

RANGER OPERATORS INSTRUCTION MANUAL

P/N R6402R-1

INTENTIONALLY BLANK

RANGER

664C/666C

FOR SERIAL NUMBERS

| | |
|-------------------|------|
| 664 Cable - | 514H |
| 664 Cable Turbo - | 546H |
| 664 Grapple - | 508H |
| 666 Cable - | 513H |
| 666 SWB - | 526H |
| 666 Grapple - | 515H |
| 666 Grapple - | 542H |
| 666 Cummins - | 500H |

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

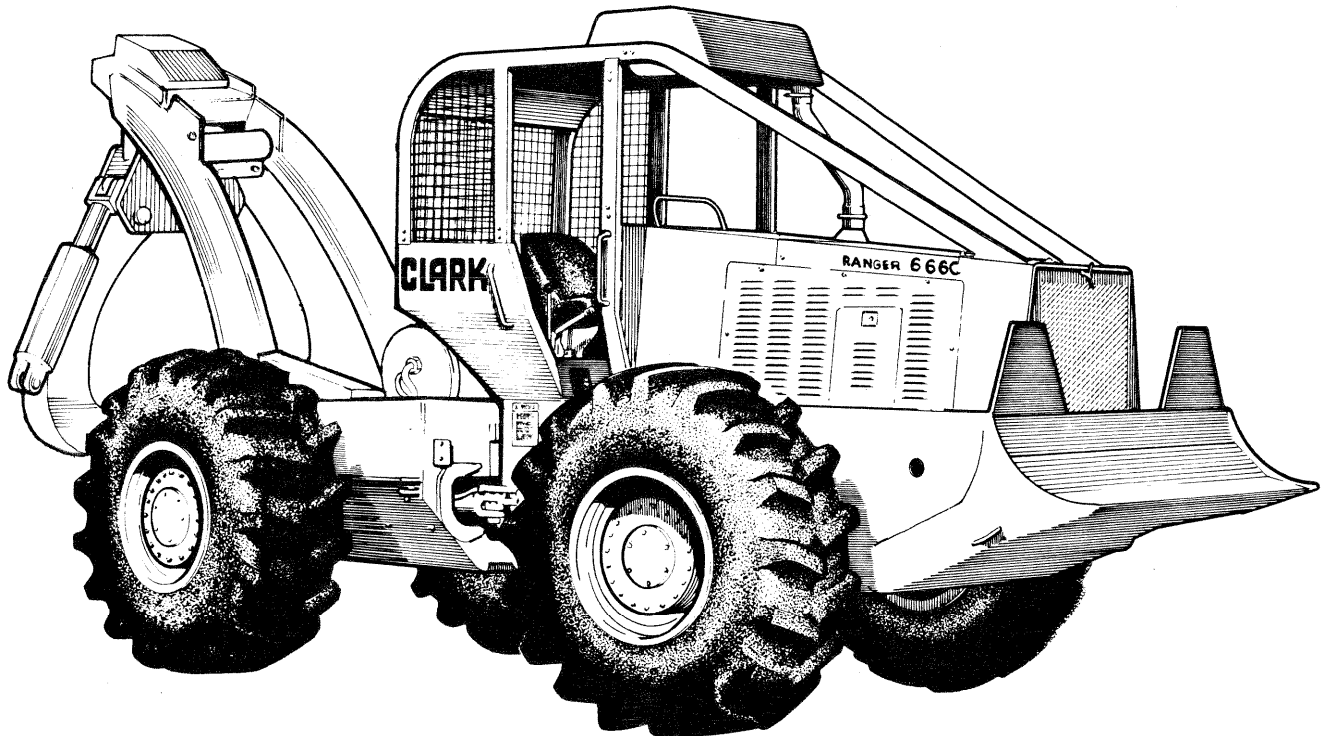
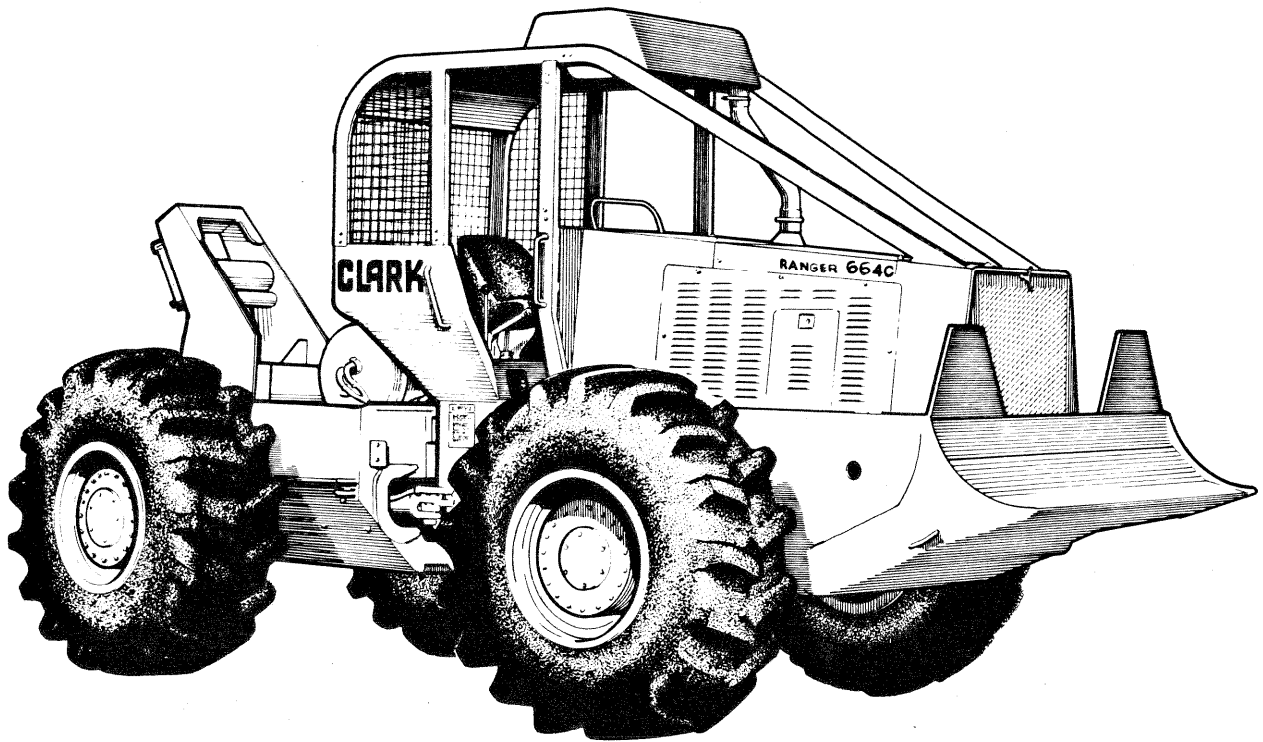
Machine Serial _____

Engine Model _____

Engine Serial _____

OPERATOR'S MANUAL

NO. 6402 R-1



TO OWNERS

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

You have purchased this Ranger Log Skidder machine with the expectation that it will give you long and faithful service. In its construction, we have taken every precaution to see that you get an efficient, 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.

For these reasons, we take the liberty of suggesting that your Ranger Log Skidder will always respond at its best with considerate treatment and care. The slight outlay in personal attention and the cost required to give it regular and proper lubrication, inspection, and such adjustments as may be necessary, will repay you many times in low cost operation and trouble-free service.

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

Operating instructions for many options are given in this manual. The photographs and illustrations in this manual may show optional equipment.



This SAFETY ALERT SYMBOL will appear at various points in this manual and on the machine to accompany WARNING statements. When it appears, PAY ATTENTION, BECOME ALERT, YOUR PERSONAL SAFETY IS INVOLVED.

IMPORTANT

UNAUTHORIZED MODIFICATION OF ROLL-OVER PROTECTIVE STRUCTURES (ROPS)

Do not make unauthorized modifications or alterations to the ROPS such as: welding on fire extinguisher brackets, CB antenna brackets, or fire suppression systems. Unauthorized modifications will affect the structural limits of the ROPS and will void the certification.

The Roll-Over Protective Structures (ROPS) manufactured and sold by VME Americas Inc. have been certified to meet specified test requirements. These certifications are required by the Canada Standards Association under CSA B352 and by the U.S. Department of Labor under OSHA Regulation 1926.1000.



















Any planned modification or change must be reviewed in advance by the Engineering Department of VME Americas Inc., to determine if the modification or change can be made within the limits of the certifying tests.

It is important that each person in your organization, including management, be made fully aware of these rules involving the ROPS.

Whenever anyone sees a machine ROPS with unauthorized modifications or changes, both the customer and the factory should be notified in writing.

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NOTES

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INTRODUCTION

Your Ranger Log Skidder is designed and manufactured for rugged, heavy duty logging applications. A powerful Detroit Diesel engine supplies power to the Clark drive train components.

Power from the engine comes through a Clark torque converter with a three to one torque multiplication factor to a power shifted, full reversing transmission and finally to the Clark winch and axle assemblies. All components are joined with universal slip joint drive shaft assemblies.

The axle assemblies are Clark all wheel drive units. All differentials are full floating, spiral bevel, ring gear and pinion types and further reduction is provided by planetary gear sets in the wheel hubs.

Steering is controlled by a single lever which articulates the machine at a mid point by two hydraulic cylinders. The blade and grapple assemblies are also hydraulically operated.

This manual contains valuable periodic service information to keep your machine trouble-free and operating at its peak of performance. Any problems and/or adjustments not in this manual can be handled by the Service Department at your Ranger Distributor.

A great deal of the checks and adjustments are recommended to be done at *Operating Temperature*. The operating temperature of the engine is 66°C (150°F), as indicated on the engine water temperature gauge. The operating temperature of the transmission/converter system is between 82°C and 93°C (180°F and 200°F) as indicated by the converter oil temperature gauge. The operating temperature of the hydraulic system is between 66°C and 77°C (150°F and 170°F). This can be reached after the recommended warm-up procedures.

Warm the engine as follows:

Run the engine at idle for three to five minutes, then at 1000 RPM for three minutes and at 1800 RPM for three minutes.

NOTE: If the machine is equipped with a hand throttle, lock the throttle at the desired position to facilitate warm-up.

NOTE: DO NOT accelerate the engine to its maximum RPM until it has reached its operating temperature.

Warm the transmission/converter oil as follows:

Put the transmission control levers in the FORWARD and THIRD positions and stall the converter with the parking and service brakes applied and the wheels blocked. Stall the converter for 30 seconds and then shift the levers in neutral for 15 seconds.

Warm the hydraulic oil as follows:

With the engine operating between 1400 to 1500 RPM, operate the steer and blade system over relief pressure for five seconds every 10 seconds. Hold the cylinders open or closed to bring the pressure over relief.



WARNING: Before doing any work on your machine, make sure that you follow these instructions to put your machine in the SERVICE POSITION. For your safety and the safety of those around you, we recommend the positions as follows:



Fig 1-1

1. Park the machine on level ground if it is to be serviced away from the shop.

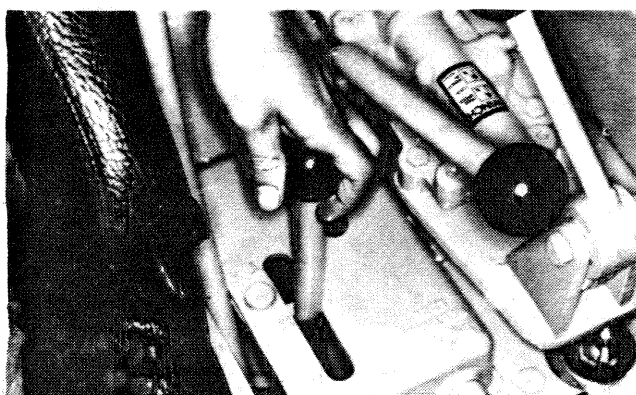


Fig 1-2

2. Put the direction control lever in the NEUTRAL position and engage the neutral lock mechanism.

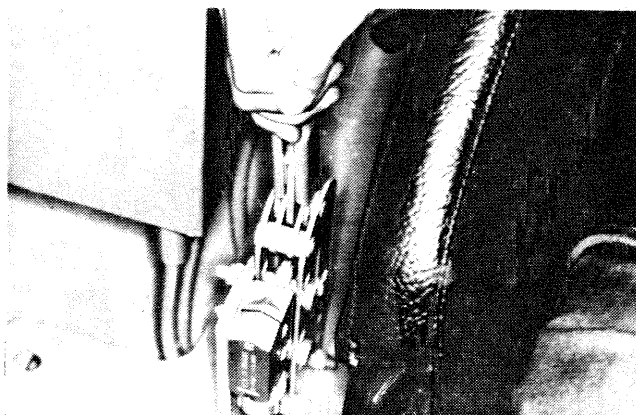


Fig 1-3

3. Actuate the parking brake.

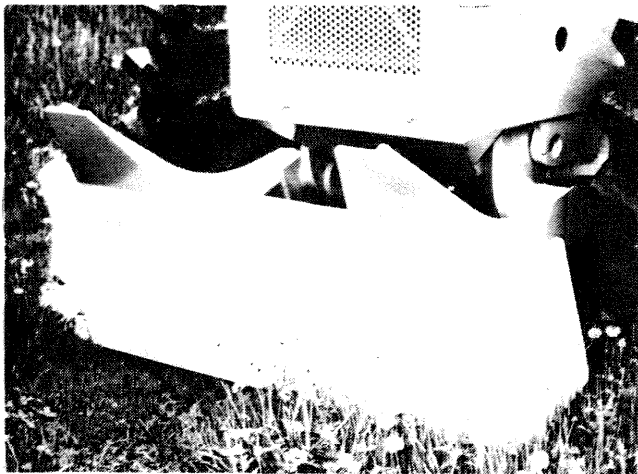


Fig 1-4

4. Lower all hydraulic attachments (blade and grapple assemblies) to the ground.

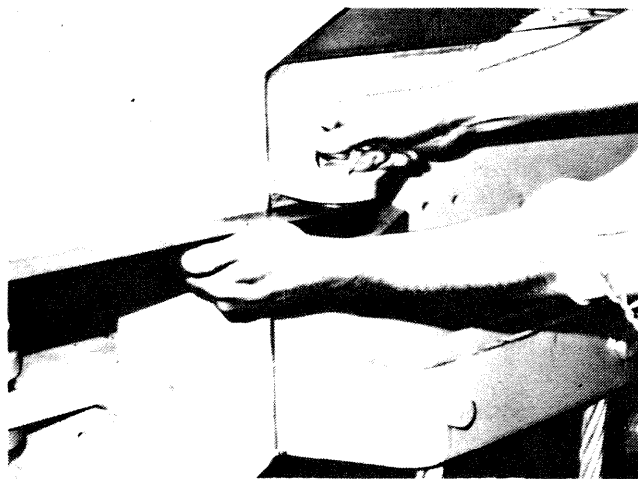


Fig 1-7

7. Fasten the articulation lock between the frames.

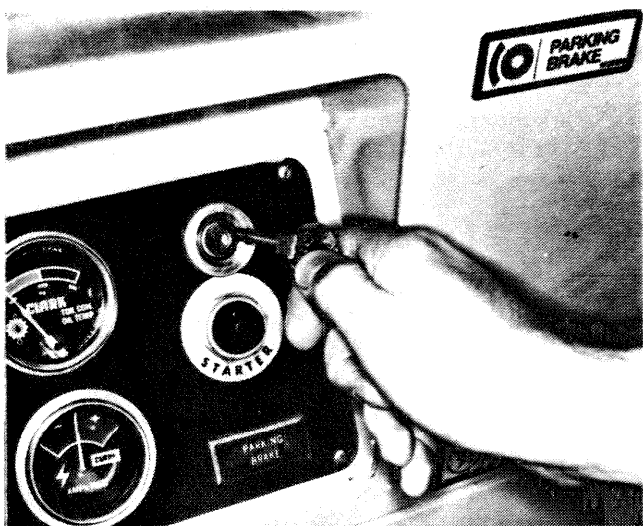


Fig 1-5

5. Stop the engine and remove the key from the ignition switch.



Fig 1-8

8. Fasten a red warning flag to the canopy upright to indicate that the articulation lock is fastened.

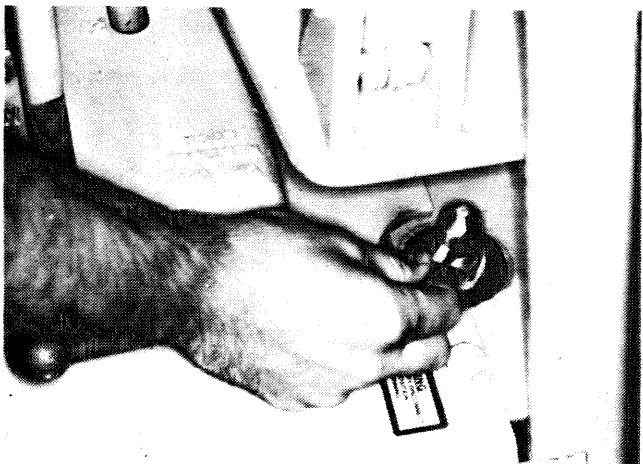


Fig 1-6

6. Turn the battery disconnect switch to the OFF position.



Fig 1-9

9. Block the tires.

OPERATING SAFETY INSTRUCTIONS

This SAFETY ALERT SYMBOL will appear at various points in this manual and on the machine to accompany WARNING statements. When it appears, PAY ATTENTION, BECOME ALERT, YOUR PERSONAL SAFETY IS INVOLVED.

Your Ranger Log Skidder is heavy equipment and must be treated with care and respect. Be a careful and efficient operator and observe the following simple but fundamental rules of safety to avoid unnecessary and careless accidents. Read and understand this manual before you operate the machine.

The following personal safety rules should be followed to protect yourself and your co-workers.

1. Be careful not to strike persons or vehicles with the machine.
2. DO NOT leave your machine with the engine running or with any hydraulic implements (blade and/or grapple assemblies) in their raised positions.
3. Be careful when operating the machine on steep grades to avoid sudden tipping.
4. When making repairs or doing any service to the machine, ALWAYS put the machine in the Service Position (See Sec. 1).
5. Be aware of the hazards from tree limbs and other overhead obstructions. Watch out for stumps and all ground obstructions.
6. NEVER use the transmission as a downhill brake, (operating the transmission in reverse when travelling forward down a hill). The engine can stall and the steering system will not operate.
7. ALWAYS obey ALL safety decals; they are there for your protection and the protection of those around you.
8. NEVER carry passengers in your machine; there is only one seat and it should carry only one person.
9. Take special care when operating in wet or icy conditions.
10. NEVER use the blade as a brake when travelling.
11. NEVER travel in the NEUTRAL mode when you operate on a grade.
12. ALWAYS operate your machine at speeds that are safe for the conditions of each job.

The following personal safety rules should be followed to protect yourself and your co-workers:

1. NEVER wear jewellery or loose fitting clothing such as scarves, loose cuffs or fringed jackets.

2. Know and understand all the safety equipment on your job site and use it when you need it.
3. Know and understand all the hand signals used on the job and always obey the signalman.
4. Allow only trained operators to use the machine; read and understand this manual before you operate the machine.

Before you start the machine, observe the following instructions:

1. Walk around the machine and warn all persons in the area before you enter the operator's compartment.
2. Report or correct all apparent machine malfunctions.
3. Note all hazards and obstructions such as ditches, electrical wires and wheel blocks.
4. Ensure proper ventilation if you are going to start the machine indoors.
5. Be particularly careful if this is not the machine you normally operate.

When you enter or leave the operator's compartment, observe the following instructions:

1. Make sure all steps and handles are free of grease, oil and mud. Keep hands, floor and all controls clean.
2. NEVER leave the machine unattended with the engine running.
3. ALWAYS put the transmission in the NEUTRAL mode, engage the neutral lock, lower the blade and actuate the parking brake when you leave the operator's compartment.
4. NEVER leave or enter the operator's compartment when the machine is moving.
5. ALWAYS actuate the parking brake and lower the blade when you park the machine, block the wheels when you park on a grade.
6. At the end of the work shift, or when the machine is not to be operated, turn the battery disconnect switch to the OFF position.

When you start or stop the machine, observe the following instructions:

1. Remove or secure all maintenance or personal items such as lunch boxes, chains, and tools.
2. Start the engine from the operator's seat.
3. ALWAYS apply both the service brake and the parking brake before you start the machine.

Before you put the machine in motion, make the following checks:

1. Check all gauges and instruments for incorrect or abnormal operating conditions. Report or repair any problems.
2. Operate the machine slowly in the forward direction and test the steering system. Steer completely to the left and right and report or repair any problems.
3. Test the service and emergency (if applicable) brake systems against the power of the engine and report or repair any problems.
4. Test the auxiliary steering system.

When you are operating the machine, observe the following instructions:

1. NEVER stand in the articulation area when the engine is running.
2. When you are filling tires, stand away from them to avoid serious injury in case of a rupture.
3. Use extreme caution when removing radiator caps, tank filler caps, and drain plugs.
4. DO NOT attempt repairs you do not understand, ask for help if you need it.

Forest fires are both costly and dangerous. Fire prevention must be foremost in the mind of a skidder operator. Follow these instructions to reduce the chance of fire:

1. Keep your hand fire extinguisher charged and in good working order at all times.
2. Make periodic checks of all electrical connections and make note of any frayed or broken wires. Repair any electrical faults immediately.
3. Check all fuel and hydraulic lines for damage and loose connections. Repair these promptly and clean up any leaked fluid.

4. Clean all debris such as leaves, needles and twigs after each work shift. Periodic steam cleaning of the frames and articulation area will help prevent build-up of flammable materials.
5. Take care to clean up any spilled fluids to reduce the chance of a fire.
6. Non turbocharged 664C machines, and all 666C machines, are factory equipped with a regulation (U.S.D.A. Forest Service) approved spark arrestor installed in the exhaust system. All machines that are to be operated on or near forest-covered, brush-covered, or grass-covered lands must be so equipped and maintained in proper working order to comply with certain government requirements. Failure to maintain this device may be violation of certain regional or local laws. See Sec. 6 for spark arrestor service instructions. A turbocharged engine is approved as a spark arrestor device and requires no spark arrestor service.

IMPORTANT NOTE: On machines with enclosed cabs, an escape hatch is provided at the front of the operator's seat. Remove the keeper pins around the front windshield and push out the window to exit from the cab if the doors are jammed closed for any reason.

AFEX FIRE SUPPRESSION SYSTEM

If your machine is equipped with an Afex Fire Suppression System, refer to the Lease Afex, Inc. service manual for operation and maintenance instructions. It is RECOMMENDED that you take time to read this manual and become familiar with the system and all its operation and maintenance procedures. NOTE: The hand fire extinguisher is still standard on the machine, know how to use it and keep it charged.

OPERATING CONTROLS

The controls on the left hand side of the operator's seat are as follows:

Winch Control Lever



Fig 3-1

This lever actuates the winch control valve to operate the winch. When the lever is pulled to the rear **FREE SPOOL** position, the winch mainline can be pulled out from the winch cable drum. When the lever is pushed to the front **WINCH IN** position, the winch cable drum will rotate and pull the logs up to the machine's butt pan. When the lever is in the centre **LOCK** position the cable drum is held in the **SKIDDING** position and the load can be pulled.

NOTE: The winch cable is fastened to the grapple assembly on the grapple skidder and should be drawn up tight against the butt pan when travelling without a load.

Battery Disconnect Switch



Fig 3-2

Turn the switch to the **OFF** position to disconnect the current supply from the battery to the electrical system. This switch should be in the **OFF** position when you do any work on the machine especially arc welding.

IMPORTANT NOTE: Do not turn this switch to the **OFF** position when the engine is operating. Serious damage to the alternator and electrical system can result.

Direction Control Lever

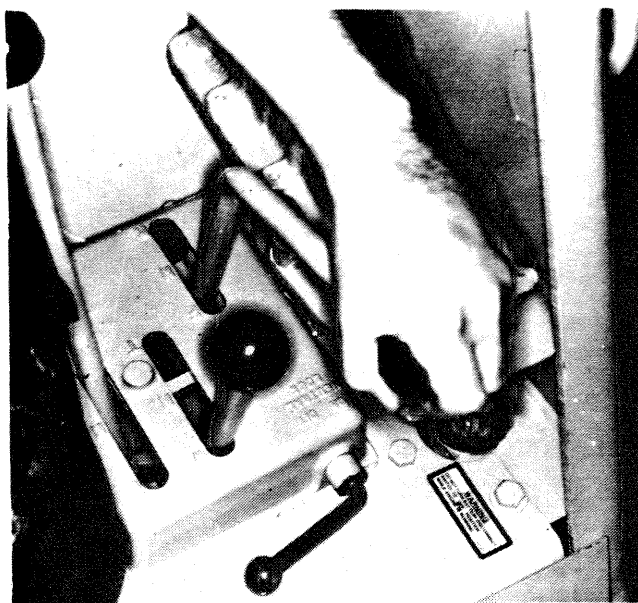


Fig 3-3

This lever is connected to the transmission control valve and controls the transmission's **FORWARD** and **REVERSE** functions and has a centre **NEUTRAL** position.

Neutral Lock

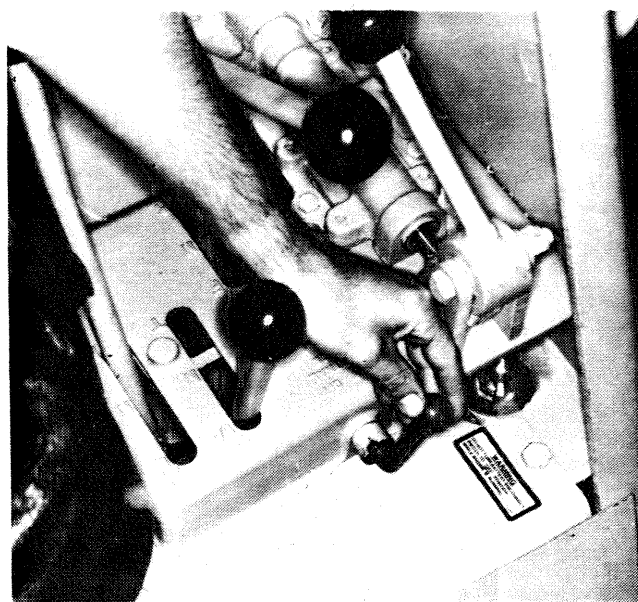


Fig 3-4

Turn this lever to the right when the Directional Control Lever is in the **NEUTRAL** position to lock the lever in that position.

Speed Range Control Lever

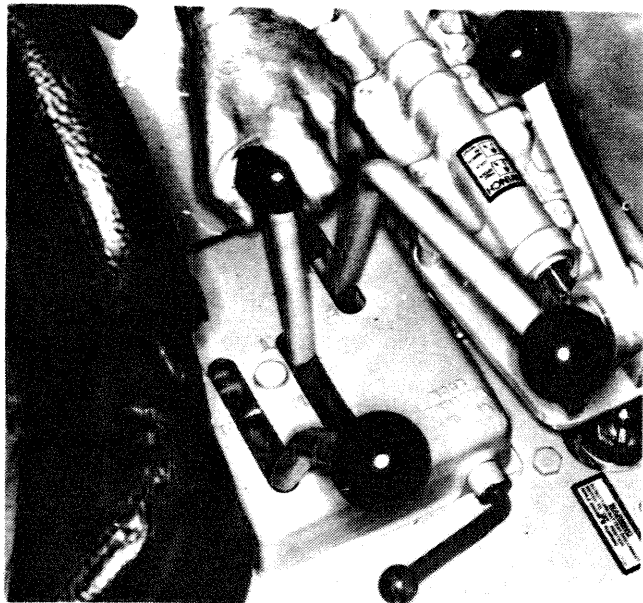


Fig 3-5

This lever is also connected to the transmission control valve and controls the transmission's FIRST, SECOND, and THIRD speed ranges. The lower the range selected, the less strain is on the engine when a load is being pulled.

Work, Travel Range Control Lever



Fig 3-6

This lever works with the Speed Range Control Lever to provide three transmission range selections. The combination of LOW and WORK ranges provides FIRST gear, LOW and TRAVEL provides SECOND gear, and HIGH and WORK provides THIRD gear. The combination of HIGH and TRAVEL is not possible because of a FOURTH GEAR LOCKOUT provision.



Fig 3-7



WARNING: The fourth gear lockout has been introduced for your safety. DO NOT attempt to remove or disable this device.

The controls on the right hand side of the operator's seat are as follows:

Steer and Blade Control Lever

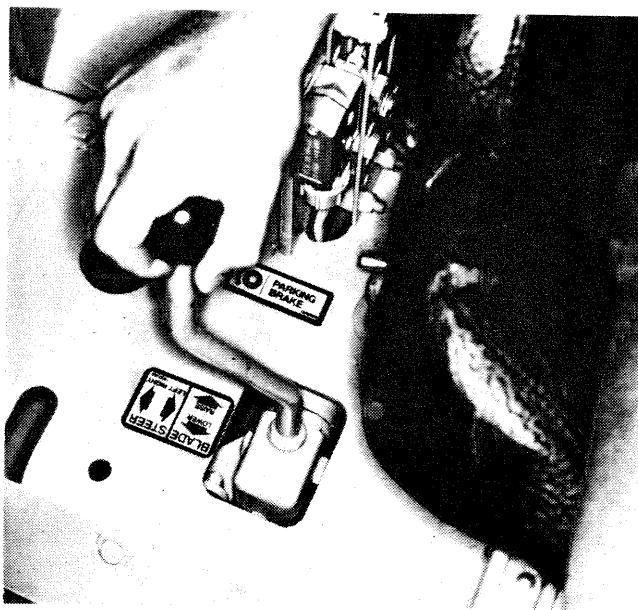


Fig 3-8

This lever is connected to the steer and blade control valve and controls both functions. Moving the lever to the left and right steers the machine to the left and right. Pulling the lever straight back raises the blade. Pushing the lever straight forward lowers the blade.

NOTE: The 666C SWB machine has no blade so this control is for steering only.

Parking Brake Lever



Fig 3-9

Pull up and back on this lever to actuate the parking brake mechanism. An indicator light on the dash panel glows when the parking brake is applied, and the ignition switch is in the ON position.

Hand Throttle

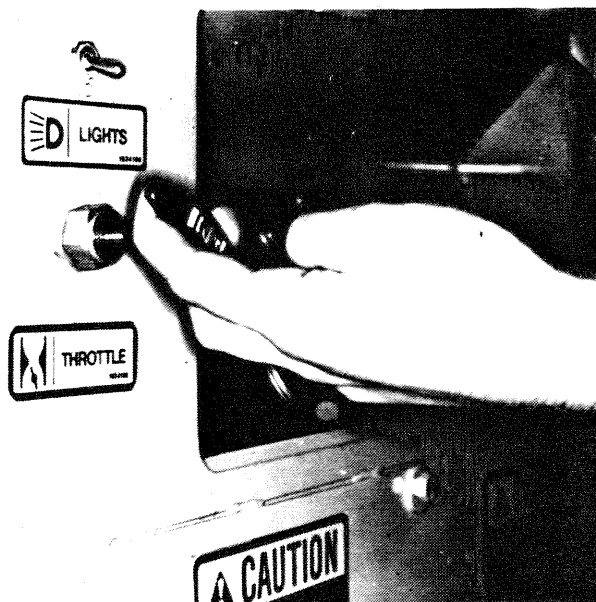


Fig 3-11

Pull the handle out until the desired machine speed is achieved and turn the handle clockwise to lock the control for a constant travel speed. Turn the handle counterclockwise to release the throttle and push the handle in to return the engine speed to idle.

NOTE: When locked, this control over-rides the accelerator pedal.

