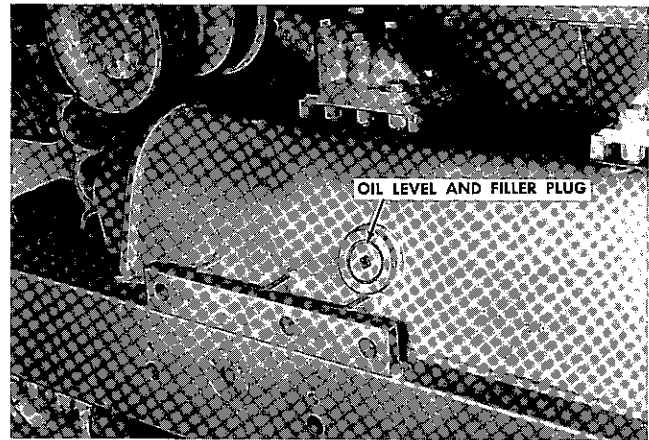


Fig. 16
(T-41356)

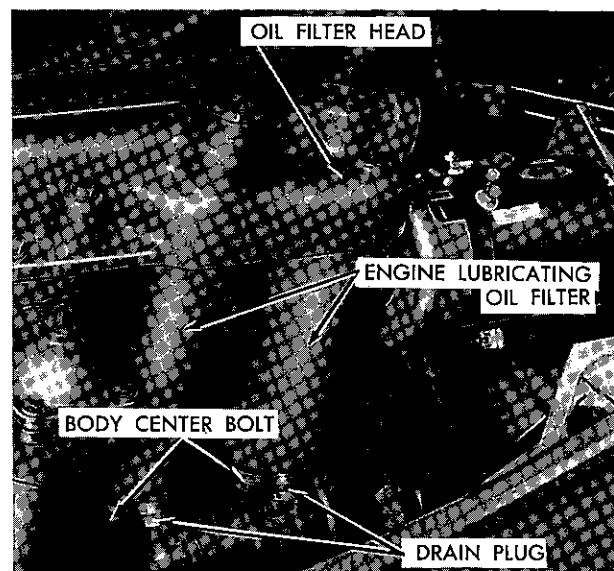
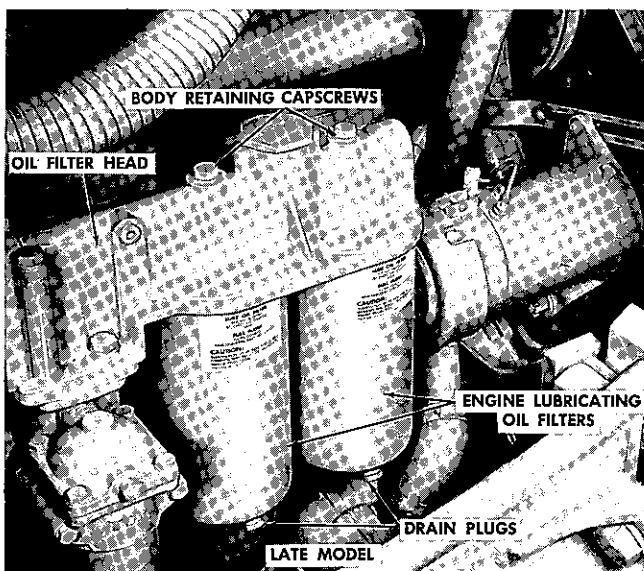


Fig. 15
(T-70837 - T-23268)

LUBRICATE

FAN BEARINGS - 1 lubrication point (Fig. 17). Lubricate with pressure gun lubricant, using hand type lubricating gun (approximately 4 to 6 shots).

CAUTION

Do Not Over - Lubricate.

WATER PUMP IDLER BEARINGS - 1 lubricating point (Fig. 17). Lubricate with pressure gun lubricant, using hand type lubricating gun (approximately 4 to 6 shots).

CAUTION

Do Not Over - Lubricate.

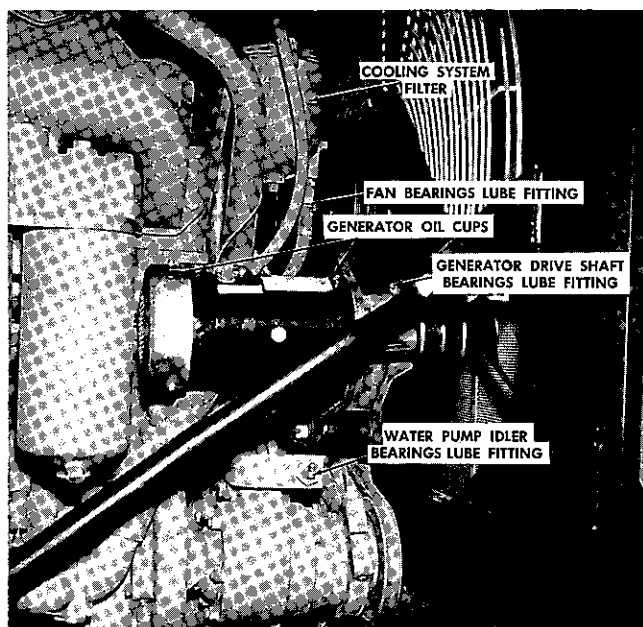


Fig. 17
(T-70557)

GENERATOR DRIVE SHAFT BEARINGS - 1 lubrication point (Fig. 17). Lubricate with pressure gun lubricant, using hand type lubricating gun (approximately 4 to 6 shots).

CAUTION

Do Not Over - Lubricate.

GENERATOR OIL CUPS - 2 oil cups (Fig. 17). Lubricate with 10 drops of light engine oil in each cup.

400-HOUR SERVICES

NOTE

Also perform the 10, 100, and 200-Hour Services.

LUBRICATE

DRIVE SHAFT UNIVERSAL JOINTS - 3 lubrication points (Fig. 18). Remove right front floor plate to reach the lube fittings. Lubricate with pressure gun lubricant, using hand type lubricating gun (approximately 4 to 6 shots).

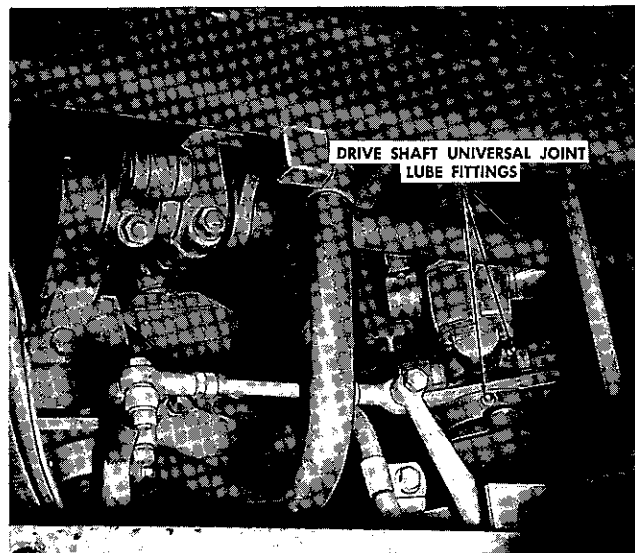


Fig. 18
(T-70838)

SERVICE

FIRST AND SECOND STAGE FUEL FILTERS - REPLACE ELEMENTS - Install new element in each filter (Fig. 9) after every 400 hours of operations, or when the fuel pressure drops to 8 psi due to clogged filter elements. Do not attempt to clean clogged filter element. Refer to "FUEL SYSTEM" for detailed information.

ENGINE COOLING SYSTEM FILTER - REPLACE ELEMENT - Install new element in this filter (Fig. 17) after every 400 hours of operation, or more often if conditions warrant. Also, thoroughly clean or buff the lower corrosion resistor plate of the filter. Refer to "ENGINE COOLING SYSTEM" for detailed information.

1000-HOUR SERVICES

NOTE

Also perform 10, 100 and 200-Hour Services.

SERVICE

STEERING CLUTCH AND BEVEL GEAR COMPARTMENTS - CHANGE OIL - Remove the 3 oil drain plugs (Fig. 19) from bottom of bevel gear and steering clutch compartments and allow oil to drain. The magnetic type plug must be cleaned and reinstalled in bottom of bevel gear compartment. The other two

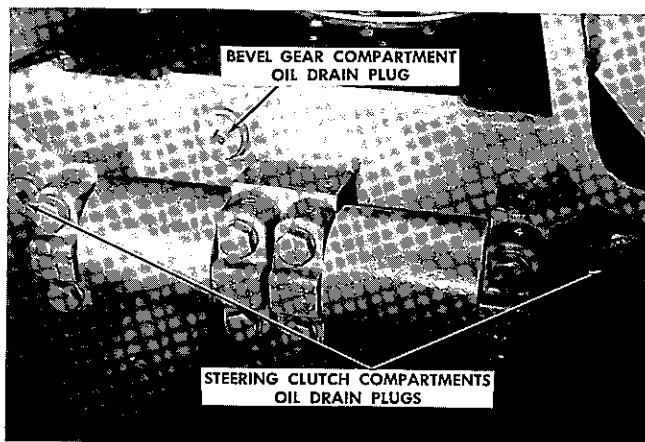


Fig. 19
(T-70582)

plugs are to be reinstalled in bottom of steering clutch compartments.

NOTE

The filter elements should be replaced and breather cleaned before proceeding.

Pour approximately 27 gals. of specified lubricant through oil filler pipe. Oil level should be within "Operating Range" marks on gauge rod (Fig. 3).

STEERING AND BRAKES SYSTEM OIL FILTERS - REPLACE ELEMENTS - On a new tractor, or after major repairs have been made to bevel gear, brakes, or steering clutches, the filter elements should be replaced after first 50 hours of operation. Thereafter, elements should be replaced after every 1000 hours of operation. Remove elements from each filter tank (Fig. 9), discard element, and clean interior of each filter tank. Install new element in each filter tank and install filter tank on filter head. Tighten tank retaining capscrews to a torque of 80 to 90 lbs. ft. Refer to "STEERING CLUTCHES AND BRAKES" for detailed information.

FINAL DRIVES - CHANGE OIL - 1 plug each side (Fig. 13). Climatic or operating conditions may require this service at shorter intervals. Remove each drain plug and allow oil to drain; reinstall each plug and tighten securely. Fill each final drive with specified lubricant through oil filler plug opening to a level even with filler plug opening.

ENGINE CLUTCH, TORQUE CONVERTER AND TRANSMISSION - CHANGE OIL - Remove drainplugs (Fig. 20) from torque converter and transmission. Allow oil to drain; reinstall drain plugs securely. (Make certain transmission drain plug gasket is in good condition).

Pour specified lubricant through transmission filler pipe (Fig. 12). Make certain oil is observed on gauge

rod before starting engine. Start engine and run at low idle speed while observing oil pressure gauges; if gauges do not indicate a pressure within "Operating Range" within a few minutes, stop engine and determine the cause. Run tractor long enough to heat oil to at least 150° F. then with range selector lever in 2nd forward position, modulated engine clutch **DIS-ENGAGED**, parking brake applied, and engine running at low idle speed, check oil level. Make certain oil level is not above upper end of "Operating Range" on gauge rod. Refer to "ENGINE CLUTCH, TORQUE CONVERTER, AND TRANSMISSION" for detailed information.

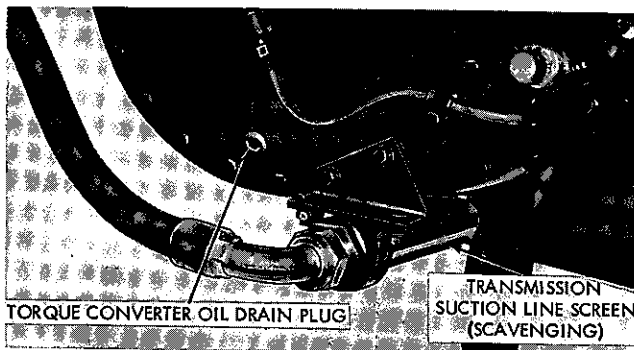
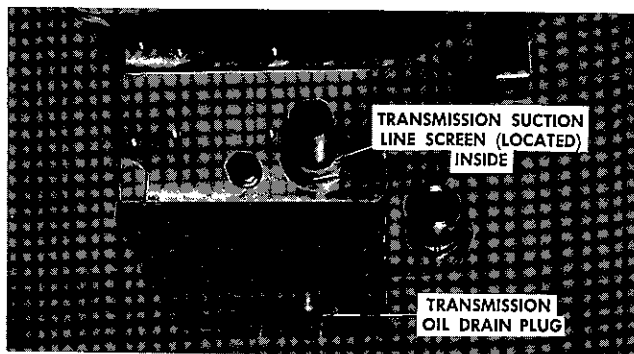


Fig. 20
(T-70870 - T-70443)

ENGINE CLUTCH, TORQUE CONVERTER AND TRANSMISSION - REPLACE FILTER - Remove and discard old filter element (Fig. 21) and thoroughly clean and dry filter tank. Use new gaskets and seals and install new filter element in tank and place tank in position on filter head. Secure with tank retaining capscrew and torque to 80-90 lbs. ft. Check filter for leaks with engine running. Refer to "ENGINE CLUTCH, TORQUE CONVERTER AND TRANSMISSION" for detailed information.

STEERING CLUTCH AND FINAL DRIVE COMPARTMENT BREATHERS - CLEAN - Remove the four breathers (2 each side), Fig. 10, and wash in solvent or fuel oil. Blow dry with compressed air and reinstall.

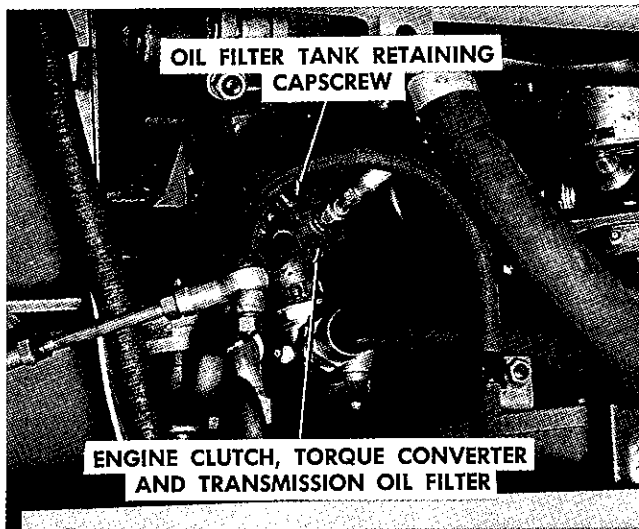


Fig. 21
(T-70871)

Operating in extremely dusty conditions may require a more frequent cleaning.

ENGINE CLUTCH, TORQUE CONVERTER AND TRANSMISSION BREATHER - REPLACE ELEMENT - Remove breather (Fig. 22) and discard old element. Coat new breather element with clean oil and install element in breather; re-install breather. Refer to "TRANSMISSION" for detailed information.

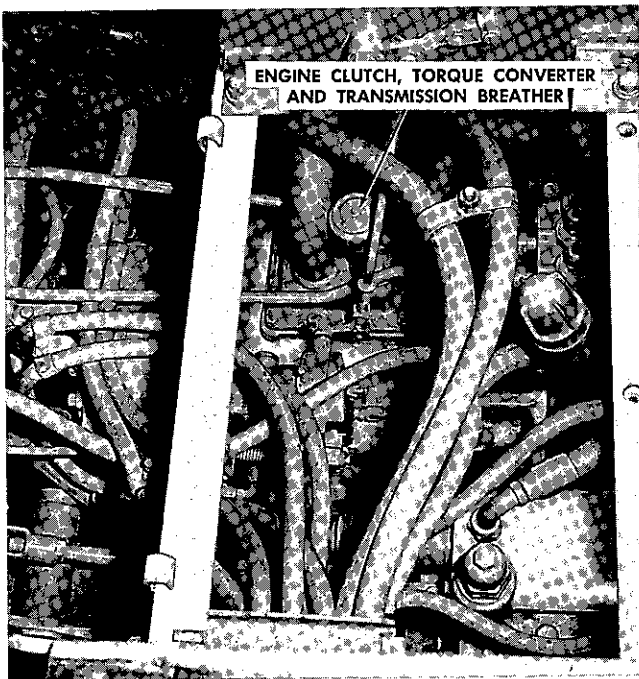


Fig. 22
(T-70869)

PERIODIC SERVICES AND ADJUSTMENTS

SERVICE

STEERING, BRAKES AND BEVEL GEAR SYSTEM OIL SUCTION LINE SCREEN - This screen (Fig. 9) must be removed and cleaned periodically and whenever major repairs are made to steering clutches, brakes or bevel gear. Refer to "STEERING CLUTCHES AND BRAKES" for detailed information.

ENGINE CLUTCH, TORQUE CONVERTER AND TRANSMISSION OIL SUCTION LINE SCREENS - The screen for oil pump (pressure) suction line is located inside transmission oil pan (Fig. 21). The screen for oil pump (scavenging) suction line is located externally (Fig. 21) (attached to lower-right side of torque converter). These screens must be removed and cleaned periodically and whenever major repairs are made to engine clutch, torque converter or transmission. Refer to "ENGINE CLUTCH, TORQUE CONVERTER AND TRANSMISSION" for detailed information.

ENGINE AIR INTAKE SYSTEM - Check all capscrews, hose clamps, etc. and tighten if necessary. Also make certain all gaskets are properly installed and are in good condition to avoid air leaks. Refer to "AIR CLEANER" for detailed information.

FUEL TANK - Drain water and sediment from fuel tank. If a large accumulation of water, rust, or scale is evident, drain and flush tank.

ENGINE CRANKCASE AND TRANSMISSION - GUARDS - Remove any accumulated dirt or debris from inside of guards.

TRACK ADJUSTING SCREW LUBE FITTINGS - 2 fittings each side. Lubricate periodically to prevent rusting and to facilitate turning adjusting screw when adjusting track. Refer to "TRACK AND TRACK IDLERS" for detailed information.

TRUCK WHEELS, TRACK IDLERS, AND TRACK SUPPORT ROLLERS - Check these components periodically for signs of grease leakage; grease leakage is an indication of damaged grease seals or loose or damaged bearings and the components must be removed immediately for inspection and repair.

ADJUSTMENTS

BRAKE ADJUSTMENT - Check the adjustment of each brake. As brake linings wear, it will become necessary to adjust the brake bands. Due to variable operating conditions, specific time intervals for brake band adjustments are not given. The brake bands require adjustment when it is possible to depress brake pedals 4-1/2" or more, using moderate pressure on pedals with engine stopped. Refer to "STEERING CLUTCHES AND BRAKES" for detailed information.

PARKING BRAKE - Check parking brake lever adjustment. After extended usage, it will be necessary to adjust parking brake. Due to variable operating condi-

tions, specific time intervals for adjustments are not given. Adjust parking brake to a pull of 80 to 85 lbs. at top end of lever.

TRACK ADJUSTMENT - Check adjustment of each track. Keep tracks adjusted so that upper part of each track can be lifted 1-1/2" to 2" above support rollers with use of a pry bar. Refer to "TRACK AND TRACK IDLER" for detailed information.

FAN AND GENERATOR DRIVE BELTS - The belts are properly adjusted when straight side (left side) of

belts can be pressed inward (by hand) approximately 1" at a point half-way between fan and crankshaft pulleys. Adjust belts when slippage is evident. Refer to "ENGINE COOLING SYSTEM" for detailed information.

WATER PUMP DRIVE BELT - The belt is properly adjusted when top side of belt, midway between water pump pulley and water pump idler pulley, can be depressed (by hand) 1/4". Adjust water pump idler when slippage is evident. Refer to "ENGINE COOLING SYSTEM" for detailed information.

PREPARATION OF TRACTOR FOR USE

Fill fuel tank with specified fuel. Use care to prevent entrance of dirt or foreign matter while filling tank.

NOTE

Make certain air cleaner protection cover (installed at factory for shipping purposes only) is removed before attempting to start engine.

Make certain engine crankcase; brakes, bevel gear and steering system; final drives; engine clutch, torque converter and transmission system; and track release housings are filled to proper level with specified lubricants. Lubricate all points where lube fittings are provided: refer to "LUBRICATION AND SERVICE INSTRUCTIONS" for detailed information.

Start engine and observe all instruments and gauges for proper pressures, operating ranges, etc.

Operate controls and check for proper operation. Stop engine and check any hoses, lines and fittings for oil leakage; tighten connections if necessary.

