CLARK®
EQUIPMENT

Ranger

SERIES 660

Record Your Machine Serial Number and Engine Model Specification and Serial Number Here

Machine Serial _____

Engine Model _____

Engine Serial _____

OPERATORS MANUAL

No. 2514

Ranger

CLARK EQUIPMENT

WARRANTY

Clark Equipment Company (CLARK) has warranted to the Distributor (Seller) who, pursuant to agreement with CLARK, hereby, on its own behalf, warrants to the Buyer each new CLARK product to be free from defects in material and workmanship under normal use and maintenance as herein provided.

Distributor's sole obligation under this warranty shall be limited to repairing, replacing or allowing credit for, at Distributor's option, any part which under normal and proper use and maintenance proves defective in material or workmanship within six (6) months after delivery to or one thousand (1000) hours of use by Buyer, whichever shall occur first, provided, however, that (i) the product is placed in use not later than one year after shipment from CLARK'S plant; (ii) that notice of any such defect and satisfactory proof thereof is promptly given by Buyer to Distributor; and (iii) such material shall have been returned to Distributor, with transportation charges prepaid and found by Distributor to have been defective.

This warranty does not apply in respect of damage to or defects in any product caused by overloading or other misuse, neglect or accident, nor does this warranty apply to any product which has been repaired or altered in any way which, in the sole judgment of Distributor, affects the performance, stability or general purpose for which it was manufactured.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES (EXCEPT OF TITLE), EXPRESSED OR IMPLIED, AND THERE ARE NO WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL DISTRIBUTOR BE LIABLE FOR CONSEQUENTIAL OR SPECIAL DAMAGES.

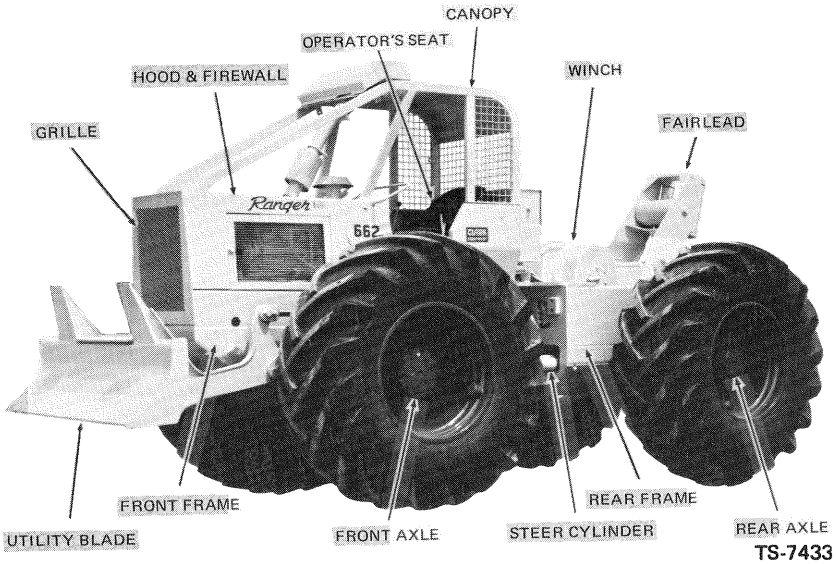
This warranty does not apply to parts of trade accessories not manufactured by CLARK, or attachments not manufactured or sold by CLARK, Buyer shall rely solely on the existing warranties, if any, of the respective manufacturers thereof.

IMPROVEMENTS

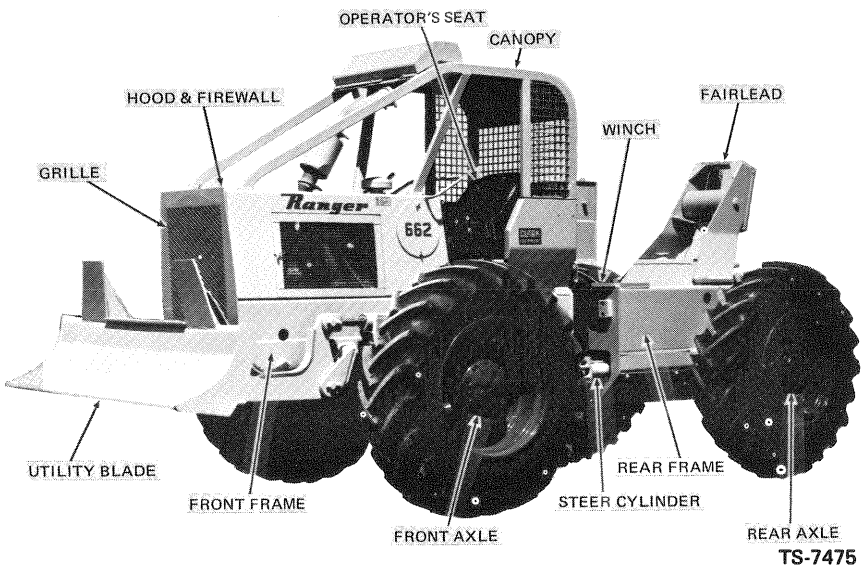
It is CLARK'S policy to constantly strive to improve its products. The right therefore is reserved to make changes in design and improvements whenever it is believed the efficiency of the product will be improved thereby, but without incurring any obligation to incorporate such improvements in any product which has been shipped or is in service.

Rev. May 1, 1966

NOTES



RANGER MODEL 662 GM POWERED



RANGER MODEL 662 FORD POWERED

CLARK EQUIPMENT

Ranger

INDEX

TO OWNERS

The purpose of the manual is to serve as a guide to the proper operation, lubrication and minor adjustment of the RANGER. Study this manual carefully before starting or operating the machine for the first time. Become familiar with all the controls and procedures, and keep the manual on the machine for handy reference.

You have purchased this RANGER with the expectation that it would give you long and faithful service. In its construction we have taken every precaution to see that you get an efficient, long lived, satisfactory machine. It is our sincere hope that you derive from its operation the full measure of value and utility which you looked forward to when purchasing it.

Whenever repair or replacement of component parts is required, only Clark-approved parts as listed in the applicable parts manual should be used. Use of "will-fit" or non-approved parts may endanger the proper operation and performance of the equipment. The Clark Equipment Company does not warrant repair or replacement parts, nor failures resulting from the use thereof, which are not supplied by or approved by the Clark Equipment Company.

GENERAL DESCRIPTION

Clark machines are constructed for rugged, heavy duty industrial and commercial applications. They are specifically engineered for maximum ease of operation to move the greatest amount of material in the shortest possible time.

Power comes from the engine through a Clark torque converter having a 3 — 1 torque multiplication factor, to a power shifted, full reversing type transmission, to the axle assemblies. Universal slip joint drive shaft assemblies are used between the power transfer units.

The axle assemblies are Clark all wheel drive, full floating, spiral bevel ring gear and pinion, with further reduction provided by planetary gear sets within the wheel hubs.

The Ranger has an articulated type frame which provides the steering of the machine. The steering is accomplished by the actuation of one 3 1/2" diameter hydraulic cylinder.

An internal, multiple-disc, oil cooled brake completely enclosed in the transmission, provides four wheel braking of the machine.

Fig. 1-1 Machine Serial Number Plate

For more complete specifications, refer to the Specifications on page of this manual.

MACHINE SERIAL NUMBER PLATE

The machine serial number plate is mounted on the right hand side of the seat support below the operator's seat. This plate gives the model number and serial number of the machine. Fig. 1-1.

The serial number of the machine is also stamped in half inch numerals on the right hand side at the front of the rear frame.

IMPORTANT: ALWAYS GIVE THE SERIAL NUMBER OF THE MACHINE WHEN ORDERING PARTS.

TRANSMISSION AND TORQUE CONVERTER SERIAL NUMBER PLATE.

The transmission serial number plate is located on the right hand side at the rear of the transmission. The torque converter serial number plate is centrally located at the top side of the converter.

Both plates are identical except for the model number and serial number stamped on each plate to correctly identify the units. The plate is shown in Fig. 1-2.

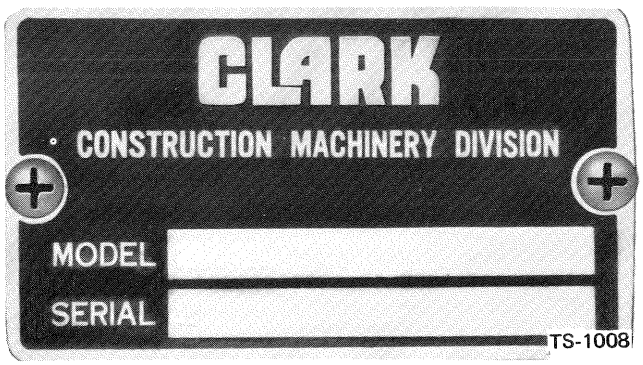


Fig. 1-2 Transmission or Torque Converter Serial Number Plate

PREPARATION FOR OPERATION

It is essential that the following points be checked with the machine in a level position before operating the machine.

Refer to the lubrication charts to locate the items referred to below.

1. Check the entire machine for damages in transit or storage.

2. Check the oil levels on the following to the specifications given in this manual.

   a. Engine crankcase.

   b. Transmission case (with the engine idling).

   c. Front drive axle differential.

   d. Front axle planetary hubs.

   e. Rear drive axle differential.

   f. Rear axle planetary hubs.

   g. Hydraulic system reservoir.

   h. Winch.

   i. Brake master cylinder.

   j. Winch control units.

3. Check the cooling system to make sure that the radiator is filled and that the radiator drain cock and the engine block drain cock are closed. When there is a danger of water freezing in the cooling system, use a permanent type of anti-freeze according to the manufacturer's instructions. For further information, please refer to the operation and maintenance manual of the engine manufacturer.

4. Check that the battery plates are covered with water. Add only clean distilled water.

5. Check the fuel level in the fuel tank. Handle the fuel in clean containers. Use the type of diesel fuel oil specified by the engine manufacturer.

6. Check that all the drain plugs, drain cocks, filler openings, fuel lines, hydraulic lines, cooling system and the air cleaner connections are tight, and do not leak.

7. Check the tire pressures. See the specifications section for the proper air pressure. Be sure that the valve caps are in place to prevent dirt, moisture and foreign material from damaging the valve core.

8. Grease all the lubrication points of the entire unit. Refer to the lubrication chart as a guide for the location, type and quantity of lubricant.

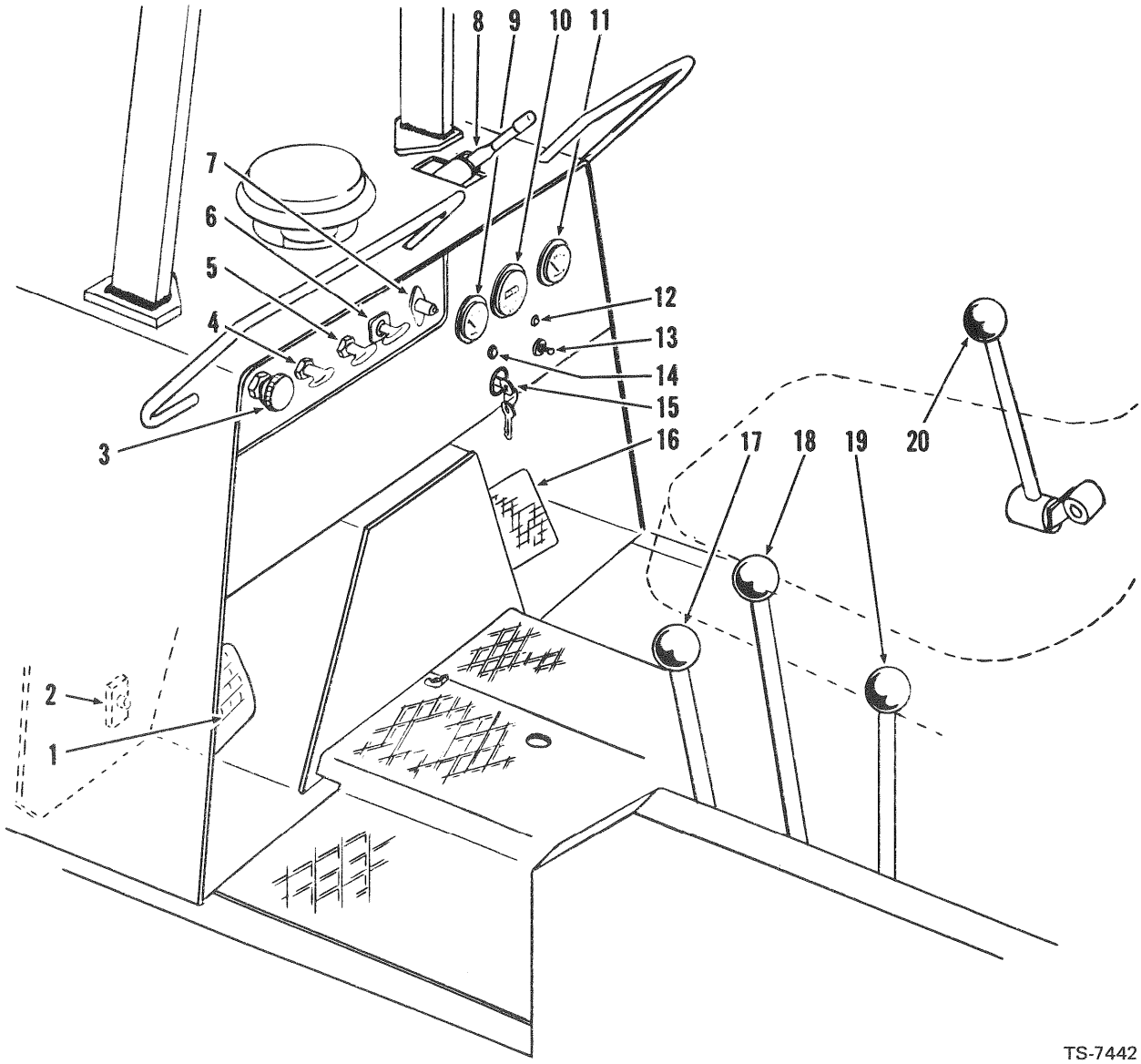


Fig. 2 - 1 OPERATING CONTROLS

1. Brake pedal
2. Battery disconnect switch
3. Ether starting kit control
4. Standard engine stop
5. Hand throttle
6. Emergency engine stop
7. Air cleaner service indicator
8. Parking brake lever
9. Oil temperature gauge
10. Hourmeter
11. Water temperature gauge
12. Engine oil pressure warning light
13. Light toggle switch
14. Ammeter
15. Ignition switch
16. Accelerator pedal
17. Forward and reverse control lever
18. Speed range control lever
19. Winch control lever
20. Steering and blade control lever

OPERATING CONTROLS

1. **Brake Pedal** — is located on the left side of the cockpit. Application of the brake will provide braking to the drive line.

2. **Circuit Braker Reset Button** — is located inside the operator's compartment behind the brake pedal, mounted on the firewall. It is used to protect the electrical wiring and components, by interrupting short circuits or overloads. Its operation is similar to that of a fuse, except the circuit breaker can be reset and used repeatedly. If there is a short circuit or an electrical component malfunctioning causing an overload, the circuit breaker reset button will spring out cutting off the electrical power to the starter solenoid. When this occurs, wait until the system has cooled down then reset the circuit breaker button by pushing the button in. If the reset button springs out again after starting the machine, further trouble shooting of the electrical system will be required to determine the cause of failure.

