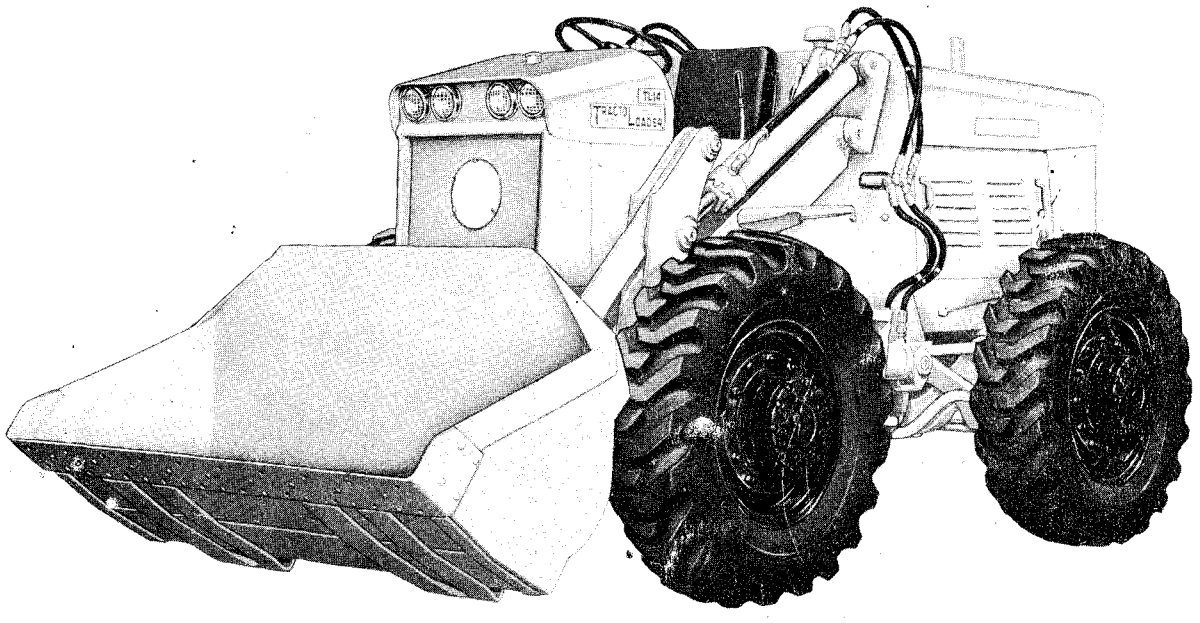
OPERATORS MANUAL
FOR
MODEL TL-14A (GASOLINE)
TRACTOLOADER



ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WISCONSIN, U. S. A.

LITHO. IN U. S. A.

FORM TM-225

FOREWORD

This Operator's Manual contains the essential operating instructions and routine servicing procedures for the day-to-day care, adjustments, and lubrication of the wheel loader. This manual will enable the operator to accomplish the job which the unit has been designed to do and to gain the maximum in trouble-free operation and long life for the TL-14A TRACTOLOADER.

The Model TL-14A TRACTOLOADER has two distinct features which greatly improve its operation and output. They are:

A. THE ALLISON HYDRAULIC TORQUE CONVERTER

1. The torque converter, located between the engine and transmission, provides a very flexible hydraulic connection between the engine and transmission, permitting a smooth, shockless flow of power. It prevents stalling of the engine when the unit is overloaded.

2. It means less wheel slippage because the converter automatically adjusts the speed of the wheels to the load.

3. The converter allows the machine to crowd forward into the pile at the same time the bucket is tipping back and raising, without lugging the engine down. This eliminates slipping the clutch to load the bucket. If the bucket starts to "stall out," slight pressure on the brake pedal will hydraulically release the range clutch which in turn, stops the machine from crowding into the pile. When the bucket starts to raise, release the brake pedal.

NOTE: *A control lever is provided for disengaging this automatic clutch release feature if operating conditions make it undesirable. For positions and location, refer to page 11.*

B. THE ALLISON FULL POWER SHIFT TRANSMISSION

1. The full-power-shift transmission means selecting the speed range and reversing the direction of the unit without shifting gears. One lever controls all speeds - forward and reverse.

2. The single lever control of the full-power-shift transmission allows the operator to change from any forward speed to any reverse speed at any time by using only one lever.

3. The advantages of hydraulic torque multiplication are further extended by the constant mesh planetary gearing in the transmission. This combination makes available an "infinite" number of speed ratios (within design limits of the converter and transmission) with three forward and three reverse speed ranges.

4. It provides direct power from the engine crankshaft through a series of gears to the loader hydraulic pump.

The practice of going to your Allis-Chalmers Dealer for all parts and repair work, other than routine care and adjustments, is encouraged, as the dealers are kept well informed by the factory regarding parts and advanced methods of servicing Allis-Chalmers products.

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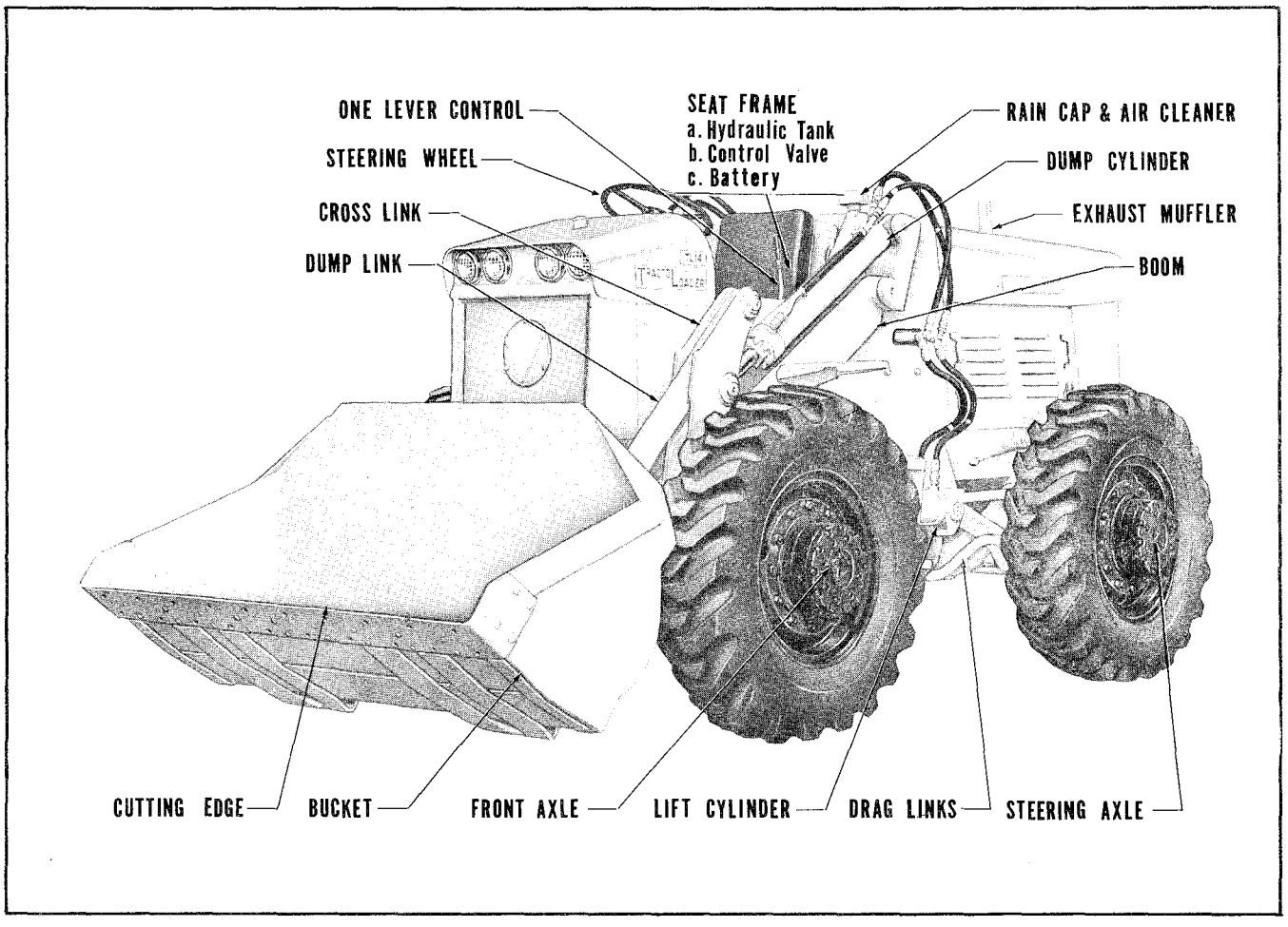

TL–14A TRACTOLOADER

The Model TL-14A Gasoline Wheel Loader is a 13,610 pound (less bucket), four wheel drive, wheel loader unit powered by a 6 cylinder gasoline engine.

Power from the engine is transmitted directly to the single stage type torque converter. The torque ratio in the converter is increased 3.5 to 1, then transmitted to the full-power-shift transmission. A power train in the transmission serves the hydraulic system pump whenever the engine is running. Forward or reverse direction of the shift lever into any speed range transmits power from the transmission through the universal drive shafts to both front and rear differentials and axles.

The transmission provides 3 forward speeds and 3 reverse speeds ranging from 0–4.0 M.P.H. in low gear to 0–26.0 M.P.H. in high gear, at the rated engine speed of 2200 R.P.M. (governed full load). Control of the loader is accomplished hydraulically by the transmission mounted hydraulic pump, control valve with two control levers, two lift cylinders, two dump cylinders, and the necessary hydraulic lines.

There are no exposed hoses or fittings around the operator's compartment. The hydraulic tank, located behind the operator's seat, provides mounting of the control valve and levers, piping and safety valves. Short, external piping on each side of the operator's seat directs the oil to the left side and the right side lift and dump cylinders.

The loader design provides top visibility, strength, and servicing accessibility. The loader side frames are mounted to the axle housings with heat-treated pins. The rear stabilizer shroud and heavy steel seat frame

bly are bolted together with the side brace assemblies to provide a rigid box construction for mounting the boom, hydraulic cylinders, and other loader linkage. The heavy steel plate boom assures a long life of heavy-duty work.

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

Standard equipment includes: lift and dump cylinders with chrome plated piston rods; cast cowl and steel plates around operator; heavy-duty bumper; drawbar; torque converter and full-power-shift transmission; power booster hydraulic brakes and parking brake; power booster steering; electric starter, lights and horn; oil bath air cleaner; oil filter, muffler, and hour meter.

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

Special equipment includes: a TRACTOFORK; TRACTOCRANEHOOK; TRACTODOZER Blade; bucket teeth, and TRACTOHOE.

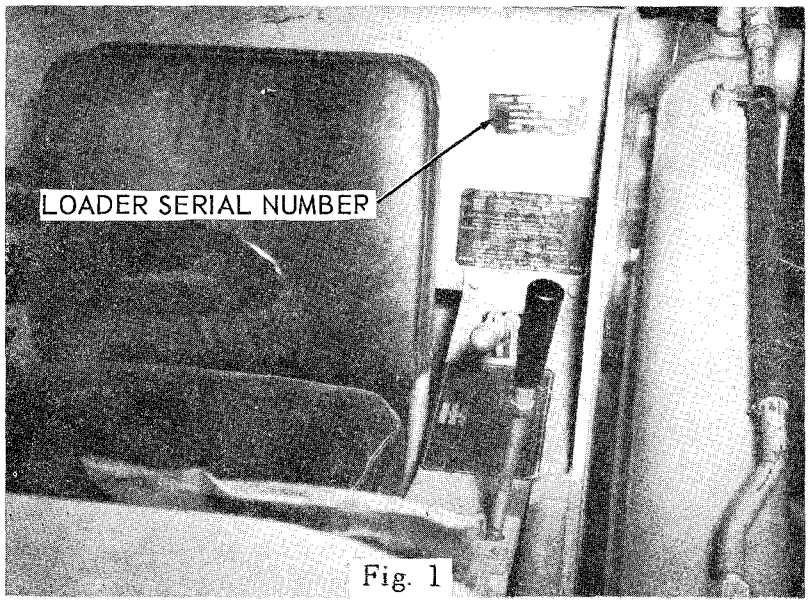

Fig. 1

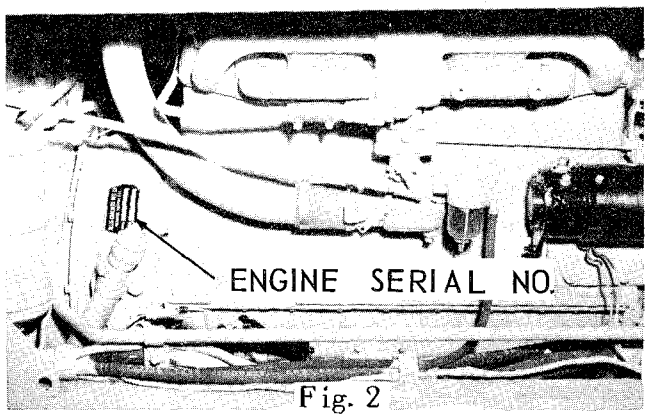

Fig. 2

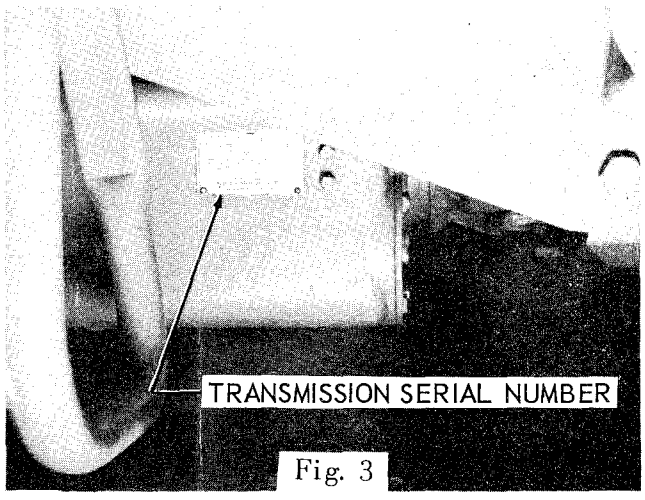

Fig. 3

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. _____

The engine serial number is stamped in name plate attached to the flywheel housing. _____

The hydraulic pump serial number is stamped in the name plate located on the cover of the pump. _____

The control valve serial number is stamped in the name plate located on the top of the control valve. _____

The power steering pump serial number is stamped in the name plate located on top of the pump. _____

Each front and rear axle serial number is stamped in the differential housing above the filler plug. _____

The transmission serial number is stamped in the name plate located on the left hand side of the housing. _____

ALLIS-CHALMERS WARRANTY

"ALLIS-CHALMERS MANUFACTURING COMPANY warrants that it will repair F.O.B. its factory, or furnish without charge F.O.B. its factory, a similar part to replace any material in its machinery which within six months, or 1500 hours of use, whichever occurs first, (except six months on utility wheel tractors sold for non-farm use) after the date of delivery by the Dealer, is proven to the satisfaction of the Company to have been defective at the time it was delivered, provided that all parts claimed defective shall be returned properly identified to the Company's factory, charges prepaid.

"This warranty is the only warranty, express, implied or statutory, upon which said machinery is purchased. No other warranty has been made or exists either expressly, or by implication, all statutory and implied warranties being hereby expressly waived and excluded from this transaction, and the Company's liability in connection with this transaction is expressly limited to the repair or replacement of defective parts, all other damages, statutory or otherwise, being hereby expressly waived.

"This warranty applies only to new and unused machinery, which after shipment from the factory of the Company, has not been altered, changed, repaired or treated in any manner whatsoever. No warranty of any kind, statutory, implied, or otherwise, shall apply to trade accessories, attachments, tools, or implements not manufactured by the Company, though sold or operated with the Company's machinery, or to second-hand machinery, or to new and unused machinery, which, after shipment from the factory of the Company, has been altered, changed, repaired, or treated in any manner whatsoever.

"No representative of the Company has authority to change this warranty or this contract in any manner whatsoever, and no attempt to repair or promise to repair or improve the machinery covered by this contract by any representative of the Company shall waive any consideration of the contract or change or extend this warranty in any manner whatsoever.

"Allied or Companion equipment not manufactured by the Company is covered only by the standard warranty of the manufacturer of such allied or companion equipment though sold or operated with the Company's machinery."

BUCKET SPECIFICATIONS				DIMENSIONS			
SAE RATED CAPACITY CU. YDS.		WEIGHT POUNDS	OUTSIDE WIDTH INCHES	A	B***	C	D
3		1600	95–1/2	17' 5"	3' 7"	7' 3"	14' 8–1/2"
2-1/2		1500	90	17' 3"	3' 6"	7' 4–1/2"	14' 5"
2		1450	90	16' 7"	3' 4"	7' 11–1/2"	14' 2"
1-1/2		1050	84–1/2	16' 3–1/2"	3' 1"	8' 3"	13' 7–1/2"
1-1/4		990	84–1/2	16' 1"	3' 0"	8' 3–1/2"	13' 6"
1		900	76	15' 11"	2' 11"	8' 5–1/2"	13' 2–1/2"

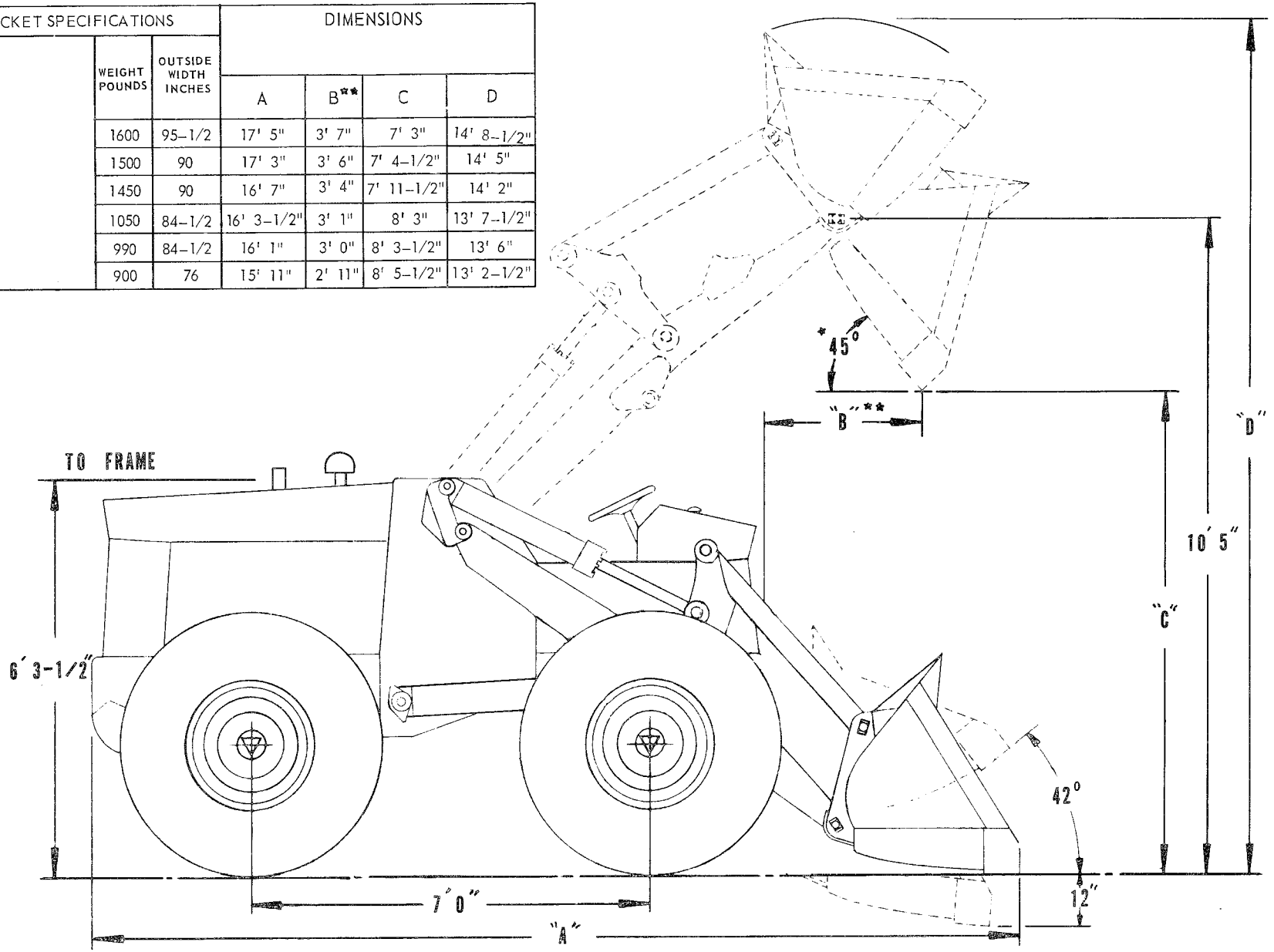

FIG. 4 – TL–14A DIMENSIONS CHART

SPECIFICATIONS

ENGINE

Make and Model	Allis-Chalmers G–262
Number of Cylinders	6
Brake Horsepower at governed RPM – without accessories	86
Fuel	Gasoline
Bore and Stroke	3–9/16" x 4–3/8"
Firing Order	1–5–3–6–2–4
Piston Displacement (cu. in.)	262
Governed Speed (RPM)	2200
Air Cleaner	Oil Bath
Lube Oil Filter	Full Flow
Electrical System	12 Volt

WEIGHTS (With 1–1/2 cu. yd. Bucket)

Front Wheels (lbs.)	7300
Rear Wheels (lbs.)	7360
Shipping Weight (lbs.) (approx.)	14,660

TRANSMISSION

Make	Allison
Type	Power Shift

Speeds - Forward and Reverse

1st	2nd	3rd
0–4.0	0–10.5	0–26.0

BUCKET

Carry Capacity (lbs.)	5300
Maximum Capacity (lbs.)	up to 12,500
Breakout Force (lbs.)	up to 18,880
Lifting Time	6.5 Sec.
Lowering Time	5.0 Sec.