When tractor is shipped from the factory, both inlet and outlet shut-off cocks of cooling system filter are closed and cooling system filter is not in operation. The cooling system is filled at the factory with a Methol Alcohol anti-freeze solution which will protect the system from freezing to 40° F. below zero. This solution is for storage and moving the unit under light load only. Before tractor is placed under load and before cooling system filter is placed in operation, this solution **MUST** be drained and the cooling system refilled. Refer to "ENGINE COOLING SYSTEM" for detailed information.

Operate tractor with a light load for the first 60 hours. The most efficient engine operation is obtained with

engine coolant temperature held within "Operating Range." Operating the engine with coolant temperature below this range will result in incomplete combustion of fuel, higher fuel consumption with less power, and will cause harmful gummy deposits within engine.

When operating in cold weather, provide covers for sides of engine compartment if thermostats do not maintain coolant temperature within "Operating Range."

CAUTION

Never use canvas side covers or engine side plates that may restrict the flow of air to the air cleaner intake; such restrictions may cause heat to be inhaled through the aspirator and destroy the element, resulting in serious damage to the engine.

Inspect entire tractor after first 10 hours of operation. Tighten all loose bolts and check adjustment of all controls, brakes and tracks. Tighten all track shoe bolts; by tightening these bolts at this time and again at the end of 60 hours, the possibility of their becoming loose will be minimized.

CAUTION

The fuel injection pump and governor, as set by the factory, permits operation of tractor at altitudes up to 8,000 feet above sea level.

Before operating tractor at 8,000 feet or more above sea level, it is absolutely necessary to reduce fuel input to the engine; contact your nearest authorized "Allis-Chalmers" Construction Machinery Dealer so he can make proper adjustments.

OPERATING CONTROLS AND INSTRUMENTS

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

A. INSTRUMENTS

CAUTION

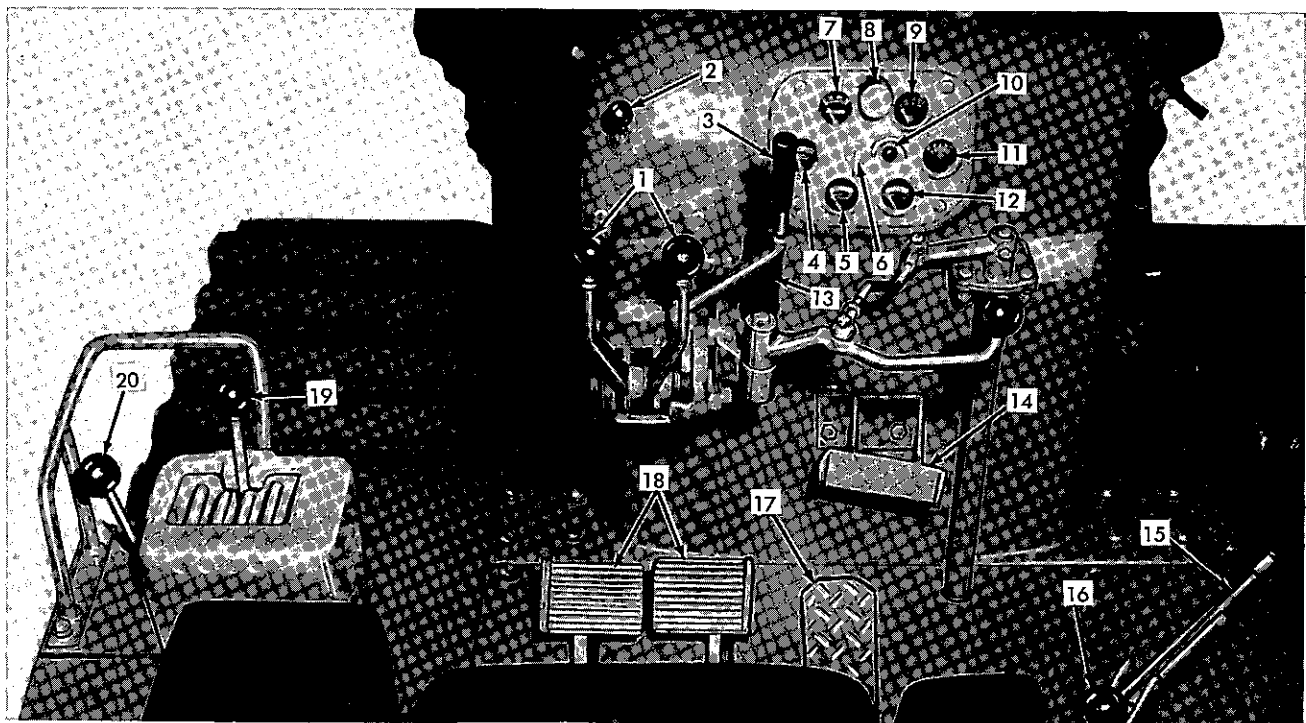
If any gauge (Fig. 23) does not indicate a proper reading within a few minutes after engine has been started (except engine temperature gauge), the engine must be stopped immediately and the cause determined and corrected.

ENGINE TEMPERATURE GAUGE. This gauge indicates engine coolant operating temperature. The coolant operating temperature should be within "Operating Range" on gauge.

FUEL PRESSURE GAUGE. This gauge indicates the pressure of which fuel is circulated through the low pressure fuel system. Under normal conditions, with engine operating at full governed speed and full load the fuel pressure should be between 8 to 30 psi.

ENGINE OIL PRESSURE GAUGE. This gauge indicates the pressure at which engine lubricating oil is circulated through the engine. At full throttle the oil pressure should be between 30 and 55 psi at normal engine operating temperature.

TRANSMISSION LUBRICATING OIL PRESSURE GAUGE. This gauge indicates pressure of oil supplied



- | | | |
|---------------------------------------|--------------------------------------|--|
| 1. Steering levers | 7. Fuel pressure gauge | 14. Foot rest |
| 2. Engine shut-off knob | 8. Instrument light | 15. Parking brake hand lever |
| 3. Engine governor hand control lever | 9. Engine oil pressure gauge | 16. Travel speed governor hand control lever |
| 4. Engine temperature gauge | 10. Starter switch button | 17. Decelerator pedal |
| 5. Transmission oil pressure gauge | 11. Ammeter | 18. Brake pedals |
| 6. Light switch | 12. Transmission lube pressure gauge | 19. Range selector lever |
| | 13. Air cleaner indicator | 20. Safety lever |

Fig. 23 Operating Controls and Instruments
(T-40439)

to lubricate the transmission. With engine running and oil at normal operating temperature, pressure should be within "Operating Range" on gauge.

TRANSMISSION OIL PRESSURE GAUGE. This gauge indicates pressure of the oil supplied to engage the hydraulically actuated clutch packs in the transmission. With the engine running and oil at normal operating temperature, pressure should be within "Operating Range" on gauge.

AIR CLEANER FILTER SERVICE INDICATOR. The red indicator will gradually rise until it reaches the top and locks in position. The air cleaner filter element must then be replaced immediately. Reset indicator after changing element.

AMMETER. The ammeter indicates charging rate of the generator. When batteries are in a discharged condition, the ammeter should indicate a good rate of charge until batteries approach a fully charged condition. When batteries are fully charged, the ammeter will indicate nearly zero except for a short time after starter has been in use.

ENGINE HOUR METER. The engine hour meter (Fig. 24), installed as special equipment, is a direct reading type. The meter records up to 10,000 hours and repeats. The four figures of the hours are read directly. The red figures indicate 10ths of an hour. The small indicator (upper left) visibly turns when meter is recording.

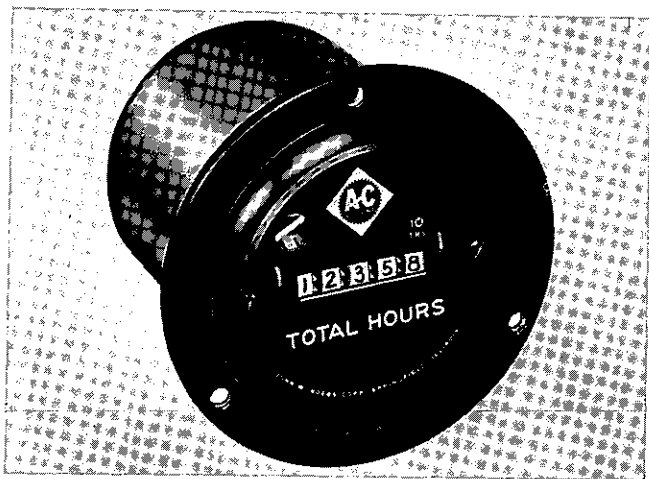


Fig. 24 Engine Hour Meter (Reading - 1235.8 Hours)
(T-35027)

B. OPERATING CONTROLS

CAUTION

If while operating the unit, any control does not function properly the cause must be determined and corrected immediately.

ENGINE FUEL SHUT-OFF KNOB. The engine fuel shut-off knob is provided to actuate the fuel shut-off lever of the fuel injection pump. When engine is to

be started, lift up on knob and allow shut-off rod to move forward to RUN position. To stop engine, pull shut-off knob all the way back and lock.

On tractors equipped with ground speed governor, the shut-off knob has three positions; START (forward position); RUN (middle position); and STOP (rear position).

STARTER SWITCH BUTTON. Before using starter switch button to actuate the starter, the transmission speed range selector lever **MUST** be in NEUTRAL-START position and the safety lock lever must be locked in its forward position. This is necessary to complete the starter switch circuit. Push on starter button to actuate starter solenoid and engage starter pinion with flywheel ring gear.

SPEED RANGE SELECTOR LEVER. The transmission speed range clutches and engine clutch are engaged by a single common lever, (speed range selector lever). Move the lever to left or right to engage the desired speed range transmission clutch pack. Pull lever back (to rear) to engage modulated engine clutch and place tractor in motion.

NOTE

Move speed range selector lever to "Power Take-Off" position (P.T.O.) to engage modulated engine clutch only (no tractor motion) for operating rear mounted equipment from transmission top shaft.

SAFETY LOCK LEVER. This lever locks the speed range selector lever in NEUTRAL-START position, to prevent speed range selector from accidentally being engaged and also to complete the starter switch circuit when starting engine.

STEERING LEVERS. The steering levers, located directly in front of operator, are provided to control the two steering clutches, which connect transmission and bevel gear with the final drive gears and track drive sprockets. These levers are used to steer the tractor by actuating valve plungers in the steering hydraulic control valve assembly. The action of these valve plungers hydraulically disengages the right or left steering clutch. Pull right-hand lever all the way back to make a right turn; pull left-hand steering lever all the way back to make a left turn (refer to "OPERATING INSTRUCTIONS" for detailed information).

THROTTLE OPERATING HAND LEVER. The throttle operating hand lever is connected by linkage to speed control lever of engine governor. The engine will run at low idle speed with throttle operating hand lever all the way forward; pull lever back to increase engine speed as desired.

NOTE

On tractors equipped with TRAVEL SPEED GOVERNOR (Special Equipment) a travel speed

governor hand operating lever is provided for use in conjunction with throttle operating hand lever to control engine and travel speeds of the tractor. Refer to "OPERATING INSTRUCTIONS" for detailed information.

DECELERATOR PEDAL. The decelerator pedal is used in conjunction with throttle operating hand lever to regulate engine speed. Depress toe end of pedal to reduce engine speed; release pedal to return engine speed to where throttle operating hand lever is positioned.

NOTE

On tractor equipped with TRAVEL SPEED GOVERNOR (Special Equipment) the operation of the decelerator pedal is identical; engine speed will be reduced when pedal is depressed and naturally travel speed will be reduced also. When decelerator pedal is released, engine and travel speeds will return to where throttle operating and travel speeds operating hand levers are positioned.

BRAKE PEDALS - The brake pedals are used to retard the speed or to facilitate turning the tractor. To turn tractor to right, fully disengage right steering clutch and press on right brake pedal; to turn tractor to left, fully disengage left steering clutch and press on left brake pedal. After desired turn has been made, release brake and return steering lever to its forward position.

CAUTION

As tractor is equipped with power brakes, engine must be running to obtain maximum effective braking.

PARKING BRAKE HAND LEVER. A parking brake hand lever is provided to apply and hold the right brake in the applied position when tractor is to be parked. The parking brake may also be used in an emergency. To stop tractor in either of these cases, press down on both brake pedals and pull parking brake hand lever all the way back. To release brake lever, push forward on lever until it is all the way forward.

LIGHT SWITCH. Turn switch lever clockwise to turn on lights.

MASTER SWITCH. The electrical system master switch (Fig. 7) located in battery box, is provided for connecting or disconnecting the batteries. Pull handle of master switch and turn in direction of arrow to disconnect batteries from electrical system; turn handle until it is positioned level (with top of batteries) to connect electrical system. As a safety precaution, it is recommended that the master switch be used to disconnect batteries from electrical system at end of an operating period to prevent starter from being used to start engine.

CAUTION

To prevent possibility of body injury, always use master switch to disconnect the batteries before cleaning, repairing, disconnecting or connecting any of the heavy electrical cables.

OPERATING INSTRUCTIONS

Before starting engine and/or placing tractor in motion, make certain that tractor has been properly prepared for use and has been properly serviced since last operating period. Refer to "PREPARATION OF TRACTOR FOR USE" and "LUBRICATION AND SERVICE INSTRUCTIONS" for detailed information.

CAUTION

The fuel injection pump and governor, as set by the factory, permits operation of tractor at altitudes up to 8,000 feet above sea level.

Before operating tractor at 8,000 feet or more above sea level, it is absolutely necessary to reduce fuel input to the engine; contact your nearest authorized "Allis-Chalmers" Construction Machinery Dealer so he can make proper adjustments.

If repairs have been made since last operating period, be sure that all nuts and bolts affected by repairs have been tightened and the parts have been properly adjusted.

A. STARTING THE ENGINE

Proceed as follows to start engine:

1. Push speed range selector lever all the way forward and lock in NEUTRAL-START position with safety lock lever.
2. Turn electrical system master switch handle to "ON" position.

IMPORTANT

When starting a cold engine, make certain that engine fuel shut-off knob is pulled all the way back and locked (stop position) and crank engine with starter for 15 seconds. This will assure proper lubrication of engine components before engine is started.

3. Raise up on engine fuel shut-off knob and allow it to move forward to RUN position. On tractors equipped with travel speed governor, push fuel shut-off knob all the way forward to START position. Pull throttle operating hand lever back to about 1/4 throttle position. Press starter switch button to actuate starter. On tractors equipped with a travel speed governor, pull travel speed governor, operating hand lever back to about 1/2 speed position before pressing starter button.

CAUTION

If engine does not start within 30 seconds, allow starter to cool for 2 minutes before using again.

4. As soon as engine starts, release starter switch button and pull throttle operating hand lever back to about 1/2 throttle and allow engine to warm up. Leave speed range selector in NEUTRAL-START position during engine warm-up period. Observe all instruments for proper readings.

NOTE

On tractors equipped with travel speed governor, move fuel shut-off knob to RUN (middle) position.

5. In cold weather when it is necessary to use commercial type starting fluid contained in a pressurized can, as an aid in starting the engine, proceed as described in first 3 operations, then proceed as follows:

- a. Press on starter switch button to actuate starter, and at same time spray starting fluid into air cleaner, making certain that spray can is held far enough away from air cleaner so that the cleaner elements will not become saturated with fluid. Continue spraying until engine starts and runs smoothly.

IMPORTANT

When using commercial type starting fluid, always observe caution instructions printed on fluid container.

- b. As soon as engine starts, release starter button and allow engine to warm-up.
6. If engine will not start due to low batteries or inoperative starter, it is possible to start engine by pushing or towing the tractor if tractor is equipped with a ground driven (push-start) pump (special equipment). On tractors so equipped use the following procedure to start engine.
 - a. Move throttle operating hand lever to high idle position; move speed-range selector to 1st or 2nd REVERSE position.
 - b. Push or tow tractor REARWARD a short distance with engine fuel shut-off knob in OFF position to provide initial lubrication for engine parts.

CAUTION

If 1st reverse is used, the speed of push or towing must not exceed 3.0 mph; if 2nd reverse is used, the speed of pushing or towing must not exceed 6.1 mph. This will prevent over-speeding the engine while pushing or towing before engine starts.

- c. Move engine fuel shut-off knob forward to RUN position to start engine.
- d. When engine starts, move speed range selector to NEUTRAL-START position; move throttle operating hand lever to about 1/2 throttle position and allow engine to warm up.

CAUTION

A tractor not equipped with ground driven pump and with engine not running, should never be pushed or towed any further than necessary to load it on a suitable carrier, or to free it when stuck.

B. ENGINE IDLING

Prolonged engine idling causes the engine coolant operating temperature to fall below "Operating Range." Since starting the engine is readily accomplished with an electric starter, there should be no reason for prolonged engine idling. Stop engine when prolonged idling periods would occur. However, if it is necessary to keep engine running, it should be run at a speed fast enough to maintain normal oil and fuel pressures and with speed range selector lever in NEUTRAL-START position; lower front and rear mounted equipment to the ground.

C. STOPPING THE ENGINE

Push throttle operating hand lever, (and if so equipped) the travel speed governor operating hand lever all the way forward (low idle position) and move speed range selector lever to NEUTRAL-START position. Allow engine to idle for at least 5 minutes so that engine may cool gradually and uniformly, then pull engine fuel shut-off all the way back and lock to stop engine. Push safety lock lever all the way forward.

D. PLACING TRACTOR IN MOTION

1. Start engine and allow it to warm up.
2. The speed range selector lever has 4 positions (other than neutral and P.T.O.), providing 2 forward speed ranges and 2 reverse speed ranges. Cast letters and numbers on top of speed range selector lever housing identifies each speed range and direction of travel position. Pull safety lock-lever all the way back. Move speed range selector lever to the desired speed range and direction of travel. Moving speed range selector lever to the left (1st or 2nd reverse) or to the right (1st or 2nd forward) engages the transmission clutch pack of the desired range.
3. Pull the speed range selector lever to the rear to engage modulated engine clutch which will place tractor in motion.

NOTE

To operate power take-off (for rear mounted equipment) pull range selector lever into center position (P.T.O.). Modulated engine clutch will be engaged, but tractor will remain stationary.

CAUTION

For operator's safety, it is advisable to decelerate engine and bring tractor to a complete stop when reversing direction of travel.

4. Pull throttle operating hand lever back to increase engine speed and obtain the desired tractor travel speed (which will vary with load conditions).

Tractors equipped with travel speed governor (Special Equipment) can be operated by means of either the engine governor (throttle operating hand lever), or by the travel speed governor.

When tractor is controlled by engine governor, engine speed remains constant and travel speed varies with load conditions. When tractor is controlled by travel speed governor, travel speed remains constant and engine speed automatically adjusts to load conditions.

Each governor is controlled with a separate lever. However, the levers work in conjunction to control the tractor, therefore BOTH levers must be properly positioned to obtain desired engine speed or travel speed. Depending on type of control desired, position control levers as follows:

- a. To operate tractor at a fixed engine speed: Move travel speed governor hand lever all the way back, then regulate engine speed with throttle operating hand lever.
- b. To operate at a fixed travel speed: Pull throttle operating hand lever back to high idle position and move travel speed governor hand lever back until desired tractor travel speed is obtained.
- c. To decelerate engine speed (in either case) without disturbing position of either hand lever, depress decelerator pedal. When decelerator pedal is released, engine speed will return to respective hand lever settings.

NOTE

Travel speed governor does not over-ride the engine governor.

E. SELECTION OF PROPER SPEED RANGE

Since, in any speed range, it is possible to travel at any speed up to the maximum speed of that range, selection of proper speed range for any particular job or working condition is influenced by several factors:

1. Difficult or rough terrain may require that the maximum speed of tractor be restricted to a speed safe for both the operator and tractor. Also, some jobs such as bulldozing can best be accomplished at relatively slow tractor speeds. Use of low range (1) will not allow tractor to exceed a maximum of 3.4 mph (forward) or 3.0 mph (reverse) even though throttle operating hand lever (and travel speed operating lever on tractors so equipped) is in full speed position.
2. Where the preceding factors have no influence or need not be considered because of operating conditions, the governing factor in selecting the proper speed range is the speed at which tractor can move the load. In general, the speed range should be used which will give fastest travel speed.
3. When tracks stall, the output shaft of torque converter is stationary.

Stall periods, or operation near stall point of torque converter, should be avoided except for very short periods to prevent excessive heating of torque converter fluid. Remember, with torque converter, it is no longer possible to estimate the load on tractor by lugging of the engine; selection of proper speed depends on speed range which allows tractor to work at its maximum efficiency. The operator will quickly acquire the experience necessary to select the proper speed range to allow tractor to work at its full capacity.