3. **Ether Starting Kit Control (Optional)** — is used in cold weather operations when difficulty in normal starting is encountered. To operate, pull out the control and push back to its closed position. This operation will disperse vaporized ether into the engine air intake manifold.

4. **Standard Engine Stop** — should be used to stop the engine in normal circumstances. To stop the engine, pull the stop handle out and hold until the engine has stopped. Then push the handle in and return the ignition switch to the "OFF" position. Before restarting the engine, always make sure the engine stop handle has been pushed completely in.

5. **Hand Throttle (Optional)** — is located to the right of the standard engine stop control. Pull out to over-ride the accelerator pedal. When the desired engine speed is reached, pull out the hand throttle control and turn it one-quarter turn clockwise to lock the engine speed at the desired setting. To return the engine speed to idle, turn the hand throttle control one-quarter turn counter-clockwise and push to its closed position.

6. **Emergency Engine Stop** — (GM ONLY) is only to be used in case of an emergency. Misuse of this control may result in damage to the engine.

7. **Air Cleaner Service Indicator** — indicates when to service the air cleaner element.

8. **Parking Brake Lever** — To set the brake pull up and back on the lever. This applies the brake located on the back of the transmission. To release the brake push the lever forward and down.

9. **Oil Temperature Gauge** — indicates the temperature of the oil in the torque converter — transmission. When the temperature approaches 250° F shift to a lower operating range.

10. **Hourmeter** — shows the number of hours the engine has run.

11. **Water Temperature Gauge** — indicates the engine water temperature. Under normal operating conditions the gauge should register between 170° F and 185° F.

12. **Engine Oil Pressure Warning Light** — indicates the oil pressure in the engine lubricating system. Under normal operation at idle and governed rpm, the warning light will not light. This indicates the oil pressure is sufficient in the lubrication system. If an abnormal operation of the lubrication system occurs the warning light will light. If this condition exists shut down the engine immediately and determine the cause.

13. **Light Toggle Switch** — is located below the oil pressure light on the firewall assembly. Lift up the switch to operate the head and tail lights.

14. **Electrical System Warning Light** — indicates current flow to and from the battery. Under normal operating conditions the light should not be lit. This indicates a charge condition. If the light should come on during operation of the machine it indicates a discharge condition. If this condition continues trouble shoot your electrical system checking wiring harness, batteries, alternator and voltage regulator.

15. **Ignition Switch** — is located on the right hand side of the firewall assembly. The switch has two positions. The first position will energize the electrical circuit, the second position will energize the starting motor.
    Do not crank the engine for more than 30 seconds to avoid damage to the starting motor.

Pause a few minutes between each cranking if hard starting is encountered.

16. **Accelerator Pedal** — this pedal will control the engine speed.

17. **Forward and Reverse Control Lever** — Provides three positions, Forward, Neutral and Reverse to control the direction of the machine travel. Pushing the lever forward permits the machine to travel forward. Pulling the lever backwards permits the machine to travel backwards.

    Caution: *Do not use the engine as a down-hill brake by operating the vehicle with transmission in reverse.*

    When the down-hill speed critically over-runs the torque converter input speed, the converter changes from a maximum 3:1 ratio to a 1:1 ratio and causes the engine to stall. No operator can determine when this occurs.

    CLARK SHALL NOT BE LIABLE FOR ANY CONTINGENT OR SPECIAL DAMAGES OR LIABILITIES, OR ANY FAILURES IN, OR DAMAGE TO, OR DEFECTS IN ANY PRODUCTS, ARISING OUT OF THE USE OF THE ENGINE AS A DOWN-HILL BRAKE.

18. **Speed Range Control Lever** — provides position, low gear, second gear and high to control the travel speed of the machine. Pulling back on the control handle engages low gear. Pushing forward from low gear engages second and high gear.

19. **Winch Control** — has three positions. Handle down is the "Free Spooling" position necessary for paying out the main line. Handle in neutral is "Skidding" position; handle up is the "Winching In" position.

20. **Steering and Blade Control Lever** — controls the turning of the machine to the left and right and controls the up and down movement of the utility blade. Tilting the lever to the right will steer the machine right, tilting the lever to the left will steer the machine left. Pulling back on the lever will raise the blade, pushing the lever forward will lower the blade.

    The steering valve incorporates "fine metering" for sensitive steering control during the first one inch of lever travel in either direction. Full lever travel will provide full pump delivery for fast turning. By letting the control lever return to neutral from any position, any desired position of the steering and blade will be maintained.

INTENTIONALLY BLANK

OPERATING INSTRUCTIONS

After the machine has been properly checked, and the operator has familiarized himself with the location and function of the various controls, the machine should be operated according to the instructions in the following paragraphs.

SAFETY PRECAUTIONS

A careful and efficient operator of equipment of this nature must be guided by simple and fundamental rules of safety. He must take the necessary precautions to insure the safety of others as well as himself, and must avoid careless operating habits which cause damaging accidents to the machinery and equipment.

The use of this machine is subject to certain hazards that cannot be met by mechanical means, but only by the exercise of intelligence, care, and common sense.

The following are a few of the primary sources of injury to operators and other workmen.

1. Repairing and servicing the equipment in dangerous positions.
2. Striking other persons or vehicles with the machine.
3. Unexpected violent tipping of the equipment.
4. Unexpected violent shocks or jars to the machine.
5. Uncontrolled traffic involving other vehicles.
6. Hazards from limbs of trees or overhead obstructions.
7. Leaving equipment in dangerous positions, unattended.

In order to help prevent accidents the following safety rules should be observed at all times.

Do Not Park the Machine Unattended — Do not park the machine unattended with the engine running. Always place the control levers in neutral, lower the blade, apply the parking brake and shut down the engine before leaving the operator's seat.

Never park the Machine With the Blade Raised — Never park the machine without first lowering the blade so that it rests on the ground. Make sure all the control levers are in the neutral position and the engine shut down.

Avoid Greasy Hands and Floors — Keep hands, floor and controls free from water, grease and mud to insure non-slip control.

Never Get On or Off A Machine in Motion — Never get on or off a machine that is in motion. Positively in no case should anyone ride on the blade, or on the outside of the machine.

Stop the Machine to Lubricate or Adjust — Stop all operation and shut down the engine when cleaning, adjusting or lubricating the machine. Tie a red WARNING tag on the steering control lever and remove the key from the ignition switch.

Always Apply the Parking Brake to Hold the Machine When Parked — Set the parking brake lever when parking the machine. If on a grade, block the wheels.

Maintain the Correct Tire Inflation — Check the tire inflation pressure daily to provide the best operation and the longest tire life. Particular attention must be emphasized when checking hydro-inflated tires as there is less volume of air to provide cushioning.

Select the Correct Speed Range — Operate the machine at speeds consistent with the conditions on the particular job. Extra caution should be used if wet or icy conditions exist.

Do Not Use the Blade as a Brake — When going down a steep slope, do not use the blade as a brake.

CAUTION: *Do not use the engine as a downhill brake by operating the vehicle with the transmission in reverse.*

Check Before Moving the Machine — Walk around the machine to make certain that no one is in the "danger area" before entering the operator's compartment.

Do Not Operate the Machine Without Instruments — Each gauge on the instrument panel serves as an important check point for operating conditions of the machine. Do not operate the machine if the gauges and warning lights are not functioning properly.

Be Courteous — Always give loaded equipment the right of way.

PRE-STARTING CHECKS

Before starting the engine at the beginning of the work shift, or any time the machine has been shut down for adjustment or time-off period, perform the following checks:

1. Engine oil level.
2. Engine air cleaner.
3. Hydraulic system oil level.
4. Cooling system.
5. Fuel supply.
6. Transmission fluid level.
7. Tire pressures.
8. Battery electrolite levels.

Service units at this time if inspection indicates the necessity.

Normal Starting (Above 40° F.)

CAUTION: *Walk around the machine. Make certain that no one is in the "danger area" before entering the operator's compartment.*

1. Set the control lever (forward and reverse control lever) in NEUTRAL.
2. Make sure that the engine stop control is pushed in.
3. Turn the ignation switch to the first position, then turn again to start the engine. Do not crank the starting motor more than 30 seconds at a time to avoid overheating the motor.

CAUTION: *If the engine fails to start, wait until the cranking motor stops rotating before repeating the starting operation. Serious damage may result if this precaution is not followed. If the engine fails to start after four periods of cranking, refer to the operation and maintenance manual of the engine manufacturer.*

4. After the engine starts, the oil pressure light should be out. If it remains on for over 15 seconds, shut off the engine and determine the cause.
5. Allow the engine to reach operating temperature before driving or operating the machine.

Cold Weather Starting

The Ranger does not require extensive preparation for cold weather operation beyond the addition of a permanent type anti-freeze to the cooling system. The batteries must be kept fully charged at all times, since in cold weather the capacity of a battery to deliver full power is greatly reduced. A fully charged battery at 15° F. is capable of delivering only 70% of its rated amperage, and at lower temperatures becomes even more inefficient. Service the batteries weekly as follows:

1. Add distilled water to cover the plates but do not overfill. Overfilling causes dilution of the electrolyte, and sputtering during the charging cycle. This may result in the battery freezing and terminals corroding.
2. Keep the terminals clean and the connections tight. Dirty or loose connections offer high resistance.
3. Keep the vent plugs in place, and tight, to prevent the entrance of foreign material into cells.
4. Check the specific gravity regularly with a hydrometer, and recharge or replace batteries that continually show a low reading.

Service the other electrical components as follows:

1. Visually check all the wiring for worn or cracked insulation and loose terminal connections.
2. Clean the connections of the cranking motor, alternator, voltage regulator, solenoid switch, relays and sender units.
3. Clean and tighten the external ground straps and replace if badly frayed or corroded.

To avoid unnecessary cranking because of air locks in cold fuel oil, change the fuel filters only when the engine is hot; then start and run the engine after the filter change, and check that there is no fuel restriction nor leakage.

When not in use, the machine should be parked or stored in a closed garage or building during cold weather to reduce the cranking effort when starting a cold engine. It is particularly important in

starting the engine, that it is not accelerated to the governed speed, or a load applied until the oil has become warm enough to circulate to all bearing surfaces.

G.M. Diesel (Below 40° F.)

G.M. Diesels are not equipped with cold weather starting aids. However, an ether dispenser kit can be obtained from either your Clark distributor or any authorized G.M. Diesel distributor.

1. Set the control lever in NEUTRAL position and turn the ignition switch ON.
2. Depress the accelerator to the full throttle position.
3. Turn the ignition key starter switch and simultaneously direct the starting fluid into the air cleaner intake.

Do not operate the cranking motor for more than 30 seconds at a time to avoid overheating the motor.

CAUTION: *If the engine fails to start, wait until the cranking motor stops rotating before repeating the starting operation. Serious damage may result if this precaution is not followed. If the engine fails to start after four periods of cranking, refer to the operation and maintenance manual of the engine manufacturer.*

4. After the engine starts, the oil pressure light should be out. If it remains on for over 15 seconds, shut off the engine and determine the cause.
4. Allow the engine to reach operating temperature before driving or operating the machine.

Warm-Up Checks

Hold the engine at idle speed for approximately two minutes after starting; then while the engine continues to warm up for the next few minutes, perform the following checks:

1. Engine warning lights.
2. Transmission fluid level (with the engine idling).
3. Electrical system warning light.
4. Engine temperature gauge.
5. Fuel level.
6. Torque converter temperature gauge.
7. Water temperature gauge.
8. Hydraulic oil level.

Visually check for leaks at the drain and fill plugs in the axle assemblies, torque converter, transmission and winch and at all hose couplings and fittings in the hydraulic, fuel, air intake, brake and cooling systems. Correct all leaking conditions, and repair or replace the gauges that are not functioning before continuing the operation of the machine.

SHUTTING DOWN THE ENGINE

It is important to idle the engine 3 to 5 minutes before shutting it down. This will allow the lubricating oil and water to carry heat away from the combustion chambers, cylinder head, bearings, and shafts.

Residual heat can damage many parts, ranging from valves to fuel pumps. The latter suffer from gums and deposits remaining after vaporization of the lighter ends. In addition, the physical stresses from expansion and contraction can cause distortion, permanent warping, and gasket failures. In some cases, the oil seals and the cylinder sleeve seals suffer badly, although the results may not appear until much later.

IT IS GOOD PRACTICE TO IDLE ANY ENGINE LONG ENOUGH TO REDUCE EXTREME TEMPERATURES.

G.M. and Ford Diesel.

To shut down a G.M. and Ford Diesel, turn the ignition switch off; then pull the standard engine stop control, (this operation cuts off the fuel supply). Hold this control out until the engine stops operating. After the engine has stopped, replace the control to its original position.

G.M. Diesel Only.

If after pulling the standard engine stop control, the engine continues to operate, the emergency engine stop must be used.

By pulling the emergency engine stop control, the air supply to the engine is cut off, thus choking and stopping it. (Fig. 3-1 for the position of the emergency engine stop.)

When this operation has been performed, it will be necessary to re-set the butterfly plate located in the engine air intake. To do this, the right hand side panel, (looking from the operator's seat), must be removed, thus exposing the emergency stop cable, lower arm, and latch. After the emergency engine stop control has been used, the latch handle will have rotated in a counter-clockwise direction to the position shown in Fig. 3-1.

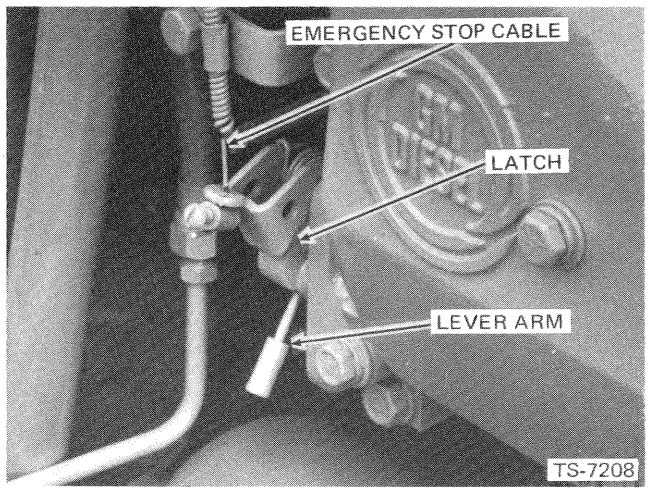


Fig. 3-1 Latch Handle Rotated

To re-set, push the latch handle clock-wise towards the engine thus rotating the latch until the lever arm springs into place on the latch, as shown in Fig. 3-2.

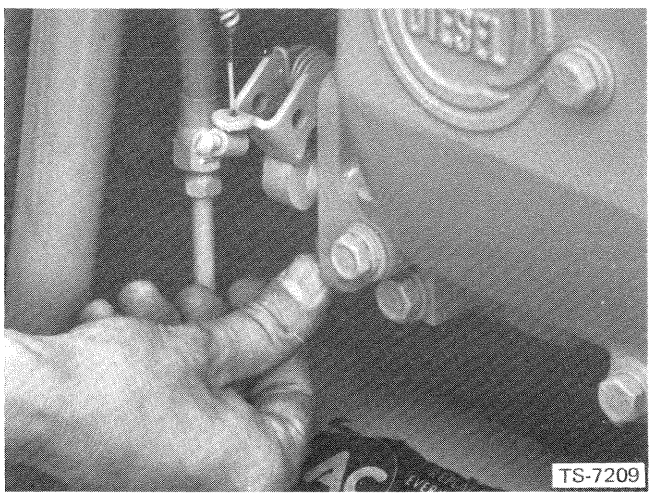


Fig. 3-2 Resetting the Latch Handle

This operation re-opens the butterfly plate, allowing air to pass through to the engine.

