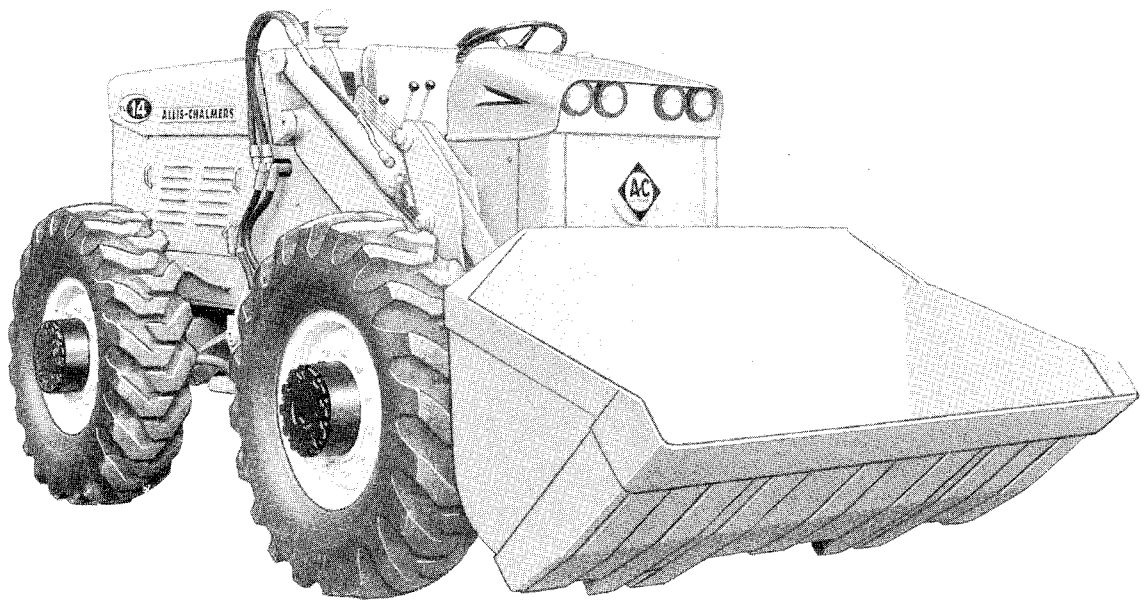
OPERATING INSTRUCTIONS
AND
FIELD MAINTENANCE
TL14D
TRACTOR LOADER

(Serial No. 1525 and Up)



ALLIS-CHALMERS MFG. CO.

MILWAUKEE, WISCONSIN, U. S. A.

LITHO. IN U. S. A.

Price $1.00

3036868
(12-64)

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GENERAL DESCRIPTION

The Model TL-14D Tractor Loader (effective with Serial No. 1525) is a 15,300 pound (with standard bucket), four wheel drive, loader unit powered with a 4 cylinder, 4 stroke cycle, naturally aspirated, open combustion chamber, direct injection, "Allis-Chalmers" Model 6000 Diesel engine.

Power from the engine is transmitted directly to the single-stage type torque converter. Torque, which is increased a maximum of 3 to 1 in the converter, is then transmitted to the power-shift transmission. The engine supplies power to the hydraulic system pump whenever the engine is running. Forward and reverse direction in any speed range is transmitted from the transmission through the universal drive shafts, to both the front and the rear differentials and axles.

The transmission provides 4 forward speeds and 4 reverse speeds, ranging from 3.2 M.P.H. in low to 22 M.P.H. in high, at the rated engine speed of 2200 R.P.M. (governed full load).

Operation of the loader is accomplished hydraulically by the converter mounted pump, a control valve with two control levers, two lift cylinders, two dump cylinders, and the necessary hydraulic lines.

There are no exposed hoses or fittings located in or around the operator's compartment. The hydraulic tank, located behind the operator's seat, provides a mount for the control valve and incorporates the necessary tubing and safety valves. Short external pressure hoses on each side of the operator's compartment carries oil to the lift and dump cylinders.

The loader design provides top visibility, strength, and servicing accessibility. The loader main frames are mounted to the axles with forged, cadmium plated, heat-treated pins. The rear stabilizer shroud and heavy steel seat frame are welded together with the side braces to provide a rigid box construction. This provides a mount for the boom, the hydraulic cylinders, and other loader linkage. The boom assembly, of heavy steel plate, gives added assurance of long life at heavy-duty work.

Levers, pedals, gauges, etc., are well situated in the operator's compartment so that full control of the tractor loader may be maintained easily at all times.

Standard equipment includes: hi-traction differentials; lift and dump cylinders with chrome plated piston rods; formed cowl and plates around the operator;

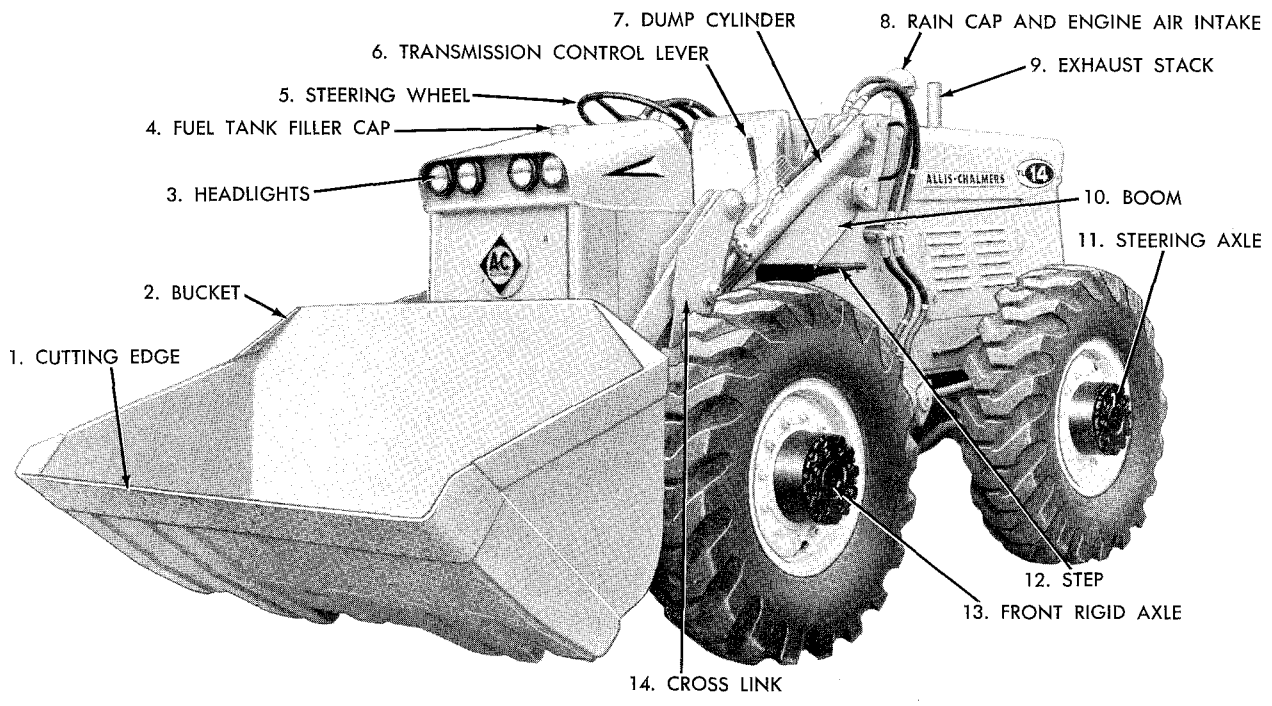

Figure 1. Model TL-14D Tractor Loader (Effective with S/N 1525)
(T-38451)

heavy duty bumper; drawbar; torque converter and power-shift transmission; power brakes and mechanical parking brake; power steering; electric starter; muffler; lights and horn; dry type air cleaner; oil filter; hour meter; and bucket level indicator.

Optional equipment includes: a heater, operator's cab, special tire equipment, and long booms.

Special equipment includes: Lift Fork, Cranehook, Backfiller Blade, Back Hoe, and Bucket Teeth.

TRANSMISSION, CONVERTER, ENGINE AND LOADER SERIAL NUMBERS

On all parts orders and in all correspondence relative to the loader, it is necessary that the loader model and serial number be given. All major components of the loader (such as engine, transmission, hydraulic pump, hydraulic control valve, power steering pump and front and rear axles) have serial numbers which should also be given to properly identify the unit and component. These will assure obtaining the correct replacement parts.

The loader serial number is located on the name plate attached to the left rear face of the seat frame in the operator's compartment, as shown in Fig. 2.

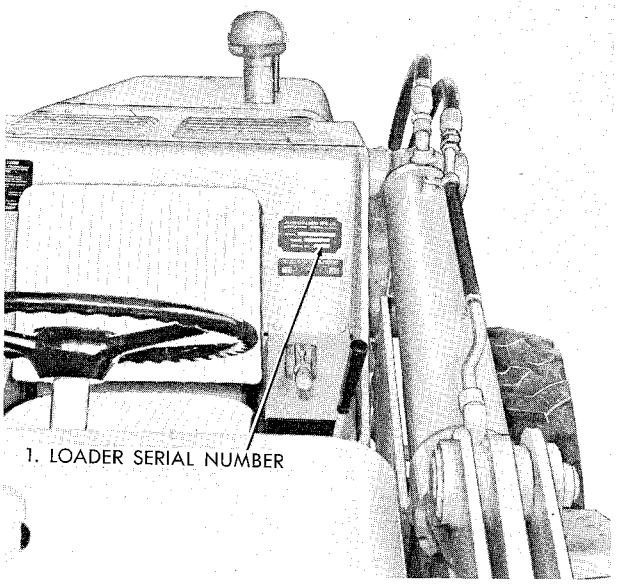

Figure 2. Loader Serial Number Location (T-28754)

The engine serial number is located on the name plate on the engine block as shown in Fig. 3.

The converter serial number is located on a plate on the lower left or top left of the converter housing as shown in Fig. 4.

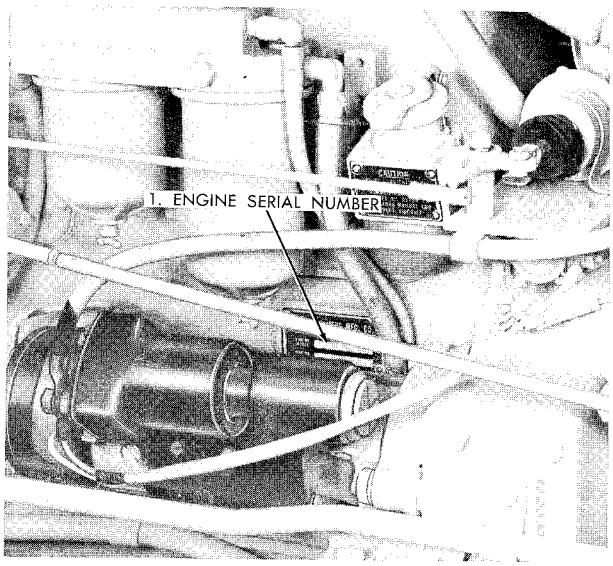

Figure 3. Engine Serial Number Location (T-38452)

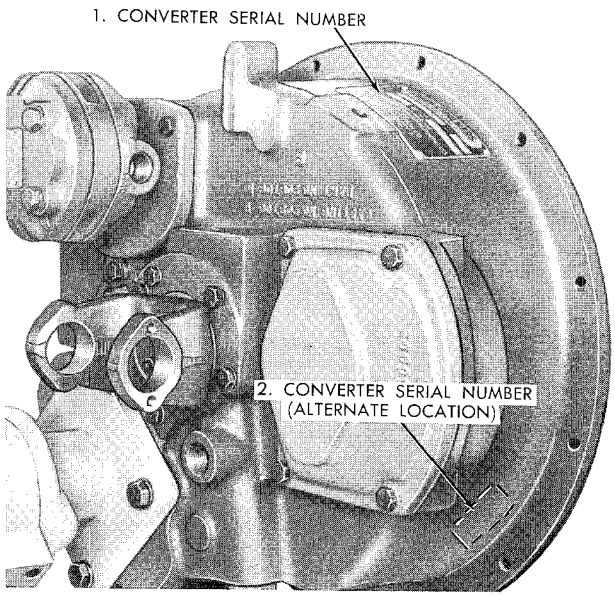

Figure 4. Converter Serial Number Location (T-40636)

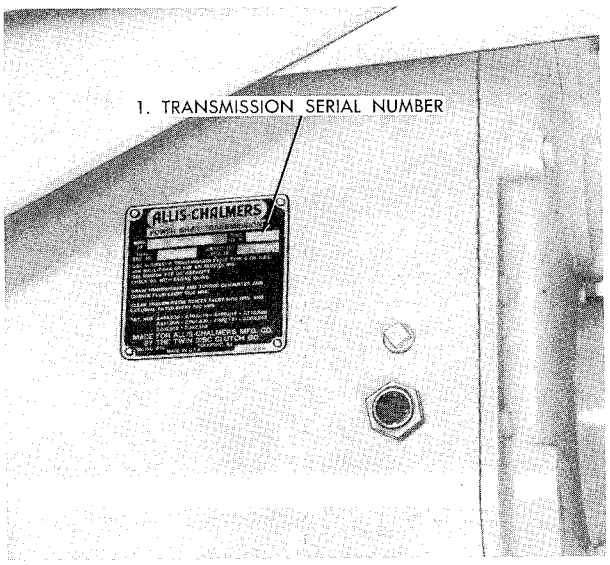

Figure 5. Transmission Serial Number Location (T-38453)

The transmission serial number is located on a name plate on the lower right hand side of the housing as shown in Fig. 5.

NOTE

The terms "LEFT HAND" and "RIGHT HAND" as referred to in this Manual (unless otherwise specified) are determined by sitting in the operator's seat facing the front or bucket end of the loader.

GENERAL SPECIFICATIONS

General Dimensions and Weight

Weight, Shipping (with 1-1/2 cu. yd. Bucket)	15,300 lbs.
Front Wheels	7,550 lbs.
Rear Wheels	7,750 lbs.
Overall Width (Wheel Hubs)	84-1/2"
Overall Height with Bucket Down (or to Top of Frame)	6' 3-1/2"
Overall Length with Cutting Edge Level on Ground	16' 3-1/2"
Ground Clearance	15"
Drawbar Height	23"

General Purpose Bucket (Standard)

	Published
Capacity (cu. yds.)	1-1/2
Published Capacity:	"SAE Rating (Nominal Heaped)" average volume of common earth handled per bucket load.
Maximum Bucket Tip Back	54°
Maximum Dumping Angle (Controllable in all Bucket Positions)	
At Maximum Raise	52-1/4°
At Ground Level	63°
Carry Capacity	5,500 lbs.
Maximum Lifting Capacity	13,000 lbs.
Breakout Force	18,800 lbs.
Lifting Time	6.5 Sec.
Lowering Time	5.0 Sec.

Hydraulic System

Transmission Mounted Pump gpm at 2200 rpm	49
Capacity, Hydraulic System — Gallons (approx.)	29
Lift Cylinders	2 — Double Acting 5" Dia.
Dump Cylinders	2 — Double Acting 4-1/2" Dia.
Oil Reservoir	Tank Behind Operator's Seat
Type of Filters	Micronic and Full Flow
Control Valve	Four Positions — Raise, Hold, Lower, and Float

Tire and Tread

Tread, Front and Rear Wheels	5' 6-1/2"
Tires (Standard — Tubeless)	
Front and Rear	13:00 x 24 — 8 Ply
Tire Pressure:	
13:00 x 24 — 8 Ply	40 psi
13:00 x 24 — 12 Ply	40 psi
14:00 x 24 — 8 Ply	35 psi
14:00 x 24 — 12 Ply	35 psi
14:00 x 24 — 16 Ply	35 psi
15.5 x 25 — 12 Ply	35 psi
17.5 x 25 — 12 Ply	30 psi

Engine

Make	"Allis-Chalmers"
Model	6000 TL-14D
Type	Vertical In-Line Compression Ignition, Water Cooled, Four Cycle, Direct Injection, Full Diesel
Number of Cylinders	4
Bore	4-7/16"
Stroke	5-9/16"
Crankshaft Rotation (When Viewed from Fan End)	Clockwise
Number of Main Bearings	5
Piston Displacement	344 cu. in.
Firing Order	1-3-4-2
Lubrication	Full Pressure
Fuel Used	See "FUEL SPECIFICATIONS"
Fuel Supplied By	Model PSB4A-100EH-5307B1 Fuel Injection Pump
Low Idle Speed	600 rpm
High Idle Speed	2375 — 2425
Rated rpm (Governed at Full Load)	2200 rpm
Air Cleaner	Dry Type
Oil Filter	Full Flow
Electrical System	24 Volt

Turning Radius

Tip of Bucket (at 14" Carry Position)	21' 10-1/2"
Outer Steering Wheel (Measured at Hub)	22' 9-1/2"

Capacities (Approximate) (U.S. Standard Measure)

Cooling System	27 Qts.
Crankcase – Total Dry to Fully Wet	13 Qts.
Crankcase — Oil and Filter Change	12-1/2 Qts.
Transmission and Converter	8 Gals.
Differential (each)	2-3/4 Gals.
Planetary Hubs (each)	2 Qts.
Steering Gear	1-1/2 Lbs.
Fuel Tank	33 Gals.
Hydraulic Brake System	2 Pts.

Speed (M. P. H. at Rated Engine Speed)

1st Gear	0-3.2
2nd Gear	0-4.8
3rd Gear	0-14.3
4th Gear	0-22
1st Reverse	0-3.2
2nd Reverse	0-4.8
3rd Reverse	0-14.3
4th Reverse	0-22

U.S. - Metric Measure Conversion Factors:

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

Bucket Specifications			Dimensions			
S.A.E. Rated Capacity (Cu. Yds.)	Weight Pounds	Outside Width (Inches)	A	B*	C	D
3	1600	95½"	17' 5"	3' 7"	7' 3"	14' 8½"
2½	1500	90"	17' 3"	3' 6"	7' 4½"	14' 5"
2	1450	90"	16' 7"	3' 4"	7' 11½"	14' 2"
1¾	1200	84½"	16' 6"	3' 3"	8' 1½"	13' 10"
1½	1050	84½"	16' 3½"	3' 1"	8' 3"	13' 7½"
1¼	990	84½"	16' 1"	3' 0"	8' 3½"	13' 6"
1	900	76"	15' 11"	2' 11"	8' 5½"	13' 2½"
* For Reach to Tires Deduct 2½"						

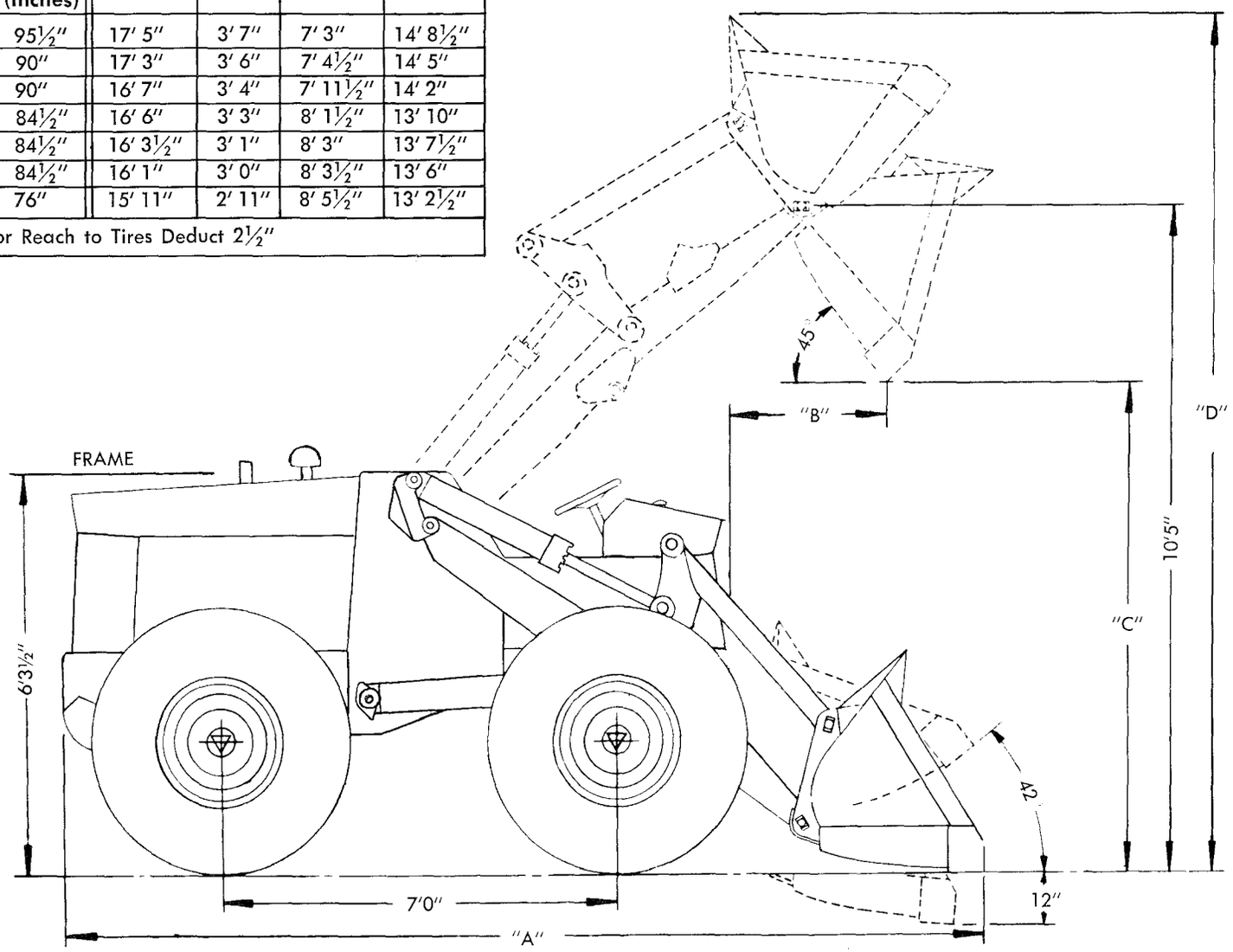

Figure 6. Loader Dimensions (General Purpose Bucket)
(T-27989)

SPECIFICATIONS OF LUBRICANTS

A. ENGINE CRANKCASE LUBRICANT

USE NON-CORROSIVE "DIESEL" ENGINE CRANKCASE OIL CONTAINING ADDITIVES WHICH WILL PREVENT SLUDGE OR GUM DEPOSITS.

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

The oil should meet the American Petroleum Institute (API) Diesel classification of "For Service DS" or "Series 3."

"For Service DS" or "Series 3" oils contain additives which promote general cleanliness within the engine and prevent the formation of sludge, hard carbon, and varnish deposits on/or within engine parts.

Detergent type oils will become darker in color within a short period of operation. The darkening of the oil is due to minute particles of carbon being suspended in the oil. One of the primary functions of a detergent type oil is to hold the carbon particles in suspension; therefore, darkening of the oil is normal and should not cause concern.

Suppliers of lubricants recognize the importance of the qualities required for use in our equipment and they are cooperating fully to assure the use of only those oils which fulfill these requirements. The lubricant supply source is to be held responsible for the results obtained from their product.

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

NOTE

If "For Service DS" or "Series 3" oil is not available through your oil distributor in the viscosities recommended, use oil of the viscosity recommended by the particular oil distributor and/or supplier.

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

B. TRANSMISSION AND CONVERTER LUBRICANT (Symbol EO or TF)

SAE 10W lubricating oil meeting Automatic Transmission Fluid "Type C-1" specification and American Petroleum Institute (API) classification "MS" and Military specification MIL-L-2104A or MIL-L-2104B GRADE 10W is now specified for use. However, Transmission Fluid "Type C-1" may still be used if so desired. "For Service DS" or "Series 3" oil is not recommended.

When atmospheric temperature is below -10°F., 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. DIFFERENTIAL LUBRICANT (Symbol MGO)

Both the differentials use Multipurpose (E.P. type) gear oil of the following viscosities:

ATMOSPHERIC TEMPERATURE	VISCOSITY
Above 32° F.	Use SAE 140
32° F. and below	Use SAE 90

D. PLANETARY HUB LUBRICANT (Symbol MGO)

All four planetary hubs use Multipurpose (E.P. type) gear oil. Use SAE 90 both Summer and Winter.

E. PRESSURE GUN LUBRICANT (Symbol PGL)

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

F. HYDRAULIC SYSTEM LUBRICANT (Symbol HO or EO)

Hydraulic oil meeting the following specifications is recommended:

		ASTM Test Method
Viscosity @ 0°F., sec., max.	12000	D 343
Viscosity @ 100°F., secs.	150-190	D 88
Viscosity Index, min.	90	D 567
Flash Point, deg. F., min.	370	D 92

		ASTM Test Method
Neutralization No., mgs. KOH/g. oil	0.10	D 664
Aniline Point, deg. F.	180-220	D 611
Oxidation Stability, hrs., min.	1000	D 943
Pour Point, deg. F., min.	Minus 20	D 97
Rust Test	Pass	D 665
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 for Service MM, MS, DG, MD, 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 viscosity specifications and classifications and recommended by reputable oil companies.

SPECIFICATIONS OF FUEL

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
Ash	.02 of 1% Max.
Conradson Carbon	.03 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 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 end point are important. High volatility is required to enable complete vaporization of the fuel, clean combustion, and low residue formation.

The flash point of a fuel has no quality significance, but 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. At times it may be necessary to use fuel with no lubricating properties. If this occasion arises, add one quart of SAE 10 engine oil to every 10 gallons of fuel. When the proper fuel is again available, the fuel system must be drained before the proper fuel is added.

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 from 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 pump and fuel injection nozzles.

A portable storage tank provides the best method of 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 loader 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 can be provided in the bottom of the 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 it is added to the fuel tank with the loader. It is advisable to use a pump and draw the fuel from the storage tank, or barrel, rather than to drain it from the bottom of the 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 the plugs are tight.

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

PERIODIC LUBRICATION AND PREVENTIVE MAINTENANCE

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

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

SERVICE AND LUBRICATION GUIDE TABLE — TL-14D

Service Point No.	Identification of Service Point	No. of Points	Recommended Lubrication	Service Intervals				
				10	50	100	500	1000
1, 29	Engine Crankcase*	1	EO	✓	*	X		
2, 20, 35	Hydraulic System	1	HO	✓	....	✓	....	OX
3, 38	Transmission and Converter (Oil Level)	1	EO or TF	✓	....	....	....	X
4, 16	Radiator (Coolant Level-Check Care for Plugging)	1	.....	✓	....	✓		
5, 21	Batteries	12	.....	✓	....	✓		
6	Tires (Pressure and Inspection)	8	.....	✓				
7	Axle Breathers	2	.....	✓				
8, 23	Hydraulic Tank Breather	1	.....	O	....	X		
9	Fuel Tank (Fill)	1	.....	✓				
10, 11, 32	Fuel Tank Drain Cock, 1st and 2nd Stage Fuel Filters	3	.....	✓	....	....	X	
12	Steering Linkage Lubrication Fittings	9	PGL	+				
13	Loader Linkage Lubrication Fittings	18	PGL	+				
14	Engine Air Cleaner (Service Element)	1	.....	....	O			
15	Universal Joint Assembly, Converter to Transmission — Lube	3	PGL	....	+			
17, 36	Axle Differentials	2	MGO	....	....	✓	....	X
18, 37	Planetary Hubs	4	MGO	....	....	✓	....	X
19	Brake Master Cylinder (Fluid Level)	1	BF	....	....	✓		
22	Hydraulic System Filters — Screen and Magnet	4	.....	....	....	XO		
24	Universal Joint Assy., Transmission to Differentials — Lube	6	PGL	....	....	+		
25	Hydrovac Unit — Oil Level	1	VCO	....	....	+		
26	Water Pump Bearings	1	PGL	....	....	+		
27	Fan Pulley	1	PGL	....	....	+		
28	Transmission, Control Valve and Accelerator Linkage	35	EO	....	....	+		
30	Engine Oil Filter	1	.....	....	....	X		
31	Steering Gear (Oil Level)	1	SGL	....	....	....	✓	
33	Transmission Oil Filter	1	.....	....	....	....	X	
34	Steering Axle Trunnion Socket	2	PGL	....	....	....	+	
39	Transmission Strainer (Clean)	1	.....	....	....	....	....	O

KEY

EO — Engine Lubricating Oil
HO — Hydraulic Oil
TF — Transmission Fluid — (See "SPECIFICATIONS OF LUBRICANTS")
PGL — Pressure Gun Lubricant (Ball and Roller Bearing Lubricant with Min. Melting Point of 300° F. and must be waterproof)
MGO — Multi-Purpose Gear Oil (See "SPECIFICATIONS OF LUBRICANTS")
BF — Brake Fluid (S.A.E. 70R3, or Equivalent)
SGL — Steering Gear Lubricant (GMC — 4567M or Equivalent)
VCO — Vacuum Cylinder Oil (Bendix Vac. Cyl. Oil, Delco Shock Absorber Fluid, or Equivalent)
* — Initial Oil Change is at 50 Hours — All others are at 100 hour intervals.

✓ — Check
X — Change
+ — Lubricate
O — Clean

LUBRICATION GUIDE

IMPORTANT: Thoroughly clean all lubrication fittings, caps, filler and level plugs and their surrounding surfaces before servicing. Prevent dirt from entering with the lubricant. The lubricant should be warm (operating temperature) when draining at oil change intervals.

The intervals given in this guide are based on normal operation; perform these services, inspections, etc. more often (as necessary) for operation under abnormal and severe conditions.

10-HOUR SERVICES

INSPECT:

1. ENGINE CRANKCASE - OIL LEVEL

   Check the oil level and add oil through the crankcase oil filler pipe if necessary to raise the level to the "FULL" mark on the gauge rod (Fig. 7).

2. HYDRAULIC SYSTEM - OIL LEVEL

   Clean the top of the hydraulic tank at the filler plug location. Be certain that the loader is level, the dump cylinders are fully retracted, and that the bucket is lowered to ground level. Remove the oil level dip-stick and the oil filler plug (Fig. 8), and dry the dip-stick with a clean cloth. Insert the dip-stick back into the tank, resting the filler plug on top of the oil filter cover. Withdraw the dip-stick and note the oil level. The oil level should be even with the ring groove in the dip-stick. Add oil as necessary to raise the oil in the tank to the proper level. Install the dip-stick and the oil filler plug, and tighten securely. Refer to "HYDRAULIC SYSTEM" for detailed information.

