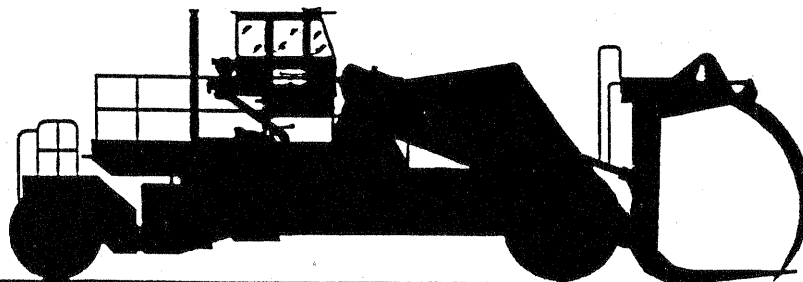

OPERATOR'S MANUAL

L490 lumberjack



Allied Wagner

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Section 1

General

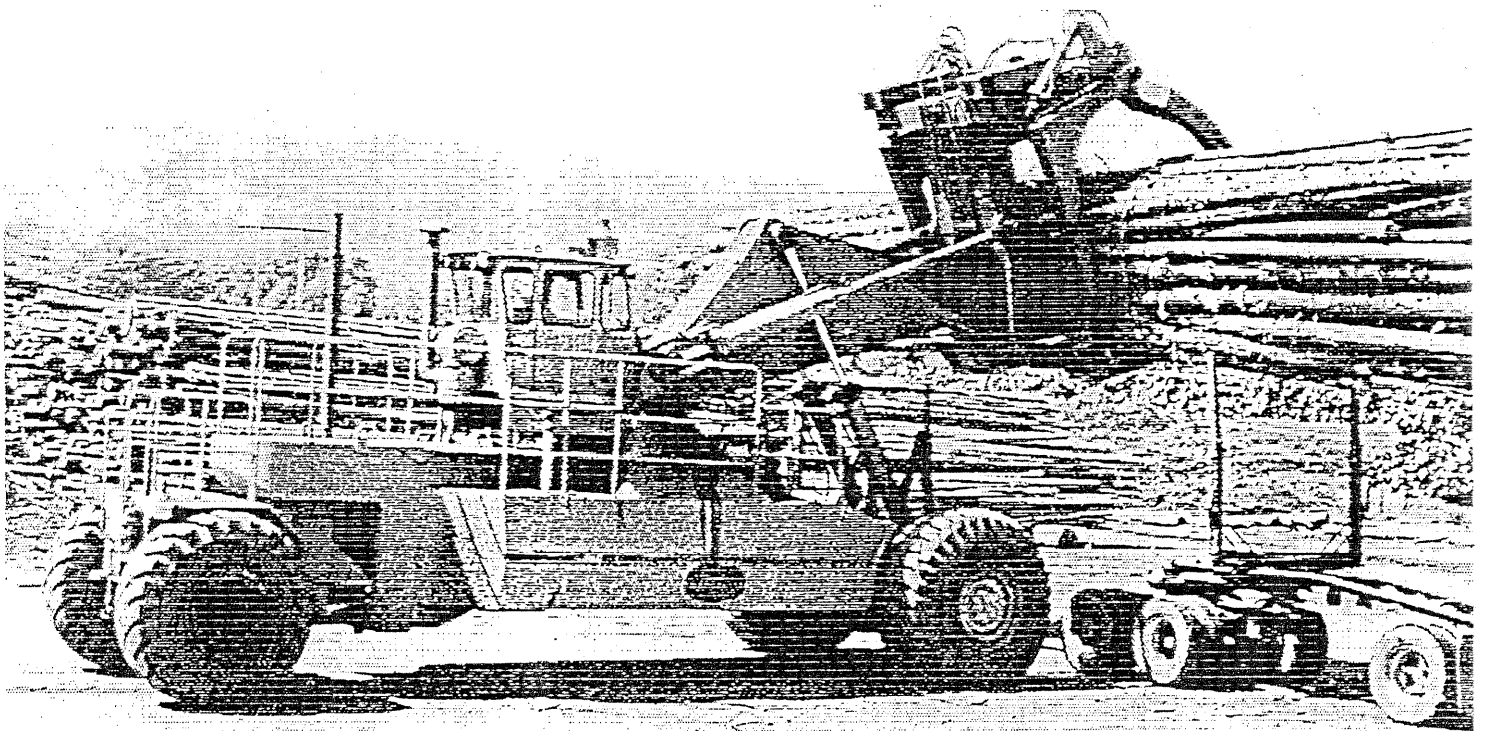


Fig. 1-1 Wagner L490 Lumberjack

1.1 Introduction

This manual is your guide to correct operation of the Wagner L490 Lumberjack. Become familiar with it, understand it, and use it. Read all instructions carefully prior to operation. They will help you understand the unit, its capabilities, and its limitations.

As an operator, it's your responsibility to make certain that your Lumberjack operates at maximum efficiency, with the greatest possible safety. It is also your responsibility to keep it in top operating condition through proper operating techniques and correct operator maintenance. Remember, safe and efficient operation is up to you - the operator.

The Lumberjack, workhorse of the logging industry, has proved itself the world over. It can unload a full truck load or rail car load of logs with a single bite. And...the load may be decked, dumped in mill ponds, or transported directly to the mill, covering every distance with speed and agility. The Lumberjack is also a time and labor saver in splitting loads and sorting within log yards.

Rugged construction and ease of service contribute to the Lumberjack's long life and low maintenance. And the Lumberjack's superior visibility and responsive controls result in a fast, efficient and safe operation.

1.2 Machine Identification

Typical MODEL, SERIAL NUMBER, and LUBRICATION plates are shown in Fig. 1-2. These plates are securely fastened to the cab superstructure on the right side.

The lubrication plate lists the time intervals, specifications, temperature limits, and viscosity requirements of lubricating oils and greases. For further lubrication information, see Section 5 of this manual.

NOTE: The importance of the machine's model and serial numbers cannot be overstated. Always have these numbers at your fingertips when requesting parts, service, or operation information of any kind. It is from these numbers that our Service Department creates a unit file in which a complete history of your machine is maintained.

WAGNER

LUBRICATION CHART

The below specifications and viscosities for each unit are the manufacturer's recommendations for the temperatures shown. Consult your lubricant supplier for products meeting these specifications and viscosities for temperature below or for above or below those shown. If supplier cannot furnish, contact your Wagner Dealer.

| UNIT | INTERVAL | SPECIFICATION | TEMP. AMBIENT | SAE GRADE |
|--|---|--|--|---|
| PLANITARY GEARS & DIFFERENTIALS | CHECK OIL LEVELS WEEKLY. DRAIN AND REFILL EACH 500 OPERATING HOURS | MS 8 SCL | BELOW 0°F 0°F TO 100°F ABOVE 100°F | SAE 80 SAE 90 SAE 140 |
| HYDRAULIC SYSTEM | CHECK OIL LEVEL DAILY. DRAIN AND REFILL EACH 1000 HOURS | HYDRAULIC OIL APISE | 0°F TO 100°F BELOW 0°F | SAE 10W-30 HYDRAULIC OIL SAE 10W-30 TYPE-A |
| UNIVERSAL JOINTS MISCELLANEOUS GREASE LUBRICATION POINTS | LUBRICATE WEEKLY FOR NORMAL SERVICE. DAILY IF WORKING MORE THAN NORMAL EIGHT-HOUR SHIFT | MILGI GRADE 2 HEAVY DUTY MULTI PURPOSE GREASE | 0°F TO 100°F | |

WAGNER

A Division of Allied Systems Co.

MODEL

SERIAL #

RATED CAPACITY lbs. at in. LOAD CENTER

BASED ON MACHINE BEING LEVEL AND AT "0" ACCELERATION

MODIFICATIONS AND ADDITIONS WHICH AFFECT CAPACITY AND SAFE OPERATIONS SHALL NOT BE PERFORMED BY THE CUSTOMER OR USER WITHOUT MANUFACTURER'S PRIOR WRITTEN APPROVAL.

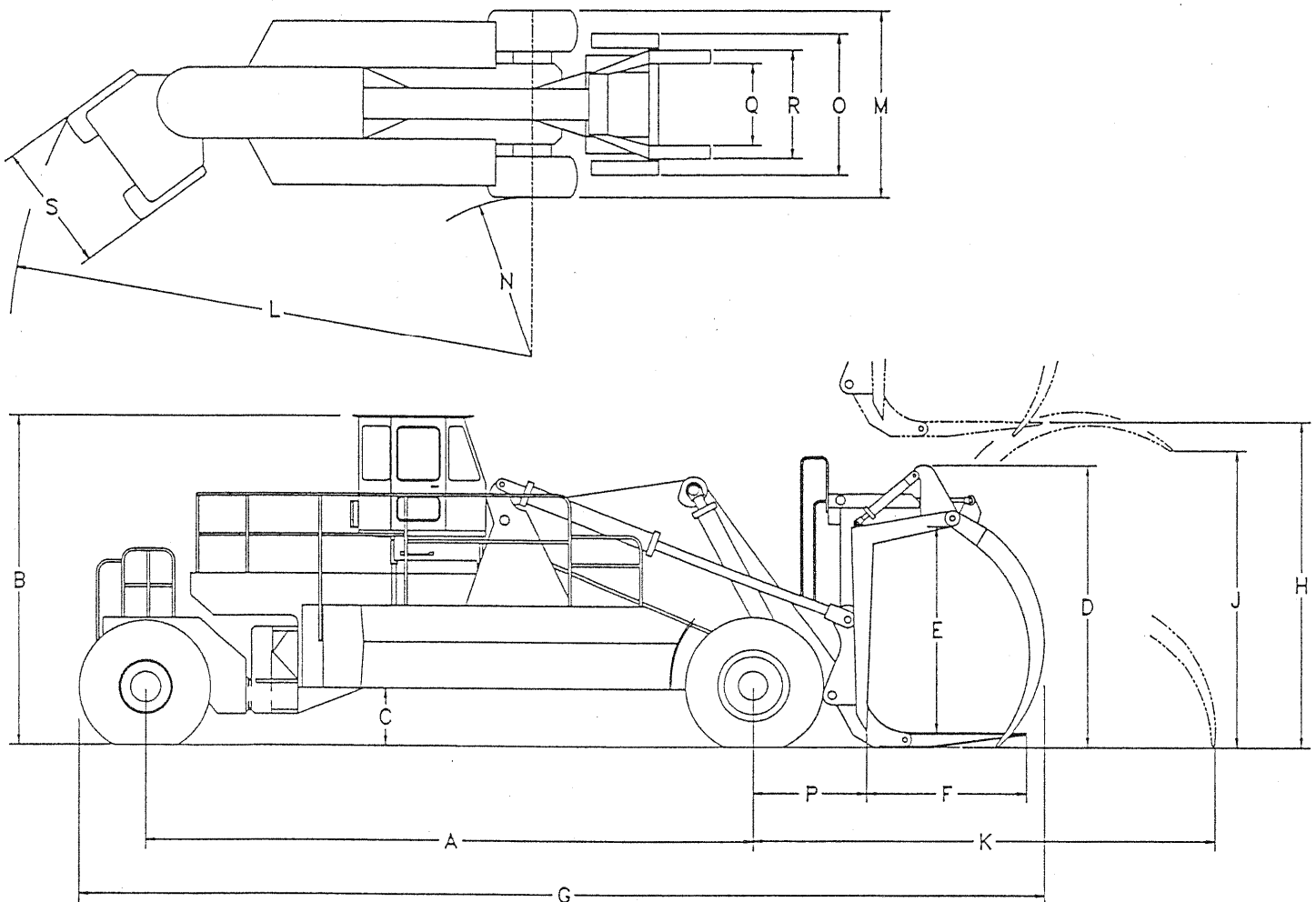
WARNING

DO NOT OVERLOAD MACHINE



Fig. 1-2 Lubrication and Identification Plates

1.3 Specifications



Dimensions (approximate)

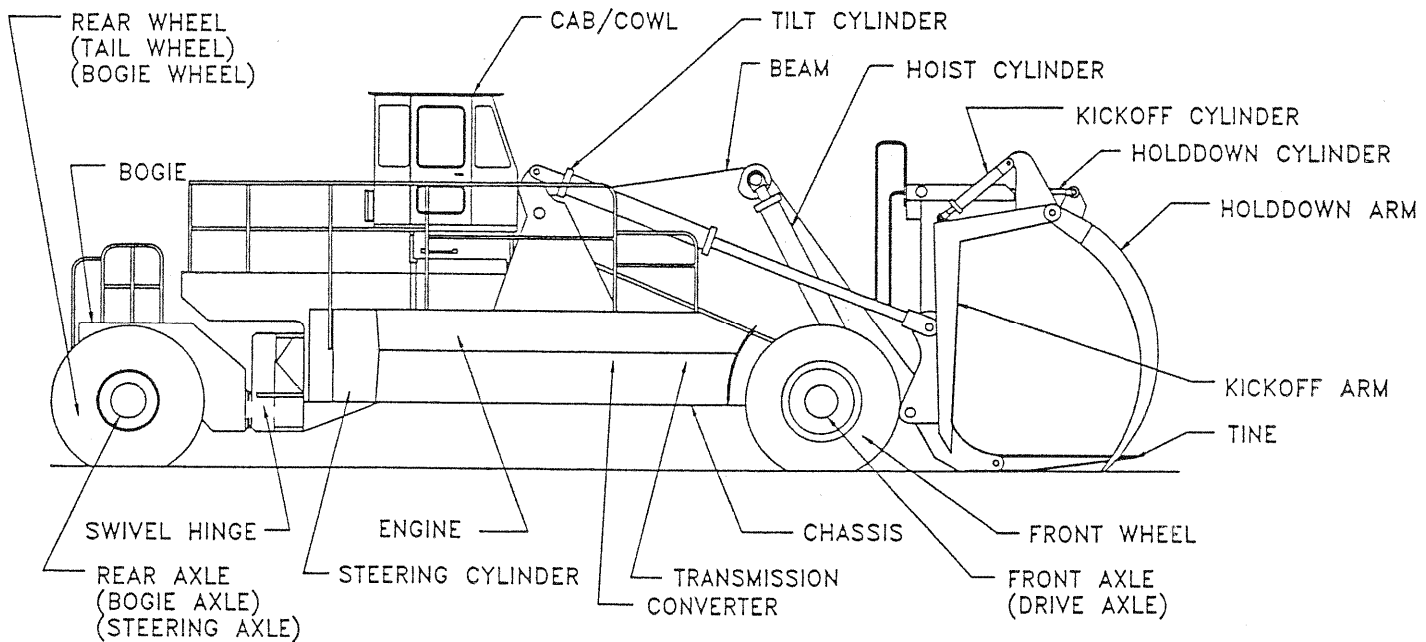
| | | | |
|--|------------------|--|-------------------|
| A. Wheelbase | 30' 0" (9144mm) | K. Distance from Axle to Holddown Tip for Reach | 26' 0" (7925mm) |
| B. Height to Top of Cab | 15' 6" (4724mm) | L. Turning Radius Tail Swing | 50' 6" (15392mm) |
| C. Ground Clearance Chassis | 2' 6" (914mm) | M. Width Outside Chassis Tires (narrow) | 14' 7" (4445mm) |
| D. Carriage Height | 15' 0" (4572mm) | N. Inside Tire Radius | 32' 0" (9754mm) |
| E. Mouth Opening | 11' 0" (3353mm) | O. Carriage Width | 11' 1" (3378mm) |
| F. Tine Length | 9' 0" (2743mm) | P. Axle to Face of Carriage - Hoist Down | 7' 4" (2235mm) |
| G. Overall Length | 49' 1" (14961mm) | Q. Width Inside of Tines | 6' 6" (1981mm) |
| H. Ground to Fork - Hoist Up | 16' 6" (5029mm) | R. Width Outside of Tines | 8' 6" (2591mm) |
| J. Ground to Holddown Tip Carriage Down/Holddown Up | 16' 4" (4978mm) | S. Width Outside of Boogie Tires | 10' 10" (3302mm) |

Weight and Capacity (approximate)

| | | | |
|--|-------------------------|--|-----|
| Unit Weight | 127,300 lbs (57,864 kg) | Forward Tilt @ Ground Level | 45° |
| Drive End | 84,600 lbs (38,455 kg) | Forward Tilt @ Max Height | 24° |
| Tail End | 42,700 lbs (19,409 kg) | Backward Tilt @ Ground Level | 12° |
| Rated Lift Capacity @ 54" LC | 90,000 lbs (40,823 kg) | Backward Tilt @ Max Height | 43° |

NOTE: The specifications shown in this manual are based on information available at the time of publication and are subject to change without notice or obligation.