OPERATING THE MACHINE

The steps below give the correct procedure for setting the machine in motion:

1. Raise the blade to its maximum height, by pulling backward on the steer and blade control lever.

2. Place the forward and reverse control lever in position for the desired travel direction. When shifting from forward into reverse, or vice-versa, always decrease the engine R.P.M. and stop the machine momentarily while making the shift.

3. Select the speed range for operating the machine. The speed selector lever has three positions, Low, Second and High. Selection of the speed range depends upon the terrain, and load conditions.

4. A shift from one speed range to a higher speed range can be made when the machine is in motion even at full throttle ("POWER SHIFTING"). When making a down shift, decelerate the engine R.P.M. before shifting to a lower speed range.

5. Release the mechanical parking brake by pushing the handle, located on the firewall, forward. This releases the multiple disc brake in the transmission.

TOWING THE MACHINE

If at any time it is necessary to tow the machine any appreciable distance, observe the following precautions:

1. Set all the control levers in neutral.

2. Remove both the propeller shafts from the transmission to the front axle assembly and from the transmission to the pillow block. (Transmission to the optional midmount bearing, machine having optional back-up brake).

IMPORTANT: *Note the correct assembly of the propeller shafts before removing them. Reassemble them in the same position. (The tubular end is always the driving end.) Do not separate the two ends of the assembly due to the wear pattern and balancing characteristics. Wire the spider and bear-*

ing assemblies to the propeller shaft flanges and wrap the assemblies in a lint free cloth.

When the machine is being towed, the torque converter charging pump is not operating. There is a danger of bearing or gear damage in the torque converter and transmission if the propeller shafts are not removed.

When replacing the propeller shafts, use only the special heat treated nuts and bolts provided. Tighten the attaching bolts to torque specified in the bolt torque chart.

INTENTIONALLY BLANK

ENGINE

8 Hour Operations

Engine and Accessories — Refer to the Operation and Maintenance Manual of the engine manufacturer for the lubrication and maintenance instructions of the engine and its accessories.

Radiator — Check daily and refill as required with clean, soft water. See "Every 1,000 Operating Hours" for Drain and Refill of the radiator.

50 Hour Operations

Check the Cooling System for Leaks — Check the radiator, hoses, oil cooler, water pump and drain cocks for leaks and correct where necessary. Loss of coolant due to ruptured hoses, loose clamps, leaking pump or drain cocks can and will result in expensive repairs or replacement of the engine components.

Check the Anti-Freeze Protection — At specified intervals, or whenever anticipating extremely cold weather, use a hydrometer to check the freezing point of the solution (permanent type anti-freeze) when it is at the operating temperature (180° F. to 200° F.) If necessary add additional anti-freeze according to the manufacturer's instructions to maintain a safe level beyond the freezing point.

Tighten the Air Cleaner Connections — Tighten the elbow clamps and air cleaner mounting bracket bolts. Check the elbow between the air cleaner and the engine for cracks or leaks, which will permit dust-laden air to bypass the air cleaner, entering into the engine, causing severe and costly damage to the engine.

Check and Adjust the Belt Tension — Each 50 operating hours, inspect all the drive belts for serviceable condition and the correct tension. Neglect and incorrect tension often leads to inadequate cooling, ball bearing failures, as well as short belt life.

NOTE: *Due to older belts having been stretched, through use, beyond their original length thus causing the newer belts to carry most of the load, it will be necessary to replace all the belts as a matched set when one belt in a set is worn or damaged beyond a serviceable condition.*

Whenever new belts are installed, and at specified intervals, check and re-tension the belts as follows:

1. Measure the span length.
2. At the center of the span, apply a force with a spring scale (at right angles to the span) large enough to deflect the belt 1/64 of an inch per inch of span. Fig. 4-1

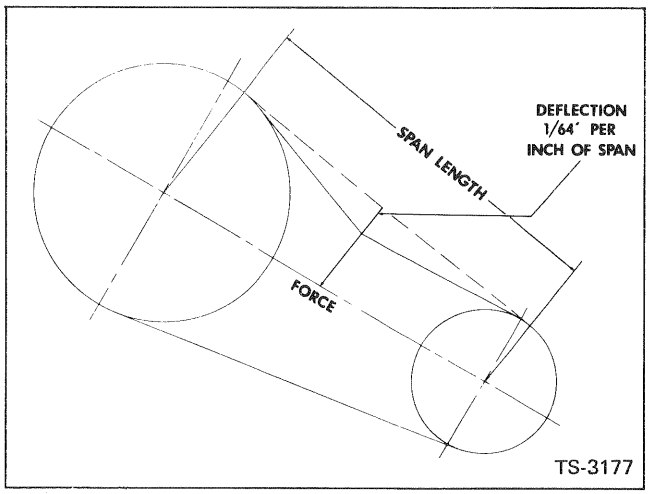


Fig. 4-1 Check Belt Tension

3. For a correct tensioned drive , the force should be within the listed range. New belts should initially be tensioned to the upper limit of the range. All new belts will loosen after operating for a day or two and must be re-checked and re-tensioned (if necessary).

Outside diameter of small sheave	Deflection force
7" to 11"	8 to 12 lbs.
11-1/2" to 16"	10 to 15 lbs.

Periodically belts should be cleaned to remove any grease and glaze, by wiping them with a cloth saturated with brake fluid. This in most instances will eliminate any squeak and will extend the service life of the belts.

100 Hour Operations

Clean and Tighten the Air Cleaner Connections — Tighten all hose clamps and air cleaner mounting parts. Note any sign of damage that might impair the operating efficiency.

The re-usable filter element is very efficient and its service life will be governed by the operating conditions. A service indicator is provided and will

show when the air cleaner element should be serviced.

250 Hour Operations

Check the Engine RPM — The engine speeds should be checked regularly against the specifications to determine the engine efficiency and the machine performance. Correct speeds insure safe operating limits for the engine and maintain correct operating speeds for the torque converter, transmission, and winch.

(a) Low Idle and High Idle RPM — These speeds are the free operating limits of the engine under no load conditions. They are determined by the amount of fuel delivered to the engine. See the Specifications and Service Date in Section 15.

Caution: *Do not accelerate to maximum RPM until the engine is at its operating temperature.*

Check the throttle linkage to ensure a wide open throttle when the accelerator is fully depressed, also a closed throttle when the accelerator is released. The accelerator and linkage should operate freely in all positions.

Occasionally the control rods, control levers or bell cranks loosen or become damaged, impairing the operating efficiency of the engine. Insufficient power is frequently caused by the throttle linkage being out of adjustment.

Fuel controls are accurately calibrated at the factory to insure the correct low idle and high idle speeds.

DO NOT ADJUST THE GOVERNOR ASSEMBLY WITHOUT CONSULTING THE OPERATION AND MAINTENANCE MANUAL OF THE ENGINE MANUFACTURER.

The linkage adjustment for the engine is as follows:

1. Unhook the spring from the accelerator linkage and disconnect the ball joit assembly from the governor throttle control lever. This will enable the governor throttle lever to return to the spring loaded idle position.

2. Depress the accelerator until it contacts the stop in the floorboard.

3. Rotate the governor throttle control lever to the extreme (full throttle) position and adjust the ball joint at the front of the accelerator rod, to obtain a slip fit in the governor throttle lever just before the accelerator bottoms. If a slip fit cannot be obtained, adjust the clevis at the other end of the accelerator rod.

4. Reinstall and secure the clevis to the governor throttle lever and reconnect the accelerator spring.

5. Release and depress the accelerator, and check that the linkage will properly rotate the throttle control lever from the idle to the full throttle position without interference.

The pressure required to depress the accelerator is controlled by a spring attached from the accelerator linkage to the anchor lug. This spring also insures that the engine will return to the idle speed when the accelerator pedal is released.

(b) Stall RPM — The engine and torque converter act as a unit to deliver power to the transmission. A stall check should be performed to insure that the engine is developing the rated power and that the torque converter is operating efficiently.

Caution: *Check the stall RPM only when the torque converter fluid is hot (180° F. to 200° F.), the engine is at the operating temperature and the steering and blade relief valve setting is correct.*

1. Install a tachometer on the engine.

2. Put the machine into a full right turn.

3. Apply the parking brake, block the wheels, and place the directional and speed range levers in NEUTRAL.

4. Start the engine and raise the blade a few inches above the ground.

5. Shift the forward and reverse lever into forward and the speed range control lever into high. Accelerate to maximum RPM. When the engine reads maximum RPM raise the blade to its maximum height and hold the machine in the full turn. When the engine RPM drops to its lowest point read the tachometer.

DO NOT STALL THE CONVERTER MORE THAN 30 SECONDS AT ANY ONE TIME.

If the stall rpm is not within the specifications, trouble shooting of the engine or torque converter by a qualified mechanic is required. See the Specifications and Service Data in Section 15.

NOTE: *The stall RPM specified in Section 15 is applicable to an altitude of 600 ft. and ambient temperature of 70° F. due to the many combinations of altitude and temperature possible in the field. Space does not permit publishing here all the corrections necessary to the stall RPM indicated to accommodate such variation. It is suggested the engine manufacturer's distributor be contacted to determine the correction necessary for the altitude and temperature in your application.*

500 Hour Operations

Clean the Radiator Core — External surfaces of the radiator core must be kept clean, straight and unobstructed to prevent blocking the air flow and causing overheating.

Flying objects such as sand, dust, leaves, twigs, bugs or other debris that plug the core or adhere to water or oil streaks, impair the cooling efficiency.

Use compressed air, steam or a high pressure water stream and remove such objects opposite the air flow through the core assembly. Oil streaks should be removed using a solvent nonharmful to hoses and wiring insulation. Straighten bent fins, being careful not to puncture or enlarge the openings.

Service the Air Cleaner Element — It should be understood that no set rule can be established to service the filter element, because its service life is governed by the operating conditions. The service indicator will show the condition of the element and establish when to service.

To change the element, remove the air cleaner access cover on the side of the firewall assembly. Loosen the clamp assembly on the air cleaner and remove the cup assembly. Unscrew the wing nut in the center of the filter element and remove the element. Fig. 4-2 for G.M. and 4-3 for Ford. Blow out the element with compressed air (pressure should not exceed 100 p.s.i.), to remove dust, blow in the opposite direction of air flow. Wash the element in a non-sudsing detergent and rinse both the inside and outside surfaces of the element until the water is clear.

Clean inside the air cleaner housing, cup assembly and cap removing all dust and foreign material. Inspect the "O" ring making sure that it is not damaged in any way, replace if necessary.

Careful final inspection is recommended for any pin holes, pleat damage or ruptures that may have occurred due to the rough handling.

Re-insert the filter element in the housing and reassemble the cup assembly. Tighten all clamps and check all hoses.

Reset the service indicator.

NOTE: REPLACE THE FILTER ELEMENT AFTER SIX CLEANINGS OR ONE YEAR OF SERVICE — WHICHEVER OCCURS FIRST.

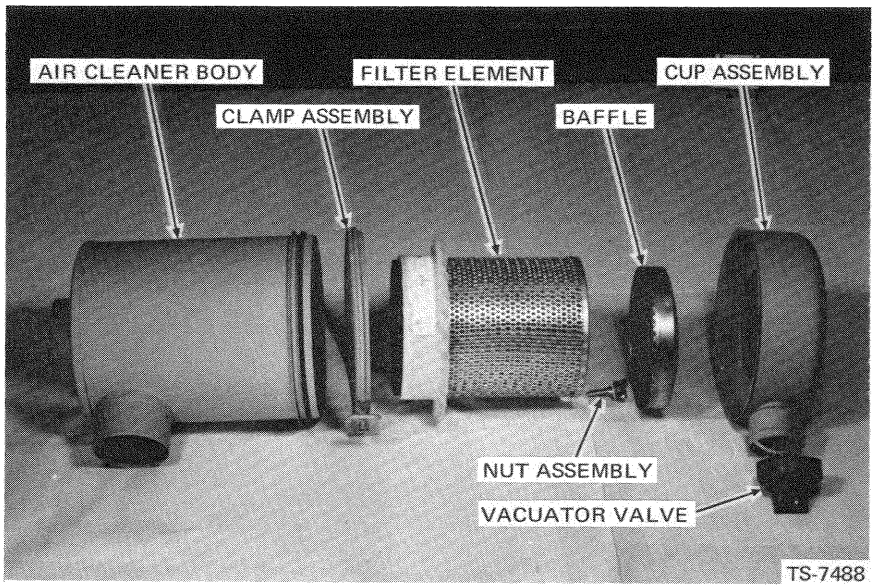


Fig. 4-2 Air Cleaner GM

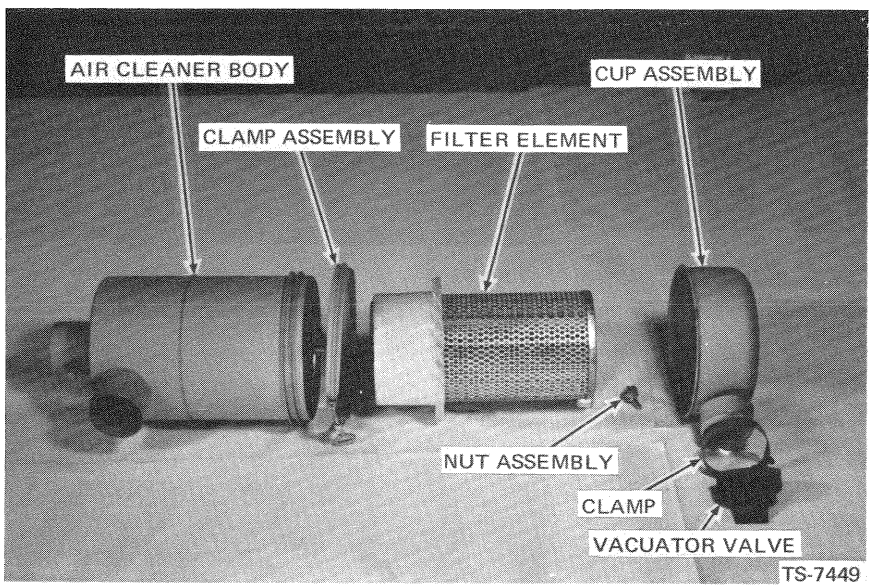


Fig. 4-3 Air Cleaner Ford

TORQUE CONVERTER

8 Hour Operations

Torque Converter — Check the fluid level daily, observing the following conditions:

1. Machine must be LEVEL.
2. Fluid must be HOT (operating temperature of 180° F. to 200° F.)
3. Engine must be IDLING (550 to 600 rpm)
4. Area around the filler opening must be CLEAN.
5. Transmission must be in NEUTRAL.
6. Parking Brake must be engaged.

Check, using the dipstick located to the right behind the operator's seat. Fig. 5-1. Pull out the dipstick and wipe with a clean, lint free cloth. Re-insert to check the fluid level, pushing dipstick down firmly. The fluid level must be at the FULL mark on the dipstick. If the fluid level is below the FULL mark, re-insert the dipstick, making sure that it is clean and free from foreign material, fill if necessary.

Use only the type of fluid specified in this manual. See "250 Hour Operations" for filter change.

