GERLINGER

DIVISION OF GERLINGER INDUSTRIES CORP.

LC-30 CRAWLER TRACTOR

OWNER'S MANUAL

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GERLINGER CARRIER CO. / P.O. BOX 2008 / 2690 BLOSSOM DR. N.E. / SALEM, OREGON 97303
TEL: (503) 399-2661 TELEX: 360-878

GERLINGER CRAWLER TRACTOR WARRANTY

Gerlinger Industries Corporation warrants new equipment sold by it to be free from defects in material and workmanship subject to the following provisions. During the first six months or 250 operating hours, whichever occurs first after delivery of the product to the initial user, a new part or a repaired part, whichever Gerlinger elects, will be provided along with labor for the installation of such parts, in place of any parts which are found upon its inspection to be defective in material or workmanship. Such parts will be provided without charge to the user during normal working hours at Gerlinger or a place of business of a dealer authorized by Gerlinger.

This warranty does not include any transportation costs and does not apply to the following;

1) Normal maintenance service such as engine tune up.
2) Replacement service items such as fan belts, filters, or lubricants.
3) Battery, which is under manufacture's guarantee.
4) Any equipment on which the hour meter has been disconnected.

Caution, the hydraulic oil temperature must not exceed 200°F during operation or severe damage to the transmission can occur.

Replacement parts provided under the terms of this warranty are warranted for the remainder of the warranty period applicable to the equipment in which they are installed as if such parts were original components of that equipment.

No warranty is made with respect to items made by others when such items are warranted by their respective makers or when they are supplied by Gerlinger special order.

This warranty is expressly limited to the provisions of parts, as specified above, and any claims for any loss arising from failure or malfunction of the equipment resulting from misuse, negligent alterations, accidents, or lack of required maintenance service, and any claim for loss of use for any period of time, inconvenience, or other consequential damage are expressly excluded.

The Gerlinger Industries Corporation reserves the right to make changes in design or to make additions to or improvements in its products without imposing any obligation upon itself to install them on its products previously manufactured.

TO THE OPERATOR AND OWNER

WARNING This safety alert symbol indicates important safety messages in this manual. When you see this symbol, be alert to the possibility of personal injury and note the instructions given.

Read and understand all warnings in this manual carefully before operating the crawler tractor.

On receiving your crawler tractor, record the serial number on the following line:

Serial Number _____

When ordering parts for your crawler tractor, it is absolutely essential to supply your dealer with the above listed serial number.

The next page shows a copy of the Gerlinger Warranty that was supplied to you with your crawler tractor. Please read it carefully, as there are limitations in this warranty which you need to be aware of.

It is the obligation of the owner of this crawler to follow instructions and service suggestions so that the machine is kept running at a high efficiency level.

CAUTION This symbol is used in this manual to indicate conditions that could cause failure or premature wear of components of the crawler tractor. To avoid damage to the crawler tractor, read this manual carefully and prevent the occurrence of the conditions warned against.

Your Gerlinger LC-30 dealer is:

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SAFETY RULES

WARNING **Your crawler has been designed with much thought towards safety of the operator and of bystanders. However, there are many instances in which careless operation could well result in accidents or injury despite the design effort expended. As an operator you are expected to observe the safety rules listed below. Please study these rules very carefully and make sure they are in effect at all times.**

1. Never operate engine in a closed garage or shed.

2. Never allow riders on the crawler tractor or on any equipment being drawn by the tractor.

3. Never operate the crawler tractor without the minimum recommended counterweights.

4. Never start or operate the crawler tractor except from the driver's seat.

5. Never operate implements such as ripper or backhoe except from the driver's seat.

6. Never exceed safe speeds.

7. Never touch wires, particularly electric wires, with any part of the crawler tractor or with equipment being drawn by the tractor. Watch for overhead wires.

8. Never carry the load high, especially when working on a hillside or backing up a steep incline, as this may topple the machine.

9. Never operate the machine without your seat belts on.

10. Never leave the machine with the engine running.

11. Never drive too close to a ditch or excavation.

12. Never refuel a hot engine. When refueling the vehicle, make sure the engine has cooled and that the area is free of open flames and sparks.

13. Never change a relief valve setting. These are set at the factory at levels safe for operation.

14. Never allow anyone to stand, work, or make repairs under a raised bucket or boom, unless properly supported. Use the boom safety bars supplied with the crawler tractor to support the bucket whenever anyone is working under it or there is any chance of somebody standing or walking under it.

15. Never remove the radiator cap without slowly relieving the pressure first. Ignoring this rule might severely burn the person removing the cap or a bystander.

16. Never tow the crawler tractor without first disengaging the Torque-Hub. Ignoring this rule will result in transmission damage. It is acceptable to skid a disabled vehicle onto a truck.

17. Never use planks as a substitute for steel loading ramps.

18. Never transport the crawler tractor on a truck or trailer which is of insufficient load capacity, or without tying the crawler down securely enough to account for steep grades and sudden stops.

19. Never suddenly raise the bucket off the ground when traveling or at a standstill parallel to a sidehill, especially loaded, as this may topple the loader.

20. Never operate the crawler when bystanders are so close to the unit that lowering the bucket or ripper may endanger them.

21. Never dismount from the machine while it is in motion. Always wait until you come to a complete stop, shut the engine off, lock the levers in neutral with locking plate provided, then dismount.

22. Never park the machine on a downhill or uphill grade, as it may roll back into an excavation and cause serious injury. If you absolutely must park the machine on a hillside, park parallel to the hill, lock the steering levers into forward or reverse, and lower the bucket into the ground.

23. Never park the machine with the boom up. Always park with the bucket on the ground.

24. Never travel fast when driving over rough terrain.

25. Never wear loose clothing when in the vicinity of moving parts.

26. Never use ground-off tools or pins.

27. Never use a hammer without using protective safety glasses.

28. Never operate the crawler tractor with hydraulic lines, hoses or tubing in a damaged condition. Lost fluid can cause expensive damage to your

crawler and can cause injury when escaping through small holes at high pressure. Do not use your hands to search for leaks.

WARNING 29. Always carry the bucket low while driving.

WARNING 30. Always dump your load on the uphill side.

WARNING 31. Always watch out for bystanders. Stop operation rather than endangering bystanders.

WARNING 32. Always watch for your head when mounting or dismounting the machine.

WARNING 33. Always fasten your seat belts securely when operating the vehicle. Do not attempt to start the crawler tractor unless you are in the driver's seat. Doing otherwise is dangerous and could cause a runaway machine.

WARNING 34. Always disconnect battery ground terminal before adjusting engine or working on the electrical system. This will prevent accidental starting and possible fires.

WARNING 35. Always use warning lamps when driving or carrying a crawler tractor on a public road at dusk or night or during other times of low visibility. Consider using slow moving vehicle emblems in addition to warning lamps.

WARNING 36. Always carry a fire extinguisher on the crawler.

WARNING 37. Always stop the engine or let it idle for a while before adding coolant after having relieved the radiator pressure very slowly and removing the radiator cap very carefully.

WARNING 38. Always make sure that all hydraulic connections are tight before applying pressure to the hydraulic system.

WARNING 39. Always use a piece of material (wood or paper) instead of your hand to find leaks.

WARNING 40. Always seek medical attention immediately after being injured ever so slightly by hydraulic fluid under pressure, as serious infections can result otherwise.

WARNING 41. Always keep your machine, particularly the belly pan and engine block sides, free from grease and oil to prevent fires. Also remove debris of combustible nature such as rags, weeds, and pieces of wood.

WARNING 42. Always keep your battery area free from debris.

WARNING 43. Always keep your wiring in good condition. Replace frayed wires.

WARNING 44. Always keep engine guards and grill in place to prevent combustible debris from creating a fire hazard.

CAUTION **The following caution notes will help you to obtain long life on your crawler tractor.**

CAUTION 1. Never operate the crawler for any length of time while going over high-pressure relief in the transmission.

CAUTION 2. Never transport the ripper attachment except raised to its full height.

CAUTION 3. Never use the crawler loader as a battering ram.

CAUTION 4. Never leave your crawler tractor unattended. The oil reservoir, the battery and the fuel tank can present an attractive target for vandals.

CAUTION 5. Always keep debris off the radiator and grill.

OPERATIONS

Before operating your crawler tractor, please take the time to read the safety rules listed on the preceding pages, beginning with page 5.

Pre-Starting Inspection

1. Lubricate the machine (see separate instructions, pages 20-21).
2. Check hydraulic fluid level, engine oil level, fuel level and coolant level.
3. Check the battery fluid level. Examine the battery cables for corrosion, fraying or looseness.
4. Check the air cleaner and its connection to the engine for damage or leaks.
5. Check for leaks in the hydraulic and fuel systems, as well as in the engine.
6. Look for loose parts and connections around the machine.

Operating the Engine

I. Starting the engine.

A. Adjust and fasten the seat belt.

B. Place the steering controls in neutral, center position.

WARNING C. **Turn the ignition key counterclockwise 30 seconds, then clockwise. Start the engine. (This procedure is especially important in cold weather.)**

D. Warm up the engine before operating it under full load. Do not race or idle the engine during warm-up. For the first 30 minutes of operation, use the crawler tractor at a lower engine speed than normal, and a light engine load.

II. Notes on Engine Operation

CAUTION A. **Do not operate the engine above 2,800 R.P.M. *at any time.***

B. Do not idle the engine unnecessarily; this will cut down the life of the engine since excessive idling causes deposits on valves and pistons.

C. Shut the engine off rather than letting it idle for any considerable length of time.

D. Operate the engine between 1,600 and 2,800 R.P.M. according to the working conditions encountered.

III. Break-In

A. During the first 100 hours of crawler operation it is necessary to operate the engine only when thoroughly warmed up, particularly during the first 30 minutes of operation.

B. After 50 hours of operation, change all filters and crank case oil. For specification of oils see separate section.

IV. Stopping the Engine

A. Operate the engine at half speed, no load, for two minutes. Set the throttle at idle and pull the engine stop button. (See Figure 1.)