Arch, Motor Head and Grapple Control Levers

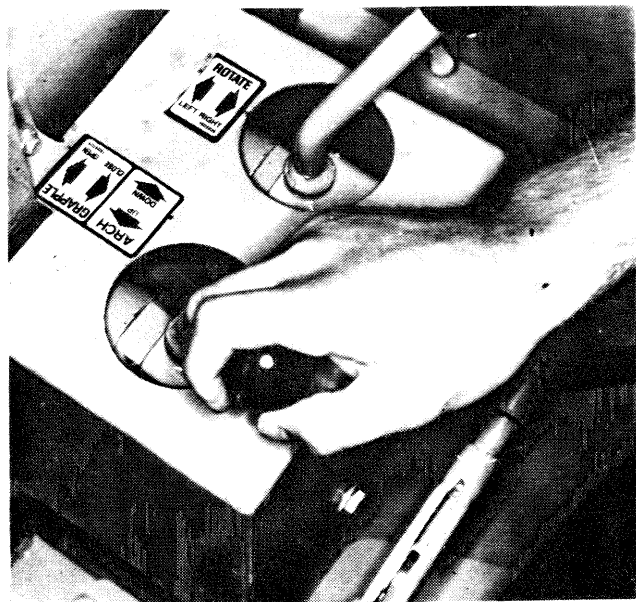


Fig 3-10

Two levers control the operation of the grapple system. The Arch Control moves the arch forward or back. The Grapple Rotating Control rotates the grapple assembly either to the left or right, and the Grapple Control opens or closes the grapple arms.

Water Temperature Gauge

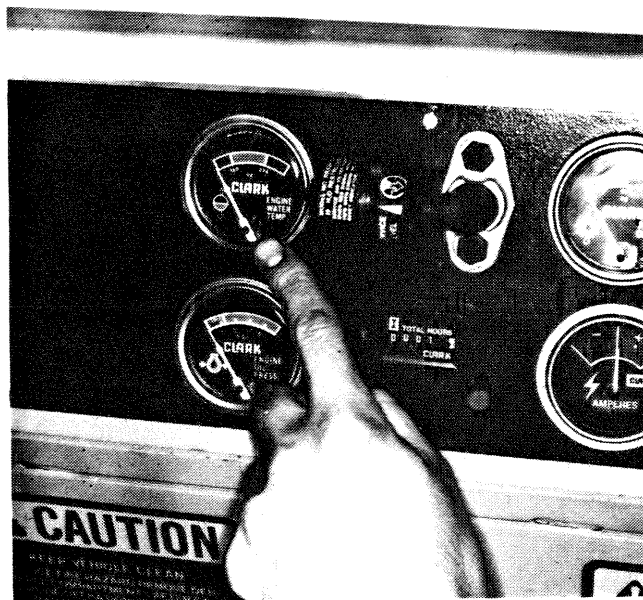


Fig 3-12

This gauge allows the operator to monitor the temperature of the engine coolant. Do not allow the indicator needle to enter the red zone on the gauge or serious damage to the engine and its components can result. If overheating does occur, check the fan belt tension (See Sec. 6) and check the radiator for debris that can restrict the air flow.

Engine Oil Pressure Gauge

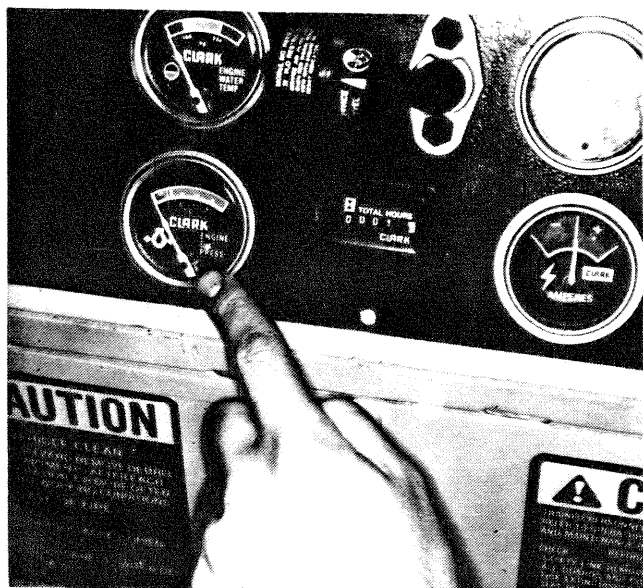


Fig 3-13

This gauge allows the operator to monitor the operating pressure of the engine lubrication system. After 15 seconds of operation, the gauge should be between 10 and 25 P.S.I. at idle. Refer to your engine service manual if the pressure is below 10 P.S.I. at idle speed.

Hourmeter

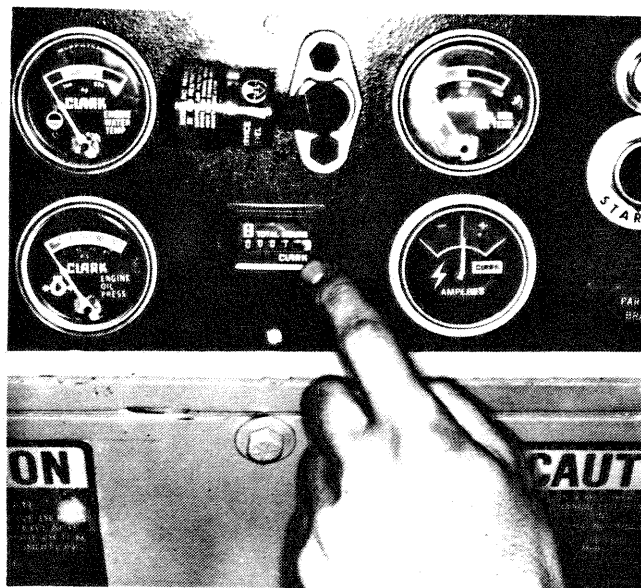


Fig 3-15

To keep your Ranger Log Skidder in optimum running condition, follow this hourmeter closely and do all required periodic lubrication and maintenance promptly as recommended in this manual.

Air Service Indicator

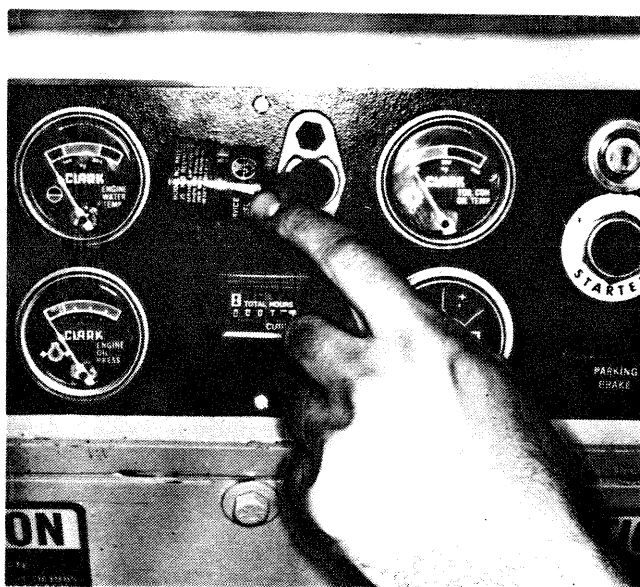


Fig 3-14

This indicator shows the working condition of the air filter elements. When the red *flag* appears in the indicator, the air filter elements should be serviced (See Sec. 6). Push the button on the end of the indicator to reset the *flag* after servicing the elements.

Converter Temperature Gauge

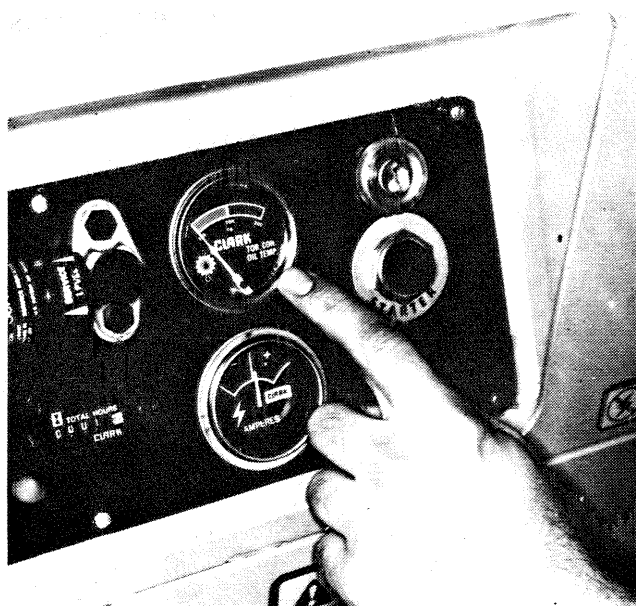


Fig 3-16

This gauge allows the operator to monitor the temperature of the converter/transmission fluid. Do not allow the indicator needle to enter the red zone on the gauge or serious damage to the system can result. If the system appears to overheat, choose a lower transmission speed range. If the system continues to operate with the needle in the red zone, a proper check should be made to determine the cause.

Ammeter

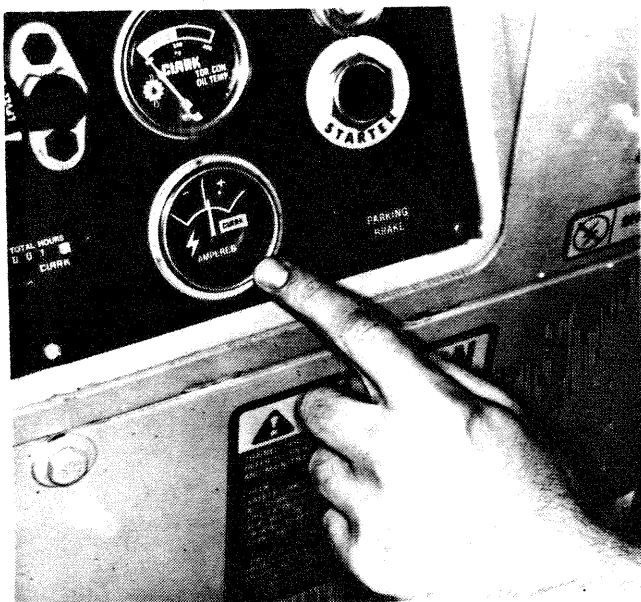


Fig 3-17

The ammeter indicates the current entering or leaving the battery (except when starting the engine). The indicator needle should show a slight charge (+) during the machine's operation. If the needle indicates either excessive charge or discharge (-) for an extended period of time, have the electrical system checked for faults.

Ignition (Key) Switch and Starter Button

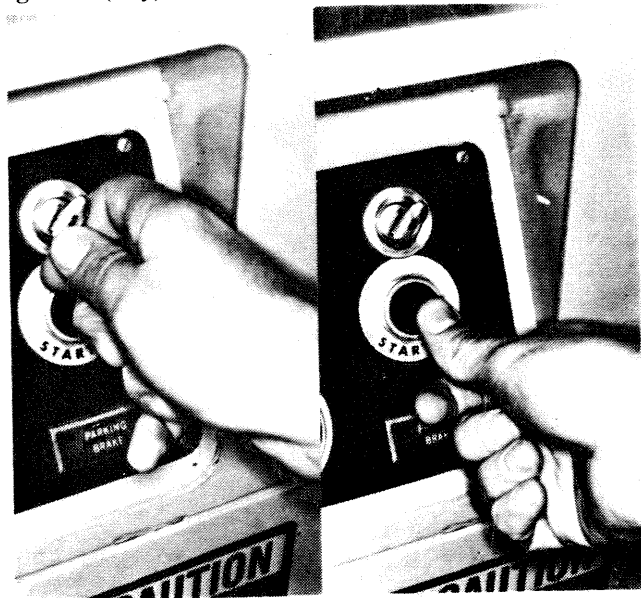


Fig 3-18

Insert the key into the Ignition Switch, put the Direction Control Lever in the NEUTRAL position, and turn the key to the (ON) position and push the starter button to start the engine. If, for any reason, the engine stops cranking suddenly while starting, push the circuit breaker on the left hand side of the instrument panel (See Sec. 14) and try again. If the engine will not crank, further troubleshooting may be required. When the engine starts, release the key.

Parking Brake Light

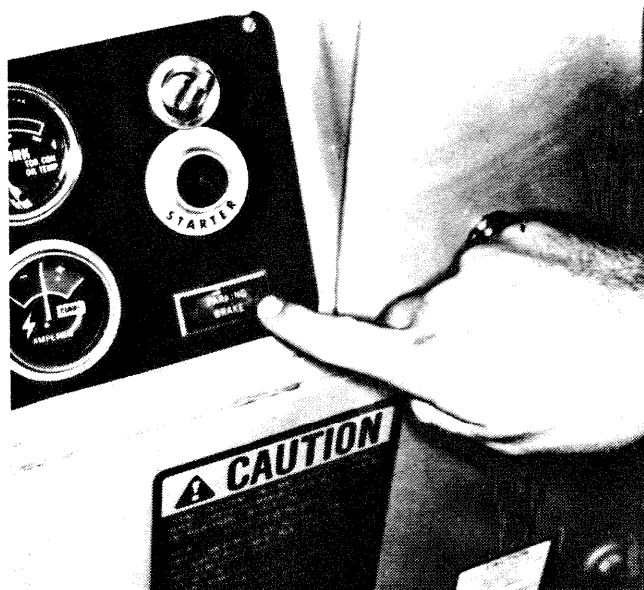


Fig 3-19

This light glows to indicate that the parking brake is actuated and the lever must be released before you move the machine.

Engine Stop Handle (Detroit Diesel only)



Fig 3-20

Pull this handle towards you to stop the engine. When the engine has stopped, push the handle in before the engine can be restarted.

Accelerator Pedal



Fig 3-21

The accelerator pedal, on the floorboard on the right hand side of the firewall, controls the throttle on the engine. Depress the pedal to increase the engine R.P.M. and the speed of the machine.

Seat Adjustment Lever

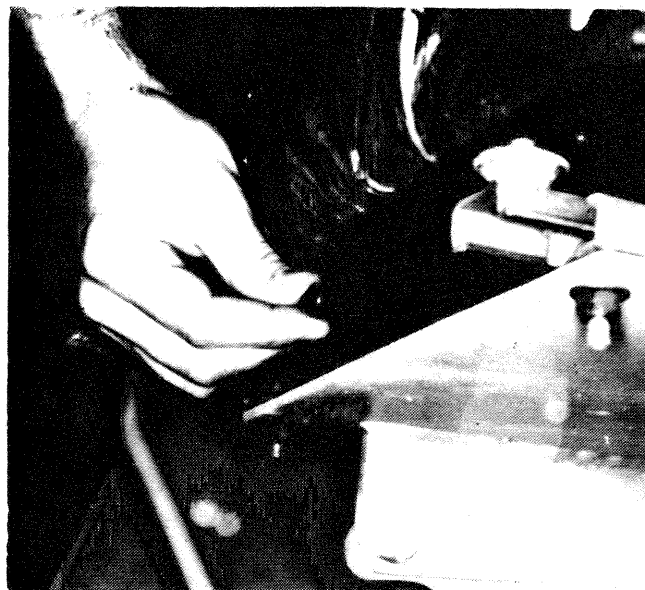


Fig 3-23

The seat adjustment lever is located to the left of the operator at the bottom of the operator's seat. Pull the lever back to allow the seat to be moved forward or backward to suit the operator.

Service Brake Pedal



Fig 3-22

The service brake pedal, on the floorboard on the left hand side of the firewall, controls the service brake system. Depress the pedal to slow or stop the machine (See Sec. 13).

Seat Belt



Fig 3-24

Always wear your seat belt when you operate your machine.

NOTE: Make sure the seat belt is adjusted to fit snugly around the hips.

Fire Extinguishers



Fig 3-25

Your machine is equipped with two 2.3 kg (5 lb) hand operated fire extinguishers mounted on the battery box behind the operator's seat. Read and understand the instructions on the canisters and know how to remove the extinguishers from the brackets in the shortest possible time.

Instruction Plates and Decals



Fig 3-26

Locate all instruction plates and decals in the operator's compartment. These contain important operation, service and safety information. Read and understand all of these instructions for safe, trouble free operation of your Ranger Log Skidder.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

STARTING INSTRUCTIONS

At the beginning of the work shift before you start the machine, make the following PRE-START checks:

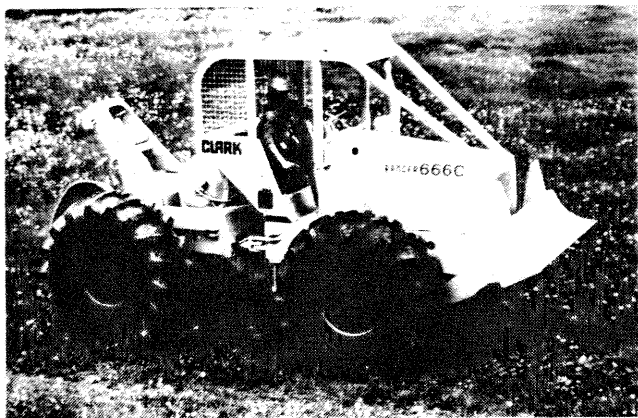


Fig 4-1

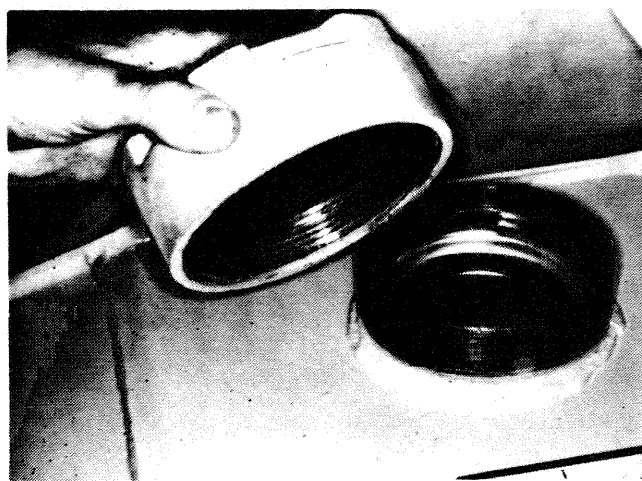


Fig 4-4

1. Put the machine in the Service Position (See Sec. 1).

4. Check the fuel level.

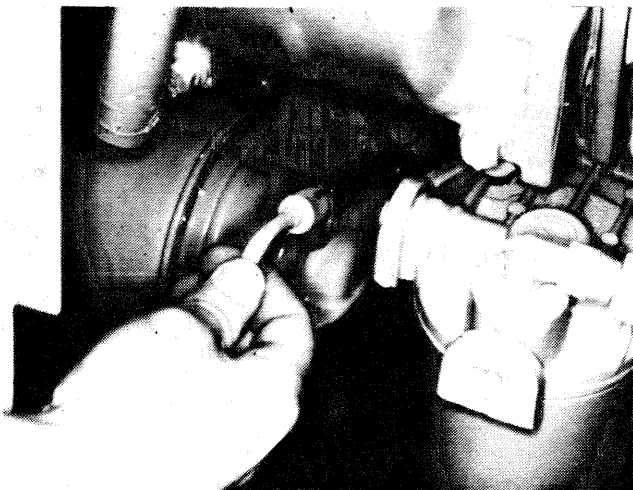


Fig 4-2

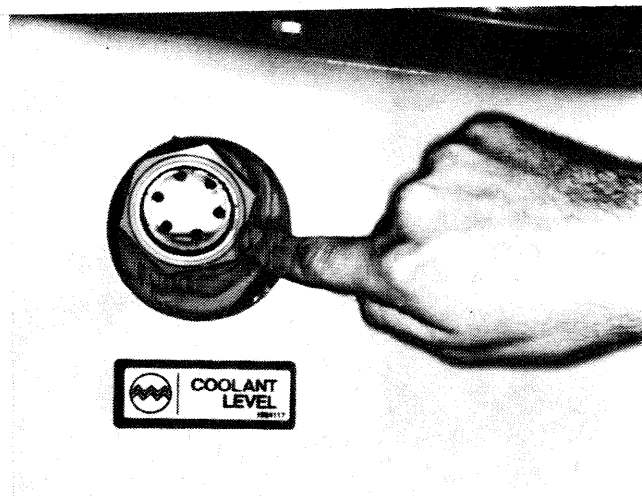


Fig 4-5

2. Check the engine oil level.

5. Check the engine coolant level.



Fig 4-3

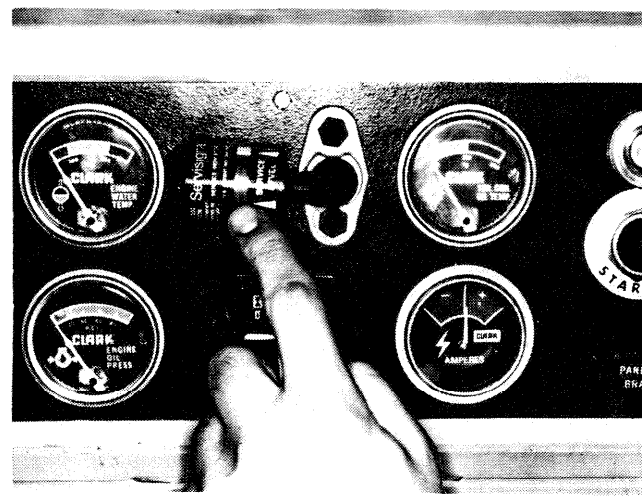


Fig 4-6

3. Check the hydraulic oil level. (See Sec. 10)

6. Check the *flag* on the air cleaner service indicator.

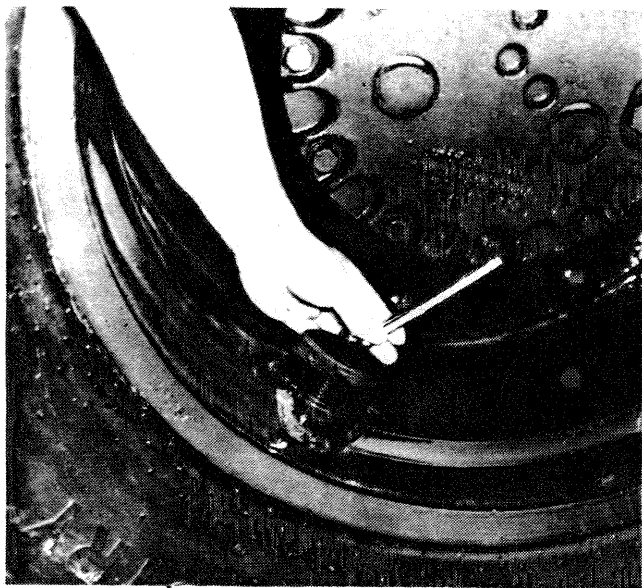


Fig 4-7

7. Check the tire pressures.

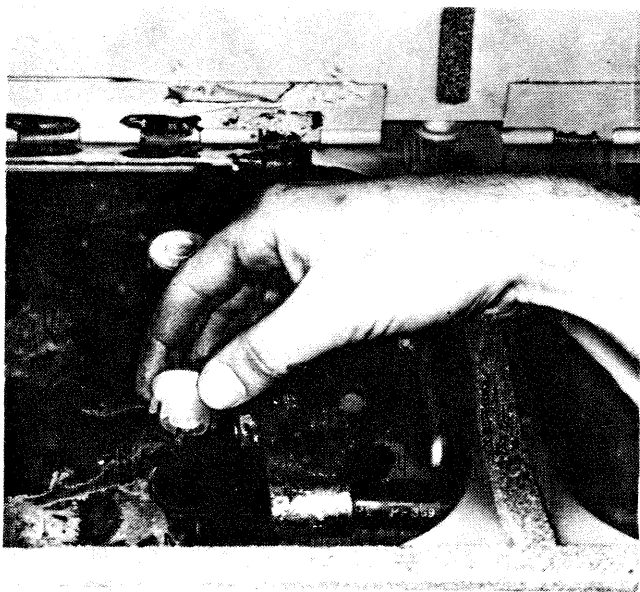


Fig 4-8

8. Check the battery electrolyte levels.



WARNING: DO NOT smoke while servicing the batteries

If these checks reveal any problems or potential problems, make sure they are corrected before you start your work shift.

ALWAYS walk around the machine and make sure that no one is in the DANGER AREA BEFORE you enter the operator's compartment.

Normal Starting Procedure (If temperatures are above 5°C (40°F).

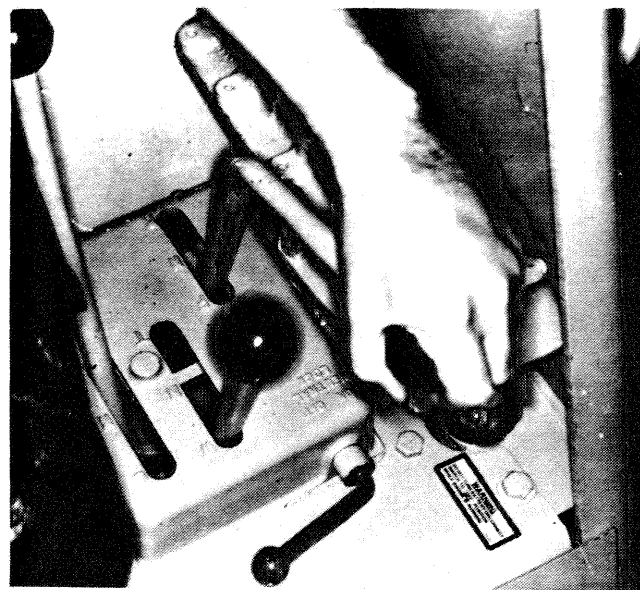


Fig 4-9

1. Put the forward and reverse control lever in the NEUTRAL position.
2. Make sure that the engine stop is pushed in to the operating position.

NOTE: If the machine is equipped with a hand throttle, make sure that it is pushed in also.

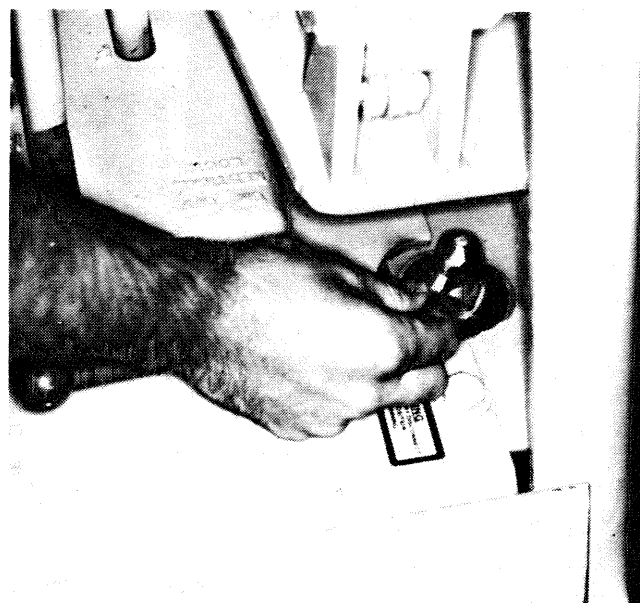


Fig 4-10

3. Turn the battery disconnect switch to the ON position.



Fig 4-11

4. Turn the key in the ignition switch to the ON position (clockwise).
5. Push the starter button to start the engine.

IMPORTANT NOTE: DO NOT actuate the starter for longer than 30 seconds if the engine fails to start promptly. Wait until the starter motor stops rotating before you repeat this step. Serious damage to the starter motor and the flywheel drive gear on the engine can result.

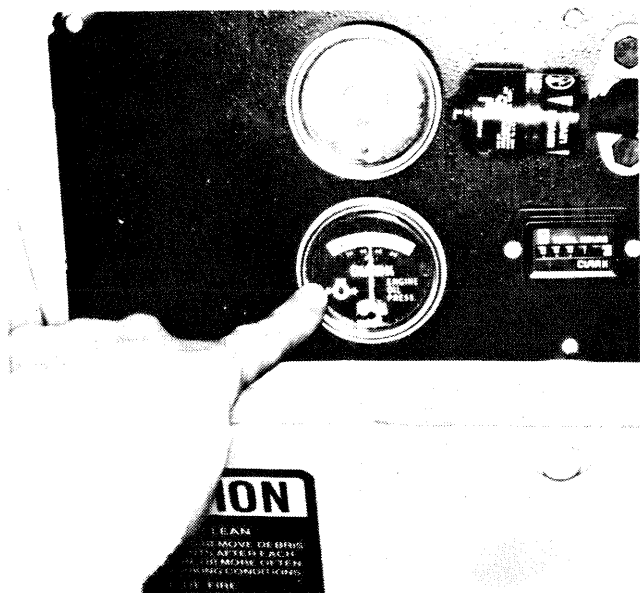


Fig 4-12

6. When the engine starts, release the ignition key or starter button and immediately check the engine oil pressure gauge. If no more than 10 PSI oil pressure is shown on the gauge after 15 seconds of operation, shut down the engine immediately and determine the cause.

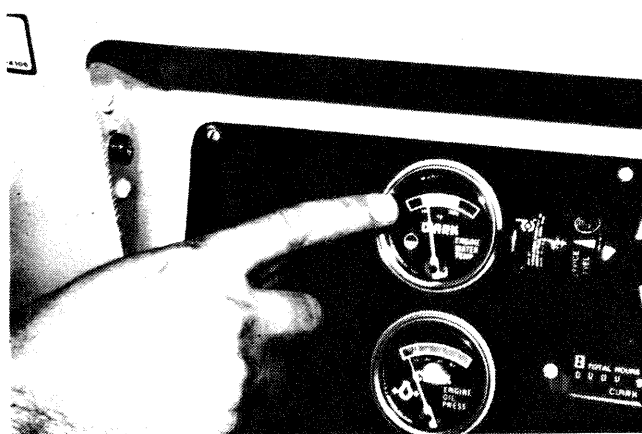


Fig 4-13

7. Allow the engine to reach its operating temperature before you operate the machine. (See Sec. 1)

Cold Weather Operation

Other than the addition of a permanent type anti-freeze to the cooling system, and the use of a suitable low temperature motor oil, extensive preparation is not required for cold weather starts. Operation at temperatures below -18°C (0°F), a change of oil in the main hydraulic system to the lubricant recommended in the lubrication chart will aid starting by reducing resistance in the main pump. Choose a good quality brand of winter diesel fuel. It may be necessary to change the lubricant in the drive axle planetary and differential housings (See Sec. 17). The most important item for cold weather starting is proper maintenance of the electrical system, especially the batteries.

Batteries must be kept clean and fully charged at all times. In cold weather their ability to deliver full power is greatly reduced. A fully charged battery at -10°C (15°F) can deliver only 70% of its rated amperage. At lower temperatures, its output is substantially reduced. Service the batteries every 50 Hours as follows:

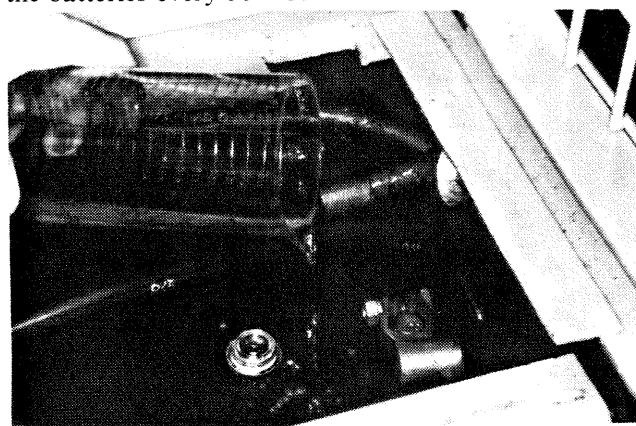


Fig 4-14

1. Add distilled water to cover the plates, but do not overfill the cells. Overfilling dilutes the electrolyte, and causes spattering in the electrolyte. Diluted electrolyte can freeze or cause corrosion in the terminals.

NOTE: Add water during the work shift to allow the charging system to mix the electrolyte and prevent the water from freezing.

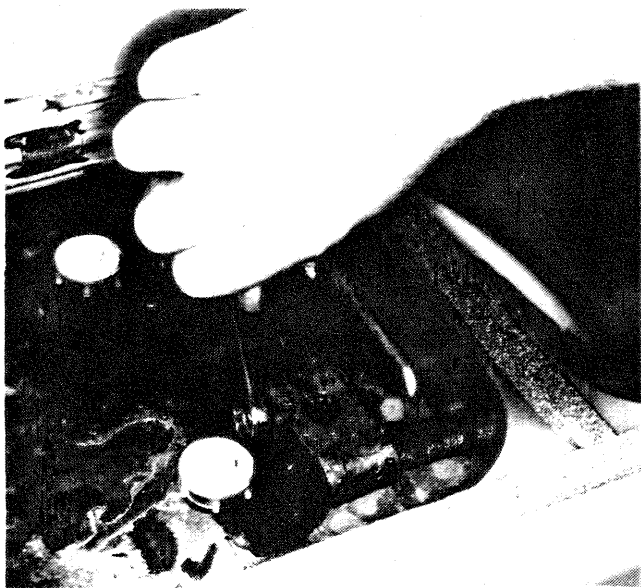


Fig 4-15

2. Keep the terminals and batteries clean and make sure the connections are tight. Loose or dirty terminals restrict current flow.