DIMENSIONS

Overall Height, top of Frame	6' 3–1/3"
Overall Width, Wheel Hubs	7' 0–1/2"
Wheel Base	7' 0"
Ground Clearance	15"
Drawbar Height	1' 11"

DIMENSIONS – Continued

Height to Hinge Pin Center Line – (maximum raise)	10' 5"
*Maximum Angle of Bucket, Dumped (maximum raise)	49°
Angle of Cutting Edge at 14"to Bucket Hinge	47°

TURNING RADIUS

Tip of Bucket (at 14" to Bucket Hinge)	18' 11"

TIRE AND TREAD

Tread - Front and Rear Wheels	5' 6–1/2"
Tires (Tube Type) Front & Rear	13:00 x 24

TIRE PRESSURE

Front and Rear	35 P.S.I.

CAPACITIES

Cooling System (quarts)	21
Crankcase (quarts)	7
Transmission & Converter (gallons)	9
Hydraulic System (gallons)	29
Fuel Tank (gallons)	35
Differentials - each (gallons)	2–3/4
Planetary Hubs - each (pints)	4–1/2
Steering Gears (lbs.)	1
Hydraulic Brake System (pints)	2

STANDARD EQUIPMENT

Electric starter, generator, horn, front quadri-lights, dash lights, stop and tail light, muffler, heavy-duty drawbar, four-wheel power booster hydraulic brakes, oil bath air cleaner, rain cap, rear axle disconnect, six-way adjustable seat, hood side plates, power steering, engine oil filter, transmission and converter temperature gauge, transmission oil pressure gauge, fuel level gauge, engine water temperature gauge, engine oil pressure gauge, ammeter, hour meter and hi traction differential.

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

SPECIFICATIONS OF LUBRICANTS

A. ENGINE CRANKCASE LUBRICANT

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

Use oils of the following viscosities:

ATMOSPHERIC TEMPERATURE	VISCOSITY
90° F. and above	Use SAE 40
32° F. to 90° F.	Use SAE 30
0° F. to 32° F.	Use SAE 20W
0° F. and below	Use SAE 10W

Manufacturers of lubricants recognize the importance of the qualities required for use in our equipment and they are cooperating fully to assure the use of only those oils which fulfill these requirements. The oil distributor and oil manufacturer are to be held responsible for the results obtained from their products.

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

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

B. AIR CLEANER

Use the same viscosity oil in the air cleaner as used in the engine crankcase.
CAUTION: *Do not use an oil that foams.*

C. TRANSMISSION AND CONVERTER LUBRICANT

Lubricate these assemblies with a good grade of Transmission Fluid type "C" oil purchased from a reputable oil company.

D. HYDRAULIC SYSTEM

A good grade of rust inhibiting hydraulic oil or automotive crankcase oil having a viscosity of 210–225 S.S.U. at 100° F. (SAE 10W) is recommended for use in the hydraulic system. NOTE: *Do not use an oil that foams.*

No specific brand of oil is recommended. Use only products qualified under the above viscosity specification and recommended by reputable oil companies.

E. FRONT AND REAR AXLE LUBRICANT

Both the differentials and planetary hubs 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

F. PRESSURE GUN LUBRICANT

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

SPECIFICATIONS OF FUEL

The engine for the TL-14A loader has been designed to burn ordinary gasoline. For best economy and performance, use a gasoline with a rating of 70 octane or higher.

In addition to using quality fuels and lubricants, always use clean containers for storing and handling.

PREPARATION OF LOADER FOR USE

Make a complete inspection of machine to make sure no parts have been lost or damaged while in transit.

Inspect oil level in engine crankcase.

Check oil level in transmission.

Check oil level in loader hydraulic system.

Check oil level in differentials.

Check oil level in planetaries.

Fill cooling system with clean soft water.

Fill fuel tank with gasoline.

Inspect oil level in air cleaner cup.

Check and lubricate all points where fittings are provided for a pressure grease gun.

Check level of electrolyte solution in the battery.

Turn fuel line shut-off cock to the open position.

Check level of brake fluid in master cylinder.

Check tire pressure (13.00–24 – 35 lbs.).

Check all bolts to be sure they are tight. By tightening the bolts at this time and again at the end of 10 hours, the possibility of their becoming loose and enlarging the bolt holes will be eliminated.

See following page for "Starting and Stopping the Engine".

STARTING AND STOPPING THE ENGINE

A. STARTING ENGINE

Place the power shift lever and bucket control levers in the neutral position. Turn ignition switch to "on" position. Depress foot throttle pedal as far down as it will go. Turn ignition key to "start" position and hold until engine starts (if weather is cool, pull out choke control located at lower front side of operator's compartment - when engine has turned over two compression strokes, push in choke control) release the key and reduce accelerator pedal to half speed until water temperature reaches 160° to 180° F. and transmission oil is warm before placing load on engine.

For positions of levers, pedals, gauges, etc. see Fig. 5.

IMPORTANT: *Converter oil temperature must not exceed 250° F. Check temperature gauge at regular intervals. See page 47 for further instructions.*

When engine is started, observe the engine lubricating oil pressure indicated by the gauge. With engine running at full speed and with the engine coolant at normal operating temperature (160° to 180° F.) the oil pressure should be between 30 and 45 P.S.I. If the oil is cold, no pressure may be indicated by the gauge for 15 seconds after the engine starts, but if the pressure does not then rise to normal or above, the engine must be stopped immediately and the cause determined and corrected.

B. STOPPING ENGINE

Release foot throttle pedal and turn ignition key to "off" position and remove key. The engine will now have no possible means of starting.

NOTE: *Always allow engine to idle at least 2 minutes, so that engine may cool gradually and uniformly.*

Be sure that the ignition key is turned to the "off" position before leaving the operator's compartment. Because of the constant flow of electricity to the gauges on the instrument panel, the battery may be drained if key is left on.

Cover the exhaust pipe at the end of each days operation to prevent rain from entering while engine is idle.

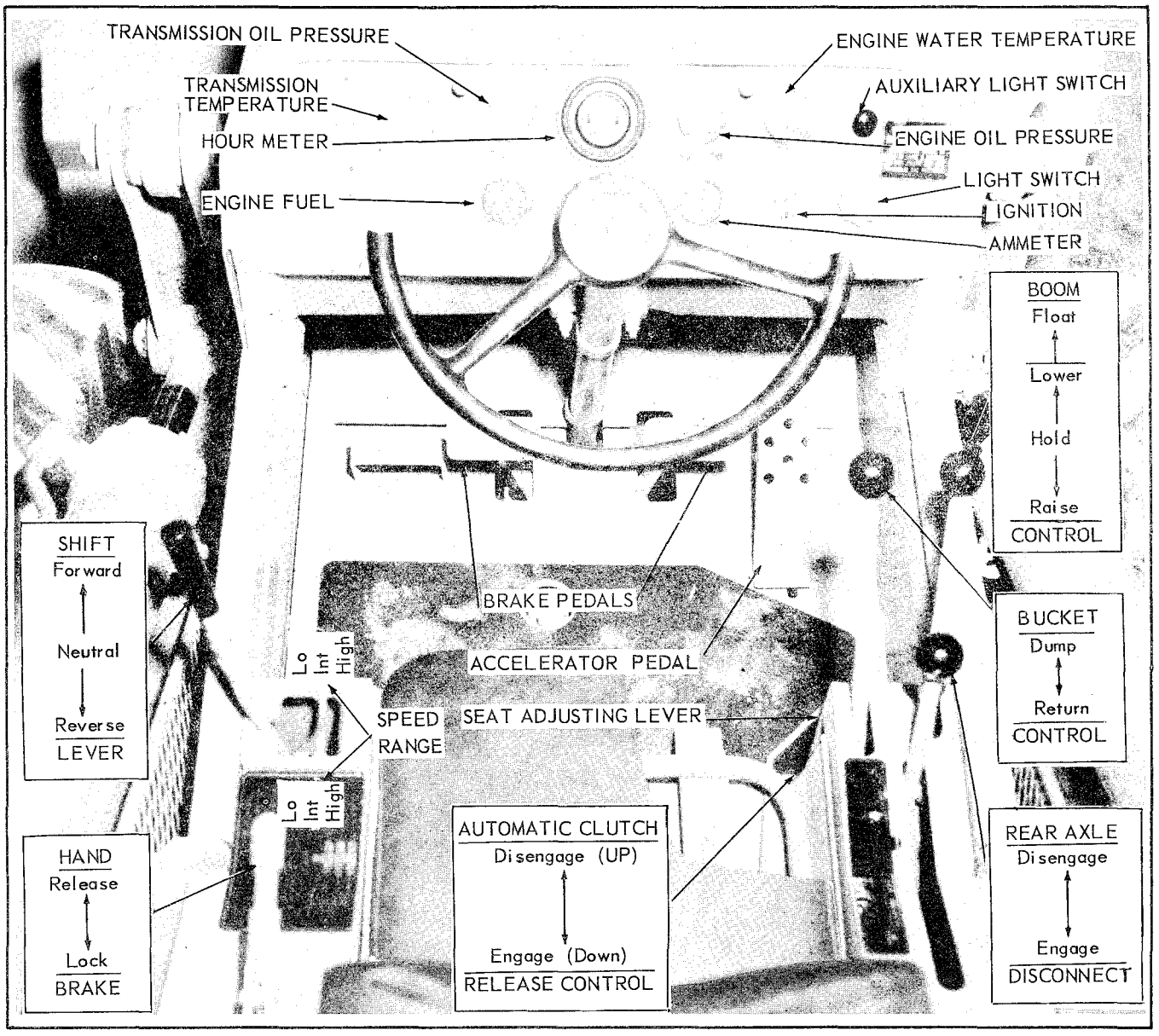

FIG. 5 – TL–14A OPERATOR'S COMPARTMENT

BEFORE STARTING THE ENGINE, MAKE SURE THERE IS SUFFICIENT OIL IN THE LOADER HYDRAULIC SYSTEM AND TRANSMISSION HYDRAULIC SYSTEM.

It is important that the operator familiarize himself with the various controls and instruments provided for operation of this unit (see Fig. 5). Although many of these controls are similar to other loaders, there are important differences, and it is not wise, regardless of previous experiences, to operate the loader before fully understanding the purpose of each control and instrument.

DRIVING TIP – The transmission is full-power shifting. It is possible to upshift or downshift the transmission at wide-open throttle regardless of load. However, do not downshift from intermediate or high range to low range at speeds in excess of 4 M.P.H. Do not shift down from high to intermediate range at speeds in excess of 10 M.P.H.

The full-Power-Shift Transmission is controlled by a single lever which allows the operator to change from any forward speed to any reverse speed at any time. The accelerator pedal is located under the right foot, while the

pedals for the four-wheel power brakes are located one on each side of the steering column, either pedal operates the master cylinder. The mechanical parking brake is located to the left of the operator and may be operated manually by pulling back on the lever to lock the brake, which is located at the lower front side of the transmission at the drive shaft. This mechanical parking brake operates independently of the service brakes and may be adjusted according to the wearing of the brake lining by turning the mechanical parking brake lever knob.

NOTE: *It is a good habit to set the parking brake before leaving the machine, but remember to release the brake before putting the machine back to work.*

The rear axle disengagement lever is located to the right of the operator (see Fig. 5). To disengage the power from the rear axle, push forward on the lever and to put power back into the axle, pull back on lever.

NOTE: *Four wheel drive should always be used when working the machine. The rear axle disconnect may be used for road travel and some light materials work.*

The one lever, full-power-shift transmission is automatically declutched by applying brake pedal pressure, and returns to the same speed range when the brake is released. However, when precise control of the machine is required on grades, this automatic clutch release may be undesirable. Accordingly, a control lever is provided so the operator can easily disengage the automatic release feature as required. When changing control lever position, the brake pedal should be fully released. For location of control lever, refer to Fig. 5. Also see "Clutch Cut-Off Valve," page 43.

To operate the loader, place the one lever transmission control in neutral position and start the engine. Move the lever to select the desired direction and speed range. See Fig. 5, page 11 for shifting procedure.

A FEW SUGGESTIONS FOR LOADING THE BUCKET AND MANEUVERING THE MACHINE.

1. A black spot on the cylinder head and an adjustable pointer, located at the rod end of the right dump cylinder are supplied as an indicator to determine correct dig position for all boom mounted attachments; be sure they are lined up before penetrating the stock pile.

2. Lower the bucket to ground level. Loader is now ready to be driven into the stock pile. If bucket starts to stall out while digging in hard material with the accelerator pedal depressed to full throttle, the penetration will be assisted if the operator touches the power brake pedal lightly for short periods with his left foot and pulls back on the bucket control lever at the same time. After the bucket is fully retracted, pull back on the boom control lever to raise the bucket. Normally, the accelerator pedal should be fully depressed during the entire loading portion of the cycle.

3. The operator will find that, in most material, the first gear forward will be the most satisfactory gear for loading, while any gear in reverse (according to conditions) may be selected with the one lever transmission control to maneuver the machine.

4. Although the power brakes can be operated with either left or right foot, the operator can safely control the machine when approaching a truck by keeping his right foot on the accelerator and his left foot ready for the brake at all times.

5. The purpose of the two brake pedals is to provide the operator with a choice of using either foot to operate the brakes.

6. The one lever control, full power shift transmission permits the TRACTOLOADER to maneuver safely in close quarters because the machine will stop with the range clutches still engaged by removing your foot from the accelerator. Because the clutches are hydraulically controlled there is automatic compensation for normal wear - no adjustments are necessary.

7. Return the raise control lever to neutral position immediately after the lift cylinders reach the end of the stroke. Otherwise, the hydraulic pump is unnecessarily subjected to excessive load.

The torque converter, in conjunction with the full power shift transmission, makes it possible to almost completely eliminate wheel spinning. However, short tire life will result if driving wheels are allowed to spin excessively.

The bucket is lifted by pulling back on the outer control lever. It is lowered by pressure when the control lever is moved forward from neutral position. When the end of the cylinder stroke is reached, either up or down, the control lever should immediately be returned to its neutral position. The bucket can be "floated" down by moving the lift control lever to its extreme forward position.

NOTE: *With the bucket empty and in float position, the bucket will automatically be stopped about three feet above the ground when lowering in the full tip-back position. This added feature is a reminder for the operator to start lining up the indicator (located at the rod end of the right dump cylinder) to assure the correct dig position by the time the bucket reaches the ground.*

The bucket is dumped by pushing forward on the inner control lever. The speed of dumping can be controlled by this lever. If material has a tendency to stick in the bottom of the bucket, it can be jarred by bumping the stops. This is done by moving the control lever back and forth rapidly. This should be done only under extreme sticking conditions.

The bucket, in addition to the automatic tip-back, during the boom raising cycle, can be tipped back at ground level to increase the pay load when handling loose material. This means that the dump cylinder piston rods must be extended to level the cutting edge when penetrating the pile, and can be retracted with break-away effect during the loading cycle to obtain a full load in the bucket.

By placing the Boom Control Lever in the "float" position rather than in down pressure, it is possible to return the bucket to the proper digging position with the bucket control lever at the same time the booms are being lowered. This practice is particularly advantageous on short hauls and stock pile work. A check valve is located in the top front side of the control valve and is connected into the Boom lowering lines so that oil may be transferred from the bottom side to the top side of the lift cylinders as required to keep the cylinders full of oil at all times.

It is possible to create extremely high pressures in the dump cylinders by such practices as back-dragging or bulldozing with the bucket and raising the booms with the bucket dumped. Although two safety valves have been provided in the hydraulic system, in addition to the main relief valve, to safe-guard the loader linkage against those high pressures; such practices should be avoided whenever possible.

One safety valve (set at 1350 P.S.I.) is located inside the hydraulic tank on the right side of the manifold plate (as seated in operator's seat) and is connected into the bucket dump line; while the other valve (set at 2000 P.S.I.) is located on the left side of the manifold plate and is connected into the Bucket Return Line.

Both of these valves have been correctly adjusted at the factory and require no further adjustment in the field.

A third valve (non-adjustable) is a "one way" check valve and is located inside the hydraulic tank on the right side of the manifold plate. This valve eliminates the void which occurs in the tail end of the dump cylinders when a loaded bucket is dumped at low engine speed. The "one way" valve is installed in the tank so that oil from the pressurized discharge side of the valve may be driven into the tail end of the dump cylinders, eliminating the void.

A valve for limiting pressure in the power steering system is provided and is located in the side of the power steering pump housing. This valve is properly adjusted at the factory for an opening pressure of 750 P.S.I. and requires no further adjustment in the field.