50 Hour Operations

Replace the filter element each 250 operating hours. See the section on hydraulics for removal and replacing the filter. (Section 10)

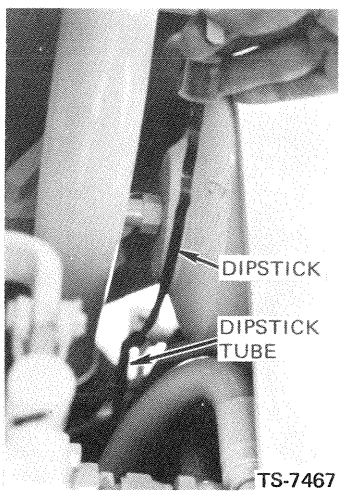


Fig. 5-1 Dipstick – Transmission

100 Hour Operations

———NIL———

250 Hour Operations

Refer to the Hydraulics, Section 10 for drain and refill.

Converter Out Pressure — Periodically or whenever the machine evidences an overheating condition, inspect and check for collapsed or ruptured hoses that might cause overheating. Correct as necessary. If overheating conditions still exist, check the converter OUT pressure to determine whether the oil cooler at the bottom of the radiator has or is becoming plugged with foreign material.

The pressure check must be made with the fluid hot (180° F. to 200° F.) using an accurate gauge at 2,000 rpm.

1. Install a tachometer on the engine.
2. Install a gauge at the converter OUT pressure port located below the sender unit on the rear of the converter. Fig. 5-2

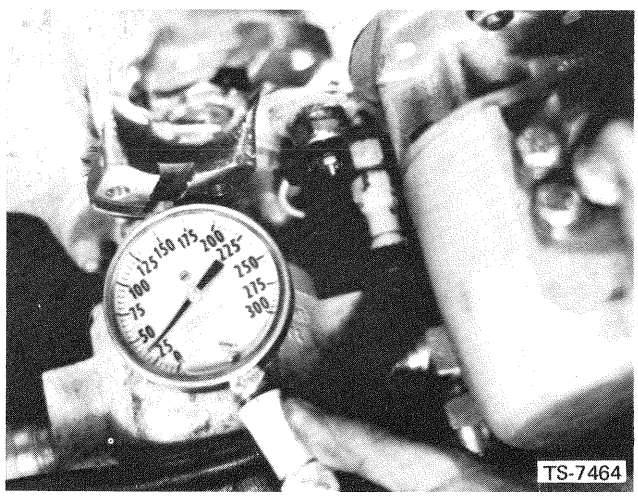


Fig. 5-2 Check Converter Out Pressure

3. Apply the parking brake; shift the forward and reverse into NEUTRAL position.

4. With the aid of a helper, read the gauge at a steady 2,000 rpm. The gauge reading must not exceed 80 p.s.i.

If the pressure reading exceeds 80 p.s.i. it will be necessary to clean or replace the hoses, the oil cooler, and/or the radiator assembly. To further pinpoint the problem, see "oil cooler pressure drop".

500 Hour Operations

Drain and refill the torque converter hydraulic system every 500 operating hours and whenever, for any reason the torque converter or any component within the torque converter system is repaired or overhauled.

TRANSMISSION

8 Hour Operations

Transmission — Check the fluid level daily, observing the following conditions:

1. Machine must be LEVEL.
2. Fluid must be HOT (Operating temperature of 180° F. to 200° F.).
3. Engine must be IDLING (550 to 600 rpm.).
4. Area around the filler opening must be CLEAN.
5. Transmission must be in NEUTRAL.
6. Parking Brake must be engaged.

Check, using the dipstick located to the right behind the operator's seat for the position of the dipstick. Fig. 6-1. Pull out the dipstick and wipe with a clean, lint free cloth. Re-insert to check the fluid level, pushing dipstick down firmly. The fluid level must be at the FULL mark on the dipstick. If the fluid level is below the FULL mark, re-insert the dipstick, making sure that it is clean and free from foreign material. Fill if necessary. Fig 6-1.

Use only the type of fluid specified in this manual. See "250 Hour Operations" for filter change.

50 Hour Operations

Clean the Transmission Breather — The transmission hydraulic system is equipped with a breather located on top of the transmission.

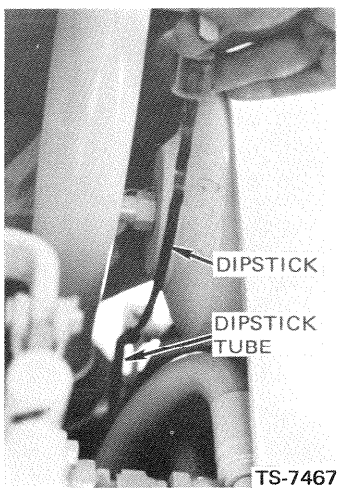


Fig. 6-1 Dipstick — Transmission

100 Hour Operations

———NIL———

250 Hour Operations

Replace the filter element each 250 operating hours. See the section on hydraulics for removal and replacing the filter. (Section 10)

500 Hour Operations

Drain and refill the transmission hydraulic system every 500 operating hours and whenever, for any reason the transmission or any component within the transmission system is repaired or overhauled.

Refer to the Hydraulics, Section 10 for drain and refill.

Check and Adjust the Transmission Shift Linkage — Inspect all the mechanical control linkages to make sure that all the rods, cross shafts, bell cranks, ball joints and operating arms are in a serviceable condition and are correctly adjusted. Correct any questionable condition such as loose or bent linkage, worn pins or evidence of binding or rubbing of any of the linkage components.

Adjustments for the shift linkages are as follows:

Forward and Reverse and Speed Range Control Levers — Check and adjust the forward and reverse and speed range gear control levers to ensure full engagement into all detent positions without interference.

1. Place the Forward and Reverse control lever in the NEUTRAL POSITION.
2. Loosen the locknuts and adjust the clevises and locknuts on the ends of both shift rods as necessary until the levers in the operator's compartment are correctly aligned.
3. Tighten the locknuts and check that the levers will shift into all detent positions without interference from the floorboard or transmission.

Pressure checks must be taken with the fluid hot (180° F. to 200° F.)

Transmission Clutch Pressure

Periodically or whenever the machine evidences incorrect operation in any one of the speed ranges in forward or reverse directions, a check of the clutch operating pressures should be made.

Using a test gauge of at least 300 p.s.i. capacity, a check should be made at the check plug on the pressure regulator valve. Remove the check plug and attach the test gauge as shown in Fig. 6-2.

The pressure check should be taken with the fluid at the operating temperature (180° F. to 200° F.). The wheels of the machine should be securely blocked and the brake lock-up applied. The pressure check should be made in all the speed ranges in both forward and reverse. With the engine idling (550 to 600 rpm) and at the operating temperature (180° F. to 200° F.) pressure should be as follows:

Minimum 240 p.s.i.
Maximum 280 p.s.i.

If the pressure is not within the specifications, further trouble shooting of the transmission and torque converter by a qualified mechanic will be required.

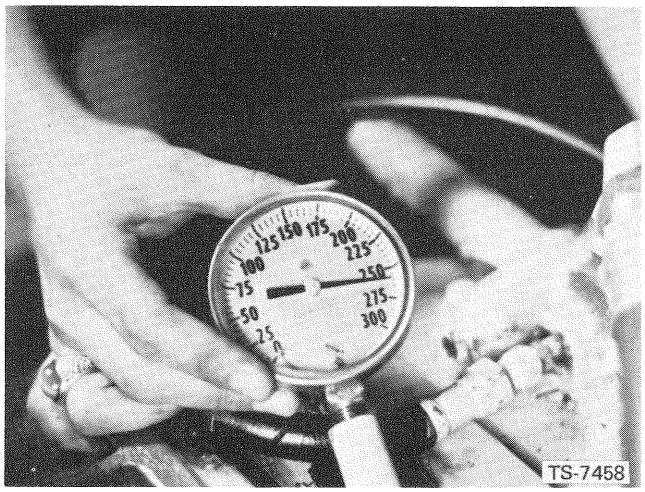


Fig. 6-2 Check Transmission Clutch Pressures

AXLE DIFFERENTIAL AND PROP SHAFTS

8 Hour Operations

——— NIL ———

50 Hour Operations

Front Axle Differential — Check the lubricant level each 50 operating hours at the differential fill and level plug in the left center of the axle assembly. Add SAE 90 or SAE 75 Extreme Pressure Gear Lube (*SCL Type) until the lubricant is level with the plug opening.

See "1,000 Hour Operations" for Drain and Refill.

Front Axle Planetary Hubs — Check the lubricant level each 50 operating hours at the fill, drain and check plug. The fill, drain and check plug is located in the external diameter of the hub and drum assembly. Rotate the wheel until the plug is slightly below the horizontal at four or eight o'clock position. At this position the oil should be checked by loosening the fill, drain and check plug. If the oil level is even with the plug sufficient oil is in the planetary. If necessary add using SAE 90 EP or SAE 75 EP gear lube (*SCL Type) through the fill, drain and check plug.

Remove the fill and check plug and check the lubricant level. If necessary, add SAE 90 EP or SAE 75 EP gear lube (*SCL Type) through the fill and level plug opening.

See "1,00 Hour Operations" for Drain and Refill.

Rear Axle Differential — Check the lubricant level each 50 operating hours at the differential fill and level plug in the left center of the axle assembly. Add SAE 90 EP or SAE 75 EP gear lube (*SCL Type) until the lubricant is level with the plug opening.

Rear Axle Planetary Hubs — Check the lubricant level each 50 operating hours at the fill and level plug located slightly off center of the thrust cap. The drain plug is located in the external diameter of the hub and drum assembly. Rotate the wheel until the drain plug is at the top center; this will position the fill and level plug in the thrust cap slightly below the center of the wheel.

**"SCL" signifies Sulfo-Chloro-Lead type. Factory fill is made with SCL type lube and it is recommended that the same type be used when adding or refilling.*

Remove the fill and level plug and check the lubricant level. If necessary, add SAE 90 EP or SAE 75 EP gear lube (*SCL Type) through the fill and level plug opening until the lubricant is level with the plug opening.

See "1,000 Hour Lubrication Operations" for Drain and Refill.

100 Hour Operations

Propeller Shafts — There are five propeller shafts in the Ranger's drive line assembly, one from the torque converter to the transmission, one from the transmission to the pillow block, one from the pillow block to the rear drive axle, one from the transmission to the front drive axle and one from the transmission to the winch. Each shaft has three points of lubrication, one on each spider and bearing assembly, and one on the slip yoke assembly, except the shaft from the pillow to the rear drive axle which has only one lubrication point (the spider and bearing assembly). Use a hand gun and apply Lithium base Multi-Purpose Grease, (LBG), be careful not to blow the seals; grease sparingly until the grease is visible at all the four bearing caps on each spider and bearing assembly. Use the grade of lubricant specified below according to ambient temperatures.

Temp. Range	Grease Consistency
0°F. and Above	Heavy oil base—Grade 2
Below 0°F.	Light oil base— Grade 0

250 Hour Operations

——— NIL———

500 Hour Operations

Axle Breathers — The breather for the front axle housing is located at the top on the left hand side. The rear axle housing breather is located at the top on the right hand side. The housing breathers have a loose fitting cap that should be rotated so that the breather air passages are unobstructed by foreign material.

Oil leakage past the breathers, thrust caps, carrier housing or pinion cap seals indicates that the breathers may be clogged. Unscrew the breathers, wash in a solvent, dry and reinstall.

1000 Hour Operations

Front Axle Differential — Drain the differential

every 1,000 operating hours through the drain plug opening in the bottom center of the axle assembly. Refill the differential with SAE 90 EP or SAE 75 EP gear lube (*SCL Type) through the fill and gear level plug opening at the center of the axle assembly until the lubricant is level with the plug opening.

Front Axle Planetary Hubs — Drain the planetary hubs every 1,000 operating hours through the drain plug opening in the external diameter of the hub and drum assembly.

Rotate the wheel until the fill, drain and check plug is slightly below the horizontal at four or eight o'clock position. At this position refill the planetary until the oil is level with the fill, drain and check plug. When the oil level is even with the plug sufficient oil is in the planetary. Refill using SAE 90 EP or SAE 75 EP gear lube.

Rear Axle Differential — Drain the differential every 1,000 operating hours through the drain plug opening in the bottom center of the axle assembly. Refill the differential with SAE 90 EP or SAE 75 EP gear lube (*SCL Type) through the fill and level plug opening at the center of the axle assembly until the lubricant is level with the bottom of the plug opening.

Rear Axle Planetary Hubs — Drain the planetary hubs every 1,000 operating hours through the drain plug opening in the external diameter of the hub and drum assembly. Rotate the wheel until the drain plug in the external diameter of the hub and drum assembly is at the top center; this will position the fill and level plug in the thrust cap slightly below center of the wheel.

Refill the planetary hubs with SAE 90 EP or SAE 75 EP gear lube (*SCL Type) through the fill and level plug opening in the thrust cap until the lubricant is level with the plug opening.

**"SCL" signifies Sulfo-Chloro-Lead type. Factory fill is made with SCL type lube and it is recommended that the same type be used when adding or refilling.*

WINCH - GEARMATIC MODEL 9 AND 19

8 Hour Operations

Winch — Gearmatic Model 9 & 19 — Check the oil level daily. When adding oil, remove the filler plug, located on the top left hand side of the winch. Also remove the oil level plug, located on the bottom left hand side of the winch. Fill to the bottom of the oil level plug hole. Use SAE 75 EP gear lube or SAE 90 EP gear lube.

50 Hour Operations

——— NIL ———

100 Hour Operations

——— NIL ———

250 Hour Operations

——— NIL ———

500 Hour Operations

Gearmatic Model 9 & 19 Winch — Drain and refill the winch every 500 operating hours and whenever, for any reason, the winch is repaired or overhauled.

Remove the drain plugs located at the bottom left hand side of the winch housing and the bottom right hand side of the winch adapter and drain the oil. Replace the drain plugs securely and refill the winch and winch adapter through the filler plug located on the top left hand side of the winch, with SAE 75 EP gear lube or SAE 90 EP gear lube. Fill to the bottom of the filler check plug hole. Run the winch for 15 minutes and again check the oil level. Fill to required level if necessary.

1000 Hour Operations

——— NIL ———

WINCH - CLARK

8 Hour Operations

Grease Fitting — Grease the fitting on the winch control lever.

50 Hour Operations

Clean the Winch Breather. The winch is equipped with a breather located on top of the housing.

Each 50 operating hours unscrew the breather, wash in a solvent, blow dry with compressed air and reinstall.

100 Hour Operations

——— NIL ———

250 Hour Operations

Replace the filter element each 250 operating hours. See the section on hydraulics for removal and replacing the filter. (Section 10)

500 Hour Operations

Drain and refill the hydraulic system every 500 operating hours and whenever, for any reason the winch or any component within the winch system is repaired or overhauled.

Refer to the Hydraulic section (10) for drain and refill.

1000 Hour Operations

——— NIL ———

INTENTIONALLY BLANK

BRAKE PILLOW BLOCK AND MIDMOUNT BEARING

8 Hour Operations

Grease the fitting on the pillow block.

50 Hour Operations

Optional Midmount Bearing — Every 50 operating hours clean the bearing breather. A hose connects the midmount bearing to the breather which is located, clipped to the right front corner of the rear frame.

100 Hour Operations

——— NIL ———

250 Hour Operations

Brake Master Cylinder — Remove the left hand engine compartment side panel. The master cylinder is located just ahead of the firewall. Maintain the fluid level to within 1/4 inch from the top of the reservoir. Add only, do not change the fluid.

The vent hole in the filler cap must be open at all times.

Inadequate braking may indicate a need to replenish the fluid in the master cylinder, adjust the pedal free travel, or to bleed the brake lines.