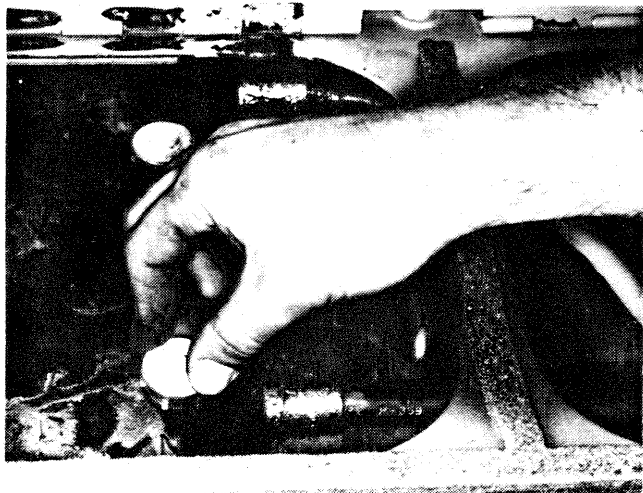


Fig 4-16

3. Keep the vent plugs in place, and installed tightly, to keep foreign material from the cells.

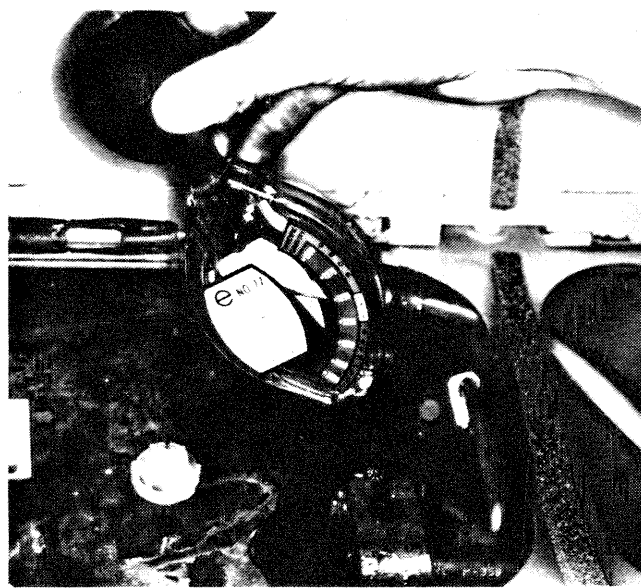


Fig 4-17

4. Check the specific gravity of the electrolyte regularly with a hydrometer. Recharge or replace batteries that show continual low readings.

NOTE: If periodic checks show that the specific gravity is consistently low, have the electrical system checked. The alternator voltage regulator, or batteries themselves may be at fault.

OPERATING THE MACHINE

BEFORE you put the machine in motion, make sure that the articulation lock has been removed and has been secured to the rear frame so the machine can be steered. Remove all blocks from the tires.

Make sure all persons are clear of the danger area.

Fasten the seat belt.

Raise the blade (and grapple assembly) to its operating height.

Put the transmission in the desired directional and speed range positions.

Release the parking brake.

Depress the accelerator pedal to put the machine in motion.

Your Ranger Log Skidder employs a Clark powershift transmission which allows a shift to a higher speed range even at full throttle. When shifting to a lower speed range, accelerate the engine to reduce the drag from the wheels.

As you move to the work area, take care to avoid any obstructions such as rocks and stumps that could cause the machine to upset. Check all gauges to see at a glance if all systems are operating correctly.

Pay attention to the surrounding terrain and notice if there is a quicker and easier way to return. Remember, the skidder will behave much differently with a load. The change in mobility may make it necessary to choose a different return route.

Work The Cable Skidder As Follows:

When you enter the stump area, make a slow turn to see the best position to approach the logs with the least amount of effort and time. Avoid obstructions that can snag or tangle the load.

Put the direction control lever in the NEUTRAL position, apply the neutral lock lever, lower the blade and apply the parking brake.

Put the winch control lever in the FREE SPOOL position.

Remove your seat belt and dismount from the operator's compartment.

Go to the rear of the machine and pull the mainline and chokers from the winch cable drum to the ends of the logs to be skidded.



WARNING: When handling winch cables, ALWAYS use protective gloves.

Attach the chokers to the logs about 60 cm (24 in) from the ends and pull them snug.

NOTE: The size and number of logs you can skid at one time depends on the terrain and conditions in which you are working and on the nature of the wood itself. Only experience and common sense can tell you the load you should skid at one time.

With the chokers secured, remount the skidder and fasten your seat belt.

Before you pull in the logs, make sure that the machine is in line with the general direction of the logs' travel.

Lift the blade and release the parking brake.

Put the winch control lever in the WINCH-IN position, and pull the logs towards the rear of the machine. Remember, the speed of the cable drum is controlled by the engine R.P.M. so accelerate the engine to increase the speed of the mainline. As the logs move, they will be bunched together. Make sure the logs are bunched tightly and pull them snug against the butt pan. Put the winch control in the LOCK position and return to the landing.

As you approach the landing, take care to warn any co-workers to stand clear in case the logs become tangled and thrown by the tires.

Winching Techniques:

Bunching: When the logs are winched-in to the butt pan, they will bunch together. Increasing the speed of the mainline can help pull the load easier over obstructions but you must use common sense to avoid breaking the cable(s) on large stumps and rocks, or even overturning the machine. Bunching can be done with the machine in motion if necessary. This can help to bunch the logs under certain conditions.

Drop-Winching: If the skidder loses traction due to soft or muddy underfooting, or due to obstructions, quickly put the winch control lever in the FREE-SPOOL position and drive the machine to more stable or clear ground. Remember not to exceed the length of your mainline. When the machine is on safe ground, winch-in the load, put the winch control lever in the LOCK position and proceed to the landing.

Reverse-Winching: If the machine becomes stuck and cannot be freed in either direction, fasten the winch cable to a large tree or similar stationary object and with the direction control lever in the REVERSE position, winch in the cable under power to free the machine. The Clark powertrain will provide equal power to the winch and drive axles and provide uniform speed to the mainline and the wheels.

Once you have reached the landing, pull the logs onto the pile and while still moving forward, put the winch control lever in the FREE-SPOOL position when the logs are piled correctly.

Put the direction control lever in the NEUTRAL position, and apply the neutral lock lever. Apply the parking brake, lower the blade to the ground, unfasten your seat belt, and dismount from the machine.

Pull the mainline from the cable drum so that the chokers are loose enough to remove easily.

NOTE: Remember your gloves.

After you have removed all of the chokers, remount the skidder and fasten your seat belt.

Put the winch control lever in the WINCH-IN position and pull in the mainline until the chokers are just on the fairlead mainroller.

Release the parking brake lever, and raise the blade. Position the machine so that the butts of the logs can be evenly piled with the blade.

If you are to make a pile (decking), approach the pile in first gear, so that the most amount of power possible can be supplied to the hydraulic system to ensure adequate lifting with the blade, and pile the logs evenly.

Make periodic checks to see that the mainline and chokers are in good working condition. If they are worn or damaged they could break under stress and cause serious bodily injury to yourself or your co-workers. Replace badly worn or damaged cables promptly.

Work the Grapple Skidder As Follows:

Observe all safety precautions given for the cable skidder and remember, ALWAYS use your seat belt.

As with the cable skidder, make note of the surrounding terrain and look for the easiest route back to the landing.

With the transmission in the REVERSE mode, approach the log pile with the grapple in its highest position and the grapple arms open.

Lower the grapple so that it contacts the logs about 1 meter (3 feet) from the ends so that it will not lose any logs that are not evenly bunched. Make sure that the grapple is centered on the pile and put the transmission in the NEUTRAL mode. Apply the parking brake.

Close the grapple arms while accelerating the engine to allow sufficient power to the hydraulic system to roll the logs into a neat, compact bundle.

When the grapple arms have closed on the bundle, put the grapple control lever in the central neutral position.

Before you proceed to the landing move the load forward to the butt pan of the machine. The load should be lowered if you travel down a steep grade, especially when turning. The load should be carried as high as possible in muddy areas and when you approach the landing.

If you are to add to a pile, move along the side of the pile with the grapple in its highest position. When the load is just past the butts of the existing logs in the pile, put the transmission in the REVERSE mode and back the load onto the pile.

Open the grapple arms and release the load on the pile. Drive forward away from the pile and close the grapple arms. Put the grapple as close to the rear of the machine and as low as possible and return to the stump area for another load.

Remember, your grapple skidder has a Clark winch and equipped with a winch cable you can perform the same winching techniques described earlier in this section as the needs arise.

IMPORTANT NOTE: ALWAYS winch the grapple assembly snug against the butt pan when travelling WITHOUT a load if the grapple is not equipped with snubbers.

IMPORTANT NOTE: The RANGER 666C Extended Frame Grapple machine is equipped with grapple snubbers which prevent the grapple from swinging while travelling with a load. Before each work shift, check the grapple snubbers' performance as shown in Sec. 15.

IMPORTANT NOTE: When shutting down the machine it is important to let the engine idle for at least three minutes to allow proper cooling before shut-down.

ENGINE SYSTEMS

NOTE: Check with the *Operation and Maintenance Manual* of the engine manufacturer for lubrication and maintenance instructions of your engine and its accessories.

Every 10 Hours of Operation:

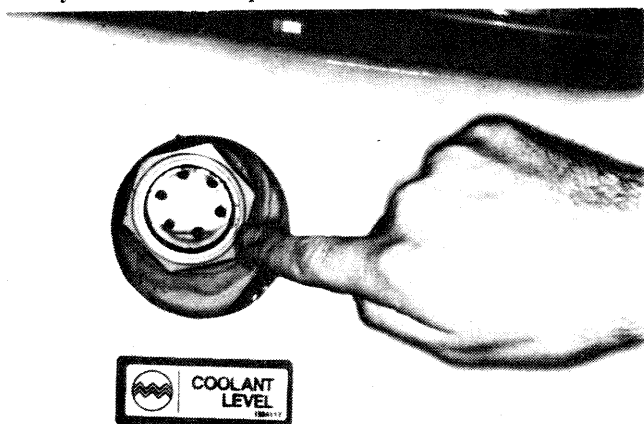


Fig 6-1

Check the coolant level at the sight gauge on the engine compartment side rail. If the level is low, add coolant to the surge tank filler hole directly above the sight gauge.

NOTE: The cooling system of your Ranger Log Skidder is factory-filled with permanent anti-freeze. Clark recommends the use of this coolant for improved cooling, low temperature protection and to reduce corrosion.

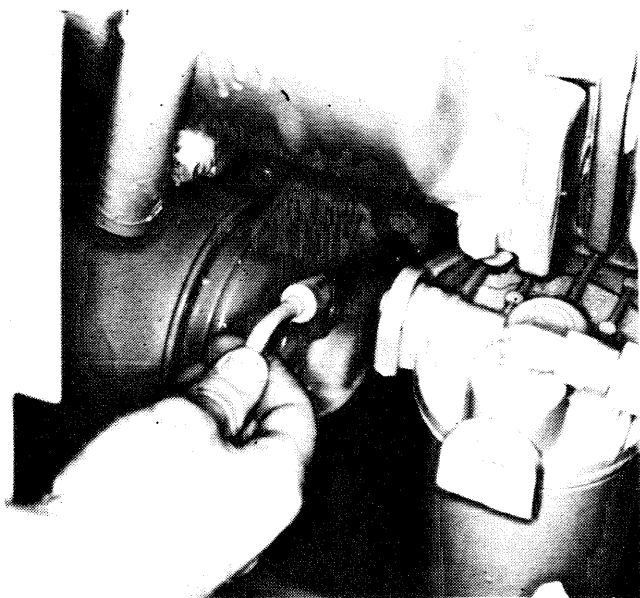


Fig 6-2

Check the engine lube oil level on the crankcase dipstick and add oil if required.

Every 50 Hours of Operation:



Fig 6-3

Check the cooling system for leaks. Inspect the radiator core as well as all hoses, clamps and fittings in both the engine cooling system and the transmission/converter oil cooler (located at the bottom of the radiator) and clean the radiator/oil cooler if necessary.

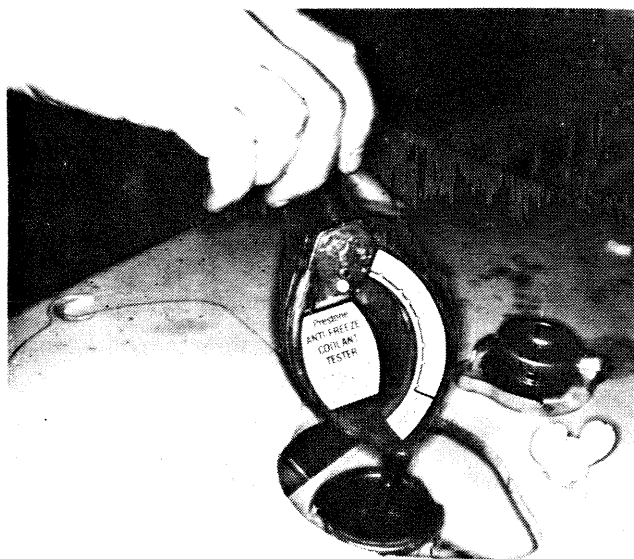


Fig 6-4

Check the freezing point of the coolant with an anti-freeze hydrometer. If the freezing point is not low enough to protect the engine, drain some of the coolant and add anti-freeze to lower the freezing point. Clark recommends the use of a solution of equal parts of Ethylene Glycol and water for maximum protection.

Service the Spark Arrestor Carbon Trap

IMPORTANT NOTE: Naturally aspirated 664C machines and all 666C machines are factory equipped with a regulation (U.S.D.A. Forest Service) approved Spark Arrestor as required by certain government regulations. These regulations also state that the spark arrestor device must be user-serviced to keep it in optimum operating condition. A turbo-charged engine is approved as a spark arrestor device and requires no such service.

CAUTION: This servicing must be done in an area where there is no danger of starting a fire due to flying sparks of hot carbon particles. Have a charged fire extinguisher available.

1. Shut down the engine and allow the exhaust system to cool.

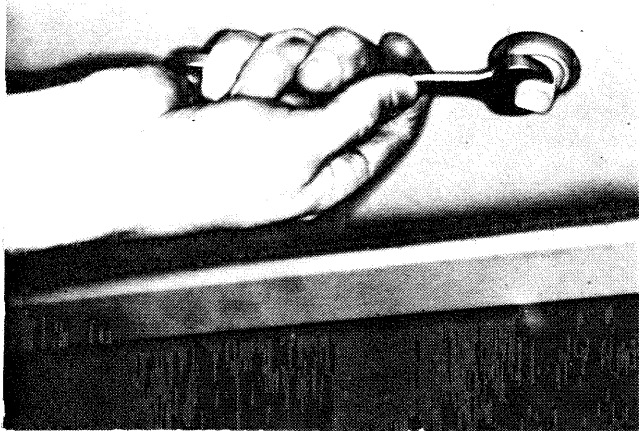


Fig 6-5

2. Remove the clean out plug.

NOTE: If a crust has formed over the hole, break it loose.

WARNING: Eye protection must be worn during this operation.

3. Start the engine and run at idle to blow collected particles from the clean out hole. If particles are slow to discharge, momentarily cover the end of the exhaust system.

WARNING: Use a large non-flammable cloth to prevent possible burns.

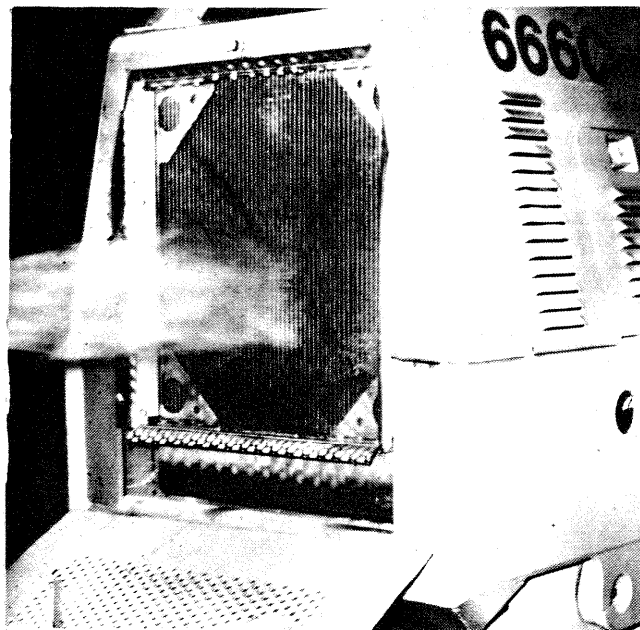


Fig 6-6

Steam clean the radiator core. Direct the steam jet in the opposite direction to the flow of air from the fan. A clogged radiator can cause overheating due to the restricted air flow.

Every 100 Hours of Operation:

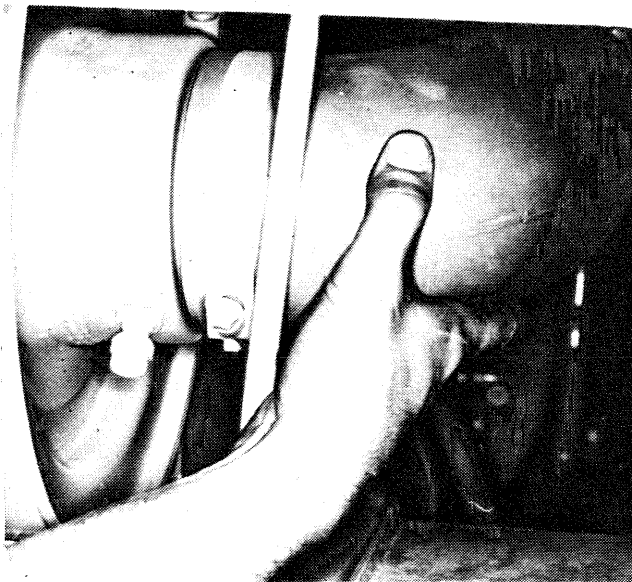


Fig 6-7

Check the flexible tube(s) between the air cleaner and the engine air intake. If they are cracked or show any signs of leakage, they must be replaced to prevent dirt from damaging the engine. Check all of the air cleaner connections and tighten the clamps if necessary. Tighten the air cleaner mounting bolts if necessary.



Fig 6-8

Check the engine drive belts. If they are worn, cracked or show signs of glaze or grease they should be replaced.

Check the throttle linkage to see that all levers, rods and bell cranks operate freely in all positions. This is to ensure that the accelerator pedal fully controls the throttle on the engine. Adjust the linkage as follows:

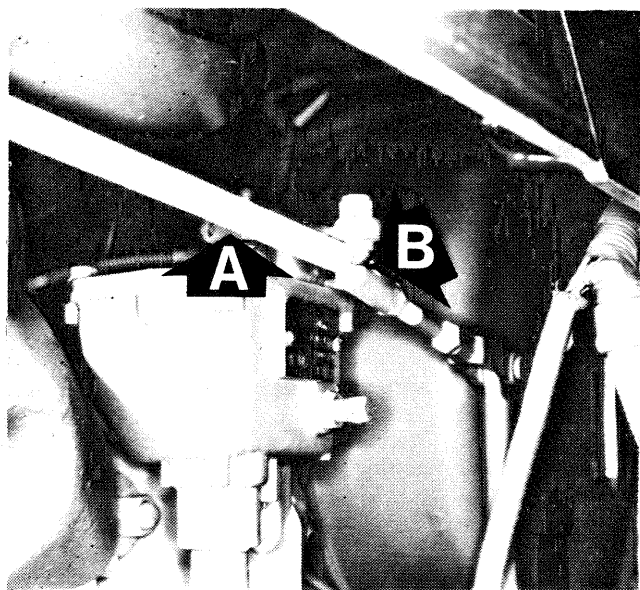


Fig 6-9

1. Unhook the spring (A) from the accelerator linkage and disconnect the ball joint assembly (B) from the throttle lever.
2. Depress the accelerator pedal until it makes contact with the pedal stop on the floorboard.
3. Turn the throttle lever by hand until it reaches its full throttle position.

4. Adjust the ball joint at the end of the accelerator rod until the threaded part of the ball joint will connect with the hole in the throttle lever with no force required on the ball joint. An additional adjustment is available at the other end of the accelerator rod if this is not sufficient.
5. Reconnect the linkage and install the accelerator spring. Release the pedal and depress it again. The throttle lever must be free to move from the idle position to full throttle when the pedal is depressed.

Every 250 Hours of Operation:

Check the drive belt tension as follows:

1. Measure the span length. This is the distance between the centres of the two pulleys.

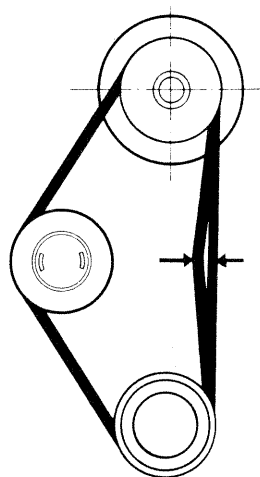


Fig 6-10

2. Attach a spring scale to the belt at the centre of the span and apply enough force to deflect the belt 1 mm for each 64 mm (1/64 inch for each 1 inch) of span.
3. Measure the outside diameter of the small pulley. If it is between 17 cm and 28 cm (7 in and 11 in) the scale should read between 3,6 kg and 5,4 kg (8 lb and 12 lb). If it is between 29 cm and 41 cm (11½ in and 16 in) the scale should read between 4,5 kg and 6,8 kg (10 lb and 15 lb). If the tension is incorrect, check your engine manual for tension adjustment. New belts should be checked after a few days of use because they will stretch.

NOTE: Drive belts must be replaced in sets to ensure even distribution of load on them.

Check the engine RPM to see that the engine is operating at its performance peak.

This will ensure that the machine will operate at its best and that the correct operating conditions exist for the transmission/converter system to operate properly. The engine RPM can be checked with the tachometer on the left hand side instrument panel.

IMPORTANT NOTE: DO NOT accelerate the engine to its maximum RPM until it has reached its *operating temperature* (See Sec. 1).

Check the low and high idle speeds. These are derived from the tachometer reading taken with no load on the engine. The correct values are located in Sec. 16 under *Specifications and Service Data*.

Check the converter stall RPM to ensure that the engine is developing its rated power and that the converter is operating efficiently. This check should be done when the oil in the converter is at its operating temperature (See Sec. 1) and the main hydraulic relief pressure setting is correct (See Sec. 10).

Check the stall speed as follows:

1. Raise the blade a few centimeters (inches) above the ground and put the machine in a full right turn. Apply the parking brake, block the wheels, put the transmission control levers in the neutral position and actuate the neutral lock.
2. Follow the engine, converter and hydraulic system warm-up procedures in Sec. 1.
3. Put the transmission control levers in the FORWARD TRAVEL, and LOW positions and depress the brake pedal.
4. Accelerate the engine to full throttle. The maximum RPM that the tachometer reads is the converter stall speed.

IMPORTANT NOTE: DO NOT HOLD the engine/converter in this stall condition for more than 30 seconds or if the reading on the converter temperature gauge is in the red area of the gauge.

5. Actuate a hydraulic cylinder to its fully closed position (such as the blade lever held in its UP position) and hold the converter in its stall position, to obtain the engine RPM reading with the main pump over relief.

Compare the stall speeds of your machine with the proper readings in Sec. 16, if they are not within the allowable figures further troubleshooting will be required. See your Ranger dealer.

Every 500 Hours of Operation:

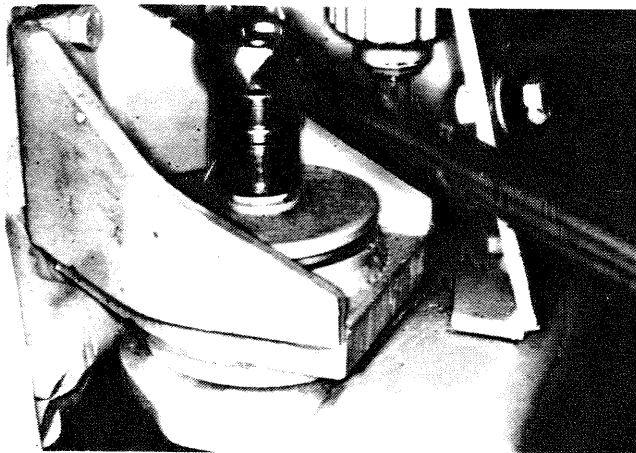


Fig 6-11

Tighten all component mounting bolts to the torques specified in Sec. 16 under *Bolt Torque Chart*. Wear and breakage can result through improperly installed mounting bolts. If no torque values are given, bolts should be tightened in a manner consistent with good workmanship.

NOTE: DO NOT overtighten.

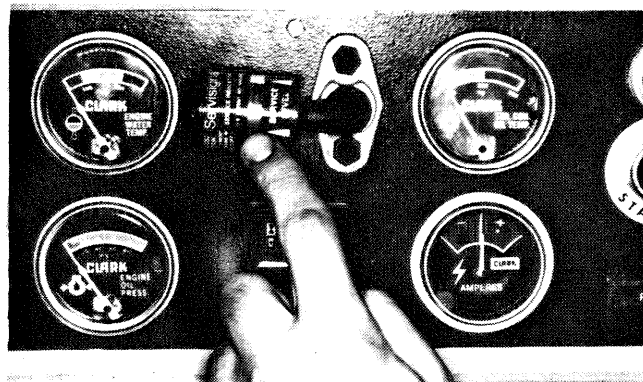


Fig 6-12

When the red flag appears in the air service indicator the air filter elements should be serviced. Locate the air cleaner assembly behind the firewall cover on the left hand side of the machine.



Fig 6-13

1. Loosen the wing-nut on the air cleaner assembly and remove the air cleaner end cap.

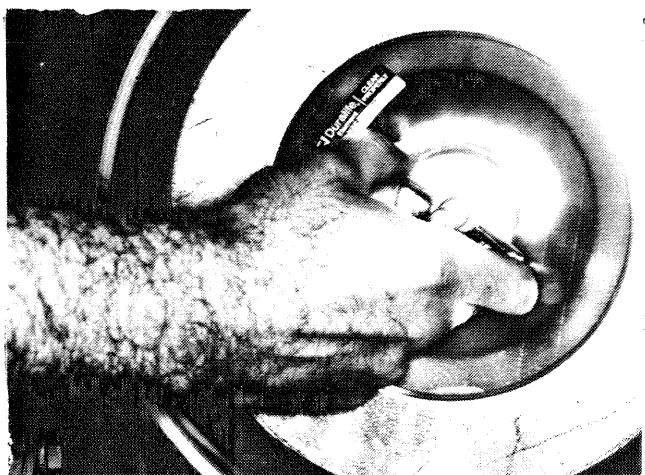


Fig 6-14

2. Loosen and remove the wing nut in the centre of the primary filter element and remove the filter elements from the air cleaner body. Do not remove or wash the safety element.
3. Use compressed air of no more than 690 kPa (100 PSI) to loosen and remove the large dirt particles. Direct the air from the inside of the primary elements.
4. Wash the primary element in a non-sudsing detergent for about 15 minutes.

NOTE: The element should be replaced after 1 year or 6 cleanings. Replace the safety element when the primary element is cleaned for the third time.

5. Rinse the elements from both the inside and outside until the water passing through the element is clear.
6. Air dry the elements at a temperature no higher than 70C (160F).
7. Shine a bright light from the inside of each element. Check both elements for damage such as pin holes, ruptures or thin spots. Discard any damaged elements and replace them with new ones.

8. Clean the filter case thoroughly, removing all foreign matter.
9. Reinstall the filter elements and reassemble the air cleaner assembly. Make sure that the housing clamp is tight.
10. Replace the firewall access panel.

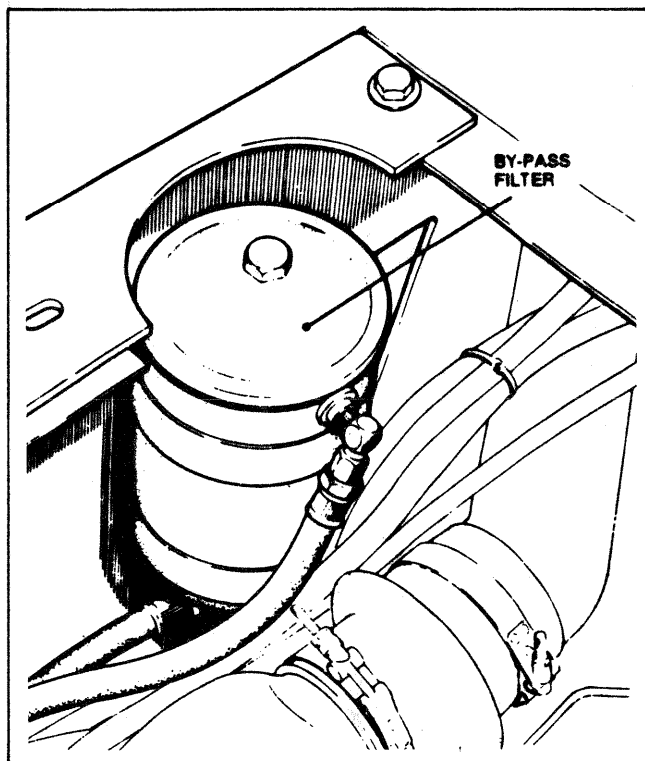


Fig. 6-15

Engine BY-PASS Filter (For Cummins Machines Only). Replace the filter element every 250 operating hours and whenever the engine is repaired or overhauled for any reason. Thoroughly clean the filter case before inserting a new element. The By-Pass filter is located on right hand side of the engine compartment.

NOTE: For servicing instructions on the engine Full Flow Filter, refer to the operation and maintenance manual of the engine manufacturer.

Every 1000 Hours of Operation:

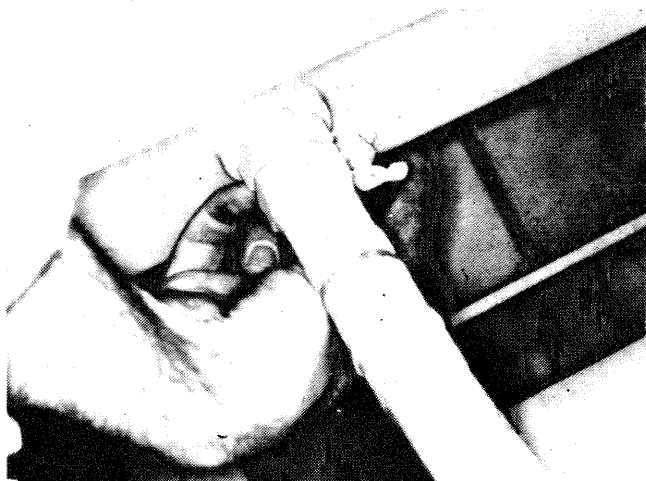


Fig 6-16

Drain the radiator. Open the draincock at the bottom of the radiator and empty the coolant into a container of at least 55 l (14 U.S. gal).

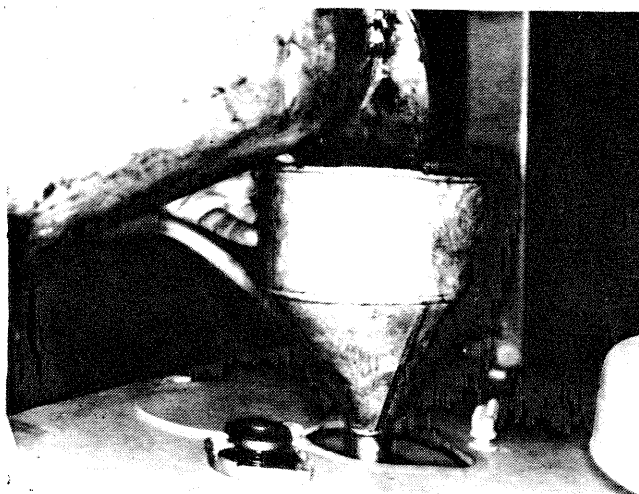


Fig 6-17

Close the draincock and add coolant to the surge tank until the correct coolant level is reached.

NOTE: Operate the engine until the coolant becomes warm enough to open the thermostat, shut down the engine and recheck the level.