When loads are carried for any appreciable distance, the bucket should be carried as close to the ground as practical since the best overall balance is obtained in this position, and with the tip-back feature, the load can be carried low with less spillage.

THE BUCKET SHOULD ALWAYS REST ON THE GROUND WHEN THE UNIT IS NOT IN OPERATION. DO NOT ATTEMPT TO SERVICE OR ADJUST ANY PART OF THE LOADER WHEN THE BUCKET IS IN A RAISED POSITION – UNLESS IT IS SUITABLY SUPPORTED BY MEANS OTHER THAN THE HYDRAULIC LIFT CYLINDERS.

ROUTINE SERVICE
(Quick Reference List)

This quick reference outline is prepared in addition to the more detailed discussion of routine service that appears on the following pages. For added convenience, listed below are the inspections, service items, lubrication points and adjustments to be made at the time designated. The accompanying "Lubrication Chart" is to show the general location of the points to be serviced.

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

TEN (10) HOUR SERVICE

INSPECT:

Engine Crankcase - Oil level
Hydraulic Tank - Oil level
Transmission - Oil level
Water Radiator - Coolant level
Air Cleaner Oil Cup - Oil level
Battery - Electrolyte level

SERVICE:

Engine Breather - Clean
Front and Rear Axle Breathers:
a. Differentials (2) - Check
b. Front Axle Shaft Compartments (2) - Check

TEN (10) HOUR SERVICE - Continued

Fuel Filter - Drain sediment
Hydraulic Tank Breather - Clean
Hydraulic Suction Line Screen & Magnet – Clean daily first week (see 100 Hr. Service)

LUBRICATE:

Power Steering Linkage:
a. Cylinder - (3) lube fittings
b. Arm Assembly, Steering - (1) lube fitting
c. 2 Drag Links - (4) lube fittings
d. Tie Rod - (2) lube fittings
e. 2 Steering Axle Pivot Pins - (1) lube fitting each

Loader Linkage (18 lube fittings)
a. Boom
b. Dump Cylinders
c. Cross Links
d. Lift Cylinders
e. Bucket

ONE HUNDRED (100) HOUR SERVICE

INSPECT:

Water Radiator - Core for plugging
Oil Radiator - Core for plugging
Front and Rear Axles:
a. Differentials (2) - Oil level
b. Planetary Hubs (4) - Oil level
Master Brake Cylinder - Fluid level
Loader Hydraulic System:
a. Oil level
b. Connections for leaks
c. Adjustment of Cylinder Piston Rod Packing

SERVICE:

Engine Crankcase - Drain and refill
Engine Oil Filter - Replace element
Battery - Test with hydrometer
Spark Plugs - Clean and adjust gap
Hydraulic System Oil Filter - Replace element
Hydraulic Tank Air Filter - Replace element
Hydraulic Tank Breather - Replace element
Hydraulic Suction Line Screen & Magnet - See 10 Hr. Service
Fuel Pump Screen - Clean

LUBRICATE:

2 Drive Shaft "U" Joints - (4) fittings
Generator
Starting Motor
Axle Disconnect Linkage (4) - Oil
Transmission Control Linkage:
a. Lube fittings (2) - Grease
b. Ball Socket Joints (4) - Oil
Control Valve Linkage (2) - Oil
Accelerator Linkage (6) - Oil

FIVE HUNDRED (500) HOUR SERVICE

INSPECT:

Steering Gear - Check oil level

LUBRICATE:

Trunnion Socket Assy. (Steering Axle)

ONE THOUSAND (1000) HOUR SERVICE

SERVICE:

Hydraulic System - Drain, flush and refill
Front and Rear Axles:
a. Differentials (2) - Drain and refill
b. Planetary Hubs (4) - Drain and refill
Transmission - Drain and refill
Transmission Oil Filter - Replace element
Transmission Sump Screen - Clean

PERIODIC SERVICE AND ADJUSTMENTS

Hydraulic System - Refer to "Hydraulic System" section.
a. Packing Glands of Cylinders - tighten if necessary.
b. Hoses, Pipes and Fittings - tighten if necessary.

Cooling System - Drain and refill.
Fan and Generator Belts - Check and adjust.
Power Steering Pump Belt - Check and adjust.
Brakes - Check and adjust
Vacuum Hydraulic Unit - Check oil level.
Wheel Nuts - Check and adjust
Tires - Check pressure
Check entire unit to see that all bolts, nuts and pins are tight.

Air Cleaner Oil Cup - Clean and refill with new oil.

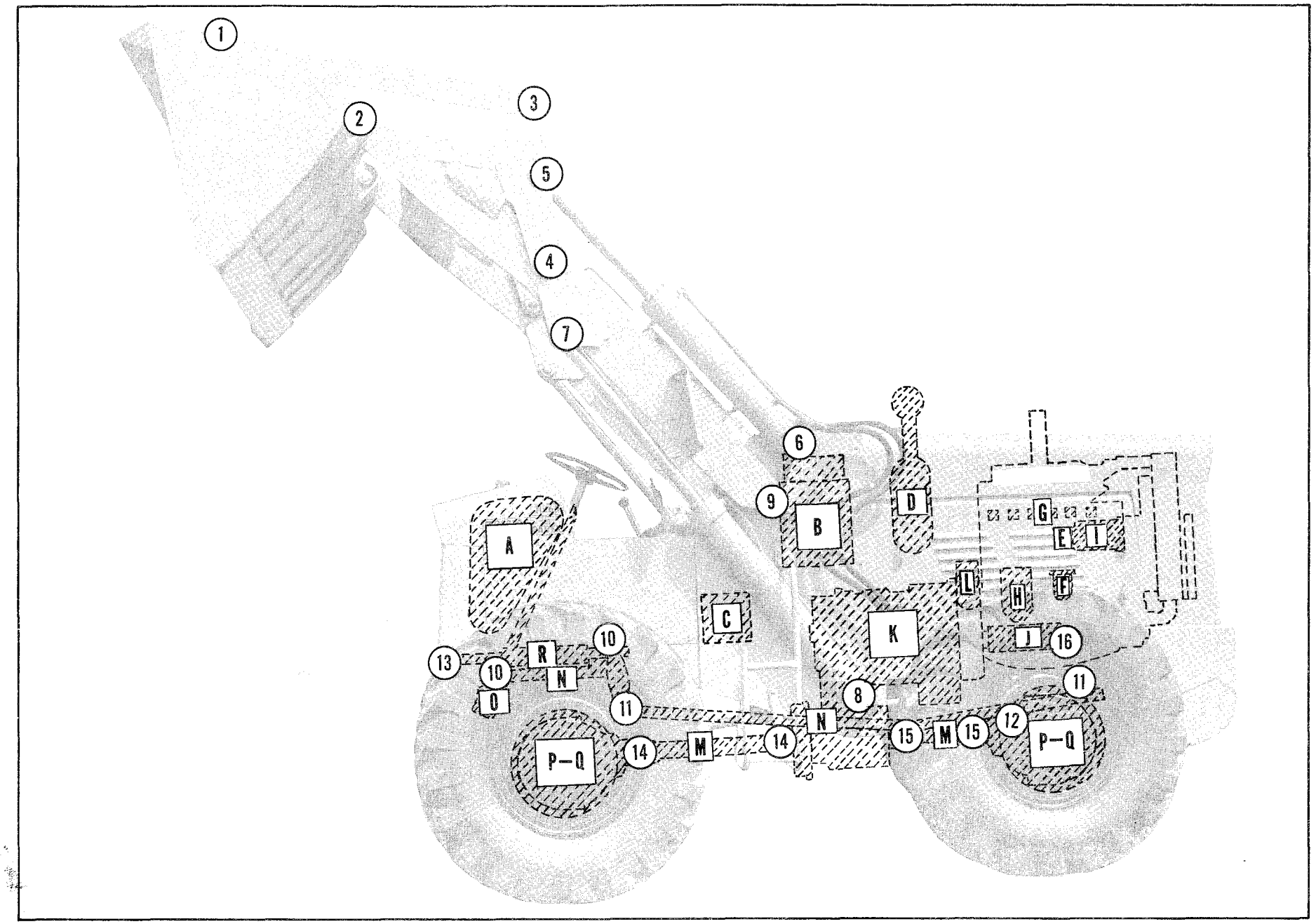

FIG. 6 – LUBRICATION CHART

○ *INDICATES GENERAL LOCATION OF LUBRICATING FITTINGS (ALL SECTIONS OF LOADER)*

BUCKET

(1) Front end of Dump Links - 2 fittings
(2) Front end of Booms - 2 fittings

CROSS LINKS

(3) Upper end of Cross Links - 2 fittings
(4) Lower end of Cross Links - 2 fittings

DUMP CYLINDERS

(5) Front end of Dump Cylinders - 2 fittings
(6) Rear end of Dump Cylinders - 2 fittings

LIFT CYLINDERS

(7) Front end of Lift Cylinders - 2 fittings
(8) Rear end of Lift Cylinders - 2 fittings

BOOM

(9) Rear end of Booms - 2 fittings
(See (2) for front end of Booms.)

DRAG LINK

(10) Short Drag Link - 2 fittings
(11) Long Drag Link - 2 fittings

TIE ROD

(12) Tie Rod - 2 fittings (Right and Left)

POWER STEERING CYLINDER

(13) Power Steering Cylinder - 3 fittings
(1 fitting through hole in Frame; front.)

DRIVE SHAFTS (Universals)

(14) Drive Shaft (Transmission to Front Axle) - 2 fittings
(15) Drive Shaft (Transmission to Rear Axle) - 2 fittings

REAR AXLE SUPPORT

(16) Support Pins - 2 fittings (Left side of Frame)

 *INDICATES INSPECTIONS AND SERVICE LOCATIONS (ALL SECTIONS OF LOADER)*

A FUEL TANK
B HYDRAULIC SYSTEM
C BATTERY
D AIR CLEANER
E ENGINE BREATHER
F FUEL FILTER
G SPARK PLUGS
H ENGINE OIL FILTER
I GENERATOR
J STARTING MOTOR
K TRANSMISSION
L TRANSMISSION OIL FILTER
M DRIVE SHAFTS (UNIVERSALS)
N DRAG LINK & TIE ROD
O STEERING GEAR
P PLANETARY HUB & SHAFT
Q DIFFERENTIALS
R STEERING CYLINDER

The operating life of a machine can be materially increased and fewer shut-downs experienced if the unit is properly serviced at regular intervals. Periodic lubrication and inspection of certain parts of the unit will often eliminate cost shut-downs and major repairs.

The above list of points to be serviced regularly at each inspection period is outlined on the following pages. NOTE: *Refer to "Specifications of Lubricants" for all types of lubricants to be used.*

A list of points to be serviced regularly at each inspection period is outlined below:

10 HOUR SERVICE

ENGINE CRANKCASE OIL LEVEL – Check level on oil level gauge rod. Add oil if necessary to bring level up to "Full" mark on gauge rod. For oil specifications refer to Specifications of Lubricants, page 8.

HYDRAULIC TANK OIL LEVEL – Check oil level and keep filled to ring groove on dipstick. Dipstick and filler plug are located on the front left hand top of the oil reservoir. For oil specifications refer to page 8.

TRANSMISSION – Check oil level at level plug, located on the left side of transfer gear housing. Oil should be level with the top plug. For oil specifications see page 8.

WATER RADIATOR – Check level of coolant. Keep radiator filled.

AIR CLEANER OIL CUP – Inspect condition and quantity of oil in oil cup. Keep oil level to top of cone in center of baffle. *DO NOT OVERFILL.* Oil must be changed if discolored or if there is a layer of dirt in cup or on baffle. Use same viscosity oil as used in engine crankcase for prevailing air temperature. *DO NOT USE AN OIL THAT FOAMS.*

BATTERY – Check electrolyte level. If it is low, add clear distilled water.

ENGINE BREATHER – Remove breather from top of oil inlet. Wash in clean solvent or "diesel" fuel, dry with air (from inside out). Dip in clean oil. Shake off excess oil before replacing.

FRONT AND REAR AXLE BREATHERS

a. DIFFERENTIALS (2) – Located on differential carrier housings. Press caps several times to make certain the breathers are free to function.

b. FRONT AXLE SHAFT COMPARTMENTS (2) – One in each end of housing near brake drum. Press caps several times to make certain the breathers are free to function.

FUEL FILTER – Inspect bowl for presence of foreign particles. Clean if necessary.

HYDRAULIC TANK BREATHER – Located at left rear top of hydraulic tank. Remove and wash in a clean solvent or "diesel" fuel, dry with air (from inside out). Dip in clean oil. Shake off excess oil before replacing.

POWER STEERING LINKAGE

a. CYLINDER – Three grease fittings located in ends of cylinder under left hand frame. Lubricate with pressure gun lubricant.

b. ARM ASSEMBLY PIVOT PIN – One grease fitting located at front left side frame through hole in left hand frame. Lubricate with pressure gun lubricant.

c. TWO DRAG LINKS – One grease fitting in each end. Lubricate with pressure gun lubricant.

d. TIE ROD – One grease fitting in each end. Lubricate with pressure gun lubricant.

e. STEERING AXLE PIVOT PINS – Two grease fittings located inside left engine side panel at main frame. Lubricate with pressure gun lubricant.

LOADER LINKAGE – Eighteen grease fittings. Lubricate with pressure gun lubricant. Fittings are located as follows:

a. 2 at rear of booms
b. 2 at rear end of dump cylinders

c. 2 at lower end of cross links
d. 2 at center of cross links
e. 2 at top of cross links
f. 2 at rear end of lift cylinders
g. 2 at front end of lift cylinders
h. 2 at front end of booms
i. 2 at front end of dump links

100 HOUR SERVICE

WATER RADIATOR – Check core for plugging. Clean out with water or air if necessary.

OIL RADIATOR – Check core for plugging. Clean out with water or air if necessary.

FRONT AND REAR AXLES

a. DIFFERENTIALS (2) – Check oil level and keep filled to level of filler plug. For oil specifications refer to "Specifications of Lubricants," page 8.

b. PLANETARY HUBS (4) – Check oil level and keep filled to oil level plug.

Before checking, rotate each wheel so "level mark" on Hub Cover Plate is horizontal. Add oil through filler plug located in Planetary Hub. For oil specifications, refer to "Specifications of Lubricants", page 8.

MASTER BRAKE CYLINDER – Check fluid level. Add fluid if necessary to level of filler plug.

LOADER HYDRAULIC SYSTEM – Check the following points:

a. Check oil level. Be sure level is even with ring groove on the dipstick. See instructions in "Hydraulic System" section.

b. Check all hoses, pipes and fittings for leaks. See instructions in "Hydraulic System" section.

c. Check packing adjustments of lift and dump cylinder piston rods. See instructions in "Hydraulic System" section under "General Care of Hydraulic System".

ENGINE CRANKCASE – Capacity 7 quarts. Drain oil from crankcase and refill with new oil. Drain plug located in the bottom at the rear of the crankcase. Fill to "Full" mark on oil level gauge rod. See "Specifications of Lubricants", page 8, for oil specifications.

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

ENGINE OIL FILTER – Located on the right side of the engine. Remove the old element, clean the filter shell and install a new element. Refer to "Engine Lubrication System."

BATTERY – Test with Hydrometer for specific gravity of each cell. Maintain electrolyte level as indicated on cap by adding clean distilled water (see page 38, "Battery").

SPARK PLUGS – Remove, clean and space points to .025" gap. If spark plug is in poor condition it should be replaced.

HYDRAULIC SYSTEM OIL FILTER – Located at the left front side, inside hydraulic tank. Replace element (from Element Kit) at 100 hours or more often if conditions warrant.

HYDRAULIC TANK AIR FILTER – Located at the left rear side, inside hydraulic tank. Replace element (from Element Kit) at 100 hours or more often if conditions warrant.

HYDRAULIC TANK BREATHER – Located on left top side of hydraulic tank. Replace element (from Element Kit) at 100 hours or more often if conditions warrant.

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, cleaning of these parts may be extended to 100 hour periods.

FUEL PUMP SCREEN – Located inside the front left frame (refer to "Fuel System").

DRIVE SHAFTS – UNIVERSAL JOINTS – One grease fitting in each universal joint. Lubricate with a regular "Universal Joint Grease." Industry's general specification for universal joint grease, according to the National Lubrication and Grease Institute is listed as follows: N.L.G.I. #2 soda soap, fiber base grease.

GENERATOR – Lubricate with 4 drops of SAE 20W motor oil in each of the two oil cups.

STARTING MOTOR – Located on left side of engine. Lubricate with 5 drops of SAE 20W motor oil.

WATER PUMP – No lubrication necessary. Pump has a sealed bearing.

500 HOUR SERVICE

STEERING GEAR – Check grease level and keep filled to the level of the filler plug. Use GMC-4567-M steering gear lubricant both summer and winter. This lubricant is available at United Motors service stations.

STEERING AXLE – Each trunnion socket should be lubricated every 500 hours or more often under extremely severe conditions with Marfax No. 2 heavy duty grease or equal. Remove pipe plug from top of steering trunnion bearing cap and install lubricating fitting. With a power grease gun or pressure gun, add three shots or approximately one ounce of grease. Remove lube fitting and replace with pipe plug. *DO NOT OVERGREASE.*

1000 HOUR SERVICE

HYDRAULIC SYSTEM – Capacity 29 gallons. Drain, flush and refill with new oil. This service should be performed more often if the oil shows signs of discoloration. Use SAE 10W. Do not use an oil that foams. For extreme cold weather, dilute the oil with the best grade of kerosene. To drain system see instructions in "Hydraulic System" section.

FRONT AND REAR AXLES

a. DIFFERENTIALS (2) – Capacity 2–3/4 gallons each. Drain and refill. See "Specifications of Lubricants", page 8, for oil specifications. Drain plug located in the bottom of the differential housing.

b. PLANETARY HUBS (4) – Capacity 4–1/2 pints each. Drain and refill. Drain plug located on the outer rim of the hub housing. To drain, turn wheel until the plug is at the bottom of the hub, to refill, turn plug opening to top. For oil specifications refer to page 8, "Specifications of Lubricants".

TRANSMISSION – Capacity 9 gallons. Drain and refill. Drain plug is located at the front lower left side of transfer gear housing. Use transmission fluid type "C". For draining and refilling procedure see instructions in the "Transmission" section.

TRANSMISSION OIL FILTER – Replace filter element located between transmission and engine.

TRANSMISSION SUMP SCREEN – Remove screen from opening in sump of transfer case. Clean thoroughly and reinstall. Refer to "Transmission" section.