F. STEERING THE TRACTOR

The tractor is steered by disengaging the steering clutch on side of tractor toward which turn is to be made. This is done by using the steering levers located directly in front of operator. To make a right turn, pull back right hand steering lever; to make a left turn, pull back left hand steering lever. If a short turn is to be made, pull steering lever back on side toward which turn is to be made and press down on corresponding brake pedal; this will stop that track completely. Always pull steering lever all the way back when turning. When tractor has turned as desired, release brake pedal and return steering lever immediately to its forward position.

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

G. STOPPING THE TRACTOR

To stop tractor: Move speed range selector lever to NEUTRAL-START position and push safety lock lever all the way forward.

Push throttle operating hand lever (and travel speed

governor operating hand lever, on tractors so equipped) all the way forward (low idle speed position) and apply the brakes.

CAUTION

As tractor is equipped with power brakes, engine must be running to obtain maximum effective braking.

Allow engine to idle at least 5 minutes so that engine may cool gradually and uniformly, then pull fuel shut-off knob all the way back and lock to stop engine.

If tractor is parked on a grade where there is a possibility of its rolling, lock right brake pedal in applied position by use of the parking brake hand lever.

NOTE

When stopping tractor at end of an operating period, it is a good practice to disconnect batteries from electrical system by means of electrical system master switch to prevent starting of engine while tractor is parked.

H. COLD WEATHER OPERATION

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

If mud or snow collects on tracks during the operating period and is allowed to freeze solid while tractor is idle, or if tracks freeze solidly to ground, apply heat to loosen frozen material or tracks. Serious damage will be caused by an attempt to break tractor loose under engine power, or by moving tractor with large frozen lumps of material in tracks. In freezing weather it is good practice to park tractor on planks or logs so tracks will not freeze solidly to ground.

When operating tractor in extremely cold weather, always allow engine to operate at approximately 1/2 throttle for 10 to 15 minutes to allow oil in engine clutch, torque converter, and transmission; steering clutches, brakes, and bevel gear system; to circulate and warm up before applying load to the systems.

NOTE

Speed range selector lever should be locked in NEUTRAL-START position, brake pedals in RELEASE (up) position, and steering levers in NEUTRAL (up) position during warm-up period.

In winter weather, use a permanent type (glycol base) anti-freeze solution in cooling system to protect against damage from freezing. This type of anti-freeze has a much higher boiling point than water. After any addition of water or anti-freeze compound, test the solution after the added quantity has become thoroughly mixed to make sure it will withstand the prevailing or anticipated temperature.

IMPORTANT

The quantity of anti-freeze to be added to the cooling system to provide adequate protection must be in accordance with the manufacturer's directions.

WARNING

Never use canvas side covers or engine side plates that may restrict the flow of air to the air cleaner intake; such restrictions may cause heat to be inhaled through the aspirator and destroy the element, resulting in serious damage to the engine.

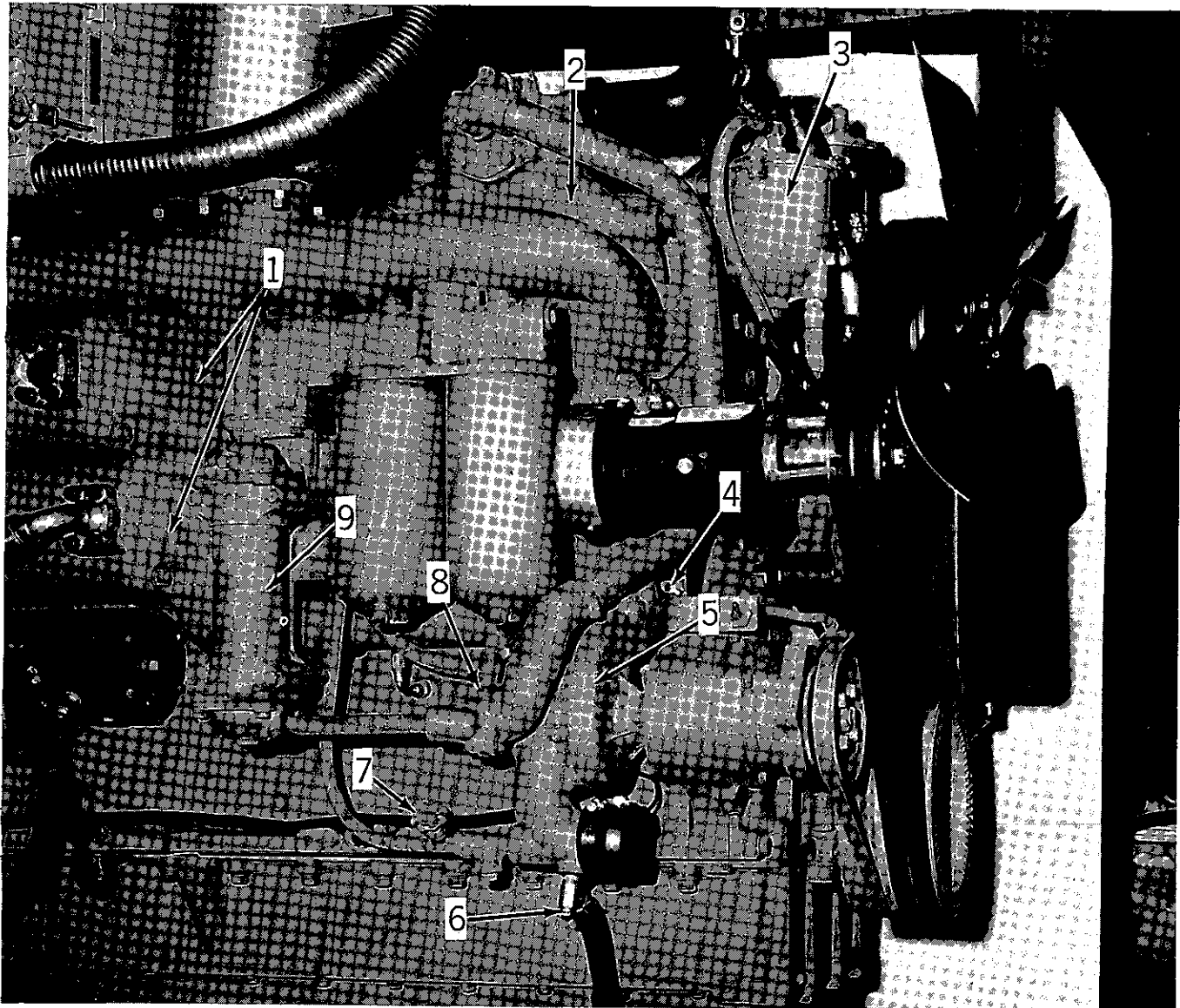
ENGINE COOLING SYSTEM

A. DESCRIPTION

The engine cooling system includes the water pump; radiator; engine oil cooler; 2 heat exchangers for engine clutch, torque converter and transmission hydraulic system; water inlet manifold; thermostats; water outlet manifold; engine temperature gauge; cooling fan; water passages in cylinder block and cylinder heads, and the cooling system filter.

The thermostats, located in engine water outlet front manifold, operate automatically to maintain a minimum coolant operating temperature of approximately 180°F.

The engine cooling system is a pressure type system; therefore, it is necessary to keep radiator cap turned on tightly.



1. Engine clutch, torque converter and transmission system heat exchangers
2. Water outlet manifold
3. Cooling system filter
4. Cylinder block drain cock
5. Water pump

6. Cooling system drain cock
7. Cooling system filter outlet shut-off valve
8. Cooling system filter inlet shut-off valve
9. Engine lubricating oil cooler

Fig. 25 Cooling System (General View)
(T-70876)

CAUTION

Do not remove pressure type radiator cap while coolant temperature gauge indicates a temperature in upper portion of "Operating Range" or above, as the coolant will break into a boil and may cause injury to person removing cap.

B. GENERAL MAINTENANCE

Keep radiator air passages free from leaves, trash, and other material which will restrict flow of air through radiator. Keep all hose clamps tight. All leaks in cooling system must be corrected as soon as they are evident. The fan and generator drive belts and water pump drive must be kept properly adjusted.

C. COOLING SYSTEM FILTER

The replaceable, element-type cooling system filter mounted on front of engine (Fig. 25), is connected to engine cooling system with by-pass hose connections. Coolant from outlet side of water pump passes through filter and is returned to suction side of water pump. Purpose of the filter is to extend engine life by establishing and maintaining a cooling system free of rust, scale or corrosion.

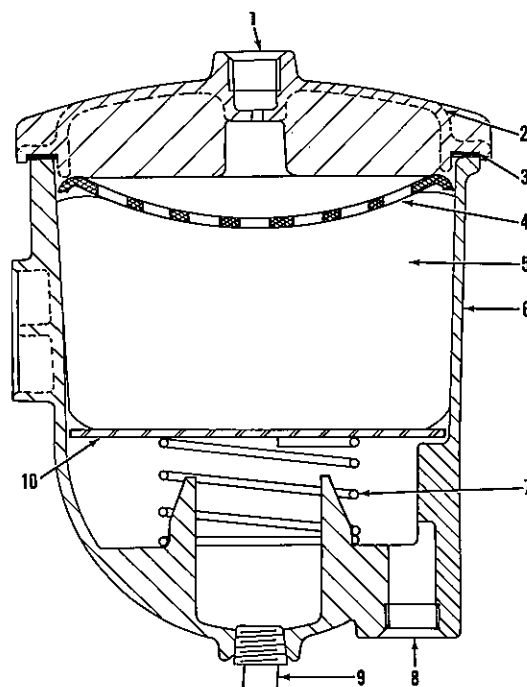
The filter contains a replaceable type, chemically activated element which performs the following functions:

1. **MECHANICAL FILTRATION** - Dirt and foreign matter suspended in coolant is trapped by the filtering medium of the element and prevented from circulating through cooling system. This action assists in keeping radiator tubes and water passages free of sludge and dirt, and also reduces wear on water pump components.
2. **ACID-ALKALI LEVEL** - Buffering agents, contained in the element, conditions coolant to meet the most desirable acid-alkali level. This reduces rust formation and corrosion of metal surfaces of cooling system.
3. **WATER SOFTENING** - An ion exchange resin, contained in the element, removes water hardness components from the coolant. This prevents formation of scale on metal surface within cooling system. As the demineralized coolant is circulated through the system, any existing scale present in system is gradually dissolved and subsequently removed by softening action of the resin.
4. **INHIBITION** - A combination of chemical inhibitors, contained in the element, provide a protective film on entire cooling system inside surfaces.
5. **ELECTROLYTIC CONTROL** - A replaceable type lower corrosion resistor plate (Fig. 26) is provided in filter body to control electrolytic action.

Control of electrolytic action prevents pitting of metal tubes and walls within cooling system.

The cooling system filter element should be changed after each 400 hours of operation, or more often, depending upon amount of coolant added to cooling system during this operating period.

Each time filter element is replaced, the lower corrosion resistor plate (Fig. 26) should be inspected and buffed to a bright finish with a wire brush or wheel. When plate becomes thin and pliable, or develops large jagged holes, it **MUST** be replaced.



- | | |
|------------------|------------------------------------|
| 1. Filter outlet | 7. Spring |
| 2. Cover | 8. Filter inlet |
| 3. Gasket | 9. Drain plug |
| 4. Upper plate | 10. Lower corrosion resistor plate |
| 5. Element | |
| 6. Body | |

Fig. 26 Cooling System Filter (Sectional View)
(T-33141)

NOTE

On units shipped from the factory, the cooling system filter contains a Borate type filter element which is suitable for use in cooling systems containing a permanent type anti-freeze or plain water. However, for most ef-

ficient results, when only plain water is used in cooling system, it is recommended that the Borate type element be replaced by a chromate type element (contact your "Allis-Chalmers" Dealer).

6. REPLACE COOLING SYSTEM FILTER ELEMENT

Thoroughly clean filter body and surrounding area and proceed as follows:

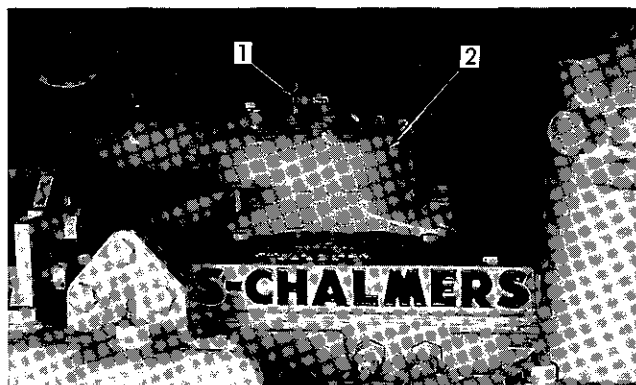
- a. Close inlet and outlet shut-off valves (Fig. 25).
- b. Remove drain plug from bottom of filter body and allow coolant to drain. Install drain plug and tighten securely.
- c. Disconnect outlet line from fitting in top of filter cover. Remove capscrews attaching filter cover to filter body and remove cover.
- d. Lift upper plate and filter element (Fig. 26) out of filter body. Discard old filter element. Remove lower corrosion resistor plate and spring from filter body.
- e. Inspect and clean lower corrosion resistor plate. Refer to Fig. 26 and install spring and lower corrosion resistor plate in filter body.
- f. Install new filter element in filter body. Refer to Fig. 26 and install upper plate in filter body.
- g. Make certain gasket is in good condition, then install filter cover and secure with attaching capscrews. Connect outlet line (Fig. 25) to fitting in top of filter cover. Open inlet and outlet shut-off valves.
- h. Operate engine until normal operating temperature has been reached. Remove radiator cap and check level of coolant. Add coolant if necessary.
- i. Check cooling system for leaks and correct any leaks found.

D. DRAINING COOLING SYSTEM

IMPORTANT

Make certain tractor is parked on level ground to assure complete draining.

Remove radiator filler cap. Remove front access cover from bottom of crankcase guard (if so equipped); then reaching through opening in crankcase guard, open cooling system drain cock; also open cylinder block drain cock (Fig. 25) located on right-hand side of engine. Open vent cock located in thermostat housing (Fig. 27).



1. Vent cock 2. Thermostat housing

Fig. 27 Thermostat Housing Vent Cock Location (T-70840)

CAUTION

When draining cooling system in freezing weather, make certain coolant flows freely from both drain cocks and that system drains completely.

E. FILLING COOLING SYSTEM

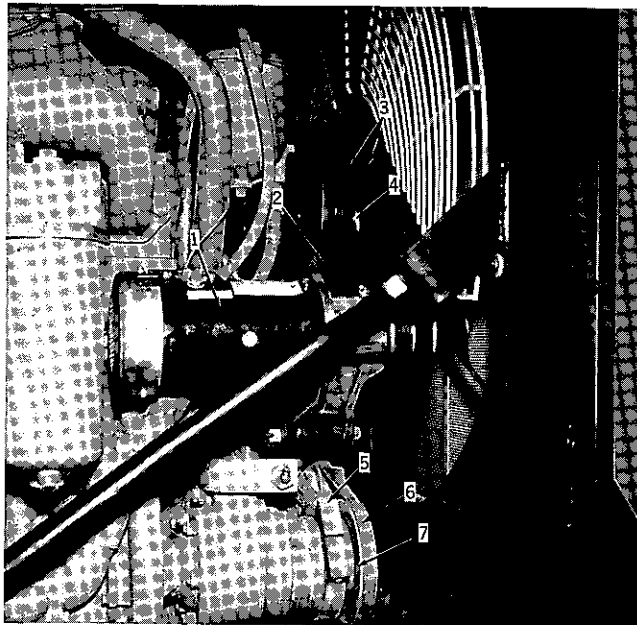
Close the two drain cocks which were opened to drain system. Install access in bottom of crankcase guard. Fill cooling system through radiator filler until coolant flows from vent cock in thermostat housing (Fig. 27). Close vent cock and complete the filling until coolant level is approximately 1-1/2 inches below bottom of radiator filler tube. Install radiator cap.

F. FAN AND GENERATOR DRIVE BELTS ADJUSTMENT

The fan and generator drive belts are properly adjusted where straight side of belts (left side) can be pressed inward (by hand) approximately 1 inch at a point half-way between the crankshaft and fan pulleys. To adjust belts, loosen generator adjusting arm capscrew (Fig. 28) and move generator in or out until proper tension on belts is obtained, then tighten adjusting arm capscrew.

G. WATER PUMP DRIVE BELT ADJUSTMENT

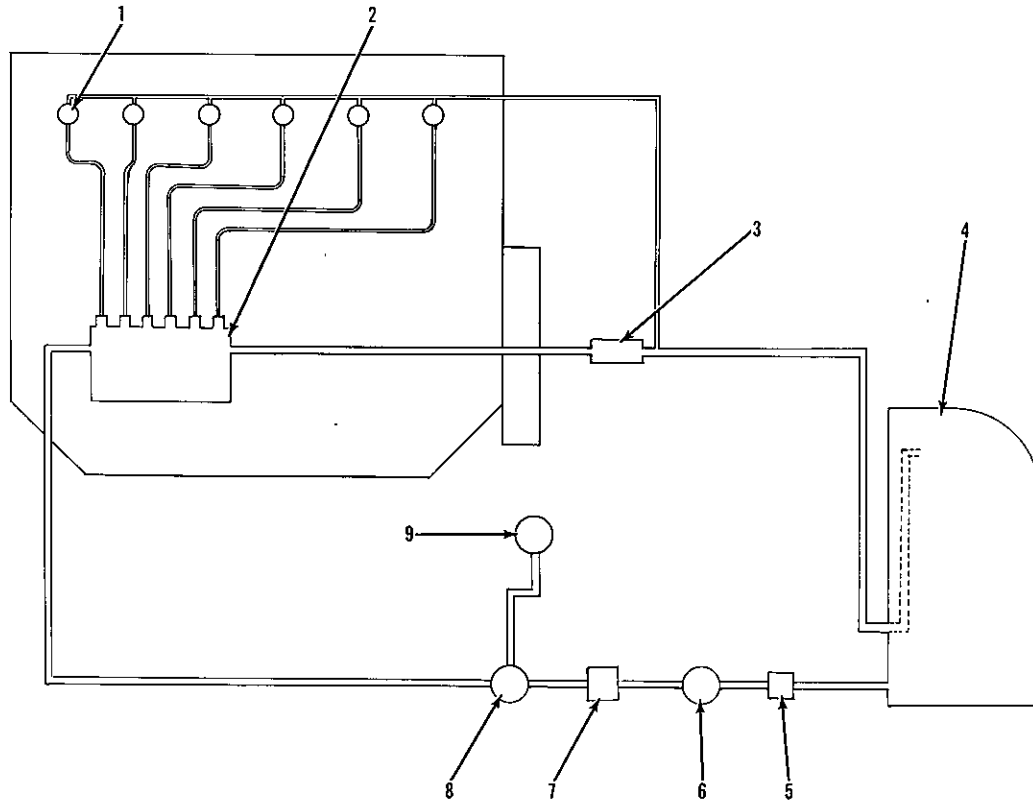
The water pump drive belt is properly adjusted when top side of belt, mid-way between water pump pulley and water pump idler pulley, can be depressed (by hand) 1/4". To adjust belt, loosen pump drive belt idler clamping capscrew (Fig. 28) and move idler upward as necessary to tighten belt, then tighten clamping capscrew (35 lbs. ft. max.) when proper tension on belt is obtained.



1. Generator
2. Adjusting arm capscrew
3. Fan drive belts
4. Generator adjusting arm
5. Pump drive belt idler clamping capscrew
6. Water pump drive belt
7. Pump pulley

Fig. 28 Fan, Water Pump and Generator Drive Belts Adjustment Locations
(T-70557)

FUEL SYSTEM



- | | | |
|--------------------------------------|-----------------------------|-----------------------------|
| 1. Fuel injection nozzle | 4. Fuel tank | 7. Fuel transfer pump |
| 2. Fuel injection pump | 5. Fuel tank shut-off valve | 8. Second stage fuel filter |
| 3. Fuel return pressure relief valve | 6. First stage fuel filter | 9. Fuel pressure gauge |

Fig. 29 Fuel Flow - Schematic
(T-37819)

A. DESCRIPTION

The engine fuel system, shown schematically (Fig. 29), consists of a fuel tank, first stage fuel filter, fuel transfer pump, second stage fuel filter, fuel injection pump, fuel injection nozzles, fuel return pressure relief valve, fuel pressure gauge, fuel tank shut-off valve and the necessary lines.

CAUTION

The fuel injection pump and governor, as set by the factory, permits operation of tractor at altitudes up to 8,000 feet above sea level.