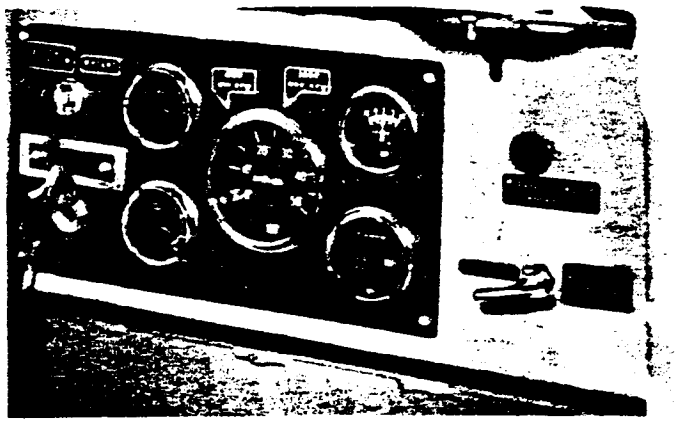


Fig. 1

B. Before dismounting from the machine, lower the bucket completely and lower the ripper if the crawler is so equipped, then lock steering levers in neutral.

V. Operating the Crawler

NOTE: Before operating the transmission controls, make sure engine has been run for at least five minutes in order to give foreign matter the chance to be picked up by the oil filter.

The crawler is operated basically by transmission controls and hydraulic controls. For a description of the specific functions of these controls see the section headed "Controls."

A. To fill the bucket from a pile, use the cutting edge of the bucket level with the ground. Drive forward into the pile and roll the bucket lip back while moving into the pile; then move the boom up until bucket is full. Lower the boom before driving off.

To avoid spilling the load, roll the bucket back as far as it will go.

B. To dig with the bucket, raise the boom slightly and tilt the bucket down until the cutting edge contacts the ground. By driving forward the bucket cutting edge will dig into the ground. Lower the boom while driving forward until full, then tilt bucket back.

C. To dump the bucket, remember first to always keep the bucket low while traveling or while turning, whether full or empty.

To do otherwise may result in toppling the machine.

Raise the bucket high enough to clear the edge of the truck or container that the load is being dumped into. It is desirable to keep the load level while raising it to avoid spilling it. Move the machine very slowly when the bucket is high to get the load placed over the truck bed. Do not make any sudden turns or lurches.

After dumping the load, in order to prevent damage to the truck or container, roll back the bucket completely before slowly backing up.

WARNING **Lower the boom completely before driving off or turning.**

WARNING **Always carry the bucket low while driving.**

WARNING **Level the bucket before raising the boom or the load may spill over the back of the bucket.**

D. Leveling and backfilling. Spread dirt by driving forward with the bucket raised off the ground and tilted down.

To level, tilt the bucket down (raise the cutting edge). Drive backwards with the cutting edge slightly off the ground.

E. Towing. The crawler loader is towable provided the Torque-Hubs are disengaged according to the manufacturer's specifications.

CAUTION **Towing must be at a very slow speed and for short distances only or excessive heat will develop in the Torque-Hubs and damage them. Disregarding this will void the crawler warranty.**

In order to disengage the Torque-Hubs, the disengagement cap must be reversed from the position shown in Figure 2. (The protrusion in the disengagement cap will face into the Torque-Hubs.)

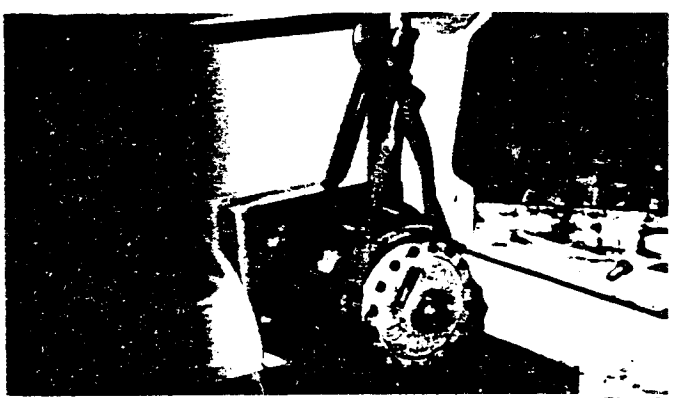


Fig. 2

CAUTION **Do not attempt to tow the machine without disengaging the Torque-Hubs.**

F. Transporting the crawler loader.

It is acceptable to skid the crawler onto a truck. This may be done with a winch.

To either skid the crawler onto a truck or drive the crawler onto a vehicle, steel ramps of sufficient capacity must be used.

WARNING **Never use wood planks to drive the crawler onto a truck or ramp.**

WARNING **Always back up onto an incline if bucket is empty; drive forward onto it if bucket is full. Drive slowly and keep the bucket as low as possible. These measures reduce the chance of tipping over the crawler.**

It is always easier to load and unload the crawler tractor when doing it on a level surface. When using ramps, in addition to sufficient strength the angle needs to be kept low.

Once the crawler tractor is loaded onto the truck bed, center the machine over the axles. Stop the engine and lower the bucket onto the truck bed. (NOTE: Protection can be provided under the bucket to avoid damage to the truck bed.) Lock the control levers into neutral position.

To secure the crawler onto the transporting vehicle, use chain or cable of sufficient strength. Chain tighteners and other securing devices may also be used.

WARNING **Do not use rope, frayed cable or damaged chain to secure the crawler.**

Important: Tie down the crawler by using the chain links as tie-downs. Using other components of the crawler as tie-downs may damage working parts.

While transporting the crawler it is necessary to plug the exhaust stack to avoid engine damage.

CONTROLS

The crawler tractor is controlled by steering levers, lift and tilt controls, ripper control, engine controls and instrumentation. mentation.

I. Steering

A. The two levers in the center of the machine ahead of the driver, control the right and left tracks respectively.

B. To drive ahead, move both levers forward. To drive in reverse, move both levers backward.

To turn the machine on its tracks, move one lever forward and the other lever backwards.

CAUTION **It shortens the life of the machine to turn on its tracks at full power.**

CAUTION **Do not go over high pressure relief for any length of time. This situation arises when the steering levers are engaged (forward or reverse) but the machine is not moving. The high pitched noise is indicative of the high pressure relief valve being open. This condition will ruin the transmission in a matter of several seconds.**

To lengthen the life of your machine, avoid turning with the two steering levers at opposite extreme positions, and avoid also turning at full power.

Avoid suddenly engaging steering levers in full forward or reverse motion from a standstill.

II. Lift Control

A. The control valve lever closest to the operator is the lift control. By pulling on it the boom rises; by pushing on it the boom lowers. (See Figure 3.)

WARNING **Do not suddenly lower the boom.**

Lowering the boom at a fast rate of speed, under certain conditions, causes instability and is therefore dangerous.

III. Tilt Control **Fig. 3**

A. The control valve lever furthest away from the operator is the bucket tilt control lever. Pushing the lever forward will dump the load; pulling the lever back will roll back the bucket.

IV. Float Position

A. Pushing the lift control all the way forward puts the valve in float position. This may be used for leveling, as the boom and bucket will follow the ground contour.

V. Ripper Control

A. The ripper control lever is located behind the driver's seat. See Figure 4.

Fig. 4

⚠WARNING In disconnecting the ripper hose lines, the two lines coming out the rear of the machine must be connected together or replaced by a hose, as shown in Figure 5. Not doing so will result in deadheading the hydraulic system and in failure of some hydraulic component. The resulting leak may cause injury.

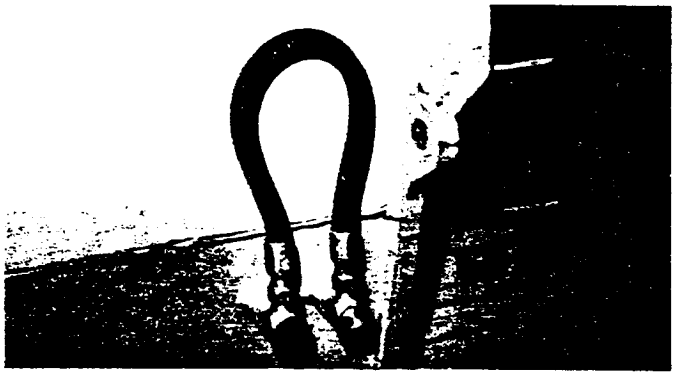


Fig. 5

VI. Throttle Control

A. The throttle control is located to the right of the instrument panel. See Figure 6. Engine speed is increased by pulling on the control and locking it by turning clockwise. The control can be locked in any desired position.

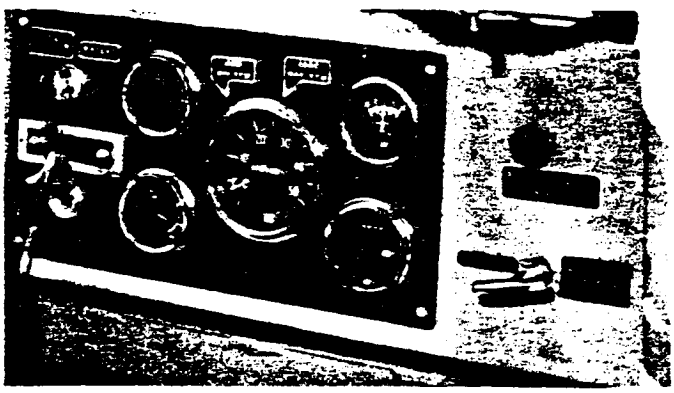


Fig. 6

VII. Instrument Control

A. The instrument panel is shown in Figure 6.

B. Engine coolant temperature should be kept at below approximately 210°F. If the temperature starts to climb above that point, reduce the working load, check the coolant level, clean radiator and cooler of debris and check for radiator fin dust contamination.

⚠WARNING Never remove the radiator cap without slowly relieving the pressure first. Ignoring this rule might severely burn the person removing the cap or a bystander.

C. The engine oil pressure gauge should indicate approximately 55-65 PSI. If oil pressure drops below the normal operating range, stop the crawler immediately and check the crank case oil level. Reasons for low oil pressure are plugged engine oil filter, low crank case oil level, restricted oil lines, restricted oil passages in the engine or incorrect oil viscosity. See lubrication instructions for proper oil viscosity and quantity of oil required in crank case.

D. The ammeter is the instrument located on the right hand upper corner. If it shows a discharge while the engine is running, shut off the engine immediately and trouble-shoot the electrical system.