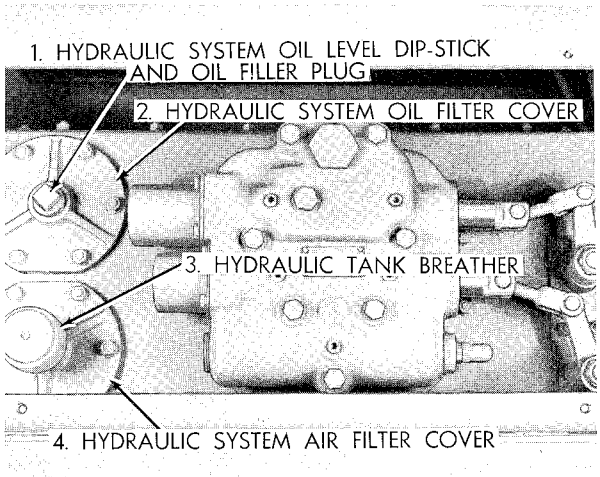

Figure 8
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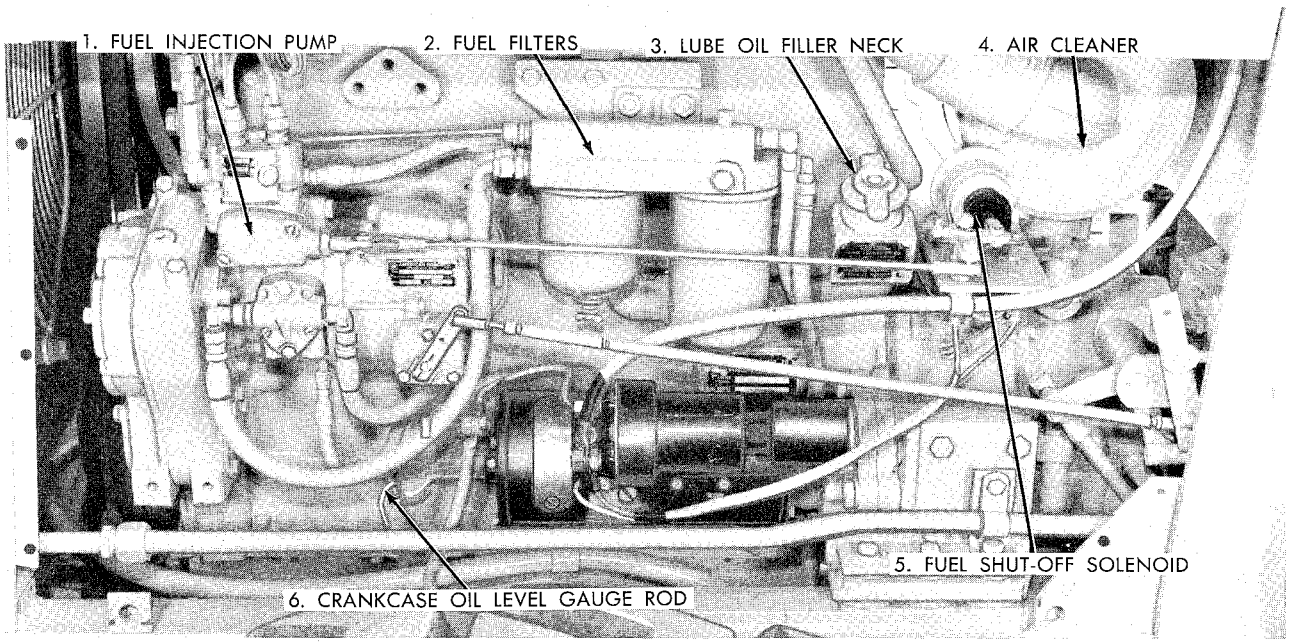

Figure 7
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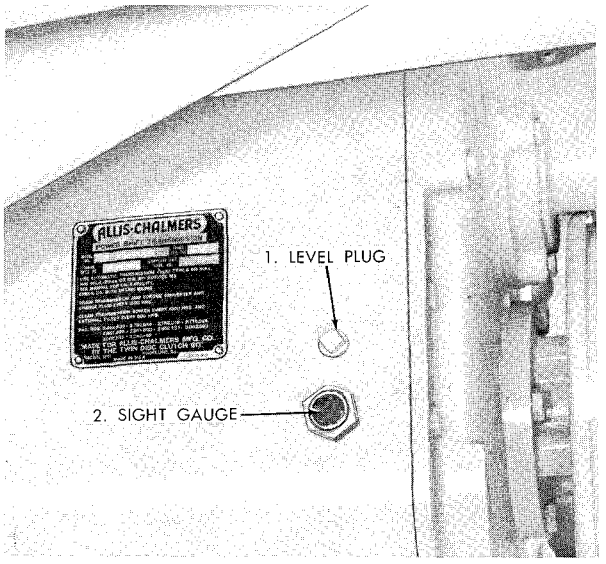


Figure 9
(T-38453)

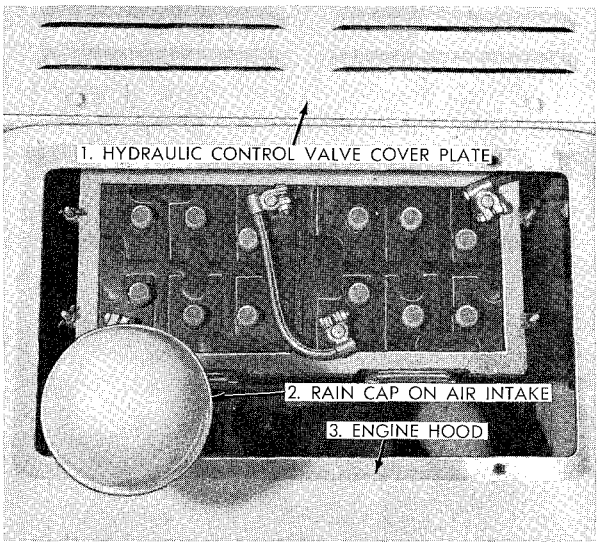


Figure 10
(T-38455)

3. TRANSMISSION AND CONVERTER - OIL LEVEL

Before starting the engine remove the transmission level plug (Fig. 9) from the lower right hand side of the transmission. If no oil appears, add oil through the transmission filler pipe until a free flow of oil appears at the plug hole. Replace the plug. Start the engine and after transmission reaches operating temperature, check the level of the oil in the sight gauge. If no oil is visible, add oil through the filler neck until it appears half way up on the sight gauge. The engine should be running at idle speed during the checking operation.

4. RADIATOR - COOLANT LEVEL

Remove the radiator cap and check the level of the coolant. Keep the coolant level within approximately 1 inch below the bottom of radiator filler pipe by the addition of clean, soft water or antifreeze solution.

CAUTION

Do not remove the pressure type radiator cap while the coolant is near 212°F., or above, as the coolant will break into a boil and splash onto the person removing the cap. Refer to "ENGINE COOLING SYSTEM" for detailed information.

5. BATTERIES

Remove the capscrews and battery compartment hatch from the forward end of the engine compartment hood. Clean and remove the 12 filler caps (Fig. 10). Inspect the electrolyte level and add clean distilled water to keep the level 3/8-inch above the plates. Install and tighten the filler caps. Keep the top of the batteries clean and their terminals free from corrosion. Test the batteries with a hydrometer every 100 hours. Refer to "ELECTRICAL SYSTEM" for detailed information.

6. TIRES - PRESSURE AND INSPECTION

Check the tires for proper inflation (Page 5), and remove any stones lodged in cuts. Check tires for cuts and bruises. If a cut is suspected of being deep enough to injure the cord, the tire should be removed at once and cut repaired. Continued operation with tires having deep cuts will result in short tire life. Refer to "TIRES" for detailed information.

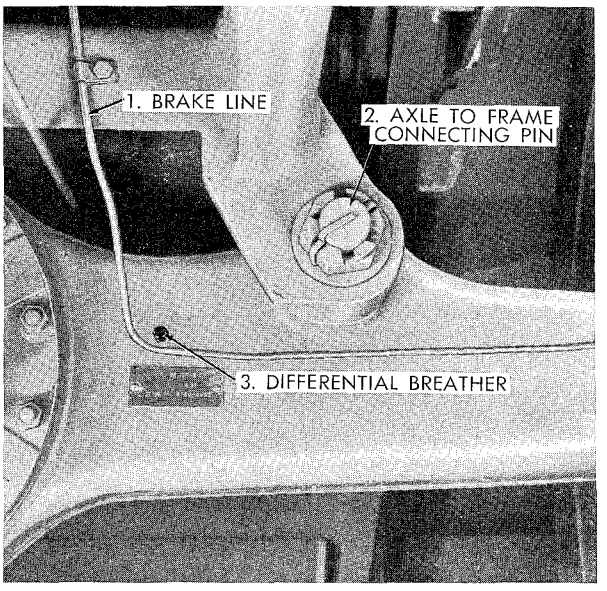


Figure 11
(T-28748)

7. AXLE BREATHERS

Press caps located on each of the differential carrier housings (Fig. 11) and at the outer ends of the front axle housing several times to be sure the breathers are free to function.

SERVICE:

8. HYDRAULIC TANK BREATHER

Remove the screw and the lockwasher attaching the breather cap (Fig. 8) to the base. Remove the breather cap and element. Wash the element in a clean solvent or fuel oil, dry with compressed air (from inside out) and dip the element in clean oil. Shake off excess oil and reinstall the element, breather cap and the screw (with lockwasher).

NOTE

Hydraulic suction line screen and magnet - It is important that these parts be cleaned daily during the first week of operation, or until the amount of foreign material collected daily has practically disappeared. Thereafter, the suction line screen and the magnet, located inside the hydraulic tank, should be removed and cleaned after every 100 hours of operation, or more often if conditions warrant. (Refer to "HYDRAULIC SYSTEM" for detailed information.)

9. FUEL TANK - FILL

Fill the tank at the end of each operating period to keep condensation in the tank to a minimum. Refer to "SPECIFICATIONS OF FUEL."

10. FIRST STAGE AND SECOND STAGE FUEL FILTERS - DRAIN

Open drain cock (Fig. 32) in the bottom of first and second stage fuel filters daily (or as often as conditions warrant), and allow any sediment to drain; close drain cocks when clean fuel runs out. Perform this service before the start of the day's operation in warm weather or shortly after the end of the day's operation in freezing weather.

11. FUEL TANK DRAIN COCK

Open the fuel tank drain cock and close when clean fuel runs out (Fig. 31).

LUBRICATE:

12. STEERING LINKAGE LUBRICATION FITTINGS

Steering Arm Pivot Pin - 1 Lube Point (Fig. 12). Lubricate with pressure gun lubricant.

Drag Links - 4 Lube Points. Two in the short drag link and two in the long drag link (Fig. 12). Lubricate with pressure gun lubricant.

Tie Rod - 2 Lube Points, one in each end (Fig. 23). Lubricate with pressure gun lubricant.

Steering Axle Pivot Pins - 2 Lube Points (Fig. 21). Lubricate with pressure gun lubricant.

13. LOADER LINKAGE LUBRICATION FITTINGS

Booms - 4 Lube Points, two in each boom, front and rear (Figs. 13 and 14). Lubricate with pressure gun lubricant.

Dump Cylinders - 2 Lube Points - at the rear end of each cylinder (Fig. 14). Lubricate with pressure gun lubricant.

Cross Links - 6 Lube Points, 2 at the lower end, 2 at the center, and 2 at the top (Fig. 13). Lubricate with pressure gun lubricant.

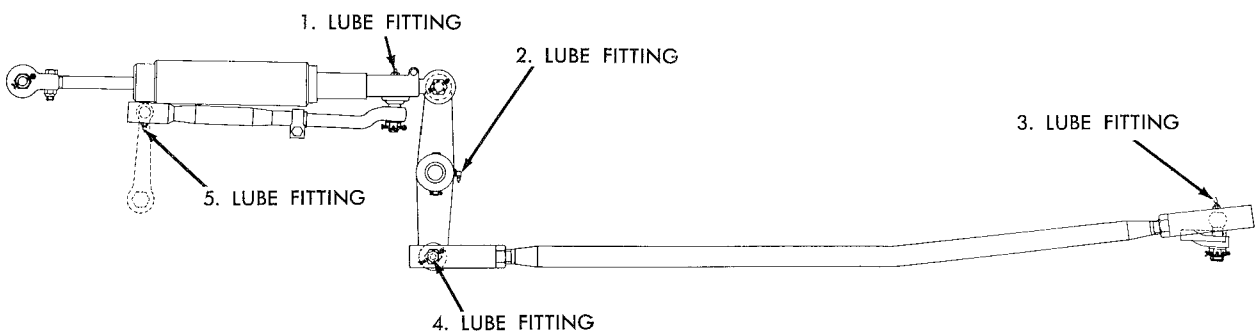


Figure 12
(T-32718)

Lift Cylinders - 4 Lube Points, 2 at the rear and and 2 at the front end (Figs. 13 and 14). Lubricate with pressure gun lubricant.

Dump Links - 2 Lube Points at the front end (Fig. 13). Lubricate with pressure gun lubricant.

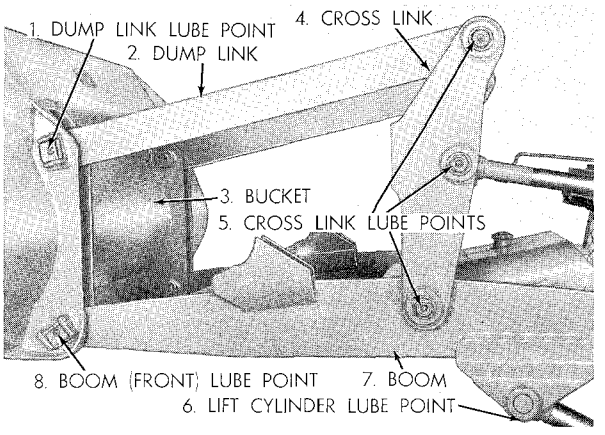


Figure 13
(T-28822)

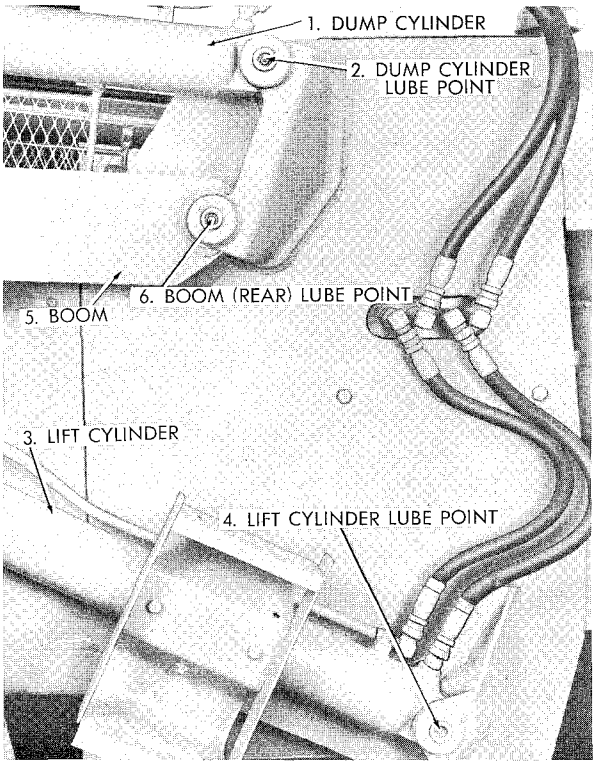


Figure 14
(T-27978)

50-HOUR SERVICES

NOTE

Also perform the 10-Hour Services.

SERVICE:

14. ENGINE AIR CLEANER - CLEAN ELEMENT

Remove air cleaner element (Fig. 15) and service. Refer to "AIR CLEANER" for detailed information.

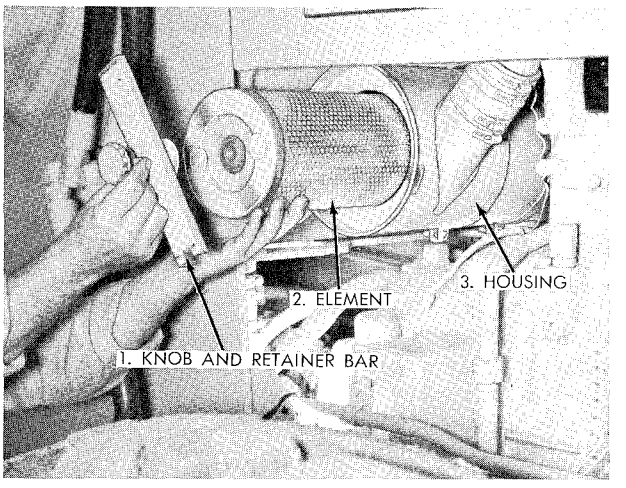


Figure 15
(T-38456)

LUBRICATE:

15. UNIVERSAL JOINT ASSEMBLY - CONVERTER TO TRANSMISSION

3 Lube Points - 1 in each of the 2 universal couplings and 1 in the slip yoke shaft between converter and transmission. Lubricate with a good grade of "Universal Joint Grease." The general specification of a good standard of universal joint grease is a ball and roller bearing lubricant with a minimum melting point of 300°F. and must be waterproof.

100-HOUR SERVICES

NOTE

Also perform the 10 and 50-Hour Services.

INSPECT:

16. RADIATOR

Check the core exterior for plugging. Clean with water or air if necessary.

17. AXLE DIFFERENTIALS - OIL LEVEL

Check the oil level in both differentials, and add lubricant, if necessary, through the oil level plug (Fig. 17). Refer to "SPECIFICATIONS OF LUBRICANTS."

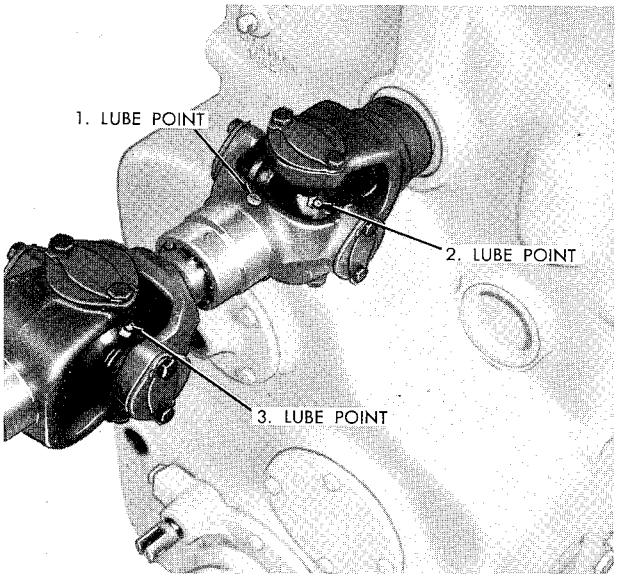


Figure 16
(T-40633)

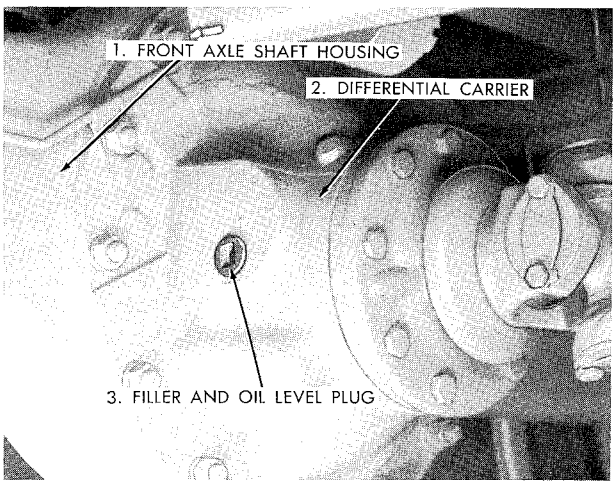


Figure 17
(T-28818)

18. PLANETARY HUBS - OIL LEVEL

Check the oil level in all 4 planetary hubs, add lubricant if necessary, to level of the level plug (Fig. 18). Before checking the oil level, rotate each wheel so that the filler plug on the hub is on top. Add oil through the filler plug until oil appears at the level plug. Refer to "SPECIFICATIONS OF LUBRICANTS."

19. MASTER BRAKE CYLINDER - FLUID LEVEL

Remove the filler plug (Fig. 25) and check the fluid level. If necessary, add brake fluid (SAE 70R3, or its equivalent) and fill to 3/4 inch under the filler plug. Reinstall the filler plug securely.

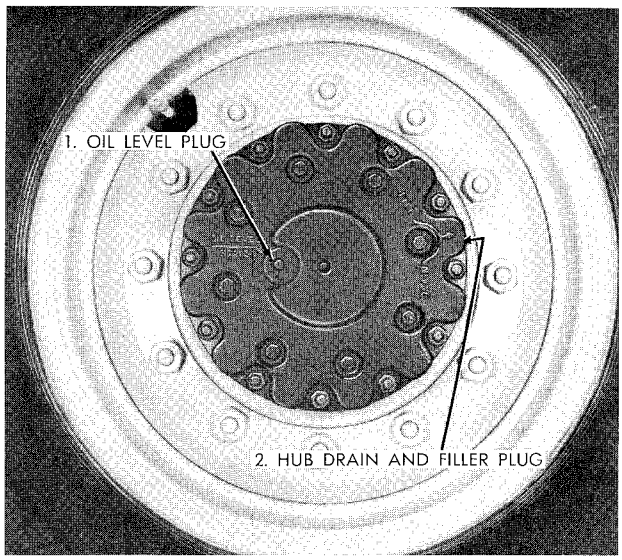


Figure 18
(T-38458)

20. HYDRAULIC SYSTEM

Hydraulic Hoses, Lines and Fittings - Check all hoses, lines and fittings for leaks. Tighten or replace, if necessary. Refer to "HYDRAULIC SYSTEM" for detailed information.

Hydraulic Cylinder Piston Rod Packing - Adjustments - Check the packing adjustments of the lift and dump cylinder piston rods. Refer to instructions in "HYDRAULIC SYSTEM" under "GENERAL CARE OF HYDRAULIC SYSTEM."

21. BATTERIES

Test with hydrometer for specific gravity of each cell. Maintain electrolyte level as indicated on cap by adding clean distilled water. Refer to "ELECTRICAL SYSTEM" for detailed information.

SERVICE:

22. HYDRAULIC SYSTEM FILTERS - SCREEN AND MAGNET

Hydraulic System Oil Filter - Replace Element - Clean off oil filter cover (Fig. 8) and surrounding area. Remove filter cover, cover gasket, and old element. Clean inside of the gasket case. Be certain that spring and metal washer are in position on the pipe in the bottom of the filter case. Insert a new element, install a new gasket, and install the filter cover. Refer to "HYDRAULIC SYSTEM" for detailed information.

Hydraulic Tank Air Filter - Replace Element - Clean off the air filter cover located at the top left rear of the hydraulic tank (Fig. 8). Remove the filter cover (with the tank breather), the cover

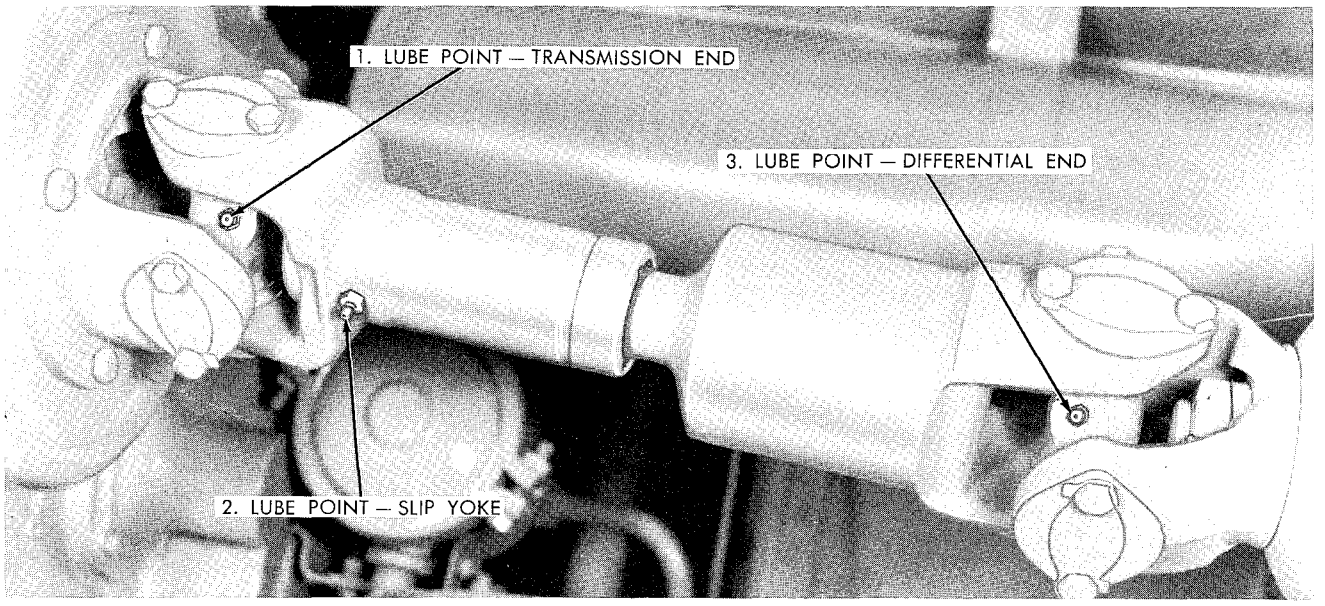


Figure 19
(T-40631)

gasket, and the old element. Clean the inside of the filter case. Insert a new filter element (with open end upward) and center the element within the case. Install a new cover gasket and install the filter cover. Refer to "HYDRAULIC SYSTEM" for detailed information.

Hydraulic Suction Line Screen and Magnet - Clean - Refer to Service Point No. 8, "NOTE". The suction line screen and magnet should be cleaned every 100 hours of operation, or more often if conditions warrant.

23. HYDRAULIC TANK BREATHER - REPLACE ELEMENT

Remove the screw and lockwasher attaching the breather cap (Fig. 8) to the base. Remove the breather cap element and discard. Dip the new element, in clean oil and shake off excessive oil. Install the new element, breather cap, and the screw (with lockwasher).

LUBRICATE:

24. UNIVERSAL JOINT ASSEMBLIES - TRANSMISSION TO AXLE

6 Lube Points. 1 in each of the 4 universals and 1 in each of the 2 slip yoke shafts. Lubricate with a good grade of "Universal Joint Grease." The general specification for a good standard of universal joint grease is a ball and roller bearing lubricant with a minimum melting point of 300°F. and must be waterproof.

25. GENERATOR, STARTER, AND HYDROVAC UNIT

Generator - The generator is equipped with sealed bearings. No lubrication is required.

Starter Motor - The starter motor is equipped with life long lubrication. No lubrication is required.

Hydrovac Unit - Oil Level - The hydrovac unit is located under the floor plate at right front of loader and is accessible from underneath. To lubricate, remove the 1/8-inch pipe plug (Fig. 59) located in the front end of the vacuum power cylinder, and inject vacuum cylinder oil into the cylinder until oil runs from the filler hole. Approximately two fluid ounces of oil are required to insure proper lubrication of cylinder piston.

Hydrovac Unit - Air Cleaner - Remove the air cleaner from hydrovac. Wash in parts cleaning solvent and allow to dry. Apply light engine oil to hair element, allow excess to drain off and reinstall air cleaner.

26. WATER PUMP BEARINGS

1 Lube Point. Lubricate with 2 to 3 shots of pressure gun lubricant (Fig. 20).

27. FAN PULLEY

1 of 2 Lube Points in the fan pulley, 180° apart. Lubricate with 1 to 2 shots of pressure gun lubricant. (Fig. 29.)

28. TRANSMISSION, CONTROL VALVE AND ACCELERATOR LINKAGE

Transmission Control Linkage - 16 Lube Points. Lubricate with SAE 20W motor oil.

Control Valve Linkage - 12 Lube Points. Lubricate with SAE 20W motor oil.

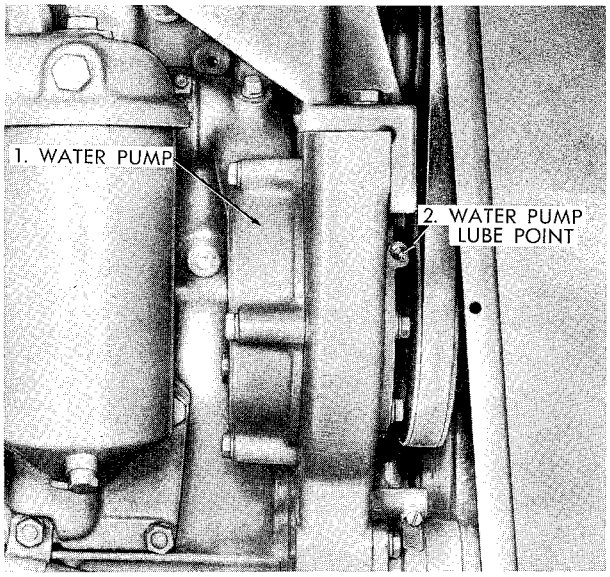


Figure 20
(T-28739)

Accelerator Linkage - 7 Lube Points located along linkage from accelerator pedal to the fuel injection pump. Lubricate with SAE 20W motor oil.

SERVICE:

29. ENGINE CRANKCASE - CHANGE OIL

NOTE

The initial engine oil change is to be made after the first 50 hours of operation. All subsequent changes will be at 100 hour intervals. Operating conditions may necessitate this service at shorter intervals.

Remove drain plug located on the right side of crankcase sump and allow oil to drain. Change the oil filter (see Service Point No. 30 below). Reinstall drain plug and refill (capacity 12-1/2 quarts) with specified oil. Fill the "FULL" mark on the oil level gauge rod.

CAUTION

Under no circumstances should a corrosive engine lubricating oil be used.

30. ENGINE OIL FILTER - REPLACE ELEMENT

When oil is drained from engine crankcase (see Service Point No. 29 above) remove the filter element (Fig. 38) and discard it. Clean filter base and filter shell and install a new assembly. Refer to "ENGINE LUBRICATION SYSTEM" for detailed information.

500-HOUR SERVICES

NOTE

Also perform 10, 50 and 100-Hour Services.

INSPECT:

31. STEERING GEAR - OIL LEVEL

Remove the filler plug (refer to "POWER STEERING") from gear housing and check level of the oil. Fill to level of filler plug, if necessary, and install filler plug. Use GM-4673M steering gear lubricant, or its equivalent.

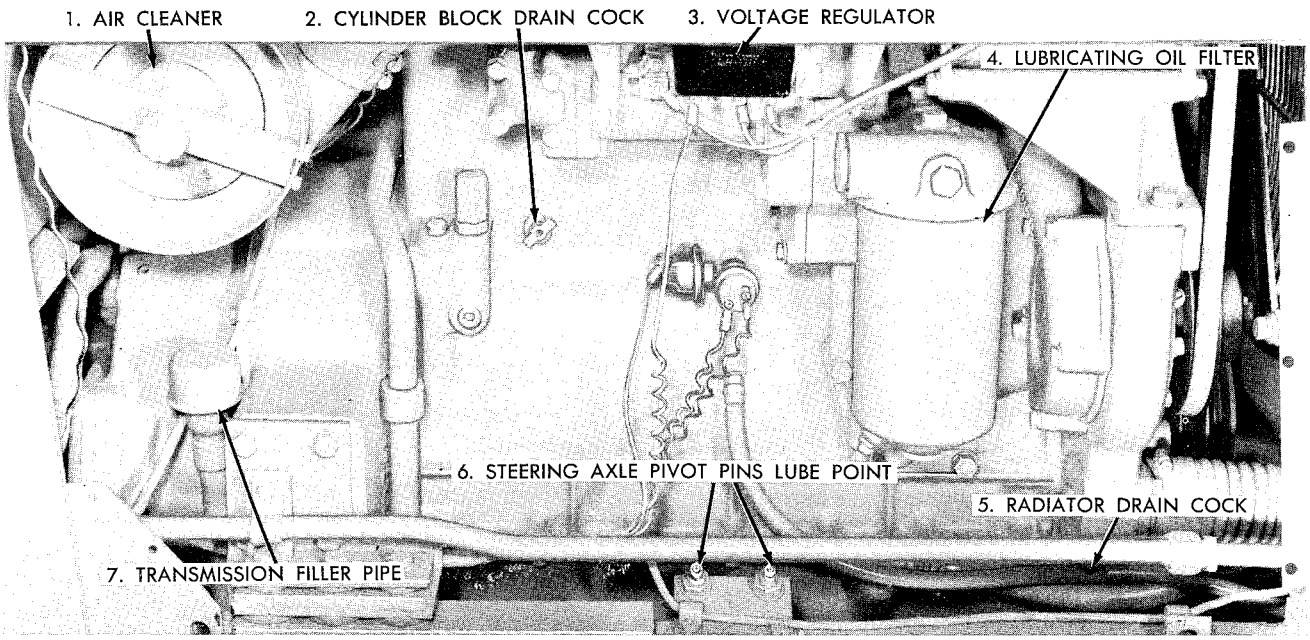


Figure 21
(T-38457)

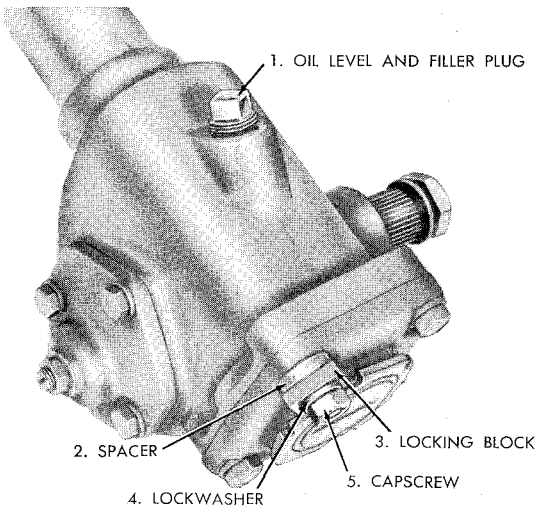


Figure 22
(T-28728)

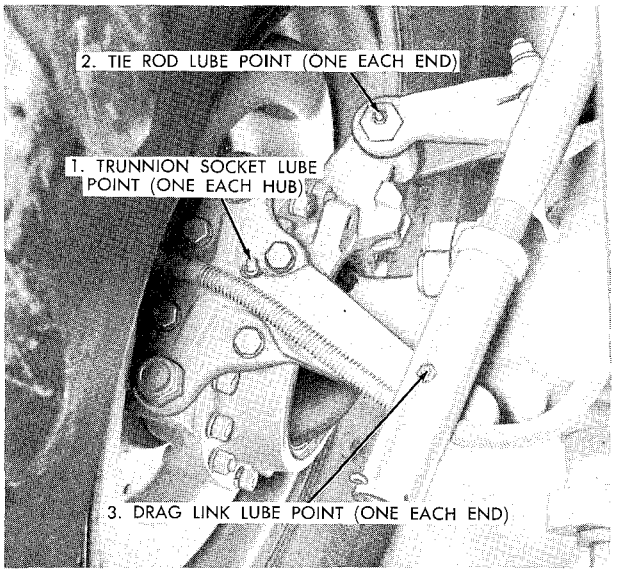


Figure 23
(T-38459)

SERVICE:

32. FIRST AND SECOND STAGE FUEL FILTERS - CHANGE ELEMENTS

Install a new element in each fuel filter (Fig. 33) after approximately every 500 hours of operation. Do not attempt to clean clogged filter elements. Refer to "FUEL SYSTEM" for detailed information.