Before operating tractor at 8,000 feet or more above sea level it is absolutely necessary to

reduce fuel input to the engine; contact your nearest authorized "Allis-Chalmers" Construction Machinery Dealer so he can make proper adjustments.

B. FUEL TANK AND DRAIN ELBOW

A drain elbow, located at bottom of fuel tank provides a means for draining tank when flushing and also acts as a sediment sump. Open drain cock (Fig. 10) in this elbow before engine is started at beginning of day's operation in warm weather or shortly after end of day's operation in freezing weather, and allow any water and sediment to drain; close drain cock when clean fuel runs out. Drain and flush fuel tank when a large accumulation of rust and scale is evident. To drain fuel tank, remove plug from drain elbow.

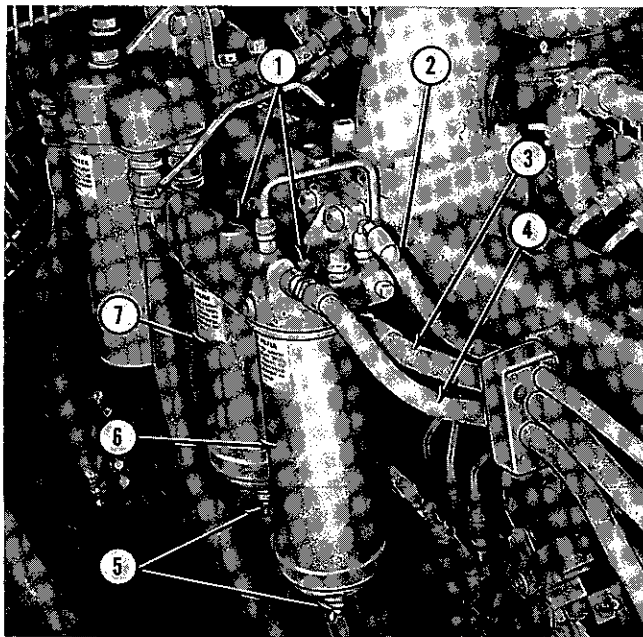
C. FIRST AND SECOND STAGE FUEL FILTERS

1. DESCRIPTION

The first and second stage fuel filter each contain a replaceable type element. Dirt and sediment is collected by first stage fuel filter and prevented from entering fuel transfer pump. Any dirt or sediment passing through first stage fuel filter and fuel transfer pump is collected by second stage fuel filter and prevented from entering fuel injection pump. A drain cock is provided in bottom of each fuel filter shell for draining any water or sediment collected.

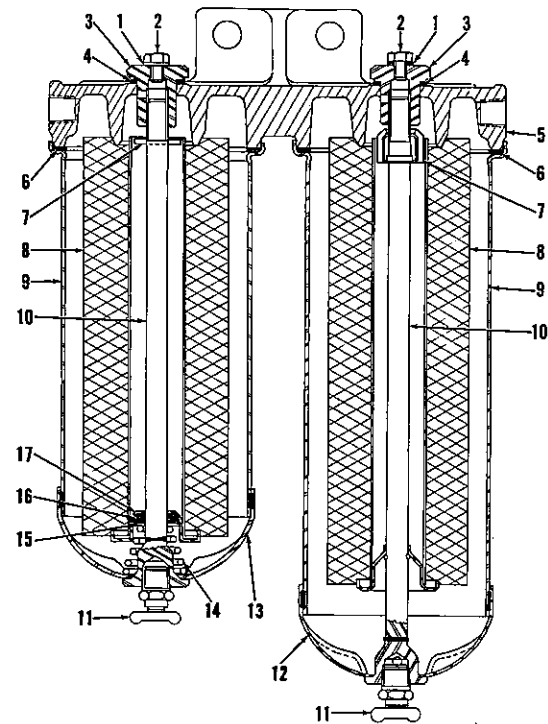
2. SERVICE

Open drain in bottom of each fuel filter shell daily, before start of day's operation in warm weather, or shortly after end of day's operation in freezing weather, and allow any water or sediment to drain. Close drain cocks as soon as clean fuel runs out. Remove and discard old filter element in each filter and install new elements after every 400 hours of operation (more often if conditions warrant) or when fuel filters become clogged and pressure drops to 8 pounds on fuel pressure gauge. Clogged filter elements are usually indicated by irregular engine performance.



1. Vent plug
2. Fuel pressure gauge hose
3. Tank-to-filter supply hose
4. Fuel return manifold-to-tank hose
5. Drain cocks
6. First stage fuel filter
7. Second stage fuel filter

Fig. 30 First and Second Stage Fuel Filter Location (T-37841)



- | | |
|-----------------------------|------------------------------|
| 1. Vent screw gasket | 10. Center-bolt |
| 2. Vent screw | 11. Drain cock |
| 3. Hex-retaining nut gasket | 12. First stage fuel filter |
| 4. Retaining nut gasket | 13. Second stage fuel filter |
| 5. Filter head | 14. Spring |
| 6. Shell gasket | 15. Metal washer |
| 7. Centering guide | 16. Seating plate gasket |
| 8. Element | 17. Seat plate |
| 9. Shell | |

Fig. 31 First and Second Stage Fuel Filter Assemblies (T-23014)

3. REPLACEMENT OF FIRST STAGE FUEL FILTER ELEMENT (Fig. 31)

NOTE

The first stage fuel filter does not contain an element when tractor is equipped with Heavy-Duty Fuel Filter (Special Equipment).

- a. Close fuel tank shut-off valve. Clean all dirt from around filter head and shell. Loosen vent screw in top of shell retaining nut and drain cock in bottom of filter shell: Allow fuel to drain.
- b. Loosen shell retaining nut in filter head until it is free from shell center-bolt; remove filter shell from filter head.

- c. Remove and discard filter element and shell gasket. Thoroughly wash and dry interior of filter shell.
- d. Install new filter element and push it down firmly so that up-turned edge of seat plate (attached to bottom of shell center-bolt) is firmly impressed into bottom of filter element.
- e. Install new gasket in lip of filter shell. Hold filter shell in position under filter head and engage threads of shell retaining nut with shell center-bolt; tighten retaining nut securely.
- f. Close filter drain cock. Open fuel tank shut-off valve and allow filter to fill with fuel by gravity. Tighten filter vent screw when fuel (free of bubbles) flows from around vent screw.

4. REPLACEMENT OF SECOND STAGE FUEL FILTER ELEMENT (Fig. 31)

- a. Thoroughly clean fuel filter head and surrounding area. Loosen vent screw in shell retaining nut and drain cock in bottom of filter shell; allow fuel to drain.
- b. Loosen shell retaining nut in filter head until it is free from center-bolt; remove filter shell (with its components) from filter head.
- c. Remove and discard filter element. Remove centering guide, element seating plate, seating plate gasket, metal washer, and element spring from shell center-bolt. Discard seating plate gasket, metal washer, and shell gasket.
- d. Thoroughly wash and dry interior of filter shell. Close and tighten drain cock located in bottom of filter shell.
- e. Place element spring (large end down-ward) on shell center-bolt and install a new metal washer over shell center-bolt and down onto the element spring.
- f. Install a new seating plate gasket in position in element seating plate then install gasket and element seating plate on shell center-bolt.

NOTE

Install element seating plate on shell center-bolt so that gasket contacts metal washer.

- g. Install centering guide in position on shell center-bolt, and install a new filter element in position in filter shell. Install new gasket in lip of filter shell.
- h. Fill filter shell with CLEAN fuel. Hold filter shell in position under filter head, install shell retaining nut and retaining nut gasket, and tighten retaining nut securely.
- i. Crank engine with starter until a full stream of fuel (free of bubbles) flows from around the

loosened vent screw; tighten vent screw while continuing to crank engine.

- j. Start engine, observe for fuel leaks, and correct any leaks found.

D. HEAVY-DUTY FUEL FILTER (Special Equipment)

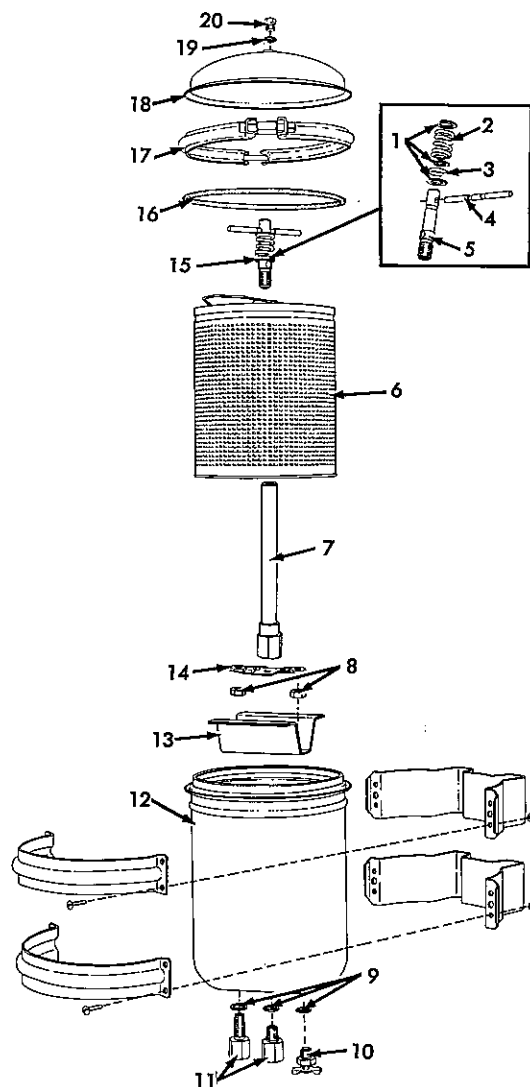
On tractors equipped with a Heavy-Duty fuel filter, service as follows: Open drain cock, located in bottom of fuel filter housing, before engine is started at beginning of day's operation in warm weather or shortly after end of day's operation in freezing weather, and allow water or sediment to drain. Close drain cock when clean fuel runs out. Remove and discard old filter element and install a new one after every 400 hours of operation, or when fuel pressure drops to 8 pounds on pressure gauge with engine running at high idle.

E. REPLACEMENT OF HEAVY-DUTY FUEL FILTER ELEMENT (Fig. 32)

1. Close fuel tank shut-off valve.
2. Open drain cock in bottom of fuel filter housing and allow fuel to drain. Remove cover clamp ring and lift cover from housing. Do not damage the cover O-ring gasket.
3. Unscrew T-handle hold-down assembly from shell center-tube and remove hold-down assembly. Remove filter element from housing by lifting with pull-out bail and discard filter element.
4. Thoroughly clean interior of fuel filter housing and close drain cock.
5. To assure leak-proof sealing, examine center-tube seat at each end of new filter element to see that seats are in good condition and clean. Insert new filter element into position in filter housing and press filter element down firmly.
6. Install T-handle hold-down assembly and tighten securely.
7. Install cover O-ring gasket and place cover in position on filter housing. Install cover clamp ring and tighten securely.
8. Fill fuel tank so that fuel level is high enough to fill fuel filter by gravity. Open fuel tank shut-off valve.
9. Loosen vent plug in filter cover and allow filter to fill with fuel by gravity. Tighten vent plug when fuel flows from around loosened vent plug.
10. Observe for fuel leaks at fuel filter cover, vent plug and drain cock. Correct any leaks found.

CAUTION

Use only the recommended filter element available through your authorized "Allis-Chalmers" Dealer.



- | | |
|-------------------|---------------------------------|
| 1. Washers | 11. Hollow bolts |
| 2. Spring | 12. Filter housing |
| 3. Seal | 13. Filter element support |
| 4. Handle | 14. Nut retainer |
| 5. Stud | 15. T-handle hold down assembly |
| 6. Filter element | 16. O-ring gasket |
| 7. Center tube | 17. Cover clamp ring assembly |
| 8. Nuts | 18. Cover |
| 9. Gaskets | 19. Washer |
| 10. Drain cock | 20. Vent plug |

Fig. 32 Heavy-Duty Fuel Filter Details
(T-28953)

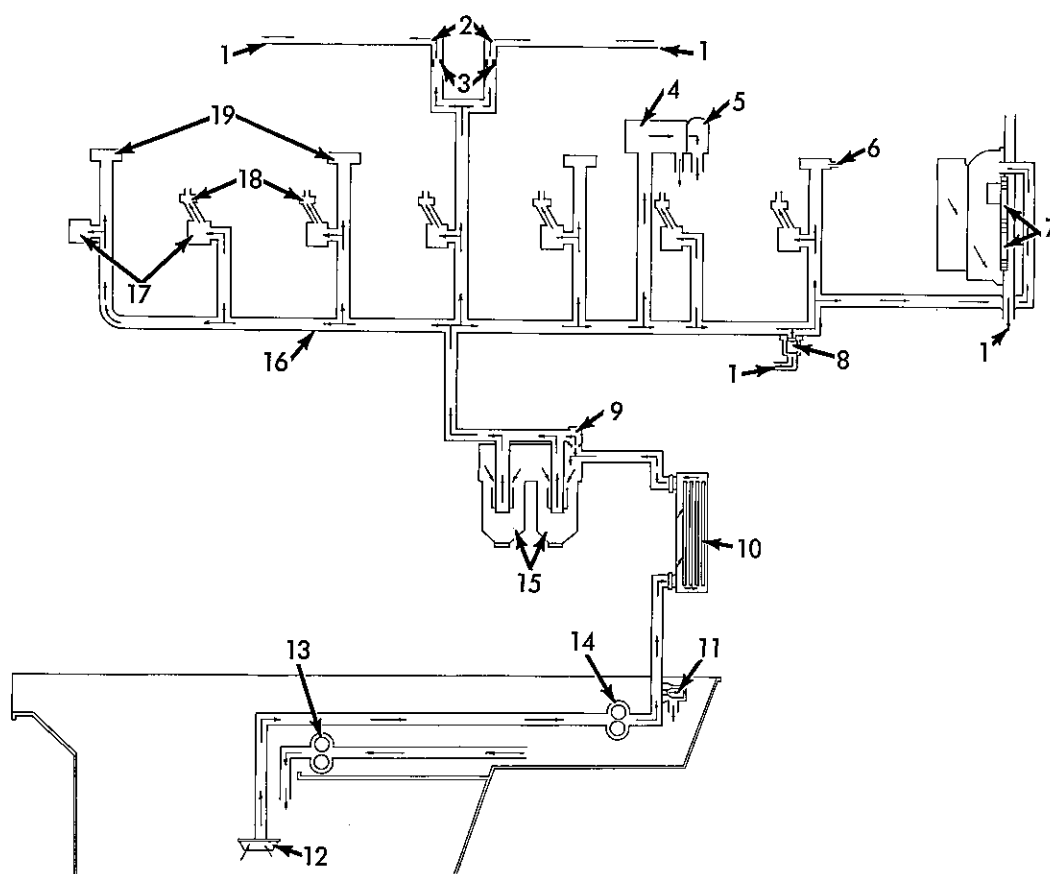
ENGINE LUBRICATION SYSTEM

A. DESCRIPTION

The engine is pressure lubricated throughout by a gear type lubricating oil pump, driven by the oil pump driving gear in mesh with crankshaft gear. A scavenging pump, driven from rear of lubricating oil pressure pump by a drive shaft, is also provided. The scavenging oil pump serves as a transfer pump, transferring

oil from front portion of oil pan to main oil sump in rear oil pan, keeping inlet end (suction screen) of lubricating oil pressure pump submerged at all times.

The engine lubricating oil filters, located on right side of engine, are the full-flow type and contain replaceable type elements. A drain plug in each filter body permits draining of filter when replacing filter ele-



- | | |
|---|---|
| 1. Returns to oil pan | 11. Lubricating oil pump pressure relief valve |
| 2. Valve rocker arm shafts | 12. Oil pump suction screen |
| 3. Orifice in rocker arm shaft (Located at Nos. 3 and 4 rocker arm bracket positions) | 13. Scavenging oil pump |
| 4. Fuel injection pump | 14. Lubricating oil pump (Pressure pump) |
| 5. Governor | 15. Lubricating oil filter |
| 6. To camshaft gear | 16. Main oil gallery |
| 7. Accessory drive gears | 17. Main bearings |
| 8. Pressure regulating valve | 18. Connecting rod bearings and to piston pins (Drains back to oil pan) |
| 9. Oil filter by-pass valve | 19. Camshaft bearings |
| 10. Engine oil cooler | |

Fig. 33 Engine Lubricating Oil Flow Schematic
(T-37840)

ments. New elements must be installed each time oil in crankcase is changed (after each 100 hours of operation) or more often if conditions warrant.

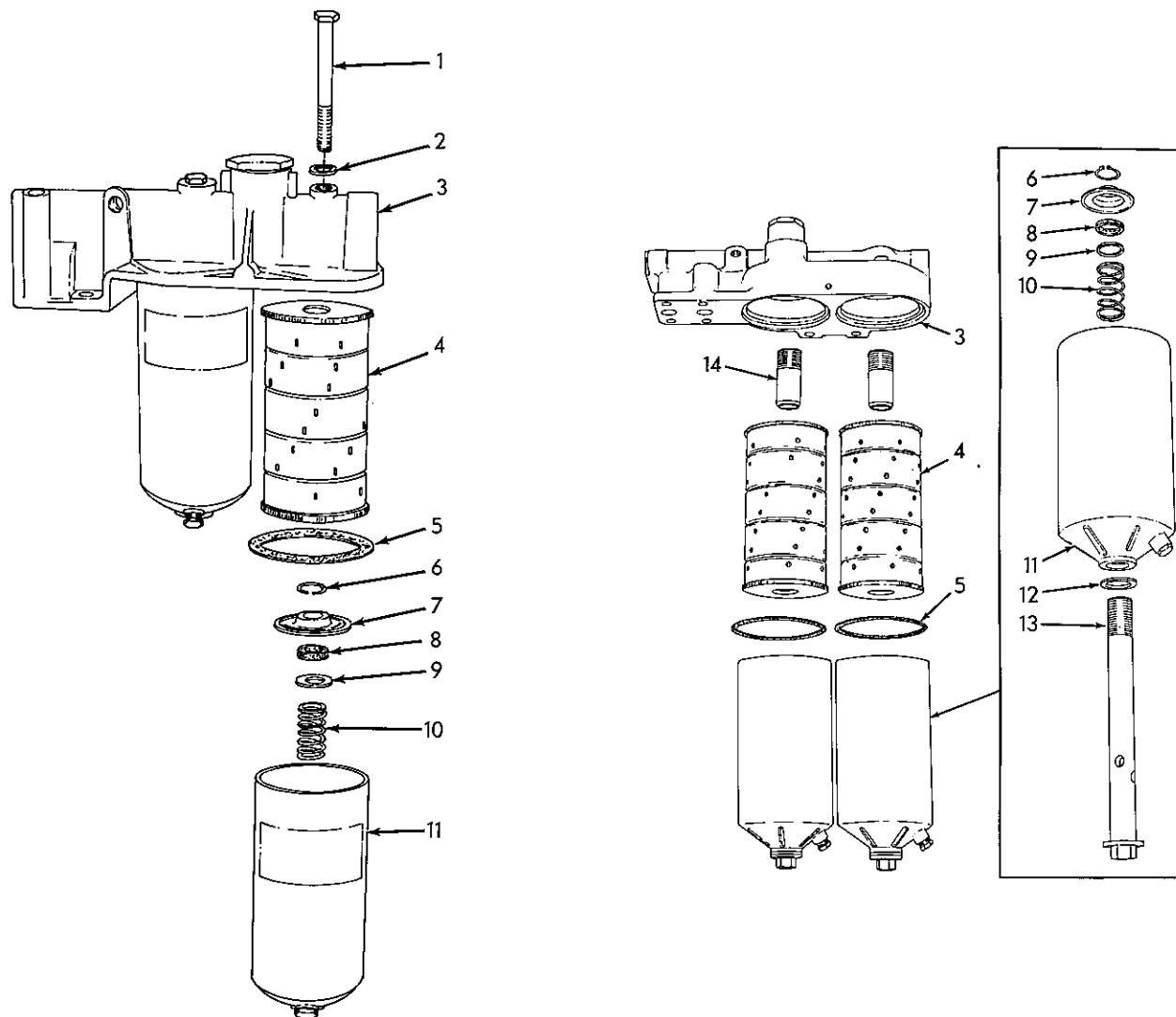
B. OIL CHANGE AND FILTER ELEMENT REPLACEMENT

The engine crankcase lubricant must be drained and refilled to proper level with specified lubricant and new elements installed in the engine lubricating oil filters after each 100 hours of operation, or more often if conditions warrant.

NOTE

The engine should be warm (operating temperature) when draining the lubricant.