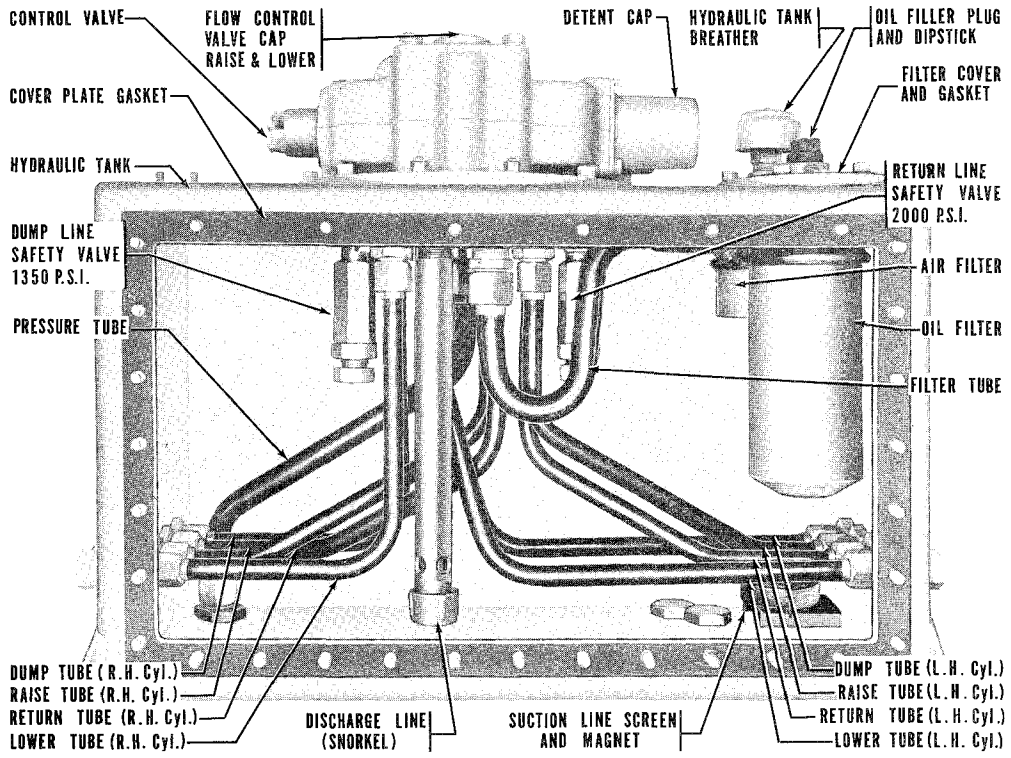

FIG. 7 – HYDRAULIC TANK

A. GENERAL

The hydraulic system consists of the gear type hydraulic pump, hydraulic tank assembly, control valve, double-acting hydraulic cylinders for the loader booms 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 torque converter housing, and is directly connected to the engine crankshaft through a gear train.

The loader is controlled by the double spool valve bolted to the top of the hydraulic tank, which is located behind the operator's seat. 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 upon operating conditions.

The dump line safety valve and the return line safety valve, located inside of the hydraulic tank as shown in Fig. 7, are properly adjusted at the factory and require no further adjustment in the field.

A check valve, located inside the hydraulic tank (not shown) does not need adjustment. The purpose of this valve is to eliminate the void which occurs in the tail end of the dump cylinder. See page 14 for full details.

B. OIL RECOMMENDED FOR HYDRAULIC SYSTEM

A good grade of rust inhibiting hydraulic oil or automotive crankcase oil having a viscosity of 210–225 S.S.U. at 100° F. (SAE 10W) is recommended for use in the hydraulic system. NOTE: *Do not use an oil that foams.*

No specific brand of oil is recommended for use in the hydraulic system. Use only products qualified under the above specification and recommended by reputable oil companies.

C. HYDRAULIC OIL FILTER

The oil filter, located inside of the hydraulic tank, as shown in Fig. 7, 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 oil is 100% filtered. Refer to Fig. 7 and replace the oil filter element as follows:

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

2. Remove the filter cover (with oil dipstick) from the top of the hydraulic tank.

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

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

5. Place a new cover gasket in position on the tank and install the filter cover (with oil dipstick). Tighten the hex nuts evenly.

D. HYDRAULIC TANK BREATHER

The tank breather (Fig. 7) 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 the machine screw and lockwasher attaching the breather cup to the base. Remove the breather cup and the breather element.

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

E. HYDRAULIC TANK AIR FILTER

The element of the air filter, located inside the hydraulic tank as shown in Fig. 7, 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 the filter cover and the surrounding area.

2. Remove the filter cover (with the tank breather) from the top of the hydraulic tank.

3. Pull the filter element from the filter case and discard the element. Thoroughly clean the inside of the filter case.

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

5. Place a new cover gasket in position on the tank and install the filter cover (with tank breather). Tighten the hex nuts evenly.

F. HYDRAULIC SUCTION LINE SCREEN AND MAGNET

It is important that the suction line screen and magnet (Fig. 7) 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 reaching down into the tank.

IMPORTANT: *PLUGGING OF THE SUCTION SCREEN WITH FOREIGN MATERIAL (PARTICULARLY, FIBERS WORN FROM 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:

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

2. Reaching down into the hydraulic tank, push down on the bail to loosen the suction line screen baffle cup (Fig. 7) and remove the baffle cup and the suction screen. Remove the magnet (ring) from the suction line.

3. Wash the suction screen in clean solvent or "diesel" fuel and dry with compressed air. Clean the magnet.

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

5. Make certain that the air filter case seal ring (located in the bore of the tank) is in good condition and insert the air filter case into position in the tank. Install the filter element following the procedure in paragraph E, steps 4 and 5.

G. PRESSURE RELIEF VALVE

The spring loaded pressure relief valve assembly, located in the loader control valve housing, is provided for regulating the pressure within the hydraulic system. The relief valve is properly adjusted at the factory for an opening pressure of 1200 to 1250 P.S.I. When the valve opens, oil is by-passed from the hydraulic pump directly to the hydraulic tank. Since the pressure relief valve is properly adjusted at the factory, no further adjustment should be necessary in the field.

1. Testing of Hydraulic System for Proper Operation

The following test can be made to determine if the hydraulic system is functioning properly: The time required to raise an empty bucket from ground level to the full raised position, with the engine running at full throttle, should be approximately 7 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. Make certain that the oil in the hydraulic tank is at the proper level.

b. Make certain that the suction line screen located in the 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 efficiency has become apparent. Without actually inspecting the internal parts of the pump, it is difficult to determine from the operating test, exactly when an overhaul should be made to the gear type pump. A gear type pump may maintain its maximum operating efficiency to a point where the bearings start to fail.

2. Testing of Pressure Relief Valve

The pressure relief valve is properly adjusted when it opens at a pressure of 1200 to 1250 P.S.I. As this 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 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 making certain that the suction line screen in the hydraulic tank is clean. Also, make certain that the oil in the hydraulic system is at normal operating temperature.*

Test and adjust the pressure relief valve as follows:

a. Thoroughly clean the top of the loader control valve.

b. Remove the rearmost pipe plug (in line with the relief valve assembly) from the top of the loader control valve and install an accurate pressure gauge having a minimum capacity of 1500 P.S.I.

NOTE: *A master gauge kit is listed under Special Tools in the Model TL-14A TRACTOPARTS Book and is available through your "Allis-Chalmers" construction machinery dealer.*

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

d. Pull the raise control lever to its full *RAISE* position and observe the pressure indicated by the gauge. The pressure should be 1200 to 1250 P.S.I. Return the boom control lever to its neutral position.

CAUTION: *When performing this test, do not hold the boom control lever in the RAISE position for long periods of time; just long enough to obtain an accurate gauge reading.*

e. If the pressure indicated by the gauge is above or below the recommended pressure setting (1200 to 1250 P.S.I.), adjustment of the pressure relief valve is necessary.

f. To adjust the pressure relief valve, remove the pressure relief valve acorn nut and loosen the jam nut on the adjusting screw. Carefully turn the adjusting screw *IN* to increase or *OUT* to decrease the pressure as necessary. CAUTION: *Do not adjust more than 1/4 turn at a time without checking the pressure gauge reading.*

When the correct adjustment is obtained, lock adjusting screw securely with jam nut and install the acorn nut. NOTE: *Pressure in excess of 1250 P.S.I. has no effect on speed or efficiency of operation but definitely causes unnecessary wear on component parts - particularly the pump assembly.*

g. Slow the engine to idling speed and lower the bucket to the ground. Push the boom control lever to the *FLOAT* position and stop the engine.

h. Remove the pressure gauge. Install the pipe plug and tighten securely.

H. CHECKING OIL LEVEL OF HYDRAULIC SYSTEM

An oil level dipstick, attached to the oil filler plug (Fig. 7), is provided in the left front corner on top of the hydraulic tank. The oil level should be checked after every 10 hours of operation by removing the dipstick and oil filler plug. NOTE: *Make certain the loader is level before checking 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 make certain 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 the engine is running at full throttle when performing these operations. Stop the engine and check the oil level as follows:*

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

2. Remove the dipstick and oil filler plug and dry the dipstick with a clean cloth.

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

4. Add oil to the hydraulic tank as necessary to raise the level even with the ring groove in the dipstick. Install the dipstick and oil level plug and tighten securely.

IMPORTANT: *The oil level should never be allowed to drop more than 1 inch below the ring groove in the dipstick. When the oil level in the hydraulic tank is too low, the action of the lifting and dumping 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 dumping cylinders. Considerable damage can be done to the hydraulic pump when the oil level is allowed to get so low that the suction line is not full.*

I. 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 oil is found discolored. NOTE: *The oil should be at normal operating temperature when draining from the system.*

Drain, flush, and refill the system as follows:

1. Remove the bucket from the machine.

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

3. Raise the booms to full height. When the oil reaches operating temperature, stop the engine. CAUTION: *SUITABLY SUPPORT THE BOOM TO PREVENT ACCIDENTAL DROPPING DURING THE NEXT OPERATION.*

4. Drain the hydraulic tank completely as follows:

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

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

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

6. Remove the boom support. Place the boom control lever in the *LOWER* position, allowing the booms to drop until all the oil is expelled from the lift cylinders into the tank and out through the drain. Do not use *FLOAT* position. NOTE: *Some oil will discharge through the dump cylinder hoses while the booms are being lowered.*

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

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

9. Disconnect both lines at the power steering cylinder. By turning the steering wheel from one extreme to the other, oil will be expelled from the valve and cylinder. The rear of the machine must either be jacked up or the drag link disconnected from the steering axle to facilitate turning the steering wheel. Disconnect the suction line from the power steering pump for draining.

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

11. Reconnect all lines which were disconnected during draining as follows:

a. Pressure and suction lines - pump to tank.

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

c. Power steering cylinder hoses - both tank and pump to cylinder.

d. Suction line - power steering pump.

12. *COMPLETELY* fill the hydraulic tank with the best grade of kerosene. Start the engine and circulate the kerosene through the system by operating both loader control levers four or five times so that the lift and dump cylinders fill and empty several times. Turn the steering wheel from one extreme to the other several times.

13. Drain the hydraulic system by following the procedure in steps 2 through 9. Reconnect all lines which were disconnected during draining as listed in step 11.

14. Remove the dipstick and oil filler plug from the hydraulic tank. Fill the hydraulic tank to a level even with the ring groove in the dipstick with the specified oil. Install the dipstick and oil filler plug.

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

16. Reinstall the bucket and connect the steering drag link to the rear steering axle, or remove jack from rear of machine (step 9).

17. Fully retract the dump cylinders and lower the bucket to ground level.

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

19. Add oil to the hydraulic tank as necessary to raise the level even with the ring groove in the dipstick. On the final check, allow a few minutes for the oil to settle before checking the level. Install the dipstick and oil filler plug and tighten securely. The hydraulic system now is full and ready to operate.

J. GENERAL CARE OF HYDRAULIC SYSTEM

1. Keep all tube fittings and hose connections tight to prevent oil leaks. *Do not overtighten or use sealing compound.*

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

3. When installing a hose assembly, be sure that it is not twisted when the connections are tightened.

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

5. Keep the packing glands for the 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 the piston rods when the 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 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.*

K. TO REPLACE WORN PACKING RINGS

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

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

3. Remove the four (4) packing rings and wipe out the packing ring space. Do not remove the bottom adapter ring.

4. Insert four (4) new packing rings into position in the recess of the cylinder head making certain that the open end of the "V's" are toward the rear of the cylinder. CAUTION: *When installing the packing rings, stagger the gaps so that no two gaps are adjacent and make certain that the edges are not doubled back.*

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

L. 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, pull the piston from the rod in order that the packing gland end plate can be slipped off the piston rod. When installing a new wiper seal, make certain that the lip of the seal is toward the outside.

FUEL SYSTEM

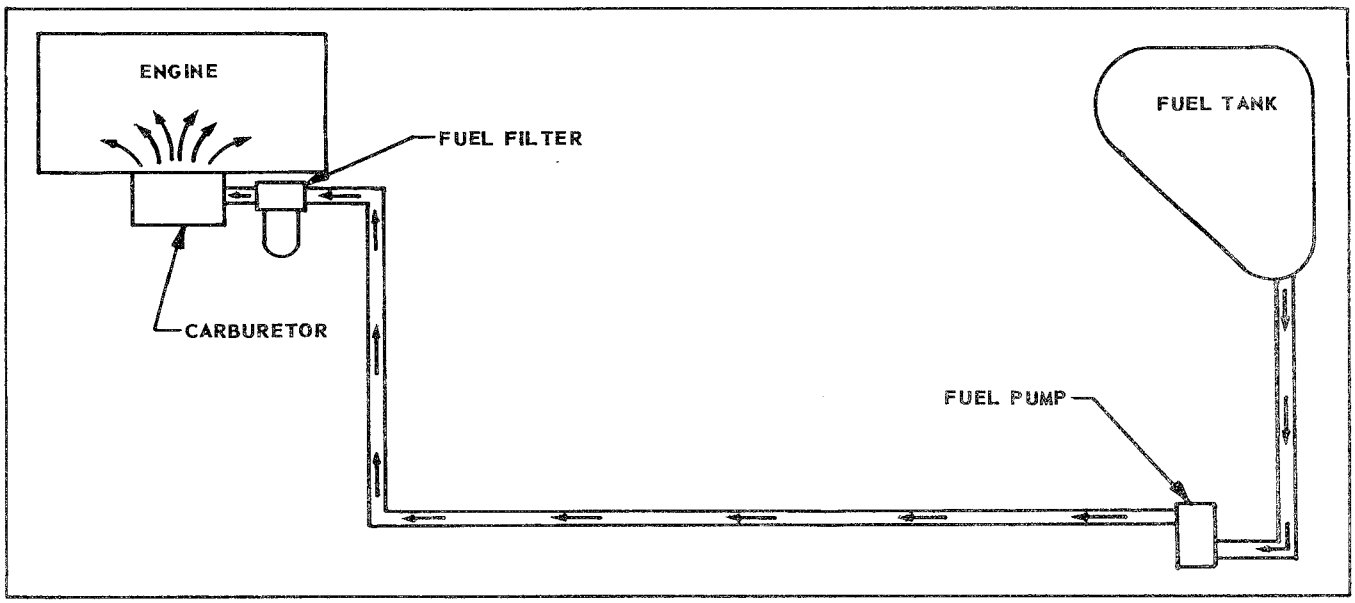

FIG. 8 – FUEL FLOW (SCHEMATIC)

A. DESCRIPTION OF SYSTEM

The engine fuel system consists of a fuel tank, electric fuel pump, fuel filter, carburetor, and the fuel lines. The fuel is drawn from the fuel tank by the electric fuel pump and forced through the fuel filter to the carburetor. The air and gasoline mixture is metered by the carburetor into the intake manifold, then into the engine cylinders.

B. FUEL TANK

The TL-14 fuel tank should be filled at the end of each operating period rather than at the start. This will reduce the water content, as a full tank is less subject to condensation.

To clean the fuel tank, open drain valve to drain the water, sediment or dirt. Periodical drainings and flushing of fuel tank are necessary. If a large accumulation of rust or sediment is found, examine and clean the fuel filter (see D). Excessive cleaning of fuel filter indicates dirty fuel. Clean all tanks, can and funnels used in handling fuel.

C. ELECTRIC FUEL PUMP

1. General Description

The TL-14 electric fuel pump, located inside the front left frame, is for a 12-volt, DC, positive ground system. It is designed with a solenoid coil, which, when energized, activates a

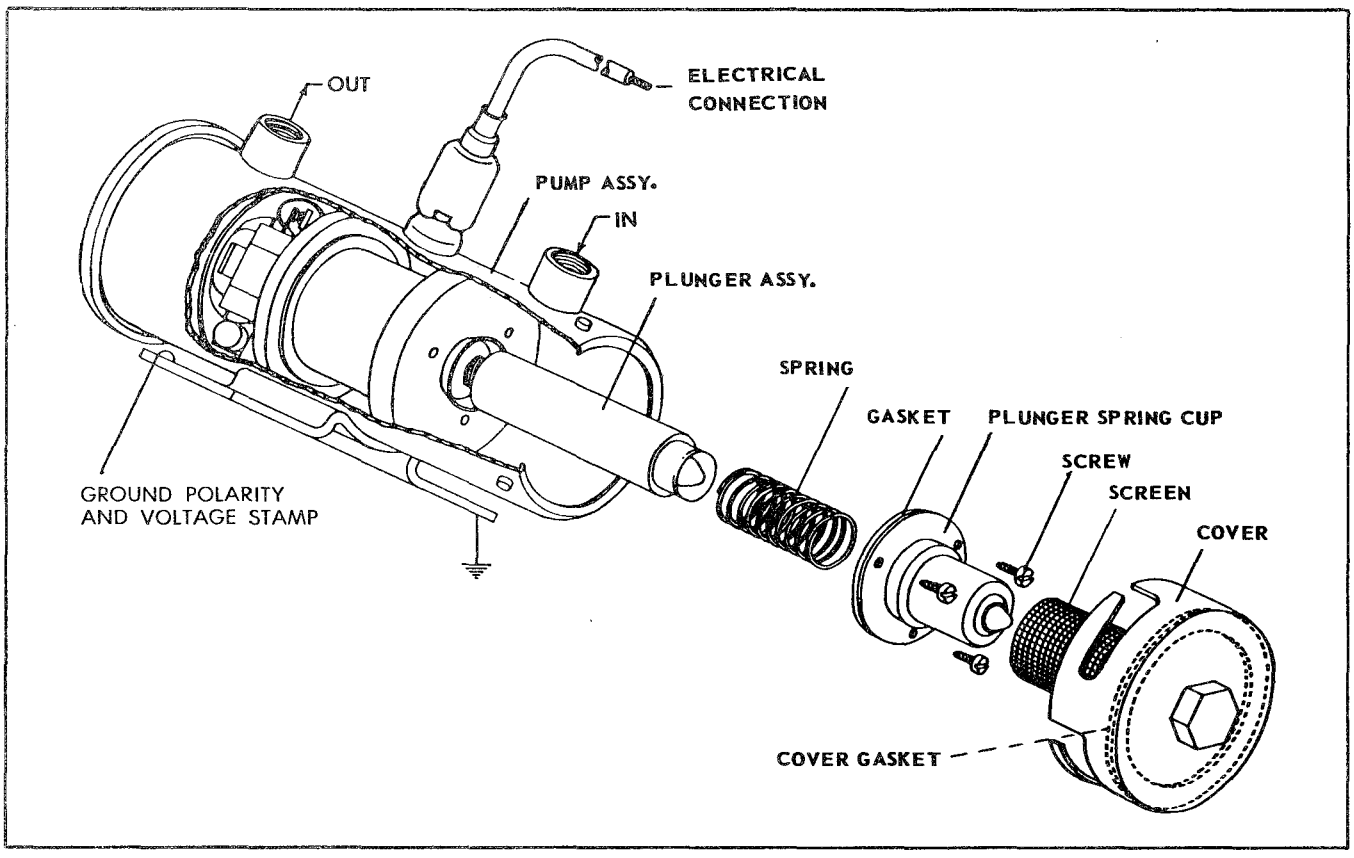

FIG. 9 – ELECTRIC FUEL PUMP

hollow plunger. The stroke of the plunger is controlled by a set of interrupter points in the electrical circuit and a calibrated plunger spring. This electrical system is sealed in helium and field service or replacement is impractical. If any of the electrical components become inoperative, the complete pump assembly should be replaced.