Nomenclature



Engine

| | |
|------------------|------------------------|
| Make and Model | Cummins KT-19C 450 |
| Max Horsepower | 450 @ 2100 rpm |
| Max Torque | 1350 Ft/Lbs |
| Bore & Stroke | 6.25" x 6" |
| No. of Cylinders | 6 |
| Displacement | 1150 Cu/In (19 liters) |

Air Cleaner

Donaldson Two Stage Dry Type

Electrical System

| | |
|------------------------------|---------------------------------------|
| Type | 24 Volt Negative Ground/24 Volt Start |
| Alternator | 100 AMP |
| Circuit Breakers (lights) | 30 AMP |
| Circuit Breakers (accessory) | 20 AMP |
| Batteries (2) | 12 Volt-8D @ 205 AMP Hr. each |

Torque Converter

Clark Single Stage 3 Elements

Transmission

Clark 8420 Series Power Shift - Spur Gear; 4 Speeds Fwd and Rev.

| Range | Ratio | Speed (Unladen) |
|-------|--------|----------------------|
| 1 | 5.31:1 | 3.2 mph (5.1 km/h) |
| 2 | 2.72:1 | 6.1 mph (9.8 km/h) |
| 3 | 1.40:1 | 11.0 mph (17.7 km/h) |
| 4 | .71:1 | Blocked |

Axes

| | |
|-----------------|--------------------------------|
| Fabricated | Allied Wagner |
| Make | Clark |
| Model (Chassis) | FD-85000 Series |
| Model (Bogie) | FD-75000 Series |
| Type | Planetary |
| Brakes | Air over Hydraulic |
| Disc Size | 1" x 37" Dia. (25.4mm x 940mm) |
| Chassis | 1" X 37" Dia. (25mm X 940mm) |
| Bogie | None |

Tires

| | |
|--------------|------------------------|
| Size (Front) | (Dual) 24.00 x 35-42PR |
| Size (Rear) | 29.50 x 29-22PR |

Hydraulic System

"Power Beyond" hydraulics with total capacity of all pumps in the system for multiple use simultaneously. Function controls are air over hydraulic or optional hydraulic over hydraulic.

| | |
|-----------------------|-----------------------------|
| Steering Cylinder (2) | 5" x 32" (127mm x 813mm) |
| Hoist Cylinder (2) | 10" x 101" (254mm x 2565mm) |
| Tilt Cylinder (2) | 10" x 51" (254mm x 1295mm) |
| Holddown Cylinder (2) | 8" x 56" (203mm x 1422mm) |
| Kickoff Cylinder (2) | 8" x 37" (203mm x 940mm) |

Service Refill Capacities

| | |
|--------------------|------------------------|
| Fuel Tank | 425 Gals (1609 liters) |
| Hydraulic Oil | 350 Gals (1324 liters) |
| Crankcase w/Filter | 13 Gals (49 liters) |
| Cooling System | 24 Gals (91 liters) |

NOTE: The specifications shown in this manual are based on information available at the time of publication and are subject to change without notice or obligation.

Section 2

Safety



2.1 Safety Is Your Business

Why? Because **SAFETY**, based on knowledge, technical skill, and years of experience has been carefully built into your Wagner Lumberjack. Time, money and effort have been invested in making your machine a safe product. The dividend from this investment is **YOUR PERSONAL SAFETY**.

However, it must be realized that no power-driven equipment can be any safer than the person behind the controls. If you don't operate and maintain your Lumberjack safely, our efforts will have been in vain.

The safety instructions and warnings, as documented in this manual and shipped with the machine, provide the most reliable procedures for the safe operation and maintenance of your Lumberjack. It's your responsibility to see that they are carried out.

The following terms define the various precautions and notices in this manual:

NOTE: Whenever information exists that requires additional emphasis beyond the standard text, the term "NOTE" is used.

IMPORTANT: Whenever information exists that requires special attention to procedures or to ensure proper operation of the equipment or to prevent its possible failure, the term "IMPORTANT" is used.



CAUTION

CAUTION: Whenever potential damage to equipment exists, requiring correct procedures for prevention, the term "CAUTION" is used.

**WARNING**

Whenever potential personal injury or death situations exist, requiring correct procedures or practices for prevention, this "WARNING" symbol is used.

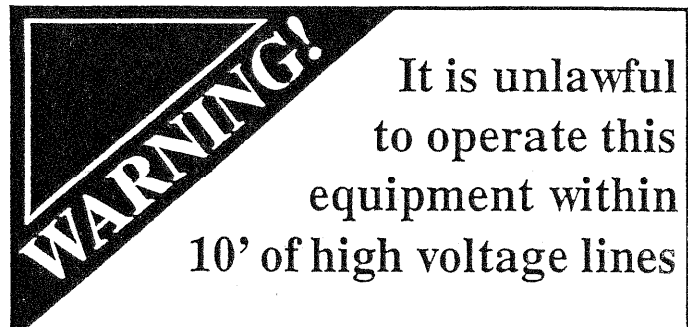
This safety alert symbol indicates important safety messages in this manual. When you see this symbol, carefully read the message that follows and be alert to the possibility of personal injury or death.

NOTE: All possible safety hazards cannot be foreseen so as to be included in this manual. Therefore, the operator must always be alert to possible hazards that could endanger personnel or damage the equipment.

2.2 Operation Warnings

- You must be trained in the operation of this machine prior to operation.
- Be extremely careful if you do not normally operate this machine. Re-orient yourself to the machine before starting, and then proceed slowly. However, you must not operate without having received proper training.
- Know your company's log yard rules. Some have specific loading directions and procedures. The methods outlined in this manual provide a basis for safe operation. Because of special conditions, your company's log handling procedures may be somewhat different from those shown in this manual.
- Always face the ladder when going up and down ladders. Use both hands.
- Never jump on or off the machine.
- All walking surfaces (steps, ladders, etc.) must be free of ice, grease, oil, or other materials that could cause or contribute to a slip or fall.
- The only person required on the machine is the operator. Never allow anyone to ride on the machine or its attachments.
- Do not operate this machine if you know of malfunctions, missing parts, and/or mis-adjustments. These situations can cause or contribute to an accident or damage to the machine. Stop the machine immediately if problems arise after starting.

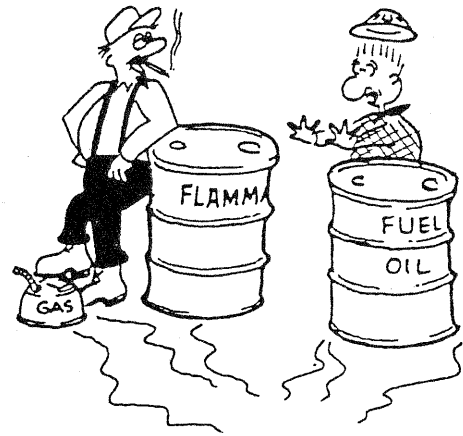
- The hydraulic tank heater and/or engine block heater use a 110 or 220VAC external power source. An electrical shock could be fatal.
- All electrical cables and connectors must be in good condition. Use caution in wet weather to avoid danger from electric shock. The hydraulic tank and/or engine block heater must be properly grounded.
- Do not operate the machine before disconnecting hydraulic tank or engine block heaters.
- Do not start the engine if the key has been tagged with a "DO NOT START" or "RED" tag.
- Never operate any of the cab controls from anywhere other than the operator's seat.
- Sound the horn to alert personnel in the area before starting the engine, and make sure everyone is clear. Be sure that all controls are in neutral before starting the engine.
- Be aware that several people can stand in the engine compartment, completely out of sight of the operator.
- For maximum visibility and overall safety, travel in reverse whenever possible. Always travel in reverse when the machine is loaded. Keep the load as low as is practical. Be aware that the stability of the machine can vary with changes in slope, load, and the position of the attachments. Do not exceed the rated load of this machine.
- Never allow the binder chains to be removed from the load until it is securely clamped by the holddown arms or secured by some other means provided by your company.
- Never pass a load over the head of anyone. Sound the warning horn and wait for the area to be cleared before moving the machine or load.
- Be accurate in load placement. It's important to know what the load will do when it's released.
- Lower or remove the load before leaving the cab or shutting down the engine.



- Electrical energy under high voltage can discharge to ground through the machine without direct contact with the machine's structure. Minimum clearances from energized power lines or other power sources must be maintained. If electrical energy does discharge through the machine, **Remain In The Cab. Do Not Permit Anyone To Come Into Contact With The Machine's Structure.**

2.3 Maintenance Warnings

- Maintenance, lubrication and repair of this machine can be dangerous unless performed properly. Each person must satisfy himself that he has the necessary skills and information, proper tools and equipment, and that his work method is safe, correct, and meets his own company's requirements.
- Do not attempt to make adjustments, or perform maintenance or service unless you are authorized and qualified to do so.
- Unless specified in this manual, never attempt maintenance or lubrication procedures while the machine is moving or the engine is running.
- Keep hands, feet, long hair and clothing away from power-driven parts. Do not wear loose fitting clothing or jewelry while performing maintenance and lubrication.
- Before performing maintenance or service under the machine, move the machine to a level surface, engage the parking brake and stop the engine.
- Tag the key switch with a "DO NOT START" sign, and/or remove the key.
- Block the tires to keep the machine from rolling.
- Perform all maintenance and lubrication procedures with the machine on level ground, parked away from traffic lanes.
- Never rely on the hydraulic system to support any part of the machine during maintenance or lubrication. If necessary, support components with appropriate safety stands. Never stand under a component that is supported only by the hydraulics. Make sure it is resting on its mechanical stops.
- Use caution when working around hot oils. Always allow lubricating and hydraulic oil to cool before draining. Burns can be severe.
- Diesel fuel and hydraulic oil are flammable. Do not smoke when checking levels or filling tanks. Keep open flames and sparks away from the machine.



- Keep the machine free of oil, grease and trash accumulations. Regular steam cleaning is recommended for fire prevention and general safety.
- Never overfill the fuel or hydraulic tanks. Any overflow could cause a fire. Immediately repair any hydraulic or fuel leaks and clean up any spills.
- Use extreme caution when using compressed air to blow parts dry. The pressure should not exceed 30 psi (208 kPa). Never use air to blow yourself off. Air pressure penetrating your skin can be fatal.
- Engine exhaust fumes can cause death. If it is necessary to run the engine in an enclosed space, remove the exhaust fumes from the area with an exhaust pipe extension. Use ventilation fans and open shop doors to provide adequate ventilation.
- DO NOT remove the radiator cap when the engine is hot. The coolant will be under pressure and can flash to steam with explosive force, causing severe burns. To prevent burns, remove the radiator cap only when the engine is cool.
- Before disconnecting hydraulic lines, be sure to lower all loads and relieve all hydraulic pressure. The load could fall on you, or escaping hydraulic oil could cause severe personal injury.



- Batteries produce explosive gases. Keep sparks, flame and cigarettes away. Ventilate when charging or using in an enclosed space. Always shield your eyes when working near batteries.
When removing battery cables, always turn the battery disconnect switches OFF first, then disconnect the (-) negative cable.
When installing a battery, always connect the (+) positive cable first.
This procedure will help to prevent a spark which could cause an explosion.
- Before making adjustments on the engine or electrical system, disconnect the battery. An electrical spark could cause a fire, explosion or severe burns.
- Batteries contain sulfuric acid which can cause severe burns. Avoid contact with skin, eyes or clothing.
- Due to the extreme height of the upper lube points, it is essential to personnel safety that safe ladders, personnel lifts and/or scaffolding be used while servicing this machine. Always use safety tread walks and hand holds to reach lubrication points or to inspect or adjust the machine. These areas can be dangerously slick under conditions of rain, frost or oil smears.
- Do not enter fuel or hydraulic tanks without proper safety equipment. Check your local government regulations for confined space entry requirements.

CAUTION

- 1. Before operating: Know your machine, Read the Operator's Manual.**
- 2. Operate at low speeds in crowded areas or soft terrain**
- 3. Avoid abrupt changes in boom direction. Do not drop load.**
- 4. Lower hydraulic equipment before leaving operators position.**
- 5. Shut power off before lubricating or making equipment adjustment unless otherwise specified in the Operator's Manual.**
- 6. Keep hands, feet and clothing away from power driven parts.**
- 7. Keep off equipment while operating unless seat or operators platform is provided. Keep all others off.**
- 8. Make certain everyone is clear of equipment before operating.**