1. Remove both drain access covers from bottom of crankcase guard (if so equipped).
2. Loosen and remove rear oil drain plug from engine oil pan and allow oil to drain. Loosen and remove front oil drain plug from engine oil pan and allow oil to drain.



1. Body retaining capscrew
2. Sealing washer
3. Filter head
4. Element
5. Gasket

6. Snap ring
7. Adaptor
8. Seal
9. Washer
10. Spring

11. Filter
12. Center-bolt gasket
13. Center-bolt
14. Center-bolt adaptors

Fig. 34 Lubricating Oil Filter Details
(T-70575 - T-70881)

handle hold-down assembly, is open. Install T-handle hold-down assembly and tighten securely.

CAUTION

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

6. Install cover O-ring gasket and place cover in position on filter housing. Install cover clamp ring and tighten securely.
7. Fill engine crankcase, through the crankcase oil filler pipe, with specified lubricant.
 - a. Make certain engine shut-off knob is pulled all the way back and locked (stop position); crank

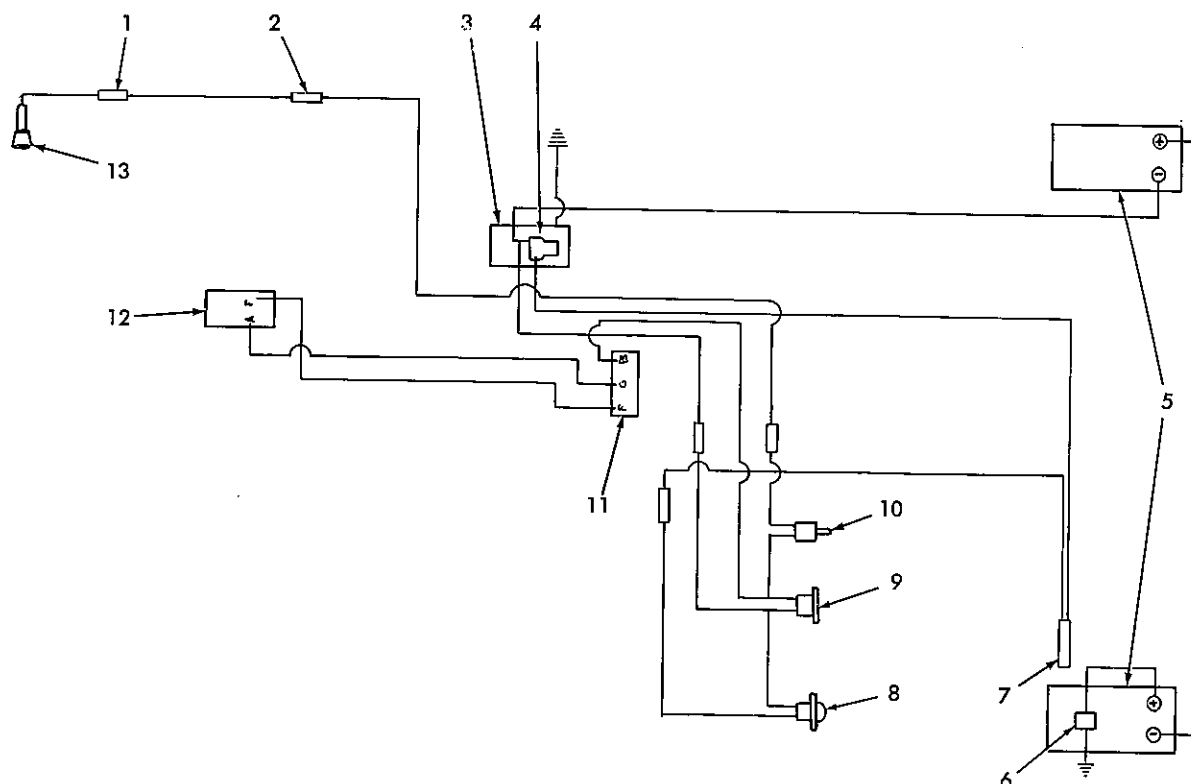
engine with the starter for 15 seconds. This will assure the filling of the filters and that lubricant has been pumped to engine components before engine is started. Pull throttle operating hand lever back so engine will run at about 1/4 speed. Start engine and operate it at this speed (1/4 throttle) for about 5 minutes.

- b. Stop engine and check oil level.
- c. Add oil as necessary to raise oil level to top of "Operating Range" on gauge rod.
- d. Observe filter for oil leaks; correct any leaks found.

CAUTION

Use only the recommended filter element available through your authorized "Allis-Chalmers" Dealer.

ELECTRICAL SYSTEM



- | | |
|--------------------------------------|--|
| 1. Connector | 8. Starter switch |
| 2. Fuse (20 - Amp.) | 9. Ammeter |
| 3. Starter | 10. Light switch |
| 4. Starter solenoid | 11. Generator regulator |
| 5. Battery (12 - Volt Each) | 12. Generator |
| 6. Master Switch (electrical system) | 13. Connector (for connecting headlight harness - Special equipment) |
| 7. Starter circuit safety switch | |

Fig. 36 Wiring Diagram
(T-70880)

A. DESCRIPTION

The electrical system, which includes the starter, starter safety switch, generator, generator regulator, ammeter, two batteries, master switch and wiring, is a 24-volt system throughout. Two 12-volt wet cell storage batteries, located in compartments at each side of operator's seat, are used to supply current for the system.

B. BATTERIES

Check level of electrolyte in batteries (one each side) after every 10-hours of operation or as often as operating conditions prove necessary. Maintain level of solution 3/8" above plates of batteries by addition of clean distilled water. Keep battery and cable terminals tight and clean.

CAUTION

To prevent possibility of bodily injury always turn electrical system master switch (Fig. 7) to off position before cleaning, repairing, disconnecting or connecting any of the heavy electrical cables.

If corrosion occurs, clean battery posts and terminals with a strong soda solution and coat terminals lightly with petroleum jelly before connecting them again. The petroleum jelly will prevent further corrosion.

When atmospheric temperature is below the freezing point, special attention should be given to hydrometer readings of the batteries. A specific gravity of 1.270 to 1.215 at 80°F. is considered satisfactory for continued

use. Specific gravity readings without correction for temperature are practically meaningless. For each 10 degrees that the temperature of electrolyte is above 80°F., add 4 points to hydrometer reading and for each 10 degrees below 90°F., subtract 4 points to get true specific gravity. For example, if hydrometer reading is 1.250 and electrolyte temperature is 20°F. (60° below 80°F.), 1.250 minus 24 points equals 1.226—the true specific gravity.

If corrected readings are below 1.215, batteries are not receiving sufficient charge. This might indicate generator or generator regulator requires attention. If these units prove satisfactory, inspect system for short circuits and for loose or corroded connections. In cold weather there is danger of batteries freezing if specific gravity is below 1.100. Batteries with a specific gravity of 1.100 will freeze at 18°F.; batteries with a specific gravity of 1.220 will freeze at 31° below zero F. During freezing weather, any addition of water to cells should be made after engine is started at beginning of an operating period to make certain that water and electrolyte solution will be thoroughly mixed; otherwise it may freeze. The filler caps must be kept tight at all times and tops of batteries kept clean and dry.

C. GENERATOR AND GENERATOR REGULATOR

The generator and generator regulator are set to keep batteries fully charged under normal conditions. The ammeter should indicate a good rate of charge for a short time after starting engine or until generator replaces energy drained from batteries during cranking; then it will show little or no charge. It is important that generator and generator regulator be maintained in good condition so batteries will be kept charged.

Testing and adjustment of generator and generator regulator should not be attempted without dependable testing equipment, therefore, it is recommended that these units be taken to a dependable electrical repair shop when service is required.

IMPORTANT

Whenever generator has been removed for repairs or replacement, or when generator regulator leads have been disconnected and reconnected, the generator must be polarized BEFORE engine is started. Polarizing causes current to flow in normal direction through the field coils and will prevent vibration, arcing, burning and sticking of regulator points.

Polarize the generator as follows:

1. Turn electrical system master switch to ON position.

2. Using a short jumper lead, momentarily touch jumper lead to "BAT." and "GEN." terminals of generator regulator.

CAUTION

Do not run or test generator on an open circuit. If it should become necessary to operate the generator without it being connected to the batteries, it should be short circuited. This can be done by disconnecting lead connected to "GEN" terminal of the regulator and connecting end of lead to a convenient ground.

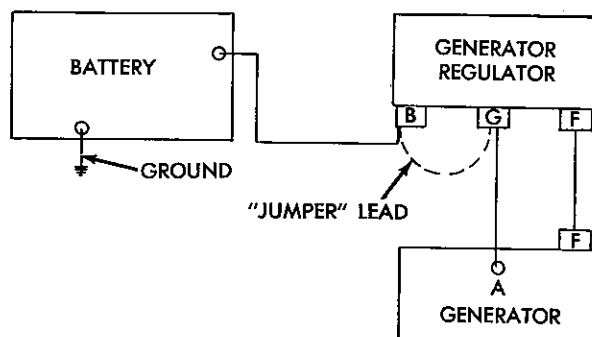


Fig. 37 Polarizing Circuit Schematic (T-18731)

D. FAN AND GENERATOR DRIVE BELTS ADJUSTMENT

The fan generator drive belts are properly adjusted when straight side of belts (left side) can be pressed inward (by hand) approximately 1 inch at a point halfway between crankshaft and fan pulleys. To adjust belts, loosen generator adjusting arm capscrew (Fig. 28) and move generator in or out until proper tension on belts is obtained; tighten adjusting arm capscrew.

E. ELECTRICAL CABLES

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

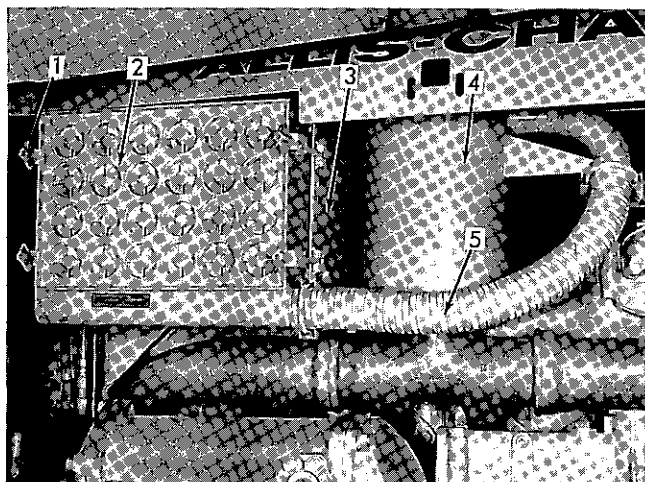
CAUTION

To prevent possibility of bodily injury, always turn electrical master switch (Fig. 7) to "OFF" position before cleaning, repairing, disconnecting or connecting any of the heavy electrical cables.

AIR CLEANER

A. DESCRIPTION

The purpose of the dry-type air cleaner (Fig. 38) is to remove dust and other foreign matter from air used by the engine. Life of the engine depends largely upon efficiency of the air cleaner. Fast wear on cylinder sleeves, pistons, and rings may result if the air cleaner is not kept in good condition and properly serviced.



- | | |
|------------------------|------------------------|
| 1. Wing nut | 5. Pre-cleaner-to- |
| 2. Pre-cleaner panel | aspirator suction line |
| 3. Air cleaner housing | (flex-hose) |
| 4. Aspirator | |

Fig. 38 Air Cleaner - Installed
(T-70841)

Air for the engine is drawn into air cleaner through openings in air pre-cleaner panel. Design of the air pre-cleaner panel imparts a rotary motion to the air as it enters air cleaner, causing heavier particles of dirt and foreign materials to drop to bottom of pre-cleaner compartment; these particles are then removed by a suction line and aspirator, (Fig. 38) connected to exhaust system expelling the particles with exhaust gases. Pre-cleaned air is then drawn through the filter element removing the fine dust, thus only clean air enters the engine cylinders.

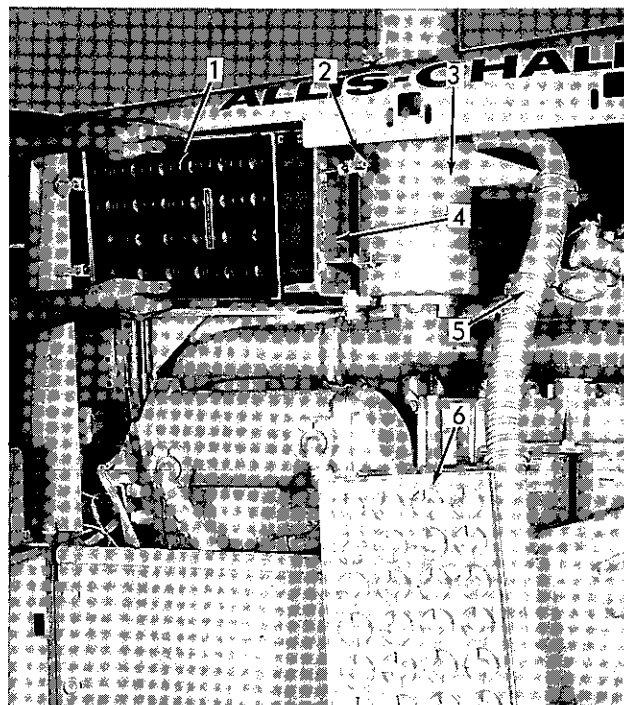
A damaged hose, loose hose clamp, damaged gasket or a leak of any kind that allows air to enter the engine cylinders without first passing through the air cleaner will defeat the purpose of the cleaner; therefore, extreme care should be taken to prevent leaks. Periodic inspection of above parts and of air cleaner housing for dents, cracks, etc., should be made frequently. If any of above mentioned conditions are found they MUST be corrected immediately.

B. AIR CLEANER SERVICE

CAUTION

It is extremely important that NOTHING be allowed to restrict the flow of air to air cleaner intake. Observe air cleaner intake frequently to be certain that no debris (large leaves, paper, etc.), canvas engine side covers, or other obstructions are plugging air intake openings. Such restrictions may cause heat to be inhaled through the aspirator and destroy the element, resulting in serious damage to the engine.

An air cleaner filter service indicator located on the cowl is used to indicate the condition of air cleaner element. When red indicator reaches the top and locks in position, the air cleaner filter element must be replaced immediately. Reset indicator (push button on bottom of indicator) after changing element. When new filter element is being installed, use care to prevent any damage to filter element, and make certain the filter element sealing flange is properly positioned before installing pre-cleaner panel.



- | |
|--|
| 1. Filter element |
| 2. Wing-nuts (panel attaching) |
| 3. Aspirator |
| 4. Air cleaner housing |
| 5. Pre-cleaner-to-aspirator suction line |
| 6. Pre-cleaner panel |

Fig. 39 Air Cleaner Service
(T-70843)

CAUTION

Do not attempt to clean filter element.

Replace air cleaner filter element (Fig. 39) as follows:

1. Loosen pre-cleaner panel attaching wing-nuts and clamps attaching pre-cleaner panel to housing; swing pre-cleaner panel aside.
2. Remove filter element from air cleaner housing and discard filter element.
3. Using a clean cloth, carefully clean interior of air cleaner housing.
4. Inspect new filter element for shipping or storage damage, then carefully install it in air cleaner

housing. Make certain sealing flange is properly seated.

5. Install pre-cleaner panel on housing and secure with clamps. Tighten attaching wing-nuts finger tight; tighten diagonally an additional 1-1/2 turns using pliers or wrench (5 lbs. ft. torque). Do not retighten at a later date (unless nuts are loose) or seal between element face and housing may be impaired.

CAUTION

Do not over-tighten!

6. Inspect air cleaner-to-intake manifold elbow hose, gasket, clamps, and fittings for looseness, damage, etc., and make any necessary repairs to prevent air leaks.
7. Reset air cleaner indicator by pushing button on bottom of indicator.

CYLINDER HEADS AND VALVES

A. CYLINDER HEADS

If cylinder heads are removed for any reason, the cylinder head capscrews must be tightened to specified torque evenly. Follow the numerical sequence illustrated in Fig. 40 when reinstalling cylinder heads.

New cylinder head gaskets must be used when heads are reinstalled.

The specified torque for cylinder head capscrews is:

5/8" capscrew = 180 to 185 lbs. ft.

3/4" capscrews = 260 to 275 lbs. ft.

B. VALVES

The correct clearance between the ends of the intake and exhaust valve stems and rocker arms is very important in a diesel engine due to high compression developed within the cylinders. Insufficient valve clearance will cause loss of compression, misfiring, and will eventually cause burning of valves and valve seats. Excessive valve clearance will result in faulty engine operation, valve tappet noise, and cause rapid wear on the valve operating mechanism.

With engine at normal operating temperature, specified valve clearance is .015" for intake valves and .020" for exhaust valves.

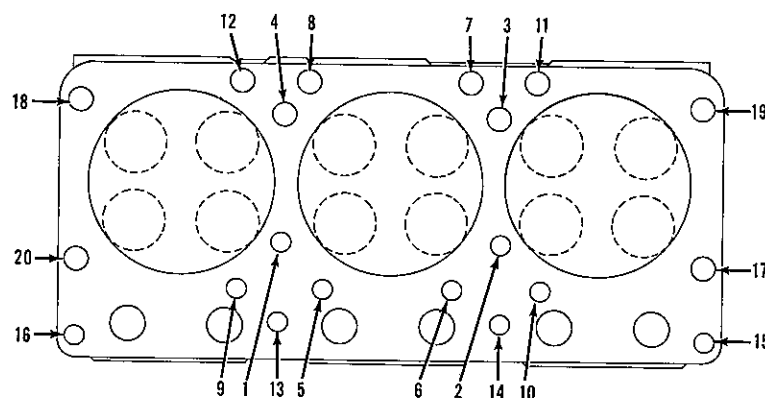
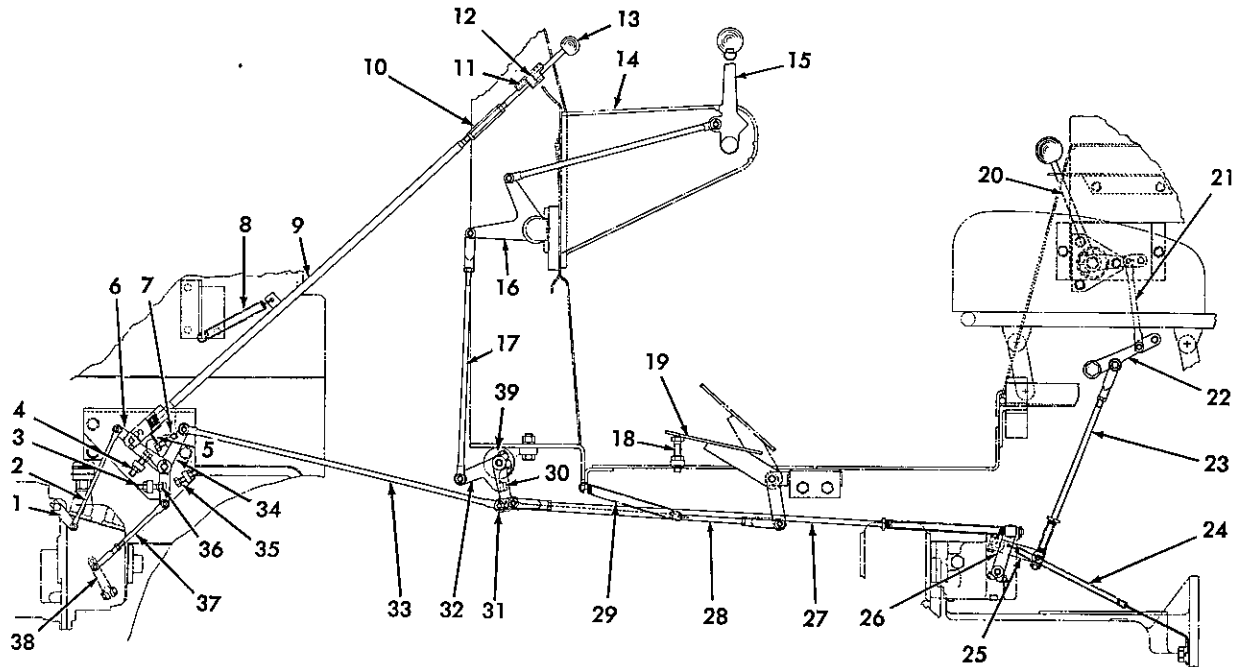


Fig. 40 Cylinder Head Torque Sequence
(T-70500)

ENGINE CONTROL LINKAGE



- | | |
|--|---|
| 1. Injection pump fuel shut-off lever | 22. Travel speed governor control rod pivot lever |
| 2. Engine shut-off front rod | 23. Travel speed governor lower control rod |
| 3. Low idle stop screw | 24. Travel speed governor control spring |
| 4. Run position stop screw | 25. Travel speed governor speed control lever |
| 5. Throttle advance plate | 26. Travel speed governor terminal shaft lever |
| 6. Shut-off lever | 27. Travel speed governor horizontal control rod |
| 7. Shut-off position stop screw | 28. Decelerator control rod |
| 8. Engine shut-off rod spring | 29. Decelerator control rod spring |
| 9. Engine shut-off rear rod | 30. Decelerator control rod lever |
| 10. Rear shut-off rod adjusting nut | 31. Intermediate control rod lever |
| 11. Engine shut-off rod lock sleeve | 32. Throttle lower lever |
| 12. Engine shut-off rod lock ring | 33. Intermediate control rod |
| 13. Engine shut-off knob | 34. Throttle pivot lever |
| 14. Throttle operating hand lever bracket | 35. High idle stop screw |
| 15. Throttle operating hand lever | 36. Pivot lever stop |
| 16. Throttle control bellcrank | 37. Throttle control front rod |
| 17. Vertical control rod | 38. Engine governor speed control lever |
| 18. Decelerator pedal stop screw | 39. Friction assembly |
| 19. Decelerator pedal | DIM. "A" - 1-1/16" |
| 20. Travel speed governor operating hand lever | DIM. "B" - 3/16" |
| 21. Travel speed governor upper control rod | DIM. "C" - 6-3/8" |

Fig. 41 Engine Control Linkage - Run Position (Includes Travel Speed Governor Linkage)
(T-37915)

A. DESCRIPTION

The engine fuel shut-off knob is connected by linkage to fuel shut-off lever of fuel injection pump. When shut-off knob is all the way forward, fuel shut-off lever is in RUN position. When shut-off knob is pulled

all the way back and locked, shut-off lever is in STOP position. Improper adjustment of engine shut-off linkage may result in loss of engine speed or power, failure of engine to start with shut-off knob in RUN position, or failure of engine to stop when shut-off knob is pulled back and locked in STOP position.