33. TRANSMISSION OIL FILTER - REPLACE

Thoroughly clean filter cover and surrounding area. Loosen capscrews in the filter cover clamp and allow filter to drain. Remove clamp, filter cover, gasket and filter element. Thoroughly clean interior of the filter case. Install a new filter element, cover gasket and filter cover. Secure cover with the cover clamp.

LUBRICATE:

34. STEERING AXLE TRUNNION SOCKET

2 Lube Points, 1 located in each steering arm (Fig. 23). Lubricate with 3 shots, or approximately 1 ounce of grease. DO NOT OVERGREASE! Use "Marfax" No. 2 heavy duty grease, or its equivalent. Each trunnion socket should be lubricated every 500 hours of operation, or more often if conditions warrant.

1000-HOUR SERVICES

NOTE

Also perform 10, 100 and 500-Hour Services.

SERVICE:

35. HYDRAULIC SYSTEM - DRAIN, FLUSH, AND REFILL

Remove the drain plug located in bottom front right side of the tank and allow oil to drain. Flush tank and clean suction line screen and magnet, and install new filter element. Refill with new oil. Use SAE 10W oil. For extremely cold weather, dilute the oil with the best grade of kerosene. DO NOT USE AN OIL THAT FOAMS! This service should be performed more often if the oil shows signs of discoloration. Refer to "HYDRAULIC SYSTEM" for detailed information.

36. AXLE DIFFERENTIALS - CHANGE OIL

Remove filler plug (Fig. 17) and drain plug. Allow oil to drain and replace drain plug. Refill with multi-purpose (refer to "SPECIFICATIONS OF LUBRICANTS") gear oil to the filler plug level. Capacity of differential is 2-3/4 gallons each. Reinstall filler plug.

37. PLANETARY HUBS - CHANGE OIL

Remove drain plug, located at outer rim of the hub housing (Fig. 18) and drain by turning wheel until opening is at the bottom of hub. Turn wheel so that the "Level Mark" is in the horizontal position. Refer to Service Point No. 18. Refill with correct lubricant. Refer to "SPECIFICATIONS OF LUBRICANT."

38. TRANSMISSION AND CONVERTER - CHANGE OIL

Remove the drain plug located in the lower rear face of the transmission housing and allow oil to drain completely.

NOTE

Replace transmission oil filter and clean suction line strainer.

Refer to Service Point 33. Reinstall the drain plug and refill transmission. Transmission capacity including converter is approximately 8 gallons. Refer to "SPECIFICATIONS OF LUBRICANTS" and "TORQUE CONVERTER AND TRANSMISSION" for detailed information.

39. TRANSMISSION STRAINER

Remove square headed pipe plug (Fig. 24) from transmission strainer projection at lower rear of transmission and remove strainer. Thoroughly clean inside of strainer housing to remove sediment left by strainer. Thoroughly clean strainer in mineral spirits, using a soft bristle brush. Replace strainer in housing. Install pipe plug and tighten securely. Refer to Service Point 33.

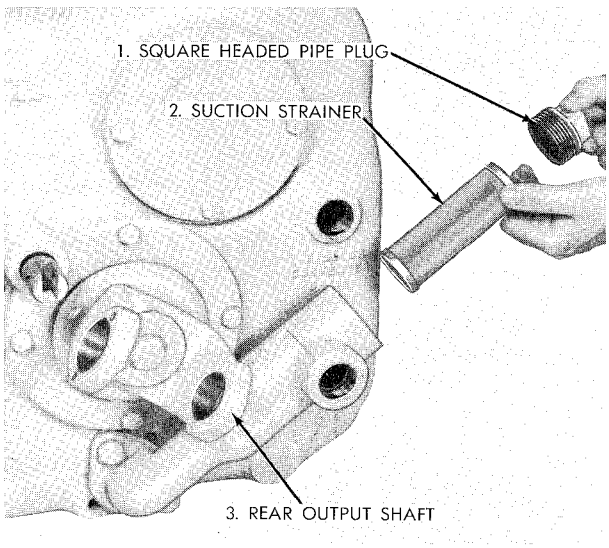


Figure 24
(T-40632)

PERIODIC SERVICES

Axle Anchor Pins - Torque anchor pins (axle to frame) to 1000 to 1100 lbs. ft. every 100 hours of operation.

Capscrews, Nuts and Pins - Check entire unit to be sure that all capscrews, nuts and pins are tight.

Engine Breather Tube - Remove the tube (Fig. 7), wash in solvent and blow out with compressed air.

Engine Cooling System - Drain and flush periodically. Keep the cooling system filled with clean soft water. In freezing weather use permanent type (Glycol base) anti-freeze solution. Refer to "ENGINE COOLING SYSTEM" for detailed information.

Engine Radiator - Check core for plugging. Clean with water or air if necessary.

First and Second Stage Fuel Filters - Install a ne element in each fuel filter (Fig. 7) after approx mately every 500 hours of operation. Do not attem t to clean clogged filter elements. Refer to "FUE L SYSTEM" for detailed information.

Fuel Tank - Drain water and sediment from fuel tank. If a large accumulation of water, rust and scale is evident, drain and flush the tank.

Hydraulic Control Valve - Torque the hold-down capscrews to 50-60 lbs. ft.

Hydraulic Pump - Tighten capscrews if necessary.

Hydraulic Tank Mounting - Check mounting capscrews and tighten if necessary.

Tire Pressure - The correct tire pressure should be maintained because under or over inflation causes excessive wear and damage. Uneven tire pressure can also cause hard steering. Maintenance of correct inflation pressure is one of the most important elements in tire care.

NOTE

All new machines shipped from the factory have over-inflated tires to facilitate shipping tie-down procedures.

Vacuum Hydraulic Unit - Fluid in the vacuum hydraulic units is checked by inspecting fluid in the master brake cylinder. Remove master brake cylinder filler plug. Fluid level should be 3/4 inch below the bottom of filler plug opening. If necessary, add brake fluid, 70R3, or its equivalent. Inspect vent in the filler plug to be sure it is unobstructed. Reinstall filler plug.

Wheel Lug Nuts - Torque the lug nuts holding wheels to hub to 300 to 350 lbs. ft.

PERIODIC ADJUSTMENTS

Brake Adjustment - Check brake lining periodically for normal lining wear. If adjustment is needed, refer to "POWER BRAKES" for detailed information.

Brake Pedal Adjustment - Check adjustment of each brake. Keep brakes adjusted so that brake pedals have 1" to 1-1/2" free travel before brake application begins. Refer to "POWER BOOSTER BRAKES" for detailed information.

Generator, Fan and Water Pump Drive Belts - The generator, fan and water pump drive belts are properly adjusted when belts can be pressed inward approximately 1/2" - 3/4" at a point halfway between generator and fan pulleys. Adjust belts when slippage is evident. Refer to "ELECTRICAL SYSTEM" for detailed information.

Hydraulic System - The hydraulic tank is designed so that with little periodic service, top performance can be maintained indefinitely. Service of filter, breathers, suction line screen, etc., is dependent upon operating conditions. The dump line safety valve, return line safety valve, and check valve located inside hydraulic tank are properly adjusted at the factory and require no further adjustment. Check and adjust pressure relief valve, cylinder packing glands, piston rod wiper seals, hoses, lines and fittings and, if necessary, replace. Refer to "HYDRAULIC SYSTEM" for detailed information.

Power Steering Pump Belt Adjustment - The pump belt is properly adjusted when the top side of belt can be pressed downward approximately 3/8" at a point halfway between the crankshaft pulley and pump pulley. Adjust the belt when slippage is evident. Refer to "POWER STEERING" for detailed information.

Vacuum Pump Drive Belt Adjustment - The vacuum pump drive belt (Fig. 62) is properly adjusted when side of belt can be pressed inward approximately 1/2" at a point halfway between the crankshaft pulley and the pump pulley. Adjust belt when slippage is evident. Refer to "POWER BOOSTER BRAKES" for detailed information.

PREPARATION OF LOADER FOR USE

Fill the fuel tank with specified fuel. Use care to prevent the entrance of dirt and foreign matter while filling tank. Fill the engine cooling system with clean soft water or a suitable anti-freeze solution.

Check oil level in the engine crankcase, transmission, differentials, and planetary hubs. Lubricate all points where lube fittings are provided for use of a lubricating gun.

Check level of electrolyte solution in the battery; check level of brake fluid in master cylinder; check tire pressure.

NOTE

All new machines shipped from the factory have overinflated tires to facilitate shipping tie-down procedures. Reset all tires to correct pressure.

Check wheel lug nuts for tightness, and be sure that all of the capscrews on unit are tight.

NOTE

Check wheel lug nut torque daily for first four days of operation of new machine.

By tightening the capscrews now and at end of 10 hours of operation, the possibility of their becoming loose and enlarging capscrew holes will be eliminated.

Check the oil level in the hydraulic tank and be certain that oil is at the proper level on the dip-stick.

NOTE

Before checking the oil be sure that loader is on level ground.

Refer to "STARTING AND STOPPING THE ENGINE" below. Turn the fuel line shut-off cock to the open position and start engine. With engine running at full throttle, raise the booms to the horizontal position. Actuate bucket through its full travel several times to be certain that dump cylinders are full of oil, then fully retract dump cylinders. Move the boom control lever to "LOWER" position and lower bucket to ground level, then return control lever to its "NEUTRAL (HOLD)" position. Be sure that engine is running at full throttle when performing these operations. Stop engine and check the oil level in the hydraulic tank.

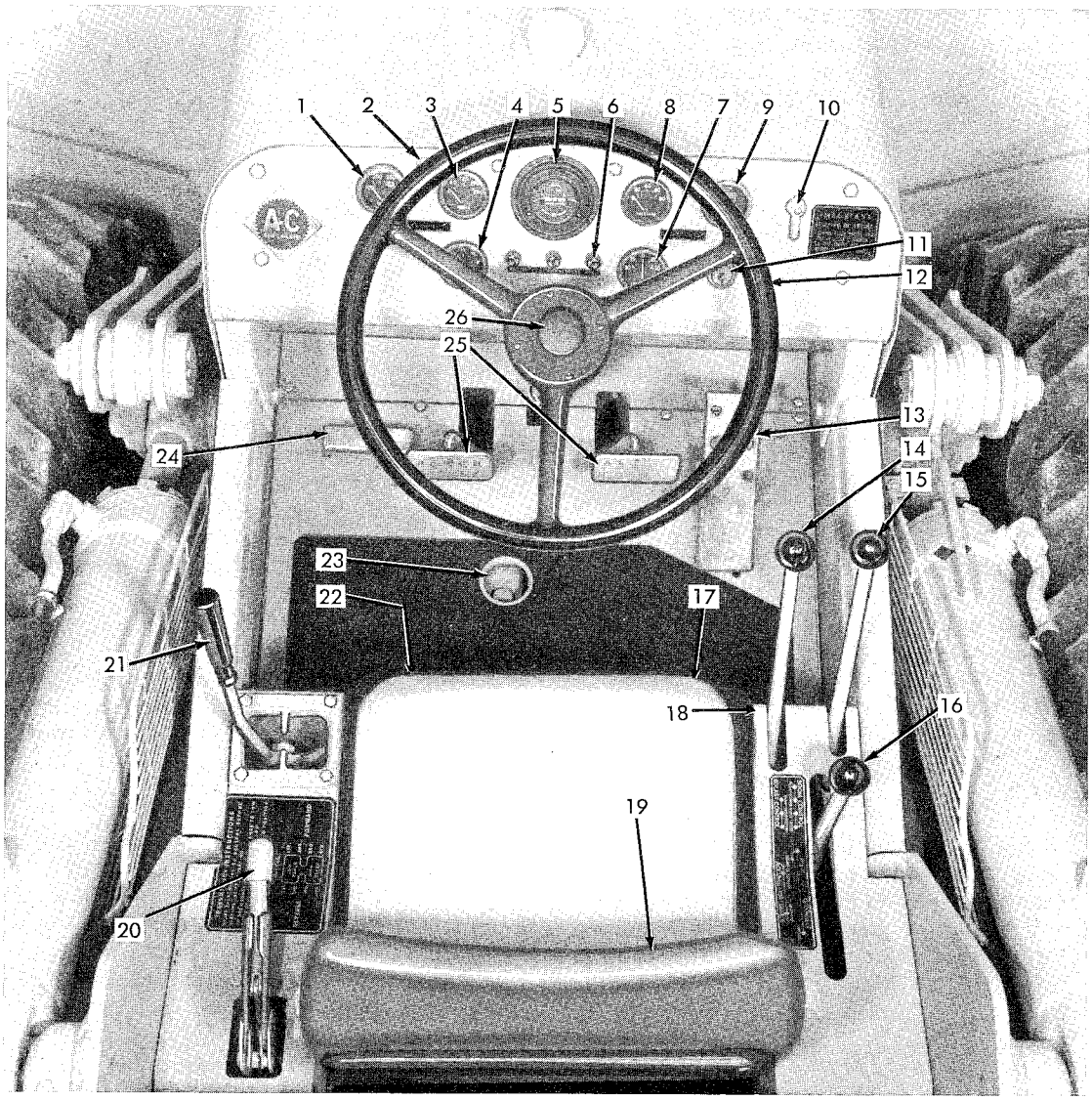
Start the engine. Operate loader controls and check for proper operation. Check all hoses, lines and fittings for oil leakage, and tighten the connections if necessary. Operate the loader with a light load for first 60 hours. The most efficient engine operation is obtained with engine coolant temperature held within a range of 170° to 190°F. Operating the engine with coolant temperature below this range will result in incomplete combustion with less power, and will cause harmful gummy deposits within the engine.

When operating in cold weather, provide a cover for the sides of the engine compartment if thermostat proves inadequate to maintain a normal operating coolant temperature of 170° to 190°F.

The hydraulic suction line screen and magnet, located in hydraulic tank, must be cleaned daily during the first week of operation, or until the amount of foreign material collected daily has practically disappeared. Thereafter, the screen and magnet should be cleaned after every 100 hours of operation (refer to "HYDRAULIC SYSTEM" for detailed information).

OPERATING CONTROLS AND INSTRUMENTS

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



1. Transmission Temperature Gauge
2. Instrument Panel Light (2)
3. Transmission Pressure Gauge
4. Fuel Gauge
5. Hour Meter
6. Fuses
7. Ammeter
8. Engine Oil Pressure
9. Engine Temperature Gauge
10. Light Switch
11. Starter (Key Turn) Switch
12. Starter Button (Not Shown)
13. Accelerator Pedal
14. Bucket Control
15. Boom Control
16. Rear Axle Disconnect Lever
17. Operator's Seat Locking Lever (Not Shown)
18. Clutch Cut-Off Valve Control (Not Shown)
19. Operator's Seat
20. Parking Brake Lever
21. Transmission Control Lever
22. Power Steering Cylinder Lube Point (Not Shown)
23. Master Brake Cylinder Filler Plug
24. Foot Rest
25. Brake Pedals
26. Horn Button

Figure 25. Operating Controls and Instruments (T-38462)

A. OPERATING CONTROLS

1. STARTING SWITCH AND BUTTON

A starting (key-turn) switch is located on the right side of the instrument panel. It has four positions - "FUEL SHUT-OFF," "OFF," "ON," and "START." Turn the switch to the "START" position and depress the starting button to actuate the starter. Release switch and button as soon as engine starts. In the event that the engine does not continue to run after the first few revolutions, the key must be released from the "START" position in order to give starter time to stop spinning. A second application of the key in the "START" position may then take place. After engine starts and the switch is released, it snaps back to the "ON" position and the ammeter and fuel gauge should operate immediately, followed by the rest of the gauges. To stop the engine, the key must be turned through the center or "OFF" position to "FUEL SHUT-OFF" position on extreme left and held in that position until the engine stops. In the "FUEL SHUT-OFF" position, a solenoid is actuated to cut the supply of fuel to the engine. When the engine stops, the key may be released from "FUEL SHUT-OFF" position and will automatically snap back to "OFF" position. While key is being held in "FUEL SHUT-OFF" position, the gauges and accessories will continue to work.

2. LIGHT SWITCH

The light switch, located on the right side of instrument panel, controls the main headlights, auxiliary headlights, back-up lights, tail light and instrument panel lights. It has four positions, "OFF," "DIM," "BRIGHT," and "AUXILIARY." The switch is turned from the vertical "OFF" position, counterclockwise, through its other three positions.

3. FUSE HOLDERS

Three fuse holders are located in the center of the instrument panel. From left to right they are as follows: Main fuse to ammeter; 30 amp fuse, auxiliary headlights and back-up lights; 10 amp fuse, main headlights, tail light and instrument panel lights; 10 amp fuse.

4. ACCELERATOR PEDAL

The accelerator pedal is located on the right front floor of the operator's compartment. It is connected by linkage to the governor on the fuel injection pump. The engine will run at idle when the pedal is not depressed; depress the pedal to increase the engine speed desired.

5. TRANSMISSION SPEED AND DIRECTION CONTROL LEVER

Transmission control, both speed and direction, is accomplished by a single lever. The transmission functions are controlled and carried out by hydraulic pressure, thereby eliminating the need of

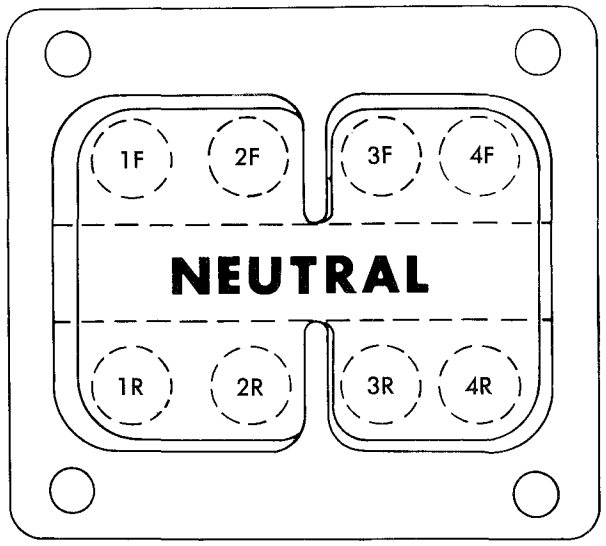


Figure 26. Shift Pattern
(T-32717)

a clutch pedal and customary "Declutching" operation on the part of the operator. The Full-Power-Shift transmission has four ranges — "1st," "2nd," "3rd" and "4th." The desired range is selected by moving the control lever toward or away from the operator; "1st" range being farthest to the left. Forward or reverse motion is obtained by moving the control lever in the direction desired; toward the instrument panel for forward motion and toward the parking brake lever for reverse.

It is possible to up-shift or down-shift the transmission at wide-open throttle regardless of the load. However, do not down-shift if the loader speed exceeds the maximum speed of the next lower range.

CAUTION

When changing direction, release the accelerator pedal while the lever is being moved.

6. CLUTCH CUT-OFF VALVE

The clutch cut-off valve is located below the operator's seat. When the clutch cut-off is operating, by depressing the brake pedal, it diverts all of the engine power from the transmission to the loader hydraulic pump. When operating on grades, this feature may be undesirable because the machine may move forward or backward momentarily before power can be restored to the transmission. Accordingly, a clutch control valve (check valve) is provided to disengage the automatic clutch release feature as desired. When changing the position of the cut-off valve, THE BRAKE PEDAL SHOULD BE FULLY RELEASED. In the "UP" position the clutch cut-off is disengaged.

7. STEERING WHEEL

The steering wheel is connected to the hubs of the steering axles through "power booster" linkage. When

the wheel is turned in either direction, a hydraulic cylinder and piston exerts pressure on the steering linkage in the direction of the turn. If the hydraulic power fails, the wheels can still be turned.

8. BRAKE PEDALS

The brake pedals are used to retard speed or stop the loader. The four-wheel power brake pedals are located one on each side of steering column. Either pedal actuates the master brake cylinder and vacuum hydraulic power unit.

9. PARKING BRAKE

The mechanical parking brake lever is located to the rear left side of the operator's compartment. The parking brake is located at the lower front side of the transmission at the drive shaft.

Pull the brake lever from the horizontal or "OFF" position, to the vertical "ON" position, to lock parking brake. The parking brake is operated independently of the service brakes. IT IS A GOOD HABIT TO SET THE PARKING BRAKE BEFORE LEAVING THE MACHINE, BUT BE SURE TO RELEASE IT BEFORE USING THE MACHINE AGAIN. The parking brake tension is adjusted by turning the knob at top of the lever.

10. BOOM CONTROL LEVER

The boom control lever and bucket control lever are located at right side of the operator's compartment. The boom lever is at the right of the bucket lever and is connected by linkage to the boom plunger in the control valve. The plunger is of the detent type and has four positions - "RAISE," "NEUTRAL (HOLD)," "LOWER," and "FLOAT."

11. BUCKET CONTROL LEVER

The bucket control lever, located at the left of the boom control lever, is connected by linkage to the bucket plunger in the control valve. The plunger is of the spring loaded type and, when released, automatically returns to its "NEUTRAL (HOLD)" position and the bucket will remain in the position to which it has been moved. The bucket is dumped by pushing forward on the control lever, and is returned to the "digging" position by pulling back on the control lever.

12. REAR AXLE DISCONNECT LEVER

The rear axle disconnect lever is located to the right of the operator and directly behind the boom and bucket control levers (Fig. 25). To disengage the rear axle move the lever forward. The rear axle should be disengaged when traveling on the highway with no load in the bucket. With the rear axle disconnected better control of the loader at highway speed is obtained, and tire wear is cut to a minimum. When working the loader four-wheel drive should always be used.

13. SEAT ADJUSTING LEVER

The seat adjusting lever is located at the base of operator's seat. The seat may be adjusted by disengaging lever and moving seat forward or backward to desired position, and then re-engaging the lever.

B. INSTRUMENTS

1. ENGINE TEMPERATURE GAUGE

This gauge indicates the Operating range (green) of the engine coolant. The engine must not be operated with the coolant in the Danger (red) area. Continued operation in the Cold range (yellow) is uneconomical and tends to produce sludge in the engine crankcase.

2. ENGINE OIL PRESSURE GAUGE

This gauge indicates the pressure at which engine lubricating oil is circulated through engine. At full throttle oil pressure should be between 30 and 55 pounds at normal operating temperature (170° to 190°F.).

CAUTION

If no oil pressure is indicated by the gauge, the engine must be stopped immediately and the cause determined and corrected.

3. FUEL GAUGE

The fuel gauge indicates the quantity of fuel that is contained in the fuel tank. It is connected to a rheostat and float unit that is located in the tank.

The gauge indicates "E (EMPTY," "1/4," "1/2," "3/4," and "F (FULL)." The fuel tank should be filled at the end of each operating period, rather than at the start, to reduce the possibility of water condensation.

4. AMMETER

The ammeter indicates the charging rate of the generator. When the batteries are in a discharge condition, the ammeter should indicate a good rate of charge until the battery approaches a fully charged condition. When the battery is fully charged, the ammeter will indicate nearly zero except for a short time after the starter is used.

5. TRANSMISSION OIL PRESSURE GAUGE

The transmission oil pressure gauge indicates the pressure at which the transmission clutches are operating. The normal operating pressure of the clutches is 150-220 pounds.

6. ENGINE HOUR METER

The engine hour meter 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 (or right side) figure indicates 10ths of an hour. The small indicator (upper left) visibly turns when the meter is recording.

STARTING AND STOPPING OF ENGINE

A. STARTING OF ENGINE

1. Before starting the engine, check the oil levels of the following and add the specified lubricant as necessary to raise to the proper level: engine crankcase, hydraulic tank, transmission, differential and planetary hubs. Fill the fuel tank with specified fuel. Check the level of the water or anti-freeze solution and add coolant if necessary. If repairs have been made since the last operating period, be sure that all nuts and capscrews affected by the repairs are tightened and the parts are properly adjusted.

2. Place the transmission control lever in its neutral position.

3. Place the bucket and boom levers in their neutral positions.

4. Depress the accelerator pedal approximately 1/4 of its travel. Turn the switch to "START" position and depress starter button until engine starts. On cold weather starts the use of a "spray can" starting aid is helpful. One or two shots sprayed around the air cleaner air intake AFTER THE ENGINE IS CRANKING should bring the desired result. When the engine starts, release the switch and button.

CAUTION

When using the starter to crank the engine and the engine does not start within 30 seconds, allow the starter to cool for 2 minutes before using again.

5. As soon as the engine starts, depress the accelerator pedal until the engine is running at half speed. Continue to use the starting aid intermittently if necessary until the engine is running smoothly.

CAUTION

Excessive use of the starting aid will cause severe detonation with resulting internal damage to the engine.

6. Observe the engine lubricating oil pressure indicated by the gauge. With the engine running at half speed, and with the engine coolant at normal operating temperature (170° to 190° F. indicated by the gauge), the oil pressure should be between 30 to 55 pounds. If the oil is cold, no pressure may be indicated by the gauge for several seconds after the engine starts; but if the pressure does not then rise to normal or above, the engine must be stopped immediately and the cause determined and corrected.

7. Observe the converter "OUT" temperature indicated by the transmission temperature gauge. With the transmission operating pressure at 190 to 210 pounds (as indicated by the transmission pressure gauge), the transmission temperature should be approximately 150° F. The transmission temperature must not exceed 250° F. at any time.

B. STOPPING ENGINE

Always allow the engine to idle at least three to four minutes so that the engine and transmission may cool gradually and uniformly. THIS IS IMPORTANT.

Release the accelerator pedal. Turn the switch to the "FUEL SHUT-OFF" position (extreme left) and hold it there until the engine stops running. When the engine stops, release the key and it will automatically return to the "OFF" position.

CAUTION

AS A SAFETY PRECAUTION, ALWAYS LOWER THE BUCKET TO THE GROUND WHEN THE LOADER UNIT IS NOT IN USE OR WHEN MAKING REPAIRS, ADJUSTMENTS, OR SERVICING THE UNIT.

Cover the exhaust pipe at the end of each day's operation to prevent rain from entering while the machine is idle.

ENGINE IDLING

Prolonged engine idling causes the engine coolant temperature to fall below the specified operating range of 170° to 190° F. Since engine starting is readily accomplished with an electric starter, there should be no reason for prolonged engine idling.

DRIVING AND OPERATING INSTRUCTIONS

A. STARTING OF LOADER

Start the engine and allow it to warm up, then slow the engine to idling speed. Move the transmission selector lever into the required range for the desired speed or power. Release the parking brake and move the transmission lever to the required position for either forward or reverse travel. Adjust the accelerator pedal to regulate the engine speed as desired.

Satisfactory and efficient operation depends largely on the operator's judgment in selecting the proper gear ratio and speed for the various loads of operation. Always operate loader in the speed range that will permit engine to operate at full speed. This will not only assure the most power from the engine, but will also allow the engine to operate at its highest efficiency. Once the proper speed range is selected, the forward and reverse direction of the loader may be continuously changed without constant "declutching" of the transmission.

B. OPERATING THE LOADER (General Instructions)

The general purpose bucket (standard bucket) has the correct "digging" angle when bucket is tilted forward so that the cutting edge rests flat on the ground. The operator can quickly determine the proper "digging" position (angle) of the bucket by observing the bucket level indicator (Fig. 27), located on the right dump cylinder. The indicator may be easily adjusted by the operator to suit any digging condition. When the rear end of the lever indicator rod is flush with the black mark on the cylinder head, the bucket is positioned at the proper digging angle. The bucket is loaded by adjusting the digging depth to suit the forward movement of the loader according to digging conditions.

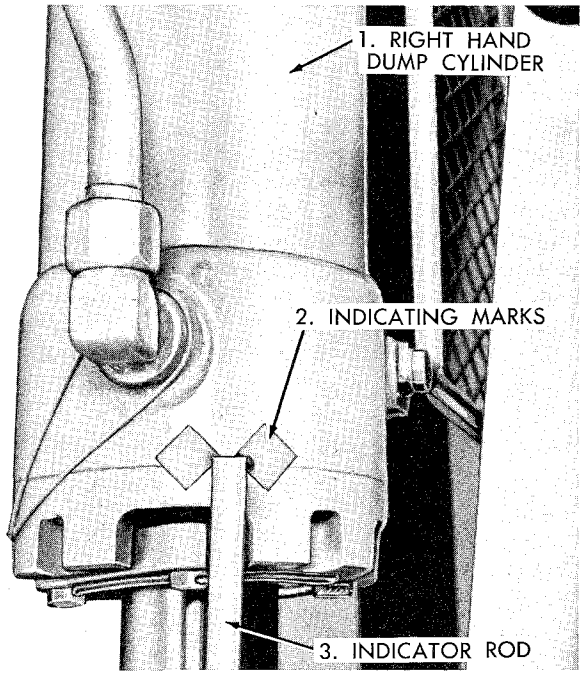


Figure 27. Bucket Level Indicator (T-28800)

Digging depth is obtained by applying down pressure, controlled by pushing forward on the boom control lever (Fig. 25). This lever controls the boom for raising, holding, lowering, or floating. With the bucket held in the "dig" position, drive the loader into the stockpile. If the loader begins to stall while penetrating into the pile at full throttle, touch the brake lightly for short periods and, at the same time, tip-back the bucket slightly (decreasing the digging angle) by pulling back momentarily on the bucket control lever (Fig. 25). After the bucket is loaded and retracted, it is lifted by pulling the boom control lever to the "RAISE" position. Return the raise control lever to the "NEUTRAL" position when the lift cylinders reach the end of their stroke. Otherwise, the hydraulic pump is subjected to excessive load. Normally, the accelerator pedal should be fully depressed during the entire loading cycle.

When using the bucket to load material that is difficult to break loose, the boom control lever may be placed in the "FLOAT" position, while "breaking out" with the dump cylinders, so the that heel of the bucket is lower than the cutting edge. This permits using the curved bucket bottom as a fulcrum point for greater leverage and "increased breakout" force. If the material is hard to penetrate, the bucket can be worked into the pile by alternate back and forth movement of the bucket control lever.

Generally, the first gear speed forward is the most satisfactory gear speed for loading. Depending on operating conditions, any gear speed in reverse may be selected to maneuver the loader. The torque converter reduces the possibility of wheel spinning. However, short tire life will result if the wheels are allowed to spin excessively.

Although the power brakes can be actuated with either the left or right brake pedal, the loader is controlled more easily and safely by applying the right foot on the accelerator and the left foot ready for the brake at all times.

The bucket is dumped by pushing forward on the bucket control lever (Fig. 25). The speed of the dumping operation is controllable by this lever. If the material being handled has a tendency to stick to the bottom of the bucket, it can be jarred loose by bumping the stops. This is done by moving the bucket control lever back and forth rapidly. This should be done only under extreme sticking conditions.

By placing the boom control lever in its "FLOAT" position rather than in its "DOWN" position, it is possible to retract the bucket with the bucket control lever at the same time that the booms are being lowered.

This practice is particularly advantageous on short hauls and stockpile work. A check valve is located in the top left side of the hydraulic control valve and is connected to the boom lowering lines so that oil may be transferred from the bottom side to the top side of the lift cylinder as required to keep the cylinders full of oil at all times. With the bucket empty and in the "FLOAT" position, the bucket is automatically stopped about three feet above the ground when lowering the bucket in the full tip-back position. This is a reminder to begin lining-up the bucket level indicator (located on the right dump cylinder) to assure the correct "dig" position by the time the bucket reaches the ground.

It is possible to create high pressures in the dump cylinders by such abnormal practices as back-dragging or bulldozing with the bucket partially dumped. Although two safety valves are provided in the hydraulic system for the dump cylinders (in addition to the main relief valve) to protect the loader linkage from these high pressures; such practices should be avoided whenever possible.

It is also possible to create high pressures within dump cylinders by raising the boom above the horizontal position while the bucket is in the extreme dump position, such as raising the boom above the horizontal position after the bucket is tipped over to a "back-dragging" position. Always return the bucket to the dig or carry position before raising the boom above the horizontal position.