INSTRUMENTS

&

CONTROLS

INSTRUMENT PANEL

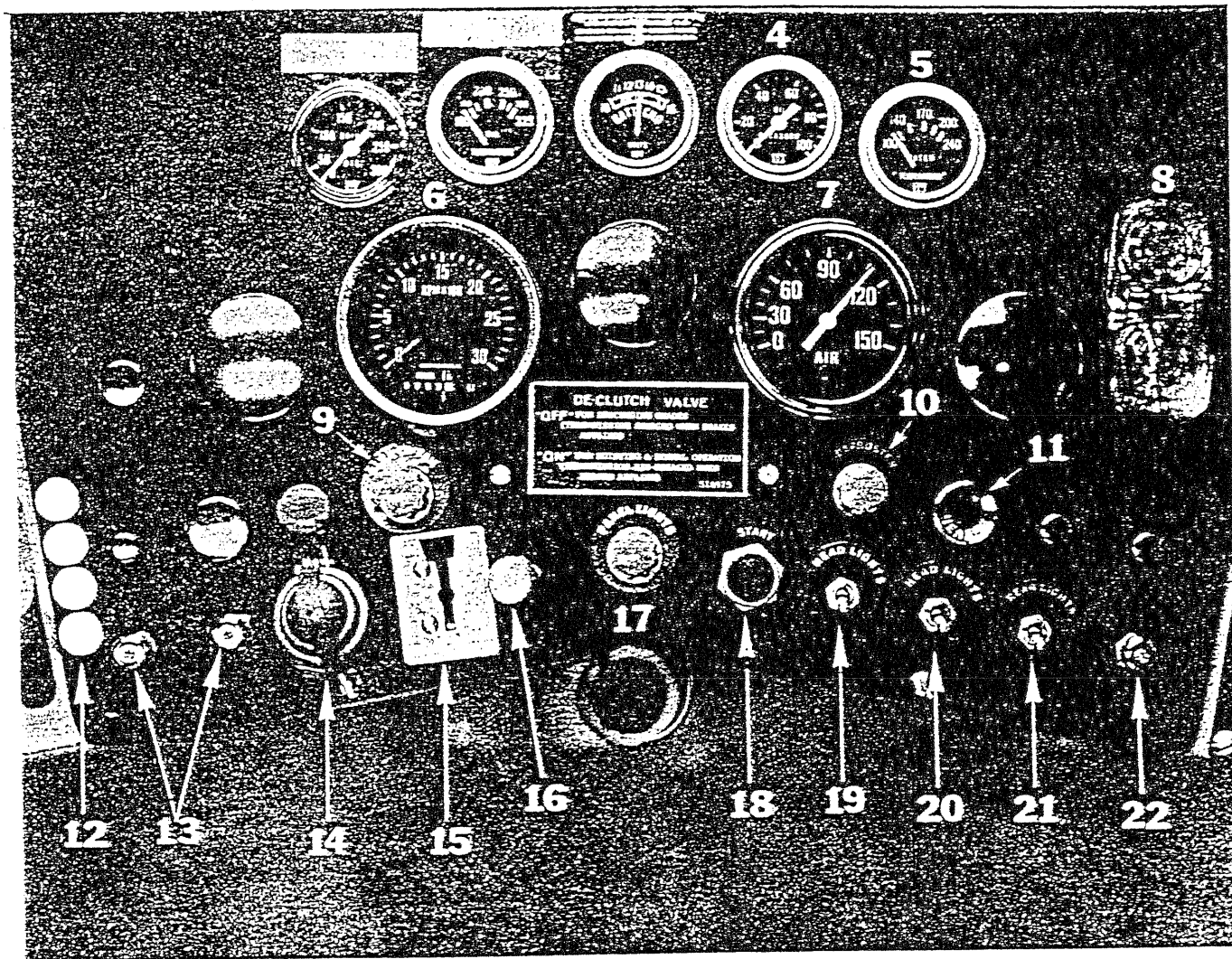
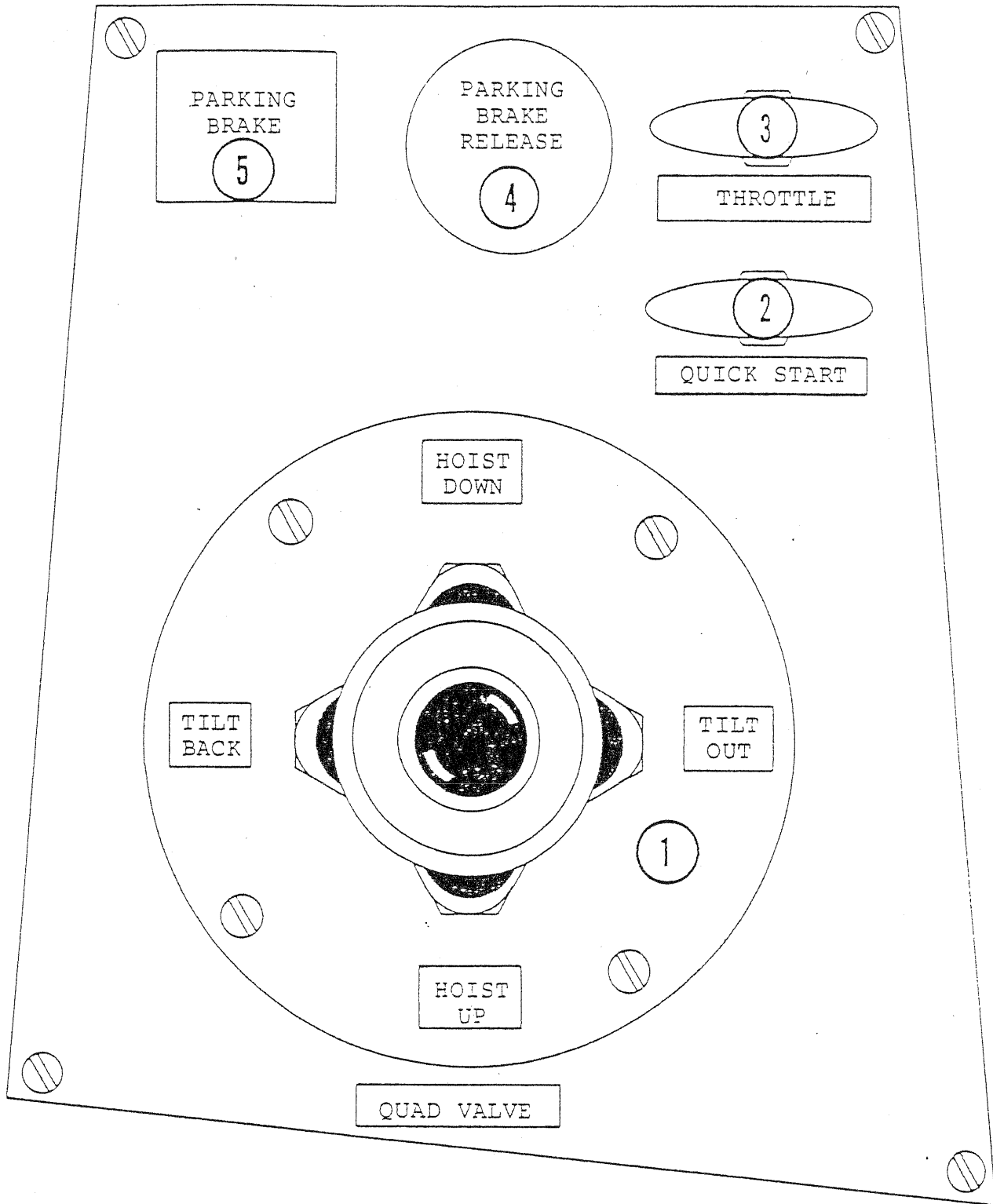


FIGURE 1

INSTRUMENT FUNCTION

FIGURE 1 illustrates a typical *LUMBERJACK* instrument panel. Instrument function is as follows:

1. DRIVE OIL: Transmission oil pressure. This is the pressure that operates the oil clutches.
2. OIL TEMPERATURE: Converter oil temperature. This gauge should read between 200°F/250°F, and never over 250°F. A converter "stall condition" will be indicated here with a rise above normal in temperature.
3. VOLTMETER: The voltmeter indicates the voltage condition of the battery, whether the alternator is or is not charging. The numbers 10-16 indicate volts, not ampere, and the dial is color coded for easy reference.
4. OIL PRESSURE: Engine lubricating oil pressure. Determines pressure only - not the amount. Should this pressure drop below normal during operation - stop the engine immediately and determine the cause.
5. WATER TEMPERATURE: This gauge indicates engine coolant temperature. Should temperature hold steady at 200°F or above - stop and determine the cause.
6. RPM: An electrical tachometer indicating engine revolutions per minute. To read, multiply indicated number by 100. Example: Indicated 20 x 1000 = 2000 RPM. Also, the gauge indicates hours of engine operation.
7. AIR GAUGE: Indicates the amount of pressure in the air reservoir. Operating pressure is 60 = psi. Below 60 psi a red warning light (within the gauge) will come on.
8. EMERGENCY BRAKE LIGHT: If the key switch is "ON" and the emergency brake is set, this light will be on.
9. BLOWER FAN: Switch for cab pressurizing fan motor. Variable speed.
10. DEFROSTER: Switch for defroster fan motor. Variable speed.
11. HEATER: Switch for heater fan motor. Variable speed.



TYPICAL R.H. PANEL

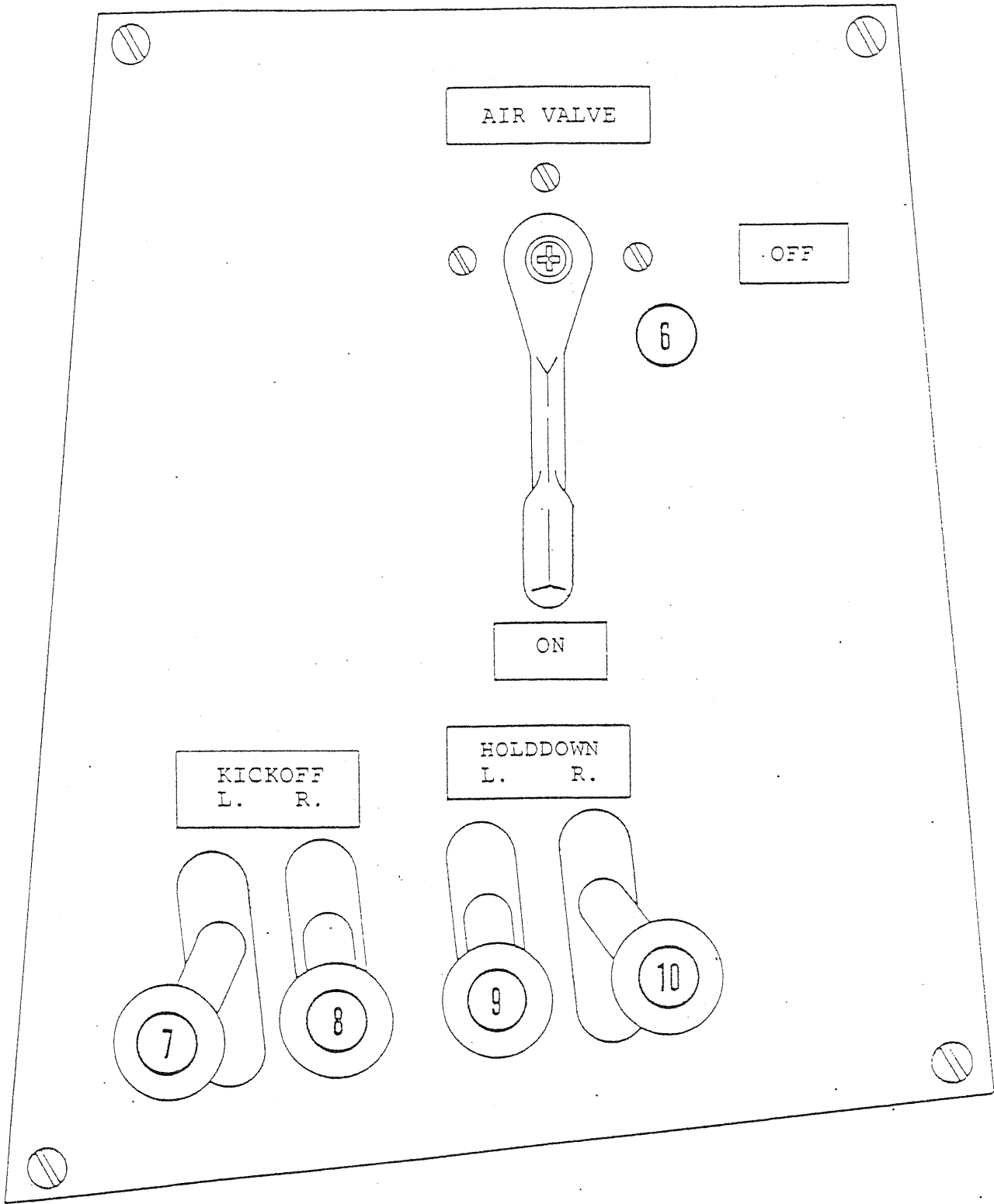
FIGURE 1

CONTROL FUNCTION

During 1975 the "Air Over Hydraulic" control system was introduced and superseded the previous method of "Oil Over Oil" system for the Lumber Jack series. Control operation of the hoist, tilt, holddown and kickoff is a system whereby an air valve on the instrument panel actuates a slave cylinder which in turn, actuates a valve spool in a high pressure hydraulic control valve.

Also, this provides a "Mono" control for the hoist and tilt actuation resulting in an effortless fingertip control. FIGURE 1 illustrates a typical right hand control panel. Control function is as follows:

1. QUAD VALVE: A single lever air valve that raises or lowers the boom and tilts the carriage forward or back. The valve is spring loaded to neutral and the load will hold at the position it is in at the time of valve lever release.
2. QUICK START: Manual control for an injection of quick start vapor for cold weather engine operation.
3. THROTTLE: Manual control, pull out for RPM increase. Overrides the foot throttle. To lock in "OUT" position turn clockwise. NOTE: The engine controls shown are applicable to Cummins or Allis-Chalmer installations. On Detroit Diesel installations there are two additional cable controls, one for emergency stop and one for manual shutdown control.
4. PARKING BRAKE RELEASE: This is an emergency release to override a vehicle air system failure in which the brakes would set automatically. To move the vehicle under such conditions "PRESS IN" the button and hold. If you release the button the brakes will reset. This emergency air system operates out of an air receiver independent of the vehicle air system, and has a reserve pressure sufficient to release the brakes three times before the pressure is exhausted.
5. PARKING BRAKE: Pull button "OUT" to set the brakes. Push "IN" to release. This control sets the wheel and transmission driveline brakes simultaneously.



TYPICAL L.H. PANEL

FIGURE 2

FIGURE 2 illustrates a typical left hand control panel. Control function is as follows:

6. AIR VALVE: "ON" or "OFF" safety feature that shuts off all air to the panel controls.
7. KICKOFF: Push the lever forward to move the LEFT Kickoff Arm "out", in order to clear the tine. Pull the lever toward you to retract the arm.
8. KICKOFF: Push the lever forward to move the RIGHT Kickoff arm "out", in order to clear the tine. Pull the lever toward you to retract the arm.
9. HOLDDOWN: Push the lever forward to move the LEFT Holddown Arm "out", in order to release the tine load. Pull the lever toward you to "hold" or "clamp" the tine load.
10. HOLDDOWN: Push the lever forward to move the RIGHT Holddown Arm "out", in order to release the tine load. Pull the lever toward you to "hold" or "clamp" the tine load.

The kickoff and holddown control valves are spring loaded to neutral. This means that a released valve will return to neutral, and the arm will "hold" at the position it is in at the time of valve release. All valves can be operated independently or in unison. As an example, to unload the tines raise the holddowns together, and move out or extend the kickoffs in unison.

The holddown arms are used to clamp the load against the carriage. They're also used to "rake" logs off a pile.

The kickoff arms push the logs off of the tines. They can also be used to help secure a partial load.

The holddown and kickoff arms can be actuated individually or in unison.

4.3 Break-in Period

The initial break-in period for your unit is limited to engine break-in. The hydraulic system and other components are ready for full operation.

The way you operate your new engine during the first 50 - 100 hours will have an important effect on its service life. Its moving parts are closely fitted, and even though most diesel engines are dynamometer run before leaving the factory, an additional period may be required before uniform oil films are established between mating surfaces.

Generally speaking, proceed with a new engine as follows:

1. Operate most of the time at one half to three quarters full throttle. Do not operate at maximum horsepower for more than five or ten minutes at a time.
2. Don't idle the engine for long periods. This may cause cylinder wall glazing, resulting in excessive oil consumption and loss of power.
3. Keep a close watch on the instruments. Reduce rpm if water temperature reaches 200 ° F.
4. Operate in a gear low enough so that you can accelerate under any condition.
5. Study and follow the engine's operation manual for specific information.

The operator must assume the responsibility of engine care during operation. This is an important job and one that will determine to a large extent the success of the operation. Premature engine failures are very expensive because of lost productivity and the high cost of engine repairs or replacement. Protect your company's investment!

4.4 Start and Stop Procedures

Engine Pre-Start

Before operating this machine, the operator must have prior operator training, a familiarity with this manual, and a complete understanding of all the procedures and functions that may be performed with this machine.

Pre-start Inspection

Planned maintenance and inspections are to be performed after the machine has been delivered, and prior to each shift. The operator should be aware of these procedures and be able to perform spot checks during operation.

NOTE: These inspections may be performed by maintenance personnel or by the operator. In either case, it is the operator's responsibility to see that the machine is ready for operation prior to starting.