The throttle operating hand lever is connected by linkage to speed control lever of engine governor. Engine will run at low idle speed with throttle operating hand lever all the way forward; pull back on lever to increase engine speed as desired. Improper adjustment of throttle operating linkage may result in loss of engine speed.

A decelerator pedal is provided for use in conjunction with throttle operating hand lever to regulate engine speed. With engine operating at full speed (throttle operating hand lever all the way back) depress decelerator pedal with foot to slow engine to desired speed. Releasing of decelerator pedal allows engine speed to increase to speed where throttle operating hand lever is positioned. This pedal should be used for decelerating engine whenever minute engine speed control is desired.

CAUTION

The fuel injection pump and governor, as set by the factory, permits operation of tractor at altitudes up to 8,000 feet above sea level.

Before operating tractor at 8,000 feet or more above sea level, it is absolutely necessary to reduce fuel input to the engine; contact your nearest authorized "Allis-Chalmers" Construction Machinery Dealer so he can make proper adjustments.

The engine governor was adjusted at the factory to provide proper horsepower and full governed engine speed (under load) of 1750 rpm.

The specified low and high idle speeds are 500-600 rpm and 1840-1870 rpm respectively. Should an adjustment of the governor become necessary, contact your nearest authorized "Allis-Chalmers" Construction Machinery Dealer.

The engine speed should be checked with a stroboscopic type tachometer. Check engine speed at either the crankshaft pulley or fan drive pulley.

NOTE

Allow engine to warm-up to normal operating temperature before making rpm check.

On tractors equipped with "TRAVEL SPEED GOVERNOR" (Special Equipment) the shut-off knob has three positions: START, (all the way forward against spring pressure); RUN, (middle position); and STOP, (rear position). The shut-off may be locked in the START and STOP position.

The throttle operating hand lever and travel speed governor operating hand lever are used in conjunction to regulate engine speed. The engine will run at low idle speed with either hand lever pushed all the way forward. BOTH hand levers must be moved to the rear to increase engine speed.

The decelerator pedal will reduce engine speed without disturbing position of either hand lever. Depress toe end of decelerator pedal to reduce engine speed; when decelerator pedal is released, engine speed will return to respective hand lever settings.

B. ADJUSTMENT OF ENGINE SHUT-OFF CONTROL LINKAGE

If engine fuel shut-off control fails to operate properly, first make certain the condition is not due to binding in linkage or to a broken spring. Refer to Fig. 41 and adjust engine shut-off linkage as follows:

1. Loosen jam nuts on run position stop screw (4) and shut-off position stop screw (7); turn stop screws in approximately two turns.
2. Release engine shut-off knob (13) and allow it to move to RUN position; make certain injection pump fuel shut-off lever (1) is properly positioned on its shaft and is in the run position.
3. Turn run position stop screw (4) out as necessary until it contacts stop on shut-off lever (6). Tighten jam nut on run position stop screw (4).
4. Disconnect engine shut-off rod spring (8) from rear shut-off rod (9); pull engine shut-off knob (13) back as far as it will go and lock (shut-off position). Make certain injection pump fuel shut-off lever (1) is in the fully shut-off position; turn shut-off position stop screw (7) out as necessary until it contacts stop on shut-off lever (6). Tighten jam nut on shut-off position stop screw (7).
5. Loosen jam nuts on rear shut-off rod adjusting nut (10) and pull shut-off knob (13) back as far as it will go. Turn rear shut-off rod adjusting nut (10) as necessary to obtain 1/32" to 1/16" clearance between engine shut-off rod lock sleeve (11) and engine shut-off rod lock ring (12). Tighten jam nuts on rear shut-off rod adjusting nut (10). Connect engine shut-off rod spring (8) to rear shut-off rod (9).

C. ADJUSTMENT OF THROTTLE CONTROL LINKAGE

1. Refer to Fig. 41. Loosen elastic stop nut on friction assembly (39) until vertical control rod (17) and throttle lower lever (32) can be moved easily by hand; loosen jam nuts on high idle stop screw (35) and low idle stop screw (3); turn stop screws in approximately two turns.
2. Disconnect throttle control front rod (37) from engine governor speed control lever (38); disconnect throttle control spring (not illustrated) from throttle control intermediate rod (33); disconnect decelerator spring (29) from decelerator rod (28) on tractors equipped with travel speed governor; disconnect decelerator control rod (28) from decelerator pedal (19); disconnect vertical control rod (17) from throttle control bell-

crank (16). Disconnect travel speed governor lower control rod (23) and horizontal control rod (27), on tractor equipped with travel speed governor.

3. Move throttle pivot lever (34) as necessary to obtain 1/32" to 1/16" clearance between arm of pivot lever (34) and throttle advance plate (5) when engine shut-off control is in RUN position; hold throttle pivot lever (34) in this position and turn low idle stop screw (3) out as necessary until stop screw contacts stop on pivot lever (34).
4. Start engine, and allow it to warm up (to operating temperature); move governor speed control lever (38) to obtain specified low idle speed; loosen jam nut on throttle control front rod (37) and adjust yoke as necessary until yoke pin can be installed easily into yoke and speed control lever (38). Check to make certain pivot lever (34) is against low idle stop screw (3) and that engine is still running at specified low idle speed. Tighten jam nut on throttle control front rod (37).
5. Loosen jam nut on vertical control rod (17); make certain throttle operating hand lever (15) is in low idle position (all the way forward) and that stop on throttle lower lever (32) is contacting stop on intermediate rod lever. Adjust yoke on vertical control rod (17) as necessary until yoke pin can be installed easily into yoke and throttle control bellcrank (16). Tighten jam nut on vertical control rod (17).
6. Connect throttle control spring (not illustrated) to throttle control intermediate rod (33). On tractors equipped with travel speed governor, connect decelerator spring (29) to decelerator rod (28). Move throttle operating hand lever (15) to high idle position. Turn high idle stop screw (35) out as necessary to obtain the specified high idle speed; tighten jam nut on high idle stop screw.

NOTE

If specified high idle cannot be obtained, contact your authorized "Allis-Chalmers" Construction Machinery Dealer.

7. Place toe end of decelerator pedal (19) at specified height above floor plate (DIM "C"); loosen jam nut on decelerator control rod (28); make certain that stop on decelerator control rod lever (30) is contacting stop on intermediate control rod lever (31) and adjust yoke on decelerator control rod (28) as necessary until yoke pin can be installed easily into yoke and decelerator pedal (19); tighten jam nut on decelerator control rod (28).
8. Loosen jam nut on decelerator pedal stop screw (18) and turn stop screw in several turns. Tighten elastic stop nut on friction assembly securely and move throttle operating hand lever (15) to low idle position (all the way forward) and pull

engine shut-off knob (13) to the shut-off position and stop engine.

9. Turn decelerator pedal stop screw (18) out as necessary until stop screw just contacts the bottom side of decelerator pedal (19). Tighten jam nut on decelerator pedal stop screw.

NOTE

On tractors equipped with travel speed governor (Special Equipment) the following additional adjustments are also necessary; proceed as follows:

10. Make sure that adjustments in steps 1. through 9. have been properly made; engine shut-off knob (13) is in RUN position; throttle operating hand lever (15) and travel speed governor operating hand lever (20) are both in low idle position (all the way forward); and engine is NOT running. Remove travel speed control spring (24).
11. Make certain that travel speed governor terminal shaft lever (26) is installed on terminal shaft 28° (1-3/8") to rear of vertical WHEN TERMINAL SHAFT IS ROTATED CLOCKWISE AS FAR AS IT WILL GO; this is not Dim. "A".
12. Adjust yoke at front end of travel speed governor horizontal control rod (27) until terminal shaft lever (26) is positioned 20-1/2° (1-1/6", refer to Dim. "A") to the rear of vertical when stop on intermediate control rod lever (31) is contacting stop on decelerator control rod lever (30) and then install yoke pin into yoke and intermediate control rod lever (31) with easy slip-fit. Tighten jam nut against yoke.
13. Make certain that travel speed governor speed control lever (25) is installed on speed control lever shaft 4° (3/16", refer to Dim. "B") below horizontal WHEN SPEED CONTROL LEVER SHAFT IS ROTATED COUNTER-CLOCKWISE AS FAR AS IT WILL GO.
14. Adjust yoke at top end of travel speed governor lower control rod (23) to maintain the speed control lever (25) 4° (3/16", Dim. "B") below horizontal and the travel speed governor operating hand lever (20) in the low idle position (all the way forward). Install yoke pin into yoke and travel speed governor control rod pivot lever (22) with easy slip-fit; tighten jam nut against yoke. Reinstall travel speed control spring (24).

D. TRAVEL SPEED GOVERNOR CHECK

1. On tractors equipped with travel speed governor (Special Equipment) start engine and move travel speed governor operating hand lever (20) to low speed position (all the way forward). Place speed range selector lever in any speed range and apply brakes to stop tractor motion. ENGINE SPEED MUST NOT INCREASE.

2. With engine running, travel speed governor operating hand lever (20) in LOW speed position; speed range selector lever in NEUTRAL-START position; move throttle operating hand lever (15) to high idle speed position (all the way back). Move travel speed governor operating hand lever (20) to HIGH speed position. THROTTLE PIVOT LEVER (34) MUST MOVE TO CONTACT HIGH IDLE STOP SCREW (35).

E. TRAVEL SPEED GOVERNOR ADJUSTMENT

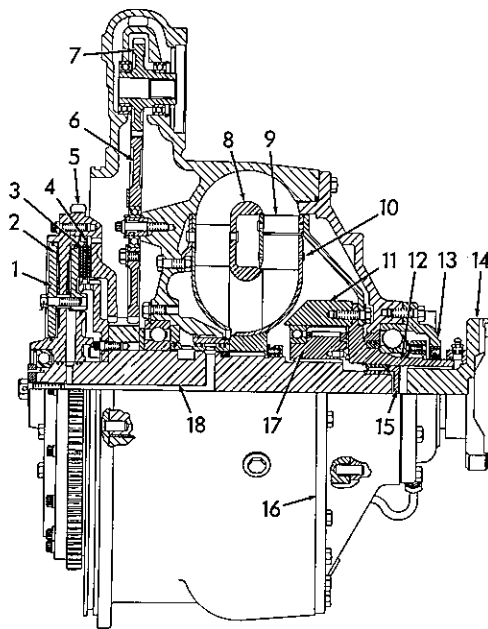
The travel speed governor (Special Equipment) was properly adjusted at the factory and no further adjustments should be necessary. However, should an adjustment of the governor become necessary contact your nearest "Allis-Chalmers" Construction Machinery Dealer.

ENGINE CLUTCH, TORQUE CONVERTER AND TRANSMISSION

A. DESCRIPTION

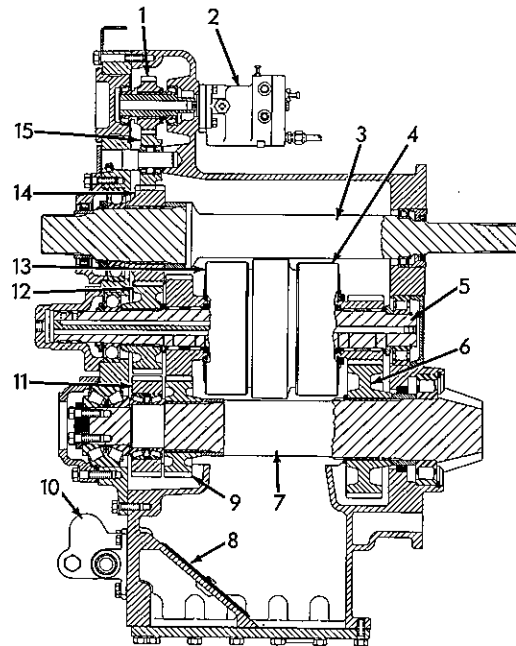
1. GEAR TRAIN

Power from the engine flywheel is transmitted through an internally splined drive ring (integral with engine flywheel) to the oil-type, multiple disc, hydraulically operated, modulated engine clutch. When modulated engine clutch (Fig. 42) is engaged, power is transmitted to input shaft of the single stage torque converter. The turbine wheel of torque converter transmits the power through a drive shaft universal



1. Clutch disengaging piston
2. Engine clutch carrier
3. Bi-metallic friction plate
4. Steel friction plate
5. Back plate
6. Idler gear
7. Pump driving gear
8. Guide wheel assembly
9. Turbine wheel
10. Impeller wheel
11. Over-running clutch race
12. Turbine wheel flange
13. Rear bearing retainer
14. Drive shaft yoke assembly
15. O-ring carrier
16. Rear end plate assembly
17. Over-running clutch
18. Input shaft

Fig. 42 Engine Clutch and Torque Converter -
Sectional View
(T-39352)

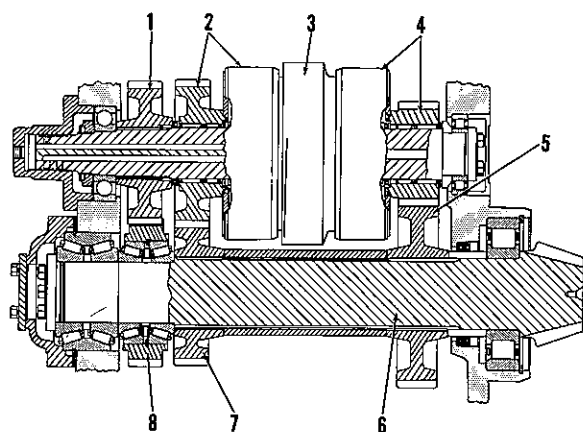


1. Governor drive gear (special equipment)
2. Ground speed governor (special equipment)
3. Top shaft (input shaft)
4. 1st forward clutch drum and gear
5. Forward range clutch shaft (left shaft)
6. Bevel pinion shaft low speed gear
7. Bevel pinion shaft
8. Suction line screen
9. Bevel pinion shaft 2nd speed gear
10. Oil diverter valve (special equipment)
11. Reverse idler gear
12. Clutch shaft front gear
13. 2nd forward clutch drum and gear
14. Top shaft gear
15. Governor idler gear (special equipment)

Fig. 43 Transmission Assembly
(Left Clutch Shaft Shown)
(T-39538)

joint assembly to the power shift transmission top (input) shaft.

The power shift transmission (Figs. 43 and 44) is the constant mesh type, consisting of front and rear gear transmission. Two power shift dual drive hydraulic clutch assemblies are used in the transmission to provide smooth high speed shifts. With transmission installed in tractors, the transmission shaft on right carries the 1st and 2nd reverse clutches and gears; the transmission shaft on left side carries the 1st and 2nd forward clutches and gears.



1. Right clutch shaft drive gear
2. 2nd reverse clutch drum and gear
3. Right clutch shaft and clutches (reverse speeds)
4. 1st reverse clutch drum and gear
5. 1st (forward and reverse) bevel pinion drive gear
6. Bevel pinion shaft
7. 2nd (forward and reverse) bevel pinion drive gear
8. Bevel pinion idler gear

Fig. 44 Right Clutch Shaft (and Bevel Pinion Shaft)
(T-37914)

Each clutch assembly is actually two clutches on one shaft. The clutches are the multiple disc type and are oil cooled. The clutch friction plates have sintered bronze facings; the reaction plates are of steel. The clutches are engaged hydraulically and are spring released.

The transmission top shaft gears drive the front gear of left clutch shaft in clockwise rotation. The right clutch shaft is driven counter-clockwise by the idler gear located on front of bevel pinion shaft; the idler gear is driven by transmission top shaft gear.

When tractor is operating in 1st forward speed, rear clutch on transmission left shaft (Fig. 43) is engaged and drives the respective clutch drum and 1st forward speed gear (gear welded on clutch drum). The 1st forward speed gears drive the rear gear on bevel pinion shaft. This gear in turn drives the bevel pinion shaft.

When tractor is operating in 2nd forward speed, front clutch on left shaft (Fig. 43) is engaged. The respective clutch drum and 2nd forward speed gear (gear welded to clutch drum) is in mesh with the (front gear) on bevel pinion shaft. This gear in turn drives the bevel pinion shaft.

When the tractor is operating in 1st reverse speed, rear clutch on right transmission shaft (Fig. 44) is

engaged and drives the respective drum and 1st reverse speed gear (gear welded on clutch drum). The 1st reverse speed gear drives the rear gear on bevel pinion shaft. This gear in turn drives the bevel pinion shaft.

When tractor is operating in 2nd reverse speed front clutch on right transmission shaft (Fig. 44) is engaged. The respective clutch drum and 2nd reverse speed gear (gear welded to clutch drum) is in mesh with the (front gear) on bevel pinion shaft. This gear in turn drives the bevel pinion shaft.

On tractor equipped with travel speed governor, the governor (Fig. 43) is driven by the governor drive gear which is in mesh with governor drive idler gear driven by transmission top shaft gear.

On tractor equipped with ground driven push-start pump, the pump is direct drive coupled to front end of transmission bevel pinion shaft.