One safety valve (set at 1000 psi) for the dump cylinders is located inside of the hydraulic tank on the right side of the manifold plate (Fig. 68) and is connected into the bucket dump line. The other safety valve (set at 2000 psi) is located on the left side of the manifold plate (Fig. 68) and is connected into the bucket return line. Both of these valves have been properly adjusted at the factory and require no further adjustment in the field. A third valve (non-adjustable) is a "one way" check valve located inside the hydraulic tank on the right side of the manifold plate (Fig. 68) and connects the low pressure side of the main control valve to the tail end of the dump cylinder. When loads are carried for any appreciable distance, the bucket should be carried as close to the ground as possible because the best overall balance is obtained in this position, and with the bucket tipped back, the load can be carried low without spillage.

C. STOPPING THE LOADER

To stop the loader, release the accelerator pedal, move the transmission speed selector and direction levers to their neutral positions, and apply the brakes. If the loader is parked on a grade where there is a possibility of its rolling, lock the parking brake in its applied position by pulling the parking brake lever all the way back.

CAUTION

AS A SAFETY PRECAUTION, ALWAYS LOWER THE BUCKET TO THE GROUND WHEN THE LOADER UNIT IS NOT IN USE, OR WHEN MAKING REPAIRS, ADJUSTMENTS, OR SERVICING.

Allow the engine to idle for at least four minutes so that the engine and the transmission can cool gradually and uniformly, then turn the switch to the "OFF" position and remove the key.

D. PUSH STARTING AND TOWING

CAUTION

The loader should never, under any circumstances, be pushed or towed to start the engine.

When the loader is being towed or pushed, with the drive line connected, the power flow going from the loader's wheels, through the drive line and into the transmission and converter, causes certain parts in the transmission and converter to rotate. Even though there is little or no load on these parts, they require sufficient lubrication to prevent damage due to friction and heat. Since the lubrication requirements of the transmission will not be fully satisfied while the loader is being towed or pushed, it is imperative that BOTH drive shafts be disconnected when travel of any distance is done in this manner.

COLD WEATHER OPERATION

If the loader 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.

CAUTION

If mud or snow collects in any of the moving parts of the loader and is allowed to freeze solid while the loader is idle, apply heat to loosen the frozen material. Serious damage may result by an attempt to break the loader loose under engine power.

In winter weather, use a permanent type (glycol base) anti-freeze solution in the system to protect from damage due to 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 is thoroughly mixed to be sure that 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 anti-freeze manufacturer's direction.

When starting in cold weater, always allow the engine to operate for approximately 10 or 15 minutes to allow the oil in the loader hydraulic system to circulate before applying load to the system.

ENGINE COOLING SYSTEM

A. DESCRIPTION OF SYSTEM

The engine cooling system includes the water pump, radiator, thermostat, engine temperature gauge, cooling fan, and the water passages in the cylinder block and cylinder head. The water pump draws the coolant from the bottom of the radiator and circulates it through the engine. The coolant is discharged from the cylinder head into the water outlet manifold and passes through the thermostat housing and the radiator inlet to the tank at the top of the radiator. The coolant is cooled as it passes from the top to the bottom of the radiator core by the pusher type cooling fan.

The thermostat, located in the thermostat housing at the rear of the water manifold of the engine, operates automatically to maintain a normal coolant operating temperature of 170° F. to 190° F.

A double acting valve in the radiator cap is provided for relieving pressure due to expansion (from heating of coolant), and allows atmospheric pressure to enter when contraction (due to cooling of coolant), occurs. Because this is a pressure type cooling system it is necessary to keep the radiator cap tight.

CAUTION

Do not remove the pressure type radiator cap while the coolant is near 212° F., or above, as the coolant will boil and splash the person removing the cap.

B. GENERAL MAINTENANCE

In warm weather, keep the cooling system filled with clean soft water or rain water. Check frequently. If soft water is not available and hard water must be used, hard water should first be treated with a water softener. A commercially reliable rust inhibitor should also be added to the cooling system for warm weather operation. A rust inhibitor (soluble oil), available in half pint or quart containers, can be obtained from "Allis-Chalmers" Dealers and should be added to the cooling system in proportions of 1 pint of soluble oil to every 15 quarts of water. The cooling system will hold 21 quarts of water.

CAUTION

Drain, flush and refill the cooling system with clean water before adding an anti-freeze solution for cold weather operation. Never add a rust inhibitor to a cooling system that contains an anti-freeze solution.

Keep the radiator air passages free from leaves, trash, and other materials which will restrict the flow of air through the radiator.

All leaks in the cooling system must be corrected as soon as they are evident. The fan, water pump and generator drive belts must be kept properly adjusted.

C. DRAINING OF COOLING SYSTEM

Remove the radiator filler cap and open the cylinder block drain cock, water transfer housing drain cock, and the radiator drain cock.

CAUTION

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

D. FILLING OF COOLING SYSTEM

Close the drain cocks which were opened to drain the system in par. C above. Fill the cooling system through the radiator filler cap opening slowly, until the coolant flows from the thermostat housing vent cocks. Close the cocks and continue to fill the system until the coolant is within approximately 2 inches of the top of the radiator and install the radiator cap.

E. GENERATOR, FAN AND WATER PUMP DRIVE BELT ADJUSTMENT

The generator, fan and water pump drive belt (Fig. 28) is correctly adjusted when the straight side of the belt can be pressed inward by hand approximately 1/2 inch at a point halfway between the generator and the water pump pulleys. To adjust the drive belt, loosen the capscrews in the generator brace and move generator in or out as necessary to obtain the correct tension on the belt. Then tighten the capscrew in the brace.

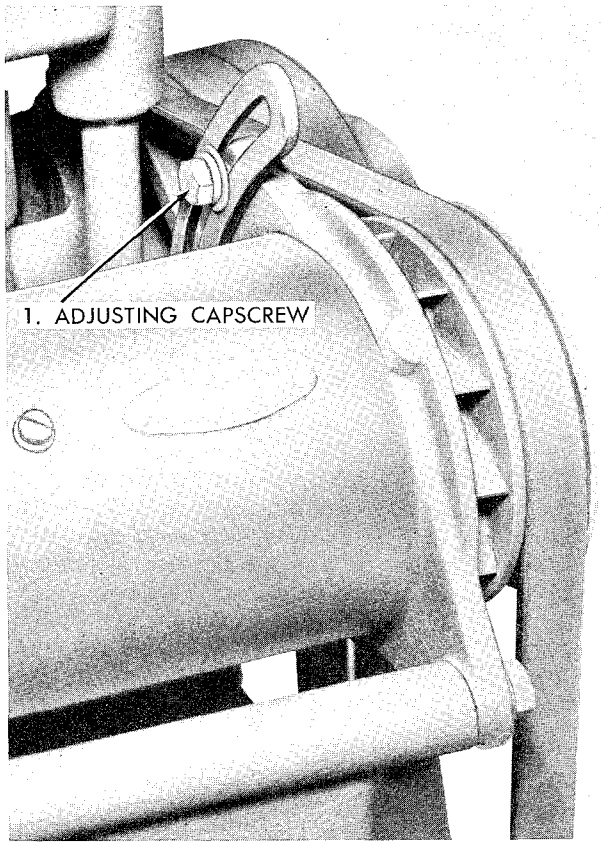


Figure 28. Generator, Fan, and Water Pump Drive Belt Adjustment
(T-28746)

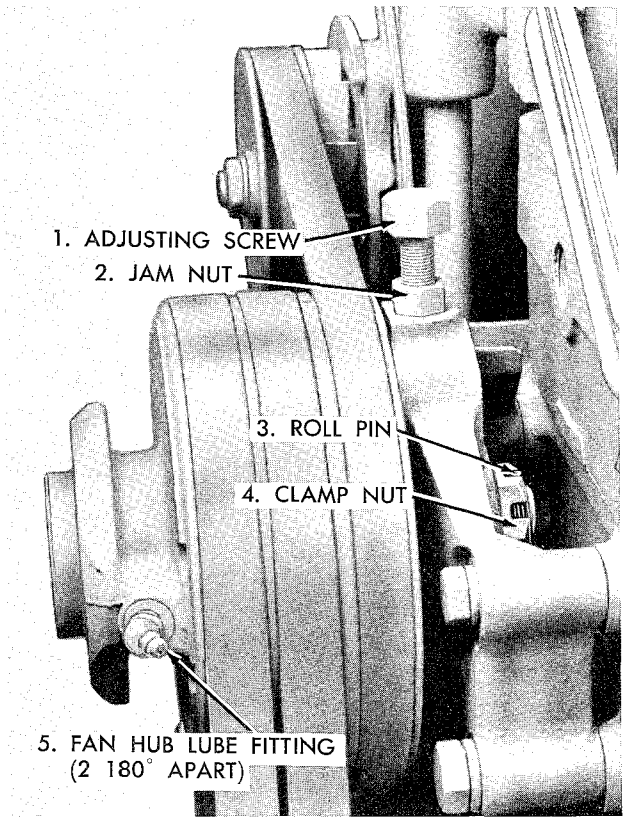


Figure 29. Fan to Crankshaft Drive Belts Adjustment
(Fan Blades Removed)
(T-28733)

F. FAN TO CRANKSHAFT DRIVE BELTS ADJUSTMENT

The fan to crankshaft drive belts are correctly adjusted when the sides of the belts can be pressed in 1/2 to 3/4 inch at a point halfway between their respective pulleys. To adjust the belts, drive the roll pin from the end of the fan shaft (Fig. 29) and loosen the clamp nut. Loosen the jam nut on the fan belts adjusting screw and turn the screw in or out to obtain the proper tension on the belts. Retighten the jam nut. Retighten the clamp nut and install the roll pin.

NOTE

WHEN A FAN TO CRANKSHAFT DRIVE BELT IS WORN THE BELTS MUST BE REPLACED IN PAIRS.

FUEL SYSTEM

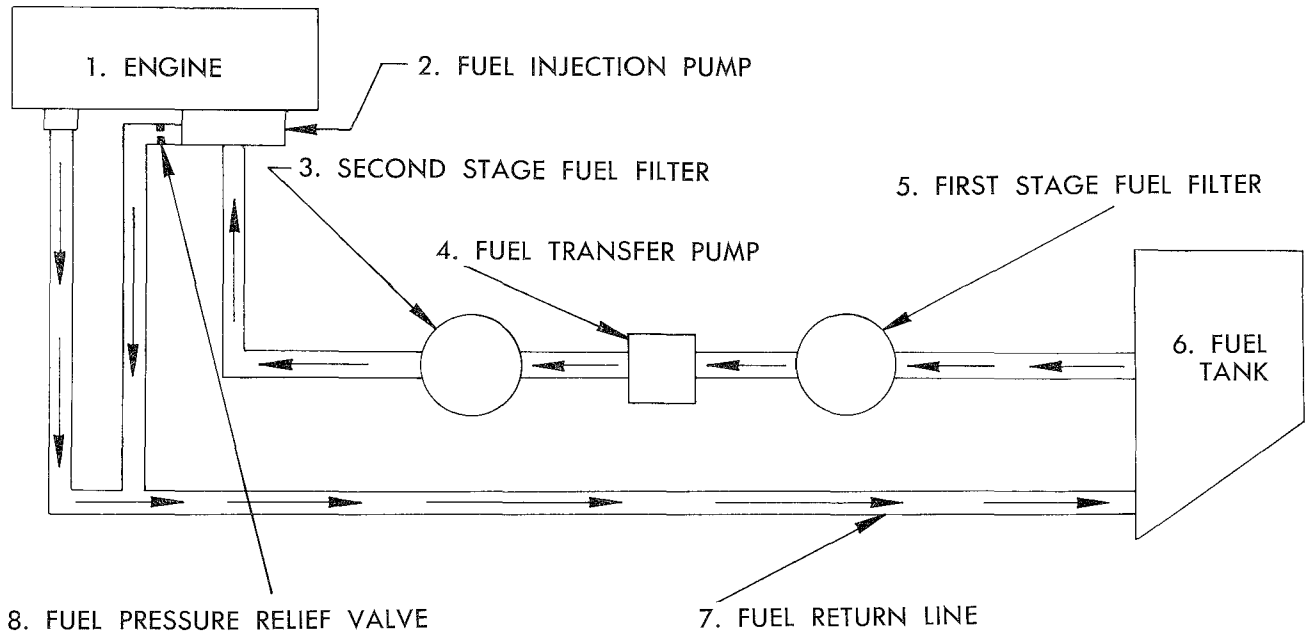


Figure 30. Fuel System — Schematic
(T-28805)

A. DESCRIPTION OF SYSTEM

The engine fuel system shown schematically consists of a fuel tank, first stage fuel filter, fuel transfer pump, second stage fuel filter, fuel injection pump, fuel nozzles and fuel lines. There are two fuel pressure systems; the low pressure system and the high pressure system.

The low pressure system consists of the fuel tank, fuel feed line, first stage fuel filter, fuel transfer pump, second stage fuel filter, fuel return manifolds and the fuel return line leading from the fuel metering and control valve in the hydraulic head back to the fuel tank.

The high pressure system consists of the hydraulic head, fuel nozzles and all high pressure fuel lines connecting the fuel injection pump to the fuel nozzles. The high pressure lines are seamless steel tubing.

The fuel is drawn from the fuel tank through the first stage fuel filter by the fuel transfer pump. After passing through the transfer pump it is directed to the second stage fuel filter and then on to the injection pump where fuel at transfer pump pressure is forced through an axial passage at the hydraulic head of the injection pump to the metering and control valve. The amount of fuel for combustion is forced under high pressure by the fuel injection pump, through high pressure lines to the fuel nozzles, from which the fuel enters the engine combustion chambers in a fine cone shaped spray.

B. FUEL TANK AND DRAIN COCK

A drain cock located at bottom right hand side of fuel tank, provides a means for draining the tank

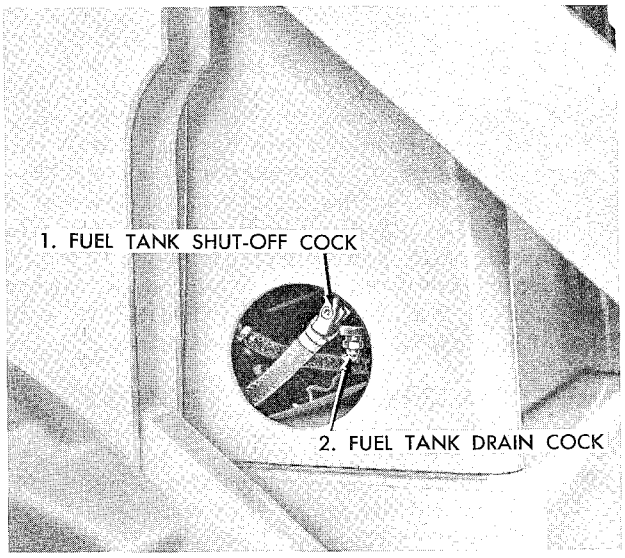


Figure 31. Fuel Tank Drain Cock
(T-28797)

when flushing and also acts as a sediment sump. Open the drain cock before engine is started at the beginning of the day's operation in warm weather or shortly after the end of the day's operation in freezing weather, and allow any water and sediment to drain; close the drain cock when clean fuel runs out. Drain and flush the fuel tank and replace fuel filters when a large accumulation of rust and scale is evident. The fuel tank should be filled at the end of each operating period rather than at the start. This will reduce the water content because a full tank is less subject to condensation.

C. FIRST AND SECOND STAGE FUEL FILTERS

The first and second stage fuel filters, mounted on right side of engine contain replacement type elements.

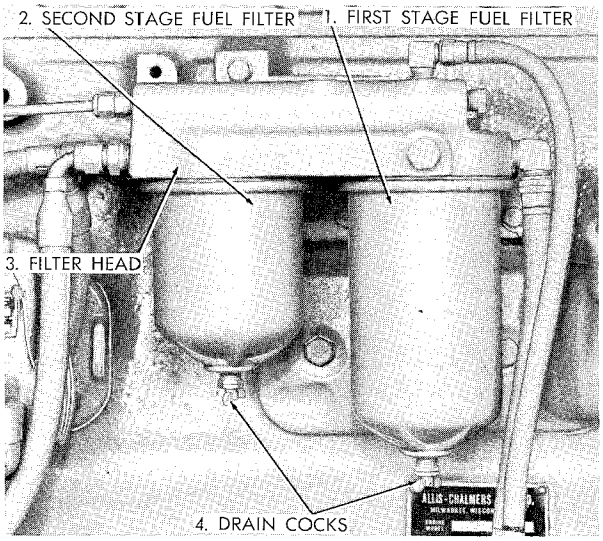


Figure 32. First and Second Stage Fuel Filters (T-28750)

1. SERVICE

Before starting the engine at the beginning of the day's operation in warm weather or shortly after stopping the engine at the end of the day's operation in cold weather, loosen the drain cocks located at the bottom of the first and second stage fuel filter shells and allow the water and sediment to drain; tighten the drain cocks when clean fuel runs out. Remove and replace the filter elements after every 500 hours of operation, or more often if conditions warrant.

2. TO REPLACE FIRST STAGE FUEL FILTER ELEMENT

a. Close the fuel tank shut-off valve. Clean all dirt from around the filter head and shell. Loosen vent screw in the top of the shell retaining nut and the drain cock in the bottom of the filter shell and allow the filter to drain.

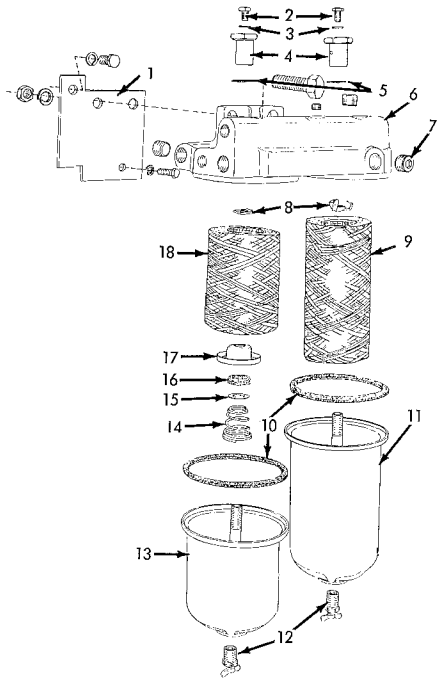
b. Loosen the shell retaining nut in the filter head until it is free from the shell center-bolt and remove filter shell from the filter head.

c. Remove and discard the filter element and the shell gasket. Thoroughly wash and dry the interior of the filter shell.

d. Install a new filter element and push it down firmly so that the up-turned edge of the seat plate, attached to the bottom of the shell center-bolt, is firmly impressed into the bottom of the filter element.

e. Install a new shell gasket in position in the lip of the shell. Hold the filter shell in position under the filter head and engage the threads of the shell retaining nut with the shell center-bolt and tighten the retaining nut securely.

f. Close the filter drain cock. Open the fuel tank shut-off valve and allow the filter to fill with



1. Filter Mounting Bracket
2. Vent Screws
3. Copper Washers
4. Shell Retaining Nuts
5. Gaskets
6. Filter Head
7. Hex-Socket Pipe Plug
8. Centering Guides
9. First Stage Fuel Filter Element
10. Shell Gaskets
11. First Stage Fuel Filter Shell
12. Drain Cocks
13. Second Stage Fuel Filter Shell
14. Element Spring
15. Metal Washer
16. Seating Plate Gasket
17. Element Seating Plate
18. Second Stage Fuel Filter Element

Figure 33. First Stage and Second Stage Fuel Filter Details (T-23778)

fuel by gravity. Tighten the filter vent screw when fuel (free of bubbles) flows from around the vent screw.

3. TO REPLACE SECOND STAGE FUEL FILTER ELEMENT

a. Thoroughly clean the fuel filter head and surrounding area. Loosen vent screw in the shell retaining nut and the drain cock in bottom of the filter shell and allow filter to drain.

b. Loosen shell retaining nut in the filter head until it is free from shell center-bolt and remove filter shell (with its components) from the filter head.

c. Remove and discard filter element. Remove centering guide, element seating plate, seating plate gasket, metal washer, and element spring from the shell center-bolt. Discard seating plate gasket, metal washer and shell gasket.

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

e. Place the element spring (large end downward) in position on shell center-bolt and down onto the element spring.

f. Install a new seating plate gasket in position in the element seating plate, then install the gasket and element seating plate in position on the shell center-bolt.

NOTE

When installing the element seating plate and gasket on the shell center-bolt, install the seating plate so that the gasket contacts the metal washer.

FUEL INJECTION PUMP

A. GENERAL

The injection pump was adjusted at the factory to provide for proper horsepower and a full governed engine speed (under load) of 2200 rpm. The injection pump should require no adjustment during the warranty period. Should an adjustment become apparent while the loader is in warranty, contact your nearest authorized "Allis-Chalmers" Dealer.

B. CHECKING ENGINE SPEED

The injection pump seldom gets out of working order. If engine speed is irregular, check the fuel system and all other engine adjustments before changing injection pump setting.

Operate the engine until normal operating temperature (160° to 185° F.) is indicated by engine temperature gauge. Check speed as follows:

1. Remove radiator grill.

2. Move transmission lever to "NEUTRAL" and start engine.

3. Hold tachometer against engine crankshaft with accelerator pedal fully depressed, engine speed should be 2375 to 2425 rpm. With accelerator pedal released, engine speed should be 600 rpm.

C. LOW IDLE AND HIGH IDLE ENGINE SPEED ADJUSTMENTS

Before changing the high idle speed, with accelerator pedal fully depressed, and the low idle speed, with the accelerator pedal fully released, be certain that the throttle control linkage moves the governor speed control lever through its full travel. To adjust engine speed, proceed as follows:

1. Disconnect the throttle control rear rod from the governor speed control lever so that the lever may be moved by hand.

2. Remove the capscrew and the cover (Fig. 34) over the throttle adjusting screws.

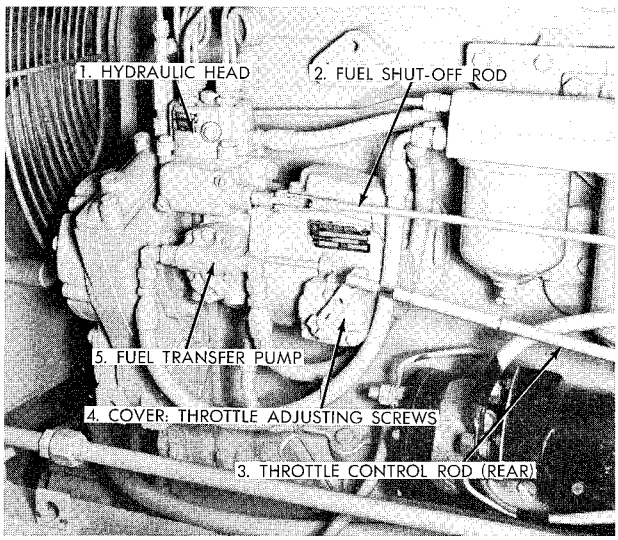


Figure 34. Fuel Injection Pump (T-38460)

3. With the engine running, loosen the jam nut on the low idle adjusting screw (Fig. 35). Hold the governor speed control lever toward the front so that the control lever shaft stop plate con-

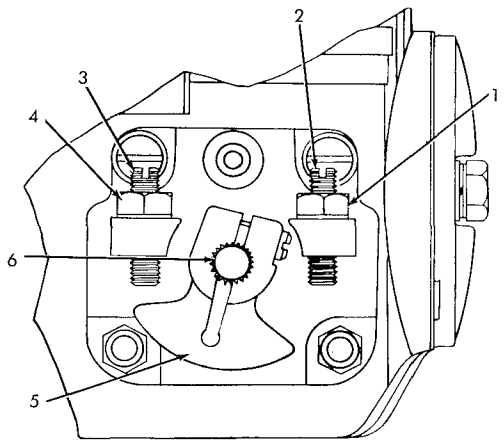
tacts the low idle adjusting screw. Turn the low idle adjusting screw "in" as necessary to increase, and "out" as necessary to decrease the low idle speed. When a speed of 600 rpm is obtained at the crankshaft, hold the low idle adjusting screw and tighten the jam nut.

4. With the engine running, loosen the jam nut on the high idle adjusting screw. Hold the governor speed control lever toward the rear so that the control lever shaft stop plate contacts the high idle adjusting screw. When a speed of 2375 to 2425 rpm is obtained at the engine crankshaft, hold the high idle adjusting screw and tighten the jam nut.

5. Replace the adjusting screw cover with its capscrew.

6. Connect the throttle control rear rod to the governor speed control lever.

7. Install the radiator grill.



1. Jam Nut (high idle)
2. High Idle Adjusting Screw
3. Low Idle Adjusting Screw
4. Jam Nut (low idle)
5. Control Lever Shaft Stop Plate
6. Control Lever Shaft

Figure 35. Idle Speed Adjustments (T-38444)

ENGINE LUBRICATION SYSTEM

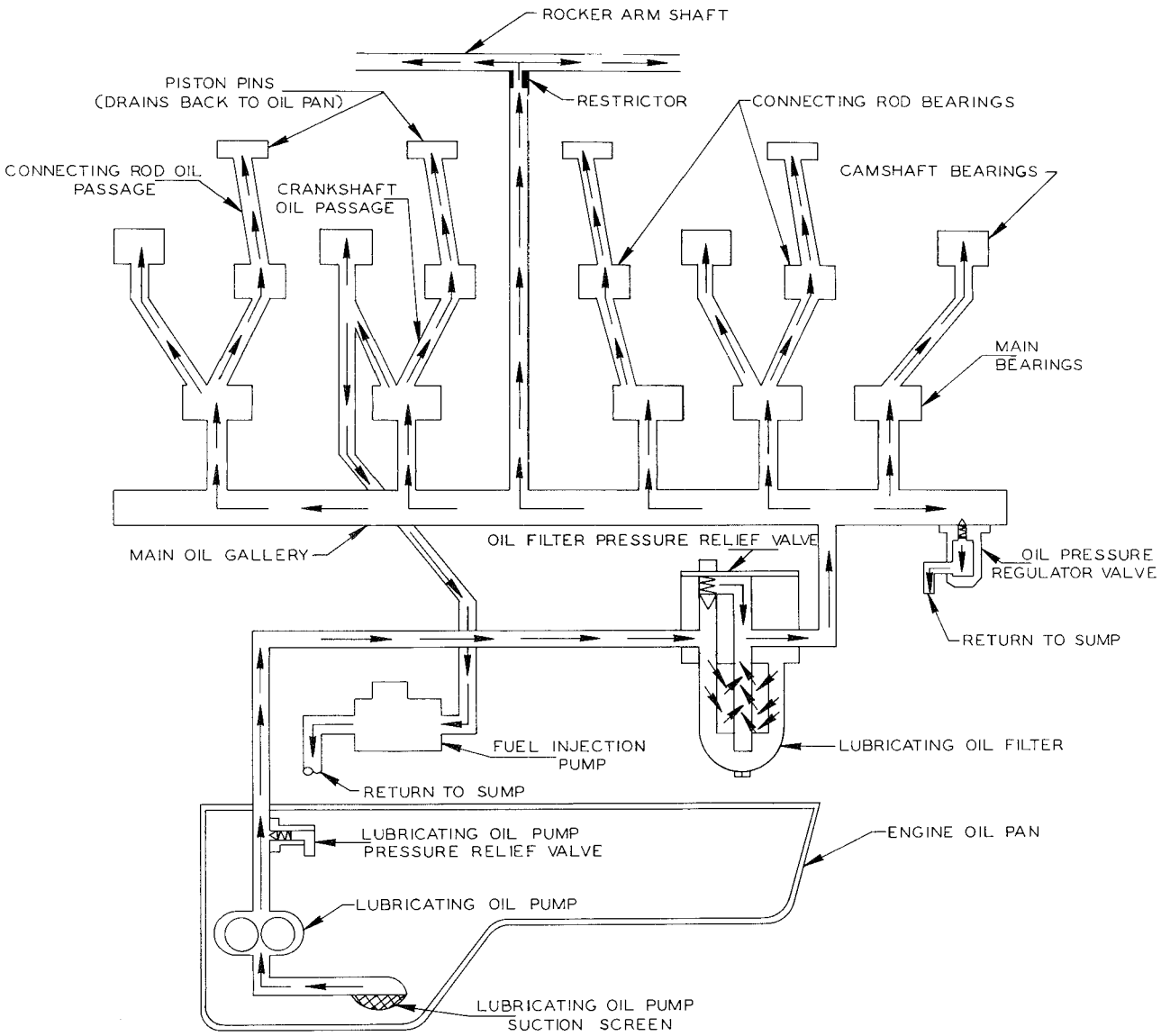


Figure 36. Lubricating Oil Flow — Schematic
(T-28811)

A. DESCRIPTION OF SYSTEM

The engine is pressure lubricated throughout by a gear type lubricating oil pump, driven by the oil pump driving gear in mesh with the crankshaft gear.

The lubricating oil pump draws the oil from the crankcase through the oil pump suction screen which is submerged in the lubricating oil. The pump then circulates the oil under pressure through the oil filter, and then to the main oil gallery of the engine which extends lengthwise through the cylinder block and parallel to the camshaft. Oil passages direct the oil from the main oil gallery to the camshaft and main bearings and through the rifle drilled connecting rods to the piston pins.

Stabilized oil pressure is maintained within the engine by an oil pressure regulator valve, located in the main oil gallery at the left front corner of the engine assembly. Excess oil by-passed through this valve returns to the crankcase oil pan.

A horizontal oil passage through the center of the cylinder block extends from the main oil gallery to a cavity in the left side of the cylinder block. From

this cavity there are two openings which extend to the rocker arm assemblies. The oil filter by-pass valve in the filter head is provided to by-pass oil directly from the oil pump to the lubrication system in the engine if the oil filter becomes clogged, or if, in cold weather, the oil is too thick to circulate freely through the oil filter.

B. LUBRICATING OIL FILTER

The lubricating oil filter (Fig. 37) located on the left side of the engine, is of the full-flow type and contains a replaceable type element. A new element must be installed each time the oil in the crankcase is changed, or more often if conditions warrant.

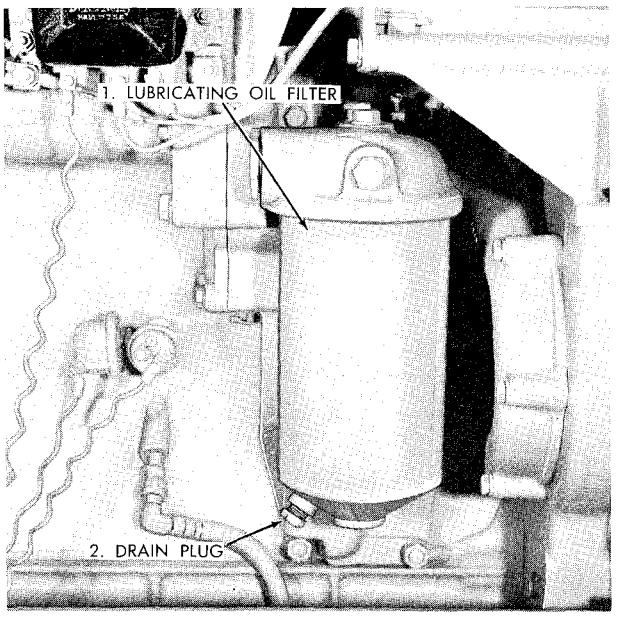


Figure 37. Lubricating Oil Filter
(T-40638)

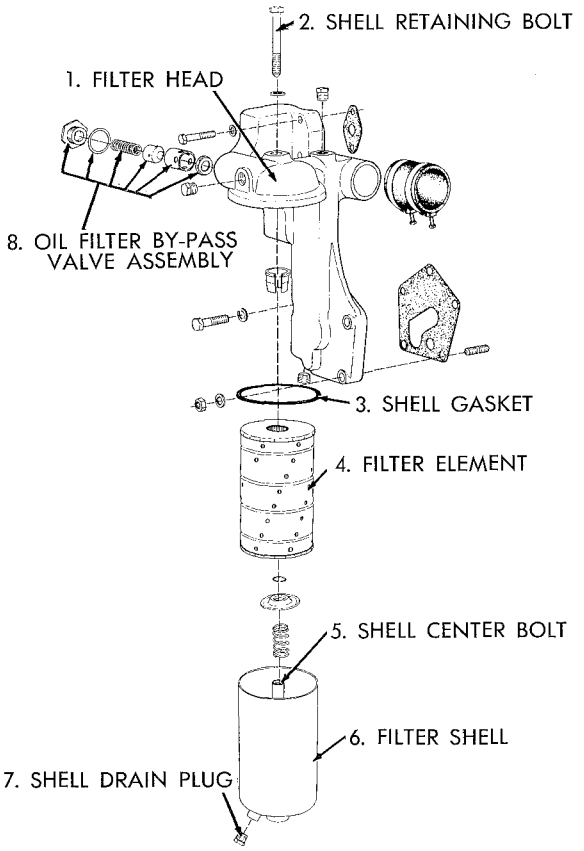


Figure 38. Lubricating Oil Filter Assembly Details
(T-28734)

C. TO REPLACE FILTER ELEMENT

1. Thoroughly clean the filter shell and the surrounding area.

2. Loosen the shell retaining bolt and remove the center-bolt and filter shell and element as an assembly. Remove the element from the filter shell and discard the element.