Refer to the planned maintenance chart, Section 5, for a complete list of the daily checks that are to be performed.

Engine Oil Level

The oil level should be checked prior to starting the engine.

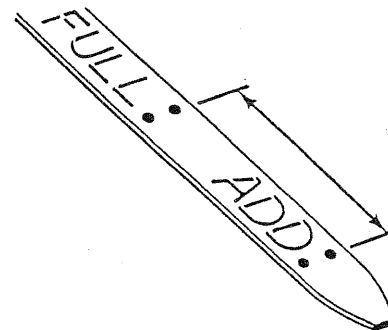


Fig. 4-2 Typical Dipstick

NOTE: A 15 minute drain-back time is recommended (if the engine has been running) to obtain an accurate reading.

The oil level must be maintained between the "L" (low) or "add" mark, and the "H" (high) or "full" mark. Maintain the oil level as close to the "H" or "full" mark as possible.



CAUTION

CAUTION: Never operate the engine with the oil level below the "L" (low) mark, or above the "H" (high) mark. Refer to the engine's Operation and Maintenance manual for detailed engine service information.

CAUTION: Use only approved engine oil (see Lubricant Specifications Chart, Section 5). Do not overfill.

Engine Coolant Level



WARNING

Never remove the radiator cap if the engine is hot. The coolant will be under pressure and could flash to steam with explosive force, causing severe burns. Remove the radiator cap only when the engine is cool.

Daily inspection of the coolant level is recommended. Cooling systems using anti-aeration baffles restrict visual observation of the true coolant level. If the coolant can be seen, the system may not be full. To gain a true fill, add water slowly up to the bottom of the fill neck and allow a 30 second settling period. Remember to compensate for the loss of anti-freeze when adding water.

NOTE: If the engine is hot, the coolant level will be higher than when it is cold.

Inspect the radiator daily for restriction caused by leaves, paper or other foreign material. Inspect the radiator, cap, hoses, and connectors for any signs of leakage or damage.

Hydraulic Oil Level

Always check the hydraulic oil level prior to operation. The dipstick and fill pipe are located on the RH chassis deck, to the right of the operator's cab.



WARNING

WARNING: Always open the tank breather petcock (located on the breather pipe) before removing the dipstick, filler cap, or in-tank filter cover plate. Failure to vent the tank can result in personal injury and/or a substantial oil spill. Be sure to close the petcock before operating the machine.

The oil level should be checked with the hoist cylinder retracted (down). The oil level should be at or near the "H" (high) mark on the dipstick. Fill with approved hydraulic fluid as required (See Lubricant Specifications Chart, Section 5). Do not overfill.

Transmission Oil Level

Always check that the transmission dipstick shows at least some oil prior to starting the engine. The level should be checked after engine warm-up, with the transmission at normal operating temperature. The dipstick and fill tube are located on the chassis deck, near the

valve module and hydraulic brake actuators. Always check the level with the engine running, at operating temperature, with the transmission in neutral. The oil level should be between the "H" (high) and "L" (low) marks. Fill with approved fluid only (See Lubricant Specification Chart, Section 5).

"Walk Around" Inspection

Perform a "walk around" inspection, looking for leaks, loose or missing fasteners, damaged hoses, structural cracks or damage, etc.

Do Not operate the machine until all problems have been corrected.

Tires

Visually inspect the tires for low air pressure and damage to the tread and side walls. If a tire appears suspect, appropriate maintenance personnel should thoroughly check it prior to operation.

Engine Pre-start

1. Make sure that oil and coolant levels have been checked before attempting to start the engine.
2. Sit in your normal operating position and adjust the seat for your personal comfort. It is recommended that you wear your seat belt.
3. Check for emergency/parking brake engagement: Pull the knob to set the brake.
4. Place the transmission range selector in the "neutral" position, "N" on the gear quadrant.
NOTE: All current Wagner units are equipped with a neutral start switch which prevents the engine from starting unless the transmission is in neutral.
5. Give warning that you are going to start the engine. Remember, there is ample space within the engine, transmission, and driveline compartments for several people, and you cannot see them from the cab. Be sure that the area around the machine is clear of all personnel and obstructions.



WARNING

Don't start the engine if the key switch has been tagged with a "Do Not Start" or "red" tag.

6. Turn the key switch to the ON position. The emergency brake light and circuit lights should come on.

Also, the engine protection system bell and light should come on.

7. With Caterpillar and Detroit Diesel Engines, check that the emergency shutdown control is pushed IN.

Engine Start-up

1. Turn the key switch to the START position. Release the switch to the RUN position as soon as the engine starts.



CAUTION

CAUTION: If the engine does not start within 30 seconds, allow the starter to cool for at least 2 minutes before re-engagement.

In cold weather it may be necessary to use the cold weather starting procedure.

2. After the engine starts, let it idle. Do not accelerate. Remember, high rpm and full load conditions on cold oil can severely damage the engine, transmission and hydraulic system.

The engine warning light and bell should go out within a few seconds after starting. If engine oil pressure fails to rise sufficiently after approximately 40 seconds of running, the engine may automatically shut down.

IMPORTANT: Your Lumberjack is equipped with and audiovisual engine protection system. If oil pressure drops below a safe level, or coolant temperature becomes excessive, the engine warning light and bell will come on. With some models, if the condition continues, the engine will shut down automatically. If your unit is not equipped to shut down automatically, it is vitally important that you immediately shut down the engine if the light and bell go on.

3. If a rise in oil pressure of the engine or transmission is not observed within 5 seconds, or a rise in air pressure is not observed in 10 seconds, shut down the engine and have maintenance determine the cause of the problem. Do not operate the machine until the problem has been corrected.
4. Warm the engine at idle until the air pressure reaches at least 60 psi, then recheck that the transmission is in neutral and that the parking brake is applied.

Using the hand throttle, continue to warm the engine at 1000 rpm until the engine temperature reaches at least 130° F, and the air pressure rises to 120 psi.

5. Release the hand throttle. Meanwhile, observe the gauges for proper readings and operation. Also,

check the operation of all safety equipment and accessories.

Cold Weather Starting Procedure:

NOTE: For maximum engine protection and easier starting:

Keep the batteries fully charged.

Keep the fuel clean and free of water.

Change the engine oil to the recommended viscosity for the air temperature.

1. Before cranking the engine, pull the "cold start" handle out. Wait 3 seconds for the valve to fill.
2. While cranking the engine, push the handle in to discharge the ether into the engine.
3. In extremely cold weather additional shots may be required to keep the engine running.



WARNING

Starting fluid is extremely flammable and toxic. Never smoke while using starting fluid. Never make a hole in the starting fluid container. Do not use near an open flame or put the container into a fire. Use only small amounts of starting fluid. Never store starting fluid in a hot area or the operator's cab.

Temperatures below 32° F (0° C):

1. Let the engine idle for approximately 15 to 20 minutes before putting any load on the engine. Check all gauges for normal readings.
2. After the engine is warm, move the machine to full work capacity slowly until the hydraulic oil is at operating temperature.

Temperatures below 0° F (-18° C):



CAUTION

CAUTION: If the temperature of the hydraulic oil is below its pour point, do not start the engine. The high oil viscosity could cause immediate pump cavitation, resulting in severe damage. The oil in the hydraulic tank must be heated prior to engine start-up.

If the machine will be shut down for several hours or longer with ambient temperatures below 32° F (0° C), the hydraulic tank heater should be

plugged in as soon as the machine is shut down. This will help to maintain hydraulic oil temperature.



WARNING

The hydraulic tank heater uses a 220 or 110 VAC external power source. An electrical shock could be fatal. Don't forget to disconnect the heater cable before beginning operation. All electrical cables and connectors must be in good condition. Use caution in wet weather to avoid danger from electric shock. The heater must be properly grounded.

Let the engine idle for approximately 10 minutes before putting any load on the engine. Check all gauges for normal readings. In extremely cold temperatures, allow sufficient warm-up time.

Engine Shut-down

1. Move the throttle to idle speed, and let the engine idle for at least 5 minutes in order to normalize internal engine temperatures.



CAUTION

CAUTION: Except in emergencies, never shut the engine down immediately after operation. Allow the engine to idle for at least 5 minutes. Failure to do this could cause severe engine damage.

2. Meanwhile, place all controls in neutral and set the emergency brake.
3. To stop the engine, turn the key switch to the OFF position.

Detroit Diesel and Caterpillar engines

Normal shut-down is with the key switch. An emergency shut-down control is provided with these engines. Pull the handle to stop the engine. After the engine stops, push the "stop" control in and turn the key switch to the OFF position. If emergency stop procedures are ever required to stop the engine, make sure that the problem is checked by maintenance personnel before resuming operation.

4.5 Using Booster Batteries



WARNING

Batteries produce explosive gases. Keep sparks, flame and cigarettes away. Ventilate

when charging or using in an enclosed space. Always shield your eyes when working near batteries.

If the batteries on the machine are weak or discharged, use booster batteries to start the engine. Never try to start the engine by towing or pushing. Use the following procedures:

1. Make sure that the parking brake is applied and that all electrical loads are stopped.
2. To prevent damage to the alternator, use care not to reverse the battery connections. Immediate damage to the alternator can be caused by making an incorrect wiring connection during the starting procedure.



WARNING

Batteries contain sulfuric acid which can cause severe burns. Avoid contact with skin, eyes or clothing.

3. Connect one jumper cable to the (+) positive terminal of the booster battery. Connect the other end of the same cable to the (+) positive terminal on the machine's battery.
4. Connect the other jumper cable to (-) negative terminal of the booster battery. Connect the other end of this cable to a good ground connection on the machine's frame, away from the battery. This procedure will prevent a spark near the battery which could cause an explosion.
5. Start the engine in the normal manner.
6. After the engine has been started, disconnect the negative cable first, then remove the positive cable.



WARNING

When removing battery terminals, always disconnect the (-) negative cable first. When installing battery terminals, always connect the (-) negative cable last.

This procedure can prevent a spark at the battery which could cause an explosion. Always make the last cable connection away from the battery, such as on the engine block. Use care to keep the cables clear of the fan or any other moving parts.

4.6 Moving, Stopping and Steering

To move the machine:

1. Make sure that the area is clear of obstructions and/or personnel. It is possible for several people to stand under or near the machine, out of sight of the operator. It is recommended that you sound the horn before moving the machine.

CAUTION

CAUTION: This machine cannot be stopped instantly. A varying distance is required to stop the machine, depending on load and speed. To avoid collisions, be sure to allow ample stopping distance.

2. Check that the air pressure gauge reads between 110 and 120 psi
3. Release the hand throttle.

CAUTION

CAUTION: Never attempt to operate with the hand throttle instead of the foot throttle. The hand throttle is to be used for warm-up only.

4. Place the Declutch control in the ON position.
5. Lift the carriage, if required, to clear any obstructions you might encounter.
6. Release the parking brake and put the transmission range selector into 1st gear.

CAUTION: It is recommended that you operate in 1st gear only, until you develop a "feel" for the machine and become familiar with all of its operating characteristics.

7. Push the "forward" or "reverse" floor button. Pushing either of these buttons not only selects the direction of travel, but also shifts the transmission from neutral to "in gear".
8. Depress the throttle pedal slowly and smoothly. Avoid sudden or jerky starts. Depress the pedal just enough to begin moving slowly.

Steering:

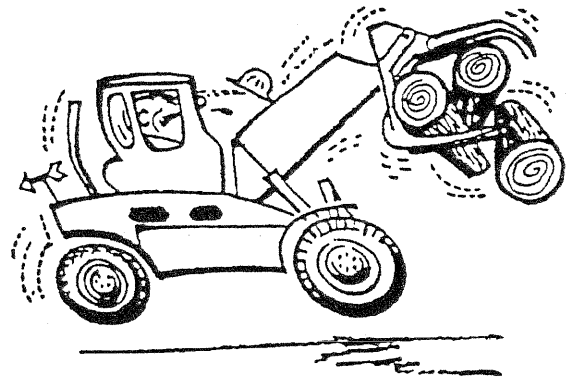
With the operator facing the front, turning the steering wheel clockwise will turn the machine right, while turning the wheel counter-clockwise will turn the machine left.

9. Practice moving the machine around the yard. Make several practice stops to develop a "feel" for the brakes. Practice driving and steering in forward and reverse. Always use the brakes to slow and stop the machine - never gear down.

CAUTION

CAUTION: Keep the speed low until you feel comfortable with the machine.

Always bring the machine to a complete stop before changing direction. Changing direction while in motion will put tremendous loads on drivetrain components, especially the drivelines. Premature wear and failure can result. For maximum visibility and overall safety, travel in reverse whenever possible. Always travel in reverse when the machine is loaded. Keep the load as low as is practical.



NOTE: It is recommended that you keep the declutch control in the ON position for normal traveling. In this position, the transmission is "declutched" or disconnected whenever the brake pedal is depressed. If a downgrade is encountered, the declutch control may be placed in the OFF position, and the transmission will remain in gear while braking.

WARNING

For maximum visibility and overall safety, travel in reverse whenever possible. Always travel in reverse when the machine is loaded. Keep the load as low as is practical.

4.7 Unloading

1. Move the Lumberjack up to a truck or trailer with the carriage in the following position:

The holddown arms out - raised position.

The kickoff arms fully retracted.

The tines level and just high enough to clear the bottom of the load.

Move in until the back of the carriage against the load. Partially clamp the load to prevent logs from rolling off. See Fig. 4-3.

3. Raise the boom until the tines begin to make contact with the load.
4. Securely clamp both holddown arms before the binder chains are removed. See Fig. 4-4.



WARNING

Never allow the binder chains to be removed from the load until it is securely clamped by the holddown arms or by some other means provided by your company.

Never allow anyone to walk under the load.

Always try to unload from the binder side of the load. It's very important that you're able to see ground personnel. Never let them out of your sight!

5. Hoist the load clear of the truck or trailer and tilt the carriage back slightly to bring the load center closer to the drive wheel axle. See Fig. 4-5.
6. With the load clear of the vehicle, back away and lower the load to about 3 feet above the ground or just high enough to clear any obstructions on your way to the point of unloading. See Fig. 4-6.