2. HYDRAULIC SYSTEM

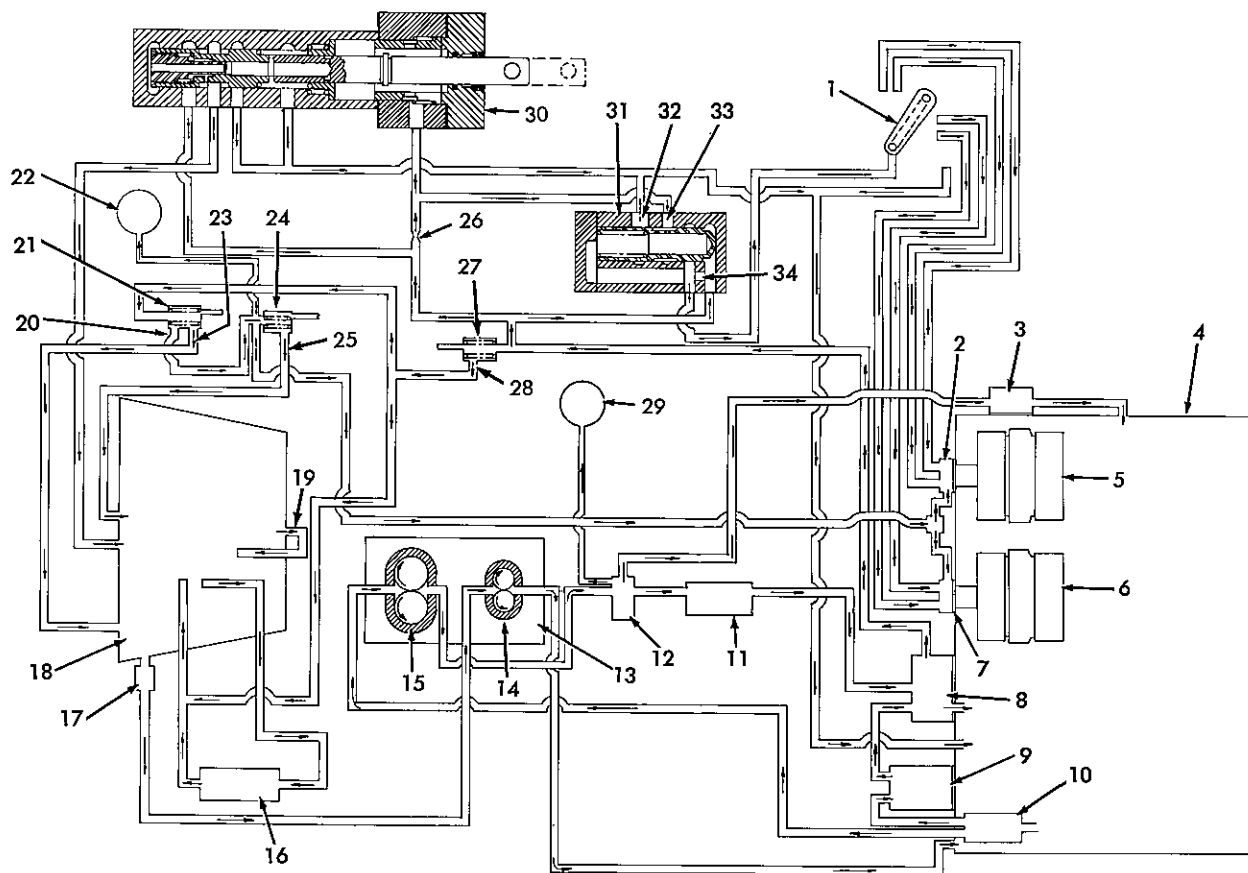
This system has a common oil sump, located in bottom of transmission case. The hydraulic system (Fig. 45) consists of a dual-type hydraulic oil pump, two oil pressure gauges, fuel-flow oil filter, two heat exchangers, oil pressure regulating valves, speed range selector valve, engine clutch modulating valve, flow sensing valve, engine clutch, torque converter, transmission (and transmission clutches), and the necessary lines and hoses.

NOTE

On tractors equipped (Special Equipment) with travel speed governor and ground driven push-start pump, the hydraulic system also includes a ground driven hydraulic oil pump, diverter valve and additional lines and hoses.

The hydraulic system dual-type oil pump is mounted on left rear of torque converter housing. The front set of gears in oil pump supply oil to the hydraulic system oil filter and then through transmission heat exchanger to transmission speed range clutches, engine clutch, torque converter and the proper valves and gauges. On tractor equipped with travel speed governor, the governor oil supply also comes from the front set of gears through an outlet in top of hydraulic system oil filter. The rear set of gears in oil pump scavenges oil from bottom of engine flywheel housing and returns it to transmission sump.

On tractors equipped with ground driven push-start oil pump, mounted on front of transmission case near the bottom, oil is supplied to a diverter valve which directs oil to the hydraulic system to engage 1st or 2nd reverse speed range clutch and engine clutch when tractor is pushed (or towed) rearward to start engine. Refer to "OPERATING INSTRUCTIONS" for detailed procedure. When engine is running, the diverter valve returns the oil from ground driven pump directly to transmission sump and the dual-type oil pump supplies oil to the hydraulic system.



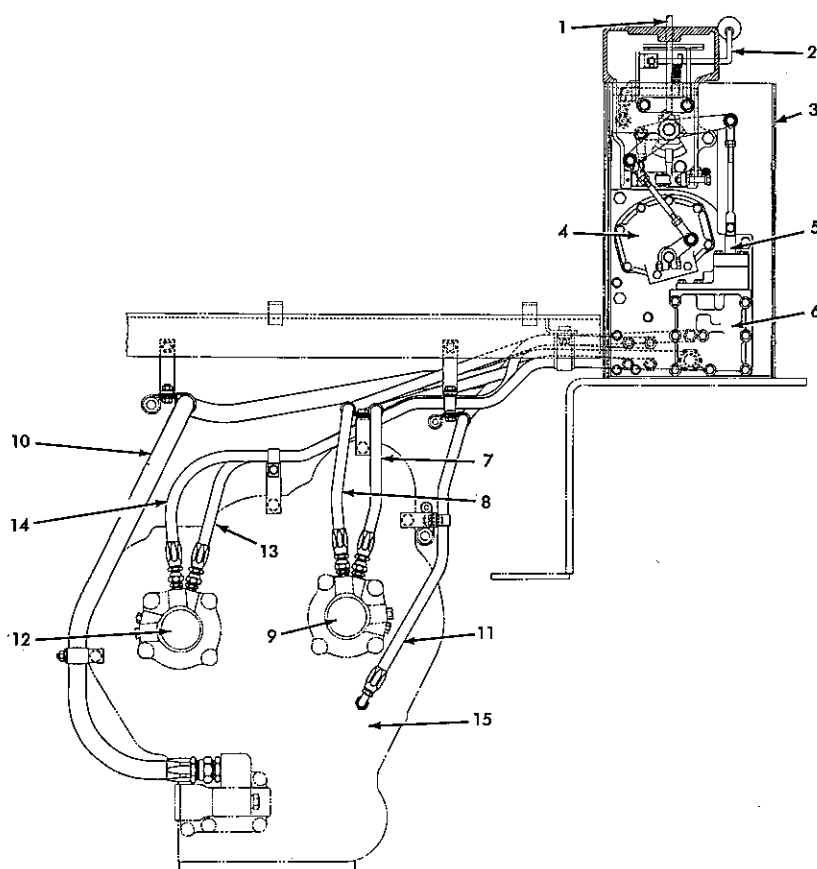
- | | |
|---|--|
| 1. Speed range selector valve | 17. Oil screen (torque converter) |
| 2. Reverse range shaft oil collector | 18. Engine clutch and torque converter |
| 3. Travel speed governor (special equipment) | 19. Torque converter rear seal drain |
| 4. Transmission | 20. Port "A" |
| 5. Reverse range shaft and clutch pack assemblies | 21. Torque converter pressure regulating valve |
| 6. Forward range shaft and clutch pack assemblies | 22. Transmission lubricating oil pressure gauge |
| 7. Forward range shaft oil collector | 23. Port "B" |
| 8. Diverter valve (special equipment) | 24. Transmission lubricating oil pressure regulating valve |
| 9. Ground driven push-start pump (special equipment) | 25. Port "C" |
| 10. Oil screen (transmission) | 26. .040" restrictor |
| 11. Transmission heat exchanger | 27. Transmission oil pressure regulating valve |
| 12. Oil filter | 28. Port "D" |
| 13. Hydraulic system oil pump (dual type) | 29. Transmission oil pressure gauge |
| 14. Rear set of pump gears (torque converter scavenging) | 30. Engine clutch modulating valve |
| 15. Front set of pump gears (hydraulic system oil pressure) | 31. Flow sensing valve |
| 16. Torque converter heat exchanger | 32. Port "E" |
| | 33. Port "F" |
| | 34. Orifice |

Fig. 45 Hydraulic System Oil Flow - Schematic
(T-39457)

The transmission main oil pressure regulating valve, flow sensing valve, and engine clutch modulating valve are enclosed in a single housing located on front of left battery box just below transmission range selector valve (Fig. 46). The torque converter pressure regulating valve and transmission lubricating oil pressure regulating valve are enclosed in a single housing located on right side of torque converter housing.

With speed range selector lever in NEUTRAL-START position (all clutches disengaged) and with engine running, an orifice (Fig. 45 - Item 34) allows a portion of oil (supplied by pump) to pass through flow sensing valve to range selector valve to keep oil lines fully charged; this oil then returns to sump. The remaining portion of oil (supplied by pump) is directed through engine clutch modulating valve and returns to sump.

When transmission speed range selector lever is moved to left or to right from NEUTRAL-START to engage desired transmission clutch the flow sensing valve opens and directs a larger portion of oil under pressure to the range selector valve to engage desired transmission clutch. The flow sensing valve automatically assures complete engagement of transmission clutch before engine clutch is engaged by allowing oil on low pressure side of .040 restrictor (Fig. 45 - Item 26) to return to sump through ports "E" and "F" (Items 32 and 33) until transmission clutch is fully engaged. When transmission clutch has been fully engaged, the flow sensing valve returns to its forward position and closes ports "E" and "F". This resumes normal oil flow to engine clutch modulating valve enabling the valve to function and direct oil to engage engine clutch.



- | | |
|--|--|
| 1. Transmission range selector lever | 9. Forward range shaft oil collector |
| 2. Safety lever | 10. Diverter valve-to-modulating valve oil line (Pressure) |
| 3. Left battery box | 11. Oil return line from engine clutch modulating valve |
| 4. Transmission range selector valve | 12. Reverse range shaft oil collector |
| 5. Engine clutch modulating valve plunger | 13. Oil line to 2nd reverse range clutch pack |
| 6. Valve housing | 14. Oil line to 1st reverse range clutch pack |
| 7. Oil line to 2nd forward range clutch pack | 15. Transmission case |
| 8. Oil line to 1st forward range clutch pack | |

Fig. 46 Transmission Controls, Valves and Oil Lines
(T-39540)

When transmission speed range selector lever is pulled rearward to engage engine clutch (into slot aligned with desired speed range), the engine clutch modulating valve is actuated and directs oil under pressure (controlled by rearward travel of range selector lever) to engage engine clutch.

At all times when engine is running, oil by-passed through transmission main oil pressure regulating valve (Item 27) enters the torque converter regulating valve (Item 21). The torque converter pressure regulating valve maintains pressure to charge the torque converter system. When oil pressure in torque converter system increases due to extremely cold ambient temperature, a cold oil relief valve (port "B" - Item 23) incorporated into torque converter pressure regulating valve opens and returns excess oil directly to engine flywheel housing until oil pressure within torque converter system drops below cold oil relief valve setting. Oil in torque converter system is cooled by circulating through a heat exchanger located on right side of engine. Oil in torque converter housing is circulated by the impeller wheel and forced through heat exchanger. Cooled oil from heat exchanger is returned to low pressure area in center of converter housing, on front side of impeller wheel.

Oil-by-passed by torque converter pressure regulating valve through port "A" (Item 20) enters transmission lubricating oil pressure regulating valve. This valve (Item 24) maintains pressure to supply lubricating and cooling oil to transmission clutches, and bearings.

Oil-by-passed by transmission lubricating oil pressure regulating valve through port "C" (Item 25) is internally routed through torque converter housing to lubricate and cool engine clutch components. The oil returns to bottom of engine flywheel housing, and the scavenge (rear) set of gears of dual-type oil pump returns the oil to transmission sump.

A line located in top of oil filter head supplies oil pressure to travel speed governor. Oil from governor is returned through an external oil line to sump in transmission case.

The transmission oil pressure gauge (Item 29) and transmission lubricating oil pressure gauge (Item 22) are located in instrument panel on cowl. Both gauges should indicate a pressure within "Operating Range" whenever engine is running. Stop engine immediately if pressure indicated by either gauge falls below "Operating Range". Determine and correct the cause before returning tractor to use.

B. HYDRAULIC SYSTEM OIL PRESSURES

The main circuit oil pressure and the oil pressures to the various components of the engine clutch, torque converter and transmission system are as follows:

1. **HYDRAULIC SYSTEM MAIN CIRCUIT PRESSURE - ALSO TRAVEL SPEED GOVERNOR PRESSURE (Special Equipment)**

At low idle speed - 155 - 185 psi
At high idle speed - 210 - 250 psi

2. **MAIN TRANSMISSION SYSTEM PRESSURE (Transmission clutch apply)**

At low idle speed - 145 - 170 psi
At high idle speed - 165 - 190 psi

3. **ENGINE CLUTCH MODULATING PRESSURE (Engine clutch apply)**

At any speed - 1 - 8 psi (Neutral position)
At high idle speed - 145 - 170 psi (P.T.O. Position)

NOTE

Prior to tractor S/N 6065 Engine clutch apply pressure at high idle speed (in P.T.O. position) is 115-135 psi.

4. **TORQUE CONVERTER PRESSURE (Torque Converter Charging)**

At any speed - 35 - 45 psi
Cold oil-relief valve opens at 50 psi

5. **TRANSMISSION LUBRICATING PRESSURE (Lubrication and Cooling)**

At low idle speed - 3 - 15 psi
At high idle speed - 28 - 40 psi

6. **ENGINE CLUTCH LUBRICATING PRESSURE (Lubrication, Cooling, and balance)**

At high idle speed - 3 - 15 psi

C. HYDRAULIC SYSTEM SERVICE

1. OIL AND OIL FILTER

The engine clutch, torque converter and transmission hydraulic system oil filter, located on inner right side of main frame between converter and transmission, is the full flow type and contains a replaceable element.

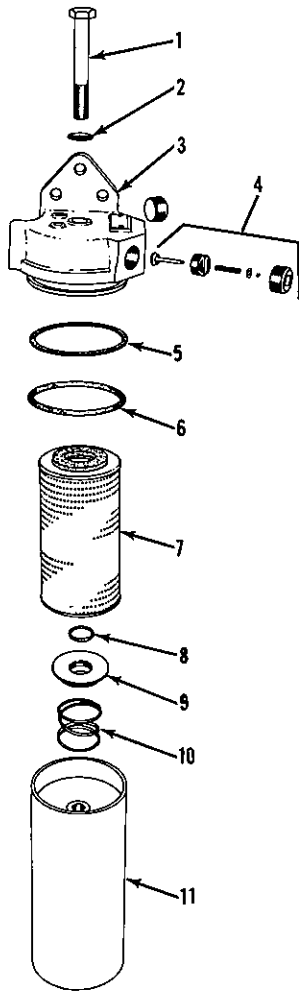
The oil in the system must be changed and a new element installed in oil filter after first 50 hours on a new unit or after major repairs to the system, each 1000 hours of operation thereafter or more often if conditions warrant.

NOTE

The oil in the system should be at normal operating temperature when draining.

Refer to Fig. 47 and change oil and oil filter element as follows:

- a. Remove drain plug from bottom of transmission case (Fig. 20); remove drain plug from rear end of torque converter (near the bottom); allow oil to drain and reinstall both plugs.



- | | |
|----------------------------------|------------------|
| 1. Tank retaining cap screw | 6. O-ring |
| 2. Sealing washer | 7. Element |
| 3. Filter head | 8. O-ring |
| 4. By-pass relief valve assembly | 9. Seating plate |
| 5. Sealing ring | 10. Spring |
| | 11. Tank |

Fig. 47 Hydraulic System Oil Filter Details
(T-41805)

- b. Remove floor plate to reach oil filter; clean filter head and surrounding area.
- c. Loosen tank retaining cap screw and remove filter tank; remove and discard old filter element.
- d. Clean inside of filter tank and make certain spring, seating plate and small O-ring are properly positioned in bottom of tank. Install new element.
- e. Install new O-ring (large) in filter head groove; position sealing ring and install tank onto filter head.
- f. Install tank retaining cap screw and sealing washer. Tighten cap screw to a torque of 80 - 90 lbs. ft.
- g. Pour specified lubricant through oil filler pipe (Fig. 12). Start engine; run at low idle speed for a few minutes to charge system. Observe for leaks and correct any found. Observe oil pressure gauges for normal readings; if normal is not indicated within a few minutes, stop engine and determine cause, then run tractor until oil is heated to at least 150° F.
- h. With speed range selector lever in 2nd forward position, modulated clutch DISENGAGED, parking brake applied, and engine running at low idle speed, check oil level. Make certain oil level is not above upper end of "Operating Range" marks on gauge rod (Fig. 12).

2. BREATHER

The engine clutch, torque converter and transmission system breather (Fig. 22) contains a replaceable element. This element must be changed after each 1000 hours of operation, or more often if conditions warrant.

Change breather element as follows:

- a. Remove breather and discard old element.
- b. Dip new element in clean engine oil; shake off any excess oil.
- c. Install element and reinstall breather.

STEERING CLUTCHES AND BRAKES

A. DESCRIPTION

1. STEERING CLUTCHES

Two spring loaded, multiple disc, oil-type steering clutch assemblies, one located at each end of bevel gear shaft, are provided for steering the tractor. Each clutch assembly is enclosed in a brake drum; each drum is bolted to a brake drum hub which is connected to the corresponding final drive pinion.

Steering of the tractor is accomplished "hydraulically" by actuating the steering levers (hand levers). When either steering lever is pulled back to make a turn, the steering lever, which is connected by linkage to a plunger in the steering control valve, moves the valve plunger and allows oil under pressure to pass through control valve to the corresponding steering clutch throwout mechanism. Oil under pressure entering clutch throwout mechanism moves steering clutch actuating piston outward and disengages the steering clutch. When steering lever is released, supply of oil to clutch actuating piston is shut-off and the clutch springs return and hold the clutch discs in their engaged position.

2. BRAKES

The brakes are the foot operated, hydraulic assist type. The brake bands are assembled around brake drums which enclose the steering clutches. The brakes serve in conjunction with steering clutches to steer the tractor. When a steering clutch has been disengaged for turning the tractor and operator applies corresponding brake, the brake tightens around brake drum and stops drum from turning, which in turn stops rotation of the corresponding final drive gears and track drive sprocket.

The steering clutches, brake drums, and brakes operate in oil to provide cooler operating temperature and longer life of the components.

3. HYDRAULIC SYSTEM

The hydraulic system consists basically of the following:

Hydraulic pump, suction line screen, an oil filter (full-flow type) for each steering clutch oil supply line, steering control valve assembly, an actuating piston and components for disengaging each steering clutch, a brake operating valve assembly for applying each brake, and the necessary lines and control linkage. The bevel gear and steering clutch compartments have a common oil sump.

The hydraulic pump has two sets of gears. One set of gears supply oil under pressure for disengaging the left steering clutch; this same set of gears supply oil under pressure to apply the right brake. The other

set of pump gears supply oil under pressure for disengaging the right steering clutch; this same set of gears supply oil under pressure to apply the left brake.

The steering control valve assembly contains two oil pressure relief valves for controlling the maximum pressure delivered to the steering clutch actuating pistons. These relief valves are of the adjustable type.

Each brake operating control valve assembly has an adjustable type oil pressure relief valve.

B. STEERING CONTROL LINKAGE ADJUSTMENT

The steering control linkage is properly adjusted at the factory and no further adjustment should be necessary. The linkage is properly adjusted when upper side of steering levers contact steering lever bracket with the steering control valve plungers in neutral position.

When steering levers are pulled all the way back, the steering control valve plungers are pulled forward from their neutral position, at which time the lower side of steering levers will contact steering lever bracket. Over-travel assemblies are provided between the steering control linkage and steering control valve plungers to prevent damage to the valve and valve plungers when steering clutches are disengaged and the plungers are at their extreme forward travel in the valve body.