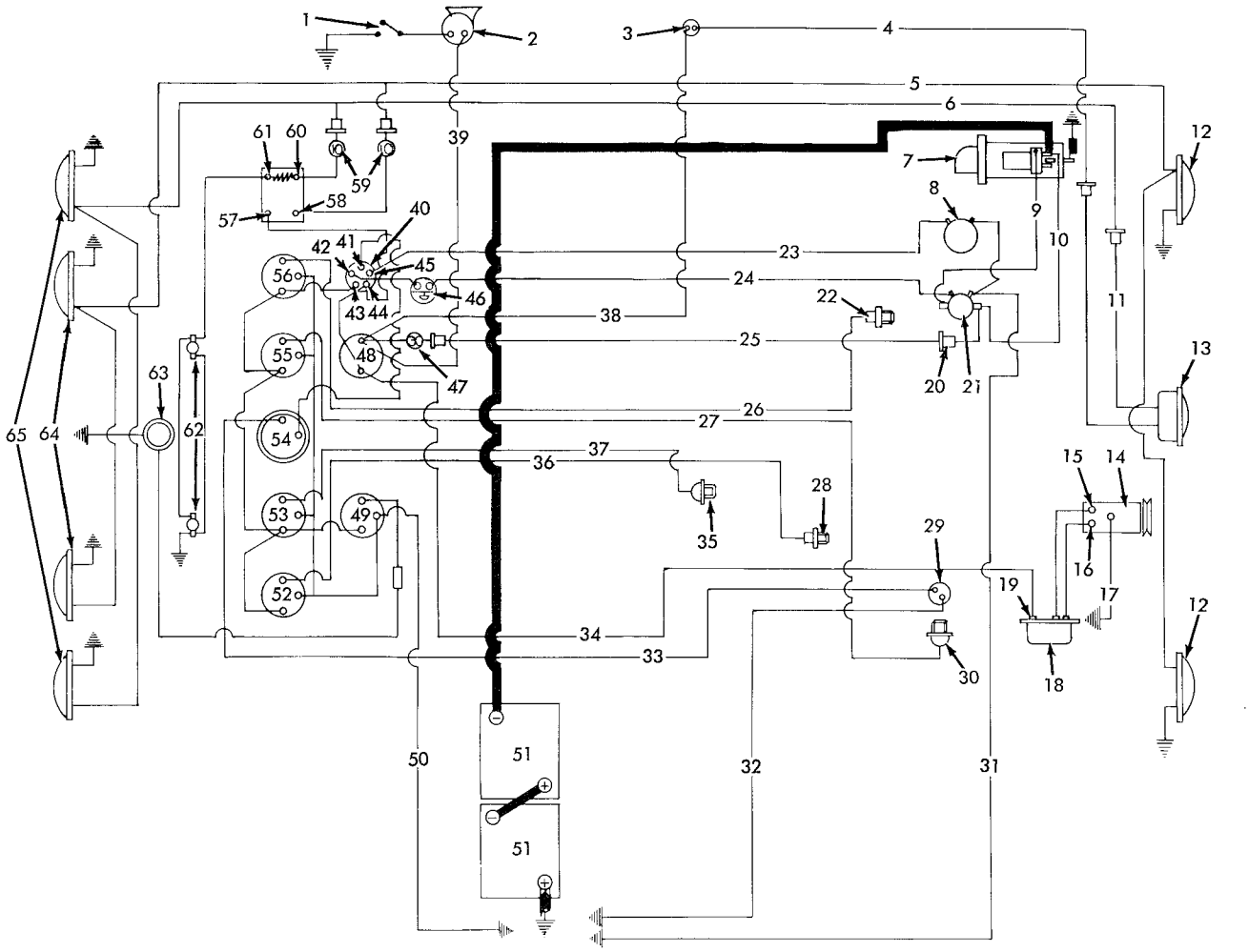
3. Thoroughly wash and dry the interior of the filter shell.

4. Install a new shell gasket in position in the oil filter head. Install a new element in position in the filter shell.

5. Install the filter shell assembly in position on the oil filter head, making certain the shell gasket is properly installed in the head, then tighten the shell retaining bolt to a torque of 75 to 80 lbs. ft.

6. Start the engine and observe for oil leakage between the filter shell and the oil filter head. Stop the engine; check the oil level of the engine crankcase, and add oil as necessary to raise the oil level to the FULL mark on the oil level gauge rod.

ELECTRICAL SYSTEM



1. Horn Button
2. Horn
3. Stop-Light Switch
4. Red
5. Black and White
6. Orange and Black
7. Starter
8. Fuel Shut-Off Solenoid
9. White and Red
10. Gray
11. Yellow
12. Back-Up Lights
13. Tail and Stop Light
14. Generator
15. Ground Terminal (Yellow Wire)
16. Field Terminal (White Wire)
17. Black
18. Voltage Regulator
19. "Bat." Battery Terminal
20. Fuse
21. Magnetic Switch
22. Engine Temperature Sender
23. Yellow
24. White and Red
25. Gray
26. Brown
27. White
28. Converter Temperature Sender
29. Hour Meter Pressure Switch
30. Engine Oil Pressure Switch
31. Black
32. Black
33. Red
34. Blue
35. Transmission Pressure Switch
36. Orange
37. Green
38. Yellow and Red
39. Yellow and Black
40. Starter Switch
41. "IGN" Terminal
42. "SOL" Terminal
43. "ACC" Terminal
44. "BAT" Terminal
45. "SOL" Terminal
46. Push Button Starter Switch
47. Fuse — 30 Amp.
48. Ammeter
49. Fuel Gauge
50. Black
51. 12 Volt Battery — Two
52. Converter Temperature
53. Transmission Oil Pressure
54. Hour Meter
55. Engine Oil Pressure
56. Engine Temperature
57. Battery Terminal
58. Auxiliary Lights
59. Fuses — 10 Amp.
60. Headlights
61. Main, Auxiliary and Back-Up Light Switch
62. Instrument Panel Lights
63. Fuel Gauge Tank Unit
64. Auxiliary Headlights
65. Main Headlights

Figure 39. Wiring Diagram — Schematic
(T-38449)

A. DESCRIPTION

The electrical system, which includes the starter, generator, generator regulator, ammeter and gauges, lights, horn and wiring, is a 24 Volt system throughout. Two 12 Volt wet cell storage batteries located underneath the hood are used to supply current for the system. Electrical energy drained from the batteries through the operation of the above named units is replaced by the generator. The output of the generator is controlled by the generator regulator to prevent overcharging of the batteries.

B. BATTERY

Check the level of the electrolyte solution every 10 hours of operation, or more often if conditions warrant. Maintain solution level as indicated on the battery caps. Keep battery and cable terminals tight and clean.

CAUTION

To prevent the possibility of bodily injury, always disconnect the battery-to-ground cable (positive terminal) before disconnecting or repairing 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 the hydrometer readings of the battery. 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 the electrolyte is above 80° F., add 4 points to the hydrometer reading and for each 10 degrees below 80° F., subtract 4 points to get the true specific gravity. For example, if the hydrometer reading is 1.250 and the electrolyte temperature is 20° F. (60 degrees below 80° F.), 1.250 minus 24 points equal 1.226 - the true specific gravity.

If the corrected readings are below 1.215, the battery is not receiving sufficient charge. This might indicate that the generator or the generator regulator require attention. If these units prove satisfactory, inspect the system for short circuits and for loose or corroded connections. In zero weather there is a danger of the battery freezing if the 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 0° F. During freezing weather, any addition of water to the cells should be made after the engine is started at the beginning of an operating period to be certain that the water and electrolyte solution will be thoroughly mixed; otherwise it may freeze. The filler caps must be kept tight at all times and the top of the battery kept clean and dry.

C. GENERATOR AND GENERATOR REGULATOR

The generator, mounted on a bracket on the left rear side of the engine, is belt driven from the fan pulley. The generator and generator regulator are set to keep the battery fully charged under normal conditions. The ammeter should indicate a good rate of charge for a short time after starting the engine, or until the generator replaces the energy drained from the battery during cranking; then it will show little or no charge. It is important that the generator regulator be maintained in good condition so that the battery will be kept charged.

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

1. With a screwdriver or similar tool, raise one of the generator brushes to break contact with the commutator.

2. Using a short "jumper" lead, momentarily touch the "jumper" lead to the "BAT" (Battery) and to the "GEN" (Generator) terminal of the generator regulator.

NOTE

The regulator terminals are marked "F" (Field), "GEN" (Generator), and "BAT" (Battery).

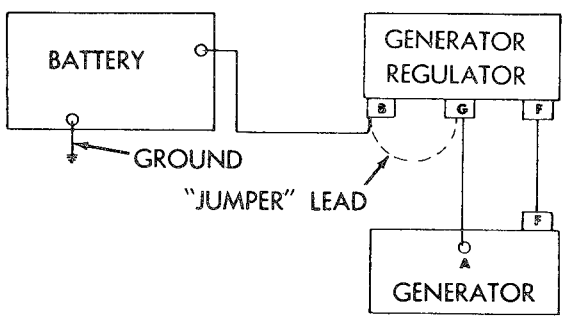


Figure 40. Polarizing Circuit Diagram (T-18731)

3. Lower the generator brush to make contact with the commutator.

CAUTION

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

D. STARTER

The 24-volt starter is mounted on the right side of the engine flywheel housing. An over-running clutch type drive is used to mesh the drive pinion of the starter with the flywheel ring gear for cranking the engine and allows the starter drive pinion to run faster than the armature once the engine has started. This protects the armature from excessive speed during the brief interval that the drive pinion remains in mesh. The starter is operated by a combination of two solenoids that are controlled by a key switch and push button switch on the instrument panel. When the key is turned to the "Start" position, it actuates the solenoids, which shift the drive pinion of the starter into mesh with the flywheel ring gear, and also closes the circuit between the batteries and the starter.

CAUTION

When using the starter to crank the engine, and the engine does not start within 30 seconds, allow the starter to cool for 2 minutes before using it again.

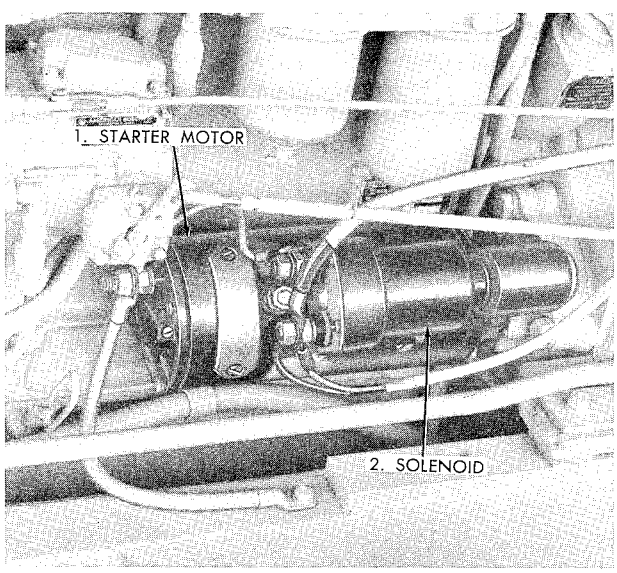


Figure 41. Starter Motor and Solenoid (T-40630)

The starter very seldom causes difficulty; however, if it fails to crank the engine properly with fully charged batteries, check all connections, being sure that they are clean and tight. A firm pressure on the starter switch when starting the engine will minimize pitting of the contact points.

It is recommended that the starter be taken to a dependable electrical repair shop when service is required.

E. ELECTRICAL CABLES

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

CAUTION

To prevent the possibility of bodily injury, always disconnect the battery-to-ground cable from the battery box support before cleaning, repairing, disconnecting or connecting any of the heavy electrical cables.

F. GENERATOR, FAN AND WATER PUMP DRIVE BELTS ADJUSTMENTS

The generator, fan and water pump drive belts are properly adjusted when the belts can be pressed inward by hand approximately 1/2 to 3/4 inch at a point halfway between the generator and the fan pulley.

To adjust the drive belts, loosen the generator adjusting arm capscrew (Fig. 28) and move the generator up or down to obtain the correct belt tension, then tighten the adjusting arm capscrew.

G. LIGHTS

A light switch, located on the right side of the instrument panel, controls the main headlights, auxiliary headlights, back-up lights, tail light and instrument panel lights. It has four positions - "OFF," "DIM," "BRIGHT" and "AUXILIARY." The switch is turned from the vertical "OFF" position, counterclockwise through its other three positions.

H. HORN

The horn is located underneath the front floor plate. The horn wire should be disconnected at the base of the steering column to prevent blowing of horn when horn button is being removed.

I. FUEL SHUT-OFF SOLENOID

The fuel shut-off solenoid, mounted on right side of the flywheel housing, is actuated by the key switch on instrument panel. Turning key to "FUEL SHUT-OFF" position energizes solenoid and the motion thus created, in connection with a linkage mechanism,

stops the flow of fuel to engine. In any other key position solenoid is dead and the fuel line to engine is open.

J. GAUGES

All the gauges are electrically operated by means of a "sender unit" located at each check point and a wire leading to the corresponding gauge on the instrument panel. Each gauge circuit is energized when the ignition switch, located on the instrument panel is turned on (refer to "OPERATING CONTROLS AND INSTRUMENTS"). It is imperative that this switch be turned OFF each time the engine is stopped, to avoid discharging the battery.

K. FUSES

Three fuse holders mounted in the center of the instrument panel contain the fuses for the 1. main fuse to ammeter; 2. fuse to auxiliary headlights, and back-up lights; 3. fuse to main headlights, tail light and instrument panel lights. They are 30 amps, 10 amps, 10 amps, respectively. Fuses are changed by depressing fuse holder cap slightly and giving it approximately 1/4 turn counterclockwise. Remove cap and lift out fuse.

A 30 amp "Slow-Blow" fuse is located in a capsule near the starter motor and is wired in series with 30 amp main fuse on instrument panel. This fuse protects the circuit between "Starter-Battery" connection and dash fuse.

AIR CLEANER - (PRIOR TO S/N 3175)

A. DESCRIPTION AND PURPOSE

The purpose of the air cleaner is to remove dust and other foreign matter from the air used by the engine. The life of the engine depends largely upon the efficiency of the air cleaner. Fast wear on cylinder walls, pistons and rings will result if the air cleaner is not kept in good condition and properly serviced.

The air enters the air cleaner through the inlet port on the left hand side of the air cleaner. Due to the cylindrical shape of the air cleaner housing, the incoming air takes on a rotary flow around the inside of the housing. This rotary action throws off the majority of the dirt and dust particles and they are deposited in and ejected from the flexible unloader on the right hand side of the cleaner.

Engine vacuum overcomes the rotary flow and draws the air through the paper element in the center of the air cleaner body. Dust particles still remaining in the air are then deposited on the outside of the element and only clean air is delivered to the engine. The capacity of the air cleaner is greater than the demand and, therefore, some foreign deposit on the paper element actually increases the effectiveness of the unit by reducing the size of the openings in the element, and restricting an even greater amount of dust particles; however, neglect of proper servicing of the air cleaner will result in loss of power, excessive fuel consumption and rapid wear on cylinders, pistons and rings.

A damaged hose, loose hose clamps, damaged gasket or leak of any kind that allows air to enter the 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 the above parts and of the air cleaner body for dents, cracks, etc. should be made frequently. If any of the above mentioned conditions are found, they must be corrected immediately.

B. AIR CLEANER SERVICE

Service the air cleaner element every 50 hours or more often if conditions warrant.

Service the element as follows:

1. Loosen the knob on the element retainer bar and remove the bar and knob. Remove the element from the air cleaner; thoroughly clean the interior of the air cleaner body.

2. Tap the paper element gently on a smooth surface to remove all excess dust. Rinse the element in cool water under a faucet and then wash by repeated dipping for several minutes in a cool lukewarm container of water with a mild non-sudsing detergent.

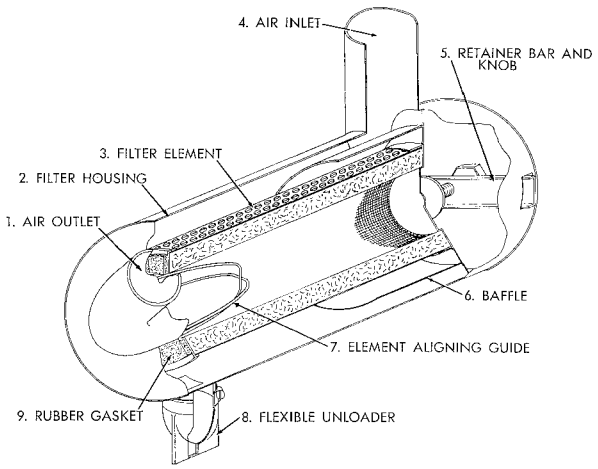


Figure 42. Typical Air Cleaner (Cut-Away View) (T-32702)

CAUTION

Never wash element in fuel oil, gasoline or solvents. DO NOT OIL ELEMENT.

Rinse the element with cold water from the inside out and allow it to dry overnight while laying on its side. Be certain it is protected from freezing until dry.

CAUTION

Do not attempt to dry a wet paper element with compressed air.

3. Inspect the element gasket. Do not use an element whose gasket is damaged or missing. If the element is judged to be acceptable, install it in the air cleaner body and secure it with the retainer bar assembly.

4. Do not service the element more than 10 times. At this time it should be discarded and replaced with a new paper element. If 24-hour operation is required, the use of two elements is suggested.

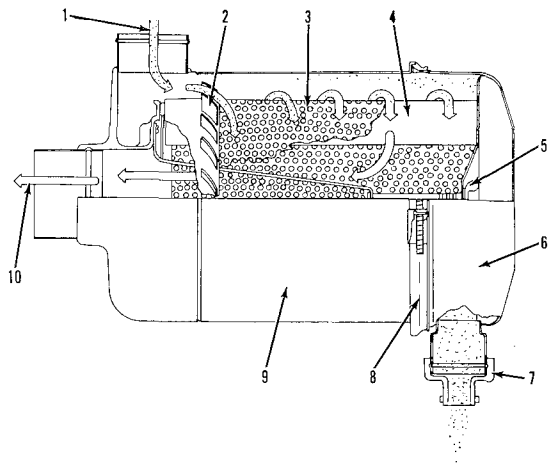
5. An alternate, though not as effective method, of servicing the filter element is to tap gently to remove excessive dust and then, using compressed air, blow the dust out from the inside of the element.

These servicing procedures may be required more frequently in extremely dusty conditions.

AIR CLEANER - (EFFECTIVE WITH S/N 3176)

A. OPERATION

Air enters the air cleaner through a pipe that extends down through the engine hood and connects to the right hand side of the air cleaner body. Due to the cylindrical shape of the air cleaner body and the directional control effected by the fins on the front end of the element, the incoming air takes on a high-speed rotary flow around the inside of the housing. This rotary flow is in fact a centrifugal action that throws off a majority of the dust particles in the air. These particles are collected in and ejected from, the flexible unloader in the bottom of the air cleaner.



1. Incoming (unfiltered) Air
2. Directional Fins
3. Filter Element
4. Filtering Material
5. Wing Nut and Gasket
6. End Cap
7. Flexible Unloader
8. Retaining Ring
9. Filter Housing
10. Filtered Air to Engine

Figure 42A. Air Flow Through Air Cleaner (T-40689)

Engine vacuum overcomes the rotary flow and draws the air through the paper element in the center of the air cleaner body. Dust particles still remaining in air are then deposited on the outside of the element and only clean air is delivered to the engine. The capacity of the air cleaner is greater than the demand; therefore, some foreign deposits on the paper element actually increases the effectiveness of the unit by reducing the size of the openings in the element and restricting an even greater amount of dust particles; however, neglect of proper servicing of air cleaner will result in loss of power, excessive fuel consumption and rapid wear on cylinders, pistons and rings.

To determine the condition of the filter element accurately a "Restriction Indicator" is provided. A glance at this indicator, while the engine is running, will reveal the immediate condition of the air cleaner.

A damaged hose, loose hose clamps, damaged gasket, or leak of any kind that allows air to enter the 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 body 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

The restriction indicator, connected to the air cleaner-to-intake manifold line, indicates the condition of the filter cartridge. As dirt is trapped in the air cleaner cartridge the volume of air flowing through the cartridge is reduced and the pressure drop across the air cleaner-to-engine circuit increases. At a predetermined point the signal in the indicator begins to rise.

When the signal is at the top of its travel (a predetermined point of maximum allowable restriction) it is locked in position and servicing of the air cleaner is required.

Service the air cleaner as follows:

1. Thoroughly clean the exterior of the air cleaner housing. Loosen the retaining ring on the filter end cap and remove the cap. Lift out filter element. Clean interior of filter housing.

2. When washing facilities are not available, blow dry compressed air (100 psi or less) through the element from the inside out, moving the nozzle up and down while rotating the element. Hold the nozzle at least 1 inch away from the element.

3. To wash, soak element for 15 minutes in a solution of 2 ounces of D1400 Donaldson cleaning compound per gallon water. To mix the solution, dissolve the D1400 in a small amount of tap water (45° - 70° F.). Add the dissolved mixture to the balance of the water (70° - 120° F.). A warm solution will do the best cleaning job. Non-sudsing household detergent may also be used. Rinse element with clear water from a hose (40 psi or less), until drain water is clear. Air-dry the element before using.

4. After cleaning and drying, carefully inspect the element for ruptures or damage by placing a bright light inside. Replace the element if the slightest sign of damage is evident. Inspect element gasket and wing nut gasket and repair (element gasket) or replace (wing nut gasket) as necessary. If element gasket is beyond repair, element must be replaced. Reinstall element and check for proper seating. Install end cap being sure "Arrows" on cap point "up" and secure with retaining ring.

NOTE

Elements must be replaced after 6 cleanings.

5. Reset the restriction indicator by pushing the reset button on top of the indicator.

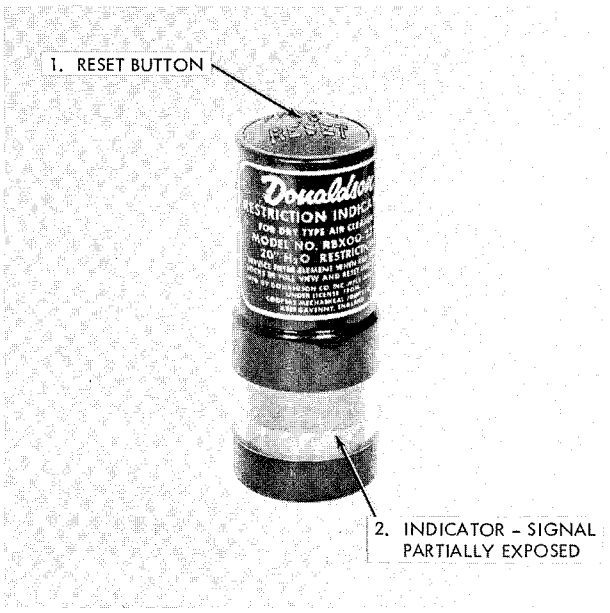


Figure 42B. Restriction Indicator (T-40700)

VALVE ADJUSTMENT AND CYLINDER HEAD

A. VALVES

The correct clearance (lash) between the ends of the intake and exhaust valve stems and the rocker arms is very important in a "DIESEL" engine, due to their high compression developed within the cylinders. Insufficient valve clearance will cause loss of compression, misfiring, and will eventually cause burning of the 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 (170° to 190° F.) the proper valve lash is: intake valves .018" and exhaust valves .018". After any machanical work has been done which would disturb valve lash, the intake valves may be set "cold" at .020" and exhaust valves at .020" clearance so that engine may be run and allowed to warm up to normal operating temperature. After engine reaches normal operating temperature, valve clearance should be checked and readjusted if necessary.

NOTE

Firing order of the engine is 1-3-4-2.

B. CYLINDER HEAD

Tightness of the cylinder head stud nuts MUST be checked at least once after a new or rebuilt engine has been placed in operation. The checks must be made after first 100 hours of operation. If cylinder head stud nuts are not maintained at correct torque (95-105 lbs. ft. for 1/2"-20 and 180-190 lbs. ft. for 5/8"-18) it is possible that cylinder head gasket trouble will be encountered. After cylinder stud nuts have been checked for proper torque, it is also necessary to check valve tappets for proper clearance.

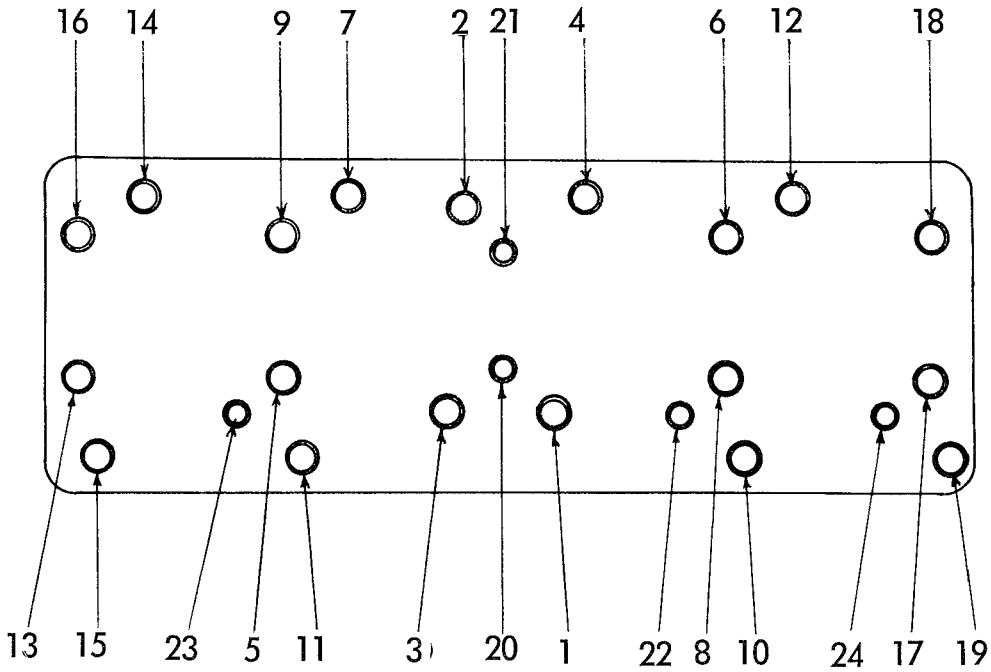


Figure 43. Sequence of Tightening Cylinder Head Stud Nuts
(T-27283)

TORQUE CONVERTER AND TRANSMISSION

A. GENERAL

The torque converter and transmission are two separate but highly compact units. They are mechanically connected by a universal drive shaft and, by means of suitable external lines and fittings, share a common hydraulic circuit. An oil cooler, built into the lower tank of the engine water radiator, serves to dissipate the heat of the transmission-converter hydraulic oil.

A small pump, driven directly from the converter, serves as a combination converter charging pump and power steering pump. This pump delivers oil from the transmission sump to the power steering cylinder. Before leaving the sump the oil passes through an oil strainer in the base of the transmission.

Excessive pressures in the power steering system are controlled by an integral relief valve. From the power steering cylinder the oil passes through a full flow micronic filter before entering the transmission valve body assembly. Oil entering the transmission is directed to a flow divider valve. A portion of the oil leaving the flow divider valve is directed, under controlled pressure, to actuate the correct directional and range clutches as selected by the operator. The remainder of the oil leaving the flow divider valve is routed through the oil cooler unit, located in the lower tank of the engine water radiator. From the cooler the oil is directed to the torque converter. Oil leaving the torque converter is returned to the transmission under low pressure to serve as lubricating and cooling oil.

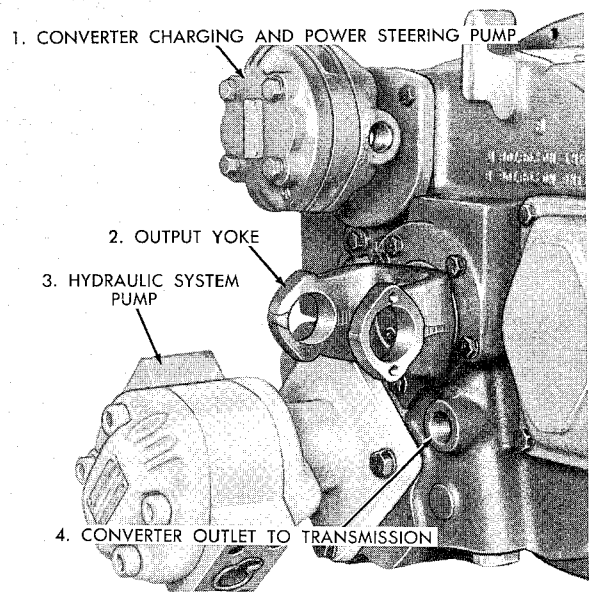


Figure 44. Torque Converter — Front
(T-40636)

Any excess oil in either the transmission or converter is returned to the sump.

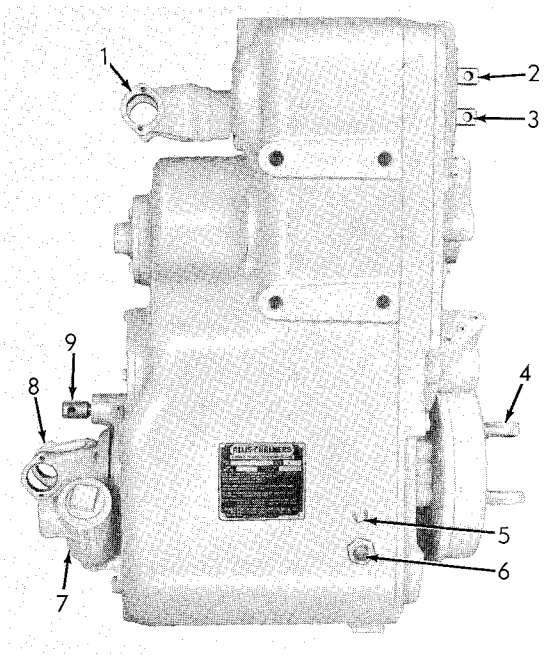
1. TORQUE CONVERTER HOUSING ASSEMBLY

The torque converter multiplies torque automatically and instantaneously as required by the load. It also permits the engine to work at its most effective speed range and produce maximum horsepower whenever required. It provides a cushion between engine and transmission to dampen shocks and delivers an infinite variety of output ratios for maximum efficiency and fuel economy.

The torque converter is bolted directly to the engine flywheel housing and may be removed as a unit. It provides a mount for the hydraulic system pump and the combination converter charging and power steering pump. The converter is a single stage type and has a 3 to 1 torque multiplication ratio. It is composed of three major parts; the impeller wheel (connected to the engine), the turbine wheel (connected to the drive wheels), and the guide wheel (which receives oil from the turbine and redirects it back to the impeller).

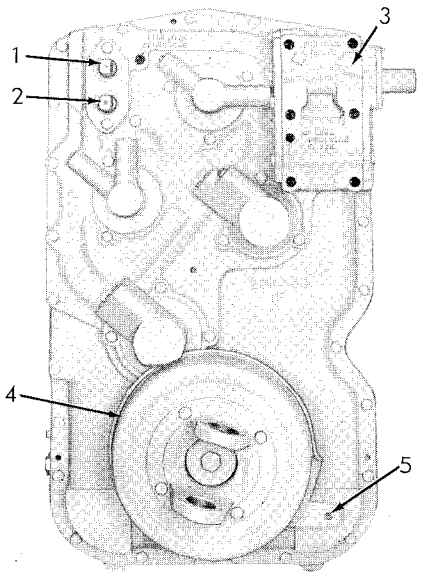
2. TRANSMISSION HOUSING ASSEMBLY

The remote mounted transmission houses the necessary gears, shafts, and clutches of the power train. The transmission housing also contains the directional valve, range valve, pressure regulating valves, clutch



1. Input from Converter
2. Directional Control
3. Range Control
4. Front Output Shaft
5. Level Plug
6. Sight Gauge
7. Strainer Housing
8. Rear Output Shaft
9. Rear Axle Disconnect

Figure 46. Transmission — Left Side (T-40635)



1. Directional Control
2. Range Control
3. Pressure Regulating Valve
4. Parking Brake Assembly
5. Brake Actuating Lever

Figure 45. Transmission — Front (T-40634)

cut-off valve and the necessary passages and lines to convey the lube oil and high pressure (clutch actuating) oil. In addition, the lower end of the housing acts as a reservoir for the transmission hydraulic system. It also houses the rear axle disconnect mechanism, the transmission oil strainer and provides a mounting place for the transmission oil sight gauge and level plug.