2. Service

The electric pump screen in the bottom of the pump must be cleaned every 100 hours, or more often if excessive rust or sediment is found anywhere in the fuel system. This can be done by the following steps:

a. Close the shut-off valve under the fuel tank. Remove the bottom pump cover with a wrench applied to the nut on the bottom of the cover.

b. Carefully remove the screen – wash in clean solvent or diesel fuel and replace. If the screen is badly distorted or collapsed it must be replaced.

c. Clean the cover thoroughly with a clean rag soaked in fuel and reinstall, making sure the cover gasket will still seal and prevent leaking. Open the shut-off valve.

Excessive dirt or rust may indicate that the plunger and its compartments must be cleaned. This can be accomplished by the following steps:

a. Close the shut-off valve and disconnect the gasoline lines and the electrical wire from the pump.

b. Remove two 1/4" capscrews, lockwashers and nuts which secure the pump to a mounting angle.

c. Remove pump from pump mounting angle and place the pump in a vise, clamping the pump by the attached mounting bracket. CAUTION: *Do not clamp pump case in vise. Serious damage may result.*

d. Remove cover and screen as for cleaning screen, and remove three screws from plunger spring cup (refer to Fig. 9).

e. The plunger cup, gasket, spring and plunger may now be removed. *Do not attempt to disassemble any of these smaller assemblies.*

f. Wash these parts in clean solvent or diesel fuel to remove all foreign particles. *Keep clean.*

g. Blow out cylinder of pump assembly with air and wipe dry with a clean cloth. *Do not use air on any of the other parts as serious damage will result.*

h. Reassemble plunger (see Fig. 9). Check the fit of the plunger by slowly raising and lowering the plunger in the cylinder. Plunger should move freely without a tendency to stick. A click should be heard each time the plunger approaches the top of the cylinder indicating that the interrupter system is properly functioning.

i. Reassemble other parts (see Fig. 9), and reasonably tighten the screws to insure a good seal, but avoid too much force, which will distort the plunger cup or strip the threads. Assemble the screen, cover and gasket, making sure the gasket seals properly.

j. Reinstall fuel pump in loader and connect gasoline lines and electrical wire.

D. FUEL FILTER

Located with carburetor on left hand side of engine (determined as sitting in operator's seat). Inspect sediment bowl every 10 hours of operation, remove bowl and element, wash in clean solvent or diesel fuel, blow off with air and reinstall. Excessive cleaning of filter indicates dirty fuel, dirty fuel containers or dirt in other parts of the fuel system.

CARBURETOR

A. GENERAL

The gasoline TL-14 engine is equipped with a Marvel-Schebler TSX-4321 series carburetor having two adjustments; one for controlling the idling speed of the engine, and one for correcting changes in fuel and atmospheric conditions.

The carburetor was adjusted at the factory to provide for the proper horsepower and a full governed engine speed (under load) of 2200 R.P.M. The carburetor should not require adjustment during the warranty period. Should an adjustment become apparent while the loader is in the warranty period, contact your nearest authorized "Allis-Chalmers" Dealer.

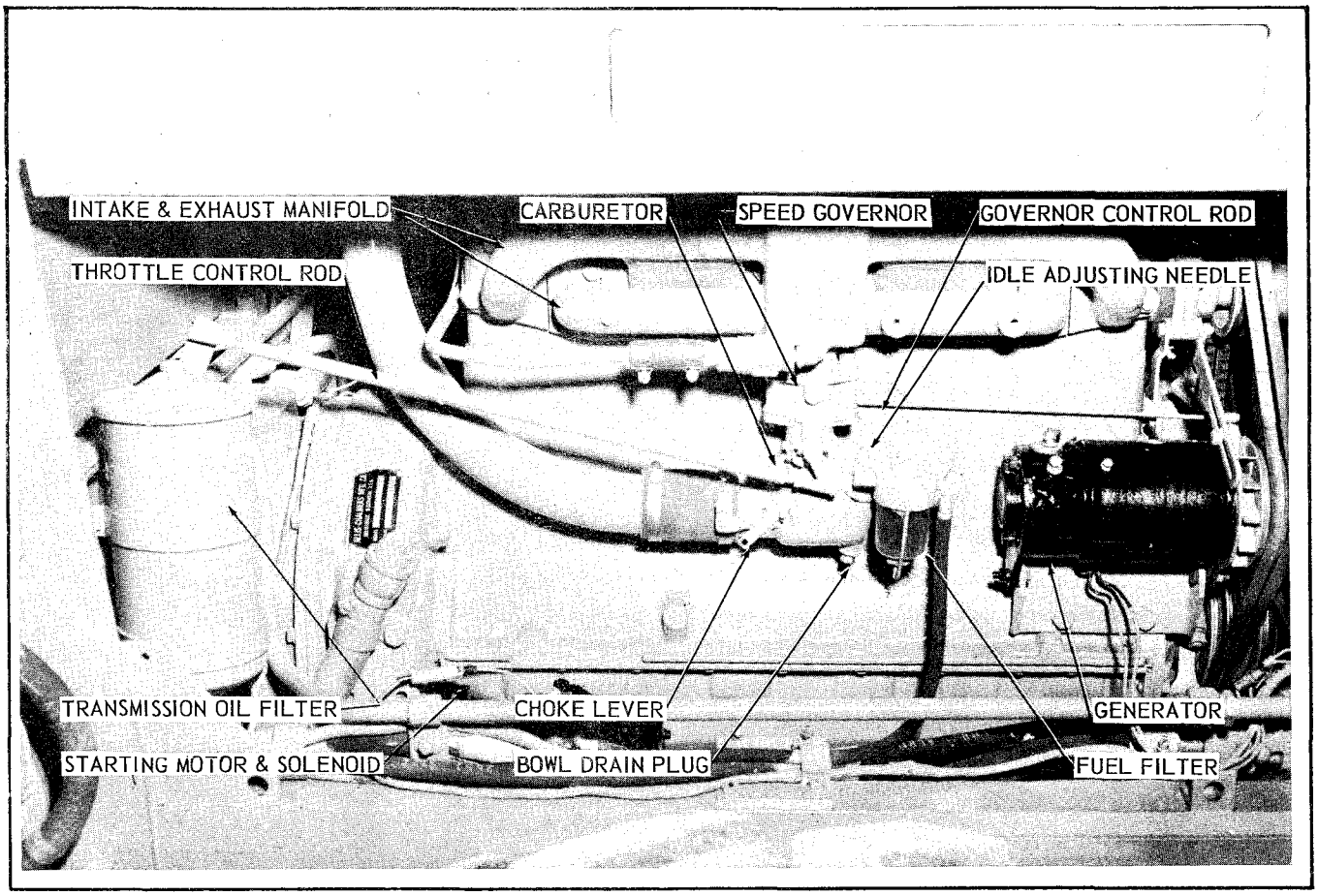

FIG. 10 – ENGINE – LEFT SIDE

B. CHECKING ENGINE SPEED

The carburetor very seldom gets out of working order. If the engine speed is irregular, check the fuel system and all other engine adjustments before changing the governor control rod setting.

Operate the engine until normal operating temperature (160° to 180° F.) is indicated by the engine temperature gauge. Check the speed as follows:

1. Remove radiator grill.

2. Move transmission control lever to *Neutral* and start engine.

3. Hold tachometer against engine crankshaft. With accelerator pedal fully depressed, engine speed should be 2350 to 2400 R.P.M. With accelerator pedal released, engine speed should be 600 R.P.M.

C. LOW IDLE AND HIGH IDLE ENGINE SPEED ADJUSTMENTS

Before changing the speed governor control rod, with accelerator pedal fully depressed, and the idle speed carburetor adjusting screw, with accelerator pedal fully released, make certain that the governor control linkage moves the speed governor control lever through its full travel.

MAIN JET SYSTEM: The Main Jet, often referred to as the "high speed jet", exerts its principal influence at the higher engine speeds. Fuel from the bowl is metered through the

Main Jet and is discharged into the air stream at the point of greatest suction, in the secondary Venturi through the Main Discharge Jet.

The main jet determines the maximum amount of fuel which may be obtained for high speed operations. The Main Jet is fixed and cannot be replaced without removing the carburetor from the engine.

IDLING SYSTEM: The idling adjusting needle controls the air supply at idle speeds. For correct fuel mixture at idling speeds of the engine, adjust the idle mixing adjusting screw, located on the rear top of carburetor. With the engine at idle, turn the Idling Adjusting Screw in to cut down the air flow to make a richer idle mixture, or turn the Idling Adjusting Screw out to make a leaner idle mixture.

The Throttle Stop screw is used to adjust the engine speed to 600 R.P.M. at low idle. To regulate the idling speed of the engine, adjust the stop screw on the throttle valve arm on the outside of the carburetor. Turning the stop screw in will increase the idling R.P.M., while turning the stop screw out will decrease the idling R.P.M.

Install the radiator grill.

VALVE ADJUSTMENT AND CYLINDER HEAD

A. VALVES

1. General

The correct clearance (lash) between the ends of the intake and exhaust valve stems and the rocker arms is very important in an engine due to the 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 of the valve operating mechanism.

With the engine at normal operating temperature (160° to 180° F.), the proper lash for the intake valves is .010" and is .019" for the exhaust valves. After any mechanical work has been done which would disturb the valve lash, the intake valves may be set "cold" at .012" and the exhaust valves at .021" clearance so that the engine may be run and allowed to warm up to normal operating temperature. After the engine has been "warmed up" to normal operating temperature, the valve lash should be checked for proper clearance. NOTE: *The firing order of the engine is 1–5–3–6–2–4.*

2. Valve Adjustment

Check the valve clearance periodically and adjust when necessary to obtain the specified lash of .010" for the intake and .019" for the exhaust valves.

a. Remove the engine hood and the rocker arm cover.

b. Operate the engine until it reaches normal operating temperature (160° to 180° F.).

c. Check the clearance between the valve stems and the rocker arms. Use a .010" thickness gauge when checking the lash of the intake valve and a .019" thickness gauge when checking the lash of the exhaust valve. The thickness gauge should pass between the rocker arm and the corresponding valve stem with a slight drag when the valve lash is properly adjusted.

d. Adjust each valve by turning the screw clockwise as necessary to decrease the clearance or counter-clockwise as necessary to increase the clearance.

e. Repeat the above operations on the valves for the other cylinders. Install the rocker arm cover and the engine hood.

B. CYLINDER HEAD

1. Tightening of Cylinder Head Stud Nuts

The tightness of the cylinder head stud nuts *MUST* be checked at least two (2) times after a new or rebuilt engine has been placed in operation. The checks must be made after the first 10 and 100 hours of operation. If the cylinder head stud nuts and capscrews are not maintained at the correct torque (95 lbs. ft.) it is possible that cylinder head gasket trouble will be encountered. After the cylinder head stud nuts have been checked for the proper torque, it is also necessary to check the valve tappets for proper clearance.

ENGINE LUBRICATION SYSTEM

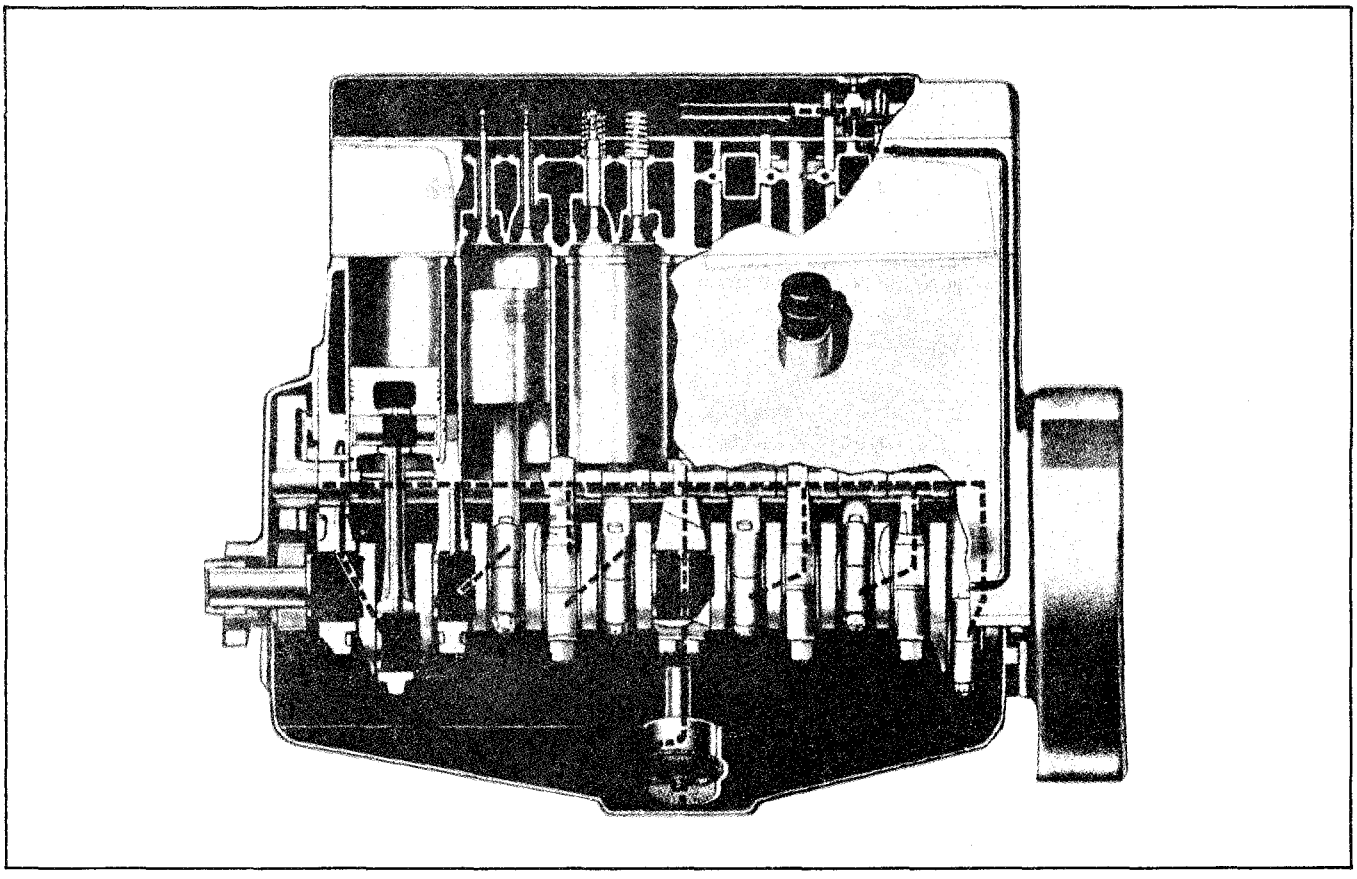

FIG. 11 – LUBRICATING OIL FLOW CHART

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 camshaft gear.

The lubricating oil pump draws the oil from the crankcase oil pan through the oil pump suction screen which is submerged in the lubricating oil. The pump then circulates the oil under pressure through a tube to a connection at the sixth main bearing cap, then to a drilled passage in the block to the base of the full flow oil filter. All of the oil from the oil pump passes through the filter and then enters the engine oil gallery. As filtered oil enters the engine oil gallery which extends the full length of the engine block, all parts of the engine are lubricated from this gallery. Drilled passages from this oil gallery deliver oil to each main bearing. The crankshaft is drilled, which delivers oil from the main bearings to each connecting rod bearing to the piston pin. Excess oil thrown from the bearings and pistons lubricates the cylinder liners by splash.

An outside oil line is connected from the oil gallery to the cylinder head to lubricate the valve mechanism. The drain back from the rocker arm shaft lubricates the camshaft bushings and the cam followers.

Stabilized oil pressure is maintained within the engine by an oil pressure regulator valve, located at the front of the main oil gallery. Excess oil by-passed through this valve enters the timing gear cover and lubricates the timing gear.

The oil filter base contains two valves, an oil filter by-pass valve and a ball check valve. Oil delivered under pressure by the lubricating oil pump holds the ball check valve in the open position, allowing the oil to circulate; whenever the engine is stopped, the ball check valve closes, preventing the oil in the filter from draining back to the crankcase oil pan sump. The oil filter by-pass valve 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, located on the right 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 oil pan is changed, or more often if conditions warrant.

C. TO REPLACE FILTER ELEMENT

1. Thoroughly clean the filter shell and the surrounding area.
2. Turn the filter shell counter-clockwise by hand as an assembly. Remove the filter element from the filter base 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 base. Install a new element in position on the filter base.
5. Install the filter shell assembly in position on the oil filter base, making certain the shell gasket is properly installed in the base, then tighten the filter shell hand tight.
6. Start the engine and observe for oil leakage between the filter shell and the oil filter base. 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.

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 through the water manifold and the radiator inlet elbow to the upper part of the radiator. The coolant is cooled as it passes from the top to the bottom of the radiator core by the suction type cooling fan.

The thermostat, located in the water manifold at the rear of the cylinder head of the engine, operates automatically to maintain a normal coolant operating temperature of 160° to 180°F.

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

CAUTION: *Do not remove the pressure type radiator cap while the coolant is above 212° F., as the coolant will break into a boil and will splash onto the person removing the cap.*

B. GENERAL MAINTENANCE

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

CAUTION: *NEVER ADD AN ANTI-FREEZE SOLUTION TO A COOLING SYSTEM THAT CONTAINS A RUST INHIBITOR. Drain, flush, and refill the cooling system with clean water before adding an anti-freeze solution for cold weather operation.*

In winter weather, use an ethylene glycol anti-freeze solution in the system to protect against damage from freezing. This type of anti-freeze has a much higher boiling point than water. After any addition of water or anti-freeze compound, test the solution after the added quantity has become thoroughly mixed to make sure it will withstand the prevailing or anticipated temperature. A mixture of 60% ethylene glycol and 40% water will provide maximum protection.
NOTE: *The mixture of ethylene glycol and water is dependent upon local weather conditions and should be mixed (percentage wise) accordingly.*

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

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

The most efficient engine operation is obtained with the coolant operating temperature held within a range of 160° to 180°F. Operating the engine with the coolant temperature below this range will result in incomplete combustion of fuel, higher fuel consumption with less power, and will cause harmful deposits within the engine.

Maintaining the normal coolant operating temperature depends mostly on proper functioning of the thermostat. If the coolant temperature remains consistently below normal, the thermostat should be removed, checked for proper operation, and replaced if necessary.

C. DRAINING OF COOLING SYSTEM

Remove the radiator filler cap and open the cylinder block drain cock located on the left side of the cylinder block. Open the radiator drain cock located in the water outlet elbow at the lower right corner of the radiator.

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

D. FILLING OF COOLING SYSTEM

Close the radiator and cylinder block drain cocks. Fill the cooling system through the radiator filler cap opening until the coolant level is within approximately 2 inches of the top of the radiator and install the radiator filler cap.