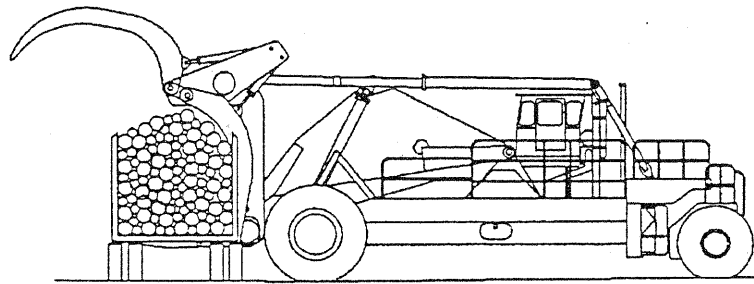


Fig 4-3

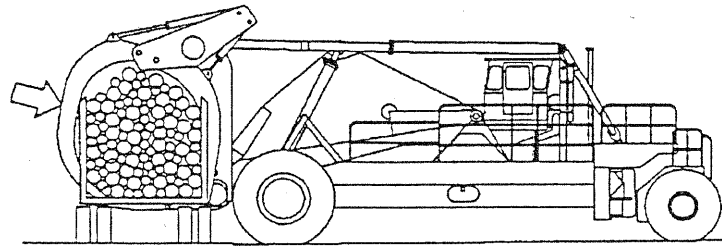


Fig 4-4

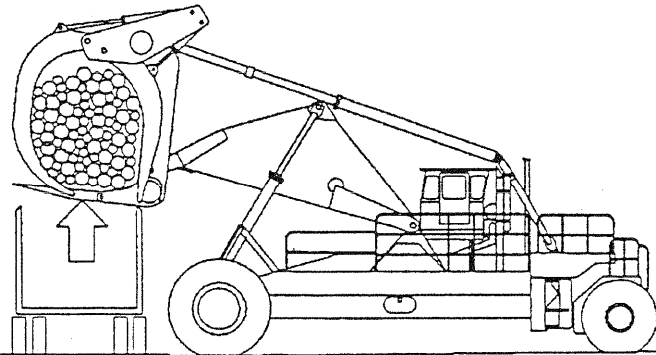


Fig 4-5

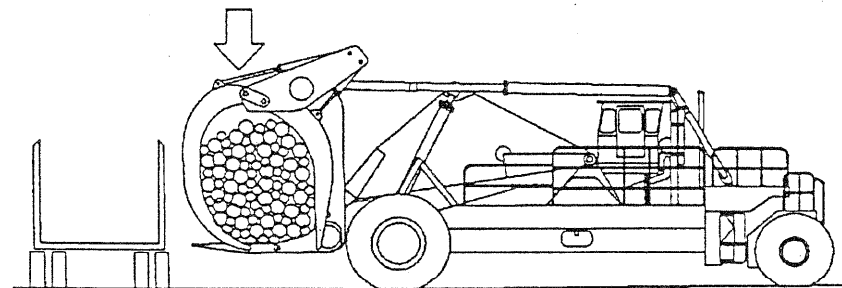


Fig 4-6

4.8 Load Splitting

1. Approach the load with the holddown arms open.
2. Raise the carriage and tilt it forward slightly.
3. Work the tines through approximately 1/3 of the load. See Fig. 4-7.
4. Bring the kickoff arms forward until they make contact with the load and then pull the load in tight with the holddown arms. Tilt the carriage back.
5. Continue to tighten with the holddown arms and raise the carriage until the load is free.

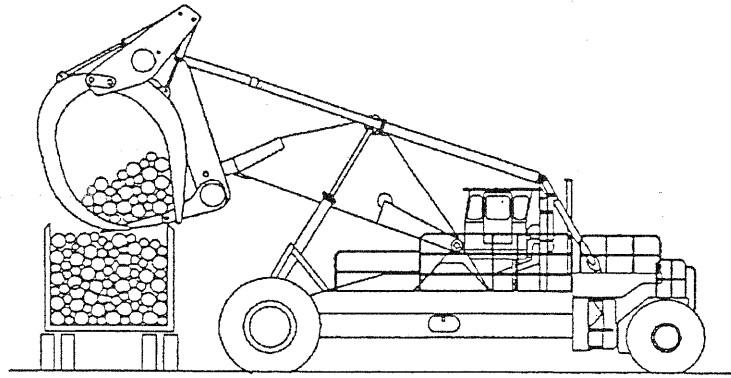


Fig 4-7

4.9 Spreading and Sorting

1. To unload the carriage for scaling or sorting, leave the carriage level or tilted slightly back. Lower the boom until the carriage is as close to the ground as possible. See Fig. 4-8.

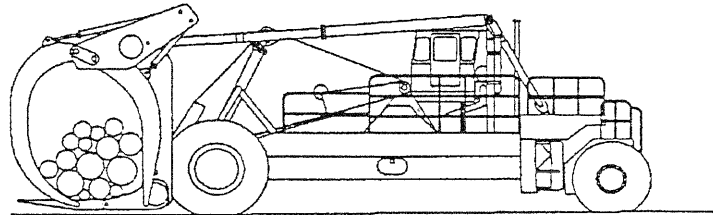


Fig 4-8

2. While backing the machine, slowly open the holddown arms and gradually push the load forward with the kickoff arms. This way, the logs can be dropped individually rather than all at once. See Fig. 4-9.

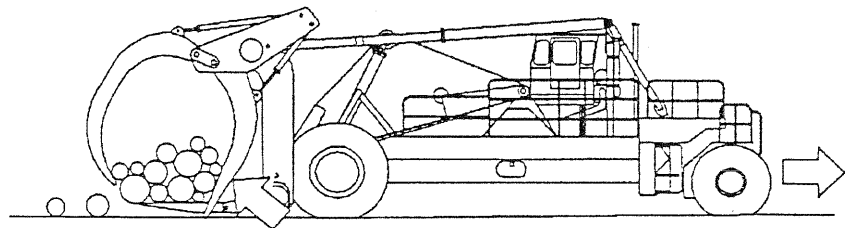


Fig 4-9

3. If several logs fall off at once and form a pile, stop the machine, tilt the carriage forward, and using the holddown arms, rake the top logs back into the carriage.

4. When retrieving spread logs and the last one is beyond the ends of the tines, extra reach can be gained by tilting the carriage forward. This places the holddown arms in a position to rake the logs onto the tines. The distance the top of the carriage extends forward is the extra reach gained at the tip of the holddown arms. See Fig. 4-10.

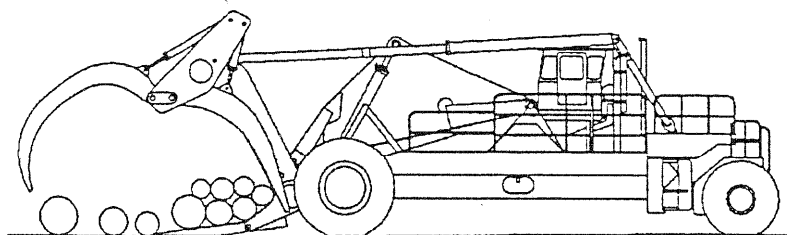


Fig 4-10

- Fig. 4-11 shows a good example of the Lumberjack's flexibility. The log is under the tines and is held by the hold-down and kickoff arms. Partial loads should be held with the hold-down and the kickoff arms.

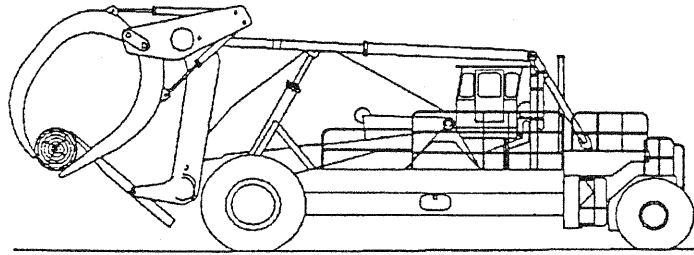


Fig 4-11

4.10 Cold Decking Loose Logs

- In building a cold deck, be sure that all logs are well balanced on the tines. This will help to prevent one end of a log from dropping down, resulting in "jack-straw" cold decking.
- Move up to the deck with the load lifted to the necessary height. Place the drive wheel tires tight against the bottom logs, as this firms up the deck and helps prevent logs from shifting when you place the new load on top. See Fig. 4-12.

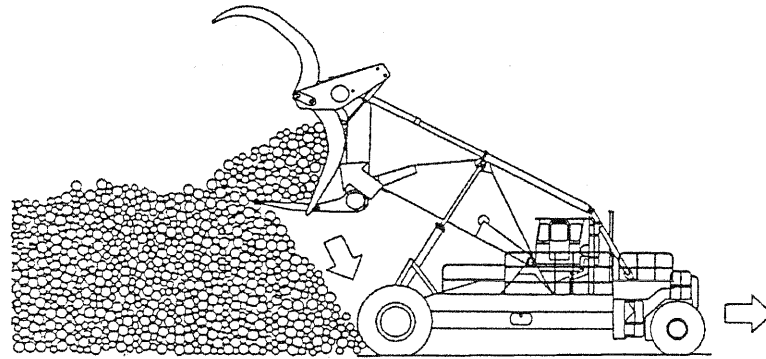


Fig 4-12

- When the required decking height is reached, push the load off with the kickoff arms and simultaneously lower the carriage and back away slowly. Keep the tines as close to the pile as possible to prevent logs from rolling down in front of the drive tires. See Fig. 4-13.

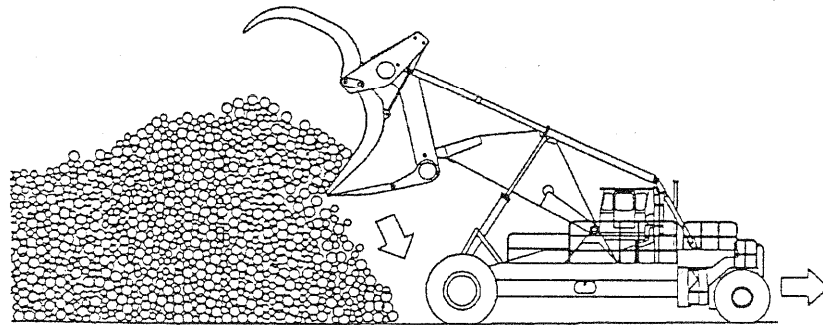


Fig 4-13

- Continue backing and lowering until all the logs are out of the carriage. See Fig. 4-14.

NOTE: If a log becomes "jack-strawed", straighten the pile before bringing in the next load. This will make decking and retrieval much easier.

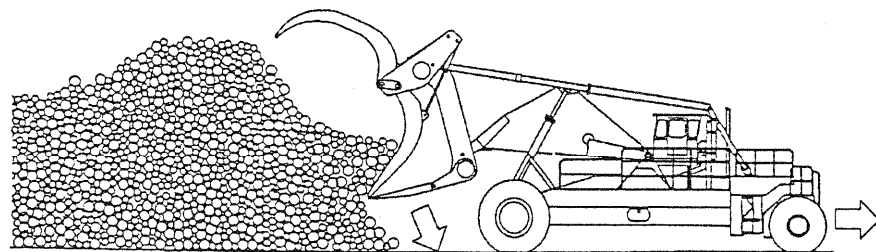


Fig 4-14

4.11 Retrieving Loose Logs

1. To obtain maximum load retrieval of loose logs, raise the holddown arms and tilt the carriage forward slightly before moving into the deck. The tines should be hinged and at ground level.
2. Move into the deck and simultaneously tilt the carriage fully forward. The logs should roll up into the back of the carriage. Move into the deck as far as possible. See Fig. 4-15.
3. Having the carriage tilted forward at this point will allow the holddown arms to gather logs that would be otherwise out of reach. To finish filling the carriage, alternate between clamping with the holddown arms and tilting the carriage back.
4. Tilt the carriage back fully and tightly clamp the load. Back away and lower the load. See Fig. 4-16.
5. Travel with the load as close to the ground as possible. Raise the load only enough to clear obstacles.
6. Occasionally, one log in a bunch will be held by only one holddown arm and will ride on the outside of the other. It's best to drop this log and retrieve it on the next trip. Securely clamp the load with one arm (the side with the log on the outside) and open the other holddown arm. The loose log will fall to the ground. Re-secure the load before proceeding.

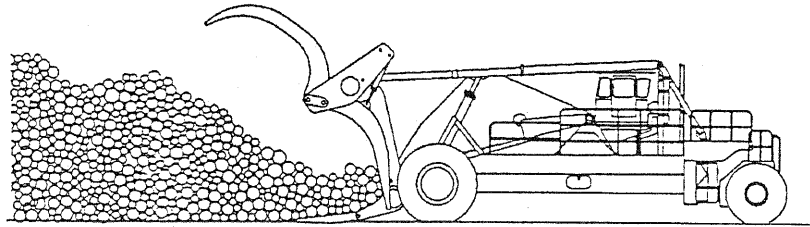


Fig 4-15

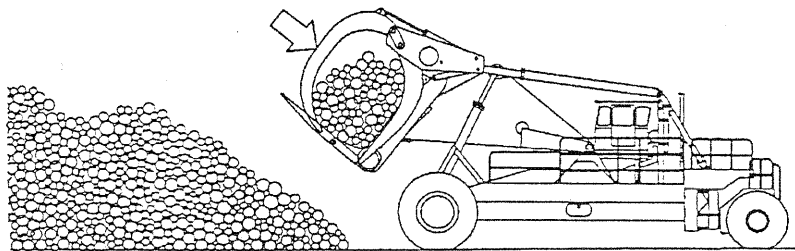


Fig 4-16

4.12 Cold Decking Bundled Logs

1. When approaching the deck with a bundle, clamp the bundle with the auxiliary holddown arms and then raise the main holddown arms. This allows the bundle to be placed tightly against the others. See Fig. 4-17.

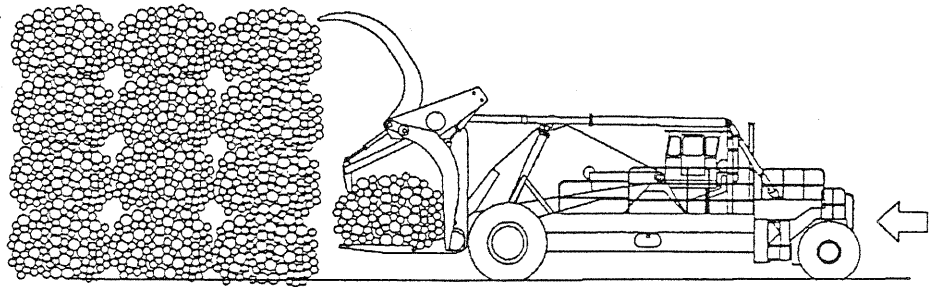


Fig 4-17

2. To place the bundle, set the bundle in position, raise the auxiliary hold-down arms and push forward with the kickoff arms while backing up. The bundle will slide off of the tines. See Fig. 4-18.

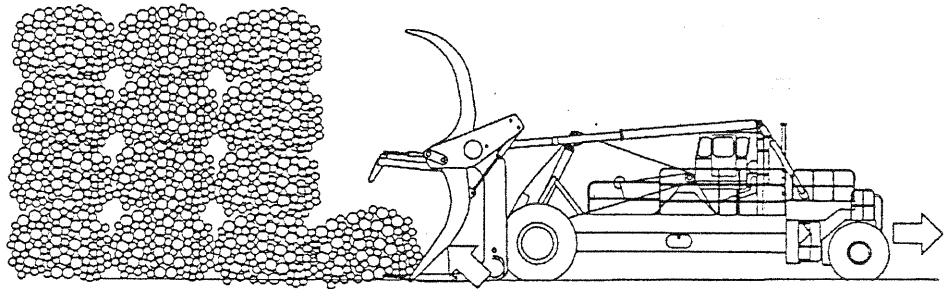


Fig 4-18

3. Always stack bundles in vertical piles - not interlocking. This will make retrieval much easier. Also, when stacking one bundle on top of another, press down on the lower bundle with the carriage. This will flatten the lower bundle and make the deck much more stable and retrieval easier. See Fig. 4-19.
4. Depending on bundle size, it may be possible to stack the bundles four high.