All gears are in constant mesh, the correct speed and direction being determined by the operator in his selection of applied clutches. The transmission, being remote mounted, may be removed without disturbing the converter.

3. CLUTCH CUT-OFF VALVE

The clutch cut-off valve is located in the pressure regulating valve assembly in the upper, left hand, forward corner of the transmission housing. It will allow oil to be delivered to the range clutches until "actuated" to cut off the flow of oil which automatically releases the engaged range clutch.

The cut-off valve is actuated by lightly applying the brake because it is connected to the hydraulic brake system. Therefore, as long as the loader brakes are applied, all the engine power is available to the loader

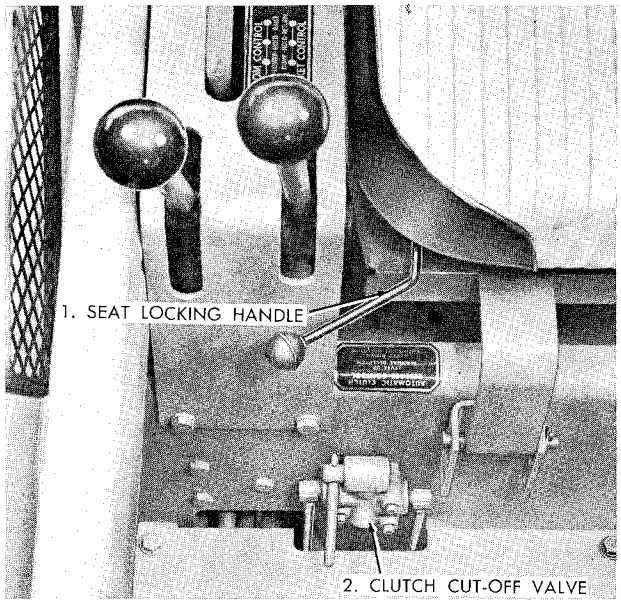


Figure 47. Clutch Cut-Off Valve
(T-28795)

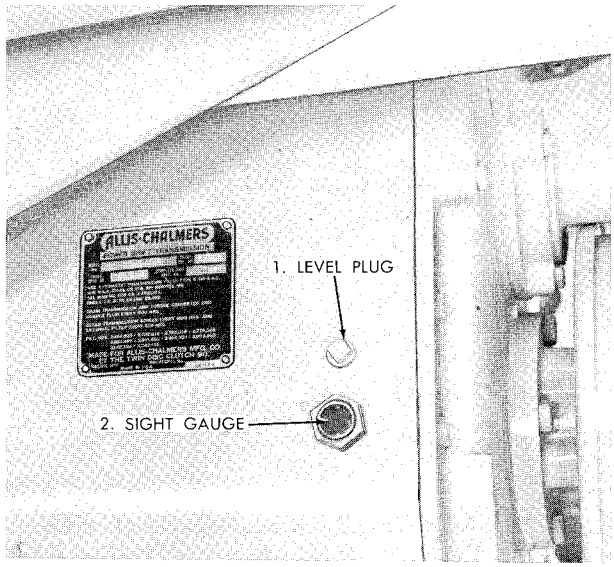


Figure 48. Level Plug and Sight Gauge
(T-38453)

hydraulic pump for a more powerful loading action. Upon release of the brakes the cut-off valve again passes oil to the range clutch which automatically engages it.

4. CONTROL OF CLUTCH CUT-OFF VALVE

When precise control of the machine is required on grades, the automatic clutch release feature offered by the clutch cut-off valve may be undesirable. Accordingly, a control lever, located near the floor of the operator's compartment on the right hand side, is provided so that the operator can easily disengage the automatic release feature as desired. Control is accomplished by the hand operated check valve in the line between the hydraulic brake circuit and the clutch cut-off valve. When the lever is in the up position the automatic feature is disconnected.

IMPORTANT: When changing the position of the control lever, the brake pedal should be fully released.

B. CHECKING OIL LEVEL

A good grade of SAE 10W engine lubricant is recommended year around for use in the transmission hydraulic system. No specific brand of oil is recommended. Use only products qualified under above specifications and recommended by reputable oil companies.

An oil level plug and sight gauge are located on lower right side of transmission. Check the oil daily before beginning operations. Before starting engine remove level plug and check for a free flow of oil from plug hole. If necessary, add oil through filler pipe, located at left hand side of converter, until oil just begins to flow freely through the plug hole. Replace plug and tighten securely.

Start engine, and after transmission reaches operating temperature check oil level in sight gauge window. If oil is not visible in window, add oil in filler pipe until it appears halfway up on sight gauge. Unit is now ready for operation. Engine should be running at low idle during checking operation.

C. CHANGE TRANSMISSION-CONVERTER OIL

The capacity of the oil system after complete draining and overhaul is 8 gallons. However, the refill capacity for an oil change is 6-1/2 to 7 gallons because the draining operation leaves some oil inside the converter, transmission and power steering lines.

Since the oil system is the "heart" of the transmission-converter, power steering combination, it is especially important that emphasis be placed on cleanliness of the oil.

The transmission-converter system should be drained and refilled with new oil after 1000 hours of operation, or more often if the oil shows evidence of discoloration, or has a strong odor resulting from operations causing high temperatures.

NOTE

Oil should be operating temperature (between 150° to 200° F.) when drained. When draining the system, allow time for oil to drain down to the sump.

Change oil as follows:

1. Remove drain plug from the lower rear face of the transmission.

NOTE

If oil is contaminated with metal particles, the entire assembly should be disassembled, cleaned, and damaged parts replaced.

2. Disconnect two hoses at power steering cylinder. Turn wheels to left and right to remove all oil from cylinder.

3. Clean strainer and replace the transmission filter elements. (Refer to Paragraphs D and E.)

IMPORTANT: THE ENGINE SHOULD NEVER BE STARTED WHEN THE TRANSMISSION CONVERTER SYSTEM IS EMPTY. DAMAGE TO THE PUMP AND CONVERTER WOULD RESULT DUE TO LACK OF LUBRICATION.

4. Reinstall drain plug and connect all hoses to the power steering cylinder.

5. Remove oil level plug from lower right side of the transmission and add oil through transmission filler pipe until there is a free flow of oil from the plug hole. Replace plug and tighten securely.

6. Start engine and allow it to run for two minutes at low idle to "charge" system. Then, with engine running, add oil through filler pipe until oil is halfway up on sight gauge window.

7. Continue to operate engine until transmission reaches operating temperatures. Check sight gauge again. Add oil if necessary to bring level halfway up on gauge window.

Bleeding the system is not necessary, but the engine should be allowed to idle for several minutes after refilling before applying a load to the converter.

D. CLEANING THE SUCTION STRAINER

The suction strainer should be removed and cleaned each time the transmission-converter oil is changed.

The suction strainer is located in the projection at the rear of the transmission sump.

Remove and clean the strainer as follows:

1. Remove square headed pipe plug from strainer housing and remove strainer.

2. Thoroughly clean strainer in a clean solvent. Wipe inside of the strainer housing to remove sediment left by strainer.

3. Install strainer in housing and replace pipe plug, tightening securely.

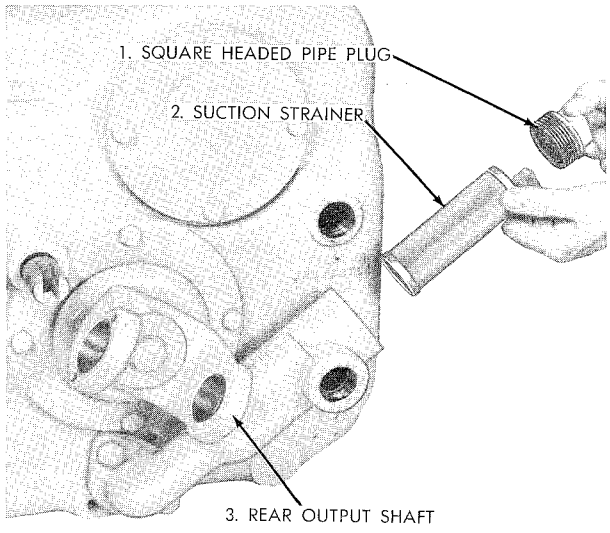


Figure 49. Suction Strainer
(T-40632)

E. REPLACING THE FILTER ELEMENT

The full flow type filter is located directly beneath the operator's seat and is most conveniently reached from underneath the loader. It contains a replaceable element that must be replaced every 500 hours, or more often if conditions warrant.

NOTE

It may be necessary to change this filter more often during the first few hours of operation.

Replace the element as follows:

1. Thoroughly clean filter cover, cover clamp and surrounding area.

2. Loosen capscrews on filter cover retaining clamp and allow filter to drain. When filter is completely drained remove filter cover clamp, filter cover and element. Discard filter element.

3. Thoroughly clean interior of the filter housing.

4. Install a new filter element and gasket. Replace filter cover and cover clamp and tighten securely.

F. OIL PRESSURES AND TEMPERATURES, TRANSMISSION-CONVERTER

Fewer shut-downs will be experienced if the operator periodically reads the transmission system pressure gauge and the converter temperature gauge provided on the instrument panel.

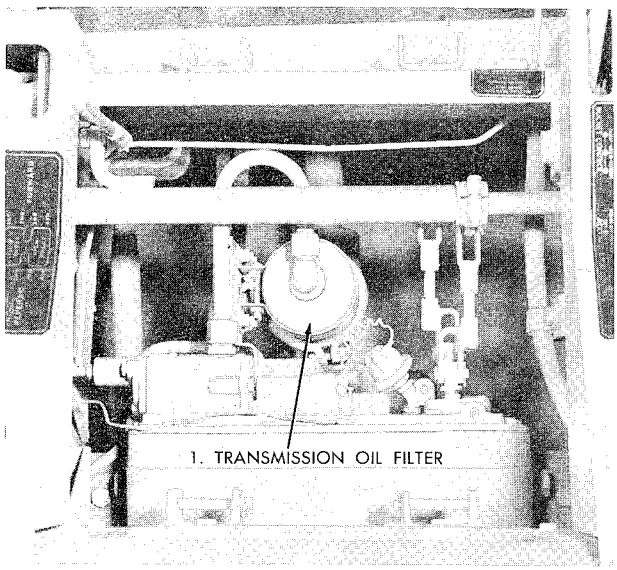


Figure 50. Transmission Oil Filter (T-40639)

The transmission pressure gauge should read between 150 and 220 psi at any time that both range and direction clutches are engaged. If the pressure consistently drops below 150 psi with any combination of clutches engaged, it may allow the clutches to slip and overheat.

Ordinarily, the converter "out" pressure reading is not required during operation — thus, no gauge is provided. It is specified at 40 psi maximum at full throttle. If the pressure consistently drops below 25 psi it indicates the converter is not receiving sufficient oil and the following points should be checked.

1. Check oil level in transmission.
2. If suction line connections are loose the charging pump may be sucking air. Tighten if necessary.
3. Check and clean suction strainer in transmission. Check transmission filter element. Replace if necessary.

NOTE

All pressure readings should be made with the transmission at operating temperature (approximately 150° F.).

The converter "out" oil temperature should never be allowed to go above 250° F. maximum. If it should exceed the maximum, stop the loader, shift transmission to neutral and run the engine at 1/3 throttle. The temperature should drop rapidly to approximately equal the engine water temperature in two or three minutes. If the temperature does not drop, the engine should be stopped immediately and the cause determined.

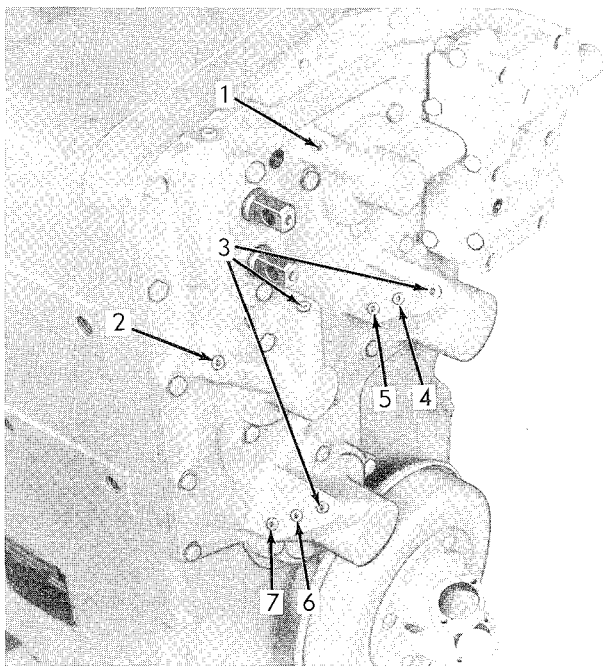


Figure 51. Transmission Pressure Check Points (T-40637)

1. Forward Clutch Pressure — 220 psi Max., 150 psi Min.
2. Reverse Clutch Pressure — 220 psi Max., 150 psi Min.
3. Lubricating Oil Pressure — 40 psi Max., 25 psi Min.
4. 1st — 3rd Clutch Pressure — 345 psi Max., 220 psi Min.
5. 2nd — 4th Clutch Pressure — 345 psi Max., 220 psi Min.
6. 3rd — 4th Clutch Pressure — 345 psi Max., 220 psi Min.
7. 1st — 2nd Clutch Pressure — 345 psi Max., 220 psi Min.

PLANETARY AXLES, FRONT AND REAR

A. GENERAL

The front and rear axles each consist of a central differential carrier section, two power actuated hydraulic brake assemblies and two planetary wheel hubs. The rear axle has in addition, two steering knuckle assembles located between the central section and wheel hubs to provide a steering type drive axle. "Toe-in" is not required since the steering wheels are also driving wheels.

The front and rear central differential carrier sections are similar in construction. Each consists of a differential assembly with hypoid type ring gear and pinion. The housing for the central section also serves as a reservoir for lubrication gear oil for these parts.

All four planetary hubs are identical and each consists of a floating gear, a floating sun gear and three planetary pinions which rotate on forged bronze planet pins. These parts are lubricated by the oil carried in each planetary hub.

As the wheel hub and planetary spider rotate, they pick up oil contained in the hub and channel it to wheel bearings and gears. Oil, therefore, is constantly flowing around these parts and through the channels in the planet pin to lubricate pinions. This assures full flow lubrication, under all operating conditions.

CAUTION

For safety, use blocks in addition to a jack if removing wheels, tires, axles, etc.

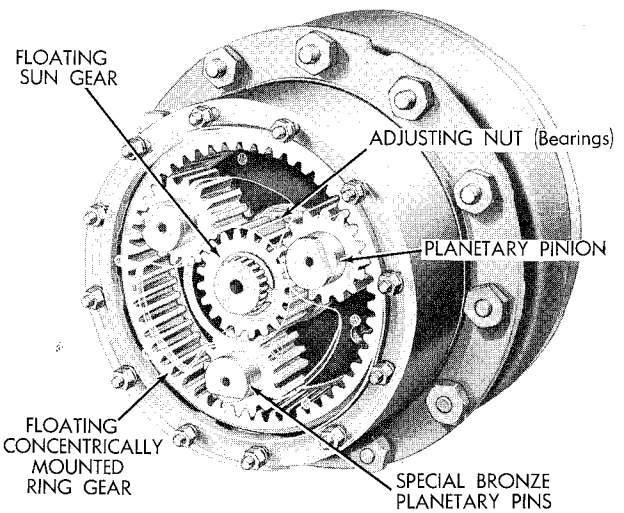


Figure 52. Planetary Hub Assembly (T-27996)

B. ADJUSTMENT OF WHEEL BEARINGS

Since wheel bearings are constantly lubricated by oil inside planetary hub, no additional lubrication or "packing" is required. When adjustment becomes necessary on either front or rear axle, proceed as follows:

1. Remove wheel and tire assembly.
2. Drain wheel hub and remove planetary end cover from the spider.
3. Insert capscrews in each of the three jack screw holes of spider. Turn capscrews in evenly until spider (including planetary pins and pinions) pulls free of wheel hub.
4. Remove snap ring, sun gear, thrust washer and lock nut (for adjusting nut) from the axle shaft. Loosen adjusting nut.

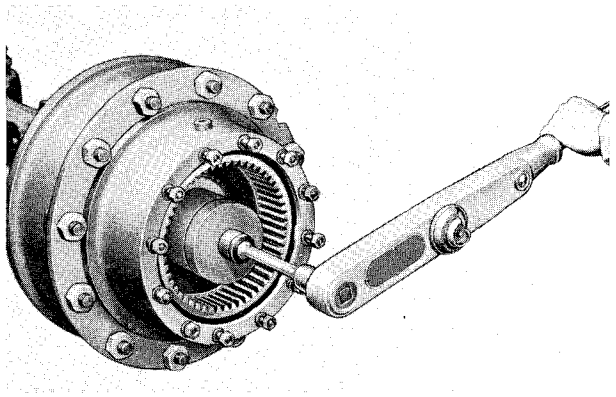


Figure 53. Tightening Adjusting Nut (T-32757)

5. Tighten the adjusting nut to 100 pounds feet while the wheel is being rotated. Rotate the wheel in both directions to make sure bearings and related parts are fully seated.
6. Back off adjusting nut 1/4 turn to relieve preload on bearings.
7. Attach a suitable cord to one of the wheel mounting lugs and wrap cord around hub several times. Attach a spring scale to end of cord. After starting resistance is overcome read the ROLLING TORQUE on the spring scale. Rolling torque is the amount of torque necessary to keep hub rolling after it is in motion. Adjust the torque on the bearing adjusting nut until a rolling torque of 9-13 lbs. ft. for the front hubs or 4 lbs. ft. for the rear hubs is indicated on the spring scale.

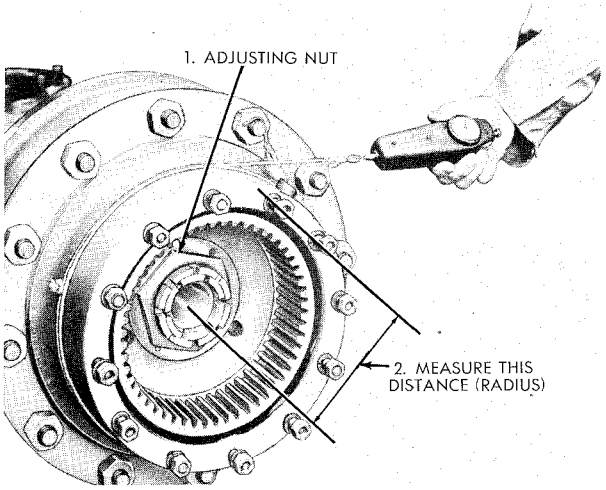


Figure 54. Checking Bearing Preload
(T-32731)

8. If it is not convenient to remove the wheels, check the wheel bearing preload torque as shown in Fig. 55. The extension (Fig. 56) permits a reading to be taken without interference from the tire.

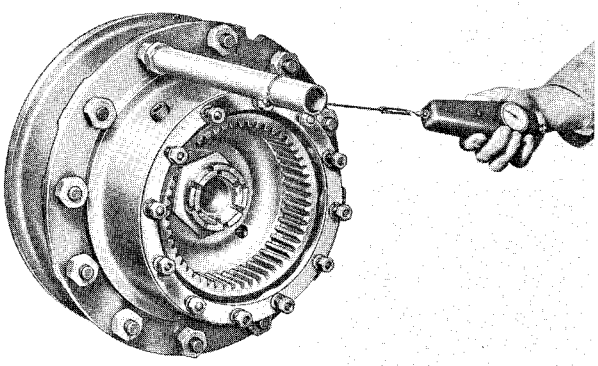


Figure 55. Alternate Method of Checking Bearing Preload
(T-32758)

Bearing preload torque is figured by multiplying the radius (the distance from the center of the wheel to the point where the cord, attached to the spring scale, just contacts the wheel hub) by the reading on the pound scale. For example: assume the distance from the center of the wheel to the cord contact point is 9 inches, and the reading on the pound scale is 7 pounds - multiplying 9 inches by 7 pounds we get 63 inch pounds. Since our preload specifications are listed in foot pounds we divide 63 inch pounds by 12 and arrive at a reading of 5.25 foot pounds.

9. Install nut lock. Back off adjusting nut to nearest slot if necessary. Recheck rolling torque with cord and spring scale.

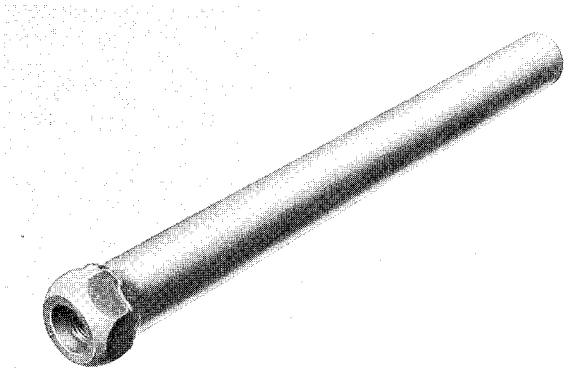


Figure 56. Wheel Lug Extension
(T-32759)

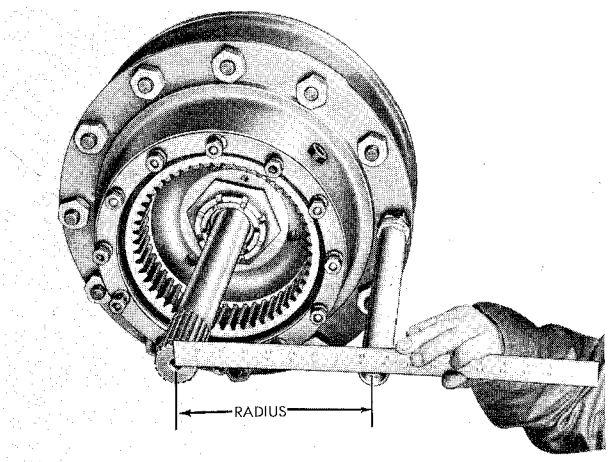


Figure 57. Measuring Radius Using Alternate Method
(T-38343)

10. Reinstall thrust washer, sun gear, snap ring, spider assembly and end cover. Reinstall wheel and tire assembly. Refill hub with oil. (Refer to 1000 HOUR ROUTINE SERVICE, "PLANETARY HUBS.")

C. STEERING KNUCKLES—REAR AXLE

The steering knuckles, or ball joints, each consist of a constant velocity universal joint and a trunnion socket. The universal joint, contained in the trunnion socket, is designed to transmit power while machine is being steered — thus a drive type steering axle. The trunnion socket is a "ball-shaped" housing with integral king pins on which are mounted two tapered roller bearings. These trunnion bearings support the wheel hub and allow it to pivot during steering.

The universal joint and trunnion bearings are prepacked with grease during assembly so that very little lubrication is required in the field. Add two or three shots of grease (Marfax No. 2 Heavy-duty or equal) every 500 hours of operation. (Refer to Routine Service, "STEERING AXLE"). DO NOT OVERGREASE.

The trunnion bearings are adjusted by shims located under their bearing caps. The quantity of shims used under upper cap should approximately equal those used under lower cap to center the universal joint in trunnion socket housing. When adjustment becomes necessary, proceed as follows:

1. Remove tire and wheel assembly.
2. Disconnect drag link and/or tie rod.
3. Add or remove shims under upper and lower trunnion bearing caps in approximately equal amount, until there is no perceptible "play" when wheel hub is manually moved up and down. Wheel hub should pivot freely right or left, as when steering.
4. Reduce shim pack by .005" under each cap, and replace cap. Wheel hub should now pivot with a slight drag when turning right or left.
5. Reconnect drag link and/or tie rod.
6. Replace tire and wheel assembly, and torque the wheel lug nuts to 330 to 350 lbs. ft.

TIRES

A. GENERAL

The tires on this vehicle react more readily to existing conditions than perhaps any other wearing part in the entire assembly. Not only do they react more readily but to a great extent, these reactions are quite obvious to operating and service personnel. In direct contrast with other components of the machine, the wearing surfaces of the tires do not require the removal of covers, plates, housings, etc., to inform concerned personnel of their condition. Only when a defect in the cord body or bead is suspected, need the tire be removed from the machine.

Tire care is, to a great extent, easy and consumes very little of the operator's or serviceman's time. Strict adherence to the recommended operating procedures outlined below will definitely increase tire life.

B. INFLATION

Correct tire pressure is perhaps the most significant item in obtaining maximum tire life. Underinflation and overinflation are equally harmful. Both conditions are to be avoided. The correct tire pressure for the TL-14D Tractor Loader is listed under "GENERAL SPECIFICATIONS".

For service in hard, dry footing, inflation may be increased 10 psi if necessary to overcome a tendency to buckle.

For maximum flotation in very soft footing, inflation may be decreased up to 10 psi.

CAUTION

Reinflate to recommended pressure before returning unit to normal service.

When mounting tires on rims, inflate all tires with a 16-ply rating or better to 75 psi then reduce to recommended pressure. Inflate all lower ply rating tires to 45 psi then reduce to recommended pressure. This procedure insures proper seating of the bead.

Machines are shipped from the factory with pressures in excess of normal. This is necessary due to tie-down procedures and to eliminate any bouncing in transit. It is absolutely necessary to reduce these pressures to the recommended (Page 5) before placing the machine in operation.

1. UNDERINFLATION

Underinflated tires flex too much, causing excessive internal temperature. The resultant heat can cause permanent tire damage - such as flex breaks, radial cracks, tread or ply separation. In tube type tires, loose cords in the band ply may chafe through the tube.

In addition, some of the excessive internal heat is conducted to the tread, reducing the tire's resistance to cuts, abrasion and impact breaks because excess heat softens rubber.

2. OVERINFLATION

Overinflation reduces the amount of tread contact with the ground. In soft soil the tire digs deeper into the ground, provides less flotation and traction, and wastes engine power. Overinflated tires tend to spin and skid. The center of the tread wears faster than other parts. The vehicle rides harder and vibrates more which causes load spillage and excess wear and tear on vehicle parts. Also, overinflation puts too much tension on both rubber and fabric, making the tire more vulnerable to cuts, snags and impact breaks.

The recommended pressure (Page 5) is a "cold" pressure. If 24 hour operation does not permit checking inflation pressures on completely cooled tires, a correction factor can be determined by experiment.

Check as many tires as possible when "cold" and again after at least two hours of operation. The average difference should be added to the recommended pressure when checking the tires during constant operation.

CAUTION

DO NOT BLEED "HOT" TIRES TO REDUCE PRESSURE.

Continuous operation of equipment builds up heat and accompanying higher pressures. These normal increases are allowed for in the design of the tire. Bleeding the built-up pressure brings on an increase in flexing and bulging which, in turn, creates more pressure, and a vicious circle is created.

Three factors that bring about excess heat and pressure in a tire are: Underinflation, Overloading and Excessive Speed. To reduce excessive heat and pressure in a properly inflated tire, reduce the speed, or both. Do not bleed off the excess pressure.

C. HAUL ROAD

A well maintained haul road is a definite asset in increasing tire life. The removal of rocks and chuck holes will pay dividends in tire costs.

A careless operator can quickly defeat the efforts of others engaged in increasing tire life. The following practices are to be avoided:

1. Excessive braking. This practice develops large quantities of heat which are transferred to the tires, causing charring and cracking around the bead.

2. Allowing tires to rub side banks on haul roads or against unloading barriers.

3. Do not overload machine. Match material being handled with correct bucket size.

4. Do not spin tires while loading bucket. Do not start too abruptly.

D. REPAIRS

A conscientious tire inspection program is of little value if known tire defects are ignored or repairs postponed.

Air leaks allow tires to operate in a dangerously underinflated condition.

Deep cuts allow abrasive material to enter and work upon cord bodies. This action can result in tread or ply separation or a possible blow-out. Stones imbedded in smaller cuts will be pounded through to the cord. Remove small stones with an awl or similar tool. Use a sharp narrow bladed knife and cut away the rubber around the cut to form a cone shaped cavity extending to the bottom of the injury. The sides of the cavity should be slanted enough to prevent stones from wedging into it.

Bent rims place a terrific strain on the tire bead and lead to tire failure.

Tires that are not properly cleaned after coming in contact with oil, grease, or gasoline will be permanently and fatally damaged. Rubber quickly absorbs these substances and then swells and becomes spongy, rendering the tire useless.

E. VEHICLE IN TRANSIT

Because of the special extra heavy construction of off-the-highway tires, special precautions must be observed to protect them when the vehicle is driven over the highway to a new job site.

If the precautions are not observed, excessive tire heat is built up and the tires will probably fail prematurely. These precautions are as follows, and apply to tires on all vehicles in transit — driven or towed.

NOTE

See Par. D, "PUSH STARTING AND TOWING" under "DRIVING AND OPERATING INSTRUCTIONS" before towing unit.

1. LOAD AND PRESSURE

   a. Vehicles must be empty during transit.

   b. Inflation pressure is to be checked before starting each day and adjusted to pressure recommended for over-the-highway travel.

NOTE

Consult authorized tire distributor for the information.

   c. To avoid damage from excessive heat build up, vehicles and tires with "dry Ballast" in them should not be driven or towed in highway transit.

   d. Inflation pressures are not to be reduced by "bleeding" tires during transit. During transit, operation pressure build-up in tires is normal.

2. SPEED

Regular Skid Depth Tires.

   a. Maximum highway speed, 30 MPH.

b. Stop for 30-minute cooling period after each 50 miles of driving or before 2 hours sustained operation, whichever comes first.

c. One hour mimimum midday lunch stop should be observed during full day operations.

Extra Skid Depth Tires.

a. Vehicles equipped with extra skid depth tires are not to be driven in transit over the highway unless the proposed trip is reviewed and approved by qualified personnel of the tire manufacturer.

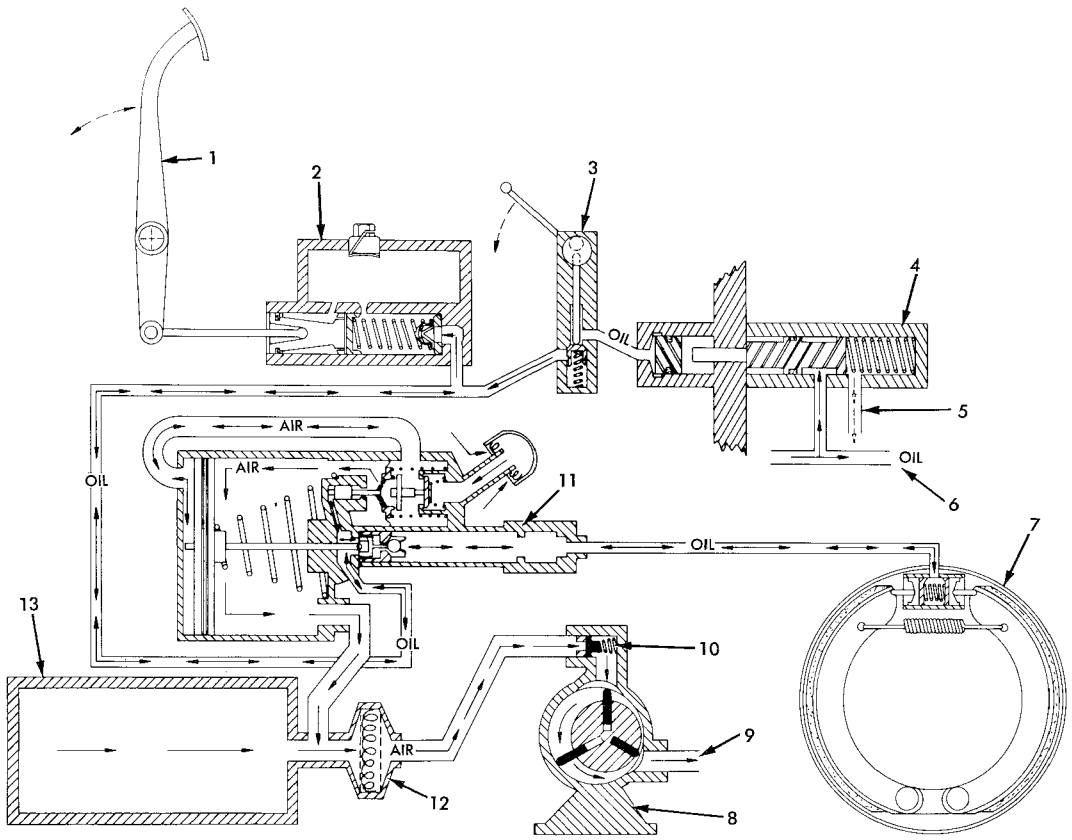
Further information on the care and servicing of tires can be obtained from your local authorized tire distributor.

POWER BRAKES

A. GENERAL

The machine is equipped with hydraulic power brakes, located in the hubs of the front and rear wheels. Power for braking is provided by a vacuum hydraulic unit (hydrovac), located under the floor plates of operator's compartment, when either of the two brake pedals are depressed.