E. The hydraulic oil level and temperature gauge is located on the hydraulic reservoir behind the driver's seat on the left hand side of the crawler.

Keep your oil level up at all times. Noticeable oil consumption is a symptom of trouble and should be checked.

Hydraulic oil temperature should be kept below approximately 190° F.

CAUTION Do not exceed 190°-200° F. in the hydraulic oil reservoir or severe damage to the transmission will occur.

F. Reasons for excessive hydraulic oil temperature could be the following:

1. Slipping fan belt on the engine resulting in decreased flow of air through oil cooler.
2. Oil cooler fins contaminated with oil and dust preventing heat transfer from taking place.
3. Debris plugging the cooler or radiator, preventing proper air flow. Hot air recirculation due to air leaks between fan shroud and radiator.
4. Plugged hydraulic oil filter. The filter condition indicator must be kept in the green area at all times except during start-up. Replace filter promptly when filter condition indicator approaches the red area.
5. Overworking the crawler tractor. Excessive load will increase the amount of heat dumped into the hydraulic oil.
6. Excessive turning at full power.
7. Going over high pressure relief on the transmission dumps heat into the hydraulic oil at an extremely high rate. Avoid this condition at all times.
8. Going over relief of the lift system relief valve. When bucket or boom come to the end of their stroke, let go of the valve handle or else it goes over relief. Keeping the valve in stroke and going over relief time and time again will, especially in high temperature ambient conditions, lead to excessive hydraulic oil temperatures.
9. Operating the crawler tractor engine at excessively low speed.

MAINTENANCE AND SERVICE

The instructions in this chapter should be followed regularly in order to keep the crawler tractor performing at its highest efficiency and economy. For genuine parts, see your Gerlinger dealer. On service beyond the capabilities of your shop, consult your Gerlinger dealer also. Do not depart from the service schedule suggested here except in order to increase the frequency of service due to extreme conditions such as heat or cold environment, dusty working conditions, or corrosive atmosphere.

I. Engine

A. Fuel System. The fuel system consists of fuel tank (under the driver's seat), fuel level gauge, fuel pump, fuel injection pump, fuel filter, injectors and lines connecting these.

CAUTION Do not subject the injection pump or surrounding areas to sudden heat or cold or pump damage may result.

The capacity of the fuel tank is nine gallons.

The engine manufacturer's warranty will be voided if the injection pump, its timing, or the injectors are modified in a manner that conflicts with the engine manufacturer's recommendations.

Excessive amount of water in the filter element is indicative of high water content in the fuel. This condition might clog the fuel filter, and if noticed, all water should be removed from the fuel tank in addition to a certain amount of fuel.

CAUTION **Do not remove, disassemble or tamper with injectors either with the engine running due to danger of fuel leaks, or with the engine stopped, due to the need for special tools.**

WARNING **Never refuel a hot engine. When refueling the vehicle make sure the engine is cold and that the area is free of open flames and sparks. Do not smoke while refueling.**

B. Cooling System. The crawler tractor has a cooling system which under normal operating conditions is under pressure. It will not operate as desired unless it is air tight.

To maintain air tightness, connections must be properly tightened and leaks must be corrected immediately.

The crawler cooling system has 182° F. thermostat and a 14 PSI pressure radiator cap.

The cooling system is filled at the factory with a 50/50 ethylene glycol/water mixture which contains a rust inhibitor, but no stop-leak additives. When adding coolant to the system use a reliable brand of ethylene glycol. For winter operation follow coolant manufacturer's instructions as to the proper mixture ratio.

For extreme winter operation, and to lengthen the life of the engine, consideration should be given to the installation of a higher temperature thermostat.

Once a year, or more often for very heavy use, completely drain the cooling system, flush with water, and refuel with new coolant.

Keep the radiator free of debris at all times. Excessive contamination of the radiator fins with oil or coolant and dust results in decreased heat transfer efficiency and could cause increased engine temperature.

WARNING **Never remove the radiator cap without slowly relieving the pressure first. Ignoring this rule might severely burn the operator or a bystander.**

C. Air Cleaner. The air cleaner is crucial to the life of the engine. Even a small leak in the air cleaner or in the air cleaner hoses and connections can destroy an engine in a few minutes of operation.

The engine manufacturer's warranty is void if the engine is damaged due to a defective air cleaner.

The air cleaner on the crawler is a two-stage stype: the pre-cleaner is a transparent bowl above the engine hood. This bowl must be emptied daily, or more often under very dusty conditions, whenever the dust reaches the level indicated on the bowl. See Figure 7.

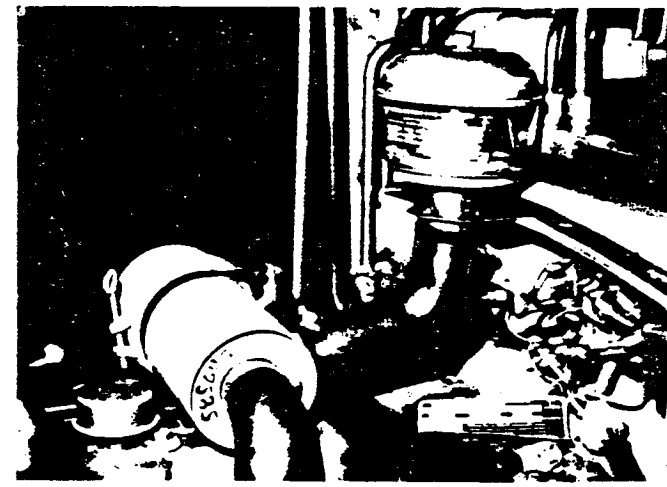


Fig. 7

In addition to emptying the bowl all connections should be inspected daily as well as the air cleaner itself, for dents and leaks.

The second stage of the air cleaner is of the paper element type.

CAUTION **Replace paper element every six months or every 200 hours of service. Replace element also if it has any pin holes, tears, or when the engine is losing power or smoking due to a paper element that cannot be cleaned anymore.**

Whenever exchanging or cleaning the paper element, clean inside of air cleaner body thoroughly with a clean, damp paper towel or rag. Make sure that air cleaner cover gasket is properly replaced.

The air cleaner element may be field serviced in emergency conditions by gently tapping the element with your hand. Do not tap element on a hard surface. Low-pressure compressed air under 25 PSI may be used to clean the element by blowing from the inside to the outside.

CAUTION **Do not wash paper element in fuel oil, oil, gasoline, or any kind of solvent.**

After replacing element, start the engine and with your hand check for leaks around air cleaner housing, hoses and connections.

D. Lubrication System. Check crank case oil daily. Replace crank case oil after the first 50 hours of operation and thereafter every 100 hours of operation.

For recommended lubricant viscosity see lubrication schedule.

Replace the engine crank case oil filter every 200 hours of operation after initial change at 50 hours of operation.

To remove the oil filter element, turn it counterclockwise (clockwise when looking at it from the top). Clean filter mounting surface, fill new filter element with the proper grade of crank case oil and install, making sure that the element is turned three-quarter turns after it is hand tight. See Figure 8.

Use only original equipment filter elements.

Please note that 50 hours of crawler tractor operation are equivalent to 3,000 road miles on an automobile.

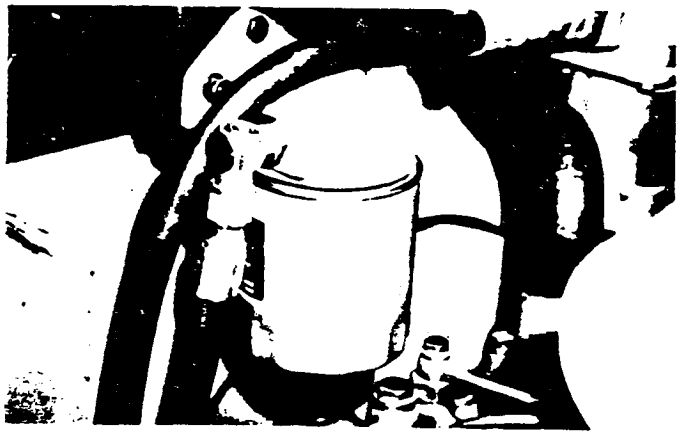


Fig. 8

Check for leaks after starting engine and tighten filter, if necessary.

II. Electrical System

This is a 12-volt system, negative ground.

The schematic K-115 represents the wiring method used on the crawler tractor.

A. Battery. The battery is located behind the engine ahead of the fire wall. See Figure 9. Keep the electrolyte level such as to cover the bottom of the vent holes in each cell.