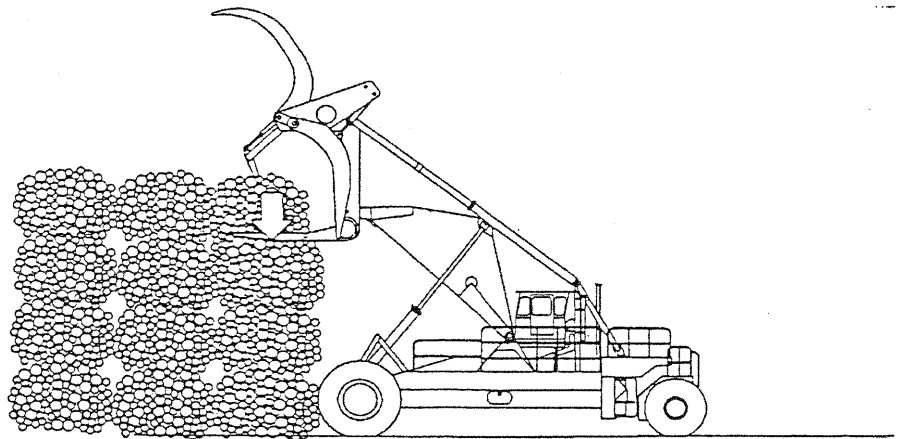


Fig 4-19

4.13 Retrieving Bundled Logs

1. Approach the deck with the carriage tilted forward and all holddown arms (main and auxiliary) fully raised.

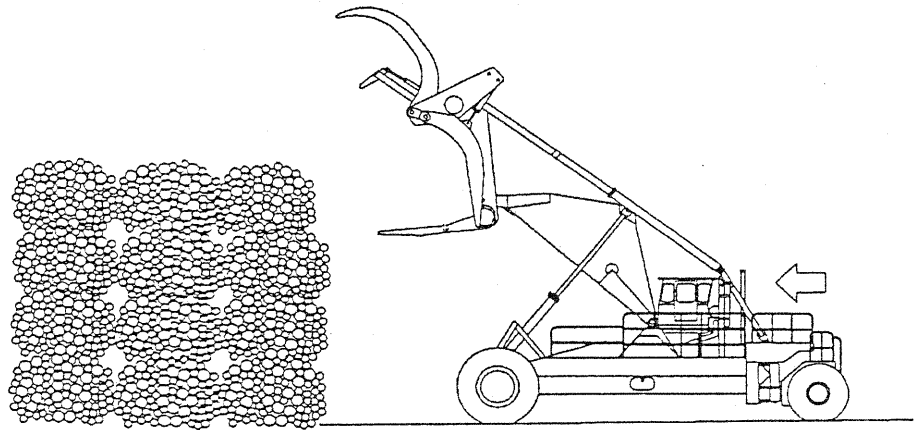


Fig 4-20

2. Work the tines between the bundles. Take care not to hook logs from the lower bundle. Work the tines as far under the bundle as possible.

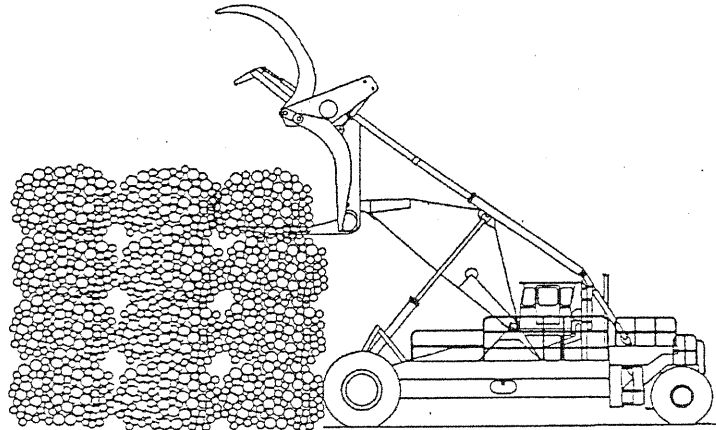


Fig 4-21

3. Clamp the bundle with the auxiliary holddown arms and tilt the carriage back.

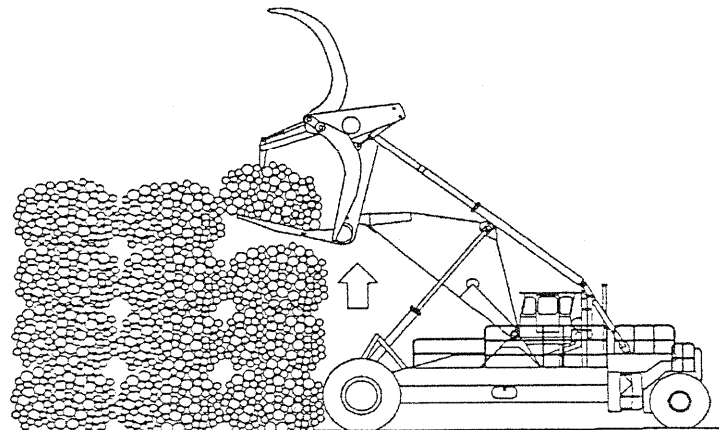


Fig 4-22

4. Lower the main holddown arms as soon as they will clear the remaining bundles.
5. Lower the bundle to the ground and re clamp if necessary to secure the load. Travel with the load as close to the ground as possible. Raise the load only enough to clear obstacles.

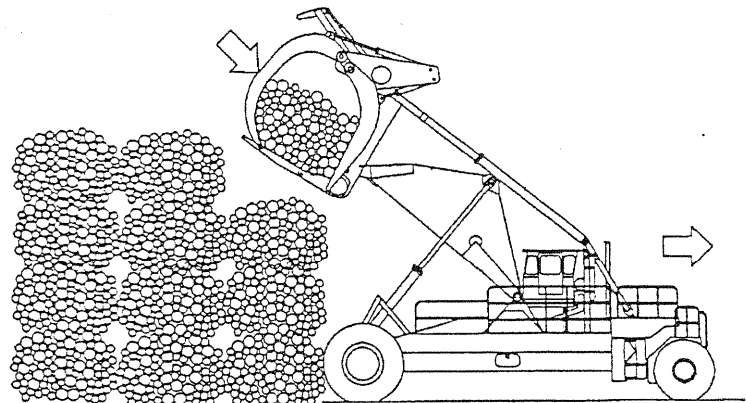
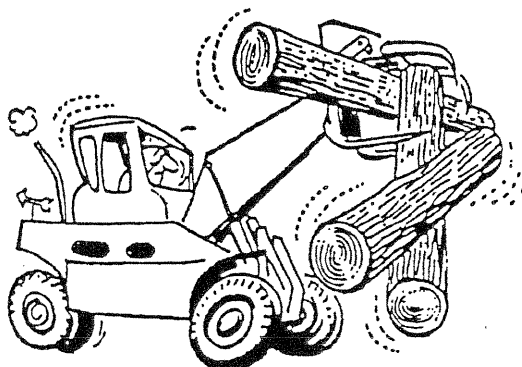


Fig 4-23

4.14 Operating Tips

1. For maximum visibility and overall safety, travel in reverse whenever possible. Always travel in reverse when the machine is loaded. Keep the load as low as is practical.
2. Always make sure that the kickoff arms are fully retracted and against their stops when carrying a full load. Leaving them partially extended could result in damage if the load should shift or roll with any force. To obtain the greatest lift capacity, the kickoff arms must be all the way back. This way the load center is as far back as possible.
3. **WITHOUT FAIL** - always secure a load before allowing the binder chains to be removed, either by clamping the load with the holddown arms, or by some other means provided by your company.



4. The holddown and kickoff arms can be damaged if they are used in any way that opposes the movement of the machine under power. For example, never use the holddown arms to drag a log while moving in reverse.

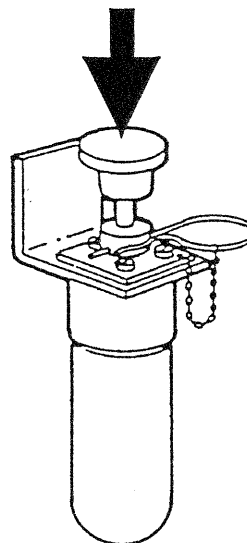
4.15 Determining Load Center

The load center is figured at a specific distance from the face of the carriage towards the tips of the tines.

| MODEL | LOAD CENTER | MAX LOAD |
|--------------|-------------|------------------------|
| L-80, L480 | 48" | 80,000 lb (36,288 kg) |
| L-90, L490 | 54" | 90,000 lb (40,824 kg) |
| L-100, L4100 | 54" | 100,000 lb (45,360 kg) |
| L-115, L4115 | 54" | 115,000 lb (52,164 kg) |
| L-120, L4120 | 60" | 120,000 lb (54,432kg) |
| L-130, L4130 | 72" | 130,000 lb (58,968 kg) |

4.16 In Case of Fire

1. Pull the safety pin on the actuator and strike the button. Fire retardant will be released, the engine will shut down, and the batteries will be disconnected from the electrical system.



IN CASE OF FIRE:

1. Remove Safety Pin
 2. Strike Button
2. Take the hand-held fire extinguisher, if possible, and LEAVE THE VEHICLE. After the system has discharged, watch carefully for flare-ups and spot fires. Call the Fire Department and/or service personnel as soon as possible.
 3. Any time the system is discharged, the system must be refilled and recharged before resuming operation. Refer to the Service Manual for complete maintenance procedures.

IMPORTANT: Each unit is equipped with two actuators. One is located in the operator's cab behind the seat to the left. The other is located on the chassis near ground level. This way, the system may be actuated by either the operator or by ground personnel.

NOTE: Some models are equipped with a fire detection system that will automatically discharge the system in the event of a fire. See the Service Manual for details.

Section 5

Maintenance and Lubrication

5.1 General

A machine that receives regular care from its operators and mechanics generally rewards them with decreased downtime and greater reliability. With the help of the information in this section, you should be able to maintain your Lumberjack at top operating efficiency. The maintenance and lubrication procedures given here can be performed with a minimum of shop tools.

5.2 Safety Precautions

Before performing any maintenance or lubrication, review the following safety precautions. They're included for your protection.

1. Read This Manual

Be sure you understand the procedures outlined in this manual before attempting to carry them out. Pay particular attention to any safety warnings presented. If you have any questions, don't hesitate to ask your WAGNER dealer.

2. Perform Maintenance on Level Ground

The machine should be on level ground and clear of traffic lanes whenever possible. The parking brake should be set and the wheels blocked.

3. Remove Loads

The machine should be unloaded, with the carriage down.



WARNING

Never rely on the hydraulic system to support any part of the machine during maintenance or lubrication. If necessary, support

components with appropriate safety stands. **NEVER** stand under a component that is supported only by the hydraulic system. Make sure it is resting on its mechanical stops or safety stands.

4. Stop the Engine

Before performing any maintenance or lubrication, remove the key from the switch, or tag the key switch "DO NOT START", to ensure that the engine is not inadvertently started.

5. Install Swivel Locking Pin

All four-wheel-drive units are equipped with these pins. Always install this pin when working in the area of the swivel hinge. The machine must be on a level surface and the bogie turned right or left for pin insertion.

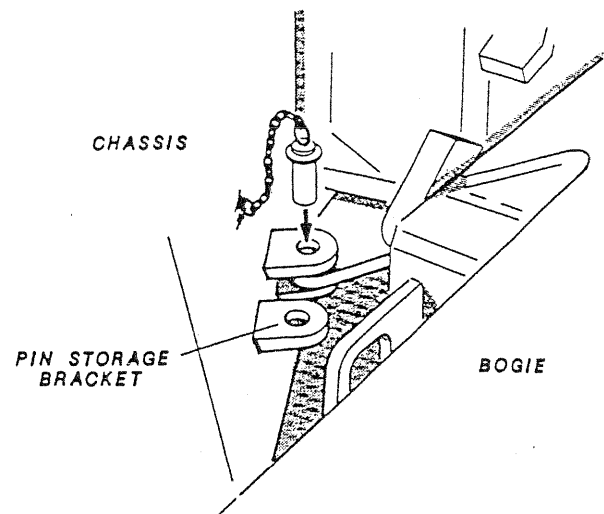


Fig. 5-1 Swivel Locking Pin

6. Use Safe Ladders/Scaffolding

Due to the extreme height of the upper lube points, it is essential to personnel safety that safe ladders, personnel lifts and/or scaffolding be used while servicing. These areas can be dangerously slick under conditions of rain, frost or oil smears.

5.3 Preventive Maintenance

Preventive maintenance is a system that is designed to detect problem areas and prevent equipment failure before trouble can develop to a critical point. The system is based on a series of maintenance checks and servicing points. To be effective, a preventive maintenance program demands strict adherence to a planned schedule of maintenance.

Benefits of Preventive Maintenance

Time spent making the required periodic checks is a real investment in working equipment and efficient use of man hours. Valuable benefits can be realized, all of which mean savings in time and resources.

Preventive Maintenance

- **Promotes Safety** - properly maintained equipment is better able to operate within its design specifications and react positively to the operator's control.
- **Improves Equipment Availability** - by minimizing the chances of breakdown.
- **Reduces Unexpected Downtime** - crash repairs are expensive and detract from normal scheduled maintenance.
- **Reduces Equipment Abuse** - provides the ability to predict component life and helps avoid operating equipment to destruction, by replacing parts before they fail.
- **Allows Planning of Daily Production** - by knowing the condition of available equipment.
- **Allows Planning of Maintenance Man Hours** - by distribution of duties and necessary lead time for parts ordering.
- **Provides Complete History of Equipment** - based on performance, frequency and type of repairs and actual man hours expended on maintenance.

Establishing a Preventive Maintenance Program

The key to an effective preventive maintenance program is diligence in following a maintenance schedule set at regular planned intervals. Such intervals should be made compatible with the nature of operation of the equipment and with the capabilities of the maintenance facility. In any event, the intervals and inspection requirements must be planned, regular, and consistent.

This program proposes the following basic schedule which is based on intervals generally used and accepted in the wood products industry.

Specific maintenance should be completed using the following intervals:

- 10 hours (each shift or daily)
- 50 hours (weekly)
- 250 hours (monthly)
- 500 hours (quarterly)
- 1000 hours (semi-annually)
- 2000 hours (annually)

Each successive schedule (e.g. weekly, monthly, quarterly, etc) builds on the former and is accumulative in nature. For example, when performing monthly maintenance, the mechanic will first take note of the shift maintenance reports and remedy any discrepancy; then comply with the shift and weekly maintenance, and in addition will perform the checks specified in the monthly schedule.

Maintenance Record Keeping

The importance of good record keeping cannot be over-emphasized. Each scheduled maintenance form should be checked off as the inspections and service is performed. Quantities of replenished lubricants should be recorded, as well as hydraulic pressure readings. All discrepancies should be recorded whether remedied or pending. Operators and mechanics should sign off forms and return them to the maintenance supervisor for approval and retention in an equipment unit file.

Accurately recorded maintenance forms will give the maintenance personnel an overall view of how particular equipment is holding up under normal operating conditions. Good records, and the ease by which they can be reviewed also enable maintenance personnel to identify and evaluate problem areas and allow adjustment in the maintenance scheduling for their particular operation.

5.4 Shift Maintenance

Shift maintenance is where preventive maintenance begins. The operator normally completes this inspection. It consists of the routine servicing and lubrication of the machine's major systems. On a daily basis, the operator is in a position to identify, remedy and/or record potential problem areas and is able to quickly recognize any change in the performance of his machine. The comments he records on the shift maintenance report become a valuable tool to the maintenance department, and is an important ingredient to the overall success of a preventive maintenance program.

Shift Maintenance Checklist

A recommended checklist is given here as an aid in developing a practical shift maintenance program if one has not been developed by your company. A shift maintenance report, based on this checklist, should be used to report defects found when making maintenance checks at the beginning of each shift.

Your company may have a different reporting method, however, it is usually a requirement that this form be filled out at the end of each shift. Accurate shift maintenance reports can help your company anticipate maintenance problems and take action to prevent costly failures.

Using the Checklist

The reference numbers in the left-hand column of the checklist indicate the physical location of each check point or lubrication point as it appears on the shift maintenance diagram. Circled reference numbers on the diagram indicate lubrication points. Boxed numbers indicate maintenance check points.