Vacuum is supplied to the Hydrovac by an engine driven vacuum pump mounted at the rear of the loader and driven by a belt from the crankshaft pulley. Vacuum is built up in a vacuum reserve tank, located beneath the battery box at forward end of engine compartment beneath the hood, at any time that engine is running. This provides maximum vacuum at any time loader is operating. The check



1. Brake Pedal
2. Master Cylinder
3. Clutch Cut-Off Check Valve
4. Clutch Cut-Off Valve
5. Return to Sump
6. Apply Pressure to Transmission Clutches
7. Wheel Brake
8. Engine Driven Vacuum Pump
9. Oil and Air Return Line to Engine Oil Pan (Atmosphere)
10. Check Valve
11. Hydrovac
12. Air Filter
13. Vacuum Tank

Figure 58. Power Brake System — Schematic (T-40641)

valve, a one way valve, is located in the vacuum line between the vacuum tank and vacuum pump. When the pedals are depressed the master brake cylinder signals the Hydrovac, through hydraulic pressure, to supply power to actuate the brakes. The amount of power being in direct proportion to the amount of pressure applied to brake pedal. If, for any reason, the vacuum system should fail, brakes will continue to operate through the hydraulic system alone.

B. HYDROVAC

1. DESCRIPTION

The Hydrovac consists of three basic units which have been so combined that they function as a single unit, all of which are controlled by hydraulic pressure developed within the master cylinder of the tractor. The three basic units are:

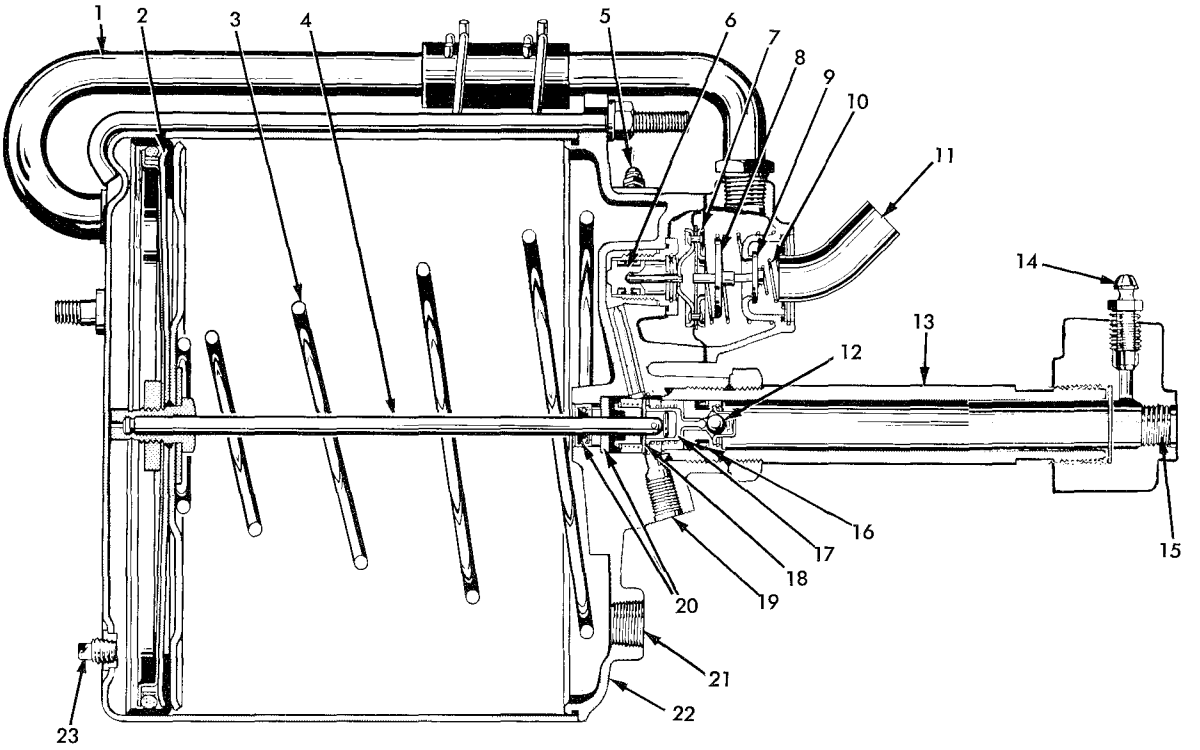
a. Hydraulically actuated vacuum control valve which controls the degree of brake application or release. The control valve consists of a hydraulic actuated piston, a diaphragm, a vacuum and an atmospheric poppet.

b. A vacuum power cylinder which contains a single piston and a push-rod that connects the vacuum piston to hydraulic piston of hydraulic cylinder.

c. A hydraulic cylinder which contains a piston with a check valve.

2. OPERATION

As brake pedal is depressed, hydraulic pressure developed within the master cylinder is transmitted to the hydraulic piston of control valve and to the hydraulic cylinder. With pressure applied to control valve piston, the vacuum valve closes and atmos-



1. Control Line
2. Vacuum Piston
3. Vacuum Piston Return Spring
4. Push Rod
5. Bleed Screw (No. 1)
6. Control Valve Piston
7. Control Valve Diaphragm
8. Vacuum Poppet
9. Atmosphere Poppet
10. Atmosphere Poppet Return Spring
11. Air Inlet Tube
12. Ball (Hydraulic Piston Check Valve)
13. Hydraulic Cylinder
14. Bleed Screw (No. 2)
15. Wheel Cylinder Connection Port
16. Hydraulic Piston
17. Yoke (Hydraulic Piston)
18. Hydraulic Piston Stop Washer
19. Master Cylinder Connection Port
20. Push Rod Seals
21. Manifold Vacuum Supply Port
22. End Plate
23. Lubrication Port

Figure 59. Hydrovac -- Cut-Away (T-32719)

pheric valve opens to admit air to the control side of vacuum power cylinder. As air is admitted, the forces acting upon the vacuum power cylinder piston are transmitted directly to the hydraulic piston through the push rod. As hydraulic piston starts to move, the piston check valve closes, trapping fluid under pressure ahead of piston.

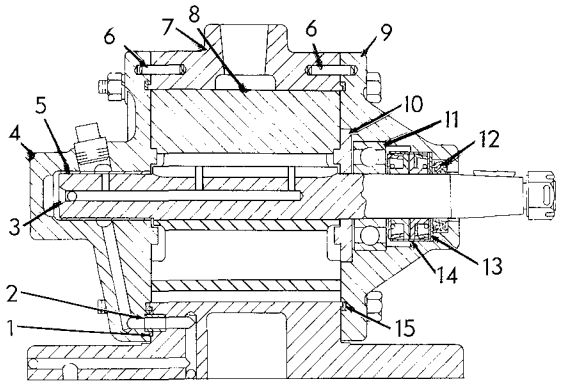
The total hydraulic pressure created and transmitted to wheel cylinders, is sum of the pressure developed as a result of the vacuum power cylinder push-rod thrust and pressure received by the Hydrovac from master cylinder.

As the brake pedal is released, pressure within the control valve hydraulic piston chamber is reduced, allowing atmospheric poppet to close and reopen vacuum poppet. The vacuum power cylinder piston is again balanced in vacuum and returns to release position. When the hydraulic piston nears release end of its stroke, its check valve reopens, thus permitting full release of the brakes.

C. VACUUM PUMP

1. DESCRIPTION

The vacuum pump is a rotary, sliding vane type pump in which the rotor is eccentrically located with respect to the housing. The pump is dependent upon oil as a means for lubrication of the bearings and also for providing a seal.



1. Retainer Gasket
2. Retainer
3. Rotor and Ball Assembly
4. Cover Plate
5. Cover Plate Bushing
6. Dowel Pin
7. Main Housing
8. Rotor Vane (3)
9. End Plate
10. End Plate Baffle
11. Rotor Ball Bearing
12. Felt Seal Retaining Washer
13. Sealing Gasket
14. Oil Seal
15. End Plate and Cover Plate Sealing Gasket

Figure 60. Vacuum Pump — Cross Section (T-32693)

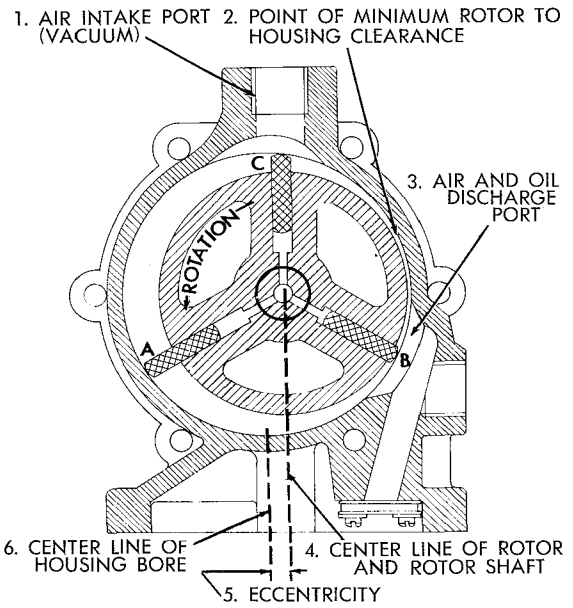


Figure 61. Pump Cross Section Showing Operation (T-32694)

The vacuum pump is operated directly by a belt and pulley drive from the engine crankshaft and operates at all times while the engine is running. Lubrication is supplied by the engine lubricating system, through an external flexible line. A second flexible external line returns oil to the crankcase oil pan.

2. OPERATION

With reference to Fig. 61 the principle of operation of the vacuum pump is as follows:

The shaft and rotor assembly rotates inside of pump as shown by the arrow on rotor. Note that centerline of rotor assembly is eccentrically located with respect to the centerline of inside diameter of pump housing. The point of minimum clearance of rotor to housing is located at point shown just above oil and air discharge port.

After vane (A) has passed air intake (vacuum) port, the volume enclosed by vane (A), rotor and housing, will increase thereby drawing in air. After vane (C) has passed air intake port, air is trapped between vanes (A) and (C) and rotor and housing. As vane (A) moves around to air and oil discharge port, the volume decreases and enclosed air is compressed. After vane (A) passes air and oil discharge port, the oil and air is discharged to atmospheric pressure. During one complete revolution of rotor, air will be drawn in between vanes (B) and (C) and vanes (B) and (A) in same manner and will be discharged at the oil and air discharge port.

The vane rings hold vanes out against inside diameter surface of housing. This is necessary when pump is

first started and oil circulation has not reached inside diameter surface of housing and also in cold weather when oil viscosity is high. After pump rotor is turning with sufficient speed, centrifugal force will hold the vanes out.

D. BRAKE FLUID LEVEL

Before adjusting brakes, check fluid level by removing filler plug (Fig. 25). The fluid level should be 3/4" below bottom of filler plug. Inspect vent in the filler cap; be certain that it is clean and unobstructed.

NOTE

A plugged filler cap vent may cause brakes to fail. Reinstall filler cap securely.

E. HYDROVAC UNIT LUBRICATION

The hydrovac unit is located under the floor plate at right front of loader and is accessible from underneath. To lubricate, remove 1/8 inch pipe plug located in front end of vacuum power cylinder, and inject Vacuum Cylinder Oil into cylinder until it runs from filler hole. Approximately two fluid ounces of oil are required to insure proper lubrication of cylinder piston.

F. BRAKE ADJUSTMENT

Adjust the brakes for normal lining wear as follows:

1. Raise front end of loader off ground with a jack and suitable support.

2. Place transmission control levers in neutral and release parking brake. Adjust brake shoes individually by turning adjusting cam bolts, two located in each of the front brake drum dust covers, until brakes begin to drag while turning wheel by hand. Then back-off adjusting cam bolts just enough to allow wheel to turn freely.

3. Rear brakes are adjusted in same manner as front.

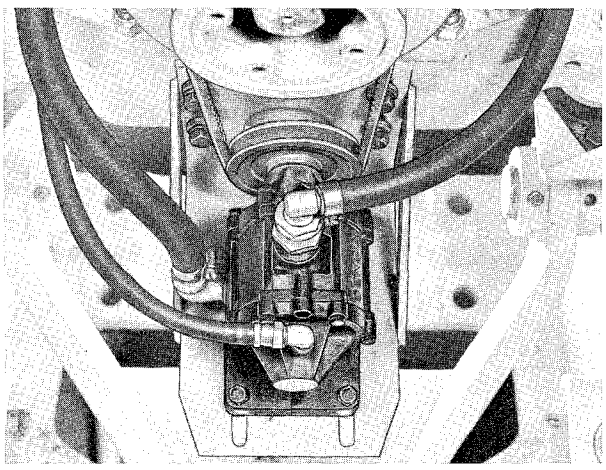


Figure 62. Vacuum Pump — Mounted
(T-40640)

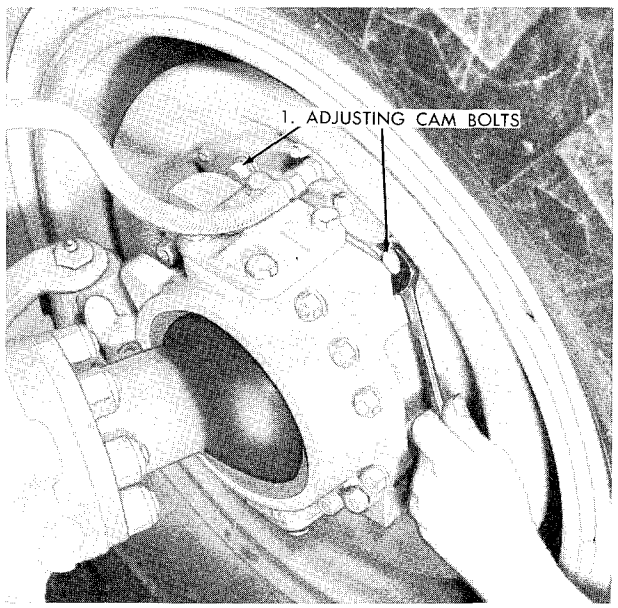


Figure 63. Adjusting Brakes
(T-38461)

G. BLEEDING THE BRAKE SYSTEM

Bleeding is required whenever system has been disconnected or disrupted at any point for replacement of parts.

CAUTION

Bleeding operation must be done with engine off.

It is recommended that a reliable pressure bleeder tank be used to bleed system. The following procedure can be used:

1. Clean dirt from around filler cap of master cylinder reservoir and then remove filler cap.

2. Fill master cylinder reservoir with Heavy Duty Brake Fluid, SAE 70R3 or equivalent.

3. Charge pressure bleeder tank to 25-30 psi. Tank pressure should not be allowed to fall below 20 psi.

4. Attach hose of pressure bleeder to master cylinder. Apply pressure to reservoir, bleeding air from hose before tightening hose connection at reservoir port.

5. Attach a rubber drain tube to first bleed screw located on the Hydrovac end plate (Fig. 59) and place the free end of drain tube in a container for receiving expended brake fluid.

6. Open bleed screw approximately 3/4 turn and allow air and brake fluid to flow into container.

7. When a solid stream of brake fluid (free of bubbles) is obtained, close and tighten bleed screw.

8. Attach rubber drain tube to second bleed screw located at end of Hydrovac hydraulic cylinder (Fig. 59) and again place free end of drain tube in container.

9. Open bleed screw approximately 3/4 turn and allow air and brake fluid to flow into container. Be sure to allow sufficient flow to insure removal of all air.

10. When a solid stream of fluid (free of bubbles) is obtained, close and tighten bleed screw.

11. Place clutch cut-off control valve in engaged position (handle down). Loosen flare type connector at clutch cut-off valve on transmission until a steady flow of fluid (free of bubbles) is observed. Tighten connector.

12. Attach rubber drain tube to bleed screw located at brake wheel cylinder at furthest line distance from Hydrovac. Place free end of drain tube in container.

13. Open bleed screw approximately 3/4 turn and allow air and brake fluid to flow into container.

14. When a solid stream of fluid (free of bubbles) is obtained close and tighten bleed screw.

15. Repeat steps 12, 13 and 14 at the remaining brake wheel cylinders in order of length. Bleed cylinder nearest Hydrovac last.

After the system bleeding is completed, remove rubber drain tube from wheel cylinder. Close shut-off valve in line from bleeder tank to master cylinder reservoir, and remove line from the reservoir. Fill master cylinder reservoir to approximately 3/4 inch under filler plug (if fluid is required), and then replace filler cap.

H. TROUBLE SHOOTING

Brake complaints can be divided into the following major classifications:

1. Hard Pedal
2. Brakes Fail to Release
3. Excessive Brake Pedal Travel
4. Grabby Brakes

To diagnose trouble in the power brake system, the following two steps should be used:

1. First determine which of the above major classifications covers complaint.

2. Narrow down complaint by a quick check so as to isolate the possible source of trouble.

Each of the major complaint classifications can be further subdivided into one or more of the following groups:

1. Vacuum System Trouble
2. Wheel Brake or Master Cylinder Trouble
3. Hydraulic System Trouble
4. Hydrovac Trouble

In the event of brake malfunction in the field during normal operation, the following grouping may assist in quickly diagnosing the complaint:

HARD PEDAL

COMPLAINT	POSSIBLE CAUSES
Vacuum System Trouble	1. Low pump vacuum, pump in need of service. 2. Loss of vacuum due to loose pump fitting or loose line fittings. 3. Low vacuum due to restricted opening in vacuum pump fitting. 4. Collapsed hose or tubing, loose hose lines, or other restriction in vacuum line. 5. Faulty check valve. 6. Air leakage into vacuum lines at fittings.
Wheel Brake or Master Cylinder Trouble	1. Brake pedal linkage binding. 2. Brake shoes bound on anchor pins. 3. Restricted brake shoe movement on backing plate.
Hydraulic System Trouble	1. Swollen primary cup in master cylinder. 2. Rust or corrosion on master cylinder bore. 3. Restriction in hydraulic lines to wheel cylinders. 4. Swollen cups in wheel cylinders.

HARD PEDAL (CONTINUED)

COMPLAINT	POSSIBLE CAUSES
Hydrovac Trouble	1. Control valve hydraulic piston binding in fitting. 2. Clogged hydraulic passage to control valve piston. 3. Faulty vacuum control valve operation. 4. Restriction in control tube. 5. Worn or dry power piston leather packing. 6. Restriction in Hydrovac air cleaner. 7. Swollen hydraulic cylinder piston cup. 8. Leakage at end plate.

BRAKES FAIL TO RELEASE

COMPLAINT	POSSIBLE CAUSES
Wheel Brake or Master Cylinder Trouble	1. Shoes binding on anchor pins. 2. Brake pedal linkage binding. 3. Faulty master cylinder push rod adjustment. 4. Weak or broken brake pedal return spring. 5. Grease or brake fluid on brake shoe lining. 6. Weak or broken shoe return spring. 7. Brake shoes binding on backing plate.
Hydraulic System Trouble	1. Swollen primary cup in master cylinder. 2. Restricted or collapsed hydraulic line. 3. Swollen wheel cylinder cups. 4. Use of Hydrovac with residual pressure check valve when master cylinder is equipped with a residual pressure check valve.
Hydrovac Trouble	1. Control valve hydraulic piston binding in fitting. 2. Clogged hydraulic passage to control valve piston. 3. Faulty vacuum control valve operation. 4. Power piston binding on return stroke. 5. Damaged vacuum power cylinder 6. Rust or accumulation of dirt in vacuum power cylinder. 7. Check valve in hydraulic cylinder piston fails to release.

EXCESSIVE BRAKE PEDAL TRAVEL

COMPLAINT	POSSIBLE CAUSES
Wheel Brake or Master Cylinder Trouble	1. Brake shoes in need of adjustment. 2. Cracked or broken drum. 3. Bent or distorted brake shoes. 4. Excessive wear in brake pedal to master cylinder linkage.
Hydraulic System Trouble	1. Low fluid level in master cylinder. 2. Air in system. 3. Leakage at master cylinder primary cup. 4. Leakage in fitting or lines to wheel brake cylinders. 5. Leakage at wheel cylinder cups. 6. Master cylinder mounting bolts loose. 7. Inadequate master cylinder displacement to compensate for drum distortion caused by brake overheating. (Check for overloading of vehicle)
Hydrovac Trouble	1. Air trapped in hydraulic cylinder. 2. Hydraulic fluid leakage at external line connections. 3. Hydraulic fluid internal leakage. 4. Scored hydraulic cylinder bore or excessive wear of hydraulic piston cup.

GRABBY BRAKES

COMPLAINT	POSSIBLE CAUSES
Wheel Brake or Master Cylinder Trouble	1. Grease or brake fluid on linings. 2. Broken shoe return spring. 3. Bind in brake pedal linkage. 4. Scored drums. 5. Bent or distorted brake shoes. 6. Incorrect shoe adjustment.
Hydraulic System Trouble	1. Leakage at brake wheel cylinders. 2. Sticky piston cups in brake wheel cylinders.
Hydrovac Trouble	1. Control valve hydraulic piston binding in fitting. 2. Power piston binding. 3. Faulty vacuum control valve operation.

POWER STEERING SYSTEM

A. GENERAL

The oil for the power steering system is supplied by the transmission, thus eliminating need for a special reservoir. The other main components of the power steering system are the pump, relief valve, control valve, and hydraulic cylinder that is connected to the arm assembly (mounted on the left hand frame). The hydraulic control valve and pilot operated relief valve are integral with the power steering cylinder. The relief valve allows free circulation of oil between both ends of the steering cylinder, in the event of a power failure or if the steering is to be done with the engine off. One drag link is attached to the steering gear "Pitman" arm and to the valve of the power steering cylinder. Another drag link connects the arm assembly to a steering arm on the rear axle.

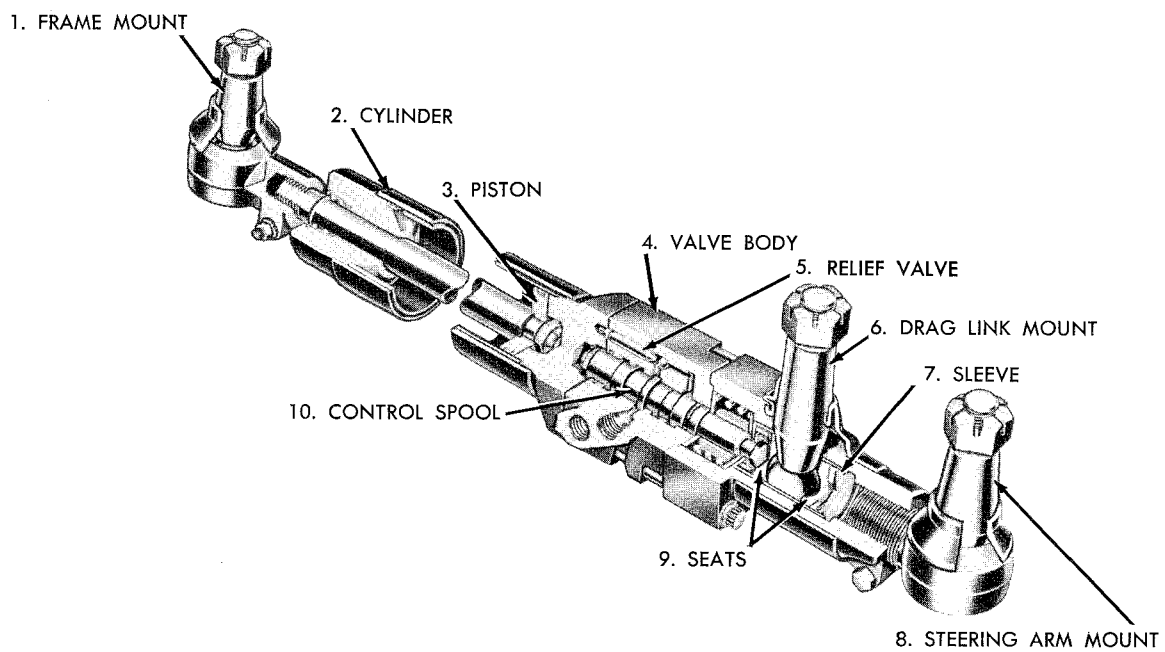


Figure 64. Power Steering Cylinder
(T-32734)

B. RELIEF VALVE —CHECKING PRESSURE

The power steering pressure relief valve located in the control valve assembly of the power steering cylinder, is provided to limit the pressure in the power steering system. When the valve opens, oil is allowed to enter the transmission circuit.

The relief valve is properly adjusted at the factory for an opening pressure of 750 psi and should require no further adjustment in the field. If steering becomes difficult and testing the relief valve becomes necessary, the steering cylinder and valve assembly must be removed from the loader. When bench testing the relief valve it should open correctly at 500 (±25) psi. This relief valve setting, plus an approximate back pressure from the flow divider valve of 200-250 psi produces the 750 psi working pressure.

C. CONTROL VALVE

The hydraulic control valve is integral with the power steering cylinder. Movement of the steering wheel is transmitted through the Pitman arm and a short drag link to the control valve in the steering cylinder. This control valve directs the oil to the steering cylinder producing a linear movement of the cylinder and attached steering arm. The steering arm in turn, transmits the movement to the long drag link which controls the movement of the rear or steering wheels. Steering actions, whether continuous or otherwise, instantly produce a corresponding movement of the steering arm and connected linkage. The force applied to the steering arm by the cylinder is automatically the amount of thrust necessary for all steering requirements.

The action of the cylinder's hydraulic mechanism responds automatically to any movement of the Pitman arm and short drag link. The ball stud on the rear end of the short drag link exerts the pressure of the Pitman arm directly against the control valve of the power steering cylinder. Movement of the ball stud to the front moves the control spool forward, directing oil pressure to the rod end of the steering cylinder producing a forward linear movement of the cylinder and attached steering arm. Oil from the opposite end of the cylinder is directed back into the transmission hydraulic circuit. The steering cylinder and valve body move forward until the control valve again reaches neutral position. Further movement of the control valve by the steering gear is necessary to produce additional steering arm movement.

Cylinder action in the opposite direction is produced when the control valve actuated by the drag link ball stud is moved to the rear, directing oil to the rear end of the cylinder.

A light spring centering device holds the control valve in the neutral position when there is no movement of the steering wheel. Oil then circulates through the control valve and back to the transmission circuit while maintaining only enough pressure to stabilize the selected position of the steering cylinder and loader wheels. Pitman arm stops prevent over-travel of the Pitman arm, and prevent excessive thrust and cramping of the cylinder and steering linkage.

The integral relief valve governs the maximum operating pressure. When the system pressure exceeds the adjusted setting as a result of steering overload, the relief valve automatically opens allowing the excessive oil under pressure to flow out into the transmission circuit.

When the steering gear is operated mechanically (without the advantages of hydraulic pressure) the relief valve permits free circulation of oil between both ends of the steering cylinder.

D. STEERING GEAR

1. DESCRIPTION

The steering gear, located at the base of the steering column, is of the recirculating ball type and consists of the steering shaft and worm, ball nut, "Pitman" shaft and gear, and "Pitman" arm.

2. ADJUSTMENT

There are only two major adjustments of the steering gear assembly: the thrust bearing adjustment and the lash adjustment.

CAUTION

It is very important that the thrust bearing adjustment be checked and readjusted if necessary before the lash adjustment is made. Failure to follow this proper sequence may result in serious damage to the steering gear. If it becomes necessary to remove the steering handwheel, a puller may be used. Damage to the valve components and bearings is certain to result if it is driven off.

The thrust bearing can be adjusted as follows:

a. Disconnect drag link from "Pitman" arm, noting its relative position before disconnecting.

b. Loosen steering column support bracket on instrument panel to insure that there is no binding due to anchorage.

c. Loosen locknut "A" and turn lash adjuster "B" a few turns counterclockwise. This removes, from thrust bearings, the load imposed due to the close mesh between ball nut rack and "Pitman" shaft and gear.

d. Remove locknut block (Fig. 65) by removing capscrew, washer, and spacer from housing end cover.

e. Turn steering wheel to extreme right turn position.

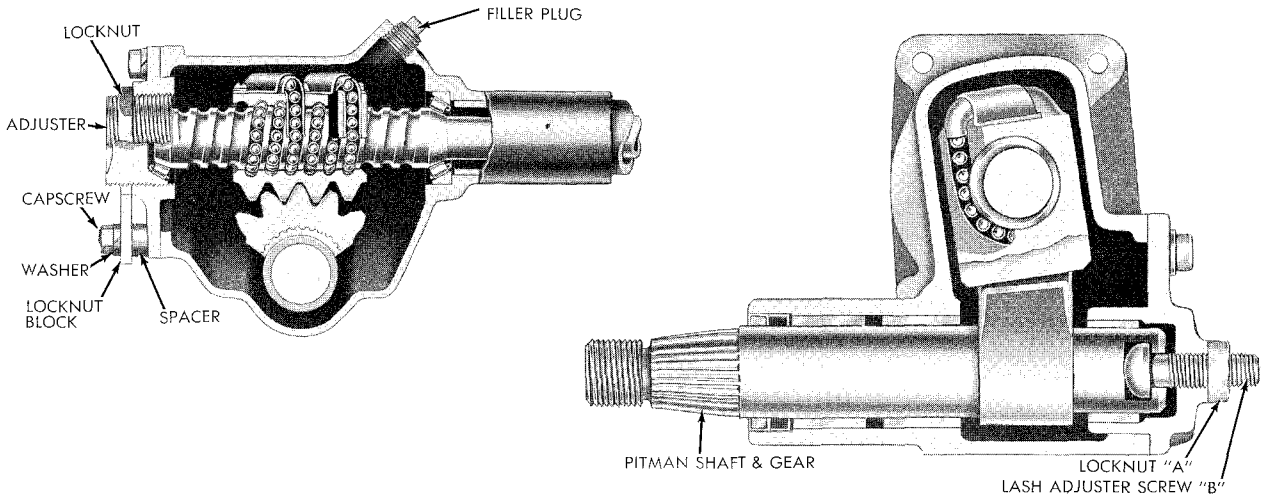


Figure 65. Steering Gear
(T-27997 & T-27998)

f. Hold handwheel in this position and tighten the thrust bearing firmly against outer bearing race. Then back off nut and retighten lightly. This adjustment provides proper clearance between bearing races and spool.

g. Release handwheel and attach a spring scale to one spoke of wheel at rim (9" radius). Measure pull required to turn wheel by maintaining line of pull at 90° to spoke. It should not exceed 1/2 to 1 pound.

h. Install locknut block (Fig. 65) and secure it with spacer, washer, and capscrew, being sure that it does not turn from its adjusted position.

After adjusting the thrust bearing, adjust the lash as follows:

a. Turn steering handwheel slowly from one extreme to the other, then turn wheel back to midway or "center" position.

b. Attach a spring scale to one spoke of wheel at the rim (9" radius) so that pull required to turn wheel through the "center" position can be observed.

c. Turn lash adjuster "B" (Fig. 65) clockwise until backlash disappears between teeth on ball nut and teeth on "Pitman" shaft and gear. When adjustment is correct, the pull required to turn the wheel through "center" position, line of pull at 90°, should be approximately 2-1/2 lbs.

d. Carefully secure locknut "A" (Fig. 65) being sure that lash adjuster "B" does not move.

IMPORTANT: Coat the worm bearing adjuster (Fig. 65) with Marfax No. 3 grease if the steering gear is overhauled or disassembled. This will prevent the steering gear lubricant from leaking by the bearing adjuster when it is assembled.

3. LUBRICATION

The steering gear is filled at the factory with a special lubricant (GM 4673M) developed for both summer and winter operation. Seasonal change of lubricant and draining of the gear case is not necessary. The gear should be kept filled to the level of the filler plug with the above lubricant or SAE 90 gear lubricant.

E. STEERING RADIUS AND LINKAGE ADJUSTMENT

Adjust the steering linkage and radius as follows:

1. Center steering wheel by counting number of turns from extreme left to extreme right turn position; from the extreme right turn position, turn wheel half as many turns back to left. The steering wheel is centered in this position, and the "Pitman" arm at the base of the steering column should be perpendicular to ground.

2. Hold a straightedge across each of the rear tires at rim height and measure between straightedge and main frame at points forward and rear of the axle. If measurements are unequal, the drag link or tie rod must be adjusted until wheels are parallel with loader's main frame.