Maintenance Operations of the Brake — The hydraulic operated multi-disc oil cooled clutch brake operated by an automatic type foot pedal. Clutches operate inside a brake housing located at the rear of the transmission. Three pistons compress the clutches to actuate the brake.

The function of the master cylinder assembly is to displace fluid for brake applications, to constantly maintain the correct volume of fluid in the system under all temperature conditions, to automatically replace fluid lost through gravity seepage or slight leaks, and to add fluid or supercharge the system on the return stroke of the pedal after each brake application.

(a) Pedal Free Travel

The brake pedal free travel is the distance the pedal moves before the push rod touches the master cylinder piston. Excessive free motion reduces the effective travel, may cause blocking of the compensating port and prevents the brake from releasing.

Always check and adjust the pedal free travel as follows: Fig. 9-1

1. Depress the pedal by hand, noting the distance the pedal moves before resistance is offered. The correct travel is 1/2 inch free travel.

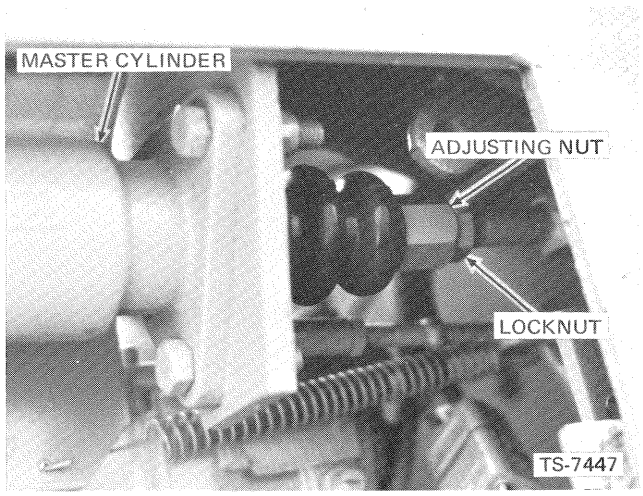


Fig. 9-1 Adjust Brake Pedal Free Travel

2. Loosen the locknut and turn the adjusting nut clockwise to decrease the travel, counterclockwise to increase the travel.

3. Tighten the locknut securely and recheck the pedal free travel.

(b) Bleed the Brake

The correct operation of hydraulic brakes requires a solid column of fluid without air bubbles at all points in the pressure system. Because of loose fittings, leaking cylinder or low fluid level in the master cylinder, it is necessary to "bleed" the system in order to expel any air bubbles which have become mixed with the fluid. The necessity of bleeding is indicated by a soft or spongy pedal.

The transmission brake must be bled in the following order:

1. Fill the master cylinder with fluid.

CAUTION

USE the same type of fluid in the master cylinder as in the torque converter, transmission and winch hydraulic system. Under no circumstances use brake fluid in this master cylinder.

2. With the aid of a helper, open the bleed screw on the brake housing in Fig. 9-2 and depress the brake pedal to expel any air and fluid from the lines.

   When the pedal reaches its maximum stroke, close the bleed screw before releasing the pedal.

   Repeat this procedure until solid fluid, free from bubbles, comes from the bleed screw.

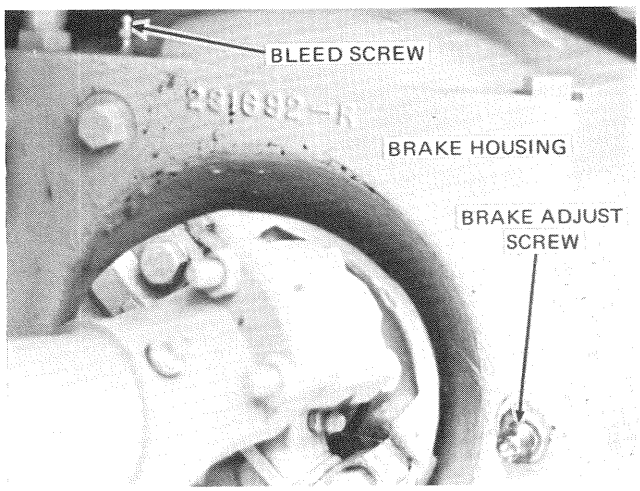


Fig. 9-2 Bleed and Adjust the Brake

Brake Adjustment

To insure correct and adequate braking pressure the brake should be adjusted periodically or whenever necessary. To adjust the brake loosen the locknut on the adjust screw, Fig. 9-2, tighten the adjust screw clockwise until it is secure. Then loosen the adjust screw counter clockwise one complete turn and secure with the locknut.

Master Cylinder Adjustment

The master cylinder is equipped with a relief valve. This relief valve is factory set for specific braking applications. Field adjustment of the relief valve should not be attempted.

Check the master cylinder frequently to insure an ample supply of fluid.

Adjust Parking Brake: When slack develops in the parking brake cable, perform the following adjustments:

1. With lever in release position turn acorn on end of handle clockwise as shown in Fig. 9-3.

2. Test for good resistance over center as handle is pulled up to applied position.

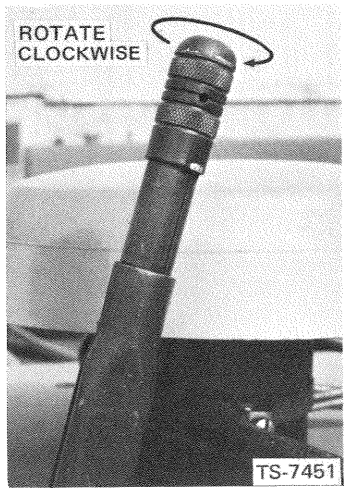


Fig. 9-3 Parking Brake

1000 Hour Operations

Change the Grease in the Pillow Block — Every 1,000 hours change the grease in the pillow block to lubricate the pillow block flange seal and to prevent foreign material getting into the pillow block bearing.

1. Remove the pillow block input drive shaft from the flange.

2. Punch position — identification marks on the slip joint and on the tube assembly of the pillow block input drive shaft and disassemble the slip joint from the tube assembly to permit ease of access to the flange bolt. (In some units, disassembly of this drive shaft may not be necessary).

3. Remove the seal from inside the pillow block and remove all the old grease.

4. Pack the area behind the above removed seal with Darina AX grease. See Fig. 9-4 which illustrates the area to be greased.

5. Reassemble the pillow block input drive shaft.

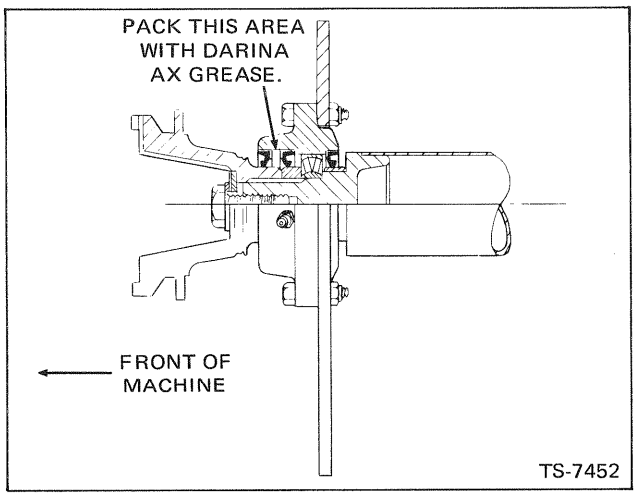


Fig. 9-4 Pillow Block

NOTE: *BE SURE that the flange on the slip joint is parallel to the flange on the tube assembly by lining up the punch marks, (Item 2).*

INTENTIONALLY BLANK

HYDRAULICS

8 Hour Operations

Hydraulic Reservoir — Check the oil level daily observing the following conditions:

1. Machine must be LEVEL.
2. Blade must be on the GROUND.
3. Engine must be SHUT DOWN.
4. Area around the reservoir cap must be CLEAN.

Remove the reservoir cap and dipstick and wipe with a clean, lint-free cloth. Replace the cap and dipstick to check the oil level. Maintain the oil level to the FULL mark on the dipstick. Fig. 10-1

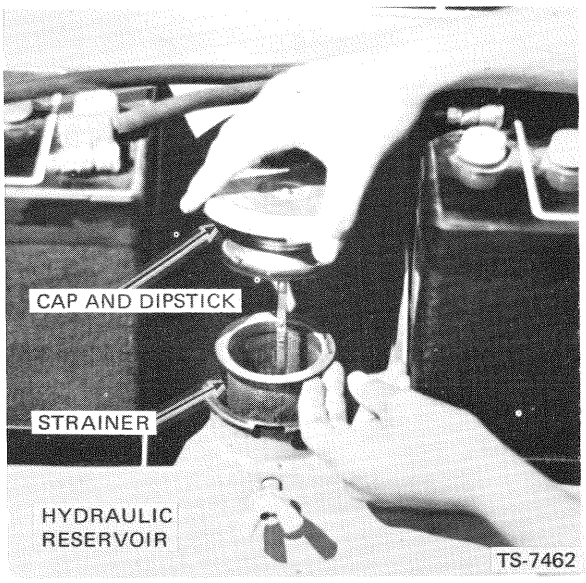


Fig. 10-1 Hydraulic Reservoir, Cap, Dipstick and Strainer

NOTE: *The same type of combination cap and dipstick is used on both the fuel tank and hydraulic oil reservoir. One side of the dipstick is graduated for oil, the other side for fuel. Make sure the correct side is read for each reservoir. BE SURE: that no fluid enters the battery compartments.*

Use the type of fluid specified in this manual. In order to prevent pump wear at high speeds and high pressures, anti-scuff or anti-wear additives are contained in these specifications.

See "500 Hour Operations" for replacing the Hydraulic Filter Assembly Element, and "1,000 Hour Operations" for the Drain and Refill of the reservoir.

Caution: *When replacing oil in the hydraulic system do not interchange type A Suffix A automatic transmission fluid and Dexron Automatic Transmission fluid with type C2 hydraulic oil and military spec., MIL-L-2104A, Supp. 1 or New MIL-L-2104B. The system must be drained and flushed. Do not flush with a cleaning or flushing oil before adding a different oil.*

50 Hour Operations

Fuel Tank and Hydraulic Reservoir Breathers — The fuel and hydraulic systems are equipped with breathers. The breathers are incorporated in the filler caps to admit only clean filtered air.

Each 50 operating hours remove the filler caps, wash in a solvent, blow dry with compressed air and reinstall.

Clean the Cylinder Rods — Wipe the blade and steering cylinder rods with a clean cloth saturated in hydraulic oil. Check the rods for nicks or burrs which would damage the packings or seals. Remove any such nicks or burrs with a fine grained hand stone or crocus cloth

100 Hour Operations

———NIL———

250 Hour Operations

Torque Converter, Transmission & Winch Filters — The torque converter and transmission hydraulic system is protected by a full flow 55 micron replaceable element type filter assembly. The filter is bracket mounted on the right hand side of the front frame below the floorboard. All fluid leaving the converter pump passes through the filter providing clean fluid to the torque converter and transmission.

Replace the filter element every 250 operating hours and whenever the converter pump, transmission, torque converter or winch is repaired or overhauled for any reason. Thoroughly clean the filter case and base casting, before inserting a new element. Use new gaskets in the base casting, tighten the center bolts to 50 ft. lbs. torque.

Run the engine 5 minutes at approximately 1,500 rpm checking the assembly, hoses and connections for leaks. Re-check the transmission fluid level when it is at operating temperature (180 F. to 200 F.) as described under "8 Hour Lubrication Operations".

NOTE: *The filter element is especially designed to*

withstand the pressure and flow rate requirements. Use only the replacement filter element called for in the applicable Parts Manual. Use of a "will-fit" or a substitute element will endanger the correct operation of the transmission and torque converter and cause costly repairs and down time.

Fig. 10-2 Filter – Transmission, Torque Converter and Winch

500 Hour Operations

Transmission, Torque Converter and Winch — Drain and refill the transmission, torque converter and winch hydraulic system every 500 operating hours and whenever, for any reason, the converter pump, transmission, torque converter or winch is repaired or overhauled.

1. Always drain the system while the fluid is at the operating temperature (180° F. to 200° F.). Hot oil flows more freely and carries more foreign material with it.

2. To drain the transmission, torque converter and winch, uncouple the reducing bushing from the back of the transmission to the dipstick tube.

3. Remove the transmission suction screen, clean in a solvent, dry, and reinstall using a new O-Ring. Reinstall the reducing bushing to the dipstick and transmission.

4. Replace the element in the transmission, torque converter and winch filter assembly. (See Fig. 10-2 for the position of the filter assembly.) Thoroughly clean the filter case and base casting before installing a new element. Use a new gasket in the base casting and tighten the center bolt to 50 ft. lbs. torque.

5. Remove the breathers from the top of the torque converter, transmission and winch. Wash in a solvent, blow dry with compressed air and reinstall.

6. Refill the transmission, torque converter and winch with the type of fluid specified in this manual through the filler plug located on top of the transmission (Fig. 10-3) until the correct level shows on the dipstick. Approximate capacity — 8 gallons (Imperial measure), 9.6 gallons (U.S. measure).

7. Disconnect the return oil cooler hose from the radiator (located on the right hand side of the machine) and direct the open end into a waste drum with a capacity of at least 4 gallons (Imperial measure); 4.8 gallons (U.S. measure.)

8. Securely block the wheels of the machine and apply the parking brake. Place the gear control lever in high speed range and the forward and reverse control lever in FORWARD.

Caution: *Draining the trapped oil in the converter cavity and oil cooler can be accomplished within 60 seconds with the return oil cooler hose disconnected. Serious damage to the transmission will result if this precaution is not complied with.*

9. Start the engine and maintain an idling speed (550 to 600 rpm) to force any trapped oil in the torque converter and oil cooler out through the open end of the return oil cooler hose. Drain approximately 4 gallons (Imperial measure), 4.8 gallons (U.S. measure) of fluid to insure clean fluid flow; then shut down the engine immediately and reconnect the return oil cooler hose.

10. Refill the transmission, restart and run the engine for 5 minutes at approximately 1,500 rpm, checking the filter assemblies, drain plug, hoses and connections for leaks. Recheck the transmission fluid level when it is at operating temperature (180° F. to 200° F.). Add fluid as necessary. Fig. 6-1

This check is to be performed with the engine idling (550 to 600 rpm). UNDER NO CIRCUMSTANCES USE ANY FLUSHING OIL OR COMPOUNDS FOR CLEANING THE SYSTEM.

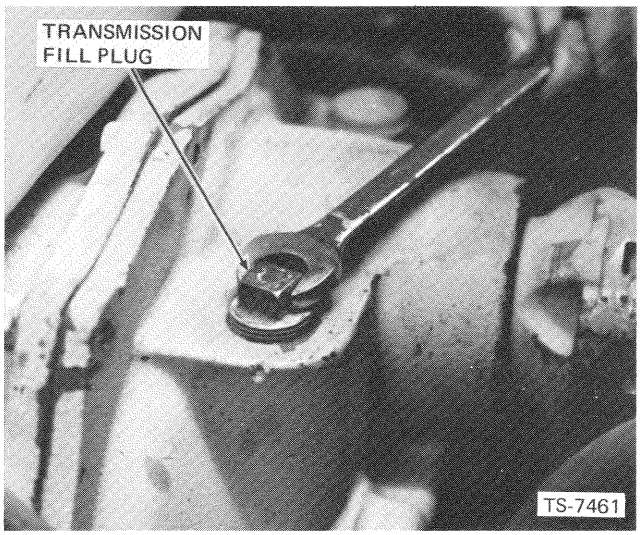


Fig. 10-3 Transmission Fill Plug

Check the Oil Cooler Pressure Drop — Check the transmission clutch and converter out pressures at specified intervals, or whenever the machine evidences over-heating or no power in any one of the speed ranges in forward or reverse direction.