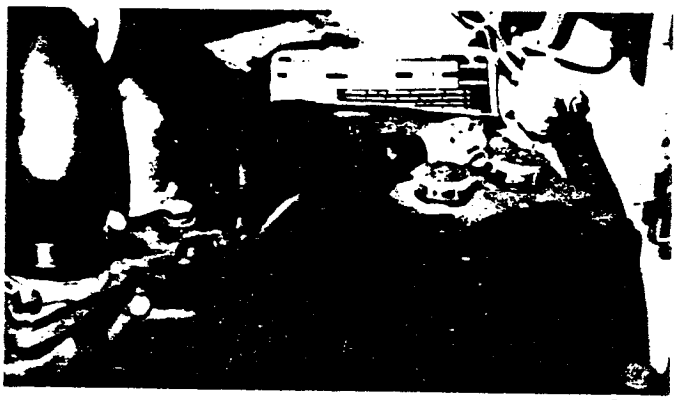
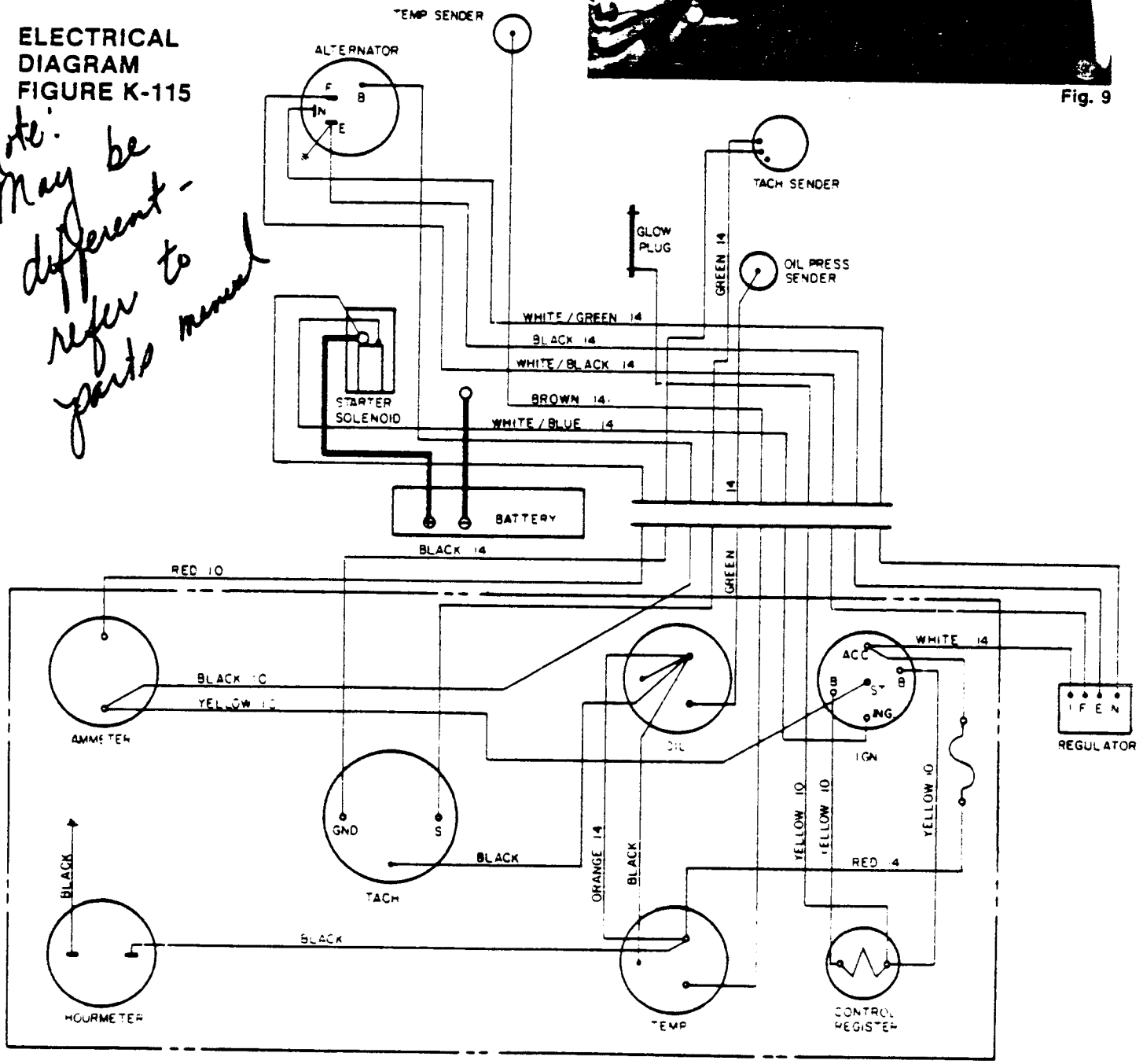


Fig. 9

ELECTRICAL DIAGRAM FIGURE K-115

Note: may be different - refer to parts manual



CAUTION **It is absolutely essential that you disconnect the battery ground strap (wire connecting battery to engine block) prior to servicing any component of the electrical system.**

WARNING **Keep battery away from fires or sparks since the gas produced by the electrolyte when the battery is in charging mode is explosive.**

In removing the battery from the crawler, use lifting straps, or injury may result from a dropped battery.

Battery maintenance. Corrosion around terminal connections must be removed to insure proper conductivity. Failure to do so may result in the engine not starting. After removing the battery cables (always remove the ground terminal first), wash the terminals with solution of baking soda and water.

While cleaning, plugs must be tightly closed otherwise the solution might enter the cells. After cleaning, wash the battery off with water and wash all surrounding areas to prevent the baking soda from corroding components. Make sure vent holes in plugs are open. Never let the electrolyte level drop so far that the battery plates might be in danger of being outside the electrolyte; this would warp the battery plates and ruin the battery. It is best to fill the battery cells to the bottom of the vent holes.

Never add freezing water to a battery. Do not check specific gravity immediately after adding water.

Maintain specific gravity per the battery manufacturer's instructions. Note that the specific gravity will be different at widely different temperatures.

When operating the crawler tractor in extremely cold weather, maintain the battery fully charged at all times to prevent the water content on the electrolyte from freezing and cracking the battery case.

When reinstalling a battery make sure the terminals are clean and always connect the positive terminal first and the negative (ground) terminal last. Coat battery terminals with grease or petroleum jelly to slow down corrosion.

CAUTION **Do not reverse polarity on the battery or the alternator will be quickly ruined.**

B. Alternator. The voltage regulator is mounted on the instrument panel.

CAUTION **Do not attempt to polarize the alternator or the regulator.**

When working on the alternator or regulator, make sure that the ground strap to the battery is first disconnected.

Do not disconnect or connect wires to the alternator or regulator while the alternator is operating.

When using alternate batteries, make sure the polarity is correct, in effect, that the ground strap is connected to the negative terminal on the battery.

To avoid the possibility of ruining the alternator diodes, do not use a booster battery charger when the battery has a very low charge. If the battery's specific gravity is below 1.150, disconnect the battery cables and charge the battery until a reading of 1.150 or above is registered before using a battery charger as a booster.

C. Starter. Figure 10 shows the location of the starter below the alternator, battery and exhaust manifold. The starter can carry a heavy electrical load for short periods of time only. The longer the time on the load, the longer the cooling period must be.

Fig. 10

CAUTION **Never operate the starter motor for more than 15-20 seconds at a time. Operating starter for 20 seconds requires two to three minutes of cooling. Always wait for the glow plug light to come on before operating the starter.**

Sluggish operation of starter may be due to one of the following causes:

1. Run-down battery,
2. Crank case oil viscosity too high for ambient temperature,
3. Hydrostatic transmission not in neutral,
4. Defective engine causing heavy burden on the starter,
5. Defective starter,
6. Corroded battery terminals resulting in high resistance and low starter voltage,
7. Loose, frayed or corroded battery cables,
8. External, low ambient temperatures resulting in low battery output.

D. Fuses. There is one in-line 20 amp fuse located in the engine compartment behind the instrument panel. The purpose of this fuse is to protect the instruments.

III. Transmission VICKERS ONLY.

The hydrostatic transmission that powers the crawler tractor consists of two propulsion pumps and two propulsion motors. The pumps are shown in Figure 11.

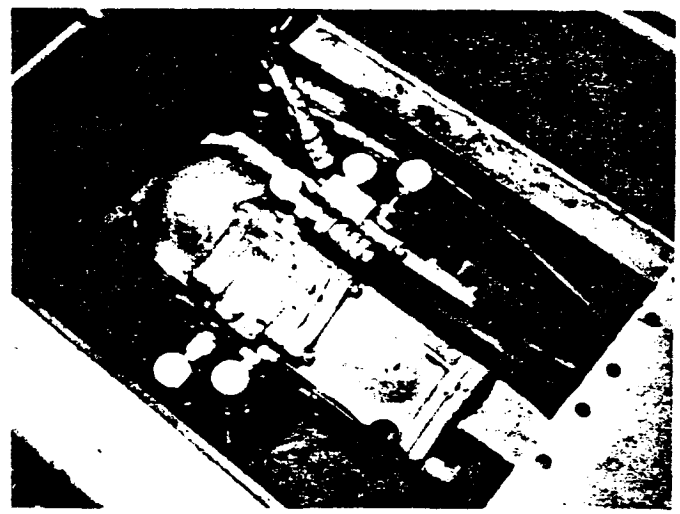


Fig. 11

Both of these components are of the axial piston type.

A hydrostatic transmission uses high pressure fluid (4,000 PSI on this crawler tractor) at a relatively low speed. Because of the high pressure involved it is crucial to keep the fittings and hydraulic connections around pumps and motors completely leak proof.

The transmission pump assembly consists of two axial piston pumps, one for each track of the machine, and in addition, a vane-type replenishing pump. See Figure 12. The purpose of the replenishing pump is to keep the high pressure loop (hoses running between pumps and motors) filled to capacity at all times. The transmission pumps are of the positive displacement type but variable from zero to maximum in both directions. The motors however, even though of positive displacement also, are of the fixed type.

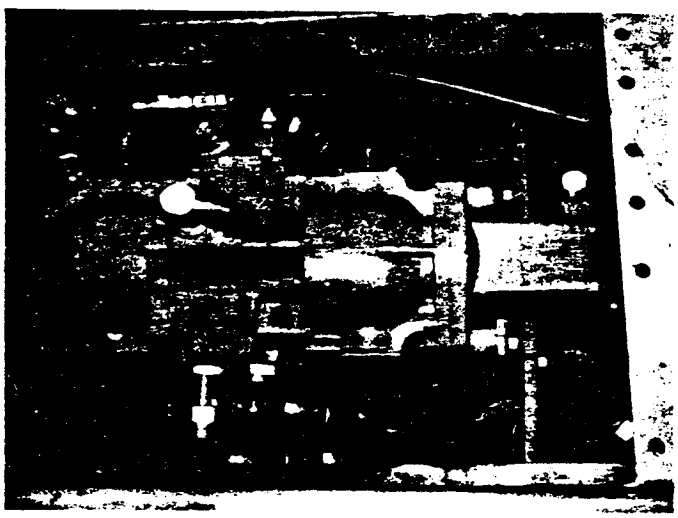


Fig. 12

Under normal operations, when the pump is stroked forward, one side of the high pressure loop between the pump and the motor is under high pressure and the return line is under a very minimal pressure. A shuttle valve in the pump insures that the charge provided by the replenishing pump always charges the loop on the low pressure side of the high pressure loop.

The duty of the replenishing pump is crucial. Failure to charge the high pressure loop invariably results in total destruction of at least one transmission pump and its mating motor.

The replenishing pump circuit has its own relief valve called replenishing relief. Whenever all the internal leaking on the transmission is below the flow rate delivered by the replenishing pump, the excess flow goes over relief and is dumped into the pump case where it contributes to the cooling of the cases.