Shift maintenance details are provided in section 5.10, Maintenance Procedures. These procedures consist of checks that can be performed by the operator.

5.5 Scheduled Maintenance

Periodic scheduled maintenance is intended to be performed in a complete maintenance facility by trained mechanics. The timely scheduling and completion of these periodic inspections by the maintenance depart-

ment will determine the length of downtime of a particular machine. Therefore, maintenance scheduling becomes a critical factor in the effective use of man hours and the availability of serviceable equipment.

Scheduled Maintenance Checklist

Actual operating environment governs the maintenance schedule. Some checks should be performed more often under severe conditions, such as heavy dust, extreme temperatures or extremely heavy loads.

These maintenance checklists are designed to be used as a guide until adequate experience is obtained in establishing a schedule to meet your specific needs.

A detailed list of component checks is provided with a suggested schedule basis given in hours of operation, or calendar time. The engine manufacturer's operation and maintenance manual should be consulted for additional engine related checks and/or details.

A maintenance schedule should be established using these checklists as a guide. The result will be a maintenance program to fit your specific operation.

Using the Checklist

Although specific maintenance is identified in these checklists, location and procedure references are not provided in the columns.

Scheduled maintenance is normally carried out by trained mechanics, who are knowledgeable of the equipment systems and component locations. Scheduled maintenance procedures can be found by referring to the appropriate section of the service manual.

5.6 Scheduled Oil Sampling

Use scheduled oil sampling (SOS) to monitor machine condition and maintenance requirements. Oil samples from engine, transmission, axles, and hydraulic system should be taken when the oil is hot and well mixed to ensure an accurate analysis. Contact your Wagner dealer for complete information and assistance in establishing a scheduled oil sampling analysis program for your equipment.

5.7 Shift Maintenance Checklist

EVERY 10 HOURS OR DAILY

Note general vehicle condition. Clear away all collected debris - steam clean if necessary. Check for mechanical damage and loose or leaking components. Report faults to maintenance department.

Before Starting Engine - Check The Following:

| REF | ITEM | OK | NO | ADD |
|-------|---|--------------------------|--------------------------|-------|
| 5 | ENGINE (Check oil level - check for leaks) | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 11 | HYDRAULIC TANK (Check oil level - check for leaks) | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2 | RADIATOR (Check coolant level - check for leaks) | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 19 | AIR CLEANER (Check indicator - clean or change element as required, empty dust cup) | <input type="checkbox"/> | <input type="checkbox"/> | |
| 19 | AIR INTAKE SYSTEM (Check for leaks and damage) | <input type="checkbox"/> | <input type="checkbox"/> | |
| 42 | ENGINE BELTS (Check for adjustment and wear) | <input type="checkbox"/> | <input type="checkbox"/> | |
| 8 | AIR TANKS (Check drain valves for correct operation) | <input type="checkbox"/> | <input type="checkbox"/> | |
| 2 | RADIATOR & OIL COOLER (Are fins clean and unobstructed?) | <input type="checkbox"/> | <input type="checkbox"/> | |
| 35 49 | WHEELS & TIRES (Check condition and pressure) | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 15 | HYDRAULIC BRAKE FLUID (Check fluid level) | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| — | LUBRICATE CHASSIS (Refer to lube chart) | <input type="checkbox"/> | <input type="checkbox"/> | |

After Starting Engine - Check The Following:

| | | | |
|----|--|--------------------------|--------------------------|
| 4 | ENGINE (Does it sound normal?) | <input type="checkbox"/> | <input type="checkbox"/> |
| 20 | INSTRUMENTS (Check for normal readings) | <input type="checkbox"/> | <input type="checkbox"/> |
| 20 | CONTROLS (Check for normal operation) | <input type="checkbox"/> | <input type="checkbox"/> |
| 18 | EXHAUST SYSTEM (Check for leaks and excessive smoke) | <input type="checkbox"/> | <input type="checkbox"/> |
| 24 | TRANSMISSION (Check oil level - check for leaks) | <input type="checkbox"/> | <input type="checkbox"/> |

Note Anything Abnormal Or In Need Of Repair:

LIGHTS _____ DEFROSTER _____ REVERSE WARNING HORN _____
 HORN _____ WINDSHIELD WIPERS _____
 HEATER _____ AIR CONDITIONER _____

OPERATOR _____ SUPERVISOR _____ DATE _____
 MODEL _____ SERIAL NUMBER _____ HOUR METER _____

5.8 Lubrication Points

10 HOURS

| REF | | FITTINGS |
|-------------|---|----------|
| (1) | Steering cylinder pins | 4 |
| (22) | Boom to chassis pin | 2 |
| (51) | Boom to carriage pin * | 3 |
| (25) & (50) | Hoist cylinder pins * | 4 |
| (17) | Hinge bearings * | 2 |
| (21) & (52) | Tilt cylinder pins | 4 |
| (32) | Holddown arm pins | 2 |
| (32) | Kickoff arm pins | 2 |
| (26) & (33) | Holddown cylinder pins | 4 |
| (27) & (28) | Kickoff cylinder pins | 4 |
| (30) | Auxiliary holddown arm pins | 2 |
| (31) & (34) | Auxiliary holddown cylinder pins | 4 |
| | * When operating in water, lubricate submerged points more frequently | |

50 HOURS

| | | |
|------|--|---|
| (37) | Swivel bearing | 1 |
| (40) | Front and rear support bearings | 2 |
| (13) | Driveline - converter to transmission * * | 3 |
| (14) | Driveline - transmission to front axle * * | 3 |
| (47) | Driveline - front support to mid support * * | 3 |
| (42) | Driveline - mid support to rear support * * | 3 |
| (39) | Driveline - rear support to hinge * * | 3 |
| (38) | Driveline - hinge to rear axle * * | 3 |
| | * * Use handgun or low pressure adapter; lubricate sparingly | |

250 HOURS

| | | |
|------|-------------------------------------|---|
| (41) | Fan drive bearing (not all engines) | 1 |
|------|-------------------------------------|---|

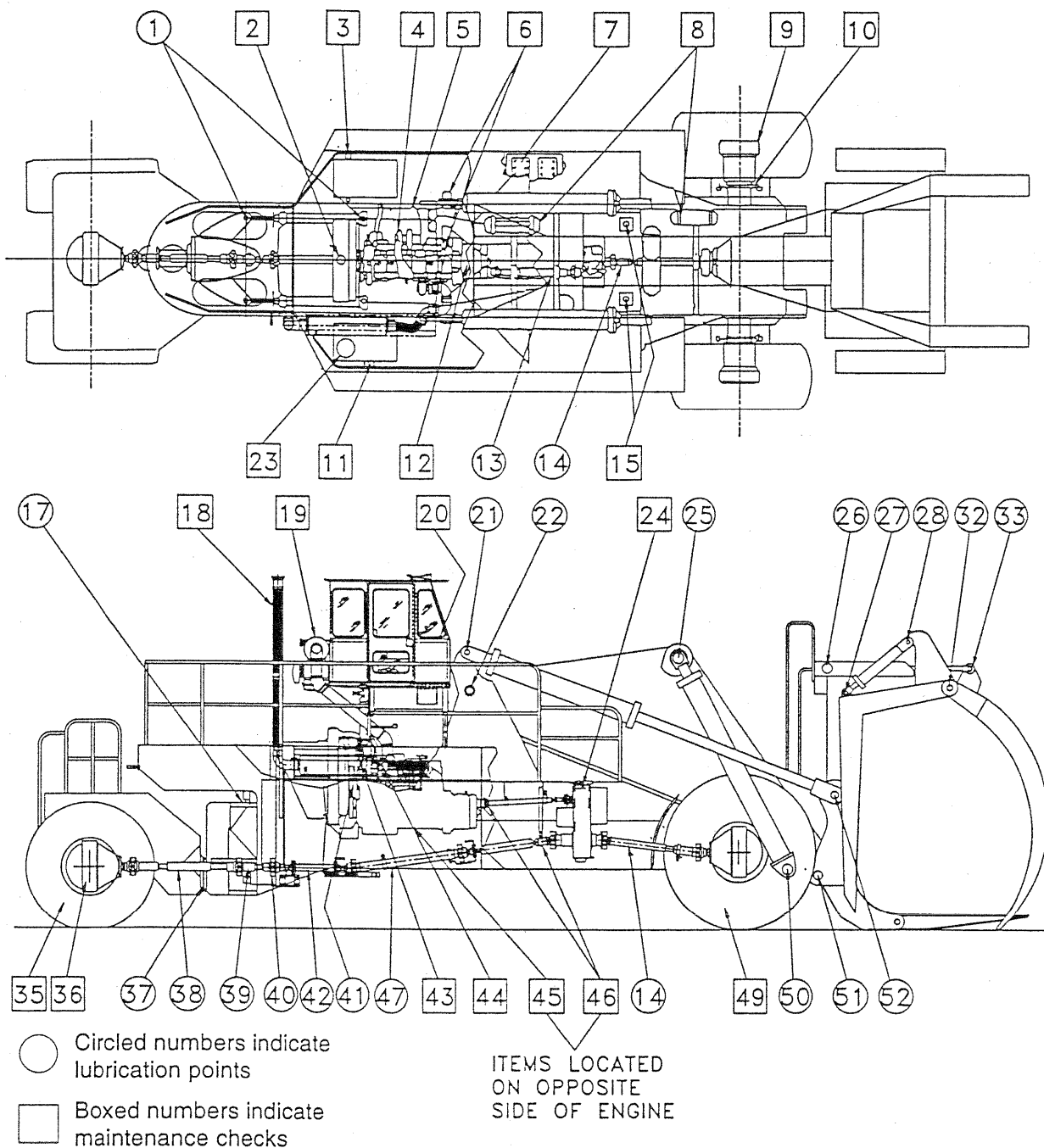


Fig. 5-2 L490 Maintenance and Lubrication Chart

NOTE: Due to variations in engine types and models, the indicated location of engine filters (fuel, oil, coolant) may not be exact. Consult your specific engine service manual for exact locations.

⚠ WARNING

Pressurized Axle (Optional)
 Front axle housing is under 3 psi air pressure. Before checking axle oil level, first shut off air supply to axle, then open air drain cock located on axle housing bulkhead.

⚠ WARNING

Due to the extreme height of the upper lube points, it is essential to personnel safety that safe ladders and/or scaffolding be used while servicing. These areas can be dangerously slick under conditions of rain, frost, or oil smears.

5.9 Maintenance Checklist**EVERY 50 HOURS OR WEEKLY**

- | | | |
|---|------------|--------------|
| 1. Repeat the 10 hour check | OK _____ | NO _____ |
| 2. Check for fluid leaks - oil, fuel, water | OK _____ | REPAIR _____ |
| 3. Check brakes for adjustment and wear | OK _____ | REPAIR _____ |
| 4. Check wheel lug nuts and studs mechanically | OK _____ | REPAIR _____ |
| 5. Check battery electrolyte level | OK _____ | ADD _____ |
| 6. Lubricate chassis - refer to Lubrication chart (page 5-7) | OK _____ | NO _____ |
| 7. Record engine rpm | HIGH _____ | STALL _____ |
| 8. Check for structural damage - inspect chassis & attachments for bending, cracking & broken welds | OK _____ | REPAIR _____ |

EVERY 250 HOURS OR MONTHLY

- | | | |
|---|----------|---------------|
| 1. Repeat the 50 hour check | OK _____ | NO _____ |
| 2. Change engine oil & filters * | OK _____ | ADDED _____ |
| 3. Take engine oil sample for analysis * | OK _____ | NO _____ |
| 4. Check axle differential oil level | OK _____ | ADDED _____ |
| 5. Check axle planetary oil level | OK _____ | ADDED _____ |
| 6. Change cooling system filter | OK _____ | REPLACE _____ |
| 7. Check all hydraulic pressures and record | OK _____ | NO _____ |
| 8. Check fire suppression actuator | OK _____ | NO _____ |

EVERY 500 HOURS OR QUARTERLY

- | | | |
|--|----------|---------------|
| 1. Repeat the 250 hour check | OK _____ | NO _____ |
| 2. Service fuel filters * | OK _____ | REPLACE _____ |
| 3. Service hydraulic filters * | OK _____ | REPLACE _____ |
| 4. Service transmission filters * | OK _____ | REPLACE _____ |
| 5. Take oil samples from transmission, axle, and hydraulic system for analysis * | OK _____ | NO _____ |
| 6. Inspect brake system & components | OK _____ | REPAIR _____ |

5.9 Maintenance Checklist (Continued)

1000 HOURS OR SEMI-ANNUALLY

- | | | |
|--|----------|---------------|
| 1. Repeat the 500 hour check | OK _____ | NO _____ |
| 2. Change transmission oil and filters | OK _____ | ADDED _____ |
| 3. Clean and flush cooling system | OK _____ | ADDED _____ |
| 4. Check pins and bushings for wear | OK _____ | REPLACE _____ |

2000 HOURS OR ANNUALLY

- | | | |
|---|----------|-------------|
| 1. Repeat the 1000 hour check | OK _____ | NO _____ |
| 2. Drain, flush and fill differential * | OK _____ | ADDED _____ |
| 3. Drain, flush & fill planetaries * | OK _____ | ADDED _____ |
| 4. Change hydraulic oil and filters * | OK _____ | ADDED _____ |

* Normal drain period and filter change intervals are for average environmental and duty-cycle conditions. Severe or sustained high operating temperatures or very dusty atmospheric conditions will cause accelerated deterioration and contamination. Change intervals should be adjusted according to the results of oil sampling analysis. Consult your WAGNER dealer for assistance in establishing an oil sampling program for your equipment.

IMPORTANT: Consult the engine manufacturer's Operation and Maintenance Manual for additional engine related checks and/or details.

Repairs:

Problem: _____

Parts: _____

Mechanic: _____ Hours Labor: _____

Operator: _____ Supervisor: _____

Machine Model: _____ Equipment No: _____

Date: _____ Shift: _____ Hour Meter: _____

5.10 Maintenance Procedures

General

The following maintenance procedures should be performed at the beginning of each work shift. The number before each maintenance procedure corresponds with the numbers given in the Maintenance and Lubrication Chart (Fig. 5-2). This provides an additional aid in locating each check point.

Before starting engine

5 Engine Oil Level

The oil level should be checked prior to starting the engine. Make sure that the area around the dipstick is clean and the machine is sitting on level ground.

NOTE: A 15 minute drain-back time is recommended if the engine has been running.

The oil level must be maintained between the "L" (low) mark and the "H" (high) mark, but as close to the "H" mark as possible.

CAUTION: Never operate the engine with the oil level below the "L" mark or above the "H" mark. Refer to the engine's Operation and Maintenance manual for detailed engine service information.

Use only approved engine oil (see Lubricant Specifications Chart, page 5-17). Do not over-fill. Check engine for leaks.

11 Hydraulic Oil Level

Always check the hydraulic oil level prior to operation. The dipstick and fill pipe are located on the RH chassis deck, to the right of the operator's cab.

CAUTION: Always open the tank breather petcock (located on the breather pipe) before removing the dipstick, filler cap, or in-tank filter cover plate. Failure to vent the tank can result in injury or a substantial oil spill. Be sure to close the petcock before operating the machine.

The oil level should be checked with the hoist cylinders retracted (down). The oil level should be at or near the "H" (high) mark on the dipstick. Fill with approved hydraulic fluid as required (see Lubricant Specifications Chart, page 5-17). Do not overfill.