Converter Out Pressure and Oil Cooler In Pressure — Periodically or whenever the machine evidences an overheating condition, inspect and check for collapsed or ruptured hoses that might cause overheating. Correct as necessary. If overheating conditions still exist, perform the following pressure checks to determine whether the oil cooler at the bottom of the radiator has or is becoming plugged with foreign material.

The pressure check must be made with the fluid hot (180° F. to 200° F.) using an accurate gauge at 2,000 rpm.

1. Install a tachometer on the engine.
2. Install a gauge at the converter OUT pressure port located below the sender unit on the rear of the converter. Fig. 10-4
3. Apply the parking brake; shift the forward and reverse levers into NEUTRAL positions.
4. With the aid of a helper, read the gauge at a steady 2,000 rpm. The gauge reading must not exceed 80 p.s.i.

If the pressure reading exceeds 80 p.s.i. it will be necessary to clean or replace the hoses, the oil cooler, and/or the radiator assembly. To further pinpoint the problem, see "oil cooler pressure drop" below.

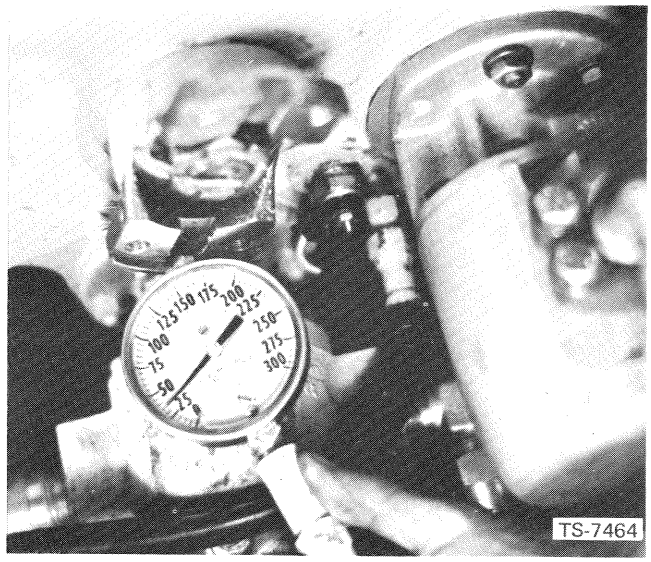


Fig. 10-4 Check Converter Out Pressure

Oil Cooler Pressure Drop

The drop in pressure across the oil cooler at the bottom of the radiator will indicate whether the oil cooler and/or the cooler hose has or is becoming plugged with foreign material, causing overheating.

NOTE: *For checking the oil cooler IN pressure refer to the procedure for checking the converter OUT pressure, as these two pressure readings are the same. See Fig. 10-5 for the position of the check point.*

1. Install a tachometer on the engine. Install gauges at the converter OUT pressure check point, (this reading is the same as the oil cooler IN pressure, see NOTE above) and at the oil cooler OUT pressure check point located at the rear of the transmission on top of the brake housing. Fig. 10-5
2. Apply the parking brake and shift the forward and reverse lever into NEUTRAL.
3. With the aid of a helper, read the gauges at a steady 2,000 rpm, and subtract the oil cooler OUT pressure from the oil cooler IN, (Converter OUT), to get the pressure drop. The pressure drop should be between 20 p.s.i. and 40 p.s.i.

If the pressure difference equals or exceeds 40 p.s.i. it will be necessary to thoroughly clean or replace the cooler hose, oil cooler and/or the radiator assembly.

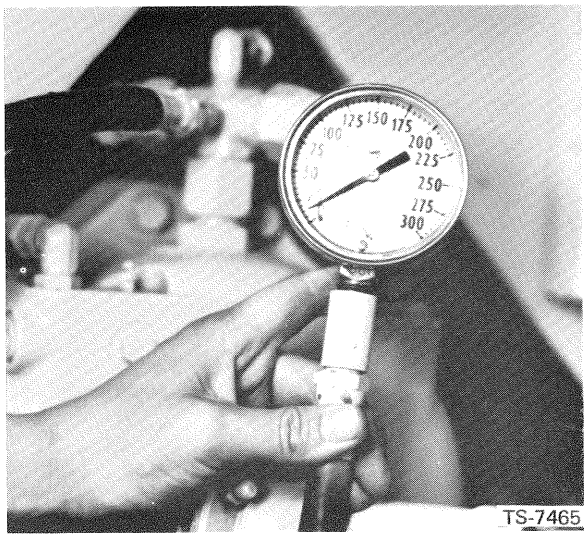


Fig. 10-5 Oil Cooler Out Pressure Drop Check

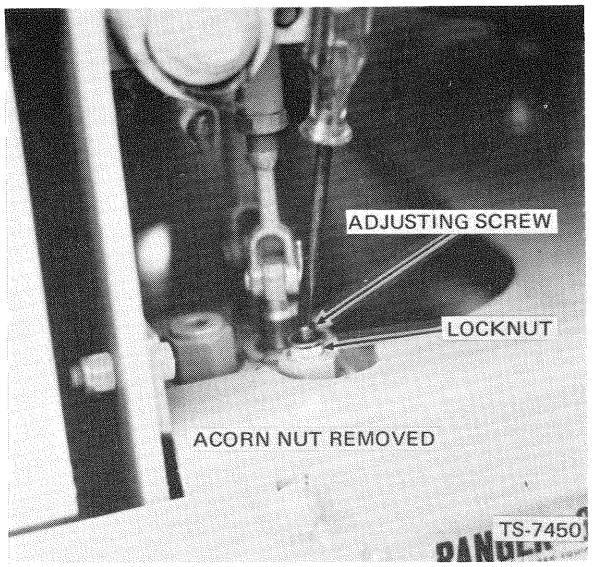


Fig. 10-6 Adjust Pressure – Main Relief Valve

Check the Main Relief Pressure on the Steering and Blade Control Valve — The main hydraulic pump is coupled to the drive line and operates as soon as the engine is started. This pump draws fluid from the reservoir and forces it under pressure into the steering and blade (main) control valve.

The Ranger is so designed that only one operation is required to check the pressure in the system.

1. Shut down the engine.
2. Move the steering control lever from side to side or backwards and forward to relieve the pressure in the system.
3. Attach a hydraulic gauge of at least 3,000 p.s.i. capacity to the hose fitting on the main control valve. Fig. 10-7
4. Start the engine and accelerate to 2,000 rpm.
5. Put the machine into a full left hand turn and hold the lever in the full turn position. The gauges should register 1,600 p.s.i. at 2,000 rpm. If not, adjust the main relief by removing the acorn nut, loosening the jam nut and adjusting the set screw located on the top of the main control valve assembly until 1,600 p.s.i. registers on the gauge. Fig. 10-6

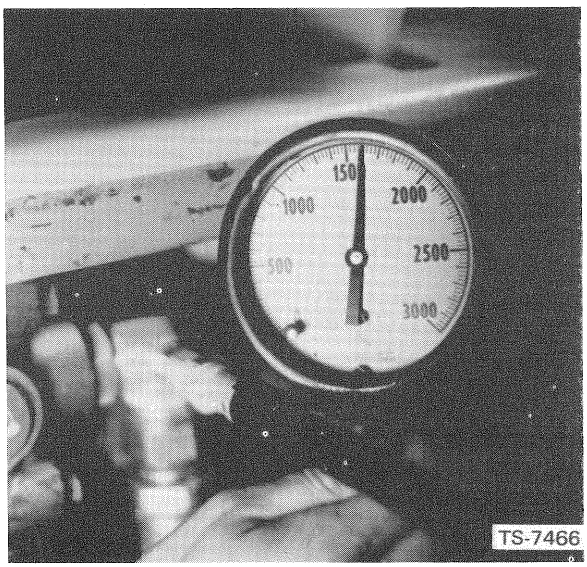


Fig. 10-7 Main Relief Valve Pressure Check

1000 Hour Operations

Hydraulic Reservoir — Drain, clean, and refill the hydraulic oil system every 1,000 hours of operation, or more often if required. When operating under severe dusty and dirty conditions, clean the system more often to prevent excessive wear or premature failure of valve, pump, or cylinder parts.

1. Always drain the system after working the machine, and while the oil is at operating temperature. Hot oil flows more freely and carries more foreign material with it.
2. Raise the dozer blade to its maximum position and SECURELY BLOCK IN PLACE to facilitate draining of these cylinders.
3. Remove the drain plug at the bottom of the reservoir and drain the reservoir.
4. Disconnect the steer and blade cylinder hoses at their lowest points to drain these cylinders.

FUEL SYSTEM

8 Hour Operations

Fuel Tank — Check the fuel level several times each day observing the following conditions:

1. Machine must be LEVEL.
2. Engine must be SHUT DOWN.
3. Area around the fuel cap must be CLEAN.

Remove the fuel tank cap and dipstick located at the rear of the machine below the fairlead. Wipe with a clean, lint free cloth and reinsert to check the fuel level. Refill as necessary, making sure before filling that the strainer in the fuel tank filler neck is clean and free from foreign material, clean if necessary. Refill to the FULL mark on the dipstick using a good brand of fuel procured from a reliable company.

Fuel Oil — For all operating conditions with regard to the load, speed, idling time or ambient air temperature refer to the fuel oil specifications recommended by the engine manufacturer.

NOTE: *The same type of combination cap and dipstick is used for both the Fuel tank and Hydraulic Oil reservoir. One side of the dipstick is graduated for oil, the other side for fuel. Make sure the correct side is read for each reservoir.*

When operating in temperatures of 32° F. and below, the fuel tank should be filled when the machine is shut down, to prevent condensation.

It is advisable to drain a pint of fuel from the fuel tank and approximately one quarter pint of fuel from the filters daily to remove the sediment and water. Drain cocks are provided at the fuel tank and at the bottom of the fuel filters.

In temperatures above 32° F. the fuel tank should be filled at the end of the shift. Before starting the engine at the beginning of the shift, similar amounts of fuel as described above should be drained from the tank and filters.

50 Hour Operations

Drain the Fuel Tank Sediment — Open the drain cock at the bottom of the fuel tank to drain the accumulated water and sediment.

Check all the fuel lines, fuel pump, filters and shut-off cocks for leaks and correct where necessary.

Fuel Tank and Hydraulic Reservoir Breathers — The fuel and hydraulic systems are equipped with breathers. The breathers are incorporated in the filler caps to admit only clean filtered air.

Each 50 operating hours — Remove the filler cap, wash in a solvent, blow dry with compressed air and reinstall the cap in the reservoir.

100 Hour Operations

———NIL———

250 Hour Operations

Fuel controls are accurately calibrated at the factory to insure the correct low idle and high idle speeds.

DO NOT ADJUST THE GOVERNOR ASSEMBLY WITHOUT CONSULTING THE OPERATION AND MAINTENANCE MANUAL OF THE ENGINE MANUFACTURER.

The linkage adjustment for the engine is as follows:

1. Unhook the spring from the accelerator linkage and disconnect the ball joint assembly from the governor throttle control lever. This will enable the governor throttle lever to return to the spring loaded idle position.

2. Depress the accelerator until it contacts the stop in the floorboard.

3. Rotate the governor throttle control lever to the extreme (full throttle) position and adjust the ball joint at the front of the accelerator rod, to obtain a slip fit in the governor throttle lever just before the accelerator bottoms. If a slip fit cannot be obtained, adjust the clevis at the other end of the accelerator rod.

4. Reinstall and secure the clevis to the governor throttle lever and reconnect the accelerator spring.

5. Release and depress the accelerator, and check that the linkage will properly rotate the throttle control lever from the idle to the full throttle position without interference.

The pressure required to depress the accelerator is controlled by a spring attached from the accelerator linkage to the anchor lug. This spring also

insures that the engine will return to the idle speed when the accelerator pedal is released.

500 Hour Operations

———NIL———

1000 Hour Operations

Fuel Tank — Every 1,000 operating hours or more often if required, drain and clean the fuel tank. The fuel tank should be drained and cleaned when the tank is relatively low on fuel.

1. Open the drain cock at the bottom of the filters, when provided, and drain off any accumulated water or sediment. Close the drain cock.
2. Open the drain cock at the bottom of the fuel tank, and drain.
3. Remove the cover and clean any foreign material from the bottom of the fuel tank. Remove the magnet from the bottom of the fuel tank and clean thoroughly. Replace the magnet and reinstall the cover and close the drain cock.
4. Clean the fuel tank strainer screen.
5. Refill the fuel tank to the full mark on the dipstick with clean fuel handled in clean containers as specified under "Service Daily". Use a good brand procured from a reliable company. For all operating conditions with regard to load, speed, idling time or ambient air temperature refer to the fuel oil specifications recommended by the engine manufacturer.

ELECTRICAL

8 Hour Operations

——— NIL———

50 Hour Operations

Batteries — The batteries are located in the battery compartment at the back of the front frame. Keep the terminals clean and the connections tight, and be sure that when distilled water is added, all the plates are covered. Do not overfill.

Check the Lights and Fuses — One 20 ampere fuse provides protection for the light circuit, a 4 ampere fuse and a 30 ampere fuse provides protection for the main wiring in the machine. The 20 ampere fuse for the lights is located in the wire between the ignition switch and the toggle switch. The 4 ampere fuse for the main wiring is located in the wire between the circuit Breaker and the Hourmeter oil pressure switch and the 30 ampere fuse for the main wiring is located in the wire between the alternator and the ammeter.

A. Floodlamps — The machine is equipped with two floodlamps that disperse light in a gradual downward pattern. Both of these floodlamps are located underneath the top of the canopy, and are mounted on welded brackets.

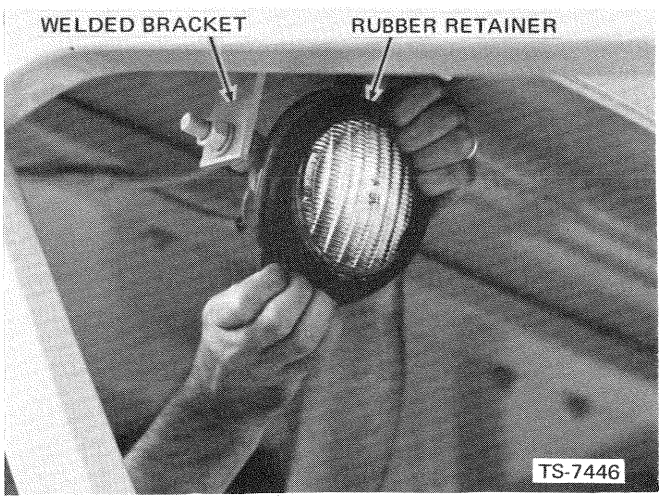


Fig. 12-1 Lamp Replacement

1. Loosen the locknut that secures the floodlamp to the canopy.
2. Rotate the floodlamp to adjust the angle of the beam, then retighten the locknut securely.

If it is necessary to replace the floodlamps, depress the lamp and spread the lip of the rubber retainer outward, forcing the lamp out as shown in Fig. 12-1 and disconnect the terminals. Reconnect the terminals on the lamp and reinstall the retainer.

B. Tail Lamp — The tail lamp is the same assembly as the floodlamps, and is mounted at the back right hand side of the canopy on a welded bracket. To replace the tail lamp, follow the same instructions as the floodlamps.