Because the flow of the replenishing pump goes directly into the high pressure loop, and is therefore pumped by the high precision parts of which transmission pumps and motors are made, it is instrumental in attaining a long transmission life to filter the hydraulic fluid before filling the hydraulic reservoir.

For this purpose, the following guidelines are offered:

1. The filter condition indicator must be respected.
2. Hydraulic fluid introduced into the oil reservoir must be filtered prior to filling.
3. Highest standards of cleanliness must be used around hydraulic connections, fittings and the like.
4. In replacing the hydraulic oil filter the new element must be filled with filtered oil prior to installation.
5. All new hoses, fittings and hydraulic components being installed must be thoroughly cleaned with air immediately prior to installation.
6. No hoses or fittings or hydraulic connections may be kept uncapped at any time. Failure to do so will introduce contamination and possibly cause the hydrostatic components to fail.
7. Hydraulic oil filter must be replaced at recommended intervals. Use original equipment filter elements only. Not doing so may introduce contamination into the system.
8. Observe complete cleanliness during reassembly of disassembled hydraulic components.

If the filter condition warning indicator on the dash shows red during start-up with cold oil, it has no meaning except that the crawler tractor should not be operated until the condition indicator is on green again.

If the condition indicator appears or goes to red during normal temperature operation, it is an indication that the hydraulic oil filter should be changed immediately.

During cold weather operation it may take additional engine warm-up time before the hydraulic oil filter condition indicator goes to green.

A. Transmission overheating.

The temperature gauge for the hydraulic oil is behind the driver on the left side of the hydraulic oil reservoir. Whenever 190° F. is approached or exceeded the cause for this excess temperature must be researched. At this time crawler operation should be stopped and the oil temperature must be allowed to cool. Before continuing operation the cause of this overheating must be determined.

The following may be reasons for oil temperature exceeding acceptable levels:

1. Excessive turning at full power.
2. Overloading the crawler tractor at low engine RPM.
3. Plugged or contaminated oil cooler fins (clean only after letting cool down).
4. Unduly heavy crawler operation.
5. Low hydraulic oil level in reservoir.
6. Going over high pressure relief. This condition occurs when the machine is stuck, but the operator is trying to force the machine out of this condition by pushing the steering levers into stroke; under these conditions the high pressure relief valve will open, making a very characteristic high-pitched sound.

CAUTION **Do not maintain this condition for any length of time or the transmission will be ruined rapidly.**

NOTE: With the high pressure relief valve open, temperature of the oil increases approximately 2° to 4° F. per second.

CAUTION **Do not attempt, under any circumstances, to repair a downed transmission. Any repair or disassembly of the pumps or motors must be performed by an authorized Gerlinger dealer or the manufacturer's warranty is void.**

B. Bleeding the transmission. The fluid in the high-pressure loop is essentially incompressible, thus the term hydro-

static. When air becomes entrenched in the high-pressure loop it will cause a mushy feeling in the drive, jerks when the steering levers are engaged and an increase in the noise level produced by the transmission.

To bleed the transmission, the main hydraulic circuit must be bled first, then bleed the transmission as follows:

1. Raise the machine until both tracks are off the ground. Block the machine so that it cannot move.
2. Loosen the two elbow fittings on the left hand side of the transmission. (See Figure 13.)
3. Very slowly move the steering levers forward and allow oil to flow from the loosened fittings until the oil flow is free of air. Retighten fittings.

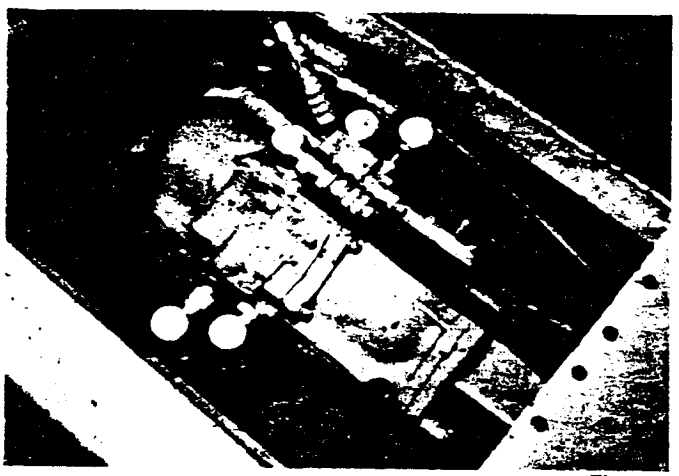


Fig. 13

C. Steering linkage control adjustment. To use the crawler tractor effectively the steering levers must be free of play. Loose steering levers make loader operation difficult and could cause jerky starts.

When excessive looseness is present, adjust the large hex nut (see Figure 14) on the lever pivot until the friction present eliminates the free play. The rods connecting the levers to the transmission should always be adjusted such that when the steering levers are locked in neutral, both propulsion pumps are also in neutral.

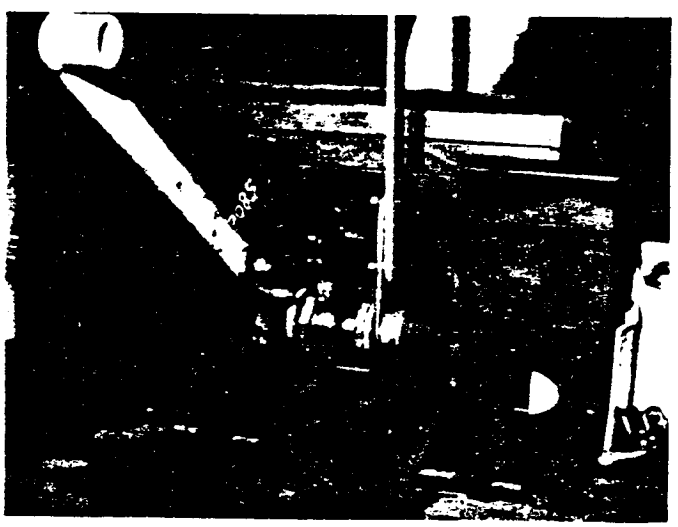


Fig. 14

D. Torque-Hubs. The Torque-Hubs are made from planetary gearing which is assembled in a timed fashion. For this reason, it is necessary to consult a Gerlinger dealer for any repairs. Should disassembly by a third party lead to failure due to mis-timed gearing, the warranty on the Torque-Hubs is void.

Use EP-90 gear lubricant and fill Torque-Hub half full. Change after the first 50 hours of operation and thereon after every 1000 hours. Operation under higher temperatures require more frequent oil changes.

Figure 15 shows the installation of a new Torque-Hub using a sling and crane.

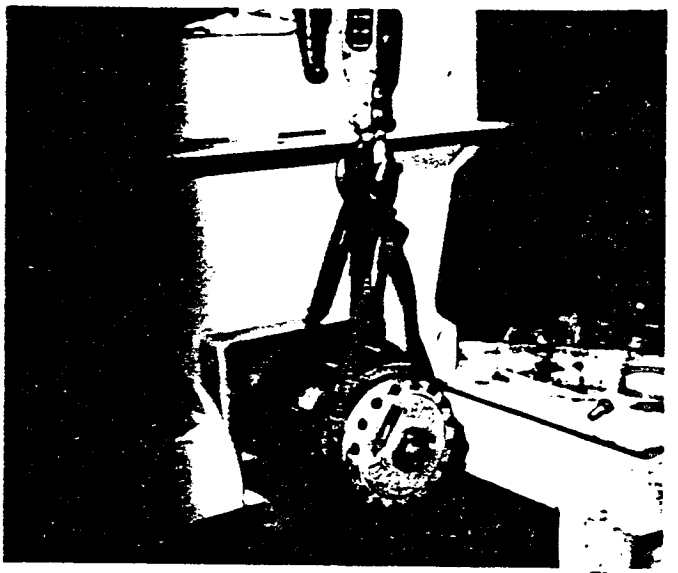


Fig. 15

IV. Hydraulic System

A. Description. The LC-30 crawler hydraulic system is operated by a vane pump located in the rear of the transmission pump assembly as shown in Figure K-114 (see page 15).

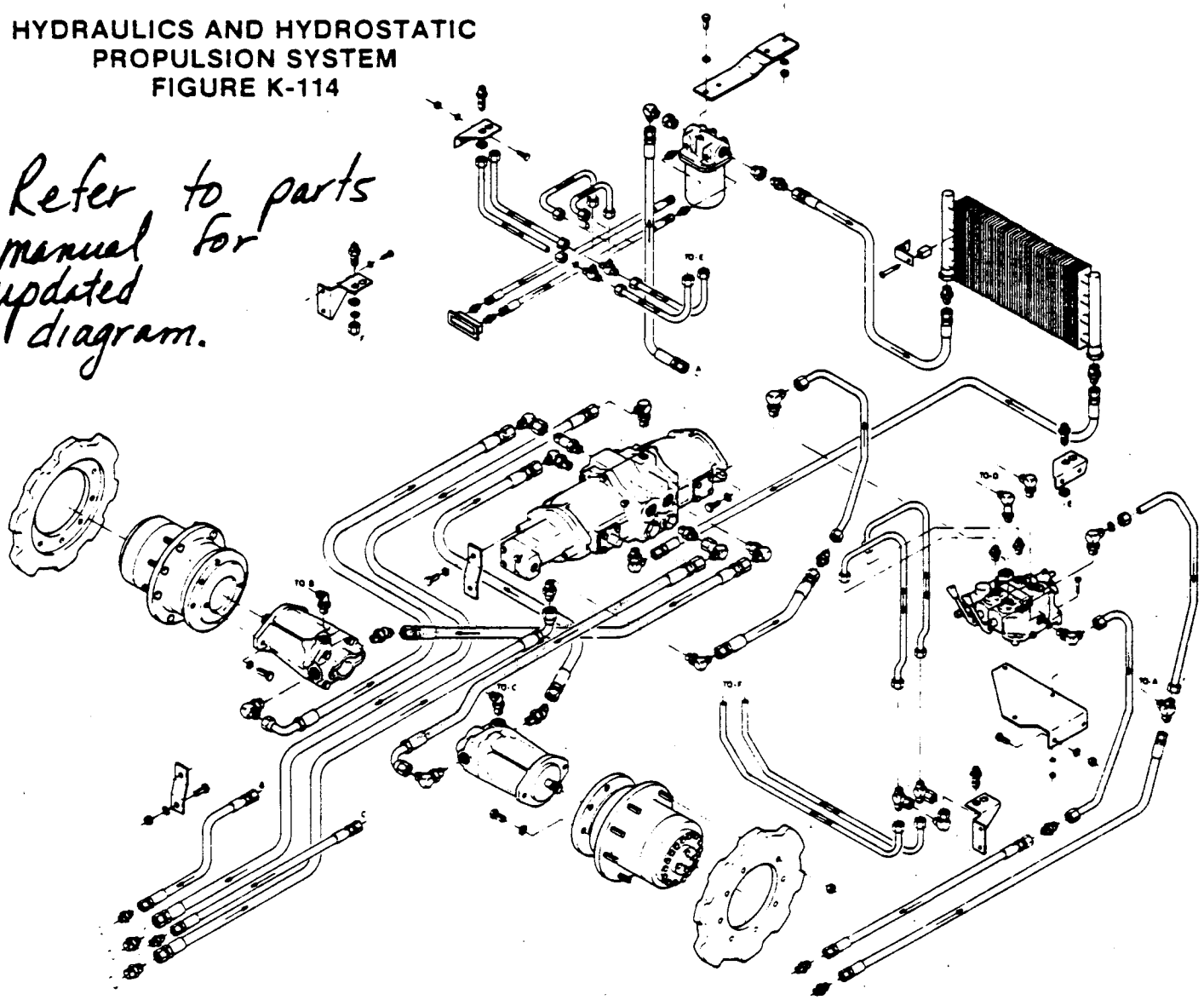
From the vane pump the oil flows to the directional control valve (see Figure 16) from which, by operating the levers, the oil is directed to tilt or lift cylinders. When the directional control valve is not being operated by the driver the oil flows through it towards the ripper attachment, and hence completes the circuit.