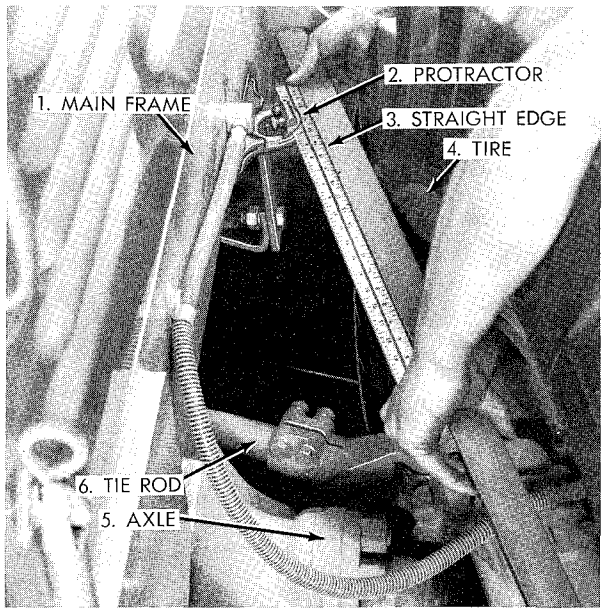


Figure 66. Measuring Steering Radius
(T-28848)

3. With steering wheel centered and wheels parallel with frame, set steering radius by moving machine forward a few feet while holding steering wheel in extreme right turn position. This will relieve any friction between the tire and floor.

4. Hold a straightedge across tire at about rim height, and place a protractor on forward edge of axle between straightedge and the main frame (Fig. 66). The steering angle should be 24° (±1°).

5. Hold wheel at a 24° angle, without tires touching main frame and adjust the "Pitman" arm stops. Stops are located in a bracket at base of steering column and adjacent to the "Pitman" arm. Screw stops so that they fit snug against "Pitman" arm and then tighten locknuts.

NOTE

Screwing stops out decreases the steering angle; screwing them in increases the angle.

Length of Drag Links: If the drag links are removed from the machine and disassembled, they can be reinstalled conveniently by first assembling them to their correct length (Fig. 67), and then installing them in the tractor loader. From center to center of the connecting joints, the correct distance between the joints of the short drag link is 20-7/16" and the long drag link, approximately 69-13/16".

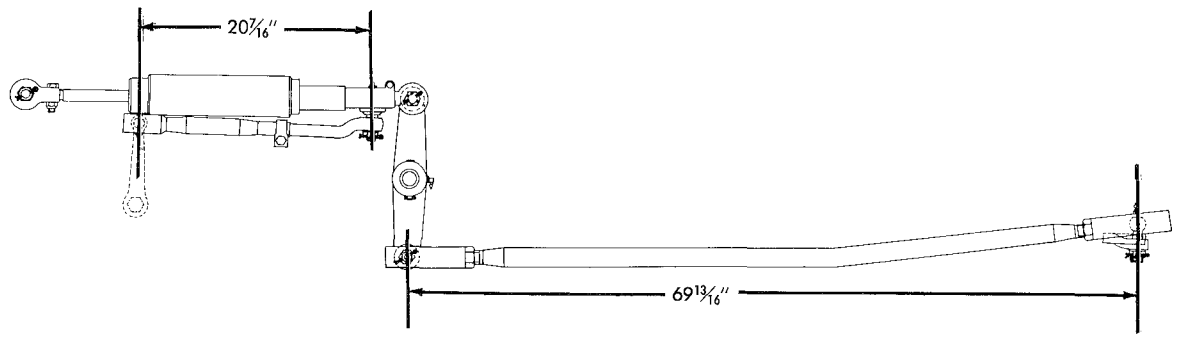
F. STEERING CYLINDER

The double acting power steering cylinder is located under the floor plates. One end of the cylinder is anchored inside the loader frame, and the other end attached to the arm assembly. A short drag link connects the steering gear "Pitman" arm to the power steering control valve at the cylinder.

G. POWER STEERING SYSTEM INSPECTION

If the power steering system fails to function properly, the following simple checks can be easily made:

1. Inoperative relief valve in the pump.
2. Incorrect tire pressure.
3. Steering column misaligned at instrument panel.
4. Improper lubrication or incorrect adjustment of the steering linkage.
5. Improper steering gear thrust bearing or lash readjustment.
6. Improper wheel bearings adjustment.



NOTE: ALL MEASUREMENTS ARE ON A STRAIGHT LINE BETWEEN BALL CENTERS

Figure 67. Measuring Length of Drag Links
(T-32718)

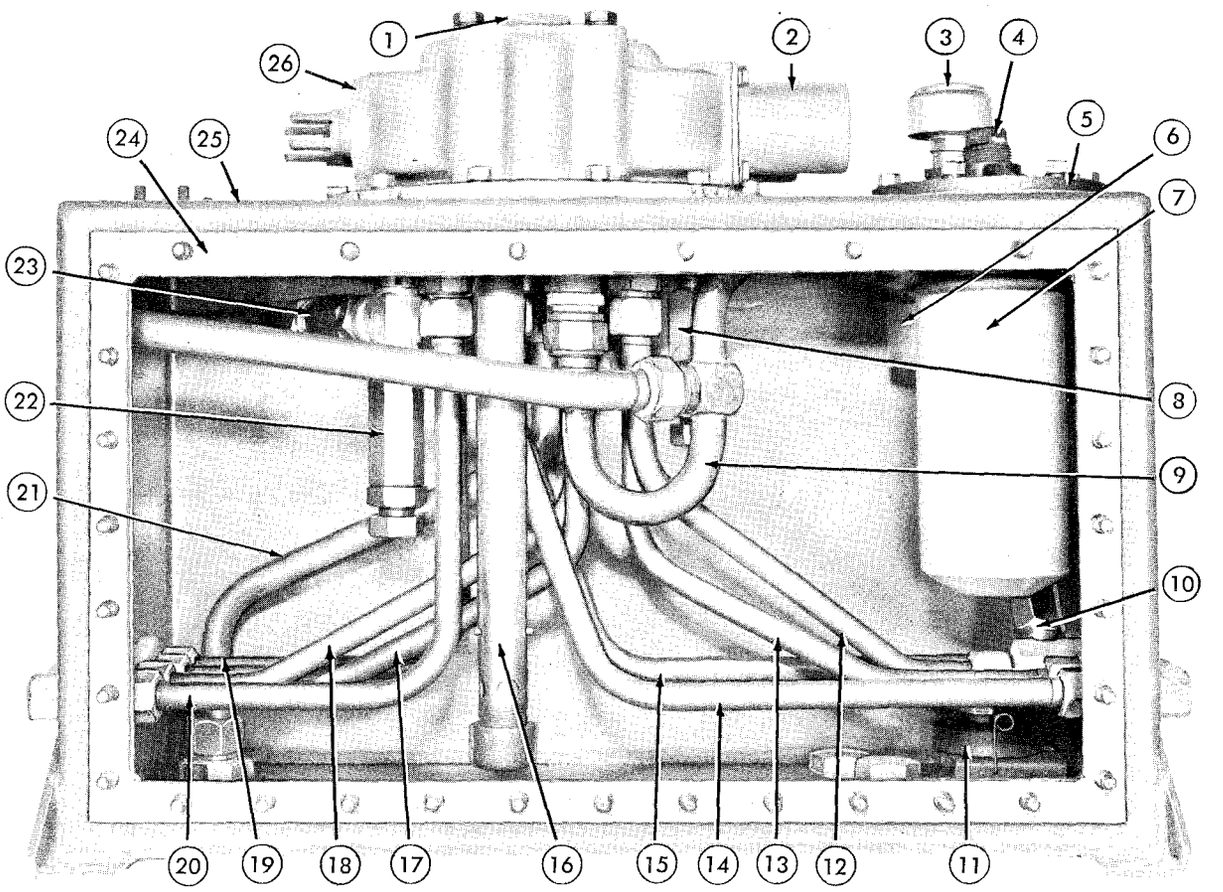
HYDRAULIC SYSTEM

A. GENERAL

The hydraulic system consists of a gear type hydraulic pump, hydraulic tank assembly (with safety valves), control valve, double acting hydraulic cylinders for the loader boom, and the bucket, and the necessary tubes and lines to complete the system.

The hydraulic pump supplies hydraulic power to operate the loader. The pump is externally mounted on the converter housing and is directly connected to the engine crankshaft through a gear train. The loader is controlled by the double plunger control valve bolted to the top of the hydraulic tank, which is located at the rear of the seat frame.

The hydraulic tank is designed so that with little periodic service, top performance can be maintained indefinitely. Service of the filters, breathers, suction line screen, etc., of the tank assembly is dependent



1. Flow Control Valve Cap
2. Detent Cap
3. Hydraulic Tank Breather
4. Oil Filler Plug and Dip-stick
5. Filter Cover and Gasket
6. Air Filter
7. Oil Filter
8. Return Line Safety Valve 2000 psi
9. Filter Tube
10. Lift Circuit Safety Valve 1400 psi
11. Suction Line Screen and Magnet
12. Raise Tube (L.H. Cylinder)
13. Return Tube (L.H. Cylinder)
14. Lower Tube (L.H. Cylinder)
15. Dump Tube (L.H. Cylinder)
16. Discharge Line (Snorkel)
17. Raise Tube (R.H. Cylinder)
18. Return Tube (R.H. Cylinder)
19. Dump Tube (R.H. Cylinder)
20. Lower Tube (R.H. Cylinder)
21. Pressure Tube
22. Dump Line Safety Valve 1000 psi
23. Check Valve (one way)
24. Cover Plate Gasket
25. Hydraulic Tank
26. Hydraulic Control Valve

Figure 68. Hydraulic Tank
(T-28732)

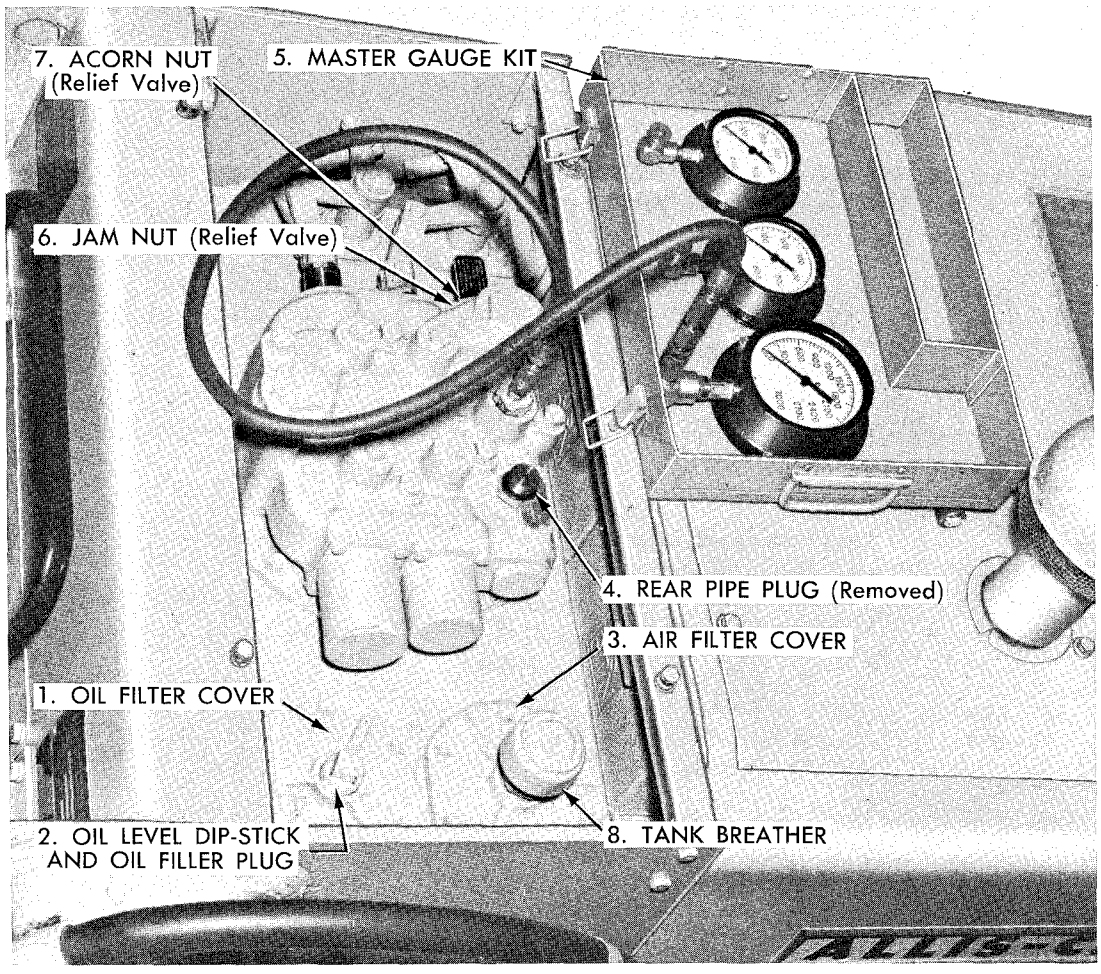


Figure 69. Checking Hydraulic Relief Valve Pressure
(T-70407)

upon operating conditions. The bucket dump line safety valve and the bucket return line safety valve, located inside the hydraulic tank as shown in Fig. 68, are properly adjusted at the factory and require no further adjustment in the field. To insure positive bucket positioning, a compensator check valve is located in the dump cylinder circuit inside the hydraulic tank, to permit oil to flow from the front ends to the rear ends of the dump cylinders to keep the cylinders full of oil at all times.

A lift cylinder safety relief valve is located in the hydraulic tank to relieve excessive pressures that can be developed when the bucket and boom levers are in their neutral positions while the tractor loader is driven into a load. Set at 1350 to 1400 psi, the valve prevents the booms, the bucket, and the linkage from being damaged.

The flow control valve (Fig. 68) located in the top front end of the control valve assembly and connected to the lift cylinders lowering lines, is provided so that oil may be transferred from the bottom side to the top side of the lift cylinders as required to keep the lift cylinders full of oil at all times.

B. OIL RECOMMENDED FOR HYDRAULIC SYSTEM

Refer to "SPECIFICATIONS OF LUBRICANTS."

C. OIL FILTER

The oil filter, located inside the hydraulic tank as shown in Fig. 68 has a micronic element which should be replaced after every 100 hours of operation or more often if conditions warrant. When the oil is at operating temperature, all the oil is 100% filtered. Refer to Fig. 69 and replace the oil filter element as follows:

1. Remove cover plate from top of stabilizer for access to hydraulic tank assembly. Thoroughly clean filter cover and surrounding area.

2. Remove filter cover (with oil dip-stick) from top of hydraulic tank.

3. Remove filter element from oil filter case and discard element. Thoroughly clean inside of filter case.

4. Be certain that spring and metal washer are in position on pipe in bottom of filter case. Insert a new filter element into position in filter case, being certain that the lower end of element seats squarely on metal washer.

5. Place a new cover gasket in position on tank and install filter cover (with oil stick). Tighten hex nuts evenly to 25 lbs. ft. torque.

CAUTION

If filter case is removed be certain when reinstalling it that none of its oil holes will be aligned with oil stream coming from filter tube.

D. TANK BREATHER

The tank breather (Fig. 68) should be serviced after every 10 hours of operation, or more often if conditions warrant. The breather element should be replaced after every 100 hours of operation. Clean the breather element as follows:

1. Loosen and remove machine screw and lockwasher attaching breather cap to the base. Remove breather cap and breather element.

2. Wash element in clean solvent or fuel oil, dry with compressed air (from inside out), and dip element in clean oil. Shake off excess oil and reinstall element, breather cap, and machine screw (with lockwasher).

E. AIR FILTER

The element of the air filter, located inside the hydraulic tank as shown in Fig. 68 should be replaced after every 100 hours of operation, or more often when operating in extremely dusty conditions. Replace the filter element as follows:

1. Thoroughly clean filter cover and surrounding area (Fig. 69).
2. Remove filter cover (with the tank breather) from top of hydraulic tank.
3. Remove filter element from filter case and discard element. Thoroughly clean inside of filter case.

4. Insert a new filter element (with open end upward) into position in filter case and center element within the case.

5. Place a new cover gasket in position on tank and install filter cover (with tank breather). Tighten hex nuts evenly to 25 lbs. ft. torque.

F. HYDRAULIC SUCTION LINE SCREEN AND MAGNET

It is important that the suction line screen and magnet (Fig. 70) be cleaned daily during the first week of operation or until the amount of foreign material collected daily has practically disappeared. Thereafter, the screen and magnet should be cleaned after every 100 hours of operation. These parts are accessible for cleaning by the removal of the air filter cover, filter element, and the air filter case, and by reaching down into the tank.

IMPORTANT: Plugging of the screen with foreign material (particularly fibers worn from the packing rings) will starve the hydraulic pump which almost always results in serious damage to the internal parts of the pump. Therefore, it is imperative that the suction screen be kept clean.

Clean the suction screen and magnet as follows:

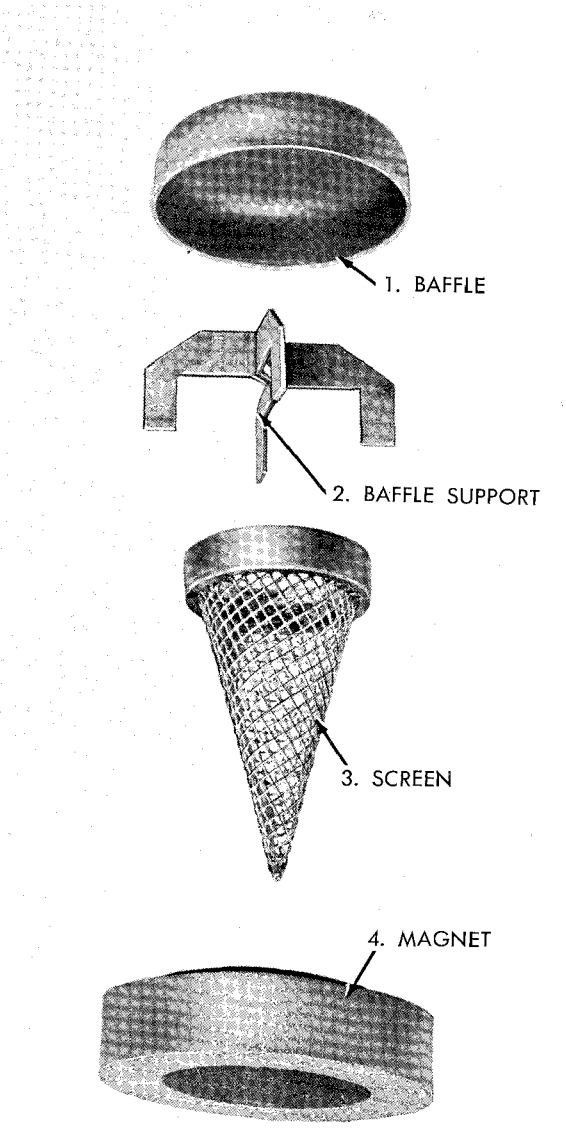


Figure 70. Suction Line Screen and Magnet (T-28725)

1. Remove air filter element following procedure in preceding paragraph, steps 1 through 3. Remove air filter case from hydraulic tank.

2. Reaching down into hydraulic tank, push sideways on bail wire to loosen suction line screen baffle cup, and remove baffle cup and suction screen. Remove ring type magnet from suction line tube.

3. Wash suction screen in a clean solvent or fuel oil, and dry with compressed air. Clean the magnet.

4. Place magnet in position on suction line tube and insert screen. Install suction line screen baffle cup and secure it with the bail wire.

5. Be certain that air filter case seat ring (located in bore of tank) is in good condition, and insert air filter case into position in tank. Install filter element following steps 4 and 5 in preceding paragraph.

G. PRESSURE RELIEF VALVE

The spring loaded pressure relief valve assembly, located in the loader's control valve housing regulates the pressure within the hydraulic system. The relief valve is properly adjusted at the factory for an opening pressure of 1250 to 1300 psi. When the valve opens, oil is by-passed from the hydraulic pump directly into the hydraulic tank. Since the pressure relief valve is properly adjusted at the factory, no further adjustments should be necessary in the field.

1. TESTING THE HYDRAULIC SYSTEM FOR PROPER OPERATION

If the hydraulic system is functioning properly, the time required to raise an empty bucket from ground level to the fully raised position, with the engine running at full throttle, should be approximately 6.5 seconds.

NOTE

The hydraulic system should be at normal operating temperature when making this test.

If it is found that the bucket raises slowly when testing as above, check the following:

a. Be certain that oil in hydraulic tank is at proper level.

b. Be certain that sucction line filter screen, located in hydraulic tank, is clean.

c. The hydraulic pump should be removed, disassembled and inspected after one year of operation, even though no noticeable decrease in operating efficienty has become apparent. Without actually inspecting the internal parts of the pump, it is difficult to determine from operating test exactly when an overhaul should be made to the gear type pump.

2. TESTING OF PRESSURE RELIEF VALVE

The pressure relief valve is properly adjusted when it opens at a pressure of 1250 to 1300 psi. As this pressure relief valve was properly adjusted at the factory, no further adjustment should be necessary in the field. However, if repairs to the loader control valve assembly have been made, or if a new control valve assembly has been installed, the pressure relief valve should be tested and adjusted for the proper opening pressure. Testing and adjusting of the pressure relief valve is also necessary when a new or a rebuilt hydraulic pump has been installed.

CAUTION

Never adjust the pressure relief valve (to increase the pressure) without first being certain that the suction line filter screen in the hydraulic tank is clean. Also, be certain that the oil in the hydraulic system is at normal operating temperature.

Test and adjust the pressure relief valve as follows:

a. Lower bucket to ground. Remove cover plate from top of stabilizer. Thoroughly clean top of loader control valve.

b. Refer to Fig. 69, remove rear pipe plug from loader control valve and install a 3000 psi capacity pressure gauge as shown.

NOTE

Contact your nearest "Allis-Chalmers" dealer for information concerning the gauge kit illustrated.

c. Start engine and operate it at full throttle. Raise bucket to its maximum height.

d. With the bucket on the ground, pull the bucket control lever into the "RETURN" psoition and observe the pressure indicated by the gauge. The pressure should be 1250-1300 psi. Return the bucket control lever to its "NEUTRAL" position.

CAUTION

When performing this test, do not hold the bucket control lever in the "RETURN" position for long periods of time; just long enough to obtain an accurate gauge reading.

e. If pressure indicated by gauge is above or below recommended pressure setting (1250 to 1300 psi) adjustment of pressure relief valve is necessary.

f. To adjust pressure relief valve, remove pressure relief valve acorn nut (Fig. 69) and loosen jam nut on adjusting screw. First back off adjusting screw about 2 turns. Carefully turn adjusting screw "IN" to increase pressure as necessary. The valve carries an instruction plate which states:

CAUTION

Do not turn the adjusting screw IN more than 1/4-turn at a time.

When correct adjustment is obtained, lock adjusting screw securely with the jam nut and install the acorn nut.

NOTE

Pressure in excess of 1300 p.s.i. has no effect on speed or efficinecy of the bucket operation, but definitely causes unnecessary wear on component parts — particularly the pump assembly.

g. Slow engine to idling speed and lower bucket to ground. Move boom control lever to "FLOAT" position and stop engine.

h. Remove pressure gauge. Install pipe plug and tighten it securely. Replace cover plate on top of stabilizer.

H. SAFETY VALVES

The safety valves located in the dump line, return line, and raise circuit are preset at the factory and should require no adjustment in the field. If, however, a safety valve is diagnosed as the source of a malfunction it should be removed from the hydraulic tank.

Disassemble the valve; clean all parts thoroughly, inspect, reassemble and test valve on a test stand.

The following pressures are effective with TL-14D, S/N 1525 and up:

Main Pressure Relief Valve	1250-1300 psi
Return Line Safety Valve	2000 psi
Dump Line Safety Valve	1000 psi
Lift Circuit Safety Valve	1350-1400 psi

I. CHECKING OIL LEVEL OF HYDRAULIC SYSTEM

An oil level dip-stick, attached to the oil filter plug (Fig. 69) is provided in the left front corner of the hydraulic tank. The oil level should be checked after every 10 hours of operation by removing the dip-stick and oil filler plug.

NOTE

Be certain the tractor loader is level before checking the oil level.

With the engine running at full throttle raise the boom to radiator height. Actuate the bucket through its full travel several times to be certain that the dump cylinders are full of oil, then fully retract the dump cylinders. Move the boom control lever to the "LOWER" position and lower the bucket to ground level, then return the control lever to its "NEUTRAL (HOLD)" position. Be sure that the engine is running at full throttle when performing these operations. Stop the engine and check the oil level as follows:

1. Thoroughly clean top of hydraulic tank (at oil filler plug location) before removing filler plug.

2. Remove dip-stick and oil filler plug and dry dip-stick with a clean cloth.

3. Insert dip-stick back into hydraulic tank, resting oil filler plug on top of oil filter cover. Withdraw dip-stick and note oil level; oil level should be even with ring groove in dip-stick.

4. Add oil to hydraulic tank as necessary to raise level even with ring groove in dip-stick. Install dip-stick and oil filler plug and tighten securely.

   IMPORTANT: The oil level should never be allowed to drop more than 1 inch below the ring groove in the dip-stick. When the oil level in the hydraulic tank is too low, the action of the lift and the dump cylinders will be sluggish because the hydraulic pump is not receiving enough oil and is, to some extent, pumping air. The upward movement of the bucket during the lifting operation might be slowed to half its normal speed, or it may stop entirely, due to an insufficient supply of oil in the system. The same applies to the dump cylinders. Considerable damage can be done to the hydraulic pump when the oil level is allowed to get so low that the suction line tube is not full.

J. DRAINING, FLUSHING, AND FILLING OF HYDRAULIC SYSTEM

The hydraulic system should be drained, flushed, and refilled with new oil after every 1000 hours of operation, or more often if the oil is found discolored.

NOTE

The oil should be at normal operating temperature when draining it from system.

Drain, flush, and refill the system as follows:

1. Remove bucket from machine.

2. Start engine and carefully retract dump cylinders all the way. Use care to see that front end of dump links are moving freely.

3. Raise booms to their full height. When oil reaches operating temperature, stop engine.

CAUTION

Suitably support boom to prevent it from accidentally dropping during the operation.

4. Drain hydraulic tank completely as follows:

   a. Remove drain plug located on right side in bottom of tank.

   b. Remove suction and pressure elbow fittings from loader hydraulic pump to accelerate draining operation. The baffle cup, placed upside down over suction line opening inside tank, will serve as a temporary cover to prevent loss of oil while removing suction elbow.

5. Move bucket (dump) control lever back and forth several times to relieve any pressure. Disconnect both dump cylinder hoses on each side of machine where they pass through loader frame. Place a container under hoses (close to tank bulkhead fittings) to catch drained oil - about 3 gallons on each side.

6. Remove boom support. Move boom control lever to "LOWER" position, allowing booms to drop until all oil is expelled from lift cylinders into tank and out through drain. Do not use "FLOAT" position.

NOTE

Some of the oil will be discharged through the dump cylinder hoses while the booms are being lowered.

7. Use an external power source to completely extend dump cylinder rods, thereby expelling all oil.

8. The oil remaining in the loader control valve may be drained by disconnecting lift cylinder hoses at cylinders, and pressure line at the pump.

9. Install a new oil filter, an air filter, and new tank breather elements (refer to Paragraphs C, D and E). Clean the suction line screen and magnet (refer to Paragraph F).

10. Reconnect all lines which were disconnected during draining procedure; such as:

    a. Pressure and suction lines - pump to tank.

    b. Lift and dump cylinder hoses - cylinders to tank.

11. COMPLETELY fill hydraulic tank with best grade of kerosene. Start engine to circulate kerosene through system. Operate both loader control levers four or five times to thoroughly flush out lift and dump cylinders.

12. Drain hydraulic system by following steps 2 through 8, above. Referring to step 10, reconnect all lines.

13. Remove dip-stick and oil filler plug from hydraulic tank. Fill hydraulic tank to a level even with ring groove on dip-stick, with specified oil. Install dip-stick and oil filler plug.

14. Start engine. Operate loader control levers so that the lift and dump cylinders fill with oil. Add oil to hydraulic tank as necessary to keep suction line filled.

15. Reinstall bucket.

16. Fully retract dump cylinders and lower bucket to ground level.

17. Remove dip-stick and oil filler plug and dry with a clean cloth. Insert dip-stick back into tank, resting oil filler plug on top of oil filler cover. Withdraw dip-stick and oil filler plug and note oil level; level should be even with ring groove in dip-stick.

18. Add oil to hydraulic tank as necessary to raise level even with ring groove in dip-stick. On final check, allow a few minutes for oil to settle before rechecking the proper level. Install dip-stick and oil filler plug and tighten it securely. Hydraulic system is now full and ready to operate.

K. GENERAL CARE OF HYDRAULIC SYSTEM

1. Keep all tube fittings and hose connections tight to prevent any oil leaks. DO NOT OVERTIGHTEN OR USE SEALING COMPOUND.

2. Use such compounds as "Permatex" #2 on pipe threads when replacing fittings. Be certain that all parts are thoroughly cleaned before they are installed.

3. When installing hose assemblies be sure that they are not twisted when their connections are tight.

4. Keep all hose clamps tight to avoid hose chafing.

5. Keep packing glands for hydraulic lift and dump cylinders properly adjusted to avoid oil leakage. The packing gland end plates should be adjusted so that there is a light film of oil on piston rods when unit is in operation.

   The packing glands of each cylinder are adjusted by removing the lockwire from the capscrews in the packing gland end plate. Tighten the four capscrews evenly using a slight pressure on a short wrench. Lock the capscrews with a lockwire.

NOTE

Excessive tightening of the packing glands results in rapid wear on the packing rings

and severe wiping of the piston rod. If the packing gland leaks oil after being adjusted properly, it is an indication that the packing rings are worn and should be replaced.

L. TO REPLACE WORN PACKING RINGS

1. Lower bucket to its normal position (dig position) on ground. Remove lockwire and four capscrews attaching packing gland end plate.

2. Slide packing gland end plate and packing gland bearing forward on piston rod.

3. Remove four (4) packing rings and wipe out packing ring space.

NOTE

Do not remove bottom adapter ring.

4. Insert four (4) new packing rings into position in recess of cylinder head, being certain that open end of the "V's" are toward rear of cylinder.

CAUTION

When installing packing rings, stagger gaps so that no two gaps are adjacent and be certain that edges are not doubled back.

5. Slide packing gland bearing and end plate back on piston rod and install attaching capscrews. Tighten capscrews evenly using a slight pressure on a short wrench. DO NOT OVERTIGHTEN. Lock capscrews with a lockwire.

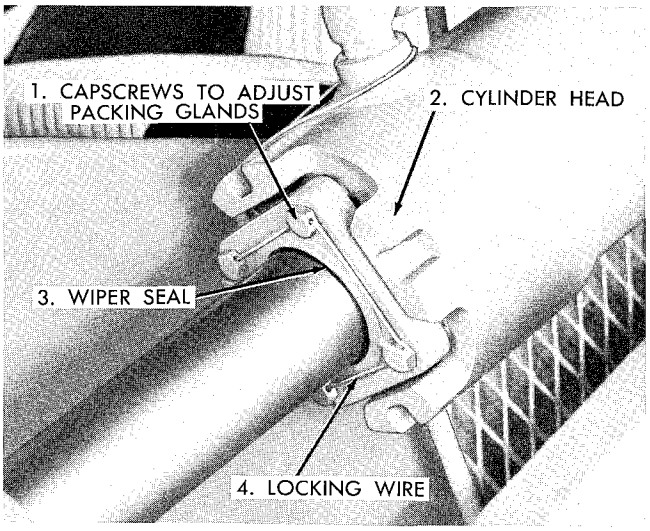


Figure 71. Hydraulic Cylinder Head (T-28752)

M. HYDRAULIC CYLINDER PISTON ROD WIPER SEALS

The wiper seal, installed in the packing gland end plate of each cylinder, serves to wipe off dirt from the piston rod surface. The wiper seal should be replaced when there are indications that the seal is not wiping the rod surface properly. To replace the wiper seal it is necessary to remove the cylinder head, remove the piston from the piston rod so that the packing gland and plate can be slipped off the piston rod. When installing a new wiper seal, be certain that the lip of the seal faces outward.

PREPARATION OF LOADER FOR STORAGE

If loader unit is to be stored during the 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 the fuel injection system drain fuel tank, then pour about 10 gallons of a mixture of 40% mineral oil and 60% "Perfection Kerosene" in fuel tank and run engine for 15 minutes to circulate mixture through the fuel system. This will leave the fuel system filled with the mixture and prevent corrosion or gumming of working parts. Major oil companies can supply this storage fuel mixture.

Coat the bottom of bucket and cutting edges with heavy grease to prevent rust. Raise and block up the axles to remove weight of loader from the tires. Lower and retract bucket to fully retract piston rods into the cylinders for protection. Place boom control lever in "FLOAT" position and coat extended portion of valve plungers with light grease to protect the plunger surfaces.

After loader has been stored, fill fuel tank with specified DIESEL fuel to minimize condensation in tank.

NOTE

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

Remove battery, clean and store it in a cool, dry place (refer to "ELECTRICAL SYSTEM"). Test it once a month and recharge it if specific gravity of the electrolyte falls below 1.215. Keep specific gravity of the electrolyte solution above 1.220 to prevent battery from freezing.

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