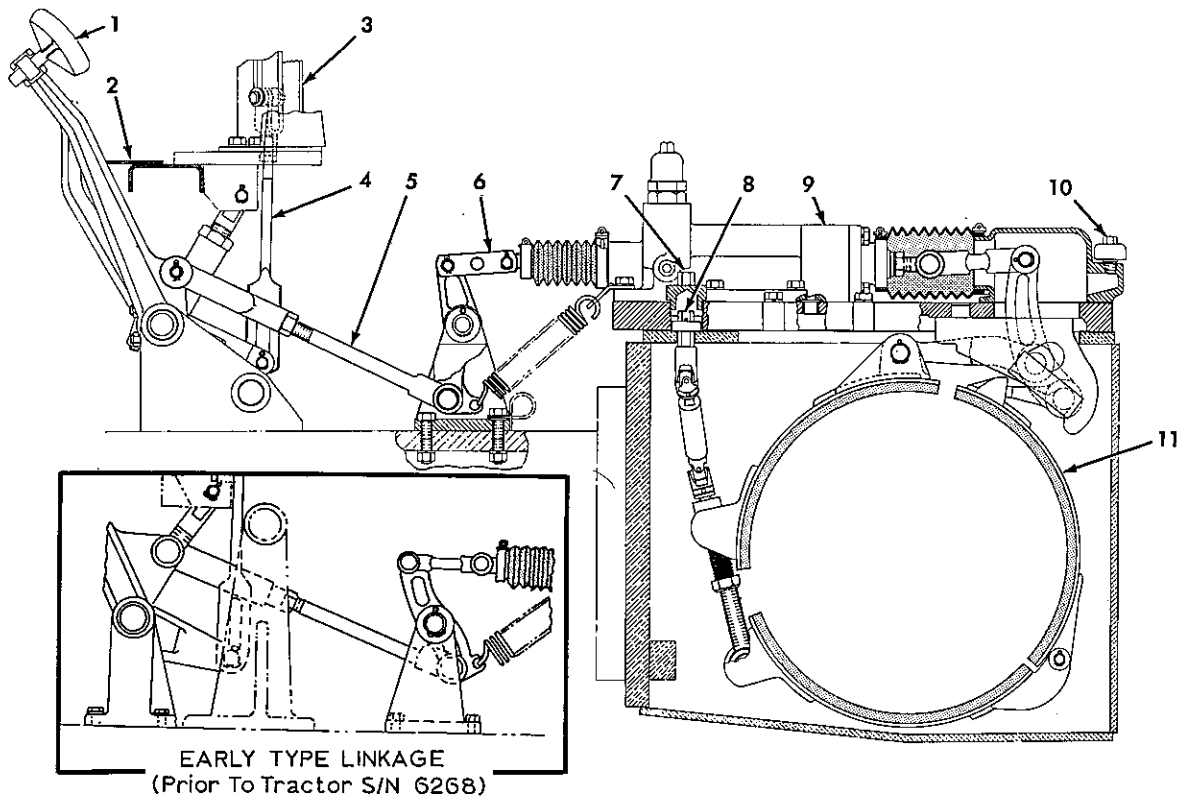
C. BRAKE LINKAGE ADJUSTMENT

The control linkage for each brake is properly adjusted at the factory and no further adjustment should be necessary. The linkage for each brake is adjusted so that when each brake pedal is fully released (pedal lever back, contacting its stop) there is proper free travel in brake valve spool.

D. BRAKE BAND ADJUSTMENT

As the linings wear, it will become necessary to adjust the brake bands. Due to variable operating conditions, specific time intervals for brake band adjustment are not given. The brake bands require adjustment when it is possible to depress brake pedals 4-1/2", or more, using moderate pressure on pedals with engine stopped. Adjust each brake band as follows:

1. Remove brake adjustment access plug (Fig. 48, Item 7).
2. Turn brake band adjusting screw (8) clockwise until brake band assembly is tight around the brake drum, then back off (loosen) band adjusting screw 2 clicks (1 turn).



1. Pedal lever
2. Floor plate supporting channel
3. Parking brake lever and bracket assembly
4. Parking brake lever connecting rod
5. Front rod
6. Connecting link

7. Brake adjustment access plug
8. Brake band adjusting screw
9. Brake operating control valve
10. Breather
11. Brake band assembly

Fig. 48 Brake and Brake Controls
(T-37903)

NOTE

On tractors equipped with early type linkage (Fig. 48) back-off (loosen) band adjusting screw 3 clicks (1-1/2 turns).

3. Install and tighten brake adjustment access plug.

E. PARKING BRAKE ADJUSTMENT

The parking brake (Fig. 49) is properly adjusted when a pull of 80 to 85 lbs. is required on parking brake operating lever to apply brake when engine is stopped. Adjust parking brake as follows:

NOTE

The brakes must be properly adjusted before parking brake can be properly adjusted.

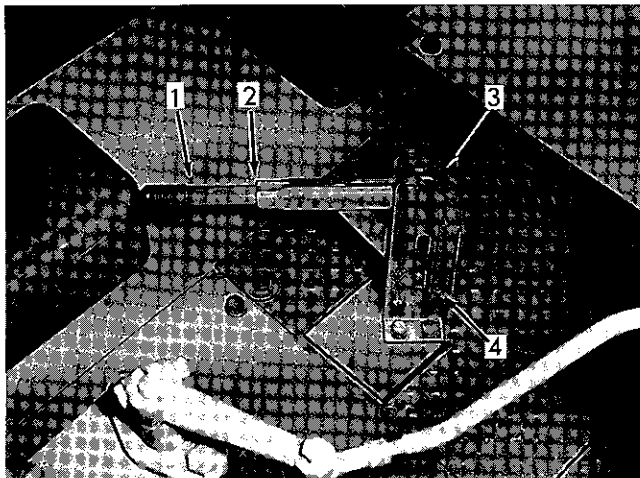
Attach a spring scale to parking brake operating lever just below adjusting cap, and weigh pull required to apply parking brake. Turn adjusting cap as necessary to increase or decrease the pull until specified pull is obtained.

F. HYDRAULIC SYSTEM PRESSURES (Steering and Brake Valves)

Two pressure relief valves are located in steering control valve (Fig. 50). Relief valve on left side of control valve (as installed on tractor) is for LEFT STEERING CLUTCH. Relief valve on right side of control valve is for RIGHT STEERING CLUTCH.

One pressure relief valve is located in each brake control valve (Fig. 50).

All relief valves, in steering and brake control valves,

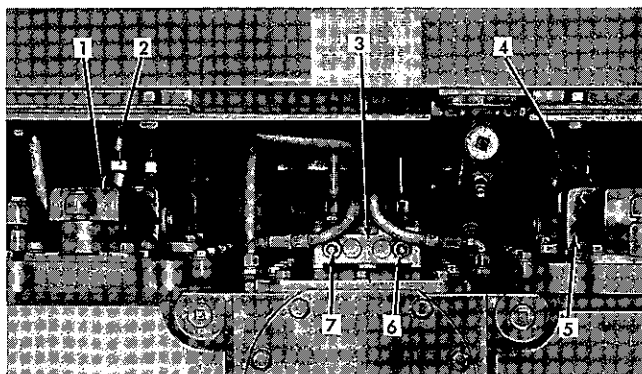


- | | |
|--------------------|----------------------|
| 1. Adjusting cap | 3. Bracket assembly |
| 2. Operating lever | 4. Lever locking pin |

Fig. 49 Parking Brake - Released Position
(T-70844)

are properly adjusted at the Factory and no further adjustment should be necessary. However, if repairs have been made to the system or new control valves or components installed, the relief valves should be tested and adjusted for proper opening pressures.

Specified relief valve opening pressures are as follows:



1. Left brake control valve
2. Left brake relief valve acorn nut
3. Steering control valve
4. Right brake relief valve acorn nut
5. Right brake control valve
6. Right steering clutch relief valve acorn nut
7. Left steering clutch relief valve acorn nut

Fig. 50 Relief Valve Locations
(T-41341)

1. STEERING CONTROL VALVE (2 relief valves)

Oil temperature at 120° - 180° F.

At low idle speed - 420 - 430 psi

At high idle speed - 575 psi max.

2. BRAKE CONTROL VALVES (1 relief valve each)

Oil temperature at 120° - 180° F.

High idle speed:

Eff. with tractor S/N 6268 200-225 psi

Prior to tractor S/N 6268 450-550 psi.

NOTE

Tractors prior to S/N 6268 that have been equipped with late type linkage set brake control relief valves at 220-225 psi.

G. HYDRAULIC SYSTEM SERVICE

Regular service of the hydraulic system consists of changing oil, changing oil filter elements, cleaning breather and periodically cleaning suction line screen.

On new units or on units which have had major repairs made to bevel gear or steering clutches, change filter elements after the first 50 hours of operation; thereafter service hydraulic system at regular 1000 hour intervals. Clean suction line screen periodically.

1. REPLACE FILTER ELEMENTS

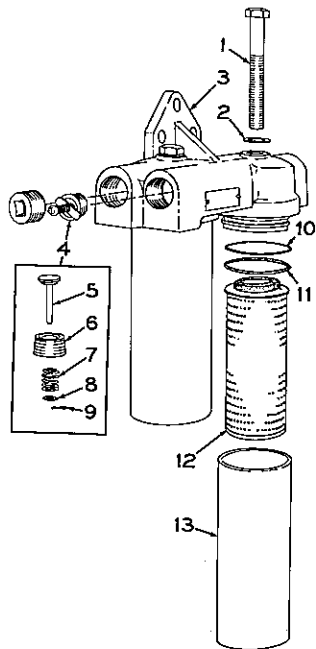
The two oil filters are located on left side of engine, Fig. 9, just ahead of engine fuel filters. Refer to Fig. 51 and replace filter elements as follows:

- a. Clean the oil filter area.
- b. Loosen tank retaining capscrew, Fig. 51, and remove tank from filter head. Remove and discard old element. Thoroughly clean interior of tank and install new element.
- c. Install new filter head sealing ring (4) O-ring (5) and sealing washer (2).
- d. Install tank on filter head and tighten tank retaining capscrew to a torque of 80 to 90 lbs. ft.

2. CLEAN SUCTION LINE SCREEN

The suction line screen is located in a filter housing, Fig. 9, just ahead of oil filters. Refer to Fig. 52 and clean suction line screen as follows:

- a. Clean filter assembly cover area.
- b. Loosen hose clamps on outlet line hose and remove capscrews securing filter cover to filter housing; remove cover with suction line screen attached.



1. Tank retaining capscrew
2. Sealing washer
3. Filter head
4. Filter head sealing ring
5. Filter head O-ring
6. Element
7. Tank
8. By-pass valves assembly
9. By-pass valve
10. By-pass valve housing
11. By-pass valve spring
12. By-pass valve spring washer
13. By-pass valve spring retaining ring

Fig. 51 Oil Filter Details
(T-39345)

- c. Turn suction line screen out of filter cover. Wash screen in clean solvent and inspect screen for damage. Replace if necessary.
- d. Clean interior of filter housing and inspect O-ring. Replace O-ring if necessary.

- e. Install screen in filter cover and place cover in position on filter housing. Tighten attaching cap-screws evenly and securely. Position outlet line hose and tighten hose clamps.

3. CLEAN BREATHERS

Remove the two breathers (one each side), Fig. 48, and wash in solvent or fuel oil. Blow dry with compressed air and reinstall. Operating in extremely dusty condition may require more frequent cleaning.

4. CHANGE OIL

To change oil in steering clutch and brake hydraulic system: The steering clutch compartments (left and right) and bevel gear compartment must be drained. The bevel gear compartment drain plug is of the magnetic type. Make certain this plug is reinstalled in the bevel gear compartment.

NOTE

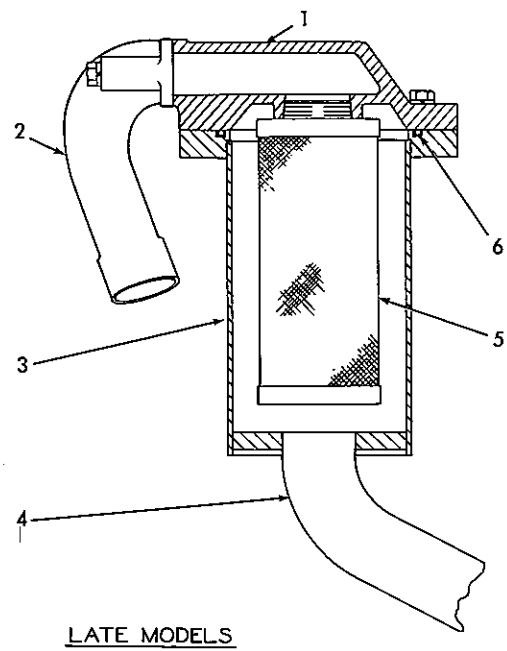
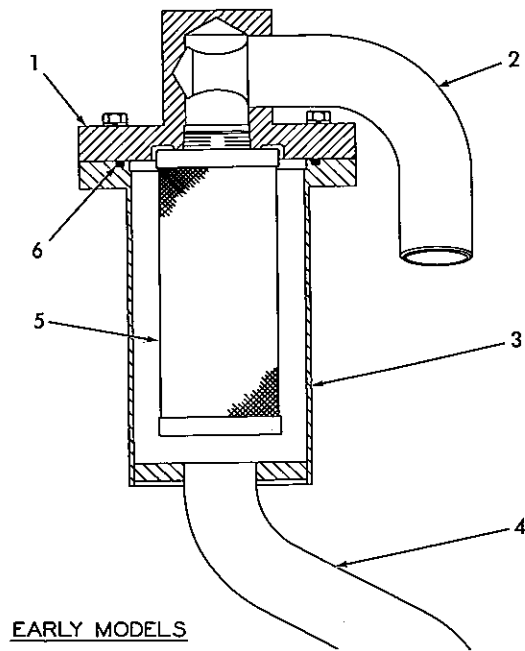
Oil should be at normal operating temperature before draining.

- a. Remove drain plug from bottom of each steering clutch housing and from bottom of bevel gear housing (Fig. 19) and allow oil to drain.
- b. After oil has been drained, clean and reinstall drain plugs in their correct position (magnetic type plug in bevel gear compartment).

NOTE

Filter elements should be replaced and suction line screen may be cleaned before proceeding.

- c. Fill system with proper amount of specified oil (refer to "LUBRICANT SPECIFICATIONS"). Oil level must be within "Operating Range" marks on oil level gauge rod.
- d. Start engine and run at approximately 1/4 throttle; operate steering levers and brake pedals a few times; stop engine and check oil level in system and add oil if necessary. Check for oil leaks and correct any leaks found.



- 1. Filter cover
- 2. Outlet line (to pump)
- 3. Filter housing

- 4. Inlet line (from sump)
- 5. Screen
- 6. O-ring

Fig. 52 Suction Line Screen Filter Assembly
(T-40392 - T-70472)

TRACK AND TRACK IDLERS

A. DESCRIPTION

Each track is properly adjusted when upper part of track can be pried upward 1-1/2" to 2" above support rollers with use of a bar. Proper adjustment is important as rapid wear will occur on the tracks and other affected parts if tracks are too tight or too loose.

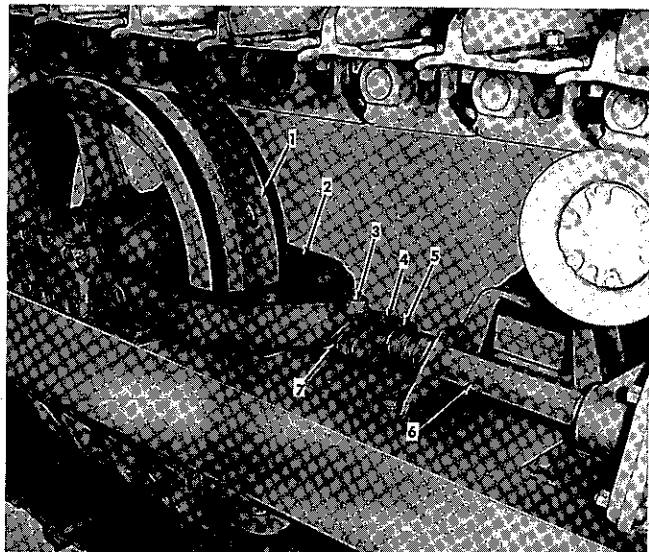
Each track idler is properly adjusted when an even contact (wear pattern) is noted on each side of track guiding flange of track idlers; light contact will be apparent on inner sides of track sidebars and on both flanges of the truck wheels.

B. TRACK ADJUSTMENT-MECHANICAL TYPE (Standard Equipment)

Remove any accumulation of dirt and debris from around track idler yoke and track adjustment screw.

NOTE

Two lube fittings (Fig. 53) are provided to lubricate track adjusting screw. Lubricate adjusting screw and lock with pressure gun lubricant to facilitate turning of screw.



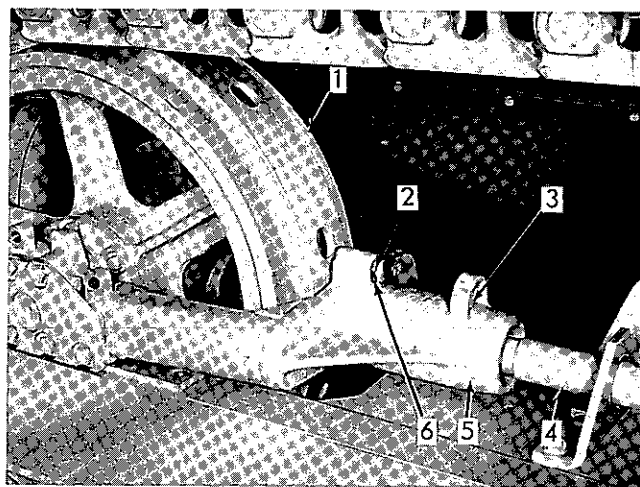
1. Track idler
2. Idler yoke
3. Lubrication fitting (yoke)
4. Lubrication fitting (lock)
5. Adjusting screw lock
6. Adjusting screw
7. Adjusting screw lock cap screw

Fig. 53 Mechanical - Type Track Adjuster -
Standard Equipment
(T-70584)

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

C. TRACK ADJUSTMENT - HYDRAULIC TYPE (Special Equipment)

Remove any accumulation of dirt or debris from around track idler yoke and lube fittings located in top of yoke. The front lube fitting (Fig. 54) is threaded into a relief valve assembly. To tighten track, add pressure gun lubricant through front lube fitting until correct track adjustment is obtained. To loosen track, use a suitable wrench on hex portion of relief valve assembly and back relief valve assembly out of track idler yoke as necessary to allow lubricant to escape from cylinder of yoke assembly. When correct track adjustment is obtained, tighten relief valve assembly. The rear lube fitting forces lubricant into two grooves in yoke assembly. This lubricant acts as a seal and it is recommended that pressure gun lubricant be added to rear lube fitting daily (approximately 2 to 4 shots).



1. Track idler
2. Track adjusting lubrication fitting
3. Piston seal lubrication fitting
4. Push-bar
5. Idler yoke
6. Relief valve assembly

Fig. 54 Hydraulic - Type Track Adjuster -
Special Equipment
(T-70845)

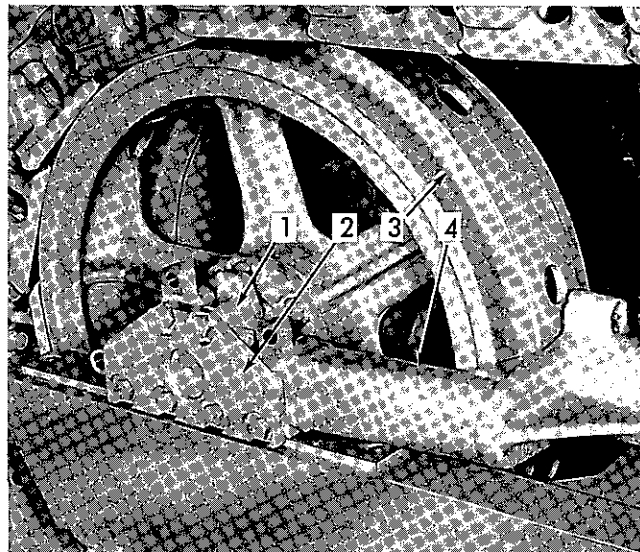
D. TRACK IDLER INSPECTION

Inspect track guiding flange of each track idler for wear.

When track idler is off-center (toward outside) in the idler brackets, heavy contact will be noted on outer guiding flange of track idler, with light to no contact on inner guiding flange of track idler and the inner side bars of track. With this condition, rapid wear and cutting of outer guiding flange of idler and inner side of outer side bars of track will occur; should track idler be off-center (toward inside), wear pattern will be in exact reverse.

Split-type idler brackets (Fig. 55) are used in order to permit a limited amount of lateral adjustment of track idlers.

If inspection of track guiding flange of track idlers indicates misalignment of track idler, make necessary adjustments immediately.



- | | |
|-----------------------------|-------------------------|
| 1. Split-type idler bracket | 3. Track guiding flange |
| 2. Idler guide plate | 4. Idler yoke |

Fig. 55 Track Idler - Installed
(T-70845)

PREPARATION OF TRACTOR FOR STORAGE

If tractor is to be stored during winter or slack season, make a complete inspection of unit for loose, worn, or damaged parts and make necessary repairs before it is stored. Drain engine crankcase and all other oil compartments and refill them with new oil. To protect fuel injection system, drain fuel tank, then pour about 15 gallons of mixture of 40% mineral oil and 60% of the best grade of kerosene in fuel tank and run engine 15 minutes to circulate this mixture through fuel system. This will leave fuel system filled with the mixture and will prevent corrosion or gumming of working parts. Major oil companies can supply this storage fuel mixture.

After tractor has been stored, fill fuel tank with specified diesel fuel to minimize condensation in tank.

NOTE

This fuel need not be drained when tractor is again placed in service.

Remove batteries, clean, and store them in a cool dry place (refer to "ELECTRICAL SYSTEM"). Test them once a month and recharge them if specific gravity of electrolyte falls below 1.220. Keep specific gravity of electrolyte above 1.220 to prevent batteries from freezing.

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