2 Engine Coolant Level

Daily inspection of the coolant level is recommended. Cooling systems using anti-aeration baffles restrict visual observation of the true coolant level. Although the coolant can be seen, the system may not be full. To gain a true fill, add water slowly up to the bottom of the fill neck and allow a 30 second settling period. Remember to compensate for the loss of anti-freeze when adding water



WARNING

Never remove the radiator cap if the engine is hot. The coolant will be under pressure and could flash to steam with explosive force, causing severe burns. Remove the radiator cap only when the engine is cool.

NOTE: If the engine is hot, the coolant level will be higher than when it is cold.

Inspect the radiator daily for restriction caused by leaves, paper or bent fins. Inspect the radiator cap, hoses, and connectors for any signs of leakage or damage.

19 Air Cleaner

The air cleaner is a cyclonic-type, dry air filter. A service indicator shows the condition of the filter. The indicator will show in the green zone when the filter is clean. The indicator will show red when the filter is restricted. If red appears in the indicator window, clean or change the element and press the reset button on the indicator.

The air cleaner is also equipped with a pre-cleaner dust cup. It should be emptied daily. Never allow the dust level to come within 1/2 inch of the pre-cleaner tubes. Be sure that the dust cup seals are in place and in good condition. Complete sealing here is essential.

43 Engine Belts

Check the tension of the drive belts by pressing with the thumb halfway between the pulleys. The belts should not deflect more than the values shown in the table (Fig. 5-3). If any belt is loose or worn, report to maintenance for corrective action.

| Engine | Belt Deflection Inches (mm) |
|---------|-----------------------------|
| Cummins | 3/8 to 5/8 (9.5 to 15.9) |
| Cat | |
| Detroit | 1/2 to 3/4 (13 to 19) |

Fig. 5-3 Engine Belt Deflection

screen strainers are approximately 9' X 24" and are to be removed and cleaned on the 500 hour basis.

After starting engine:

3 Engine

After starting, check that the engine runs and sounds normal. It should come up to operating temperature within a few minutes after starting. If you notice unusual noises or excessive smoke, have maintenance check it out.

20 Instruments

Check all instruments for normal readings immediately after starting the engine. Make sure that pressures and temperatures are within acceptable limits. Also, check that all controls function properly. They should be smooth and responsive.

19 Air Intake System

Inspect all connections for damage and air leaks. Look for damaged fittings and loose connections. Do not operate the machine if leaks are present. Dirt could enter the engine intake and cause severe damage.

18 Exhaust System

Check for exhaust leaks. Make sure that exhaust gases are not entering the operator's cab. Mounting brackets must be in place and all connections tight. Check for excessive smoke.

24 Transmission Oil Level

The level should be checked after engine warm-up, with 180° to 200° showing on the transmission temperature gauge. The dipstick and fill tubes are located on the chassis deck, directly above the transmission. Check the level with the engine running at idle, at operating temperature, and with the transmission in neutral. The level should be between the "H" (high) and "L" (low) marks. Fill with approved fluid only. See Lubricant Specifications Chart, Page 5-17. Do not overfill. Inspect for leaks.

8 Air Tank Drain Valves

Visually inspect the valves and connections for damage or leaks. There should be signs of water being ejected from the drain hoses. If not, report the condition to maintenance.

35 49 Wheels and Tires

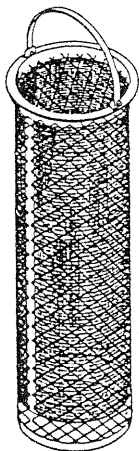
Visually inspect the tires for low air pressure and damage. Also check the wheel assemblies for cracks, loose or missing lug nuts, broken studs, etc. Report any problems to maintenance.

15 Hydraulic Brake Fluid

Check the fluid level in each of the two brake reservoirs. Each reservoir must be full. Clean the area around the filler cap before removing. Fill the reservoirs with transmission fluid. Do not use automotive brake fluid.

23 Hydraulic Strainer (Basket Type)

Located under the Hydraulic Tank Inspection Plate, are two return line Hydraulic Strainers. These metal



Hydraulic Strainer

5.11 Operator Troubleshooting

The following table lists the most common problems that may be encountered by operators. If the problem cannot

be solved using the corrective actions listed in this table, notify maintenance personnel.

Engine *

| SYMPTOM | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|--|---|
| Engine turns over but fails to start | Emergency shutdown control pulled out. | Push control in. |
| | Fuel tank empty | Fill tank |
| | Fuel shutoff valve at tank closed | Open valve |
| | Fuel filter blocked | Replace filter |
| Engine fails to turn over | Battery disconnect switches open | Close switches |
| | Transmission not in neutral | Place lever in neutral |
| | Battery low | Have charging system checked |
| | Battery terminals corroded or loose | Clean and tighten terminals |
| Engine runs unsteadily and power output low | Insufficient fuel supply | Clean fuel strainers, replace filter, fill tank, tighten fuel lines |
| | Contaminated fuel | Drain tank, lines, clean strainers, and replace fuel |
| | Wrong fuel | Drain tank and fill with proper fuel |
| | Air intake restricted | Remove restriction |
| Exhaust smokes badly | Too much oil in sump | Drain to proper level |
| | Air intake restricted | Remove restriction |
| Engine overheats | Radiator fins restricted | Clean fins |
| | Low coolant level | Check coolant level |
| Engine oil pressure low | Low oil level | Check oil level |
| | Oil leaks | Tighten connections |
| | Contaminated oil | Change oil and filters |

* Also see manufacturer's Operation and Maintenance Manual for additional information

Transmission/Converter *

| SYMPTOM | PROBABLE CAUSE | CORRECTIVE ACTION |
|-------------------------------------|-----------------------------------|--------------------------------|
| Transmission or converter overheats | Low oil level | Fill to proper level |
| | Oil cooler restricted | Remove restriction |
| Lack of power | Low engine rpm at converter stall | Have engine checked (governor) |

Air & Brake Systems

| SYMPTOM | PROBABLE CAUSE | CORRECTIVE ACTION |
|----------------------------|-------------------------------|---|
| Brakes won't release | Low air system pressure | Allow system pressure to build to 120 psi |
| Loss of braking efficiency | Air in hydraulic brake system | Check fluid level Bleed system |
| | Low air system pressure | Have maintenance check air system |

Hydraulic System

| SYMPTOM | PROBABLE CAUSE | CORRECTIVE ACTION |
|--|---------------------------------|--|
| No response to controls | Closed tank shutoff valve | Open valve |
| | Low oil level | Fill tank to proper level |
| Sluggish operation or response to controls | Hydraulic oil cold | Allow adequate warm-up time |
| | Low oil level | Fill tank to proper level |
| | Suction leak | Correct suction leak |
| | Plugged tank breather | Replace breather |
| | Restriction in circuit | Remove restriction, check filters |
| | Pump speed too slow | Check engine speed |
| Excessive noise | Cavitation | Eliminate restriction in suction line Replace tank breather |
| | Aeration | Fill tank to proper level Correct suction leak |
| | Tubing vibrating | Tighten mounting clamps |
| Hydraulic system overheating | Low oil level | Fill tank to proper level |
| | Operating over pressure reliefs | Correct operating procedure |

* Also see manufacturer's Operation and Maintenance Manual for additional information

Electrical System

| SYMPTOM | PROBABLE CAUSE | CORRECTIVE ACTION |
|-------------------------------|---------------------------------------|---|
| Engine fails to turn over | Battery disconnect switch(es) open | Close switches |
| | Neutral start switch open | Place transmission shift lever in neutral |
| | Battery low | Have start/charge system tested |
| | Battery terminals corroded or loose | Clean and tighten terminals |
| | Other connections loose | Tighten connections |
| Voltmeter indicates discharge | Alternator drive belt slipping | Tighten or replace belt |
| | Loose or corroded battery connections | Clean and tighten terminals |

5 .12 Maintenance Specifications

Hydraulic Pressure Relief Settings

NOTE: Hydraulic pressures should be set at 1500 rpm and double checked at maximum rpm. Override should not be over 50-100 psi on control valves. Check or set pressures in sequence shown and only when hydraulic oil is hot (above 120°F). Calibrate your gauge periodically.

| Component | Main | Circuit |
|--|-----------------------|------------------------|
| (1) Steering Valve | 2500 psi (17,237 kPa) | 3500 psi (24,132 kPa) |
| (2) Holddown & Kickoff Valve, LH | 2500 psi (17,237 kPa) | N/A |
| Holddown Cylinder, LH - Stem | N/A | 2750 psi (18,961 kPa) |
| - Base | N/A | 2750 psi (18,961 kPa) |
| Kickoff Cylinder, LH - Stem | N/A | 1100 psi (7,584 kPa) |
| - Base | N/A | 2750 psi (18,961 kPa) |
| (3) Holddown & Kickoff Valve, RH | 2500 psi (17,237 kPa) | N/A |
| Holddown Cylinder, RH - Stem | N/A | 2750 psi (18,961kPa) |
| - Base | N/A | 2750 psi (18,961 kPa) |
| Kickoff Cylinder, RH - Stem | N/A | 1100 psi (7,584 kPa) |
| - Base | N/A | 2750 psi (18,961 kPa) |
| (4) Diverter Valve (Aux. Holddown) | N/A | N/A |
| (5) Hoist Valve | 2400 psi (16,548 kPa) | 2750 psi (18,961 kPa) |
| (6) Tilt Valve | 2400 psi (16,548 kPa) | N/A |
| Tilt Cylinder - Stem | N/A | 2750 psi (18,961 kPa) |
| - Base | N/A | 900 psi (6,205 kPa) |
| (7) Pressure Reducing Valve (Steering) | N/A | N/A |
| (8) Pressure Reducing Valve (Pilot Controls) | 425 psi (2,930 kPa) | N/A |
| (9) Hydraulic Cooler Fan Relief | 1250 psi (8,618 kPa) | N/A |

NOTE: Set main reliefs with engine at 1500 rpm.
Set circuit reliefs with engine at 1000 rpm or less.

Wheel Lug Nut Torque

| | |
|-----------------|-----------------------|
| Front | 500 lb/ft (407 N • m) |
| Rear | 500 lb/ft (678 N • m) |

Tire Inflation Pressure

| | |
|---|---------------------------|
| Front (Driver) 24 x 35 - 42PR | 90-95 psi (620 - 655 kPa) |
| Rear (Tail) 26.5 x 25 - 24PR | 60-65 psi (414 - 448 kPa) |

NOTE: The specifications shown in this manual are based on information available at the time of publication and are subject to change without notice or obligation.

Component Capacities & Lubricants

| Component or System | Refill Capacity (Approx.) | | Lubricant Type * |
|-------------------------------------|---------------------------|-------------|----------------------|
| | U.S. Gallons | Liters | |
| Engine crankcase (includes filters) | 13 | 49 | Engine oil |
| Fuel tank | 425 | 1609 | Diesel fuel |
| Cooling system | 22.5 | 85 | Water/antifreeze * * |
| Hydraulic system | 350 | 1325 | Hydraulic oil |
| Transmission system | 22 | 83 | Transmission oil |
| Differential, front | 50 | 189 | Gear lube |
| Differential, rear | 16 | 61 | Gear lube |
| Planetary hubs (each), front | 3.5 | 13 | Gear lube |
| Planetary hubs (each), rear | 2.5 | 9.5 | Gear lube |
| Brake resevoirs | | As required | Transmission oil |
| Chassis grease fittings | | As required | Chassis grease |

* See Lubricant Specifications, Page 5-17 .

* * Some engines require additional coolant treatment. See engine Operation and Maintenance Manual for specific information

NOTE: The specifications shown in this manual are based on information available at the time of publication and are subject to change without notice or obligation.

5.13 Lubricant Specifications

| | MANUFACTURER & SPECIFICATIONS | RECOMMENDED VISCOSITY | PREVAILING AMBIENT TEMPERATURES | |
|--------------|--|---|---------------------------------|----------------------------|
| | | | (FAHRENHEIT) | (CELSIUS) |
| ENGINE | CUMMINS | SAE 10W-30 | -13 ° F to 95 ° F | -25 ° C to 35 ° C |
| | MIL-L-2104D | SAE 15W-40 | 14 ° F and Above (Normal) | -10 ° C and Above (Normal) |
| | (API CE) | SAE 20W-40 | 32 ° F and Above | 0 ° C and Above |
| | DETROIT DIESEL | SAE 30 | Below 32° F | Below 0° C |
| | MIL-L-46152 | SAE 40 | Above 32° F | Above 0° C |
| | (API CD II) | NOTE: Multi-Grade oils are not recommended in Detroit Diesel Engines | | |
| TRANSMISSION | CATERPILLAR | SAE 5W-20 | -13°F to 50° F | -25°C to 10° C |
| | MIL-L-2104D | SAE 10W-30 | -4°F to 104° F | -20°C to 40° C |
| | (API CE) | SAE 15W-40 | 5°F to 122° F(Normal) | -15°C to 50° C (Normal) |
| | CLARK | MIL-L-46167 | -65 ° F to 0 ° F | -54 ° C to -18 ° C |
| | MIL-L-2104D | SAE 10W | -10 ° F to 140 ° F (Normal) | -23 ° C to 60 ° C (Normal) |
| | (API SE) | SAE 30 | 30 ° F to 140 ° F | - 1 ° C to 60 ° C |
| TYPE C-3 | | | | |
| | ALLISON | SAE 5W-20 | Below -10° F | Below -23° C |
| | MIL-L-2104D | SAE 10W | Below 10° F(Normal) | Below -12° C (Normal) |
| | (API SE) | SAE 15W-40 | Below 30° F | Below - 1° C |
| | TYPE C-3 | SAE 30 | Below 35° F | Below 2° C |
| | NOTE: Preheat transmission fluid to indicated minimum temperature before operating transmission...or if preheating equipment is not available, operate transmission in NEUTRAL for minimum of 20 minutes prior to engaging FORWARD or REVERSE ranges | | | |
| AXLE | TWIN-DISC | SAE 5W-20 | -60° F to 0° F | -51° C to -18° C |
| | MIL-L-2104D | SAE 10W | -10° F to 140° F(Normal) | -23° C to 60° C |
| | (API SE) | SAE 30 | 30° F to 140° F | -1° C to 60° C |
| | TYPE C-3 | | | |
| | CLARK | SAE 75W | -40 ° F to -10 ° F | -40 ° C to -23 ° C |
| | MIL-L-2105C | SAE 75W-80 | -40 ° F to -0 ° F | -40 ° C to -18 ° C |
| (API GL-5) | SAE 80W-90 | -13 ° F to 100 ° F (Normal) | -27 ° C to 37 ° C (Normal) | |
| | SAE 85W-140 | Above 10 ° F | Above -12 ° C | |
| HYDRAULIC | RIMPULL/BRYAN | SAE 75W-90 | -65° F to 20° F | -54° C to -29° C |
| | MIL-L-2105C | SAE 80W-90 | -20° F and Above(Normal) | -29° C and Above(Normal) |
| | (API GL-5) | SAE 120 | -90° F to 120° F | -32° C to 49° C |
| | WAGNER | NOTE: Mobil DTE 13M is recommended for use in Allied Wager hydraulic systems operating at very low to widely varying ambient temperatures. It provides a high viscosity index with a low pour point and improved fluidity at sub-zero temperatures. | | |
| | Premium Grade | IMPORTANT: As a condition of new machine warranty, Mobil DTE 13M must be used in hydraulic system during warranty period. | | |
| | Anti-wear Hydraulic Oil (Mobil DTE 13M) | | | |
| CHASSIS | WAGNER | NLGI-1 | Below 10 ° F | Below -12 ° C |
| | Multipurpose Chassis Grease w/EP & MoS 2 | NLGI-2 | Above 10 ° F | Above -12 ° C |

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