See Every 10 Hours of Operation in this section for information on anti-freeze.

FUEL SYSTEM

Every 10 Hours of Operation:

Refill the fuel tank as required AND at the end of each work shift. The fuel tank filler is located on the fuel tank behind the winch. Make sure the area around the filler hole is clean before removing the cap. If the strainer screen is clogged or dirty, clean it in a solvent and blow dry with compressed air.

NOTE: Clark recommends the use of #2 diesel fuel. Refill the tank after each work shift to prevent condensation in the fuel tank.



WARNING: DO NOT smoke while refueling.

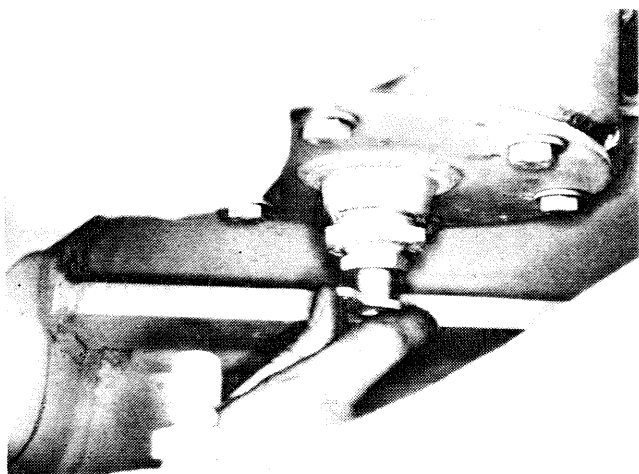


Fig 7-1

Before each work shift, open the draincock on the bottom of the fuel tank and drain sufficient fuel to remove any sediment and water. When clean fuel begins to flow, close the drain cock.



WARNING: Drain fuel into an appropriate container and dispose of it in a safe place.

Every 50 Hours of Operation:

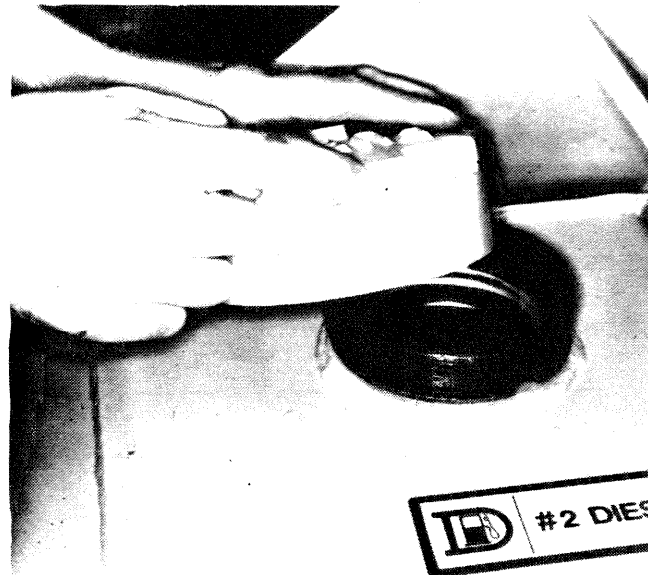


Fig 7-2

Remove the fuel filler cap and check to see that the vent hole is free from obstruction. Clear the hole if it becomes plugged.

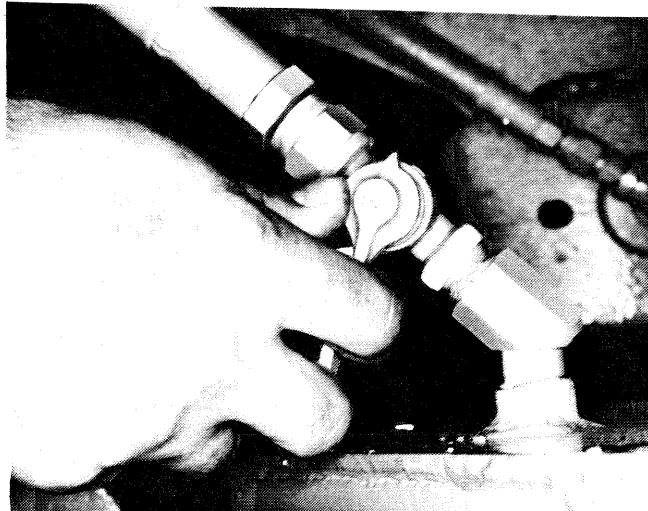


Fig 7-3

IMPORTANT NOTE: Your machine is equipped with a fuel line shut-off valve on the right hand side of the fuel tank. Use this valve in case of fire or if the fuel tank must be removed.

Every 1000 Hours of Operation:

Drain the fuel tank. Do this at the end of a shift or when the tank is almost empty. When the fuel has drained, remove the cover at the bottom of the tank and clean the magnet.

IMPORTANT NOTE: DO NOT attempt to adjust the fuel controls on the engine, they are factory calibrated and should only be adjusted by a qualified mechanic.

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TRANSMISSION/CONVERTER SYSTEM

Every 10 Hours of Operation:

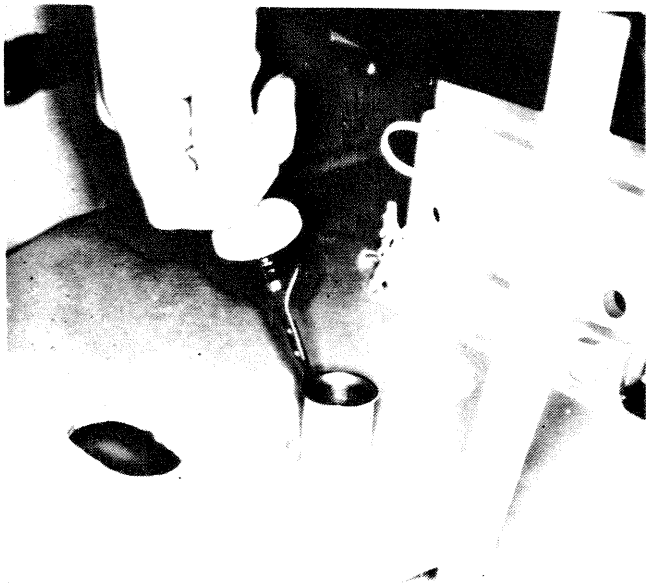


Fig 8-1

Check the fluid level in the system with the engine running and the direction control lever in the neutral position. The transmission/converter dipstick is located on the seat plate to the right of the operator's seat.

NOTE: When you do this check, the oil should be at its operating temperature, the engine must be at operating but the machine must otherwise be in the Service Position.

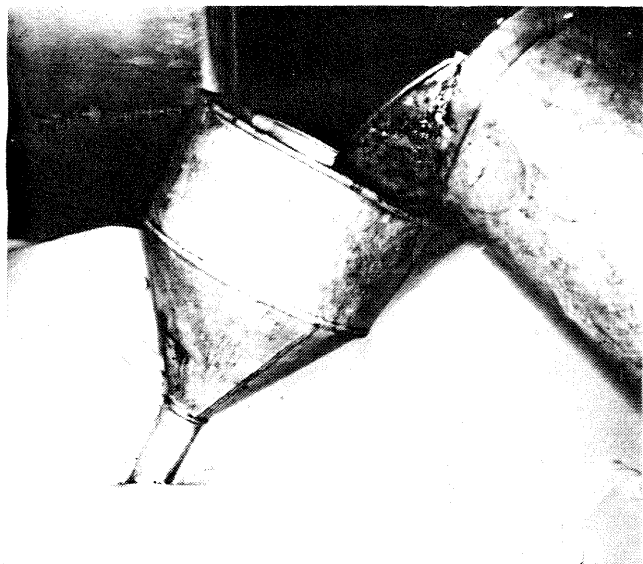


Fig 8-2

If the level on the dipstick is low, add Clark approved transmission fluid to the filler hole on top of the winch until the correct level is achieved.

IMPORTANT NOTE: Use only approved transmission fluid to fill this system. Clark recommends DEXRON II Automatic Transmission Fluid.

Every 250 Hours of Operation:



Fig 8-3

Remove the breathers on top of the transmission and converter housings and wash them in a solvent, blow them dry with compressed air and reinstall them on the components.

Check the converter OUT pressure. This check should also be made if the system appears to overheat and if a visual inspection fails to reveal any collapsed or ruptured hoses that can cause overheating. Check the converter out pressure at the operating temperature as follows:

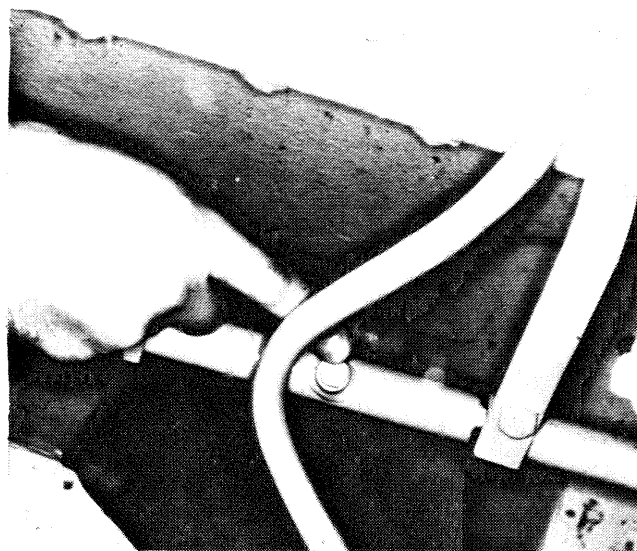


Fig 8-4

1. Connect a pressure gauge to the converter OUT pressure port located on the line between the oil cooler and the converter on the left hand side of the machine.
2. Install a tachometer on the engine.

3. With the machine in the Service Position, operate the engine at 2000 RPM and read the gauge. The gauge should not exceed 275 kPa (40 PSI) with the oil at its operating temperature (See Sec. 1).

NOTE: If the reading on the gauge is greater than the above figure, you may have to clean or replace the hoses, oil cooler and/or radiator assemblies.

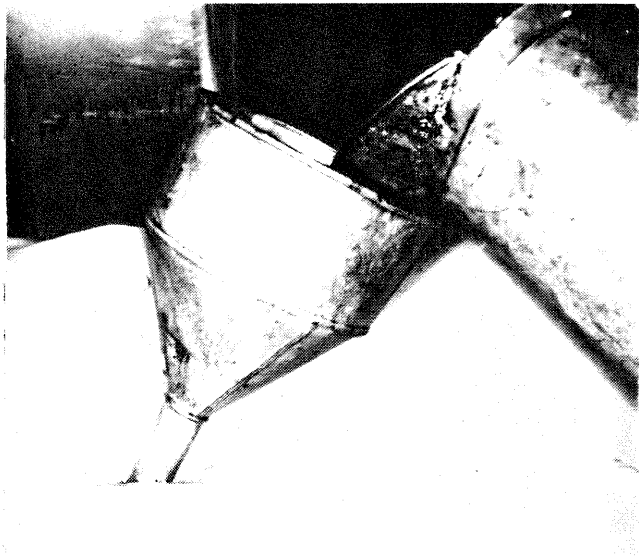


Fig 8-5

Operate the engine for five minutes at 1500 RPM and check the system for leaks. Check the level in the system and add fluid if necessary.

Every 500 Hours of Operation:



Fig 8-6

Replace the transmission/converter filter element. This element must also be replaced when the converter pump, winch, transmission or converter is repaired or overhauled. Loosen the centre bolt and remove the filter case carefully because the case is filled with oil.

Clean the filter case and base casting thoroughly and install a new Clark replacement filter element and casing gasket. **DO NOT** use will fit elements as they may endanger the proper operation of the system and can cause costly repairs and downtime.

Tighten the centre bolt to a torque of 5.5 to 6.5 N.m (40 to 50 lbf.ft). Take care that you do not damage the gasket.

Check the pressure drop across the oil cooler. This figure is the difference between the cooler IN (converter OUT) pressure and the cooler OUT pressure. Check the pressure drop as follows:



Fig 8-7

1. Use the same procedure as for checking the converter OUT pressure but also install a gauge at the cooler OUT pressure check port on the line between the oil cooler and the converter on the right hand side of the engine.
2. Record the readings on the gauges, and subtract the cooler OUT pressure from the cooler IN pressure to get the pressure drop. The pressure drop should be between 35 and 140 kPa (5 and 20 PSI).

If the pressure drop is greater than the accepted range, you may have to clean or replace the hoses, oil cooler and/or radiator assemblies.

Check the transmission clutch pressure. This check should also be made whenever there is improper operation in any speed range or direction. Check the clutch pressure as follows:

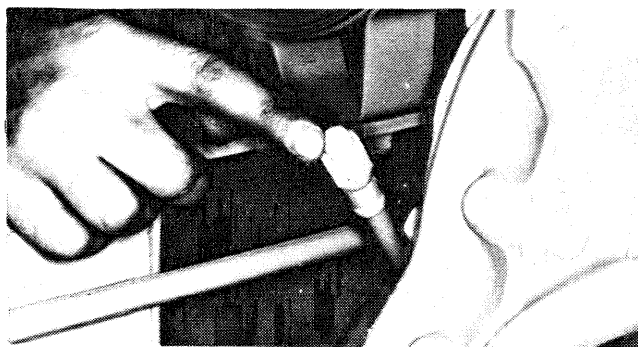


Fig 8-8

1. Install a test gauge of at least 2000 kPa (300 PSI) to the clutch pressure check port on the hose at the rear of the transmission.

- At operating temperature and the engine at idle, the gauge should read between 1655 and 1930 kPa (240 and 280 PSI) in all speed ranges both FORWARD and REVERSE directions with no more than 35 kPa (5 PSI) difference between the readings.

If the pressure reading is not within these limits, contact your Ranger distributor for further troubleshooting.

Drain the transmission/converter/winich system. The system must also be drained when the converter pump, winich, transmission or converter is repaired or overhauled.

Drain the system as follows:

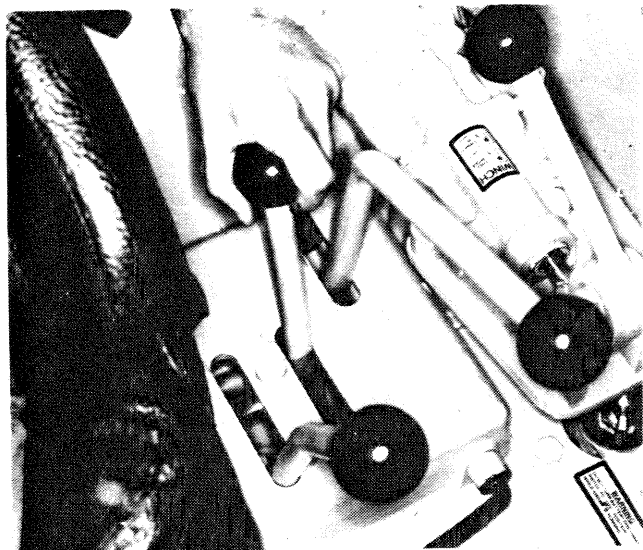


Fig 8-9

- With the machine in the Service Position, operate the engine with the gear shift levers in the FORWARD, TRAVEL, and LOW positions to warm the oil. Hot oil flows more freely and carries more foreign material with it.



Fig 8-10

- When the oil reaches its operating temperature shut down the engine, remove the drain plugs at the bottom of the transmission and converter housings and drain all of the oil into a container of at least 30l (8 U.S. gal).

- Remove the transmission suction screen, clean it in a solvent, blow dry it with compressed air. Reinstall the suction screen using a new O-ring.
- Reinstall the drain plugs and overfill the system with the recommended fluid.



Fig 8-11

- Disconnect the return oil cooler hose from the radiator and put the open end of the hose into a container of at least 20l (5 U.S. gal).
- Start the engine and operate it at low idle speed to flush any trapped fluid from the system. Drain and discard approximately 18l (4.8 U.S. gal). Reconnect the oil cooler hose.

IMPORTANT NOTE: DO NOT operate the engine with the oil cooler hose disconnected for more than 60 seconds or serious damage to the transmission and converter can result.

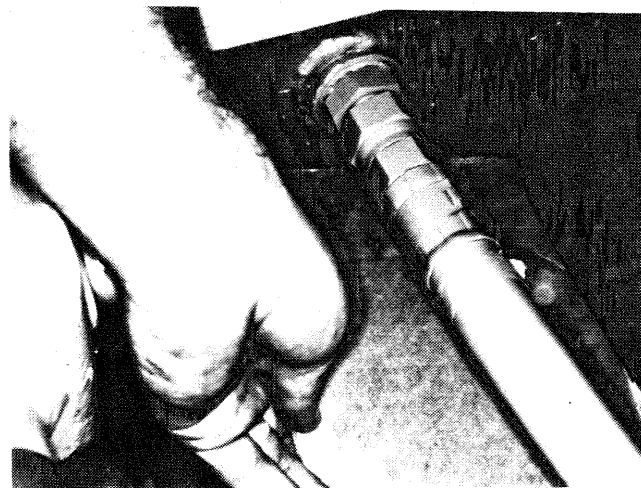


Fig 8-12

- Bring the oil in the system to the correct level and operate the engine for five minutes at 1500 RPM. Check the system for leaks and correct if necessary.

IMPORTANT NOTE: NEVER USE FLUSHING OIL OR COMPOUNDS TO CLEAN THIS SYSTEM. USE ONLY THE RECOMMENDED OPERATING FLUID.

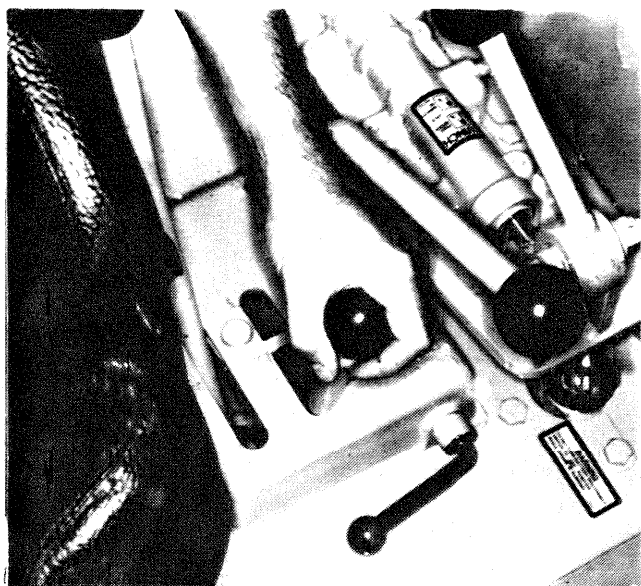


Fig 8-13

Check and adjust the transmission control linkage. Check all rods, bell cranks, ball joints and other components for damage or wear. Check to see that all parts move freely and that no binding and rubbing exists.

Adjust the control linkage as follows:



Fig 8-14

1. With the transmission control lever in the NEUTRAL position, and the speed range control lever in SECOND loosen the locknuts on both ends of the control cables and adjust the clevises on each until the levers are properly aligned.
2. Tighten the locknuts and check that the levers will go into all detent positions without interference from the floorboard or transmission.

CLARK WINCH

Every 100 Hours of Operation:

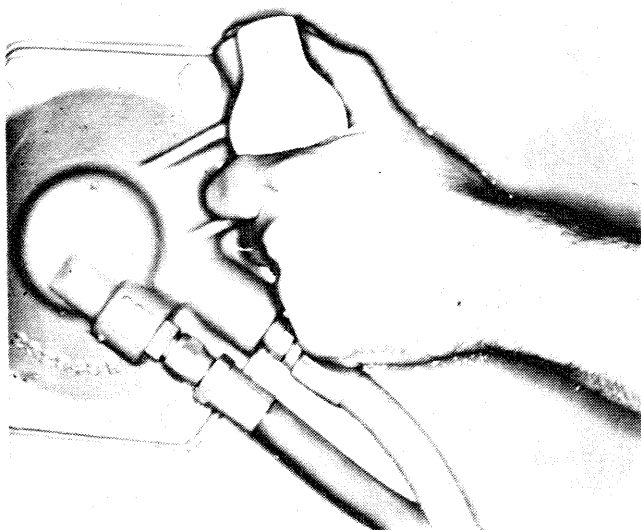


Fig 9-1

Check the operation of the winch free spool mechanism. If the operation of the free spool provision is unsatisfactory, loosen the locknut on the free spool adjusting handle and turn the handle clockwise to decrease the tension or counterclockwise to increase the tension.

Every 250 Hours of Operation:



Fig 9-2

Remove the breather on top of the winch housing, to the left of the winch cable drum. Clean the breather in a solvent, blow dry it with compressed air and reinstall it on the winch.

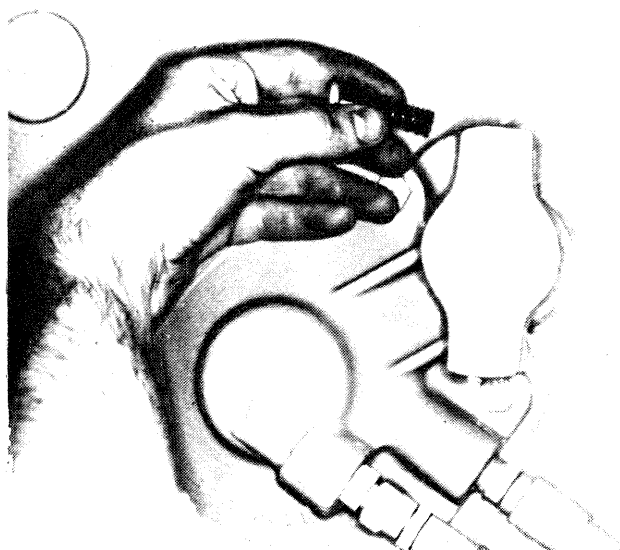


Fig 9-3

Check the condition of the wear button. Remove the lock screw, spring and lock button from the free spool adjustment provision.

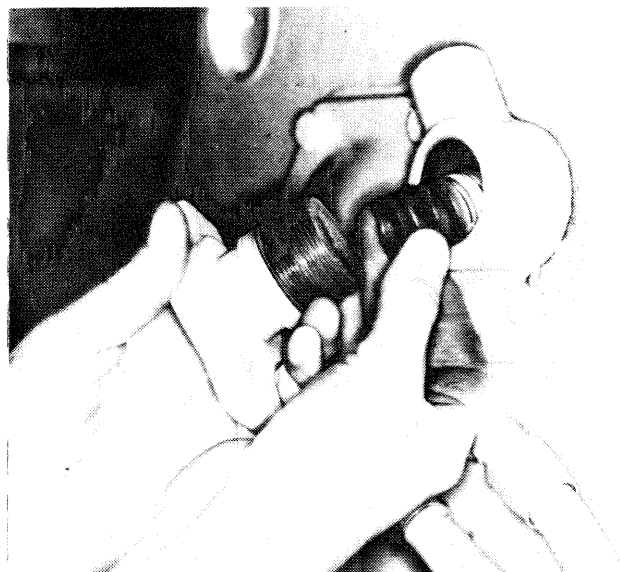


Fig 9-4

Remove the adjusting handle, spring and wear button to check its condition.

NOTE: The winch hydraulic system is integral with the transmission/converter system. Any time the winch is overhauled, the transmission/converter/winches hydraulic system will have to be drained and refilled.

IMPORTANT NOTE: See your Clark Winch Maintenance and Service Manual for all troubleshooting and overhaul instructions. **DO NOT** attempt to disassemble or make any repairs to the inside of the winch before **FIRST** reading and understanding the instructions in the manual.

Installing the Winch Cable:

1. Remove the access plug from the upper right hand side of the winch housing.



Fig 9-5

2. Put the winch control lever in the FREE-SPOOL position and rotate the cable drum until the cable anchor wire holes are seen through the access hole. Put the lever in the center LOCK position and return the machine to the Service Position (See Sec. 1).
3. Choose a gauge of anchor wire that will insert in the holes and install both ends of the wire through the holes. Install the access plug.

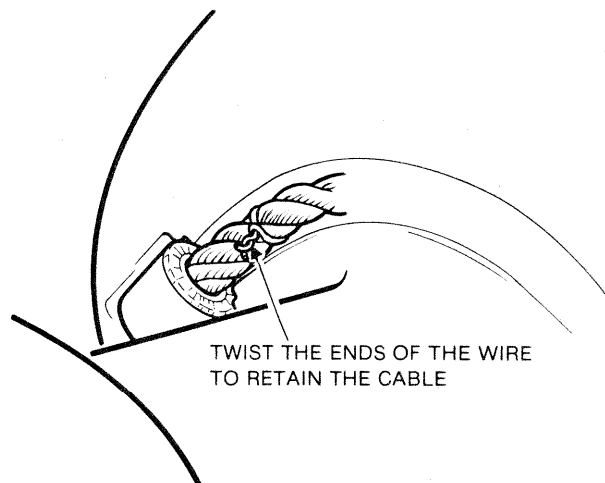


Fig 9-7

5. Twist the ends of the wire together to hold the cable in place.
6. Start the engine and put the winch control lever in the WINCH-IN position to wind the mainline onto the cable drum.

IMPORTANT NOTE: Installing the winch cable in this manner provides a means to hold the cable ferrule in place during normal operation and acts as a safety break-away function to prevent the machine from being pulled over should the load fall down a grade.



WARNING: It is imperative that the operator put the winch in the FREE-SPOOL mode if the load should begin to fall for this provision to be effective.

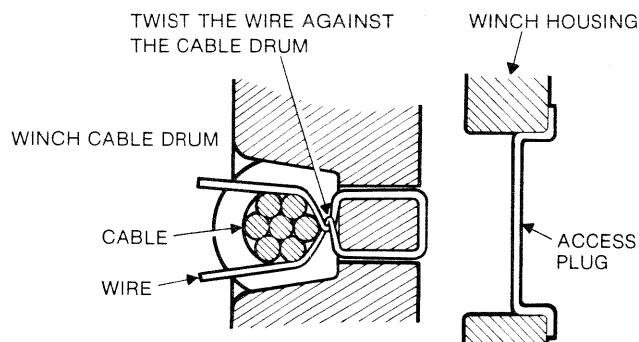


Fig 9-6

4. Twist the wire ends to tighten the wire against the cable drum and install the mainline in the cable groove between the ends of the wire. The cable ferrule should be inserted in the ferrule groove.

HYDRAULIC SYSTEM

Every 10 Hours of Operation:

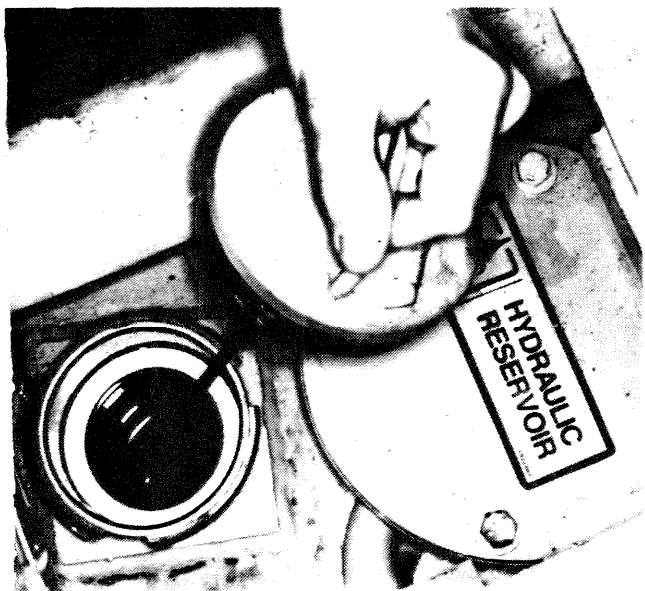


Fig 10-1

Check the oil level in the hydraulic reservoir. There is a dipstick on the filler cap below the access panel in the floorboard to the left hand side of the operator's seat.

Every 50 Hours of Operation:

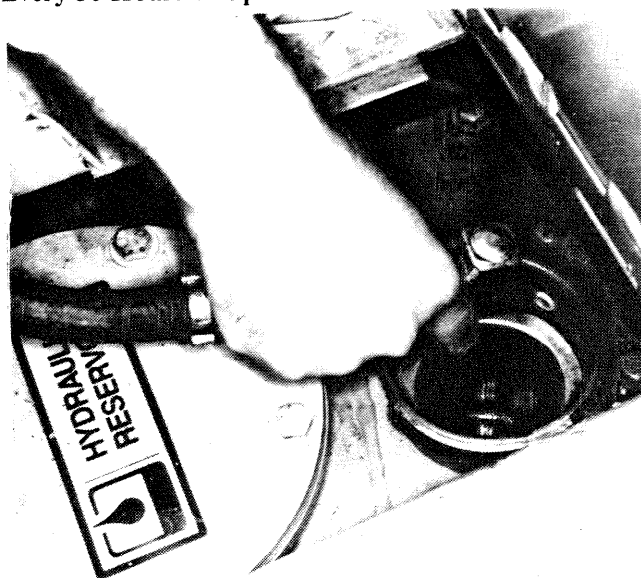


Fig 10-3

Use compressed air (34 to 69 kPa/5 to 10 PSI) to clean any foreign material from the hydraulic tank breather in the filler neck of the tank.

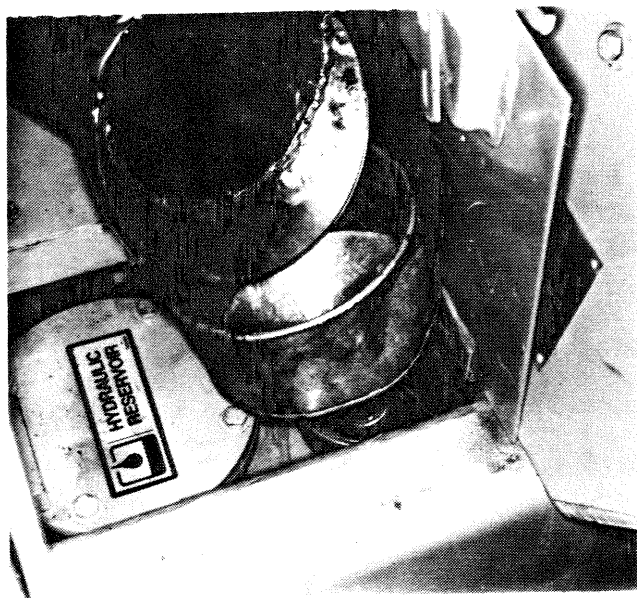


Fig 10-2

If the level is low, add only SAE 10W oil, API Class SD or SE, MIL-L-2104B or MIL-L-2104C lubricant to the filler hole adjacent to the level gauge.

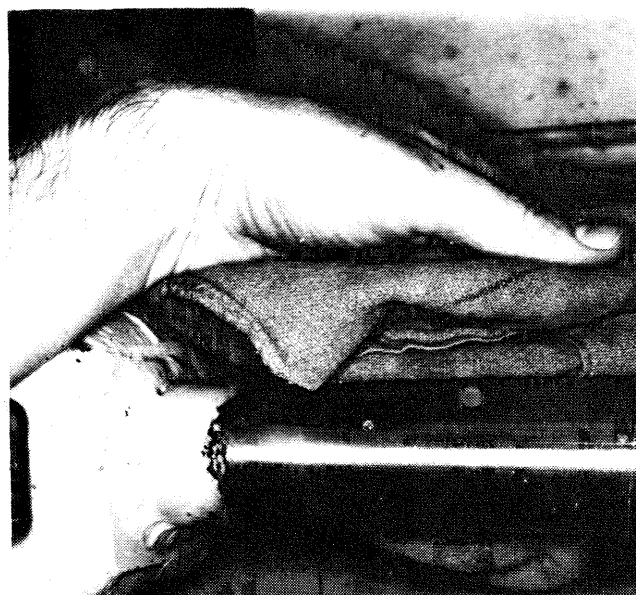


Fig 10-4

Clean the steer and blade cylinder rods (and the arch, boom, and grapple cylinder rods if applicable) with a clean cloth soaked in the same oil as in the hydraulic system. Remove any burrs or nicks on the rods with a fine grained hand stone or crocus cloth.