Service the Batteries — The batteries are located in the battery compartment at the back of the front frame. Keep the terminals clean and the connections tight, and be sure that when distilled water is added, all the plates are covered. Do not overfill.

To prevent damage to the electrical system components when recharging or replacing the batteries in the charging system:

REMEMBER

1. When installing the batteries, MAKE SURE the batteries and polarities are the same.
2. Booster batteries MUST BE paralleled.
3. Battery-charger and battery polarities MUST AGREE.
4. Before doing any welding, DISCONNECT THE GROUND CABLE FROM THE BATTERIES AND THE ELECTRICAL LEAD FROM THE BATTERY TERMINAL ON THE ALTERNATOR.

WARNING

ALWAYS CONNECT POSITIVE TO POSITIVE – NEGATIVE TO NEGATIVE WHEN USING A BATTERY CHARGER OR BOOSTER, TO PREVENT DAMAGE TO THE ELECTRICAL SYSTEM.

100 Hour Operations

———NIL———

250 Hour Operations

——— NIL———

500 Hour Operations

Clean the Alternator — Every 500 hours clean the alternator. To clean, use compressed air, (20 p.s.i. to 30 p.s.i.), or a low pressure water spray, (20 p.s.i. to 30 p.s.i.) and direct the flow through the rear of the alternator.

Clean and Tighten the Electrical Connections — Periodically inspect and check all wiring and connections on the electrical components such as the batteries, cranking motor, voltage regulator, alternator, solenoid switch, relays, instruments and switches for worn, cracked, broken or frayed insulation and loose terminal connections. Check for frayed or corroded external ground straps and corrosion on the battery posts.

Where inspection reveals dirt, looseness or damage, clean, tighten and adjust or replace as necessary depending on the existing conditions.

1000 Hour Operations

Inspect, Test and Lubricate the Electrical Units — Maintenance performed on the various electrical components usually consists of cleaning, lubricating, minor testing and adjusting, and replacing defective or worn out parts.

At specified intervals lubricate the alternator and cranking motor sparingly — Excessive lubrication can result in premature failure.

Check the cranking motor operation with a substitute battery source known to be fully charged and in good condition.

MISCELLANEOUS

8 Hour Operations

Grease Fittings — Lubricate all points indicated on the Chassis and Drive Line Lubrication charts for 8 hour intervals with Lithium Base Multi-Purpose Grease. Use the grade of lubricant specified below according to ambient temperatures.

Temp. Range	Grease Consistency
0° F. and Above	Heavy oil base—Grade 2
Below 0° F.	Light oil base—Grade 0

Check the Tire Pressures and Casings — Check the air pressure in all the tires. See specifications and service data in this manual for the correct air pressures. Particular attention must be emphasized when checking hydro-inflated tires as there is less volume of air to provide cushioning. Be sure that the valve caps are in place to prevent dirt, moisture, and foreign material from damaging the valve core.

Keep all tires free from oil and grease and repair any cuts immediately to prolong the tire life. Check the tire pressures in the morning when the tires are cold. Do not remove increased pressures caused by the operation of the machine.

Visually Inspect the Machine — Visually inspect the general condition of the machine, the operating controls, instruments and switches, control rods and linkage, fuel pumps, filters and the radiator for any noticeable damage.

Special attention must be emphasized when inspecting the components of the oil system, fuel system and cooling system. If any unusual or unexplained traces of oil, fuel or water are found on or below the components of the respective systems, locate and correct any such leaks immediately.

Unexplained oil streaks on or below the engine, transmission, torque converter and axle assemblies must be carefully investigated. Such indications may be the evidence of cracks, loose mounting bolts, damaged seals or gaskets, which (if neglected) may result in complete failure and major damage to the engine and drive line.

50 Hour Operations

Tighten the Wheel Nuts and Inspect the Tires — All wheel nuts should be checked regularly and kept tight. Loose wheel nuts will cause undue tire wear, strain the axle assemblies, and affect the steering load distribution. Apply a lubricant on the threads of the wheel studs only and tighten the wheel nuts to 475 ft. lbs. torque. Do not lubricate the spherical seat on the threaded portion of the wheel nuts.

Check the rims for bent or damaged flanges and repair or replace as needed.

100 Hour Operations

——— NIL ———

250 Hour Operations

Adjust and Lubricate the Operator's Seat — The operator's seat can be shifted forward or backwards to suit the individual, by moving the lever on the left hand side of the seat forward and shifting the seat to the desired position. Fig. 13-1. An additional adjustment in the height of the seat is offered. This can be done by removing the seat bracket mounting bolts and raising or lowering the seat brackets to one of the three hole positions in the seat mounting brackets.

Oiling of the release mechanism, track assemblies and pivot points will keep them operating freely.

Tilt the seat over, toward the instrument panel when shutting down the machine at the end of shift. Fig. 13-2

500 Hour Operations

Tighten All Mounting Bolts — The mounting bolts on such components as the engine, torque converter, transmission, axles and prop shafts will occasionally work loose and cause the supports and brackets to wear rapidly. Alignment difficulty may also develop.

Steam Clean the Machine — Periodically or whenever working the machine in muddy or swampy areas or when the machine begins to cake up with excessive dirt, the entire machine should be steam cleaned. If allowed to accumulate, dirt will find its way into the various systems when plugs, covers or caps are removed or during a unit replacement, eventually causing serious damage and downtime.

Dirt packed on or around the axle, transmission, torque converter, engine and reservoir breather will cause oil losses.

Steam is the most effective and recommended method of cleaning a dirty machine. If unavailable, use a spray of mineral spirits or a similar solvent non-harmful to exposed hoses, lines and electrical wiring.

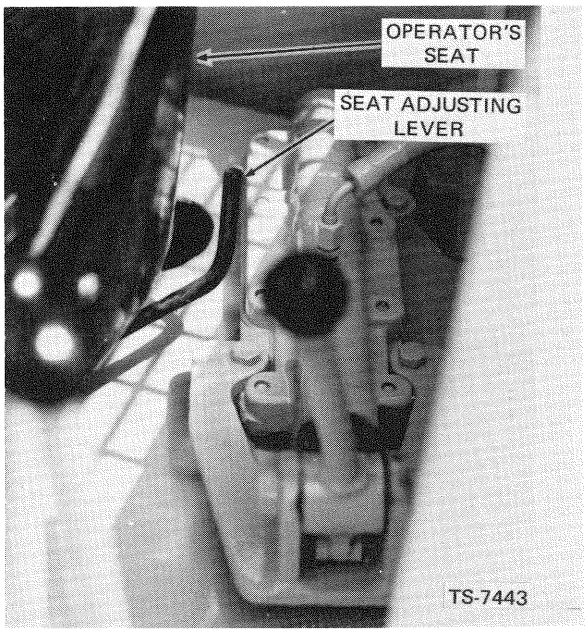


Fig. 13-1 Operators Seat Adjust Lever

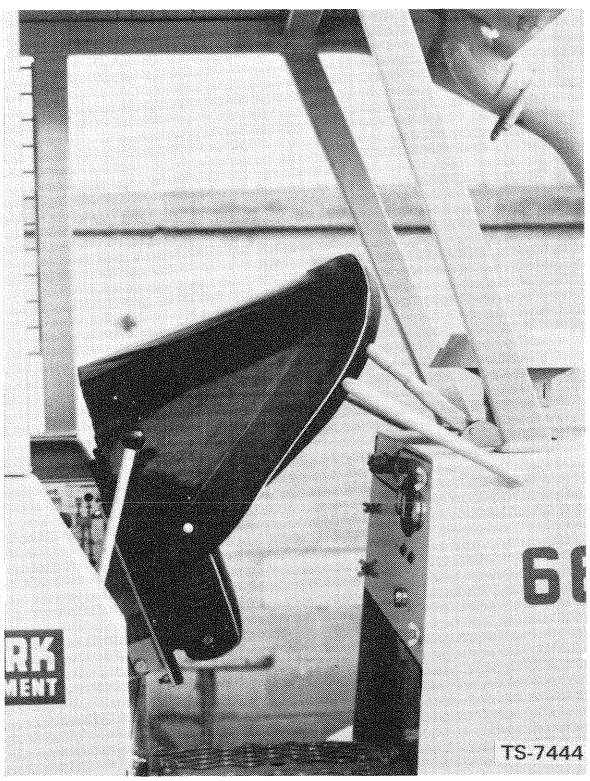


Fig. 13-2 Tilt the Operators Seat

NOTE: PRIOR TO STEAM CLEANING COVER ALL ALTERNATOR AND CRANKING MOTOR OPENINGS TO PROTECT THEM FROM THE FORCE OF THE STEAM JET.

1000 Hour Operations

Check and Repair Drive Line Noises — Unusual operating noises in the drive line components can usually be found by a process of elimination. In general the unit cause or source of most noises will be quite evident.

When any such noise develops, note the travel speed of the machine. Did it occur going forward or in reverse? Was the machine travelling straight or in a turn? Was the machine being braked, coasting, under acceleration, or being worked stationary? Did any gauges indicate overheating? Was the noise progressive, or did it just happen? Was there any vibration, chattering or shaking of the machine? Did the machine pull to one side?

Prop shaft failures are generally indicated by excessive noise or vibration only at certain speeds. Above or below these speeds the noise lessens or completely disappears.

The transmission can be checked by disconnecting the prop shaft to the front axle. Check the gear train in both work and travel ranges with the hydraulic controls (high and low and forward and reverse control shift levers) in neutral. Engage the control levers one at a time to apply the clutches and connect them to the gear train.

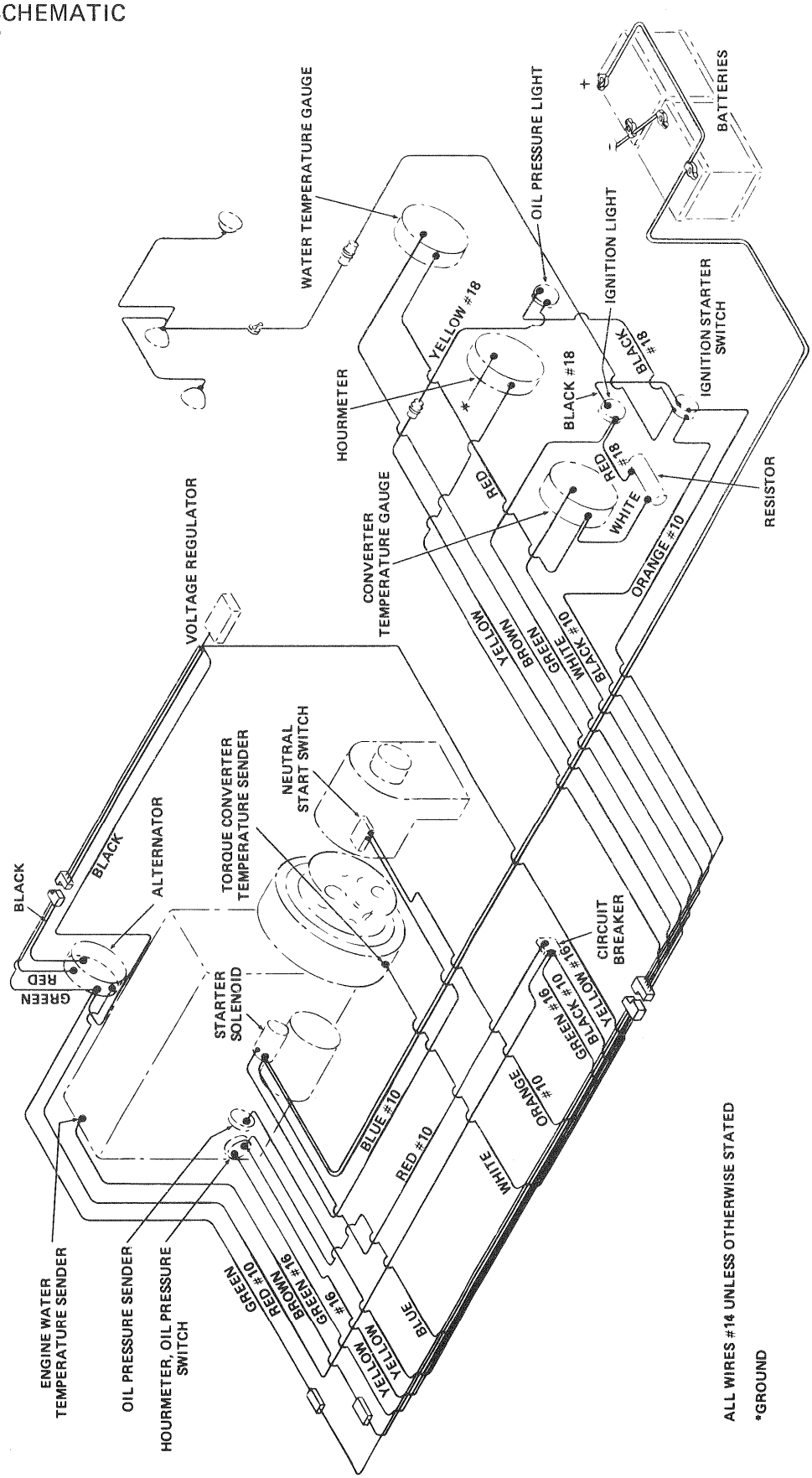
The engine and torque converter noises can be isolated by removing the prop shaft from the torque converter to the transmission. Most engine and torque converter problems are generally preceded by low power and overheating. These indications should be observed at the time and corrected before mechanical difficulties arise.

Inspect the Frames — The frames are the basic backbone of the entire machine and provide structural support directly or indirectly for completely mounting all assemblies, sub-assemblies and individual components necessary for the machine construction and operation.

The frame structures and all supporting assemblies such as cradle, blade, fairlead, crossmembers, reinforcing gussets and brackets should be periodically inspected for cracks, bends, broken welds, warping or any other signs of damage that would endanger the correct operation.

Frame damage should be immediately repaired or corrected as necessary to maintain the frame assembly in a good serviceable condition.

WIRING SCHEMATIC
Model 662



Ranger

CLARK EQUIPMENT

BOLT TORQUE CHART

FT. – LBS.

LOCATION	THREAD	GRADE	TORQUE
Front engine mount to engine	3/8-16	8	45
Front engine mount to frame	5/8-11	8	25
Rear engine mounts to engine	7/16-14	8	75
Rear engine mounts to frame (FORD)	1/2-13	8	45
Rear engine mounts to frame (GM)	5/8-11	8	100
Torque converter to flywheel housing	3/8-16	8	25
Transmission to bracket	3/4-10	8	125
*Transmission bracket to frame	3/4-10	8	100
Steer and blade valve to bracket	3/8-16	8	30
Upper drive shafts	5/16-24	8	25
Lower drive shafts	3/8-24	8	590
Pillow block mounting plate to rear frame	1/2-13	8	120
Pillow block to mounting plate	7/16-14	8	75
Winch to frame	3/4-10	8	300
Fairlead and fuel tank to frame	3/4-10	8	380
*Rear axle to mounting pad	3/4-16	8	250
Wheel nuts	3/4-16	8	475
Alternator pully	5/16-18	8	45
Hydraulic pump mounting nuts	3/8-24	8	20
Hydraulic tank filter mounting bolts	5/16-24	8	40-50 in-lb:

*When replacing these mounting bolts, use SAE #30 oil on the threads.

The wheel nut spherical seat in the wheel disc must be concentric with the stud – ream if necessary.