Fig. 16

It is for this reason that when removing the ripper attachment, the two loose hoses must always be connected. When disconnecting the ripper attachment, simply disconnect the hoses at the quick connect fittings and then bend the hose attached to the crawler so that it may be connected to the quick connect fitting provided on the

HYDRAULICS AND HYDROSTATIC PROPULSION SYSTEM FIGURE K-114

Refer to parts manual for updated diagram.



crawler chassis. If no quick connect fittings are present, connect the two fittings with a medium pressure hose, as shown in Figure 17. Failure to do so will result in dead-heading the hydraulic system and in definite failure of some hydraulic component.

CAUTION **Do not leave ripper hoses disconnected. Either connect the hoses to the ripper attachment, or if ripper attachment is removed, connect the hose with the quick connect fittings provided.**

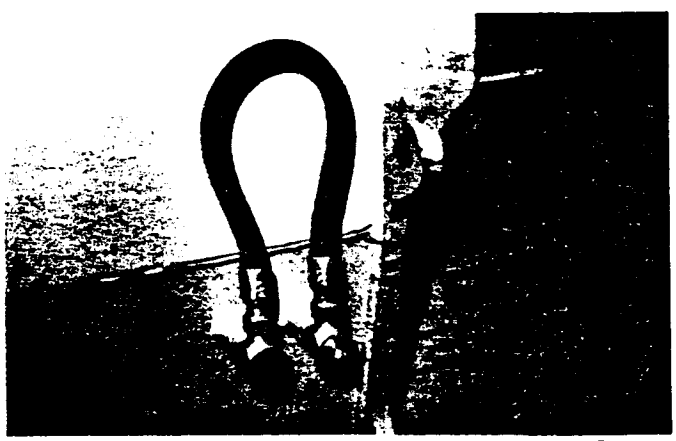


Fig. 17

After flowing through the ripper control valve, the oil goes through the hydraulic oil filter.

It is important to notice that the hydraulic oil in the crawler tractor is not filtered prior to its entering the vane pump; thus, the importance of filling the reservoir only with filtered oil.

Next, the oil goes through the oil cooler and back to the transmission where, after opening the replenishing relief valve, it either goes into the high pressure loop or into the transmission case for cooling purposes.

Finally, the oil is pushed out of the cases by very low case pressure (20-25 PSI max.) and passed back into the reservoir.

As can be seen the hydraulic oil goes through the cooler after it is filtered. Highest degree of cleanliness and care is required in working on any hydraulic components between the filter and the transmission replenishing circuit, including the cooler, since the introduction of any contamination in this section will invariably lead to rapid destruction of the transmission.

B. Hydraulic pump. The hydraulic pump is of the vane type and is behind the transmission. The maximum flow is 14 gallons per minute and the relief valve in the directional control valve is set at 1800 PSI.

CAUTION **Do not attempt to change the relief valve setting.**

C. Hydraulic fluid filter. The LC-30 crawler uses a 200 PSI, one quart, bolt-on 10 micron oil filter.

The hydraulic oil element must be changed after the first 25 hours of operation and then on every 50 hours, except when filter condition indicator goes into red, in which case filter must be changed immediately. Failure to do so greatly increases the danger of introducing contamination into the transmission.

When filter is changed the filter case must be thoroughly cleaned.

D. Hydraulic fluid. The crawler tractor hydraulic system reservoir must be filled and kept filled with an oil that will have the proper physical characteristics required in the hydrostatic transmission. Use only ATF Type F hydraulic oil on the crawler.

On start-up, especially in cold weather, it is important to wait until the filter condition indicator reaches the green section before operating the steering control levers or the directional control valve at all.

The filter condition indicator must go to green within a few seconds after engine start-up. If it does not, indications are that the hydraulic fluid being used cannot pass through the filter. Stop engine immediately and troubleshoot. Note that there is a 25 PSI bypass in the filter head.

E. Hydraulic fluid reservoir. Check for correct fluid level daily, on the level gauge located behind the driver. To add fluid, crawler must be on a level surface and the fluid must be filtered before going into the reservoir.

Clean area surrounding filler cap thoroughly before opening.

Drain the hydraulic fluid reservoir every 1,000 hours of crawler operation. Drain sooner and completely if it is suspected that the hydraulic fluid is contaminated. Drain fluid if there is water in the reservoir; water is more likely when operating in high humidity ambient and can cause damage to the transmission or the hydraulic system components if not removed.

Water is heavier than oil and as a result will come out first when draining the reservoir.

F. Hydraulic leaks. Inspect fittings, cylinders, hose connections, filter and covers daily to prevent small leaks from going unnoticed. These small leaks can drain a large amount of hydraulic fluid in a relatively short time.

Leaky fitting or hose connections can be cured by tightening the connection. Leaks that persist after tightening indicate the need to undo the connections completely and check for specks of dirt before retightening. A damaged connection is also a possibility.

In the case of an O-ring connection, often replacing the O-ring will solve the leak.

G. Hydraulic cylinders. The crawler loader has four cylinders, two for the tilt and two for the lift. (A tilt cylinder can

Fig. 18

be seen in Figure 18.) In addition, crawlers having the ripper attachment also have two ripper cylinders (see Figure 19).

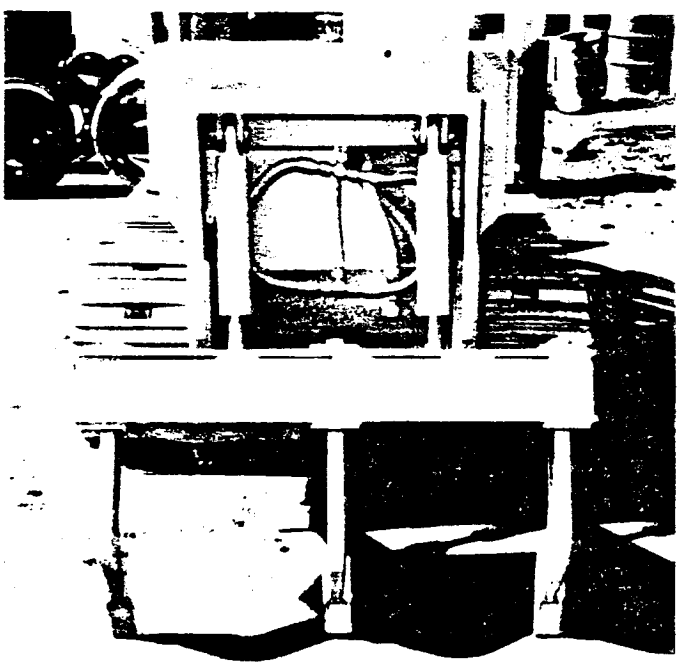


Fig. 19

1. Damaged seals. This is indicated by fluid leaking past the rod or past the head. These leaks should be repaired promptly as otherwise uneven lift or tilt will put undue stresses on the boom. Replacing the seals in the cylinder requires disassembly. A seal kit should always be replaced completely while the cylinder is already disassembled. On assembly, care must be taken not to damage the new seals.

2. Dented cylinder bodies. These may cause piston seal to lock, the result being that one cylinder pushes more than the other creating uneven lift or tilt.

3. Damaged cylinder rods. Nicks in the cylinder rods may be

caused by materials that are handled with the bucket; normally tilt cylinders are much more vulnerable than the lift cylinders. A damaged rod will cut the seal on the cylinder head and cause a leak.

Small nicks can be repaired with very fine carborundum stone. Bigger nicks can only be corrected by exchanging the rod.

Unless the operator of the crawler has special tools, it is best to refer disassembly of a hydraulic cylinder to a Gerlinger dealer.

V. Boom

The boom assembly consists of the boom proper and the level arm. These two are connected by two pairs of leveling links.

There are grease fittings provided at all pin joints on both boom and level arm.

The lubrication chart (K-117) on page 19 shows the location of those grease fittings on the crawler. Grease all the fittings on the boom and lever arm daily or every 10 hours of operation.

V. Track

The track supports the weight of the crawler loader through five track rollers located under the chassis on either side of the machine. (See Figure 20.) Each one of these rollers runs on two tapered roller bearings and is sealed by a triple lip seal for each bearing.