Every 500 Hours of Operation:

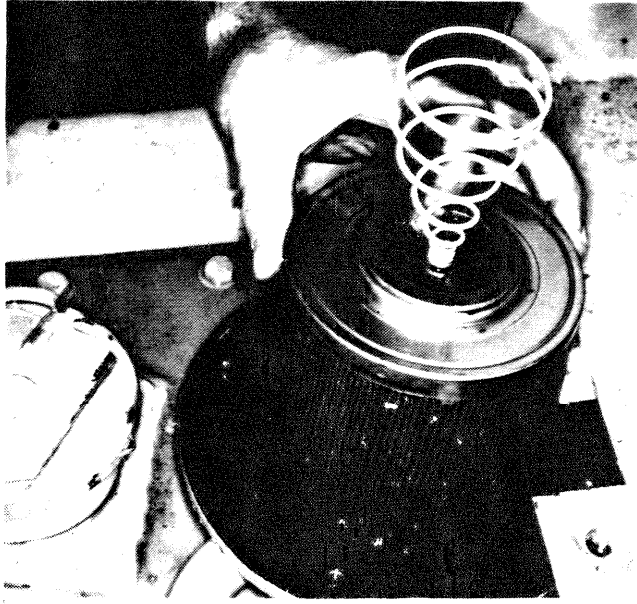


Fig 10-5

Replace the main hydraulic filter element with a Clark replacement element. This element is located under the cover on top of the hydraulic tank. Make sure no dirt enters the tank when you remove the cover. Tighten the cover bolts to a torque of 4,5 to 5,6 N.m (40 to 50 lbf.in) when you replace them.

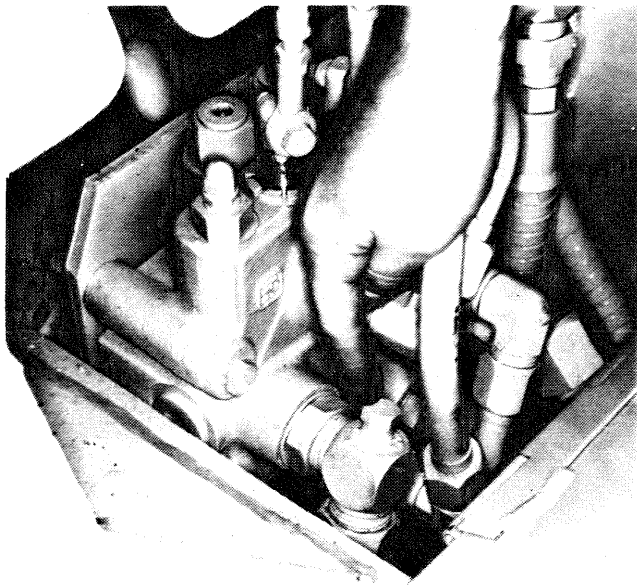


Fig 10-6

Check the main relief pressure with a test gauge attached to the main relief pressure port on the main control valve. Use a gauge of at least 20,000 kPa (3,000 PSI).

Raise the blade and hold it in its highest position with the engine operating at maximum RPM. The gauge should read 12410 kPa (1800 PSI) on the 667C cable machine and 13790 kPa (2000 PSI) on the 667C grapple machine.

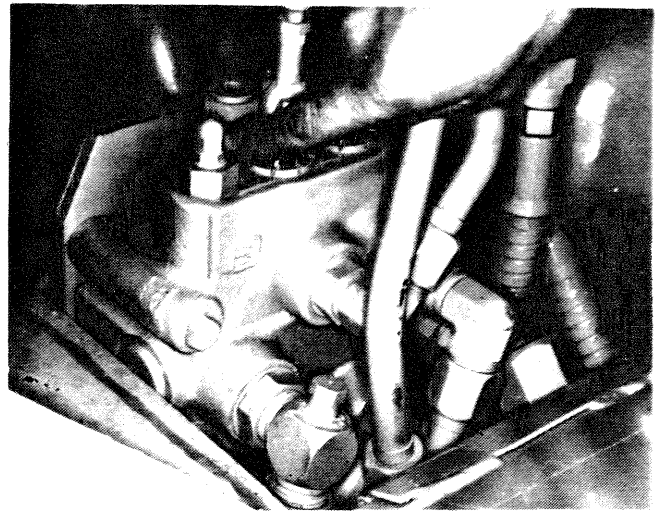


Fig 10-7

If the main relief pressure of your machine is incorrect, remove the acorn nut on the main control valve, loosen the locknut below it and turn the adjusting screw until the correct value is achieved. If the relief valve cannot be adjusted, see your Ranger distributor.

Replace the locknut and acorn nut. Shut down the engine and work the steer and blade lever to remove any pressure from the system. Remove the test gauge and replace the plug in the port.

Check the grapple relief pressure with a test gauge attached to the pressure port on the steer and blade control valve. Use a test gauge of at least 20,000 kPa (3000 PSI).

Temporarily set the MAIN relief pressure at 14315 kPa (2050 PSI) See Fig. 10-7 and 10-8.

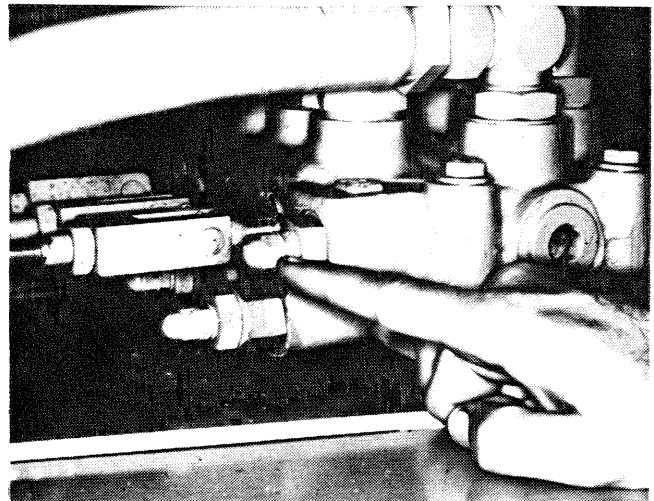


Fig 10-8

Actuate the grapple cylinder(s) and hold the grapple in its OPEN position with the engine operating at maximum RPM. The gauge should read 13.790 kPa (2000 PSI). If the grapple relief pressure is incorrect, remove the acorn nut on the grapple control valve, loosen the locknut below it and turn the adjusting screw until the correct value is achieved. Return the MAIN relief setting to its correct value.

Every 1000 Hours of Operation:

Drain the hydraulic reservoir as follows when the oil is at its operating temperature. Hot oil flows more freely and carries more dirt with it. This operation may have to be done more frequently when the machine is operating in extremely dusty or dirty conditions to prevent damage to system components.

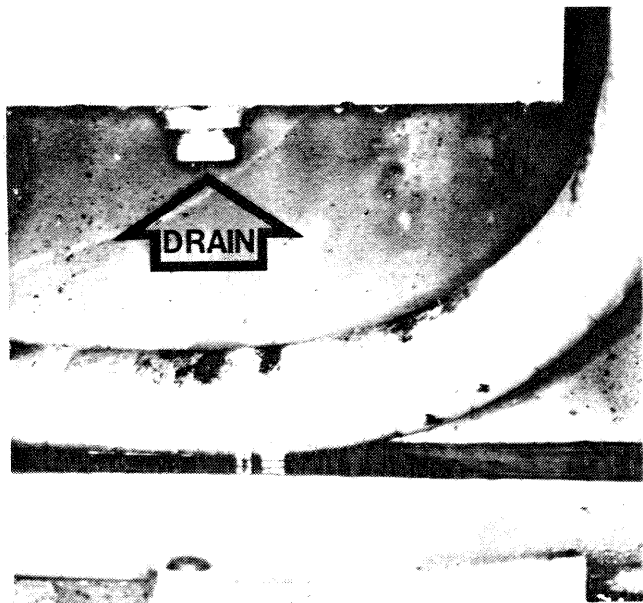


Fig 10-9

1. Remove the hydraulic reservoir filler cap. Remove the plug at the bottom of the tank and drain the oil into a container of at least 60l (16 U.S. gal).

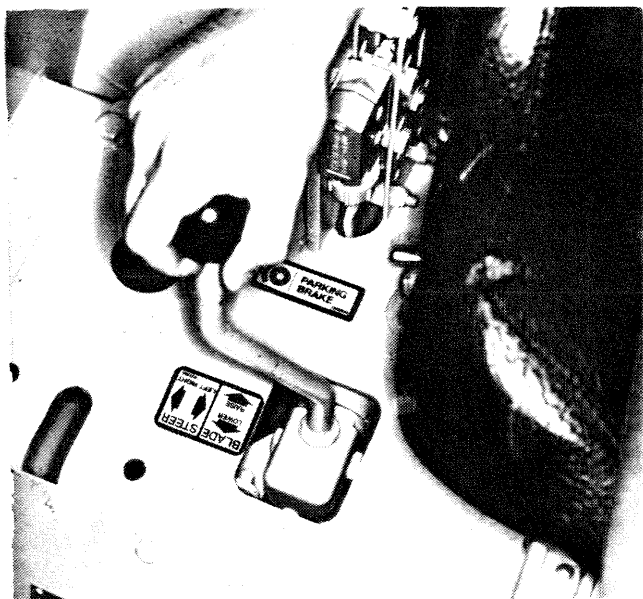


Fig 10-10

2. Slowly lower the blade (and boom and arch if applicable and allow the grapple arms to close) to force the oil in the cylinders back to the tank.



WARNING: Exercise **EXTREME CAUTION** to avoid serious personal injury that can occur if struck by one of these attachments.

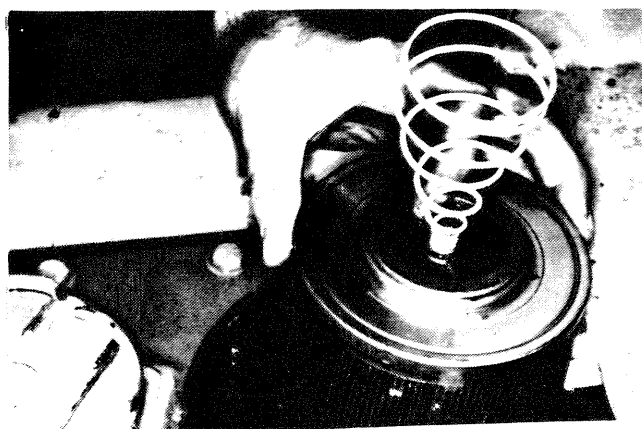


Fig 10-11

3. Remove the filter access cover and discard the old filter. Clean the inside of the tank and remove the magnet at the bottom of the tank. Clean the magnet thoroughly and replace it in the tank.
4. Remove the hydraulic tank suction screen located on the suction tube in the tank. Wash the screen in a solvent and blow dry it with compressed air. If the screen is damaged, it must be replaced to prevent dirt from entering the pump and damaging it.
5. Install a new filter element. Install the plug on the bottom of the tank and refill the reservoir with the recommended fluid (*See Every 10 Hours of Operation*).

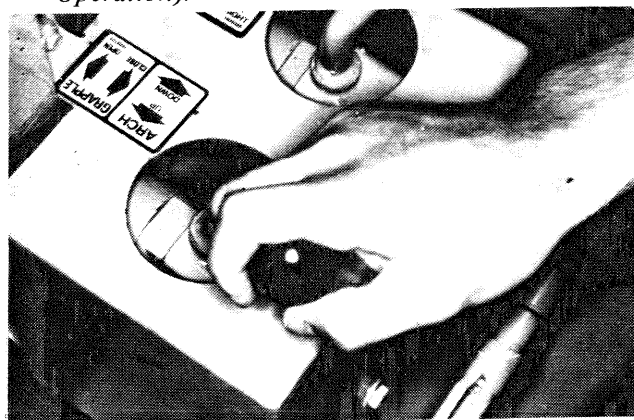


Fig 10-12

6. Make sure all control levers are in their **NEUTRAL** positions (with the neutral lock lever applied). Start the engine and run it at idle for a few minutes. Put the blade in the **UP** position to fill the cylinders with oil. Similarly fill the arch, boom and grapple cylinders if applicable.
7. Shut down the engine and allow the oil in the reservoir to stand until all the air has escaped from the oil. Add more oil until the level gauge reads correct. This will replace the oil sent to the cylinders.
8. Check all connections for leaks and replace the reservoir cap securely.

IMPORTANT NOTE: NEVER use flushing oil or compounds to clean the system under **ANY** circumstances.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

AXLES, PROPSHAFTS AND MIDMOUNT

Every 50 Hours of Operation:



Fig 11-1

Check the lubricant level in the front and rear axle differentials. Remove the check plug in the centre of each differential housing. The lubricant level should be up to the bottom of the check hole. If the level is below the hole, add the recommended lubricant to the check hole (See Sec. 17).

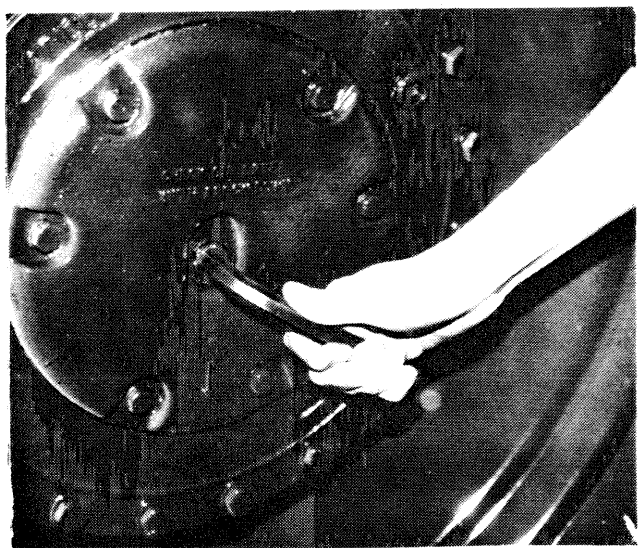


Fig 11-2

Check the lubricant level in the front and rear axle planetary hubs. Turn the wheel until the check plug on the hub is pointing upwards. Remove the check plug. The lubricant level should be up to the bottom of the check hole. If the level is below the hole, add the recommended lubricant to the check hole (See Sec. 17).

NOTE: Both the axle planetary hubs and the axle differentials are factory filled with SCL type gear lube. SCL signifies Sulfo-Chlor-Lead type lubricant however certain temperature conditions require a change of lubricant for optimum performance (See Sec. 17).

Every 100 Hours of Operation:

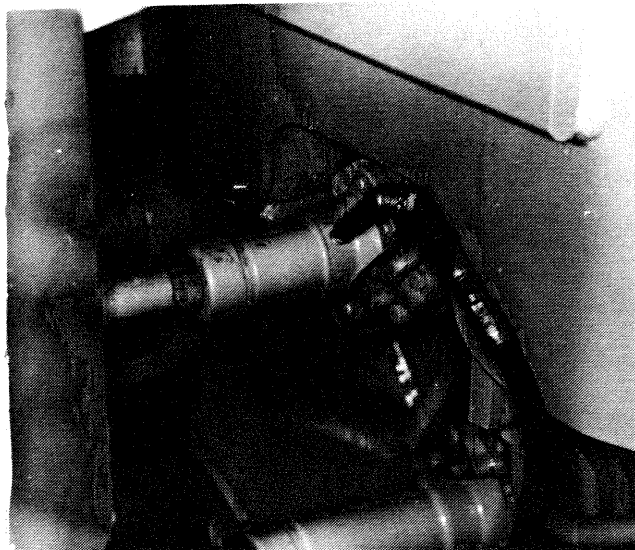


Fig 11-3

Grease all propshaft slip joints with Extreme Pressure Molybdenum Disulphide Grease. Use a hand grease gun and grease all fittings sparingly. Each propshaft has three grease points, one on the slip yoke and one on each spider and bearing assembly. When the machine is operated at temperatures above -18°C (0°F) use a Grade 2 lubricant. When the machine is operated below -18°C (0°F) use a Grade 0 lubricant.

Every 500 Hours of Operation:

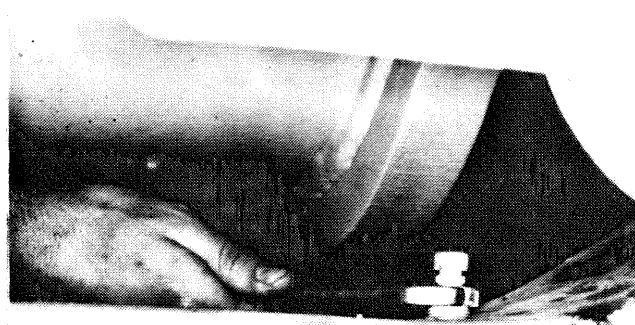
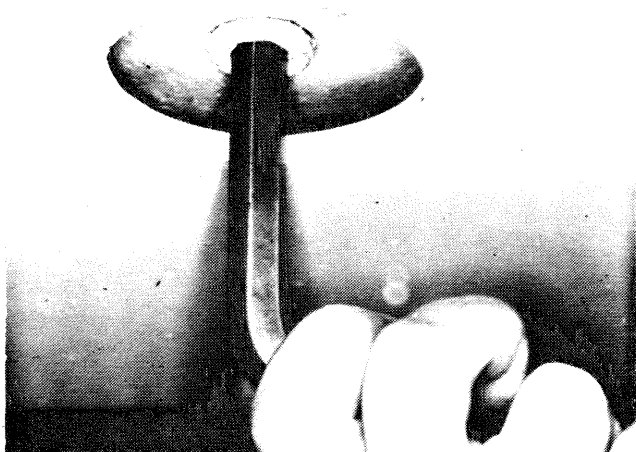
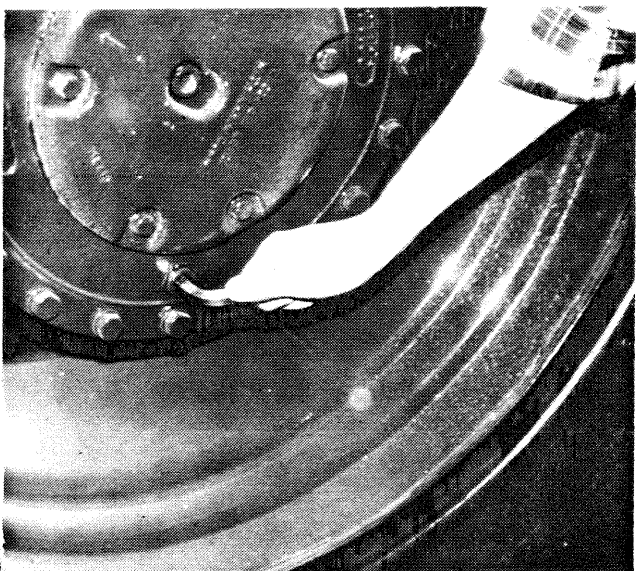


Fig 11-4

Locate the axle breathers on top of the front and rear axles. Remove the breathers and wash them in a solvent. Rotate the cap on each breather to free the air passages of foreign material, and blow dry the breathers with compressed air. Reinstall the breathers.

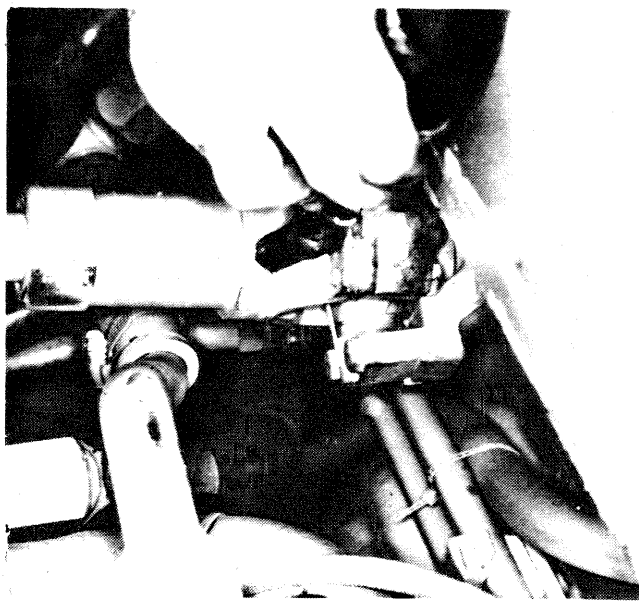
Every 1000 Hours of Operation:**Fig 11-5**

Drain the front and rear axle differentials. Locate and remove the drain plugs at the bottom of each differential and drain the old gear lube into a container of at least 13l (3½ U.S. gal). Reinstall the drain plug and fill each differential check hole with the recommended fluid (*See Every 50 Hours of Operation*).

**Fig 11-6**

Drain the front and rear axle planetary hubs. Locate the drain plug on the outer rim of each hub. Rotate each wheel until the drain plug is at the bottom of its rotation. Remove the drain plug and drain the old gear lube into a container of at least 9l (2½ U.S. gal). Reinstall the drain plug, remove the check plug. Rotate the wheel until the check plug is pointing upwards. Fill each hub through its drain plug with the recommended fluid. Reinstall the drain plugs and the check plugs.

NOTE: It may be necessary to change the lubricant in the differentials and planetaries more often when operating the machine in heavy mud or water.

**Fig 11-7**

Grease all propshaft universal joints with Extreme Pressure Molybdenum Disulphide Grease. Use a hand grease gun and grease all fittings sparingly. Each propshaft has three grease points, one on the slip yoke and one on each spider and bearing assembly. When the machine is operated at temperatures above -18°C (0°F) use a Grade 2 lubricant. When the machine is operated below -18°C (0°F) use a Grade 0 lubricant.

WHEELS AND TIRES

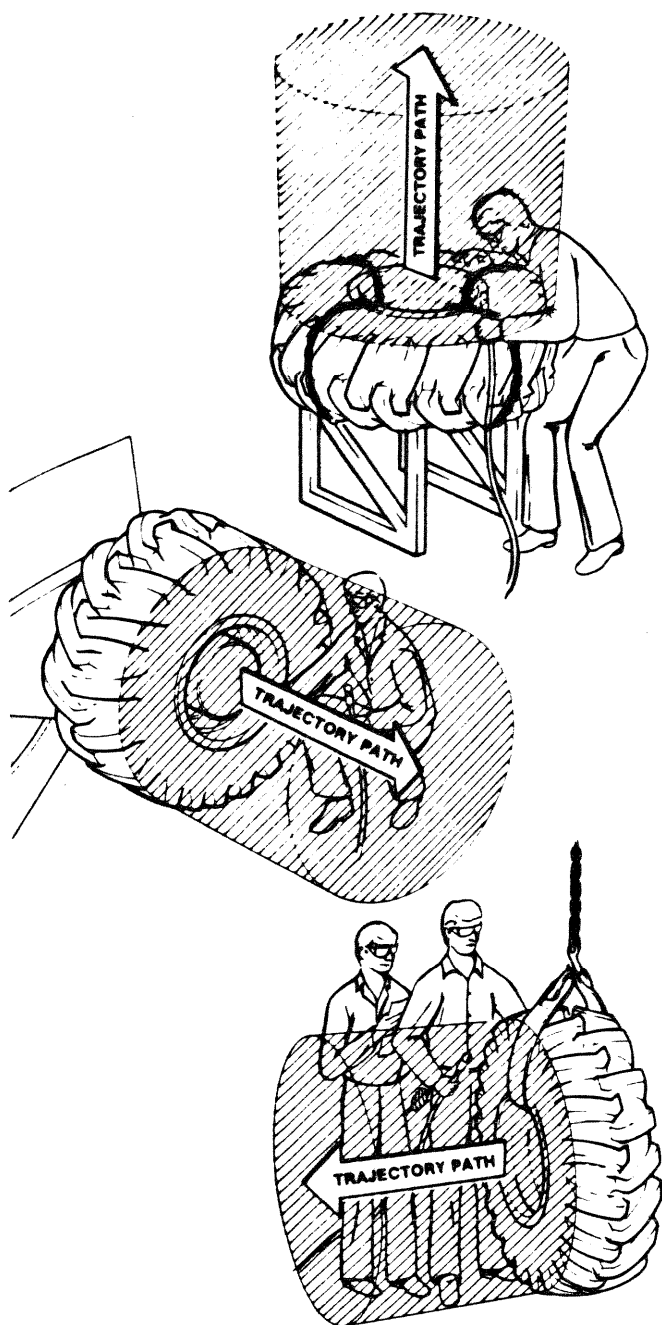


Fig 12-1

! WARNING: When doing ANY tire service, especially inflation, NEVER stand in the TRAJECTORY PATH. Serious injury or death can result if an explosion should occur.

ALWAYS use a self-attaching air chuck with a hose long enough to avoid standing in the trajectory path when inflating a tire.

ALWAYS use an inflation cage, safety cables or chains when inflating tires.

NEVER cut or weld on a wheel rim except to replace damaged split rim coupling studs.

NEVER use damaged rim parts or parts not specified for use on the actual wheel rim.

COMPLETELY DEFLATE a tire before removing foreign material from the tire bead or tread. Keep your fingers away from bead breakers and stay out of the trajectory path when removing foreign material. If a bead breaker disengages, it will do so with enough force to cause serious personal injury or death.

Every 10 Hours of Operation:

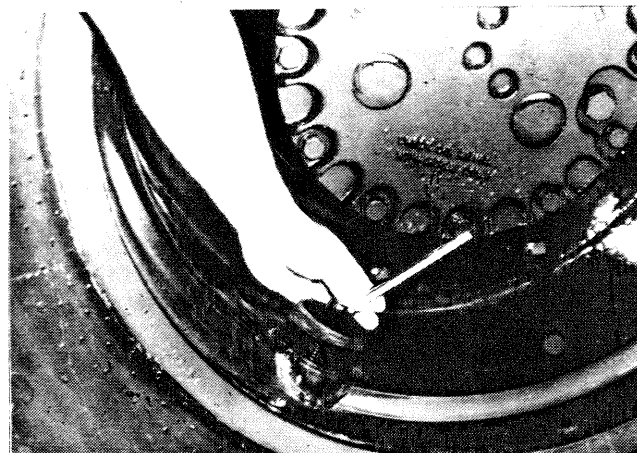


Fig 12-2

Check the air pressure of the tires. Examine the valves and make sure all valve caps are in place. See the tire pressure chart in this section for the correct tire pressure.

! WARNING: NEVER check tire pressures with a load (of logs) in place.

Every 50 Hours of Operation:

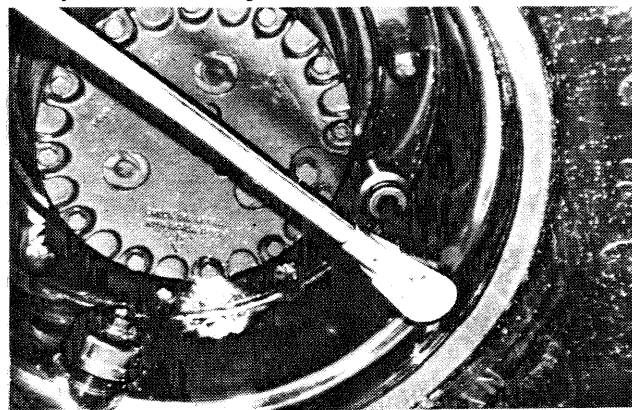


Fig 12-3

Check the wheel and wheel nuts for damage. Tighten the wheel nuts as required to a torque of 405 to 445 N.m (300 to 330 lbf.ft) for FLAT wheel nut seats or 575 to 645 N.m (425 to 475 lbf.ft) for SPERICAL wheel nut seats (See Fig 12-4).

! WARNING: IF ANY wheel studs or wheel nuts are missing or damaged, they MUST BE REPLACED.

Split Rim Examples

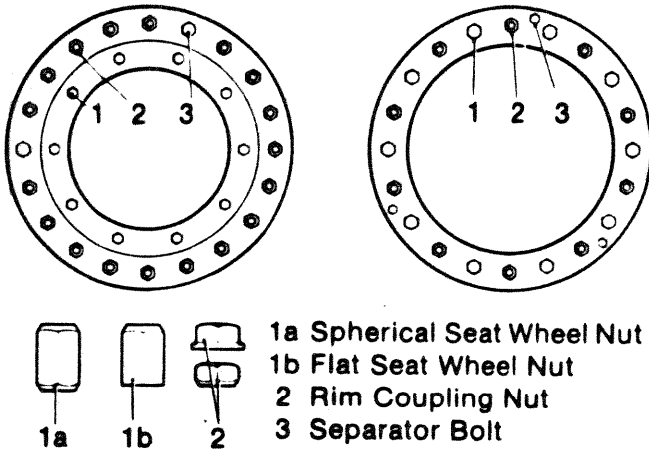


Fig 12-4

Check the rim coupling nuts (if applicable) for damage. Tighten the rim coupling nuts to a torque of 575 to 645 N.m (425 to 475 lbf.ft) for 3/4 in - 16 threads OR 980 to 1085 N.m (725 to 800 lbf.ft) for 1 in - 14 threads.

WARNING: IF ANY rim coupling studs or nuts are missing or damaged, they MUST BE REPLACED.

WARNING: USE Extreme Caution when you remove or install wheels and tires. Improper handling can cause serious personal injury or death. Always wear eye protection. Read and understand the following instructions completely before proceeding.

Tire changing can be dangerous, and should be done by trained personnel using proper tools and procedures.

Repairing Tires on Split Wheel Rims:

1. Put the machine in the Service Position, SECURELY blocking the wheels (See Sec. 2).
2. Use a jack of sufficient capacity to jack the machine and securely block the machine in place.
3. Use tire tongs or another suitable tire lifting device to support the rim and remove the WHEEL STUD NUTS (See Item 1 in Fig 12-4). Remove the assembly from the machine.

WARNING: IF YOU HAVE ANY DOUBT that the nuts you are to remove ARE THE WHEEL STUD NUTS, COMPLETELY DEFLATE THE TIRE BEFORE YOU REMOVE ANY NUTS.

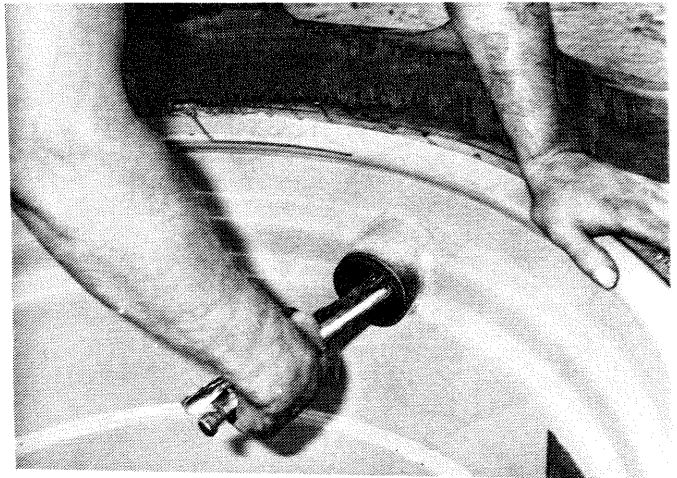


Fig 12-5

4. Remove the valve protection cap and carefully remove the valve stem to deflate the tire and allow the tire to deflate COMPLETELY. Use a piece of tire chalk to mark the tire adjacent to the valve stem as a reference point to locate the cause of the puncture.

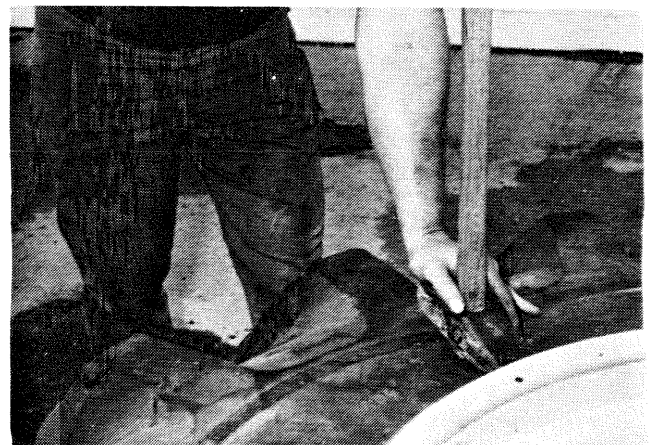


Fig 12-6

5. Drive a bead unseating tool between the tire bead and the rim flange taking care not to damage the bead. When the bead is completely unseated, turn the tire over and unseat the other bead.

WARNING: DO NOT begin to unseat the bead until the tire is completely deflated.