BOLTS NOT LISTED ARE TO BE DRAWN UP TIGHT IN MANNER CONSISTANT WITH GOOD WORKMANSHIP.

SPECIFICATIONS AND SERVICE DATA

	662	662
Engine	Diesel	Diesel
Make	G.M.	Ford
Model	3-53	2701-E
Number of Cylinders	3	4
Bore and stroke	3-7/8 x 4-1/2	4-1/8 x 4-1/2
Displacement, cu. inches	159.2	240
Maximum torque, ft. lbs.	202	170
Governed horsepower	95	74
Governed RPM (Full Load)	2700	2600
Low idle RPM	600	550
High idle RPM	2810	2860
Stall, with main pump at 1,600 psi	2100 to 2200	1900 to 2000
Converter stall	2230 to 2330	2110 to 2210

NOTE: *The stall RPM is the maximum obtainable RPM with oil at the operating temperature of 180° F. to 200° F. brake applied, the wheels blocked, the directional and speed range shift levers in forward and high and the machine turned full against stops.*

The stall speed is applicable to an altitude of 600 ft. and ambient temperatures of 70° F. Due to the many combinations of altitude and temperature possible in the field, space does not permit publishing here all the corrections necessary to the stall RPM indicated to accommodate such variations. It is suggested that the engine manufacturer's distributor be contacted to determine the correction necessary for the altitude and temperature in your application.

ELECTRICAL SYSTEM

Fuses:
Lights 20 amp
Main Wiring 4 amp and 30 amp

Lamps:
Front and rear lamps 12 volt

Instruments:
Panel gauges 12 volt
Sender Units 12 volt

Alternator:
Motorola A-12N-451 negative ground
12 volt 35 amp.

Voltage Regulator: 12 volt

Starting Motor: 12 volt

BATTERIES

Make and Part Number: Prestolite 2730 (wet type)
Clark Number: 1903464
Number Required: 2
Electrical System: 12 volt

Grounded Terminal: — Negative

Specific Gravity: 1.230—1.260
(Not over 0.050 variance between the adjacent cells).

PRESSURES

Transmission Clutches: 240 to 280 psi at idle (550 to 600 rpm) in all speed ranges in both forward and reverse directions and at an oil temperature of 180° F. to 200° F.

Steering and Blade Hydraulic System: Main relief valve 1,600 PSI.

CAPACITIES

662 G.M.

	Imperial	U.S.	Metric
Engine Crankcase	14 qts.	16.8 qts.	15.96 litres
Cooling System	30 qts.	42 qts.	23 litres
Axle (Front)	13.3 pt.	16 pt.	7.6 litres
Differentials Rear Axle	12.5 pt.	15 pt.	7.1 litres
Planetaries Front	4.2 pt.	5 pt.	2.37 litres
(each) Rear	10.8 pt.	13 pt.	6.15 litres
Fuel Tank	31.6 gal.	38 gal.	144 litres
Hydraulic System	9.6 gal.	11.5 gal.	43.6 litres
Torque Converter and Transmission	8 gal.	9.6 gal.	36.4 litres

662 Ford

	Imperial	U.S.	Metric
Engine Crankcase			
Cooling System	30 qt.	42 qt.	23 litres
Axle (Front)	13.3 pt.	16 pt.	7.6 litres
Differentials (Rear)	12.5 pt.	15 pt.	7.1 litres
Axle Planetaries (Front)	4.2 pt.	5 pt.	2.37 litres
(each) (Rear)	10.8 pt.	13 pt.	6.15 litres
Fuel Tank	31.6 gal.	38 gal.	144 litres
Hydraulic System	9.6 gal.	11.5 gal.	43.6 litres
Torque Converter, Winch and Transmission	8 gal.	9.6 gal.	36.4 litres

TIRES

Standard	16.9 x 30
Optional	18.4 x 34
	18.4 x 26
	18.4 x 25
	23.1 x 26
	24.5 x 32
	18.00 x 25
	30.5 x 32
	67 x 34.00 -25

Tires with shredded wire and steel guard construction are also available.

TIRE PRESSURES

Front Tires - 16 psi. Rear Tires - 18 psi.

HOURLY LUBRICATION AND MAINTENANCE SCHEDULE

8 HOUR OPERATIONS

Check the following:

- Engine, refer to engine manual.
- Check the fluid level in the transmission, torque converter and winch.
- Check the fluid level in the hydraulic reservoir.
- Check the midmount bearing.
- Check the fuel in the fuel tank.
- Grease all grease fittings.
- Check the tire pressure.
- Check the coolant level in the radiator.

50 HOUR OPERATIONS

Check the following:

- Engine, refer to the engine manual.
- Check the radiator for leaks.
- Check the antifreeze protection
- Clean the torque converter, transmission, winch and midmount bearing breathers.
- Clean the fuel tank and hydraulic breathers
- Check the lights and fuses.
- Check axle and differential lubricant level.
- Check the brake pedal linkage.
- Clean the cylinder rods.
- Check the fuel lines for leaks.
- Check the batteries.
- Drain the fuel sediment.
- Tighten the wheel nuts.

100 HOUR OPERATIONS

Check the following:

- Engine, refer to the engine manual.
- Grease the prop shafts.
- Clean and tighten the air cleaner connections.

250 HOUR OPERATIONS

Check the following:

- Engine, refer to the engine manual.
- Check the engine RPM.
- Check the governor.
- Replace the transmission, torque converter, and winch filter element.
- Check the fluid level in the master cylinder.
- Check the brake pedal free travel.
- Check the throttle control lever.
- Bleed the brakes.
- Adjust the parking brake.
- Adjust the operator's seat.

500 HOUR OPERATIONS

Check the following:

- Engine, refer to the engine manual.
- Clean the radiator core.
- Drain and refill the torque converter.
- Drain and refill the transmission.
- Service the air cleaner.
- Check the converter out pressure.
- Check the oil cooler in pressure.
- Check the transmission clutch pressure.
- Check the main relief pressure.
- Clean the alternator.
- Tighten the mounting bolts.
- Steam clean the machine.
- Tighten all mounting bolts.

1000 HOUR OPERATIONS

Check the following:

- Engine, refer to the engine manual.
- Drain and refill the axle oil.
- Change the grease in the pillow block.
- Drain and refill the hydraulic system.
- Drain and refill the fuel system.
- Check all electrical components.
- Check for unusual drive line noises.

NOTES

CHASSIS LUBRICATION

		HOURS						KEY
		1000	500	250	100	50	8	
1	Steer Cylinder Pin – Rear						●	LBG
2	Steer Cylinder Pin – Front						●	LBG
3	Pivot Hinge Pin – 1 Each Top and Bottom						●	LBG
4	Transmission and Winch Control Levers					●		LBG
5	Winch Control Lever (Gearmatic 9 & 19 Only)						●	BA
6	Brake Pedal Bushing					●		LBG
7	Master Cylinder					●		DX
8	Utility Blade Cylinder Pins – Rear						●	LBG
9	Utility Blade Cylinder Pins – Front						●	LBG
10	Utility Blade Hinge Pins – 2						●	LBG
11	Axle Cradle Bushing – Remote						●	LBG
12	Engine Governor Lever – (Grease very sparingly)				●			LBG
13	Steer and Blade Control Lever					●		LBG
14	Oil Reservoir *	●	●				●	DX

LUBRICATION KEY

LBG	Lithium Base Multi-Purpose Grease 0°F. and above – Grade 2 Below 0°F. Grade 0			
EPGL	Extreme Pressure Gear Lube (**SCL Type)			
DX	Ambient Temp. Range	Lubricant to be used		
		SAE Grade	API Class	Military Spec.
	1) Above 0°F.	10W	+MS DM	MIL-L-2104A, Supp. 1 or New MIL-L-2104B
	2)	Type C-2 Hydraulic Oil		
	3)	Dexron Automatic Transmission Fluid		
	Below 0°	Dexron Automatic Transmission Fluid + Sequence Tested		
BA	Heavy Duty Brake Fluid			
DA	Shell Darina "AX" Grease – Or Equivalent			

**"SCL" Signifies Suffo-Chloro-Lead type. Factory fill is made with SCL type lube and it is recommended that the same type be used when adding or refilling.

DRIVE LINE LUBRICATION

		HOURS						KEY
		1000	500	250	100	50	8	
15	Winch (Gearmatic 9 and 19 Only) *		●				●	EPGL
16	Universal Joint				●			LBG
17	Slip Joint				●			LBG
18	Universal Joint				●			LBG
19	Transmission (Converter, Winch W-301-1) *		●				●	DX
20	Torque Converter *		●	●			●	DX
21	Differential Check Plug *	●				●		EPGL
22	Planetary Check and Fill Plug *	●				●		EPGL
23	Differential Drain Plug *	●						EPGL
24	Midmount Bearing Check Plug (Optional) *		●				●	DX
25	Midmount Bearing Drain Plug (Optional) *		●				●	DX
26	Pillow Blocks are ASE Fittings						●	LBG
27	Planetary Drain and Fill Plug *	●				●		EPGL
28	Differential Drain Plug *	●						EPGL
29	Planetary Check Plug *	●				●		EPGL
30	Differential Check Plug *	●				●		EPGL

*See text

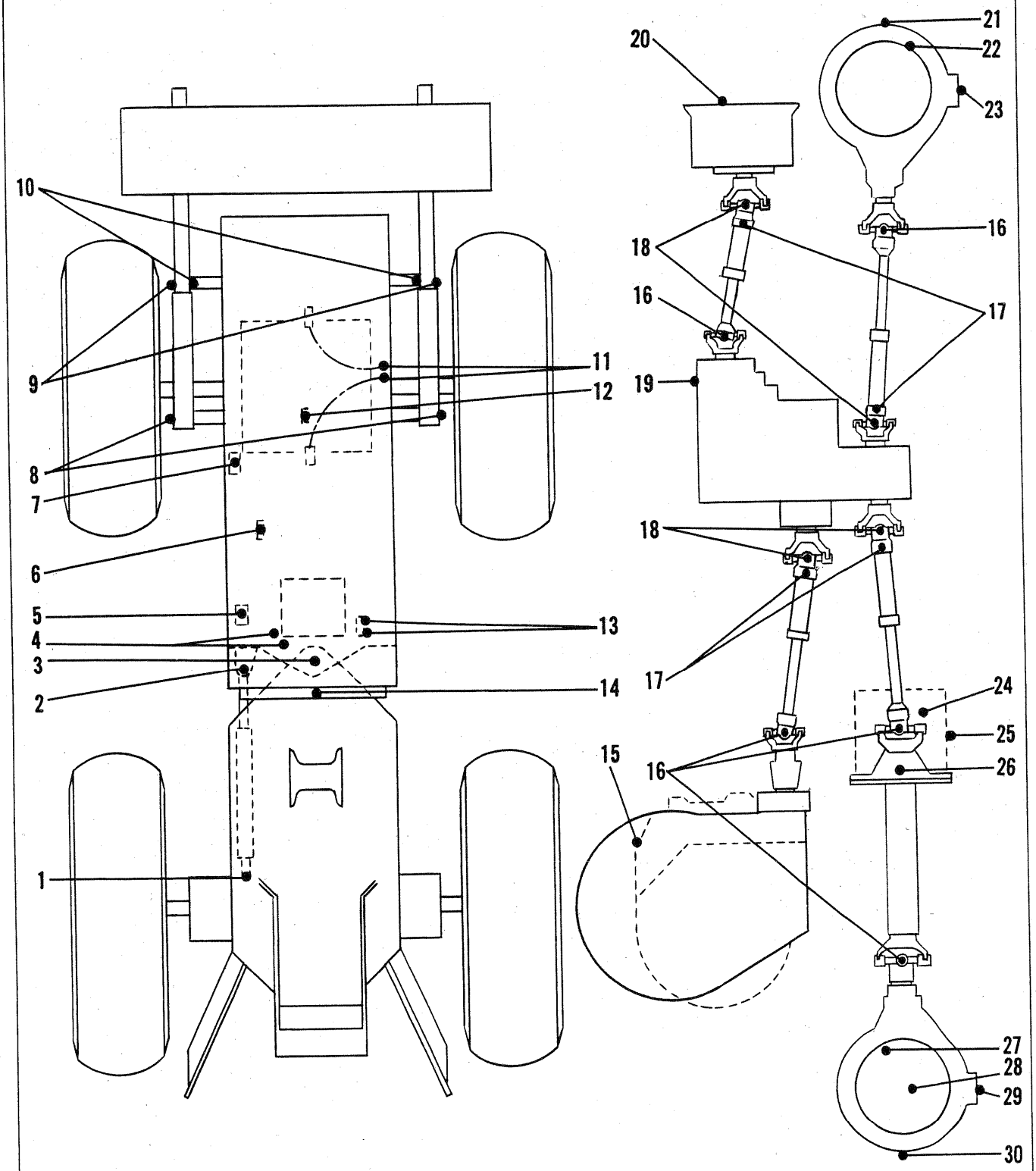
CAUTION

When replacing oil in the hydraulic system do not interchange type A Suffix A automatic transmission fluid and Dexron Automatic Transmission fluid with type C2 hydraulic oil and military spec., MIL-L-2104A, Supp. 1 or New MIL-L-2104B. The system must be drained and flushed. DO NOT flush with a cleaning or flushing oil before adding a different oil.

INTENTIONALLY BLANK

CLARK EQUIPMENT

Ranger



DRIVE LINE

CHASSIS

TS-7441

MAINTENANCE SCHEDULE

SYSTEM	OPERATION	TIME INTERVAL (Hours)					
		8	50	100	250	500	1000
Engine controls, cooling system and accessories	Engine maintenance	See Engine Manual					
	Check the cooling system for leaks		●	●	●	●	●
	Drain the fuel tank sediment		●	●	●	●	●
	Check the anti-freeze protection		●	●	●	●	●
	Check and adjust the belt tension		●	●	●	●	●
	Clean the air cleaner connections			●	●	●	●
	Check the engine RPM				●	●	●
	Service the air cleaner element					●	●
	Check the radiator core					●	●
	Flush the radiator						●
Torque Conv., Transmission and Winch System	Check the hydraulic system for leaks		●	●	●	●	●
	Check the trans. torque conv. winch breathers		●	●	●	●	●
	Check and adjust the trans. linkage					●	●
	Check the trans. clutch, conv. out pressures and oil cooler pressure drop					●	●
Steering and Blade System	Check the hydraulic systems for leaks		●	●	●	●	●
	Clean the hydraulic reservoir breather		●	●	●	●	●
	Check the main relief pressure in the steering and blade control valve					●	●
	Check and adjust the steering and blade levers					●	●
Electrical System	Check the lights		●	●	●	●	●
	Service the batteries		●	●	●	●	●
	Clean and tighten the electrical connections					●	●
	Inspect, test and lubricate the electrical units						●
Axles, Drive Shaft, Wheels and Tires	Check the tire pressure and casings	●	●	●	●	●	●
	Tighten the wheel nuts and inspect the rims		●	●	●	●	●
	Check and repair drive line noises						●
Brake System	Check and adjust the brake linkages				●	●	●
Midmount Bearing	Change the grease in the Pillow Block						●
	Check the Midmount Bearing Breather		●	●	●	●	●
General Maintenance	Visually inspect the machine	●	●	●	●	●	●
	Clean the cylinder rods		●	●	●	●	●
	Adjust and lubricate the operator's seat				●	●	●
	Tighten all mounting bolts					●	●
	Steam clean the machine					●	●
	Inspect the frames						●

INTENTIONALLY BLANK