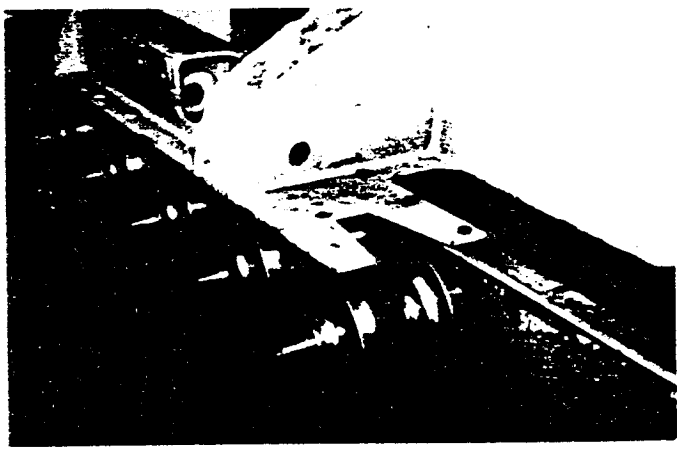


Fig. 20

Lubrication of the track rollers takes place through grease fittings that are located in the track roller shafts. (See Figure 21.)

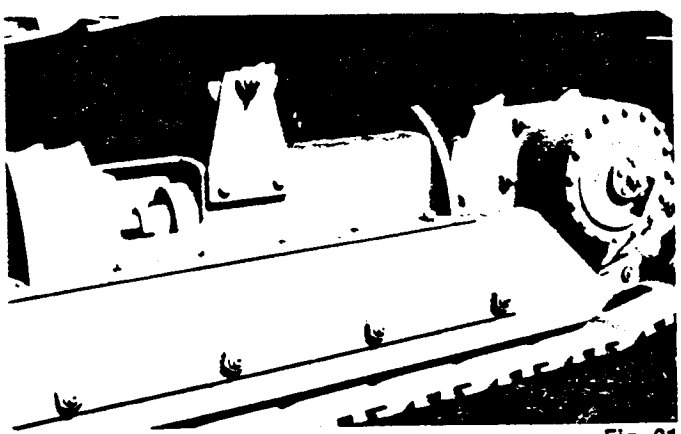


Fig. 21

CAUTION **Excess lubrication or too frequent greasing of the track roller bearings will pop the seals and lead to failure of the bearings through contamination.**

When bearings fail, it is necessary to remove all components on the failed shaft. Figure 22 shows removal of the seal, Figure 23 removal of the shaft, and Figure 24 removal of the bearing races.

Fig. 22

Fig. 23

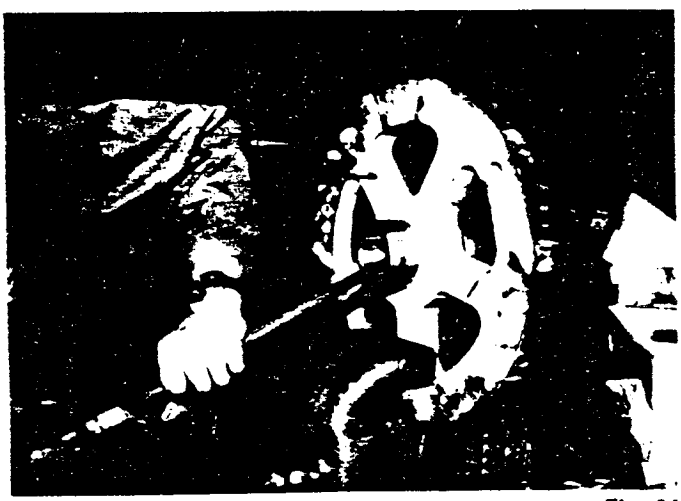


Fig. 24

Lubricate the track roller bearings only every 100 hours and use only the amount needed until increased resistance to the grease gun effort is felt.
Lubrication is strongly recommended to be by hand grease gun so that the increased pressure which might pop the seals will be felt by the hand. Figure 25 shows this process.
Track tensioning must be kept properly to obtain maximum track life.

Fig. 25

The amount of track sag determines the need for track tensioning. This sag should measure about five-eighths to one inch halfway between the track idler roller and the drive sprocket.

To tension the track, loosen the counter nut near the rubber bushing under the track idler roller, see Figure 26. Turn the nut next to the rubber bushing until proper track tension is obtained. Tighten jam nut against nut.

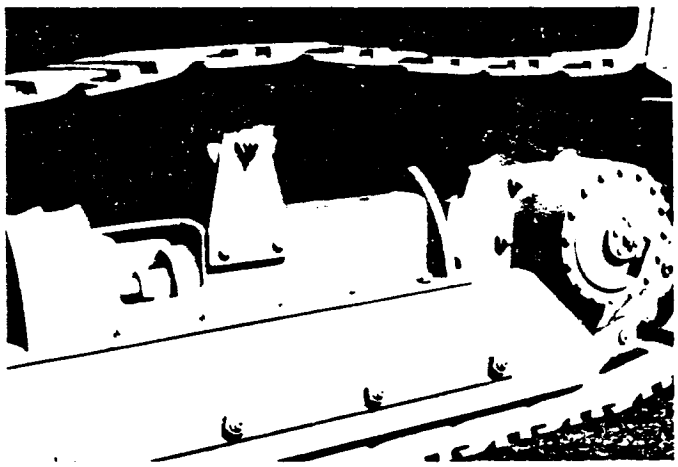


Fig. 26

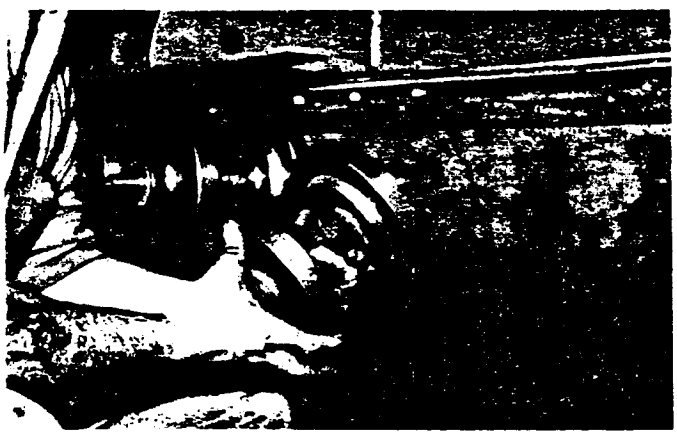


Fig. 27

Figure 27 shows a track support roller being installed. In replacing track support rollers, the entire rock guard must be removed. Figure 28 shows the outer rock guard being replaced. It is not necessary to remove the inner rock guard to replace a track support roller.

The rock guards are designed to support the crawler weight. Therefore, do not cut portions of the rock guards off as this will weaken the structure.

Grouser Tracks (optional) make it much more difficult to slip the tracks. Particular care has to be taken in operating with Grouser tracks not to go over high-pressure relief. See caution notes on page 8.

When operation of the crawler takes place in highly abrasive environment such as sand, drive sprocket and idler wheel may wear out much faster than in normal operation. Operating the crawler with a worn idler wheel will cause excessive track wear. Operating the crawler with a worn-out drive sprocket will cause premature track failure. Track disassembly is performed by finding the

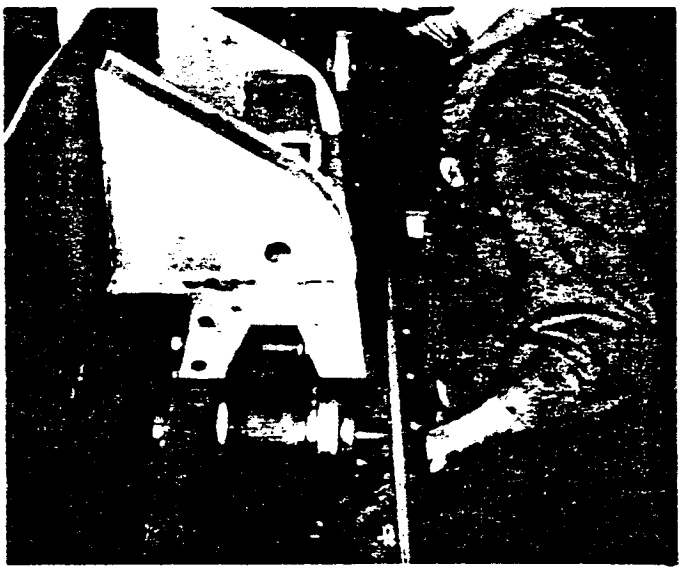


Fig. 28

connecting link pin and removing it. The connecting link pin is a special hardened bolt. Replace only with an original Gerlinger service link pin. The track idler roller is located on top of the rubber bushing, see Figure 29. Lubrication instructions for the idler roller are the same as for the support rollers. No longer bushing