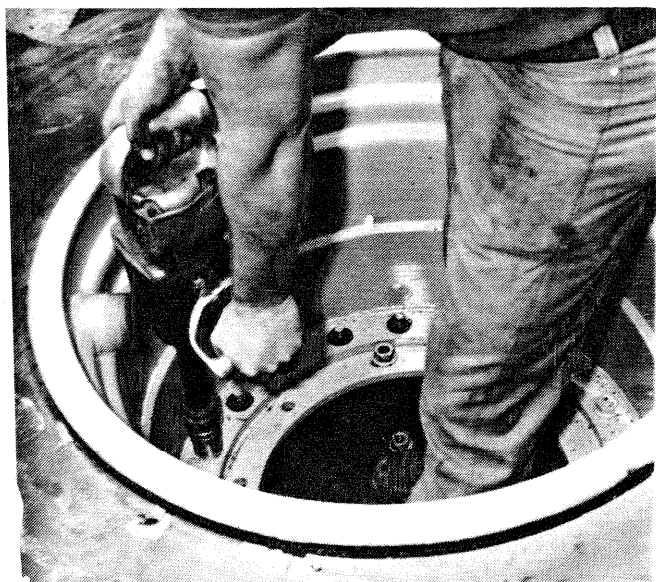


Fig 12-7

6. Mark the wheel halves to facilitate reassembly and remove the rim coupling nuts.

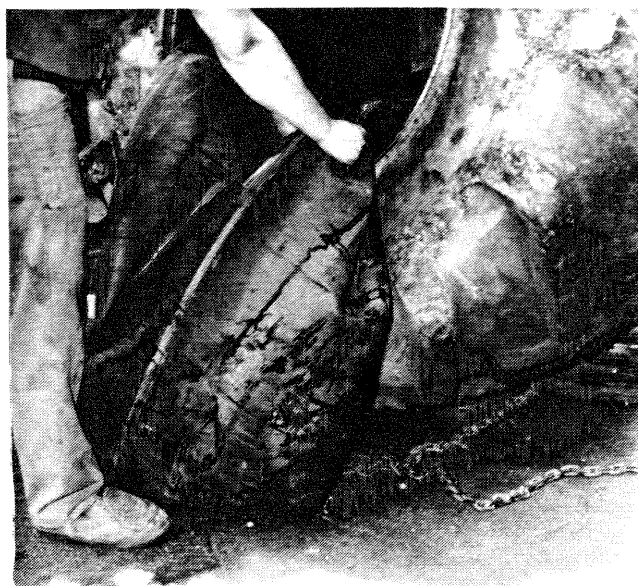


Fig 12-9

8. Remove the tube from the tire and inspect it to see if it is in good enough condition to repair or if it should be replaced. Repair or replace the tube as required.

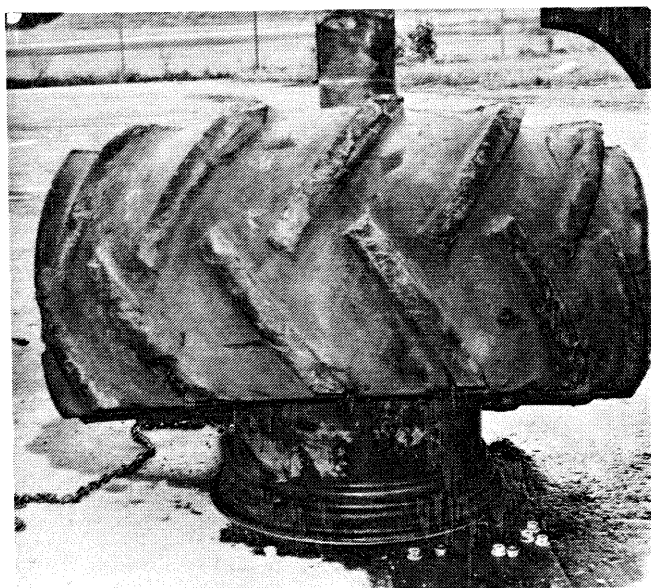


Fig 12-8

7. Use a suitable tire lifting device to lift the tire and the top rim half from the bottom rim half.



Fig 12-10

9. Clean the interior of the tire to remove any foreign material that could damage the tube.

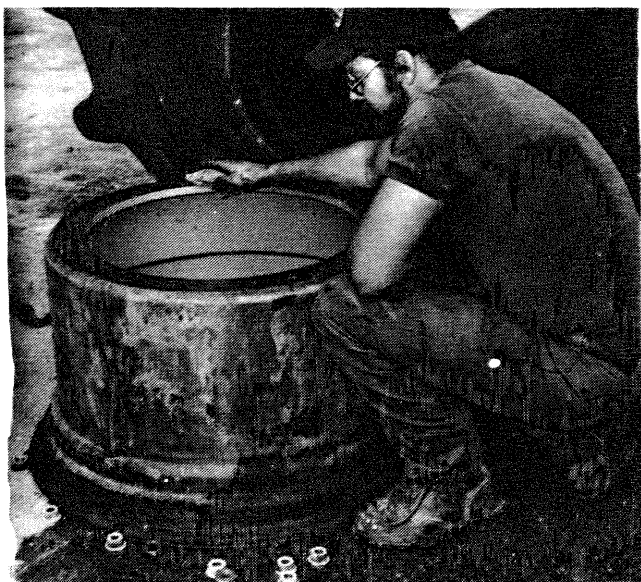


Fig 12-11

10. Thoroughly clean the mating surfaces of each rim half and remove any nicks or burrs that could interfere with proper mating. Inspect the parts for damage and **REPLACE** any damaged rim parts.



Fig 12-13

12. Install the tire on the bottom rim half and install the tube in the tire making sure that the valve will align with the opening in the wheel. Install the valve stem.



Fig 12-12

11. Lubricate the tire bead and rim flange with a rubber lubricant that is recommended for this application

NOTE: Never use silicone or petroleum base lubricants.



Fig 12-14

13. Lubricate the other tire bead and rim flange with a rubber lubricant that is recommended for this application and install the top rim half using the marks from Step 6.

NOTE: Never use silicone or petroleum base lubricants.



Fig 12-15

14. Inspect all of the rim coupling nuts and studs and replace any that are worn or damaged. Install all of the coupling nuts so the assembly can be turned over.



Fig 12-17

16. Securely fasten four sets of tire safety chains through the center of the rim and around the tire.



Fig 12-16

15. Tighten the rim coupling nuts alternately (across the hub opening) to a torque of 575 to 645 N.m (425 to 475 lbf.ft) for 3/4 in - 16 threads or 980 to 1085 N.m (725 to 800 lbf.ft) for 1 in - 14 threads.

IMPORTANT NOTE: Recheck the torque on the rim coupling nuts after the first 50 Hours of machine operation.

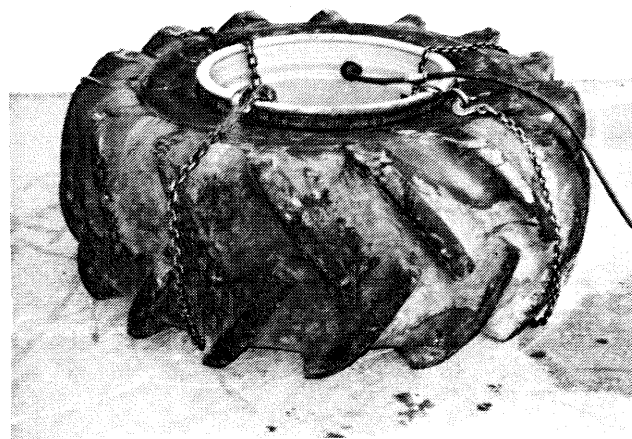


Fig 12-18

17. Attach a self-locking air chuck to the valve stem and inflate the tire to seat the beads. **DO NOT EXCEED** 240 kPa (35 PSI) inflation pressure to seat the beads.



WARNING: Stand well away from the tire and rim while it is inflating to avoid serious injury if there should be an explosion.

Repairing Tires on Single Piece Wheel Rims:

1. Put the machine in the Service Position, **SECURELY** blocking the wheels.
2. Use a jack of sufficient capacity to jack the machine and securely block the machine in place.
3. Use tire tongs or another suitable tire lifting device to support the rim and remove the wheel stud nuts. Remove the wheel/tire assembly from the machine.

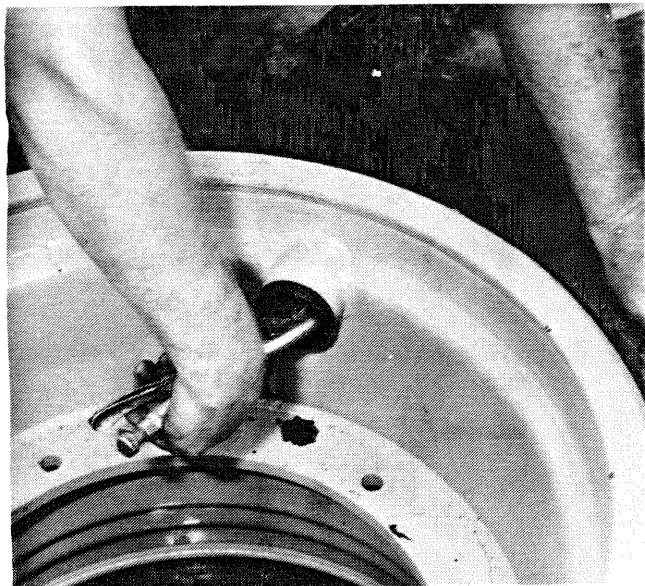


Fig 12-19

4. Remove the valve protection cap and carefully remove the valve stem to deflate the tire and allow the tire to deflate **COMPLETELY**. Use a piece of tire chalk to mark the tire adjacent to the valve stem as a reference point to locate the cause of the puncture.

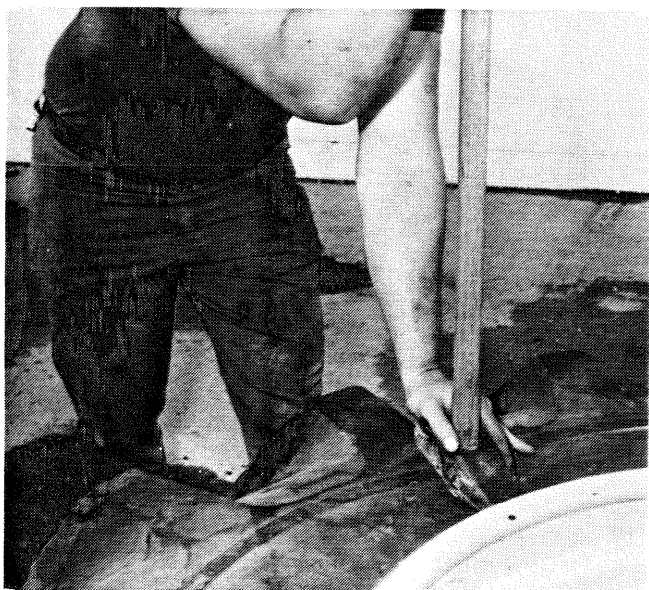


Fig 12-20

5. Drive a bead unseating tool between the tire bead and the rim flange taking care not to damage the bead.

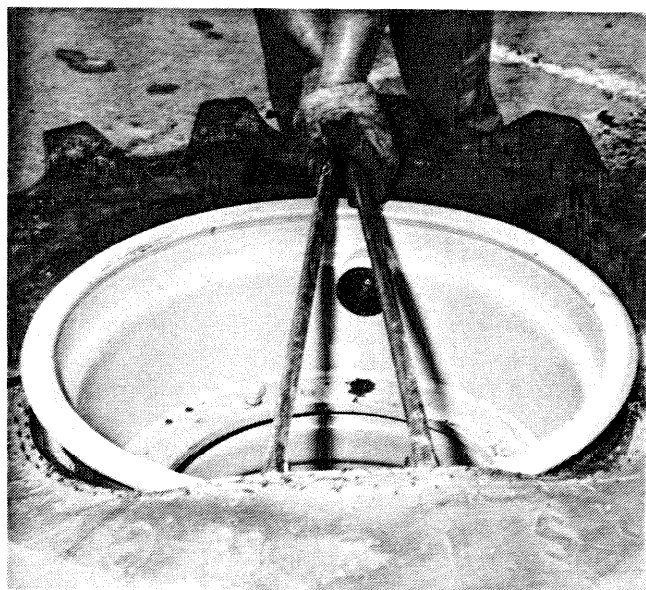


Fig 12-21

6. Use tire irons to pry the bead over the rim flange.

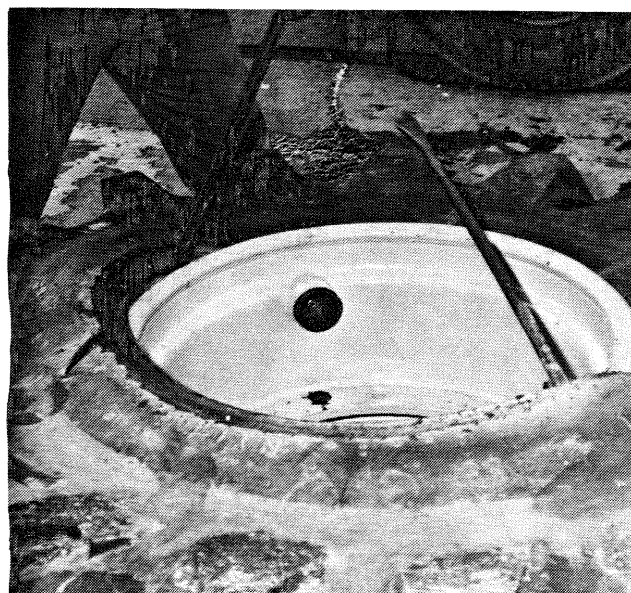


Fig 12-22

7. Leave one tire iron in the original position and pry the bead (in small sections) from the rim flange until the bead is completely unseated.

IMPORTANT NOTE: Prying too large a bead section at one time can damage the bead.

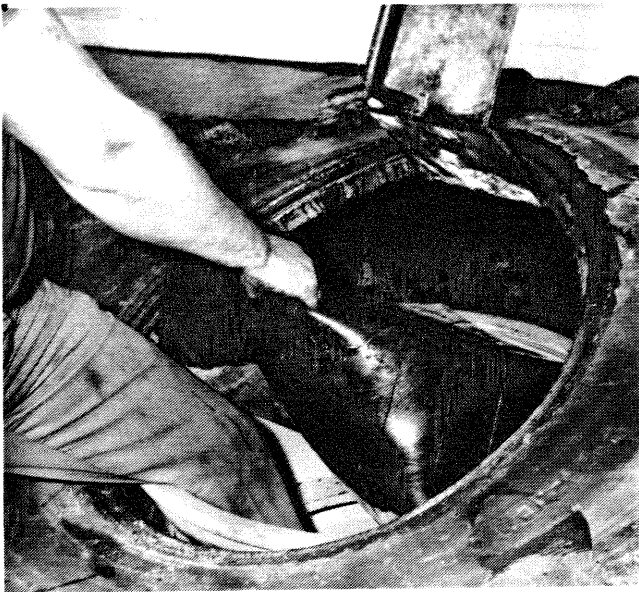


Fig 12-23

8. Use a suitable lifting device to lift the tire bead enough to remove the tube. Remove the tube and inspect it to see if it is in good enough condition to repair or if it should be replaced. Repair or replace the tube as required.



Fig 12-25

10. Install the tube in the tire making sure that the valve will align with the opening in the wheel. Install the valve stem.



Fig 12-24

9. Clean the interior of the tire to remove any foreign material that could damage the tire.

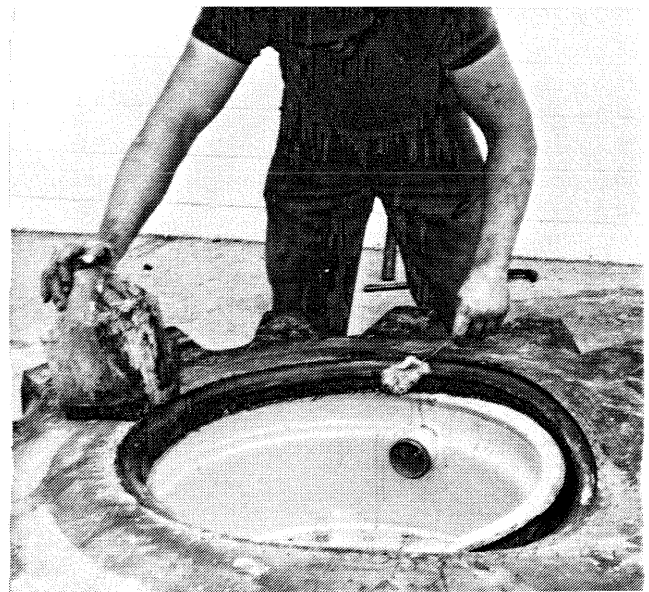


Fig 12-26

11. Lubricate the tire bead and rim flange with a rubber lubricant that is recommended for this application.



Fig 12-27

12. Use a tire iron to pry the bead onto the rim flange using a self-locking tool to keep the first bead section from unseating.

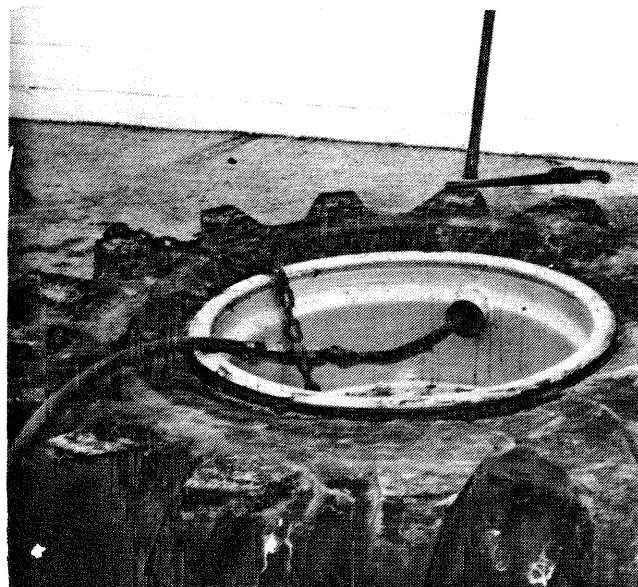


Fig 12-28

13. Attach a self-locking air chuck to the valve stem and inflate the tire to seat the beads. **DO NOT EXCEED 240 kPa (35 PSI) inflation pressure to seat the beads.**

! WARNING: Stand well away from the tire and rim while it is inflating to avoid serious injury if there should be an explosion.

RECOMMENDED PRESSURES

| TIRE SIZE | Ply Rating | (Minimum) | | (Maximum) | |
|-----------|---------------|-----------|-----|-----------|-----|
| | | kPa | PSI | kPa | PSI |
| 18.4 x 34 | 10 | 105 | 15 | 170 | 25 |
| 18.4 x 34 | 16 | 105 | 15 | 170 | 25 |
| 23.1 x 26 | 10 | 105 | 15 | 140 | 20 |
| 23.1 x 26 | 16 | 105 | 15 | 140 | 20 |
| 24.5 x 32 | 10 | 105 | 15 | 140 | 20 |
| 24.5 x 32 | 12 | 105 | 15 | 170 | 25 |
| 24.5 x 32 | 16 | 105 | 15 | 170 | 25 |
| 28.1 x 26 | 10 | 105 | 15 | 140 | 20 |
| 30.5 x 32 | 12 | 105 | 15 | 140 | 20 |
| 30.5 x 32 | 16 | 105 | 15 | 170 | 25 |

BRAKES

Every 250 Hours of Operation:

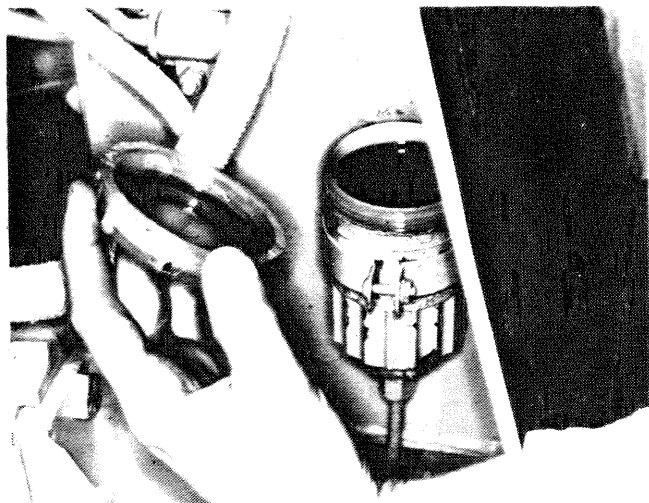


Fig. 13-1

Check the fluid level in the service brake master cylinder located beside the left hand frame rail in the engine compartment. Maintain the fluid level to within 0,6 cm (0,25 in) from the top of the master cylinder reservoir.

! WARNING: USE ONLY THE APPROVED FLUID FOR YOUR SPECIFIC BRAKE SYSTEM TO FILL THE MASTER CYLINDER. THE FLUIDS ARE AS FOLLOWS (SEE ALSO LUBE CHARTS Page 17-2 and 17-3): FOR THE MIDMOUNT BRAKE SYSTEM, USE ONLY CLARK APPROVED TRANSMISSION FLUID. FOR THE DRUM AND DISC BRAKE SYSTEMS, USE ONLY HEAVY DUTY BRAKE FLUID.

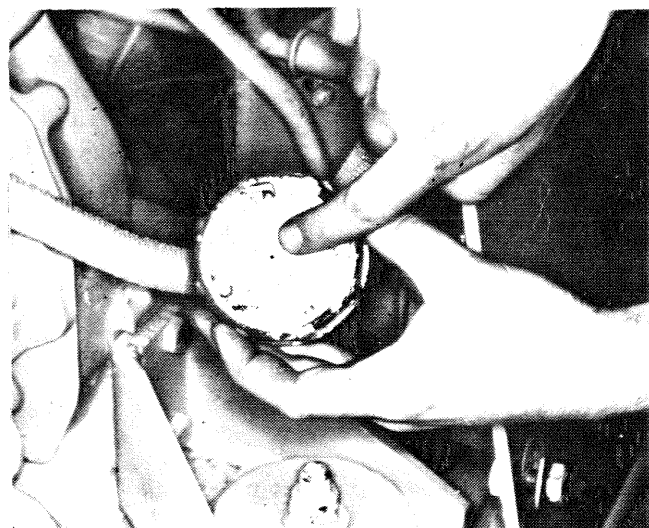


Fig. 13-2

Make sure the vent hole in the filler cap is open at all times. If the hole is plugged, REMOVE the cap, clean the hole and reinstall the cap.

! WARNING: MAKE SURE NO DIRT ENTERS THE RESERVOIR AND CONTAMINATES THE SYSTEM.

Adjust the brake pedal freeplay as follows:

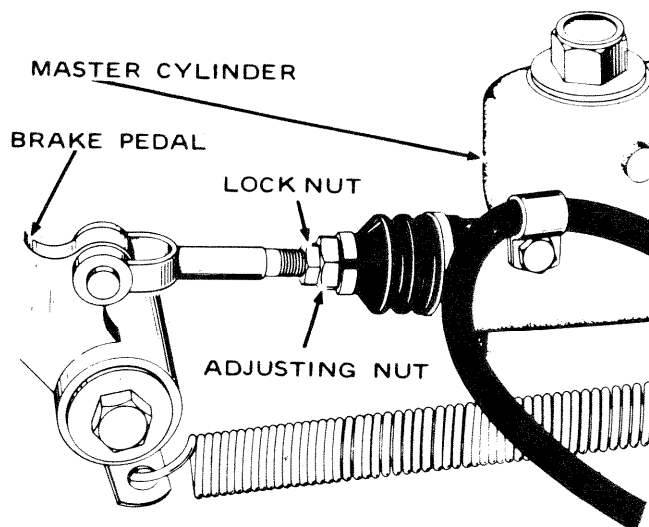


Fig 13-3

Loosen the locknut on the master cylinder pushrod and adjust the pushrod until 1,3 cm (0.5 in) of freeplay exists. Tighten the locknut.

Adjust the midmount brake as follows:

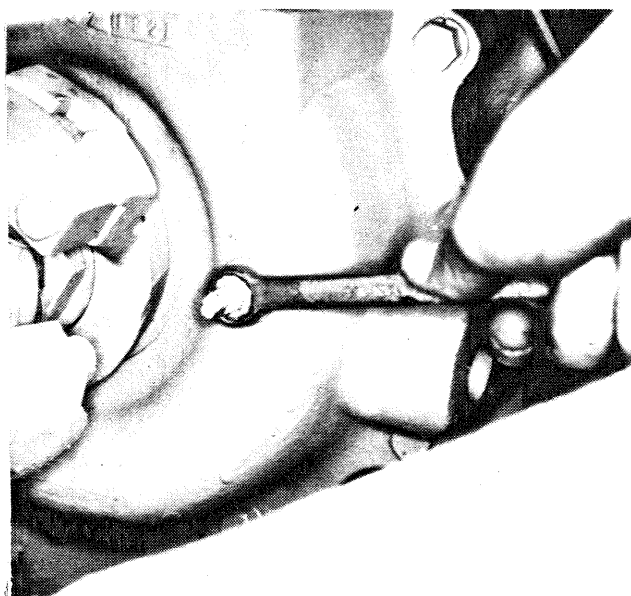


Fig 13-4

1. Loosen the locknut on the brake adjusting screw.

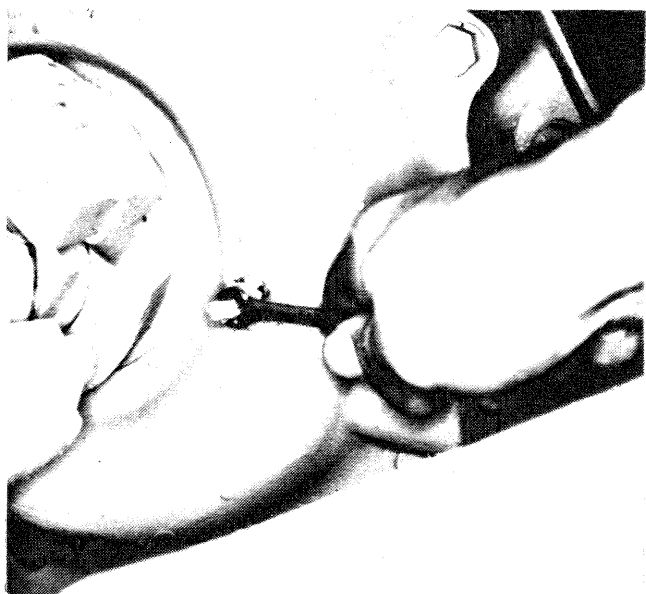


Fig 13-5

2. Turn the brake adjusting screw until it tightens against the brake yoke.

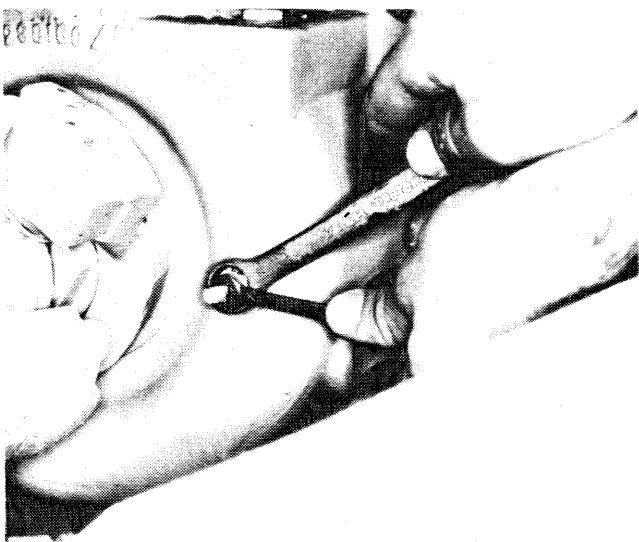


Fig 13-6

3. Loosen the adjusting screw one turn, hold the adjusting screw and tighten the jam nut.

Check the operation of the brakes when you complete the(se) adjustment(s), if they feel spongy or the pedal stroke appears to be longer than normal, bleed the brake system as follows:

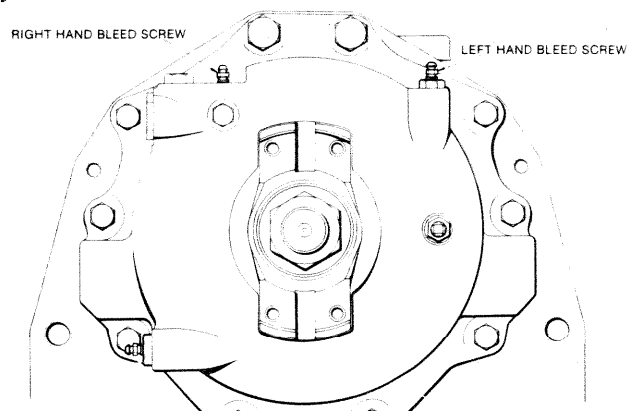


Fig 13-7 Midmount Brake

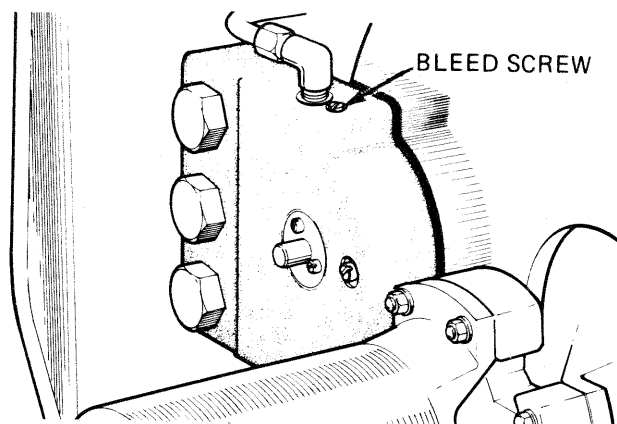


Fig 13-8 Disc Brake

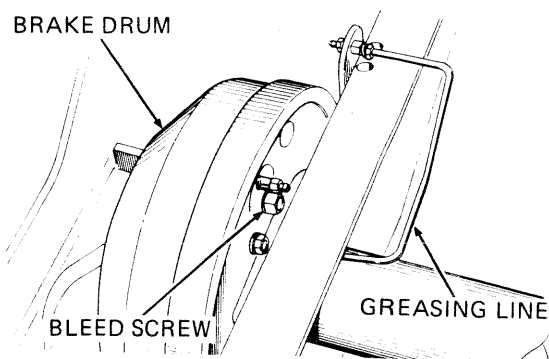


Fig 13-9 Drum Brake

1. Locate the bleed screw(s) on your specific brake system.
2. With the aid of a helper, pump the brake pedal until the brakes feel firm and open the (first) bleedscrew until a clear stream of fluid (free of air bubbles) flows through it, close the screw and release the pedal.

NOTE: It may be necessary to repeat this step so keep the master cylinder reservoir filled with the recommended fluid.

NOTE: The midmount brake assembly has more than one bleed screw (See Fig. 13-7) so bleed all locations until clear stream of oil flows through each.

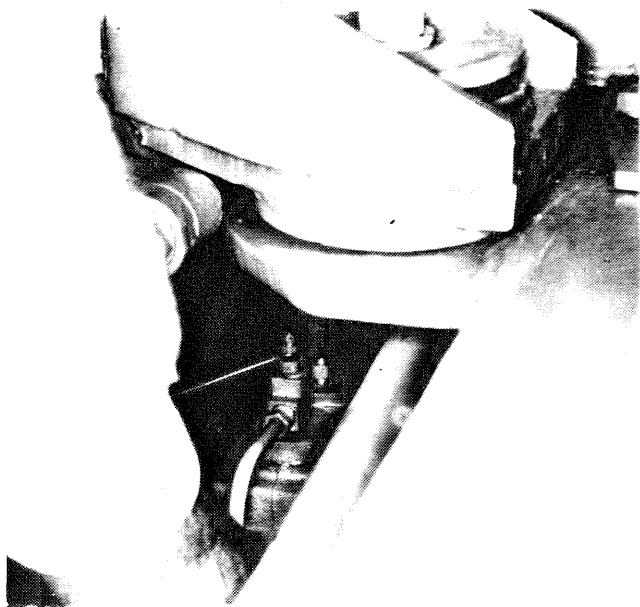


Fig 13-10

3. Open the bleedscrew on the master cylinder (if applicable) until a clear stream of oil fluid (free of air) flows through it as in Step 2.