E. WATER PUMP AND GENERATOR DRIVE BELT ADJUSTMENT

The water pump and generator drive belts are properly adjusted when the belts can be pressed inward by hand approximately 1/2" to 3/4" at a point half-way between the generator and the fan pulleys. To adjust the drive belt, loosen the generator adjusting arm capscrew, move the generator up or down to obtain the correct tension of the drive belt, then tighten the adjusting arm capscrew.

AIR CLEANER

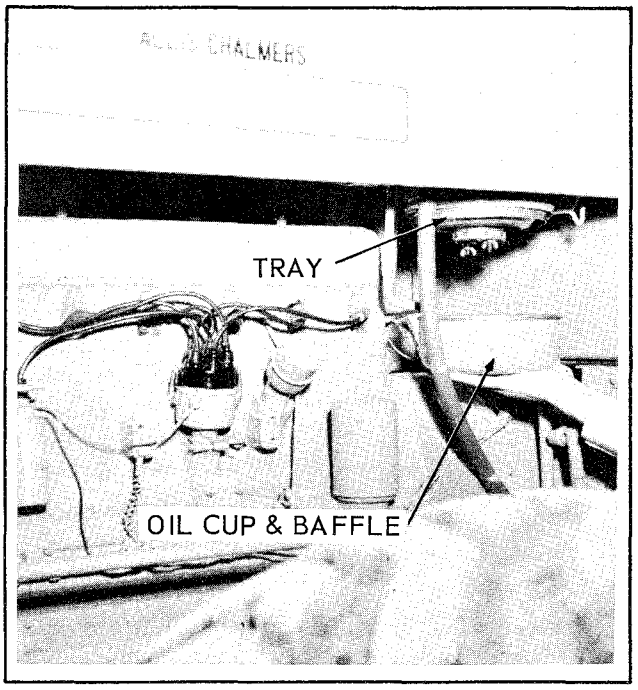

FIG. 12 – AIR CLEANER

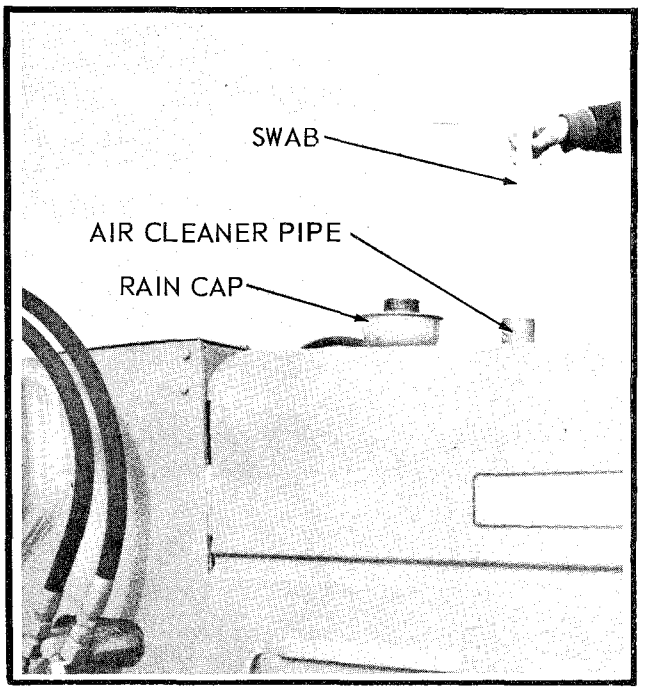

FIG. 13 – SWABBING AIR CLEANER TUBE

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

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, loosened solder connections. etc. should be made frequently. If any of the above mentioned conditions are found, they must be corrected immediately.

B. AIR CLEANER SERVICE

The filtering oil in the air cleaner oil cup must be checked daily, or more often when operating under extremely dusty conditions. Keep the oil cup filled with clean engine oil to a level even with the top of the cone in the center of the air baffle. Empty and wash the baffle whenever the oil becomes discolored, indicating a quantity of dirt has collected, then refill the cup with clean engine oil. Use same viscosity oil as is used in the engine.

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

Service the air cleaner as follows:

1. Remove the oil cup from the bottom of the air cleaner body, empty the oil from the cup. Remove the two wing nuts and the air tray from the bottom of the air cleaner body.

2. Thoroughly wash the oil cup and the air tray with clean solvent or fuel. Remove the rain cap from the top of the air cleaner and swab out the inside of the air cleaner pipe that extends from the rain cap to the oil cup. Install the rain cap.

3. Install the air tray with wing nuts to the bottom of the air cleaner body and fill the oil cup to the proper level with clean engine oil.

4. Be sure that the oil cup gasket is in good condition, then install the oil cup in position on the bottom of the air cleaner body. Check the hose clamps on the air cleaner hose and make certain that the clamps are tight and that the hose is not crimped, allowing air to enter without passing through the air cleaner.

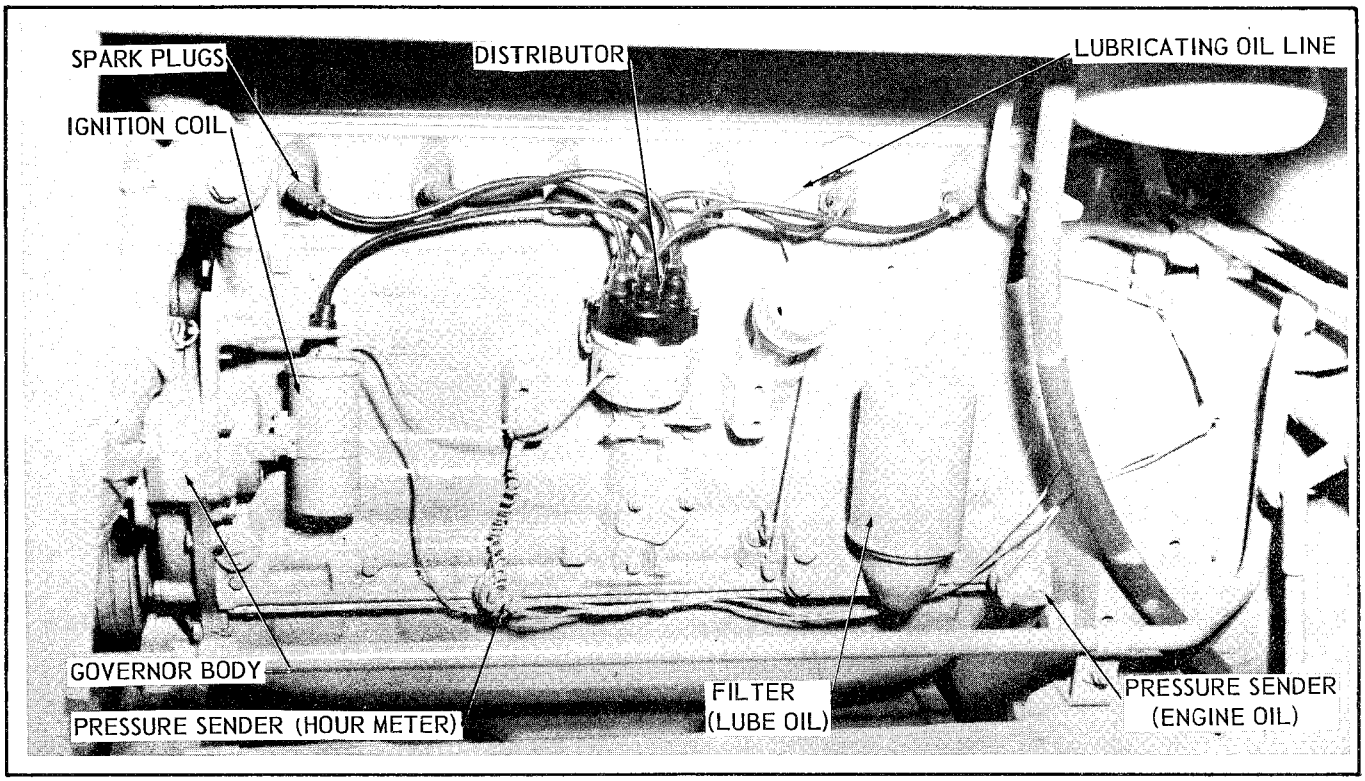

FIG. 14 – ENGINE – RIGHT SIDE

A. DESCRIPTION

The electrical system, which includes the starter, generator, generator regulator, ammeter and gauges, lights, horn, and wiring, is a 12 volt system throughout. One 12-volt wet cell storage battery, located underneath the operator's seat, is used to supply current for the system. Electrical energy drained from the battery 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 battery.

B. BATTERY

Check the level of the electrolyte solution every 10 hours of operation, or more often if conditions warrant. Maintain the solution level as indicated on the battery caps. Keep the 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 the battery posts and terminals with a strong soda solution and coat the terminals lightly with vaseline before connecting them again. The vaseline will prevent further corrosion.*

When the 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 zero F. During freezing weather, any addition of water to the cells should be made after the engine is started at the beginning of an operating period to make certain that the water and electrolyte solution will be thoroughly mixed; otherwise it may freeze. The filler caps must be kept tight at all times and the top of the battery kept clean and dry.

C. STARTER

The 12-volt starter is mounted on the left side of the engine flywheel housing. A "Bendix" type drive is used to mesh the drive pinion of the starter with the flywheel ring gear for cranking the engine and to automatically disengage the drive pinion when the engine has started. The starter is operated with a heavy-duty solenoid which is mounted above the starter and controlled by a key switch on the instrument panel. When the key is turned to "Start", it actuates the solenoid, closing the circuit between the battery and the starter, and also shifts the drive pinion of the starter into mesh with the flywheel ring gear. 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 belore using it again.*

Testing and adjustment of the starter and solenoid should not be attempted without dependable testing equipment, therefore, it is recommended that they be taken to a dependable electrical repair shop when service is required.

D. SPARK PLUGS AND DISTRIBUTOR

1. Spark Plugs

The spark plugs and cables must be maintained in good condition and if ignition difficulties are encountered, they should be checked, cleaned and respaced. Adjust the spark plug gap to .025". If the spark plugs are in poor condition they should be replaced. Make sure wire connections are tight and properly located in distributor cap.

2. Distributor

The distributor, located at the center of right side of engine, should be checked occasionally for worn or badly pitted points. When installing new points, be sure to set proper gap opening from .018" to .024".

In the event of difficulty in the ignition system, having checked the spark plugs and wires, proceed as follows:

a. Remove the distributor cover from distributor.

b. If contact points are pitted or pyramided, dress points with a fine point file or hone.

c. If points are worn or badly pitted, they should be replaced.

d. Adjust points to .018" to .024" gap.

To time the distributor, crank engine until No. 1 piston is approaching top center of its compression stroke and mark "DC" on flywheel is in dead center mark on flywheel to line up with mark on flywheel housing.

Remove distributor cover. Turn the distributor rotor so that it is at approximately the No. 1 cylinder firing position on the cap and insert the distributor into the block and coupling.

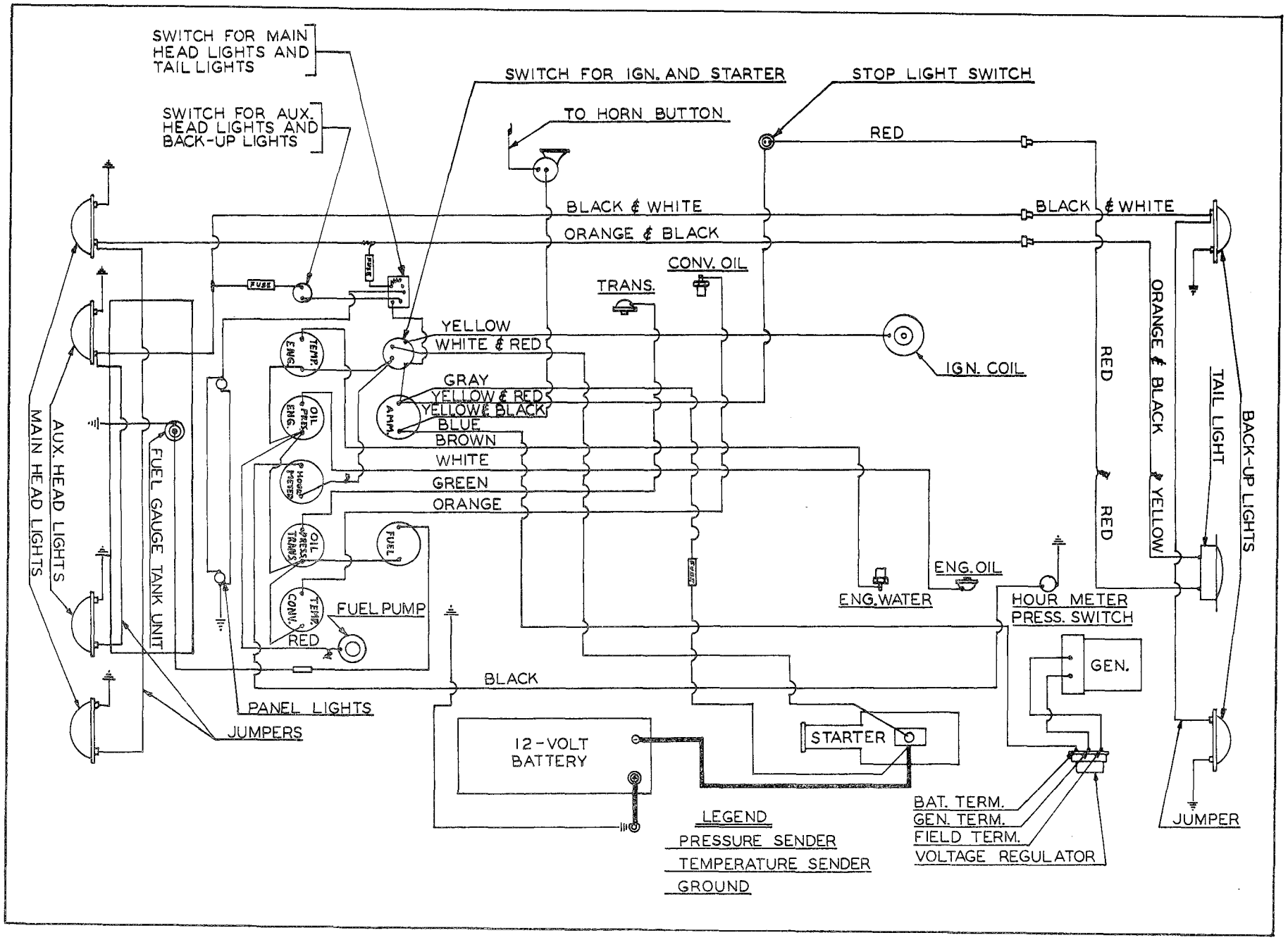

FIG. 15 – WIRING DIAGRAM (SCHEMATIC)

E. 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.

F. GENERATOR – WATER PUMP BELT ADJUSTMENT

Loosen the generator adjusting arm capscrew and move the generator up or down to obtain the correct belt tension, then tighten the adjusting arm capscrew. The tension is properly adjusted when the belts can be pressed inward by hand approximately 1/2 – 3/4 inch at a point halfway between the generator and fan pulleys.

G. LIGHTS

Four front lights, two rear lights and a tail light are used on the TL-14A TRACTOLOADER. All of these lights are vapor, moisture, dust and water proof, and are of the sealed beam type. Two front lights and the tail light are controlled by the main light switch which also controls the dash lights. Another switch controls the auxiliary lamps; two in front and two at the rear of the loader.

To replace the sealed beam element, remove the self tapping screws and rim. Pull sealed beam element out of light frame and loosen "hot" wire screw in back of the element and remove the "hot" wire; discard old element.

Install new sealed beam element in reverse order of above.

H. HORN

The diaphragm type horn is located at the base of the cowl underneath the front floor plate. When the horn button is depressed, the contact is made, closing the electrical circuit energizing the horn. The horn wire should be disconnect ed at the base of the steering column to prevent blowing of horn when horn button is being removed.

The horn button and ring must be removed to gain access to the steering wheel nut for removing the steering wheel. Remove the four screws in the horn button ring and lift the ring and horn button from the steering wheel.

I. 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 (refer to page 11) is turned on. It is imperative that this key be turned *OFF* each time the engine is shut off, to avoid discharging the battery.

J. ELECTRICAL CABLES

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

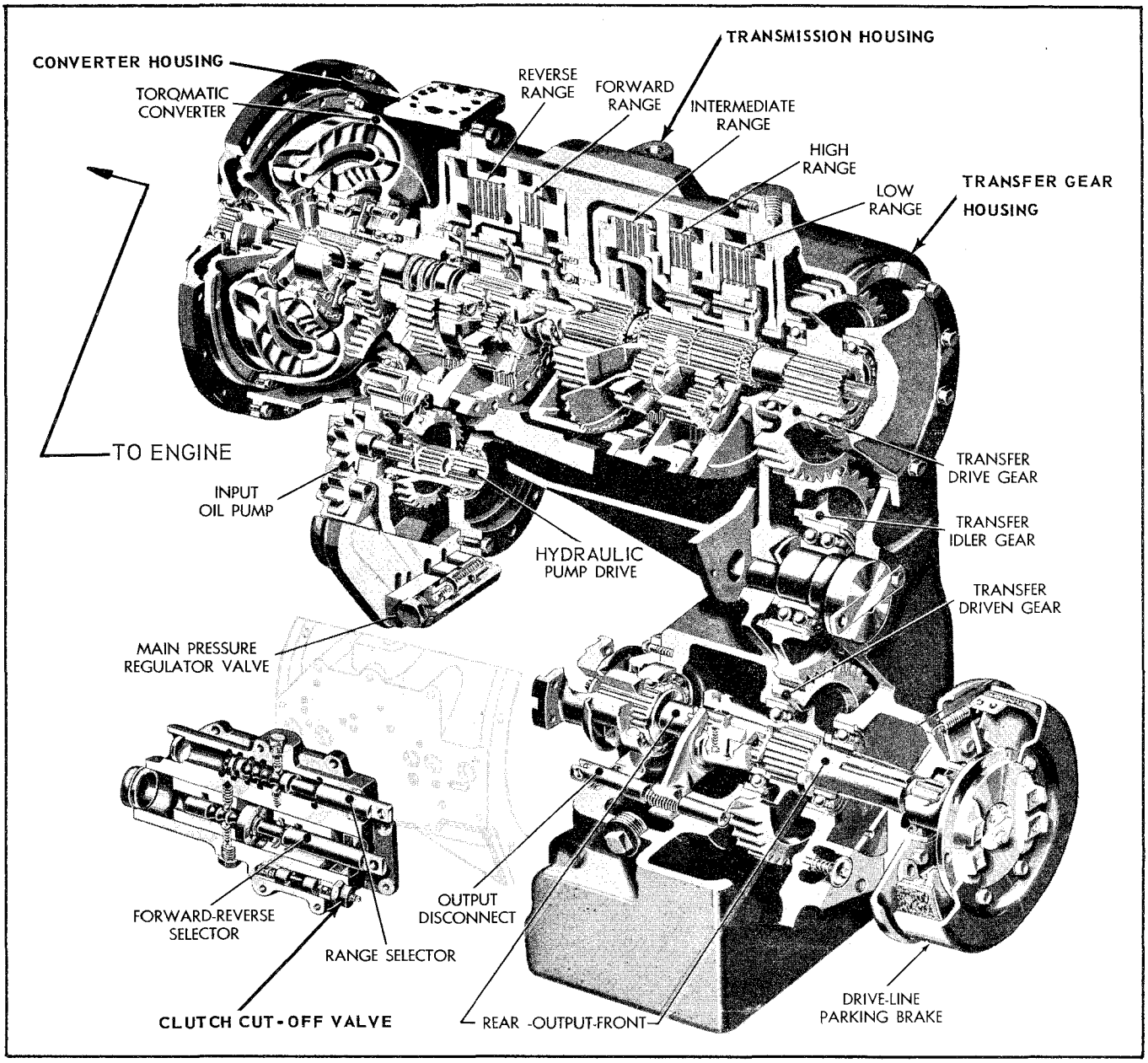

FIG. 16 – TRANSMISSION AND TORQUE CONVERTER

A. GENERAL

The torque converter and transmission is designed as a compact unit. The three major components are contained in separate housings as follows: torque converter, transmission, and transfer gear housings. These housings contain inter-connected oil passages to utilize a common oil supply. Both a screen and replaceable type filter are used to protect the hydraulic system.