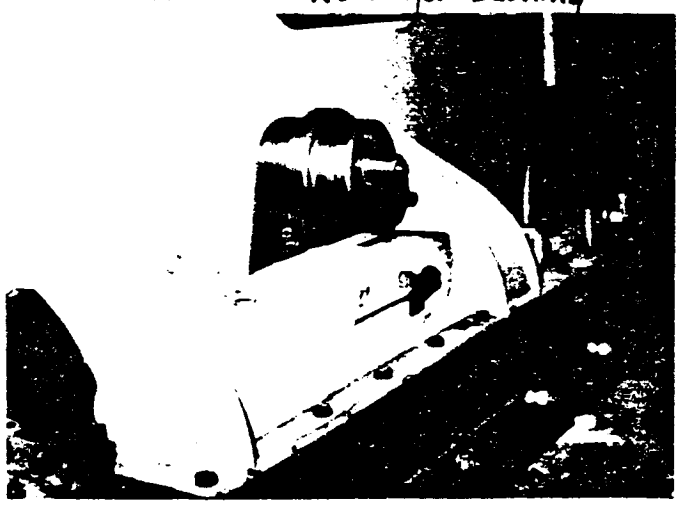
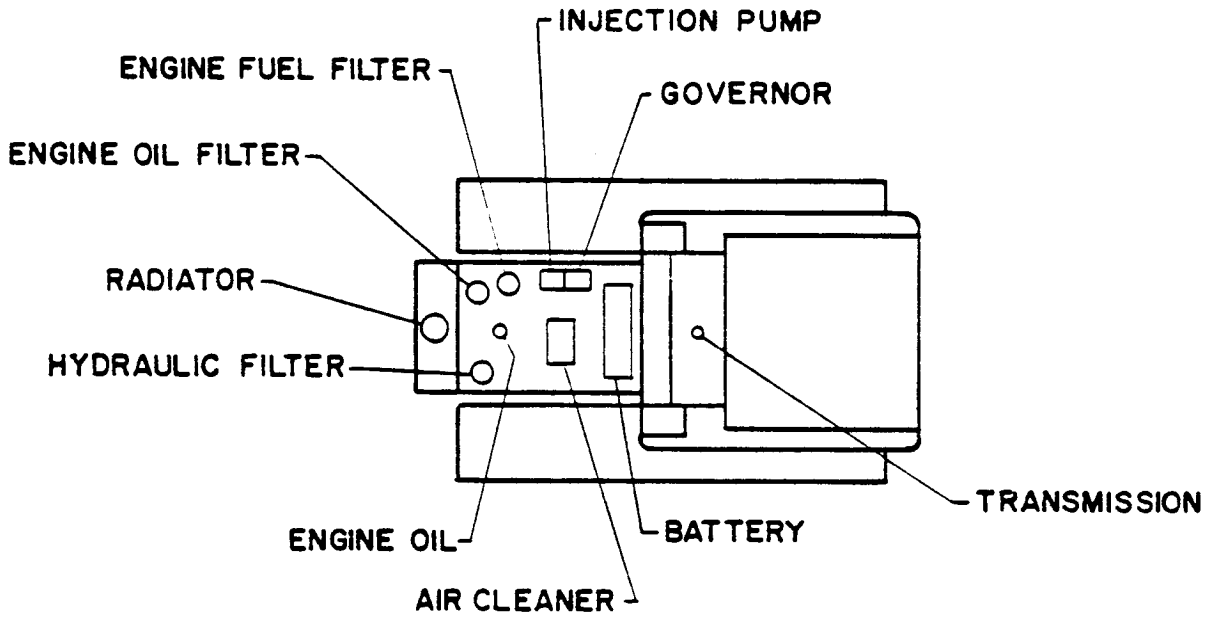


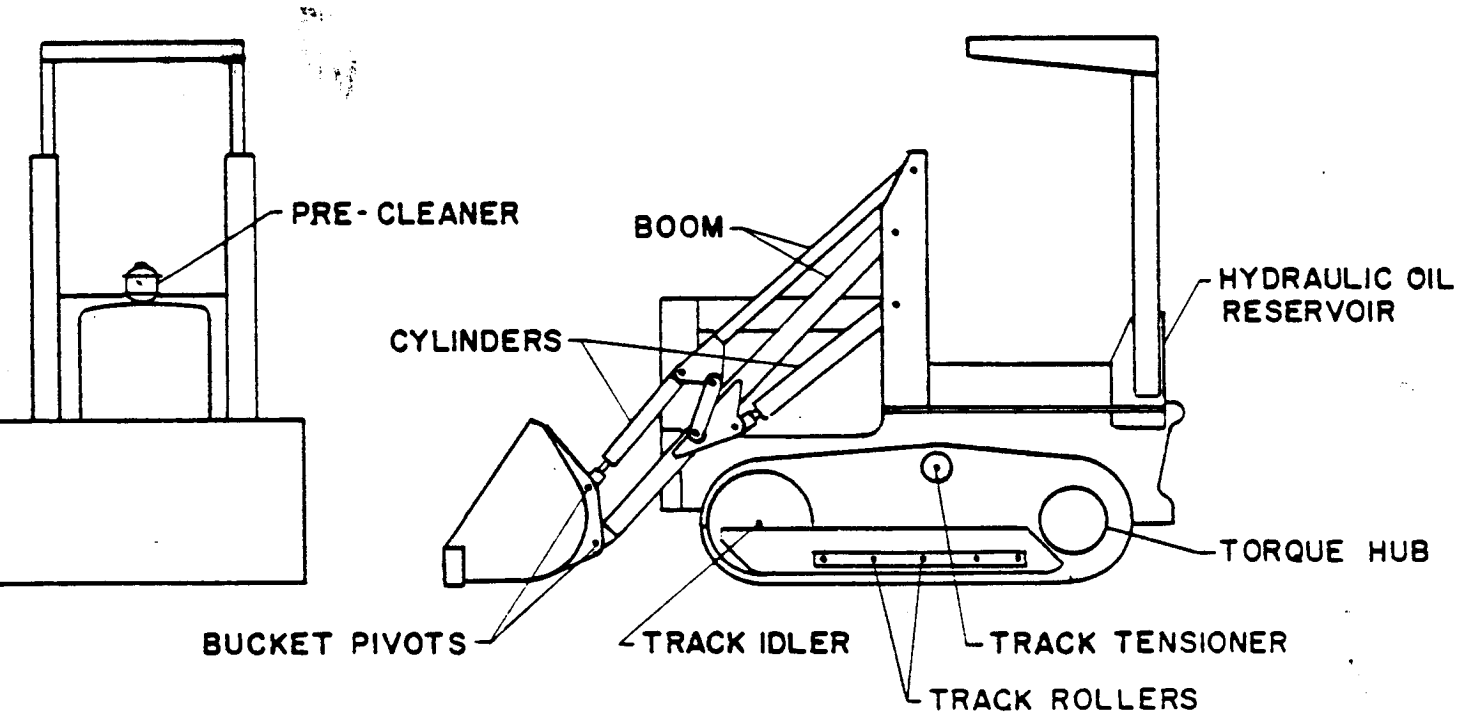
Fig. 29

VII. Periodic Maintenance Chart

Refer to Figure K-117 for location of maintenance.

LUBRICATION CHART
MODEL LC-30
FIGURE K-117





DAILY OR EVERY 12 HOURS

Component	Service Required	Lubrication Required	Quantity-Method	Location
Engine Fuel Filter	Check for sediment.	——	Drain sediment including some fuel.	Right side of engine
	Remove excessive water.	——	Drain water including some fuel.	Right side of engine
Radiator	Check coolant level.	(See page 10 for coolant.)	Fill halfway between core and filler neck.	Behind grill
Air Cleaner Pre-cleaner	Clean dust bowl daily or when power loss is noted, or when engine smokes excessively. Check for leaks daily.	——	See page 10-19.	Above engine
Engine Crankcase Oil	Check oil level.	API service DS or DV grade oil. SAE 10W, below 20°F. SAE 20W/20, between 10° and 50°F. SAE 30, between 32° and 90°F. SAE 40, above 80°F.	3.8 quarts	Dip stick
Transmission Hydraulic Fluid	Check fluid level daily. Add filtered oil only.	ATF Type F Oil	24 gallons	Fluid reservoir behind driver's seat
Hydraulic Filter	In starting a cold engine, if indicator in dash takes excessive time to go to green.	——	Clean case. Replace filter element with OEM element filled with filtered oil.	Above fan shroud
Hydraulic Cylinders	Check for leaks, nicked rods and dented cylinder bodies.	——	Repair or replace.	Lift, Tilt, and Ripper
Hydraulic Connections	Check for leaks.	——	Retighten. If leak persists, disassemble and clean.	——
Track Tension	See page 18. Adjust if sag halfway between drive sprocket and idler roller is not between 5/8" and 1".	——	Adjust with tensioning screw.	Track tensioner
Boom	Lubricate all pivot points	Multi-purpose grease	2 or 3 strokes with grease gun	Boom Pivot Level Arm Pivot
Bucket Pivot Points	Lubricate all pivot points.	Multi-purpose grease	2 or 3 strokes with grease gun	Bucket

EVERY 50 HOURS

Component	Service Required	Lubrication Required	Quantity-Method	Location
Hydraulic Filter	Change element after 25 hours and then every 50 hours.	Clean case thoroughly and fill new element with filter ATF Type F fluid prior to installation.	Replace only with OEM filter element (P/N 585077).	Above fan shroud, left side.

EVERY 100 HOURS

Component	Service Required	Lubrication Required	Quantity-Method	Location
Battery	Check electrolyte level and terminals for corrosion.	See page 11.	Add distilled water to bottom of filler neck. Clean terminals if corroded. Caution, see page 11.	Behind engine

EVERY 200 HOURS

Component	Service Required	Lubrication Required	Quantity-Method	Location
Engine Crankcase Oil Filter	Change filter.	———	Replace only with OEM filter element (P/N R10-1).	Above fan shroud, right side
Steering Levers	Check for excessive free play.	———	Adjust large hex nut until free play is eliminated.	In front of driver's seat
Alternator, Fan Belt	Check tension. ***WARNING*** Engine must be off first.	———	Adjust tension with engine stopped. A firm tug should deflect belt ¾", halfway between pulleys.	Engine Compartment
Engine Fuel Filter	Replace.	———	Use only OEM filter element (P/N 585046-1).	Side of engine
Engine Governor	Drain and refill.	See engine manual.	Fill to full mark.	Engine, right side
Injection Pump	Drain and refill.	See engine manual.	Fill to full mark.	Engine, right side
Air Cleaner Element	Clean or replace if used more than six months (more often if used in a dusty environment).	———	See page 10.	Above engine

DAILY

Component	Service Required	Lubrication Required	Quantity-Method	Location
Track Roller Bearings; Track Idler Bearings; Track Tensioner Bearings	Lubricate per figure K-117.	Multi-purpose grease	Lubricate only until resistance is felt. Do not overgrease (see page 18).	Tracks

EVERY 1000 HOURS

Component	Service Required	Lubrication Required	Quantity-Method	Location
Hydraulic Oil Reservoir	Drain and refill every 1000 hours (more often if water is present). See page 16.	ATF Type F oil.	Drain and refill 24 gallons. Oil must be filtered prior to filling the reservoir.	Behind driver's seat
Cooling System	Drain, flush, and refill.	See page 10.	———	Radiator
Torque Hubs	Drain and refill after 50 hours and thereafter every 1000 hours.	EP-90 gear oil	Refill to the overflow plug level.	Torque hubs
Air Cleaner Element	Replace.	———	See page 10.	Above engine