If slack develops when the parking brake lever is applied, adjust the brake as follows:

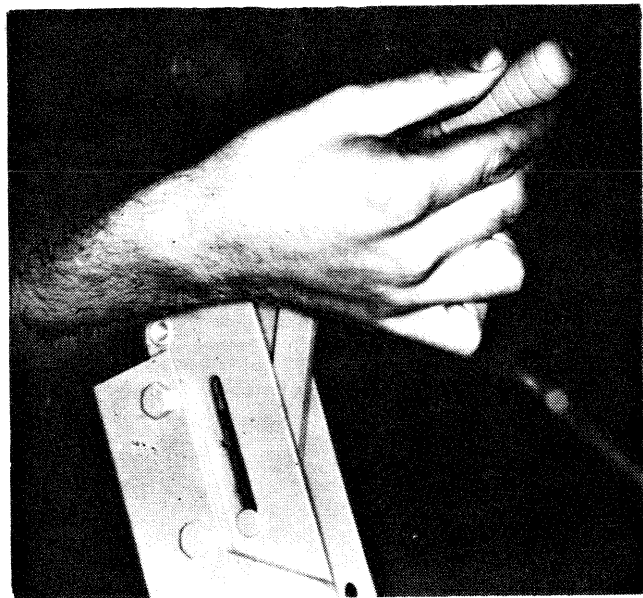


Fig 13-11

Put the lever in the release position and turn the acorn on the end of the lever clockwise to tighten the cable.

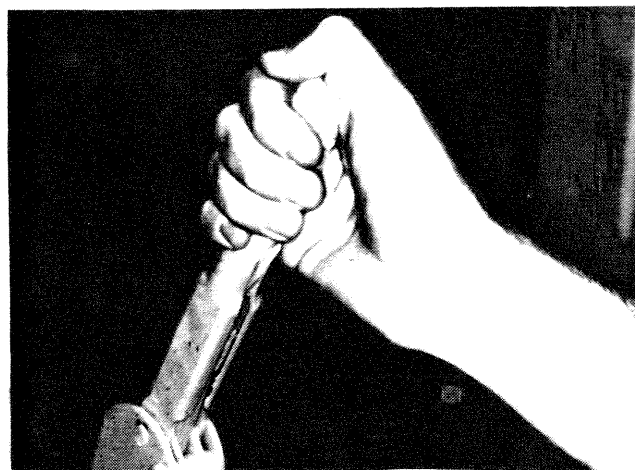


Fig 13-12

Apply the parking brake lever and test for good resistance across the centre of the stroke.

NOTE: If good resistance cannot be achieved, release the lever, loosen the acorn, and adjust the brake head assembly as follows:

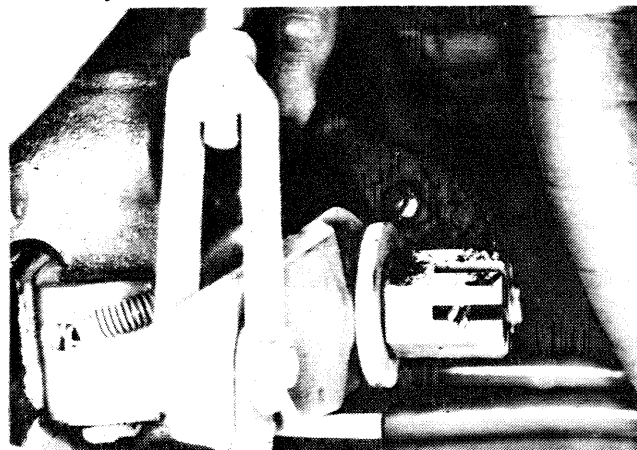


Fig 13-13

Remove the cotter pin from the castle nut on the brake operator cam.

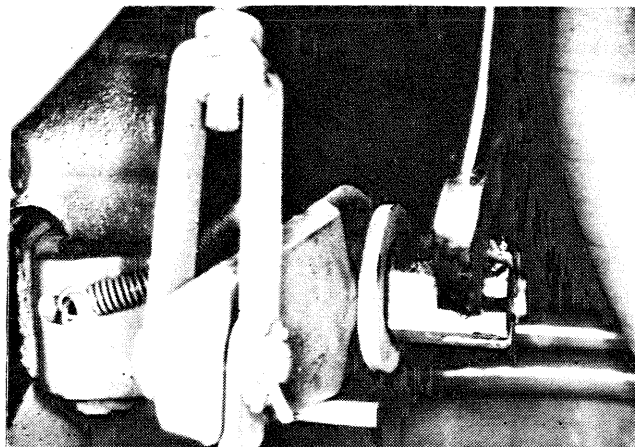


Fig 13-14

Turn the castle nut until 0,39 mm (0.015 in) clearance exists between each brake pan and the brake disc.

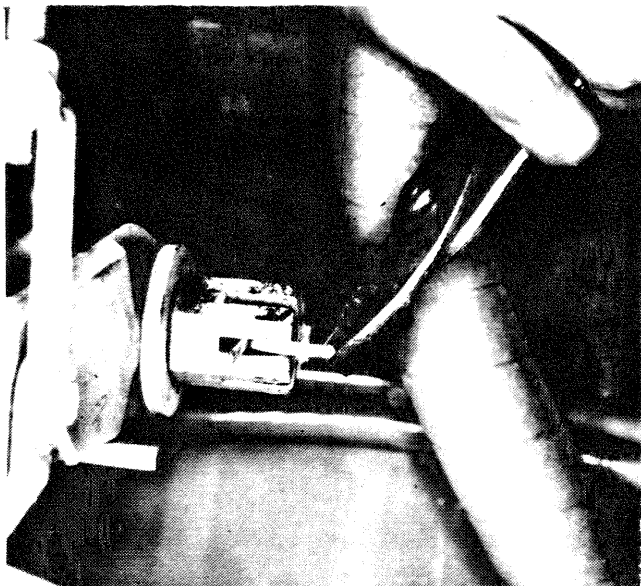


Fig 13-15

Reinstall the cotter pin without moving the castle nut.

NOTE: Some earlier machines have a locknut and an adjusting nut on the operator can instead of a cotter pin and a castle nut. The adjustment is the same but the locknut must be loosened before adjustment and tightened to a torque of 34 to 41 N.m (25 to 30 lbf.ft) after adjustment.

Every 500 Hours of Operation:

Drain and refill the midmount brake housing as follows:

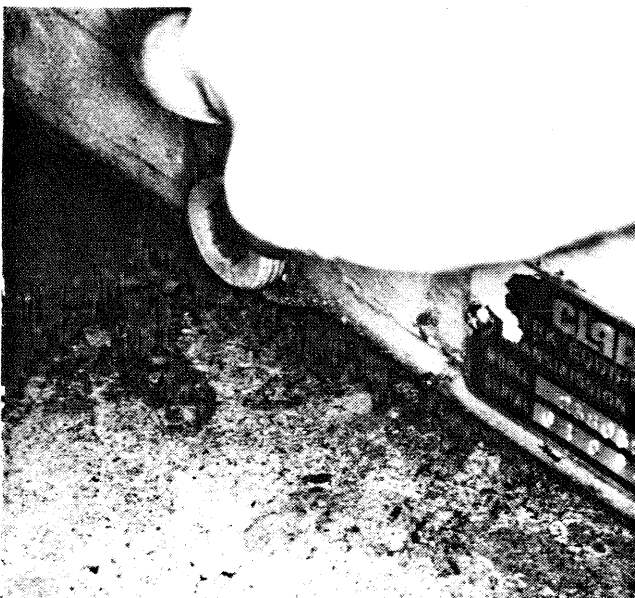


Fig 13-16

Remove the drain plug at the rear of the brake housing and drain the fluid into a container of at least 11 l (3 U.S. gal) and replace the plug.

NOTE: Drain the fluid when it is warm because the fluid will drain easier and carry more foreign material with it.

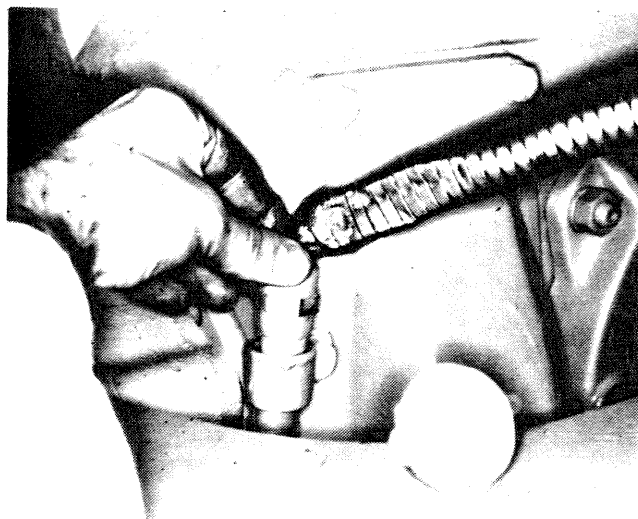


Fig 13-17

Remove the level check plug from the left hand side of the brake housing and add approved automatic transmission fluid through the breather hose fastened to the left side of the winch until the level reaches the check hole.

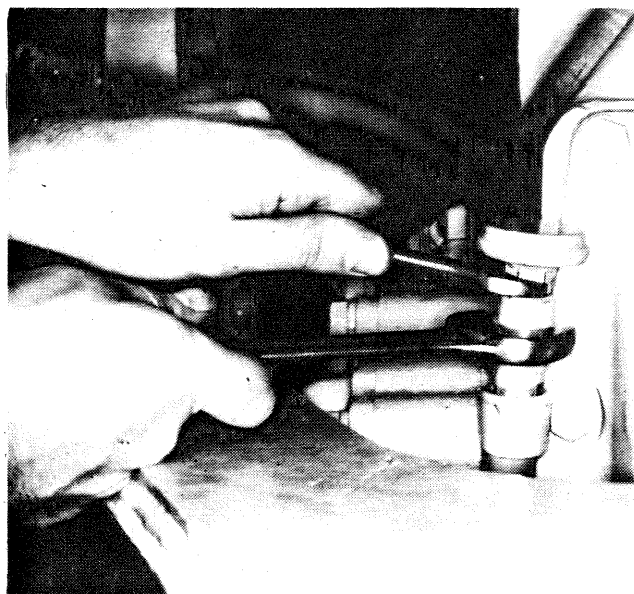
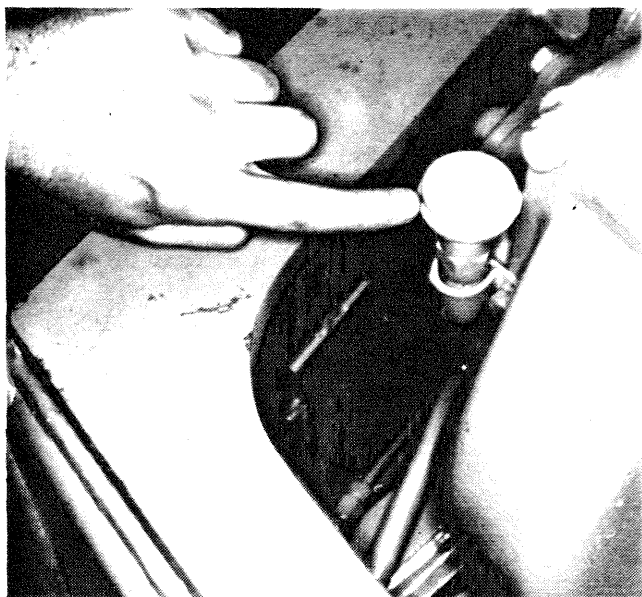


Fig 13-18

Reinstall the breather and the lever check plug.

**Fig 13-19**

Locate the midmount (brake) breather in the rear frame on the left hand side of the winch. Remove the breather, wash it in a solvent and blow dry it with compressed air. Reinstall it on the breather hose.

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ELECTRICAL SYSTEM

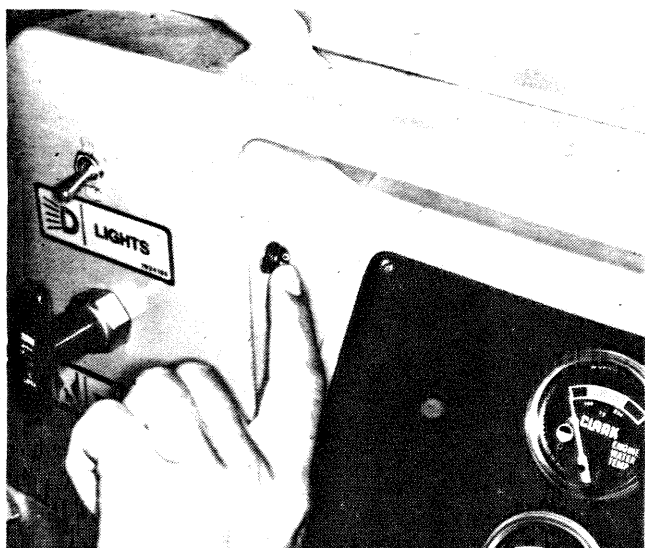


Fig 14-1

The electrical system in the 664C/666C is protected from overload by a circuit breaker located on the instrument panel. If there are sudden surges of current, the circuit breaker will actuate and prevent damage to the system. Push the red button to reset it.

Lights on your machine are adjustable by loosening the mounting nuts and turning the lamp to the desired position.

Replace the lamps by pushing the lamp in and spreading the lip of the rubber retainer.

With the rubber lip spread, remove the lamp, unplug the harness and replace the lamp.

Check and service the batteries as shown in Sec. 4.

Every 500 Hours of Operation:

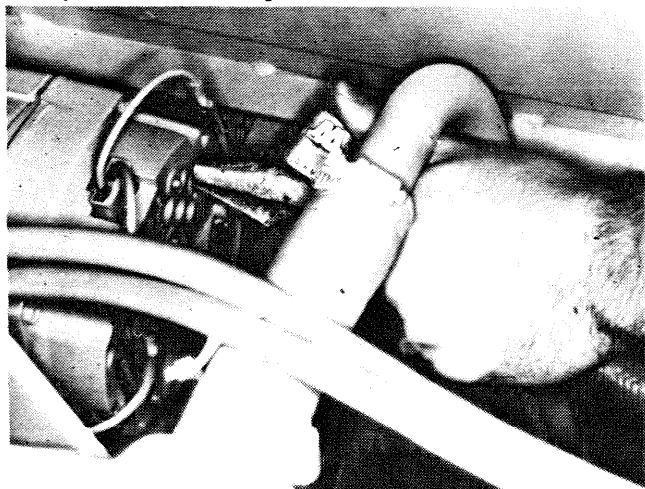


Fig 14-2

Service the other electrical components as follows:

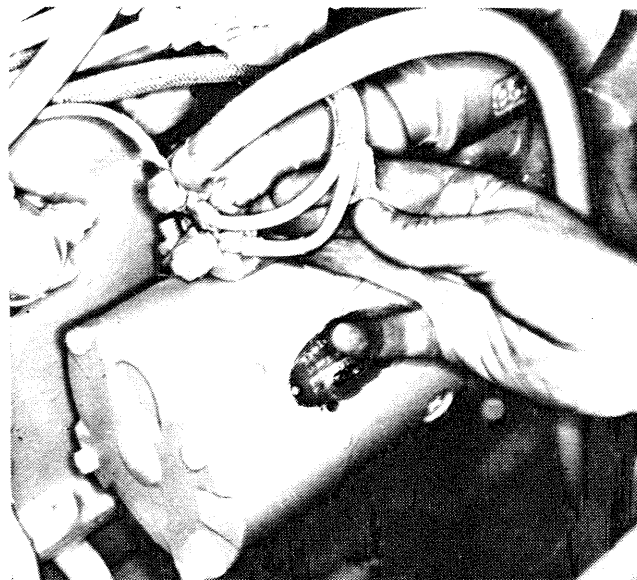
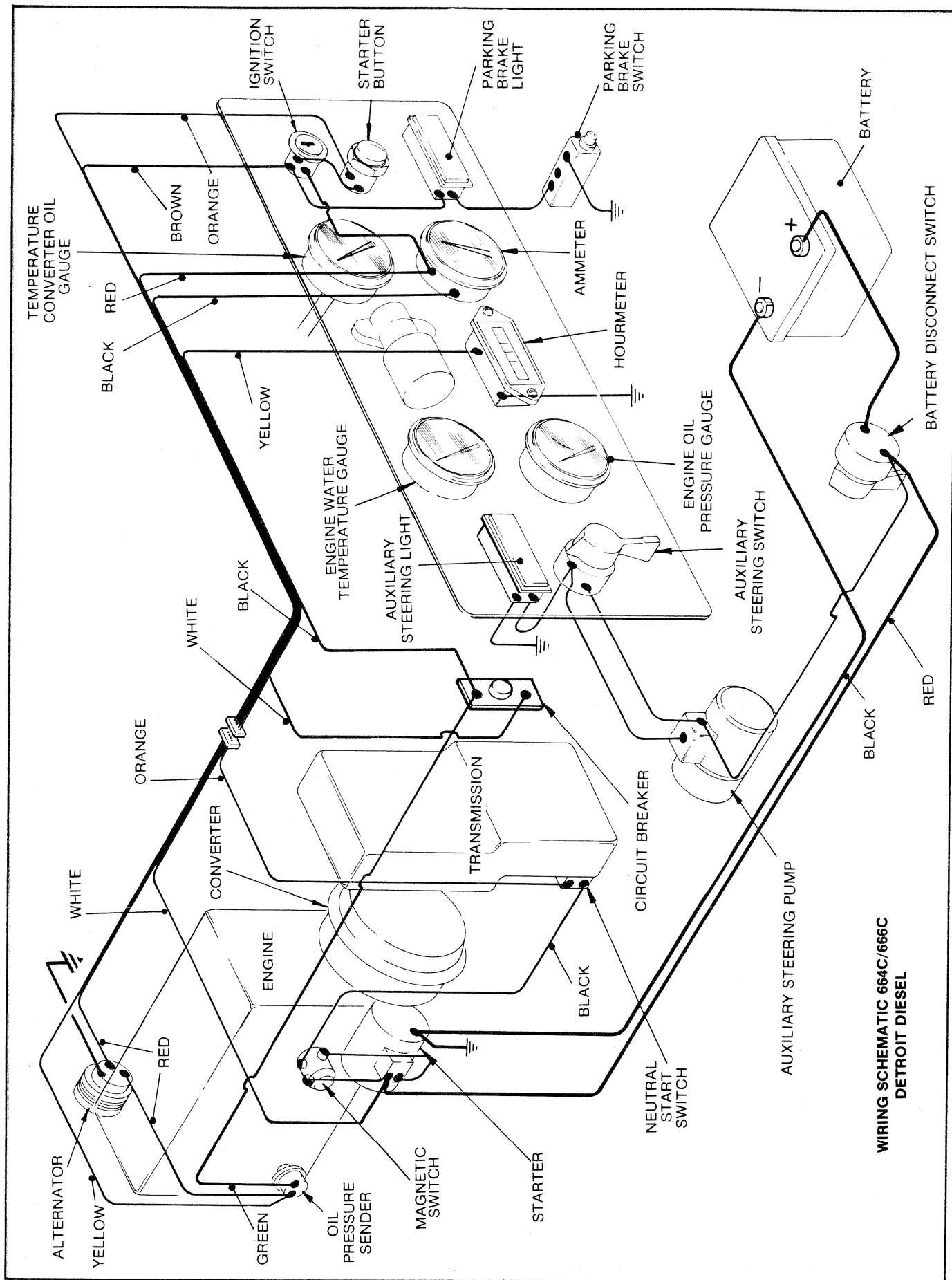


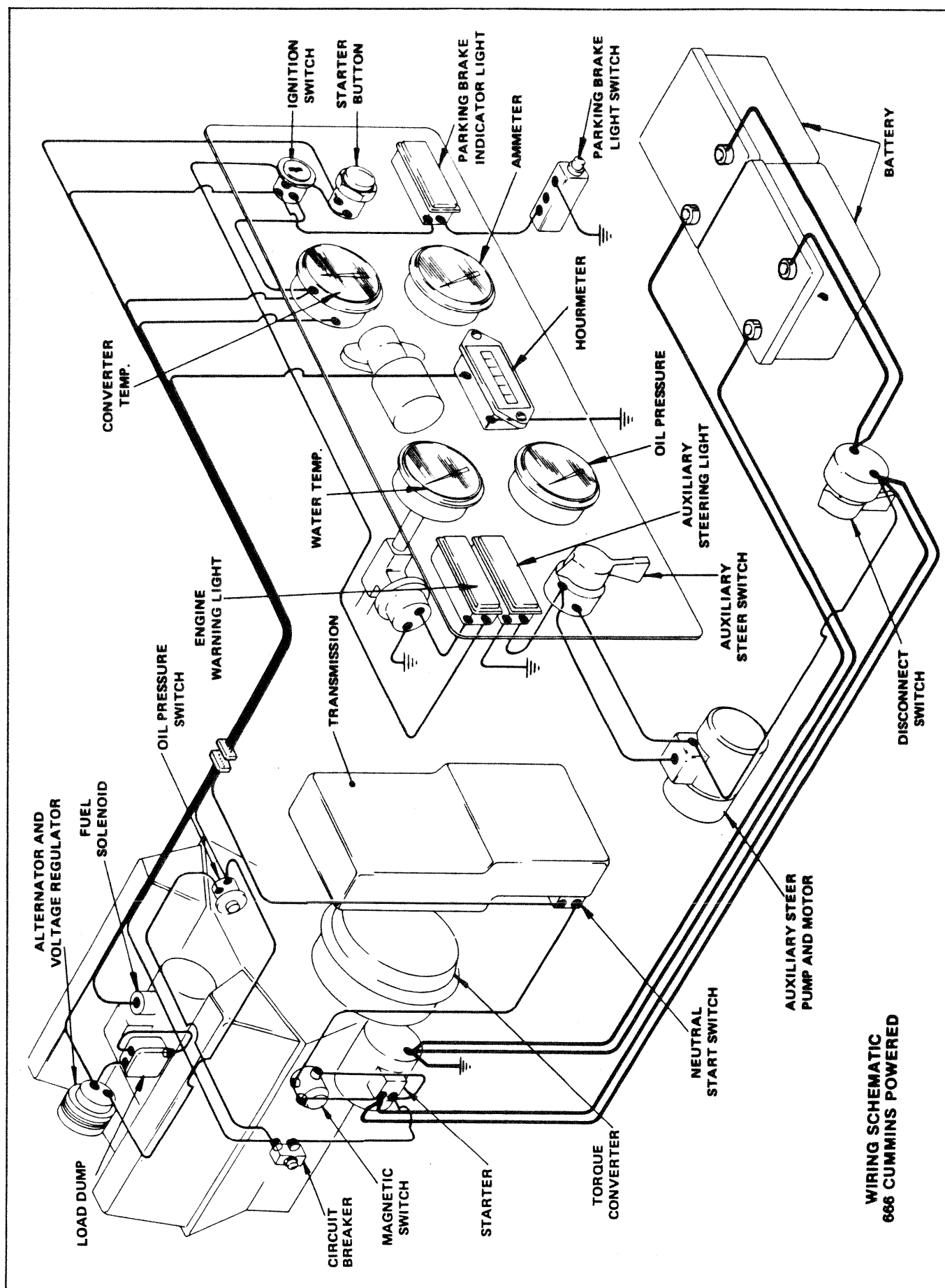
Fig 14-3

1. Visually check the wiring for worn or damaged insulation and loose terminal connections.
2. Clean the connections to the starter motor, alternator voltage regulator, solenoid switch, relays and sender units. Clean and tighten the external ground straps and replace it if it is badly frayed or corroded.

Clean the alternator with compressed air or a low pressure spray of water. Both air and water pressure should be not greater than 207 kPa (30 PSI).



WIRING SCHEMATIC 664C/666C
DETROIT DIESEL



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MISCELLANEOUS

Every 10 Hours of Operation:

Check the operation of the grapple snubbers before each work shift as follows:

1. Pull back the grapple assembly approximately 30 cm (12 in).
2. Release the grapple and allow it to swing back to rest. The grapple should stop completely just before it reaches the bottom of its swing.

If the grapple swings farther than the 30 cm (12 in), adjust the snubbers as follows:

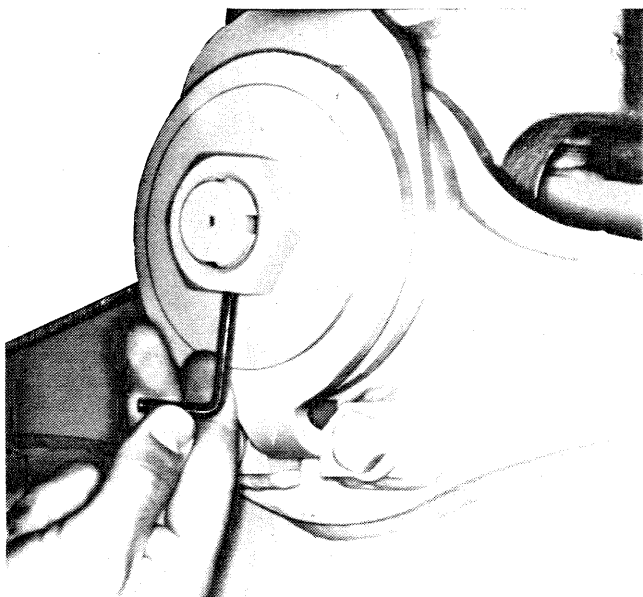


Fig 15-1

1. **IMPORTANT:** Loosen the lock screw on the side of each adjusting nut on each side of the manifold yoke and on each grapple yoke.

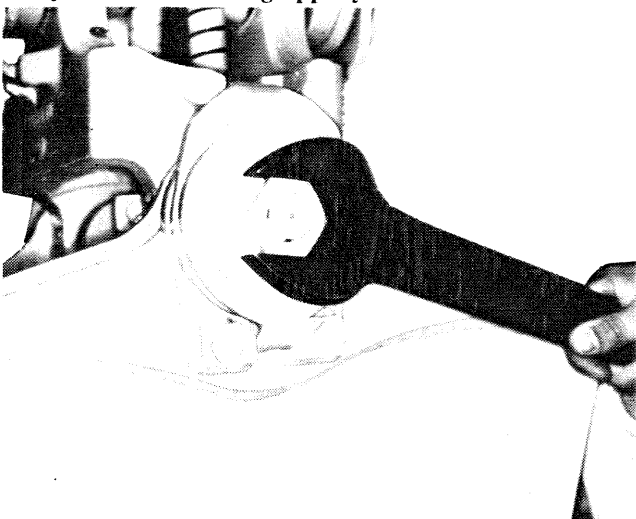


Fig 15-2

2. Loosen the four adjusting nuts.

3. Tighten the adjusting nuts until the Belleville washers collapse approximately halfway. Recheck the grapple swing.

NOTE: Never overtighten the adjusting nuts.

1. Tighten the lock screws to hold the adjusting nuts in place.

NOTE: It may be necessary to loosen or tighten the adjusting nut a small amount so that the lock screw will line up with the locking grooves in the snubber pins.

IMPORTANT NOTE: Keep oil and grease away from the snubbers so they will work at maximum efficiency.

Every 500 Hours of Operation:

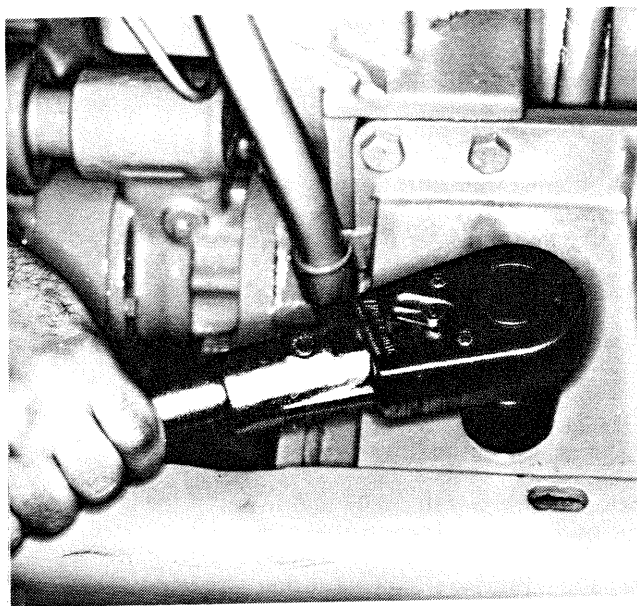


Fig 15-3

Tighten all component mounting bolts to the torques specified in Sec. 16. Wear and breakage can result from improperly installed or loosened mounting bolts (or nuts). If no torque values are given, bolts should be tightened in a manner consistent with good workmanship - See Sec. 16 - BOLT TORQUE CHART, GENERAL.

NOTE: Do not overtighten.

If you must tow the machine:

Put all control levers in their NETRUAL positions.

Remove the drive shafts that connect the rear drive axle to the midmount (brake) and the front drive axle to the transmission.

NOTE: Never separate the slip shafts because of the balance and wear characteristics of each assembly. If they are separated, mark them so they can be reassembled the same as they were disassembled.

IMPORTANT NOTE: With the engine shut down, the transmission/converter charging (lubricating) pump is inoperative. Serious damage to the transmission will result if it is driven by the wheels with no lubrication.



WARNING: ALWAYS fasten the articulation lock between the frames and install a red warning flag to the canopy upright to indicate that the steering frame lock is fastened.

Use a solid tow bar, or raise one end of the machine to tow it because with the steering frame lock fastened, and the engine shut down, the machine cannot be steered.

When you replace the driveshafts, use only the special bolts provided and tighten them to the torque specified in Sec. 16.

If you must transport the machine:

Load and unload the machine on a level surface.

Always center the machine on the trailer bed.

Always put the machine in the Service Position (See Sec. 1).

Use adequate chains, blocks and cables to safely fasten the machine to the floor of the trailer.

Measure the overall height and width of the machine on the trailer.

NOTE: It is very important that you know the overall height, width and weight when you transport the machine.

Be especially careful in foggy, dusty or stormy weather conditions.

If you must store the machine:

Thoroughly steam clean the machine to reduce the chance of fire and use touch-up paint where necessary to prevent rust.

Put the machine in the Service Position (See Sec. 1).

Check all fluid levels as shown in this manual and check the freezing point of the engine coolant. Add fluids as required.

FILL the fuel tank and the hydraulic oil reservoir.

Apply a coating of grease to all unpainted metal parts such as cylinder rods, propshaft splines, valve spools and control linkages. Use a rustproof spray on exposed pin ends and lock plates.

Cover the exhaust opening on the muffler.

Disconnect the ground cable(s) from the battery(ies).

Make a visual inspection for any oil or coolant leaks.

Check the air cleaner and air intake tubes for cracks or damage that would allow foreign material to enter and damage the engine.

Check the condition of the fan belt(s).

Grease ALL lubrication points thoroughly (See Sec. 17).

Remove the ignition key and keep it in a safe place.

Tilt the operator's seat against the handrail and cover the instruments and controls with a waterproof cover.

If possible, raise and block the machine to remove the load from the tires and reduce the tire inflation pressure to 105 kPa (15 PSI) and cover the tires to protect them from sunlight and weather.

If the machine cannot be raised, increase the inflation pressure 35 kPa (5 PSI) above the operating pressure and check the pressure every two weeks to maintain it. The tires should also be covered for protection. Do not leave tires standing on oil or fuel spills or any oil stabilized surface such as blacktop.

Start and operate the machine every 30 days as follows:

1. Check to see that the battery(ies) is (are) fully charged and reconnect the ground cable(s) to the negative battery terminal(s).
2. Clean any hardened grease from the cylinder rods.
3. Remove the covers from the tires (and lower the machine if it is raised).
4. Remove the cover from the exhaust opening on the muffler.
5. Start the engine at Low Idle RPM.
6. Check all gauges, lights and circuit breakers for proper operation.
7. Operate the engine at Low Idle RPM for approximately 15 minutes.
8. Release the parking brake and check the operation of the brake system(s) in an area free from obstructions.
9. Operate the transmission in both directions and all speed ranges for at least ten tire revolutions in each direction.
10. Operate the steering, blade (and grapple if applicable) hydraulic systems.

Stop the engine and return the machine to the Service Position (See Sec. 1). Tilt the operator's seat forward and reinstall the waterproof cover. Grease all exposed cylinder rods and check for leaks. Disconnect the ground cable(s), reinstall the cover on the muffler opening and cover the tires.