1. Torque Converter Housing Assembly

The torque converter housing is bolted to one end of the transmission housing and may be removed as a unit.

A small pump for discharging the transmission-converter hydraulic system and two separate pressure regulating valves for controlling the pressure from the pump are incorporated in the converter housing. In addition, the housing

provides a mounting for the loader hydraulic pump. Both pumps are driven by the engine crankshaft through a series of gears.

The torque converter assembly is a single stage type with a torque multiplication ratio of 3.5 to 1. It contains four elements which are: pump, turbine, first stator and second stator. The elements are enclosed in a housing consisting of two halves; the pump cover and the pump, which make up the torque converter assembly. The converter assembly is directly connected to the engine.

2. Transmission Housing Assembly

The transmission housing is supported between the torque converter housing and the transfer gear housing. This housing contains the constant-mesh, planetary gear train and the five multiple disc clutches for controlling this gear train. It provides a mounting for the selector valve housing consisting of a range plunger for selecting a speed range; a direction plunger for selecting forward or reverse; and a clutch cut-off valve to provide the automatic clutch release feature.

The compound planetary gear train is arranged to provide three speed ranges (Lo, Int and Hi) in both the forward and reverse direction. Since the gears are always in constant mesh there is no "clashing" of gears when changing either the speed ranges or the direction of travel.

Two of the five oil cooled, multiple disc clutches are classified as direction clutches, and three are classified as range clutches. All five clutches are applied by hydraulic power and spring released. The friction plates have bronze facings and the reaction plates are steel. Because of the hydraulic control, there is automatic compensation for normal clutch wear – no adjustment is necessary. A single lever, connected by linkage to the two plungers in the selector valve housing, controls both the direction clutches and range clutches – thus full power shift, one lever control of all speeds; forward and reverse.

3. Transfer Gear Housing Assembly

The transfer gear housing is bolted to the end of the transmission housing and may be removed as a unit. It contains the necessary gears to transfer the drive from the planetary gearing in the transmission to the output shaft. In addition, it contains the shifting mechanism to provide the rear axle disconnect feature and serves as a mounting for the parking brake. This housing also provides the oil sump for the transmission-converter hydraulic system and contains a suction line screen for the oil.

B. CLUTCH CUT–OFF VALVE

1. Description

The clutch cut-off valve is located in the selector valve housing mounted on the side of the transmission housing. It will pass oil to the control plunger for the range clutches until "actuated" to cut off the oil flow which automatically releases the engaged range clutch. The cut-off valve connects into the hydraulic brake system and is actuated when the brakes are applied lightly. Therefore, as long as the loader brakes are applied, all the engine power is available to the loader hydraulic pump for more powerful loading action. Upon release of the brakes the cut-off valve again passes oil to the range clutch which automatically engages it.

2. Control of Clutch Cut-Off Valve

When precise control of the machine is required on grades, this automatic clutch release feature offered by the clutch cut-off valve may be undesirable. Accordingly, a control lever is provided so the operator can easily disengage the automatic release feature as desired. Control

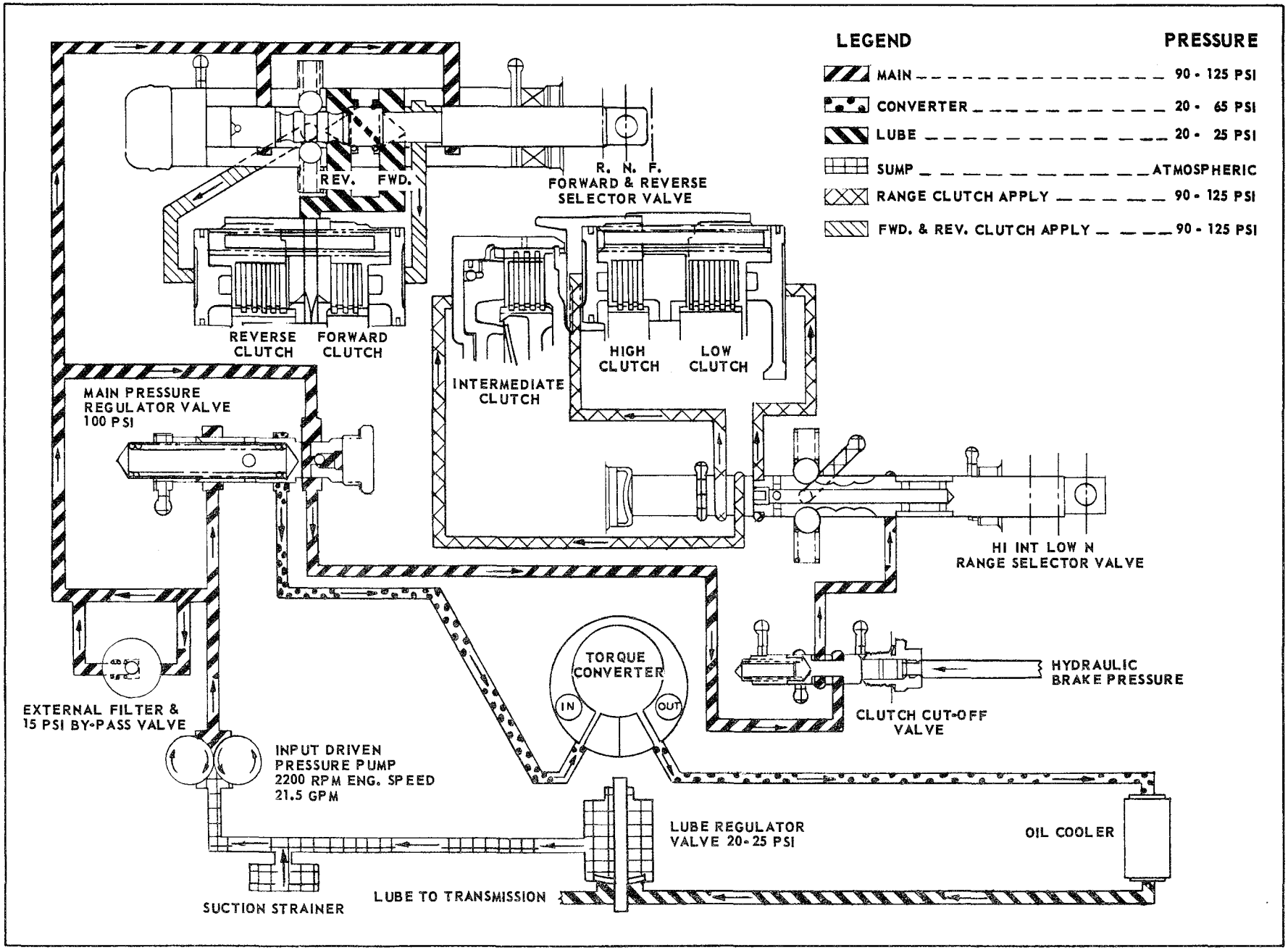

FIG. 17 – TRANSMISSION OIL FLOW AND PRESSURE (SCHEMATIC)

is accomplished by a hand operated check valve in the line between the hydraulic brake circuit and the clutch cut-off valve. When changing the position of the control lever, the brake pedal should be fully released. Refer to page 11 for location of control lever.

C. HYDRAULIC SYSTEM, TRANSMISSION – CONVERTER

1. Oil Recommended for Hydraulic System

A good grade of type "C" transmission fluid (or equal) is recommended, year around. No specific brand of oil is recommended. Use only products qualified under the above specification and recommended by reputable oil companies.

2. Oil Flow in Hydraulic System

The input charging pump draws oil from the oil sump in the transfer gear housing through the suction line screen which is submerged in oil. From the pump the oil flows through the oil filter, located between the engine and transmission, into the main pressure regulator valve located on the converter housing. The oil then flows under pressure to the selector valve housing where it is directed through oil passages to the forward and reverse selector plunger and through the clutch cut-off valve to the range selector plunger. Movement of either plunger directs oil to the selected clutch and hydraulically engages it. The oil returning from a clutch as it releases is directed back to the oil sump.

Oil is supplied to the torque converter by the excess gallonage from the main pressure regulator valve. The output oil from the torque converter flows through the oil cooler, located to the rear of the water radiator, into the lube pressure regulator valve. The lube oil then flows under pressure into the lubricating circuit and is discharged back into the sump. Normal seepage from the converter seal rings is drained back into the sump.

D. REPLACING FILTER ELEMENT AND SCREEN, TRANSMISSION–CONVERTER

1. Filter Element

The filter, mounted on the transmission support bracket between the engine and transmission, is of the full flow type with a built-in by-pass. It contains a replaceable element. A new element must be installed each time the transmission-converter oil is changed or more often if conditions warrant. To replace the element, proceed as follows:

a. Thoroughly clean the filter cover and surrounding area.

b. Remove the center bolt with cover and spring. Lift out the old element from the filter case. Discard old element and gasket.

c. Thoroughly clean the inside of the filter case before installing a new element and new gasket. Be sure element is properly seated inside case.

d. Reinstall the cover on top of element and draw it down tightly with the center bolt.

2. Screen

The screen is located in the oil sump of the transfer gear housing. It is accessible by removing the capscrews in the rear face of the sump. The screen must be removed and cleaned each time the transmission-converter oil is changed or more often if conditions warrant. To clean the screen, proceed as follows:

a. Remove the drain plug from the oil sump.

b. Thoroughly clean the screen cover flange and surrounding area.

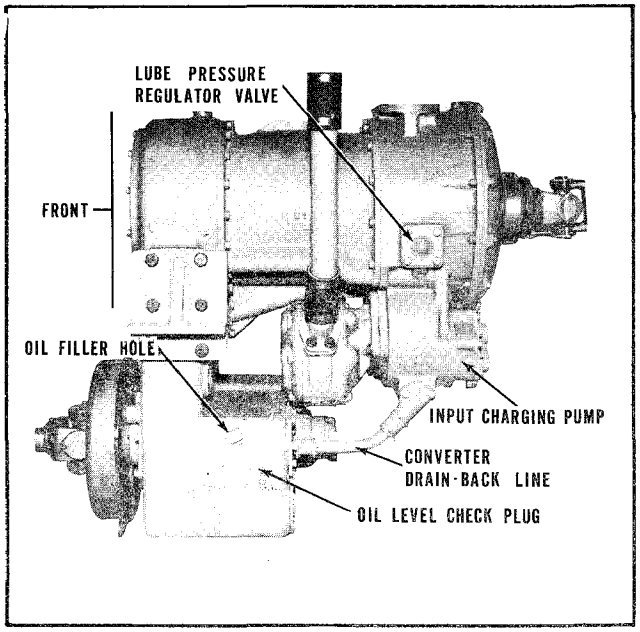

FIG. 18 – TRANSMISSION (LEFT SIDE)

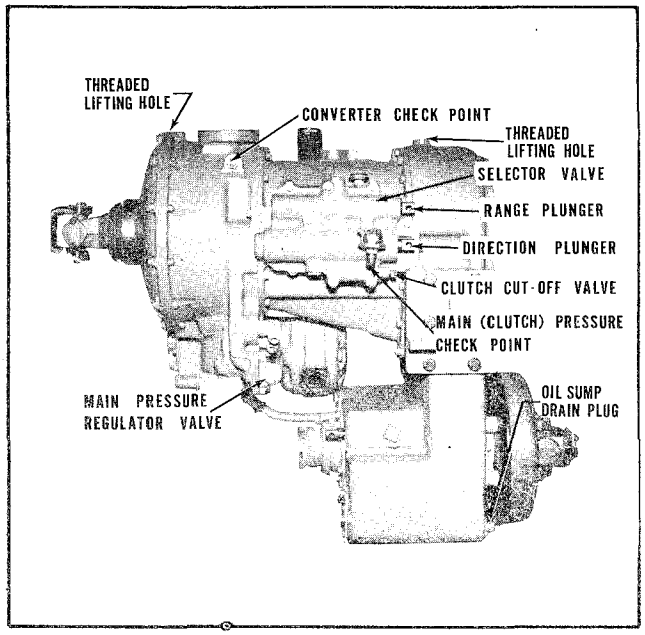

FIG. 19 – TRANSMISSION (RIGHT SIDE)

c. Remove six capscrews and slide the screen out.

d. Thoroughly clean the screen in mineral spirits, using a soft bristle brush.

e. Reinstall screen using a new gasket. Make sure capscrews are securely tightened.

E. CHECKING OIL LEVEL

The oil level plug and the oil filler line are provided in the left wall of the oil sump (Fig. 18). The oil level must be checked every 10 hours of operation by removing the level plug. Make sure the machine is setting level before checking oil level. As a safety precaution, two oil level checks must be made as follows:

1. Before starting the engine, remove the level plug.

a. If no oil appears, add oil through the filler opening until it appears at the level plug.

b. If oil appears or runs out freely, replace plug and proceed with step 2.

2. After starting the engine, wait until the hydraulic oil reaches operating temperature. Then with the engine running at 1/4 throttle, remove the level plug.

a. If no oil appears, add oil through the filler opening until it appears at the level plug.

b. Replace upper plug. *DO NOT OVERFILL.*

Although no harm will be done if the oil level is allowed to drop below the level plug (engine running at 1/4 throttle), it is recommended that the oil level be maintained even with the level plug.

F. TO CHANGE OIL IN HYDRAULIC SYSTEM, TRANSMISSION–CONVERTER

The capacity of the hydraulic system after complete draining and overhaul is 9 gallons. However, the refill capacity is 8 to 8–1/2 gallons because the draining operation for an "oil change" leaves some oil inside the torque converter, valves, oil passages and lines. Since the hydraulic system is the "heart" of the transmission-converter combination, it is especially important that emphasis be placed on cleanliness of the oil.

The hydraulic 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 high operating temperatures. NOTE: *The oil should be at operating temperature. When draining the system allow a few minutes for the oil to drain down into the sump.* Proceed as follows:

1. Remove the drain plug from the lower front face of the oil sump. NOTE: *If the oil is contaminated with metal particles the entire assembly should be disassembled, cleaned, and the damaged parts replaced.*

2. Clean and reinstall the strainer, and install a filter element (refer to Paragraph D).

3. Install the drain plug and remove the oil filler plug located in the left hand wall of the oil sump.

4. Pour in approximately 5 gallons of the specified oil (type "C" transmission fluid).

5. Start the engine and let it run for 2 minutes at low idle to "charge" the system. Then with the engine running at 1/4 throttle, add oil through the oil filler opening until it appears at the level plug.

6. Replace the level plug. Reinstall filler plug and tighten securely.

G. OIL PRESSURES AND TEMPERATURES, TRANSMISSION–CONVERTER

Fewer shut-downs will be experienced if the operator periodically reads the main system pressure gauge and the converter "out" temperature gauge provided on the instrument panel (refer to page 11 for location of gauges).

1. Main system (clutch) pressure should read 90 to 125 P.S.I. any time the engine is running. If the pressure consistently drops below 90 P.S.I., with any one of the five clutches engaged, it may allow the clutch to slip excessively and overheat.

2. Converter "out" temperature should never be allowed to go above 250° F. maximum. If it should exceed this maximum, stop the loader, shift the 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.

3. Ordinarily the converter "out" pressure reading is not required during operation – thus no gauge is provided on the instrument panel. It is specified at 25 P.S.I. minimum at full throttle, converter stall; and 65 P.S.I. maximum at full throttle, no load. The reading, if required, may be obtained by installing a pressure gauge in place of the converter "out" temperature sender, located at the converter check point (refer to Fig. 18). CAUTION: *DO NOT STALL CONVERTER LONGER THAN 30 SECONDS AT A TIME WHEN OBSERVING THIS PRESSURE.*

Normally, low pressure readings and high temperature readings result from one of the following causes:

a. Incorrect oil level, either low or high.
b. Clogged filter element or sump screen.
c. Worn input oil pump assembly.
d. Worn or maladjusted main pressure regulator valve assembly.
e. Low water level in engine cooling system.
f. Clogged or dirty oil cooler.

If checking these possibilities does not locate the cause, contact your nearest "Allis-Chalmers" Construction Machinery Dealer.

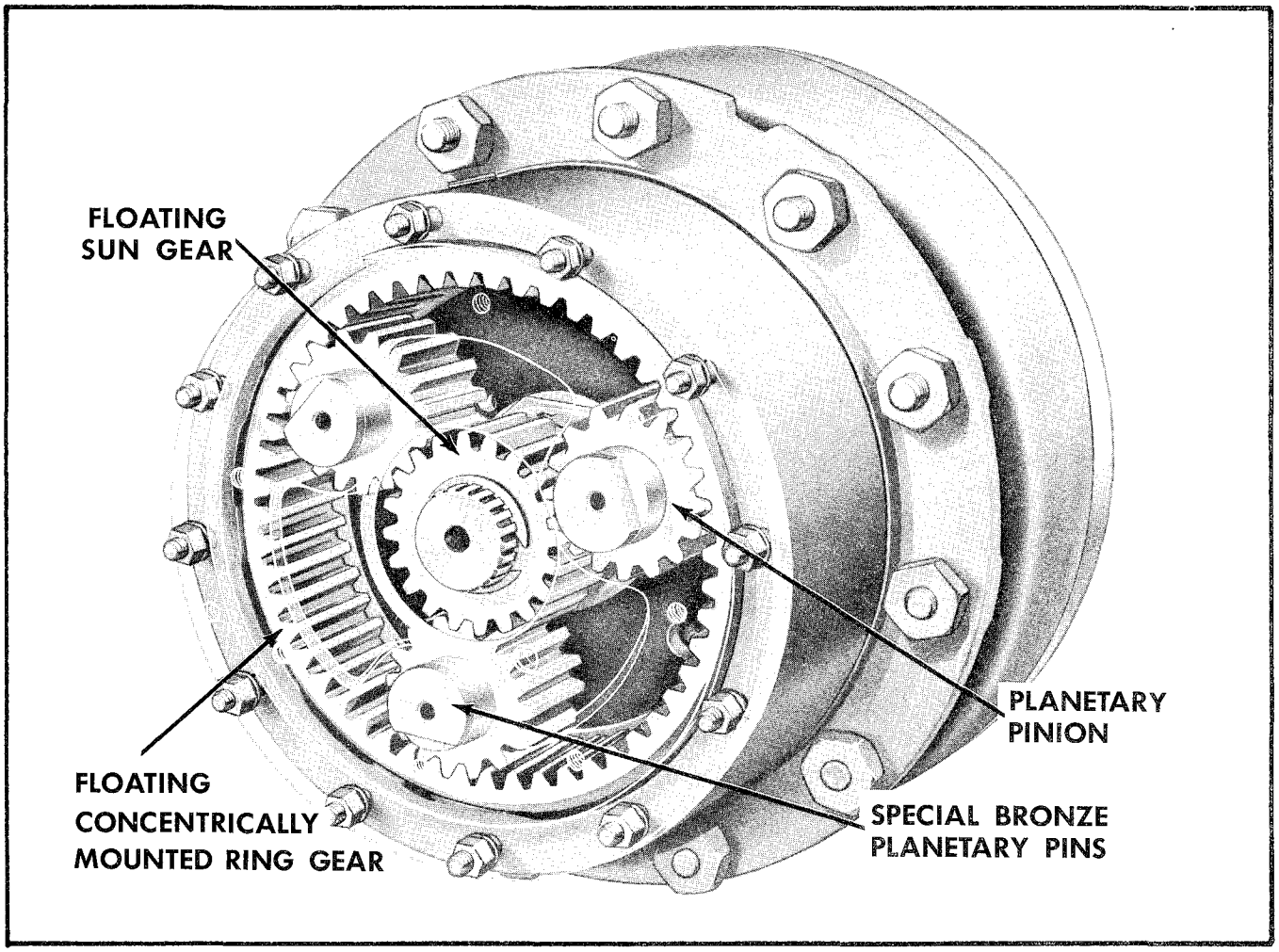

FIG. 20 – PLANETARY SHAFT AND HUB

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 assemblies located between the central section and the 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 identical 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 the lubricating gear oil for these parts.