SPECIFICATIONS AND SERVICE DATA

| | | |
|---|--------------------------|--------------------------|
| Machine Model | 664 | 664 Turbo |
| Engine | Detroit Diesel | Detroit Diesel |
| Model | 3-53N | 3-53T |
| Configuration | Inline 3 | Inline 3 Turbo |
| Bore & Stroke, cm (in.) | 9,8 x 11,4 (3.875 x 4.5) | 9,8 x 11,4 (3.875 x 4.5) |
| Displacement, ° (in ³) | 2,6 (159) | 2,6 (159) |
| Maximum Torque, N.m (lbf.ft) @ RPM | 278 (205) @ 1800 | 409 (302) @ 1600 |
| Gross Power, kW (hp) at governed RPM | 73 (98) | 93 (125) |
| Governed RPM (Full Load) | 2800 | 2500 |
| Low Idle RPM | 575-625 | 575-625 |
| High Idle RPM | 2860-2960 | 2660-2760 |
| Stall Speed (with hydraulics over relief) | 1920-2080 rpm | 1920-2080 rpm |
| Converter Stall RPM | 2300-2460 rpm | 2579 rpm |
| Machine Model | 666 | 666 Cummins |
| Engine | Detroit Diesel | Diesel |
| Model | 4-53N | V-378 |
| Configuration | Inline 4 | 6 |
| Bore & Stroke, cm (in.) | 9,8 x 11,4 (3.875 x 4.5) | 4.655 x 3.75 |
| Displacement, ° (in ³) | 3,5 (212) | 378 |
| Maximum Torque, N.m (lbf.ft) @ RPM | 366 (270) @ 1800 | 255 @ 1900 |
| Gross Power, kW (hp) at governed RPM | 95 (127) | 122 (91) |
| Governed RPM (Full Load) | 2800 | 2700 |
| Low Idle RPM | 575-625 | 600-650 |
| High Idle RPM | 2860-2960 | 2910-3030 |
| Stall Speed (with hydraulics over relief) | 2250-2400 rpm | 2040-2400 rpm |
| Converter Stall RPM | 2500-2660 rpm | 2450-2700 rpm |

NOTE: The stall RPM is the maximum obtainable RPM with oil at its operating temperature, brakes applied, the wheels blocked, the directional and speed range shift levers in forward and 3rd and the machine turned full against stops.

The stall speed is applicable to an altitude of 150 m (500 ft) and ambient temperatures of 30°C (85°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 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

Lamps:

Font and rear lamps 12 volt

Instruments:

Panel gauges 12 volt
Sender units 12 volt

Alternator:

12 v. 35 amp., negative ground

Voltage Regulator: 12 volt

Starting Motor: 12 volt

BATTERIES

Cum. Number Required: 2 (Parallel connected)

G.M. Number Required: 1

Electrical System: 12 volt

Grounded Terminal: Negative

*Later Model Skidders have 1 battery.

Hydrometer Test Readings:

1.260 - Fully charged
1.230 - 3/4 charge (fair)
1.200 - 1/2 charge (recharge)
1.170 - 1/4 charge (unserviceable)

NOTE: Readings between cells must be within 0.050.

PRESSURE READINGS - At operating temperatures (See Sec. 1).

G.M. Engine Lube Oil

- At idle: 69 to 172 kPa (10 to 25 PSI).
- At operating speeds: 372 kPa (55 PSI).

Cummins Engine Lube Oil

- At governed RPM: 45 to 65 PSI.

Transmission Clutches:

1655 to 1931 kPa (240 to 280 PSI).

In all speed ranges and directions at low idle speed.

There should be no more than 35 kPa (5 PSI) variation between all clutches.

Hydraulic Relief Settings:

Steer and Blade Relief - 12410 kPa (1800 PSI) on the cable skidder.

13790 kPa (2000 PSI) on the grapple skidder.

Arch and Grapple Relief - 13790 kPa (2000 PSI).

| TIRE PRESSURES TIRE SIZE | PLY RATING | INFLATION PRESSURES (PSI - MINIMUM) | INFLATION PRESSURES (PSI - MAXIMUM) |
|-------------------------------------|-----------------------|--|--|
| 16.9 x 30 | 8 | 15 | 25 |
| 18.4 x 26 | 10 | 15 | 25 |
| 18.4 x 34 | 10 | 15 | 25 |
| 23.1 x 26 | 10 | 15 | 20 |
| 24.5 x 32 | 10 | 15 | 20 |
| 24.5 x 32 | 12 | 15 | 25 |
| 28.1 x 26 | 10 | 15 | 20 |
| 30.5 x 32 | 12 | 15 | 20 |
| 30.5 x 32 | 16 | 15 | 25 |
| 67.0 x 34 - 25 | 8 | 15 | 20 |

Hydroinflation: For information on hydro-inflation, see your Ranger distributor.

Model 664

| CAPACITIES (Approximate) | Litres | U.S. Gallons |
|--|---------------|---------------------|
| Engine Crankcase and system..... | 15 | 4 |
| Cooling System..... | 42 | 11 |
| Front Drive Axle Differential..... | 7 | 2 |
| Front Drive Axle Planetary Hubs (ea.)..... | 5 | 1 |
| Fuel Tank | 132 | 35 |
| Hydraulic System | 55 | 14.5 |
| Mid-Mount Brake | 10 | 3 |
| Rear Drive Axle Differential | 7 | 2 |
| Rear Drive Axle Planetary Hubs (ea.) | 5 | 1 |
| Torque Converter, Transmission and Winch | 30 | 8 |

Model 664 Turbo and 666

| CAPACITIES (Approximate) | Litres | U.S. Gallons |
|--|---------------|---------------------|
| Engine Crankcase and System | 15 | 4 |
| Cooling System..... | 59 | 16 |
| Front Drive Axle Differential..... | 7 | 8 |
| Front Drive Axle Planetary Hubs (ea.)..... | 5 | 1 |
| Fuel Tank | 132 | 35 |
| Hydraulic System..... | 55 | 14.5 |
| Mid-Mount Brake | 10 | 3 |
| Rear Drive Axle Differential | 7 | 2 |
| Rear Drive Axle Planetary Hubs (ea.) | 5 | 1 |
| Torque Converter, Transmission and Winch | 30 | 8 |

Model 666 Cummins

| CAPACITIES (Approximate) | Litres | U.S. Gallons |
|--|---------------|---------------------|
| Engine Crankcase and System | 25 | 6.5 |
| Cooling System..... | 59 | 16 |
| Front Drive Axle Differential..... | 7 | 2 |
| Front Drive Axle Planetary Hubs (ea.)..... | 5 | 1 |
| Fuel Tank | 132 | 35 |
| Hydraulic System..... | 55 | 14 |
| Mid-Mount Brake | 10 | 3 |
| Rear Drive Axle Differential | 7 | 2 |
| Rear Drive Axle Planetary Hubs (ea.) | 5 | 1 |
| Torque Converter, Transmission and Winch | 30 | 7.8 |

| BOLT TORQUE CHART, APPLICATION | Thread | N.m | lbf.ft |
|--|---------------|------------|---------------|
| Front Engine Mount to Engine | 3/8-16 | 31-33 | 23-25 |
| Front Engine Mount to Frame | 5/8-11 | 216-237 | 159-175 |
| Front Engine Mount to Pedestal Mount | 5/8-11 | 122-136 | 90-100 |
| Side Frame Mount to Engine | 1/2-13 | 77-85 | 57-63 |
| Side Engine Mount to Frame | 5/8-11 | 54-136 | 40-100 |
| Torque Converter to Flywheel Housing | 3/8-16 | 27-34 | 20-25 |
| * Transmission Bracket to Transmission | 3/4-10 | 386-420 | 285-310 |
| Transmission Bracket to Frame | 5/8-11 | 216-237 | 159-175 |
| Upper Drive Shaft | 5/16-24 | 27-34 | 20-25 |
| Lower Drive Shaft | 3/8-24 | 54-61 | 40-45 |
| * Winch to Frame (Cradle) | 1 1/4-7 | 1152-1356 | 850-1000 |
| * Winch Cradle to Frame | 1-8 | 929-1017 | 685-750 |
| * Rear Axle to Frame | 1-14 | 1011-1113 | 746-821 |
| Mounting Flange to Rear Drive Shaft | 7/8-14 | 800 | 590 |
| * Mid-Mount Bearing to Rear Frame | 3/8-16 | 45-49 | 33-36 |
| Wheel Nuts | 3/4-16 | 576-644 | 425-475 |
| Alternator Pulley | 5/16-18 | 61 | 45 |
| Hydraulic Pump to Torque Converter | 3/8-24 | 27 | 20 |
| Hydraulic Tank Filter Mounting Bolts | 5/16-24 | **5-6 | 40-50 |

All bolts are grade 8.

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 A MANNER CONSISTANT WITH GOOD WORKMANSHIP.

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

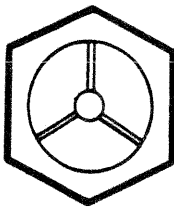
**N.m (lbf.ft)

BOLT TORQUE CHART - GENERAL

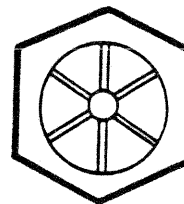
NOTE: Use this chart only if the torque is not shown on the BOLT TORQUE CHART, APPLICATION.

| Thread Diameter | | GRADE 5 | | GRADE 8 | | Socket Head and 12 Point Head Capscrews | |
|-----------------|---------|--|-----------|--|-----------|--|-----------|
| | | Part Number Prefixes Coarse Thread 1C, 15C, 61D Fine Thread 2C, 16C, 62D | | Part Number Prefixes Coarse Thread 17C, 23C, 63D Fine Thread 18C, 24C, 64D | | Part Number Prefixes Coarse Thread 25C, 73G, 93G Fine Thread 26C, 74G, 94G | |
| Fraction | Decimal | N.m | lbf.ft | N.m | lbf.ft | N.m | lbf.ft |
| 1/4 | 0.2500 | 10 | 7 | 12-14 | 9-10 | 15-16 | 11-12 |
| 5/16 | 0.3125 | 20-22 | 15-16 | 24-27 | 18-20 | 31-34 | 23-25 |
| 3/8 | 0.3750 | 34-38 | 25-28 | 50-55 | 34-40 | 60-65 | 45-50 |
| 7/16 | 0.4375 | 55-60 | 40-45 | 80-90 | 60-65 | 95-100 | 70-75 |
| 1/2 | 0.5000 | 90-95 | 65-70 | 125-135 | 90-100 | 150-160 | 110-120 |
| 9/16 | 0.5625 | 125-135 | 90-100 | 170-190 | 125-140 | 205-225 | 150-165 |
| 5/8 | 0.6250 | 170-190 | 125-140 | 240-255 | 175-190 | 285-310 | 210-230 |
| 3/4 | 0.7500 | 300-330 | 220-245 | 405-445 | 300-330 | 490-540 | 360-400 |
| 7/8 | 0.8750 | 450-490 | 330-360 | 645-710 | 475-525 | 815-880 | 600-650 |
| 1 in | 1.0000 | 645-710 | 475-525 | 985-1085 | 725-800 | 1220-1355 | 900-1000 |
| 1-1/8 | 1.1250 | 880-975 | 650-720 | 1425-1595 | 1050-1175 | 1760-1965 | 1300-1450 |
| 1-1/4 | 1.2500 | 1220-1355 | 900-1000 | 2000-2205 | 1475-1625 | 2510-2710 | 1850-2000 |
| 1-3/8 | 1.3750 | 1630-1830 | 1200-1350 | 2710-2980 | 2000-2200 | 3320-3660 | 2450-2700 |
| 1-1/2 | 1.5000 | 2035-2235 | 1500-1650 | 3523-3865 | 2600-2850 | 4270-4680 | 3150-3450 |
| 1-5/8 | 1.6250 | 2710-2980 | 2000-2200 | 4680-5150 | 3450-3800 | 5630-6240 | 4150-4600 |
| 1-3/4 | 1.7500 | 3390-3730 | 2500-2750 | 5830-6510 | 4300-4800 | 6910-7730 | 5100-5700 |
| 1-7/8 | 1.8750 | 4270-4745 | 3150-3500 | 7460-8270 | 5500-6100 | 8810-9760 | 6500-7200 |
| 2 in | 2.0000 | 5150-5965 | 3800-4200 | 8810-9760 | 6500-7200 | 10575-11660 | 7800-8600 |

NOTE: The torque values shown are for fasteners coated with zinc phosphate and oil, and used with hardened plain or zinc phosphate and oil coated washers.



Grade 5 Identification
3 Radial Lines 120° Apart
on Heads of Bolts.



Grade 8 Identification
6 Radial Lines 60° Apart
on Heads of Bolts.

HOURLY LUBRICATION & MAINTENANCE SCHEDULE



WARNING: Except when specified, lower all attachments to the ground, apply the parking brake, shut down the engine, remove the ignition key, turn the disconnect switch to the OFF position, block the wheels, engage the articulation lock, and tie a red warning flag on the canopy upright; when servicing the machine.

| SYSTEM | OPERATION | TEXT LOCATION | INTERVALS | | | | | |
|--|---|---------------|-----------|----|-----|-----|-----|------|
| | | | 10 | 50 | 100 | 250 | 500 | 1000 |
| Engine, Controls, Cooling System and Accessories | Engine Maintenance | See Engine | • | | | | | |
| | Check & Refill Radiator as Required | Sec. 6 | | • | | | | |
| | Check Cooling System for Leaks | Sec. 6 | | • | | | | |
| | Check Anti-Freeze Protection | Sec. 6 | | • | | | | |
| | Check and Adjust Belt Tension | Sec. 6 | | | | • | | |
| | Tighten Air Cleaner Connections | Sec. 6 | | | • | | | |
| | Check Engine RPM | Sec. 6 | | | | • | | |
| | Clean Radiator Core | Sec. 6 | | | • | | • | |
| | Service Air Cleaner Element and Body | Sec. 6 | | | | | • | |
| Fuel Tank and Accelerator | Drain Fuel Tank Sediment | Sec. 7 | | • | | | | |
| | Check Fuel System for Leaks | Sec. 7 | | • | | | | |
| | Clean Fuel Tank Filter Cap | Sec. 7 | | • | | | | |
| | Check Accelerator Linkage, Adjust as Required | Sec. 7 | | | | • | | |
| | Drain & Clean Fuel Tank | Sec. 7 | | | | | | • |
| Torque Converter Transmission and Winch Hydraulic System | Check Fluid Level Daily, at the Transmission | Sec. 8 | • | | | | | |
| | Clean Torque Converter and Transmission Breathers | Sec. 8 | | | | • | | |
| | Replace the Filter Element | Sec. 8 | | | | | • | |
| | Check System for Leaks | Sec. 8 | | | | • | | |
| | Check Converter out Pressure | Sec. 8 | | | | • | | |
| | Check & Adjust Transmission Shift Linkage | Sec. 8 | | | | | • | |
| | Drain & Refill Transmission, Converter, Winch, Hydraulic System | Sec. 8 | | | | | • | |
| | Check Transmission Clutch Operating Pressures | Sec. 8 | | | | | • | |
| | Check & Adjust the Clark Winch Free Spool | Sec. 9 | | | • | | | |
| | Check Clark Winch Free Spool Wear Button | Sec. 9 | | | | • | | |
| | | | | | | | | |
| Steer & Blade Hydraulic System | Clean Cylinder Rods | Sec. 10 | | • | | | | |
| | Check & Adjust as Required | | | | | | | |
| | Control Valve Relief Pressures | Sec. 10 | | | | | • | |
| | Replace Filter Element | Sec. 10 | | | | | • | |
| | Drain, Clean & Refill Hydraulic Oil Reservoir | Sec. 10 | | | | | | • |
| Axles, Propshafts & Wheels | Check Fluid Level of Differential & Planetary | Sec. 11 | | • | | | | |
| | Clean Breathers | Sec. 11 | | | | | • | |
| | Drain & Refill Differential & Planetary | Sec. 11 | | | | | | • |
| | Check For and Repair Drive Line noises | Sec. 11 | • | | | | | |
| | Check Tire Pressures & Castings | Sec. 12 | • | | | | | |
| | Tighten Wheel Nuts & Inspect Rims | Sec. 12 | | • | | | | |
| Brake System | Check & Adjust as Required, Brake Pedal & Linkage | Sec. 13 | | | | • | | |
| | Check & Adjust Brake | Sec. 13 | | | | • | | |
| | Check Fluid Level in Master Cylinder | Sec. 13 | | | | • | | |
| Electrical System | Check Lights & Fuses | Sec. 14 | | • | | | | |
| | Service the Batteries | Sec. 14 | | • | | | | |
| | Clean the Alternator | Sec. 14 | | | | | • | |
| | Clean & Tighten the Electrical Connections | Sec. 14 | | | | | • | |
| | Inspect, Test, & Lubricate Electrical Units | Sec. 14 | | | | | | • |
| | Check Cranking Motor Operation | Sec. 14 | | | | | | • |

FOR MACHINES WITHOUT MID-MOUNT BRAKE

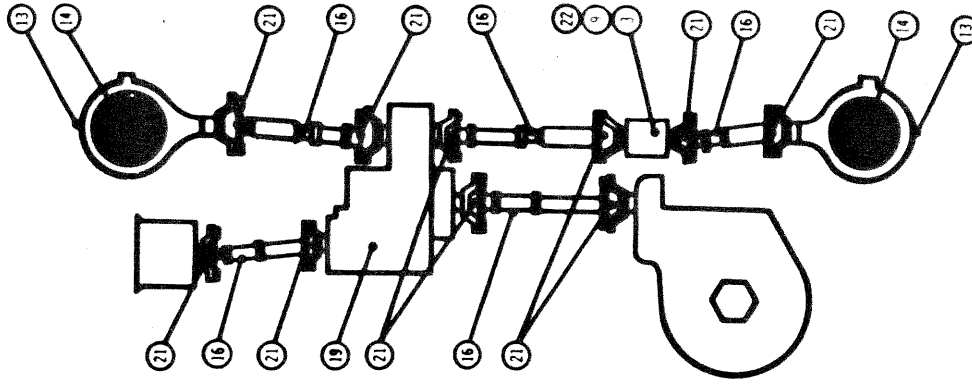
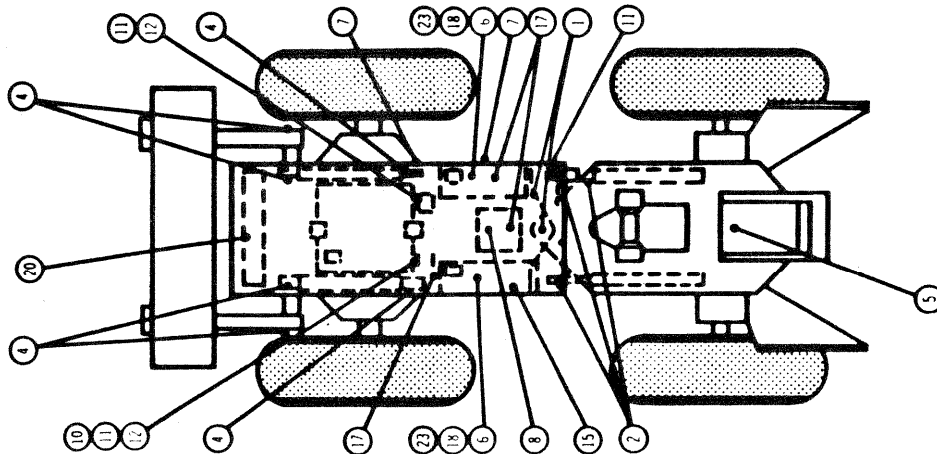
Chassis

CLARK

Lubrication Instructions

RANGER

Drive Line



| ITEM | 10 HOUR OR DAILY SERVICE | 504 500 567 569 | CHECK | LUBE CHANGE | KEY |
|--------------------------------------|--|-----------------|-------|-------------|------|
| 1 | CRADLE & HINGE PINS | X | X | X | EPMD |
| 2 | STEER CYLINDER PINS | X | X | X | EPMD |
| 3 | MID MOUNT | X | X | X | EPMD |
| 4 | UTILITY BLADE & CYLINDER PINS | X | X | X | EPMD |
| 5 | FUEL TANK | X | X | X | DF |
| 6 | OIL RESERVOIR | X | X | X | DX |
| 7 | COOLANT LEVEL | X | X | X | |
| 50 HOUR OR WEEKLY SERVICE | | | | | |
| 8 | TORQUE CONVERTER & TRANSMISSION | X | X | X | DX |
| 9 | MID MOUNT BEARING | X | X | X | DX |
| 10 | MASTER CYLINDER SERVICE | X | X | X | DX |
| 11 | MASTER CYLINDER EMERGENCY | X | X | X | DX |
| 12 | MASTER CYLINDER SERVICE | X | X | X | BF |
| 13 | DIFFERENTIAL | X | X | X | EPGL |
| 14 | PLANETARY | X | X | X | EPGL |
| 15 | WINCH LEVER | X | X | X | EPMD |
| 100 HOUR OR 2 WEEKS SERVICE | | | | | |
| 16 | SLIP JOINT | X | X | X | EPMD |
| 250 HOUR OR MONTHLY SERVICE | | | | | |
| 17 | TORQUE CONVERTER & TRANSMISSION FILTER | X | X | X | |
| 500 HOUR OR 2 MONTH SERVICE | | | | | |
| 18 | HYDRAULIC TANK FILTER | X | X | X | |
| 19 | TORQUE CONVERTER & TRANSMISSION | X | X | X | DX |
| 20 | CLEAN RADIATOR CORE | X | X | X | |
| 1,000 HOUR OR 6 MONTH SERVICE | | | | | |
| 21 | UNIVERSAL JOINTS | X | X | X | EPMD |
| 22 | MID MOUNT BEARING | X | X | X | EPMD |
| 23 | OIL RESERVOIR | X | X | X | DX |

Lubricant Key

| EPMD | Extreme Pressure Multi-Grade Grease | DF | Oil | Oil |
|------|-------------------------------------|---------|------------------------------|---|
| | Temp. Range | Ambient | Temp. Range | Extreme Pressure Gear Lube ("SCL" Type) |
| | Above -23°C (-10°F) | | Above -23°C (-10°F) | SAE Grade 75 |
| | Below -23°C (-10°F) | | Below -23°C (-10°F) | SAE Grade 80 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 90 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 140 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 160 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 180 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 200 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 220 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 240 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 260 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 280 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 300 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 320 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 340 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 360 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 380 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 400 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 420 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 440 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 460 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 480 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 500 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 520 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 540 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 560 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 580 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 600 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 620 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 640 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 660 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 680 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 700 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 720 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 740 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 760 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 780 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 800 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 820 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 840 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 860 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 880 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 900 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 920 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 940 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 960 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 980 |
| | Automatic Transmission Fluid | | Automatic Transmission Fluid | SAE Grade 1000 |

"SCL" signifies SULFONOLIC acid type factory fill is made with SCL type lube. It is recommended that the same type be used when adding or refilling.

1921614

FOR MACHINES WITH MID-MOUNT BRAKE

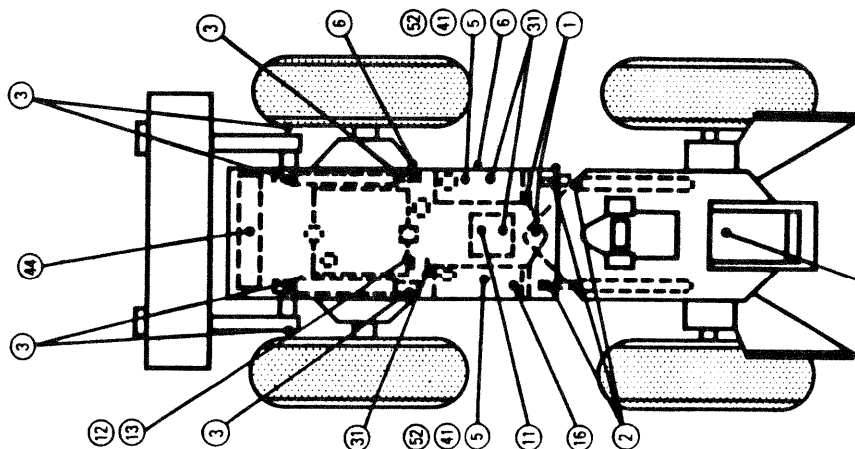
CLARK

Chassis

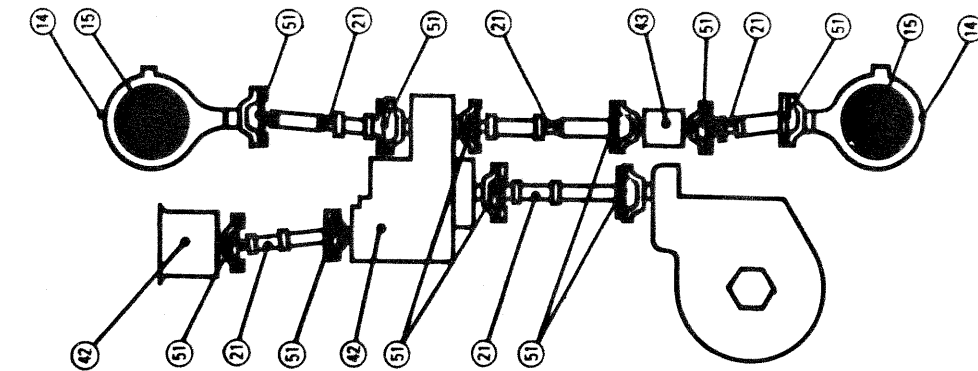
Lubrication Instructions

RANGER

Drive Line



NOTE: THIS DECAL ONLY FOR
MACHINES WITH TOTALLY
ENCLOSED MID-MOUNT BRAKE



| ITEM | 10 HOUR OR DAILY SERVICE | 500 | 507 | 508 | CHECK | LUBE | CHANGE | KEY |
|-------------------------------|--|-----|-----|-----|-------|------|--------|------|
| 1 | CRADLE AND HINGE PINS | X | X | X | | | | EPMD |
| 2 | STEER CYLINDER PINS | X | X | X | | | | EPMD |
| 3 | UTILITY BLADE & CYLINDER PINS | X | X | X | | | | EPMD |
| 4 | FUEL TANK | X | X | X | | | | DF |
| 5 | OIL RESERVOIR | X | X | X | | | | DX |
| 6 | COOLANT LEVEL | X | X | X | | | | |
| 50 HOUR OR WEEKLY SERVICE | | | | | | | | |
| 11 | TORQUE CONVERTER & TRANSMISSION | X | X | X | | | | DX |
| 12 | MASTER CYLINDER ENCLOSED SERVICE BRAKE | X | X | X | | | | DX |
| 13 | MASTER CYLINDER EMERGENCY BRAKE | X | X | X | | | | DX |
| 14 | DIFFERENTIAL | X | X | X | | | | EPGL |
| 15 | PLANETARY | X | X | X | | | | EPGL |
| 16 | WINCH LEVER | X | X | X | | | | EPMD |
| 100 HOUR OR 2 WEEK SERVICE | | | | | | | | |
| 21 | SLIP JOINT | X | X | X | | | | EPMD |
| 250 HOUR OR MONTHLY SERVICE | | | | | | | | |
| 31 | TORQUE CONVERTER & TRANSMISSION FILTER | X | X | X | | | | |
| 500 HOUR OR 2 MONTH SERVICE | | | | | | | | |
| 41 | HYDRAULIC TANK FILTER | X | X | X | | | | |
| 42 | TORQUE CONVERTER & TRANSMISSION | X | X | X | | | | DX |
| 43 | ENCLOSED MIDMOUNT BRAKE | X | X | X | | | | DX |
| 44 | CLEAN RADIATOR CORE | X | X | X | | | | |
| 1,000 HOUR OR 6 MONTH SERVICE | | | | | | | | |
| 51 | UNIVERSAL JOINTS | X | X | X | | | | EPMD |
| 52 | OIL RESERVOIR | X | X | X | | | | DX |

Lubricant Key

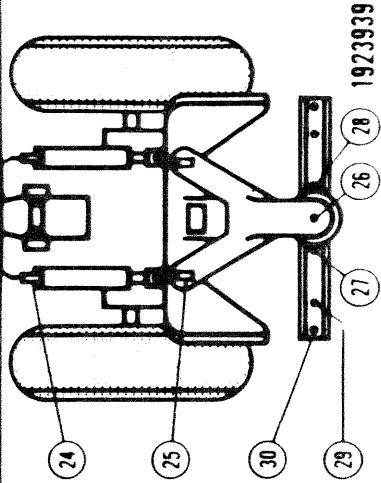
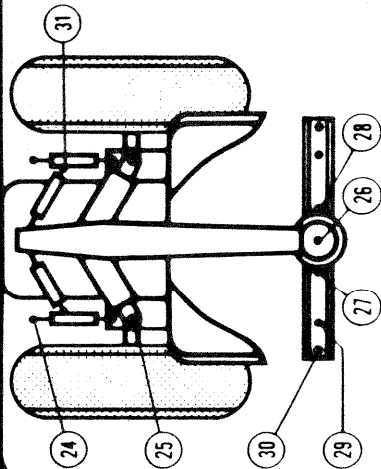
| EPMD | Ambient Temp. Range | Extreme Pressure Molybdenum Disulfide Grease | | DF | Diesel Fuel — See Engine Manual | |
|------|---------------------|--|-----------|------|---------------------------------|----------------------------|
| | | SAE Grade | API Class | | Ambient Temp. Range | Extreme Pressure Gear Lube |
| DX | Above -23°C (-10°F) | 10W | CC | EPGL | Below -23°C (-10°F) | SAE Grade 75 |
| | Above -10°F (-23°C) | 10W | CC | | -18°C to -23°C (-10°F to -10°F) | SAE Grade 80 |
| | Above -34°C (-30°F) | 10W | CC | | -18°C to -38°C (-10°F to -10°F) | SAE Grade 90 |
| | Above -54°C (-65°F) | 10W | CC | | Above -38°C (-100°F) | SAE Grade 140 |
| | | Automatic Transmission Fluid | | | | |
| | | Dextron or Dexron II | | | | |
| | | Automatic Transmission Fluid | | | | |
| | | CONOCO DM 600 Fluid | | | | |

*SCL signifies SULFO CHLORO lead type factory fill is made with .90 SCL type lube. It is recommended that the same type be used when adding or refilling.

1929732

Grapple Lubrication

| ITEM | 10 HOUR OR DAILY SERVICE | 664 | 666 | 667 | KEY |
|------|--------------------------|-----|-----|-----|------|
| 24 | ARCH CYLINDER PIN 4 | X | X | X | EPMD |
| 25 | ARCH HINGE PIN 2 (4) | X | X | X | EPMD |
| 26 | ROTATING HEAD BEARING 1 | X | X | X | EPMD |
| 27 | SUSPENSION PIN YOKE 2 | X | X | X | EPMD |
| 28 | SUSPENSION PIN GRAPPLE 2 | X | X | X | EPMD |
| 29 | GRAPPLE CYLINDER PIN 2 | X | X | X | EPMD |
| 30 | GRAPPLE HINGE PIN 4 | X | X | X | EPMD |
| 31 | BOOM CYLINDER PIN 4 | | | X | EPMD |



1923939

NOTES

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SERVICE PUBLICATIONS

All new Ranger Log Skidders are supplied with a Service Publication package consisting of one Parts, one Operator's, one Engine Manual and one Preventive Maintenance Guide to be delivered to the customer at no charge at the time of the delivery. Additional manuals are available at a nominal cost from your Ranger distributor. The machine serial number should be supplied along with the publication order. Prices may be obtained from your distributor. Where manuals have been updated, and the publication number changed, the latest issue will be sent.

SHOP MANUALS

The following are the component Shop Manuals for your Ranger Log Skidder.

| | Manual No. |
|---|------------|
| W & WD-300 & 400 Series Master Clark Winch Manual | 2561 |
| 2,000 Series Transmission | 2255-R2 |
| C-270 Series Torque Converter | 2249 |
| FD-17,000, 19,000, 24,000 Series Drive Axle | 6956 |
| Enclosed Midmounted Brake | 6960 |
| Hydraulic Cylinders | 3275 |

PARTS MANUALS

All Parts Manuals must be ordered by specific machine serial number.

MACHINE DATA

Model _____ Serial No. _____ Unit No. _____
 Engine _____ Serial No. _____
 Distributor _____

 Telephone _____ Parts Manager _____ Service Manager _____

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