All four planetary hubs are identical and each consists of a floating ring 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 the wheel bearings and gears. The oil, therefore, is constantly flowing around these parts and through the channels in the planet pins to lubricate the 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.*

B. ADJUSTMENT OF WHEEL BEARINGS

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

1. Drain the wheel hub and remove the planetary end cover from the spider.

2. Insert 7/16" – 14 NC x 2" capscrews in each of the three holes of the spider. Turn capscrews in evenly until the spider (including the planetary pins and pinions) pulls free of the wheel hubs.

3. Remove snap ring, sun gear, thrust washer, and nut lock (for adjusting nut) from axle shaft.

4. Tighten adjusting nut until bearings bind slightly while turning the wheel. Then back off the nut to the nearest slot so that nut lock can be secured. Wheels should rotate freely after securing nut lock.

5. Reinstall thrust washer, sun gear, snap ring, spider assembly and end cover. Refill 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 the 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 pre-packed 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 the upper cap should approximately equal those used under the lower cap to center the universal joint in the trunnion socket housing. When adjustment becomes necessary, proceed as follows:

1. Remove the tire and wheel assembly.

2. Add or remove shims under upper and lower trunnion bearing caps in approximately equal amount, until there is no perceptible "play" when the wheel hub is manually moved up and down. The wheel hub should pivot freely right or left, as when steering.

3. Reduce the shim pack by .005" under each cap, and replace the cap. The wheel hub should now pivot with a slight drag when turning right or left.

4. Replace tire and wheel assembly.

D. POWER BRAKES

1. Description

The TL-14 is equipped with hydraulic power brakes on the front and rear wheels. A vacuum hydraulic unit composed of three major parts; hydraulic cylinder, vacuum power cylinder and a hydraulically actuated control valve is located under the floor plates. Power for braking is provided by this unit when the brake pedal is depressed. Vacuum is supplied to the unit by a hose from the vacuum reserve tank, located

on the left hand brake under the hood. Vacuum is supplied to the unit by a hose from the vacuum reserve tank, located on the right hand brace under the hood. Vacuum for the reserve tank is provided by a line from the engine intake manifold. This provides maximum vacuum when the engine is at low idle, therefore, each time the engine is decelerated, additional vacuum is built up in the vacuum reserve tank.

If for any reason the vacuum system should fail, the brakes will operate as a conventional hydraulic brake system whether or not the engine is running.

2. Brake Adjustment

To adjust brakes for normal lining wear, follow the procedure outlined below:

a. Raise front end of loader off the ground with a jack and suitable supports.

b. Place transmission control lever in neutral and adjust brakes by means of the 5/8" capscrews located in front brake drum dust covers.

c. Adjust brake shoes individually by turning the 5/8" capscrew in until brakes begin to drag while turning wheel by hand. Back off just enough to allow wheel to turn freely.

d. The rear brakes also have two 5/8" capscrews each located on the dust shield. Use these capscrews to adjust the rear brakes in the same manner as the front.

POWER STEERING SYSTEM

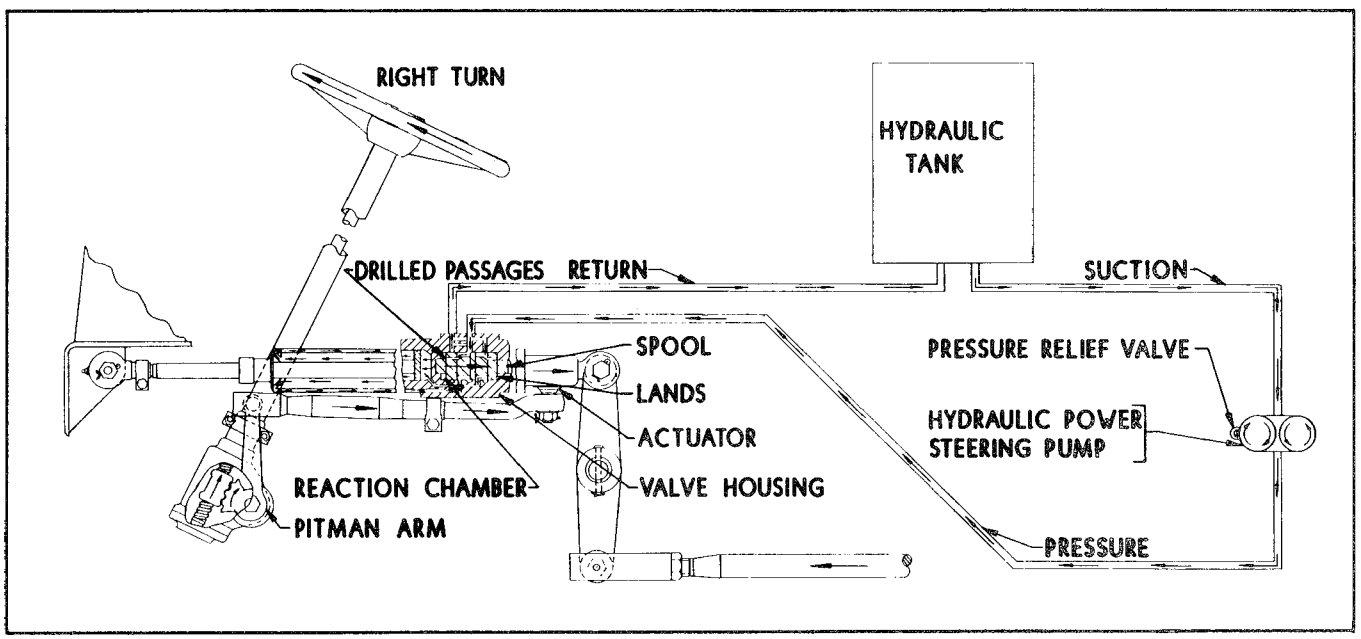

FIG. 21 – POWER STEERING CONTROL VALVE FLOW DIAGRAM

A. GENERAL

The oil for the power steering system is supplied from the main hydraulic system tank, thus eliminating the need for a special reservoir. The other main components of the power steering system are the pump, safety relief valve, control valve, and hydraulic cylinder connected to an arm assembly (mounted on the left hand frame). One drag link is attached to the steering gear pitman arm and to the valve of the power steering cylinder and another drag link connects the arm assembly to a steering arm on the rear axle.

B. PUMP AND DRIVE BELT

The power steering "gear type" pump is located on the left hand side and attached to the rear engine support through an adjustable bracket. It is belt driven by the crankshaft pulley, which means there is power supplied to the steering valve whenever the engine is running. The pump belt is correctly adjusted when the top side of the belt can be pressed downward approximately 3/8" at a point halfway between the crankshaft pulley and the pump pulley. To adjust the pump belt, loosen the mounting bracket capscrews and move pump bracket in or out from crankshaft pulley to above belt adjustment, and tighten capscrews.

C. SAFETY RELIEF VALVE

The power steering pressure relief valve consisting of a ball, spring, adjusting screw, gasket and nut is located in the side of the power steering pump housing. It is provided to limit the pressure in the power steering system.

It is properly adjusted at the factory for an opening pressure of 750 P.S.I. and requires no further adjustment in the field. When the valve opens, oil is recirculated within the pump to relieve oil pressure.

D. CONTROL VALVE

This hydraulic valve is integral with the power steering cylinder. It consists of a spool within a housing which has three grooves accurately located in relation to the spool. The spool and housing are highly machined and ground to a sliding fit to retain high pressure oil. The spool and housing are, therefore, not serviced separately.

The drag link ball stud is mounted inside a sliding sleeve with a flange. The flange is trapped between the actuator and valve housing, in turn limiting slightly the movement of the valve spool in the valve housing, to direct the flow of oil as the steering handwheel is turned. This slight movement is caused by the resistance to turn, offered by the steering wheels. The spool is held in neutral position by back pressure built up at the spool lands and transmitted through drilled passages to the reaction chambers formed by the spool projections and the bore of the valve housing.

As illustrated, the handwheel is turned right, actuating the spool which in turn closes some passages and opens others. The pitman arm, moving against the resistance at the wheels, moves the sliding sleeve and flange, displacing the spool in the same direction. Fluid pressure in the annular groove is transmitted through the cylinder port to the valve side of the power cylinder, and by means of a drilled passage to the reaction chamber. Fluid displaced from rod side of cylinder escapes through the cylinder port, into the annular grooves and back through the line to the hydraulic tank. Thus, there is a constant flow of oil to and from the hydraulic tank until the piston has completed its stroke, at which time the safety relief valve opens.

A check valve in the steering valve allows oil to circulate within the valve in the event of a power failure, or if steering is to be done with the engine off.

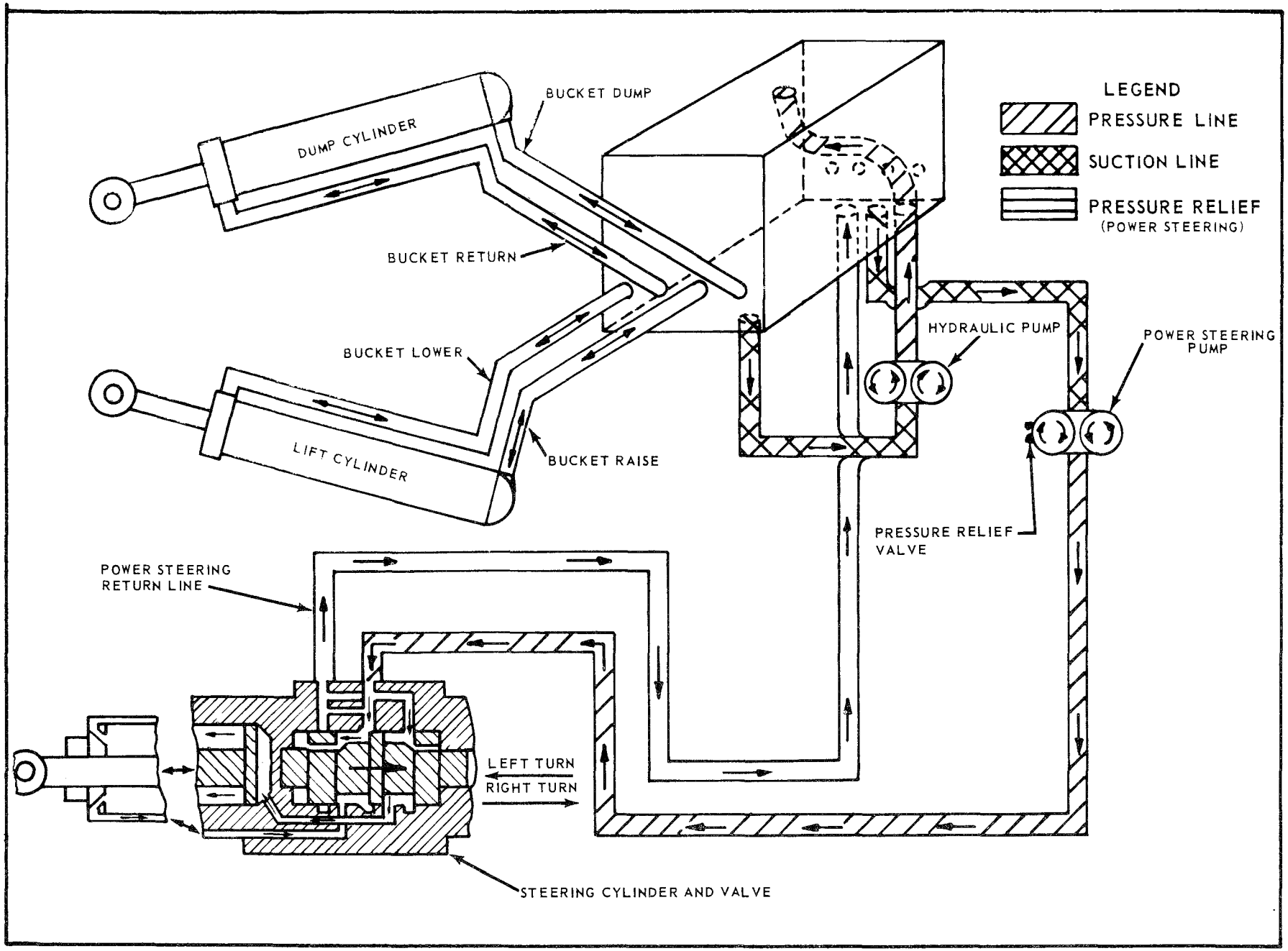

FIG. 22 – HYDRAULIC SYSTEM (INCLUDING POWER STEERING) SCHEMATIC

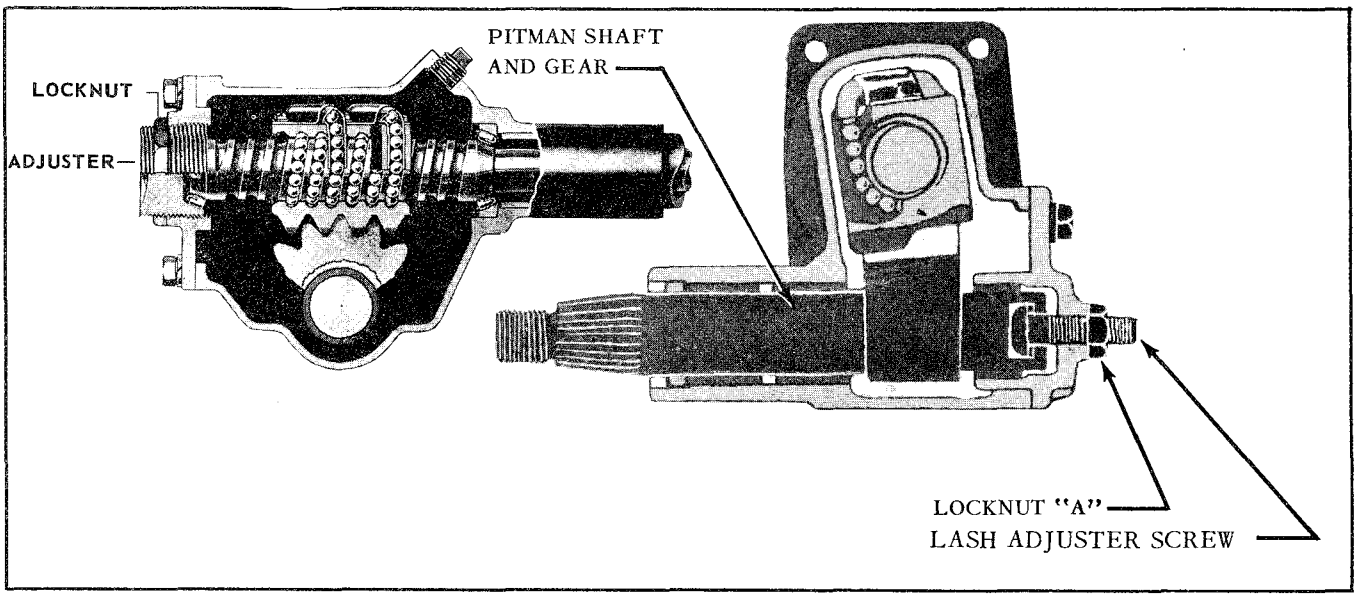

FIG. 23 – STEERING GEAR

E. 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. Helical grooves inside the ball nut are filled with steel balls which engage the mating grooves in the worm portion of the steering shaft. Rack teeth are machined on one side of the ball nut which engage the teeth on the pitman shaft and gear. When the steering wheel is turned, the steering shaft and worm rotate, causing the ball nut to move up or down. Movement of the ball nut rotates the output shaft and gear which imparts motion through the pitman arm to the drag link.

2. Adjustment

There are only two major adjustments of the steering gear assembly:

a. Thrust Bearing Adjustment
b. 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 must be used. Damage to the valve components and bearings is certain to result if it is driven off.*

Proceed as follows:

a. Thrust Bearing Adjustment

1. Disconnect drag link from pitman arm, noting relative position before disconnecting.

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

3. Loosen locknut "A" and turn lash adjuster "B" a few turns counter-clockwise. (Refer to Fig. 23.) This removes from the thrust bearings the load imposed due to the close mesh between the ball nut rack, and pitman shaft and gear.

4. Drive up the "staked" lock on the thrust bearing nut for removal and replace it with a new nut.

5. Turn the steering wheel to extreme right turn position which fully compresses the centering plunger springs.

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

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

8. Stake the thrust bearing nut into the keyway of the shaft, making sure the nut does not turn from its adjusted position.

b. Lash Adjustment – After having completed the thrust bearing adjustment proceed with the lash adjustment, which covers a range of approximately one half turn of the handwheel on each side of the "center" position.

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

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

3. Turn lash adjuster "B" (refer to Fig. 23) clockwise until back lash disappears between the teeth on the ball nut and the teeth on the 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 pounds.

4. Carefully secure locknut "A" (refer to Fig. 23) making sure that lash adjuster "B" does not move.

The steering gear is filled at the factory with a special lubricant (GMC-4567-M) developed for both summer and winter operation. Seasonal change of lubricant and draining of gear case is not necessary. Gear should be kept filled to level of the filler plug with the above lubricant or SAE 90 gear lubricant.

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. CHECKING POWER STEERING SYSTEM

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

1. Drive belt for hydraulic pump (loose)
2. Safety relief valve (stuck open)
3. Tire pressure (incorrect)
4. Steering column (misaligned at instrument panel.
5. Steering linkage (requires lubrication or adjustment)
6. Steering gear (thrust bearings or "lash" require adjustment)
7. Wheel bearings (require adjustment)

PREPARATION OF LOADER FOR STORAGE

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

Drain the engine crankcase and all other oil compartments and refill them with new oil. Fill the fuel tank to minimize condensation in the tank.

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

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

Drain the cooling system or fill it with an antifreeze solution that will withstand the lower anticipated temperature. Cover the exhaust pipe.