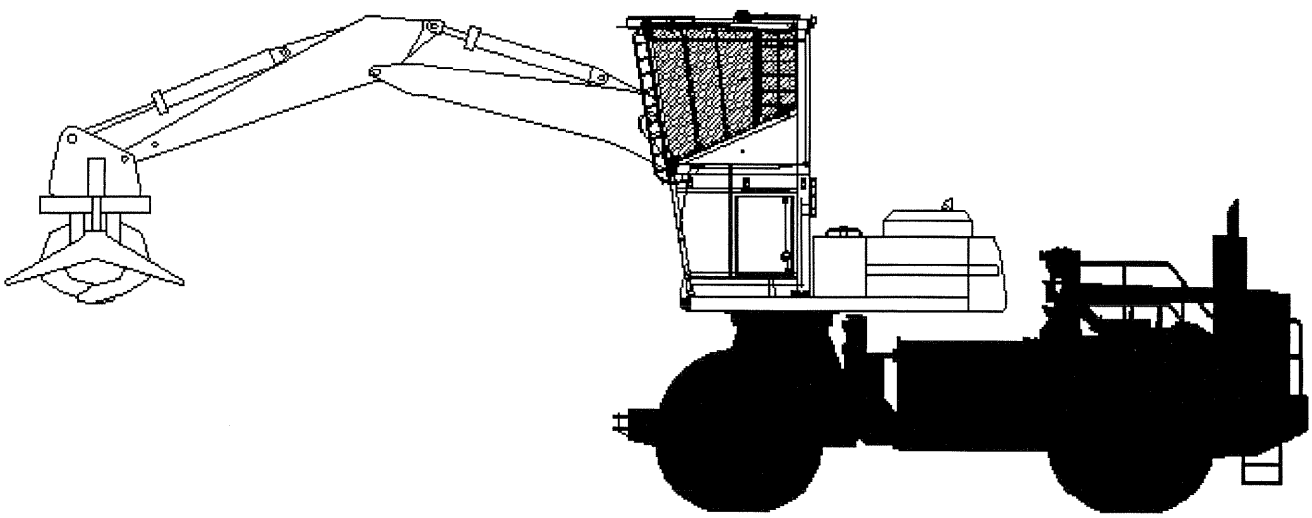
Operators Manual

LL600

Log Loader
Prime Mover



Serial Number: _____

(Record Serial Number Here)

Allied Systems COMPANY

80-598 (8/98) Printed in USA

⚠ WARNING

CALIFORNIA PROPOSITION 65 WARNING

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

This operator's manual should be regarded as part of the machine. Suppliers of both new and second-hand machines are advised to retain documentary evidence that this manual was provided with the machine.

LL 600 Log Loader Prime MoverOperators Manual

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General Information

This manual is your guide to correct operation and maintenance of the LL600 Log Loader Prime Mover only. Your dealer has provided a manual which covers the upper works. Read this manual prior to operation and before performing maintenance on your machine.

If you require information not found in this manual, please contact your local dealer. If you do not know who your local dealer is, then contact:

Allied Systems Company
2300 Oregon Street
Sherwood, Oregon 97140 USA
Phone: (503) 625-2560

Intended Use Statement

This machine is designed for the loading and transporting of logs in unimproved log yards. Use in any other way is considered as contrary to the intended use. Compliance with and strict adherence to the conditions of operation, service and repair as specified also constitute essential elements of the intended use.

The machine should be operated, serviced and repaired only by persons who are familiar with its particular characteristics and who are acquainted with the relevant safety procedures.

Accident prevention regulations, and all other generally recognized regulations on safety and occupational medicine, must be observed at all times.

Any arbitrary modifications carried out on this machine may relieve the Allied Systems Company and your dealer of liability resulting from damage or injury.

Unit Identification

The Prime Mover's serial number plate is located on the right-hand side of the valve plate. Always have these numbers available when requesting parts, service or operation information. Record the unit serial number on the front cover of this manual.

Specifications

Engine

Make and Model ..... Caterpillar 3406
Max Horsepower ..... 360 @ 2100 RPM
Max Torque ..... 1120 Ft/Lbs @ 2100 rpm
Bore and Stroke ..... 5.4" x 6.5"
No. of Cylinders 6
Displacement ..... 893 Cu/In (14.6 liters)

Air Cleaner

Two Stage Dry Type

Electrical System

Type ..... 24 Volt Negative Ground/24 Volt Start
Alternator ..... 100 AMP
Batteries (2) ..... 12 Volt-8D @ 205 AMP Hr. each

Torque Converter

Clark 8612 ..... Stall Ratio 2.54:1

Transmission

Clark 6000 Series Power Shift - Spur Gear; 4 Speeds Fwd/Rev

Range	Ratio	Speed (Unladen)
Forward		
1	4.393:1	3.0 mph (4.8 km/h)
2	2.454:1	5.8 mph (9.3 km/h)
3	1.385:1	10.0 mph (16.0 km/h)
4	.0774:1	17.0 mph (27.0 km/h)
Reverse		
1	4.393:1	3.0 mph (4.8 km/h)
2	2.454:1	5.8 mph (9.3 km/h)
3	1.385:1	10.0 mph (16.0 km/h)
4	.0774:1	17.0 mph (27.0 km/h)

Axles

Fabricated Housing ..... Allied Wagner
Make ..... Clark
Model (Chassis) ..... 70000 Series
Differentials ..... Posi-Torque
Type ..... Planetary
Brakes ..... Hydraulic Disc
Brake Size ..... 32" Diameter (813mm)

Tires

Size (Front & Rear) ..... 43.5 x 39 Radial

Hydraulic System

Steering Pump ..... 50 gpm
Pilot Pump ..... 10 gpm
Steering Cylinder (2) ..... 5" x 24.125" (127mm x 613mm)
Swivel Lock (2) ..... 5" x 24.125" (127mm x 613mm)

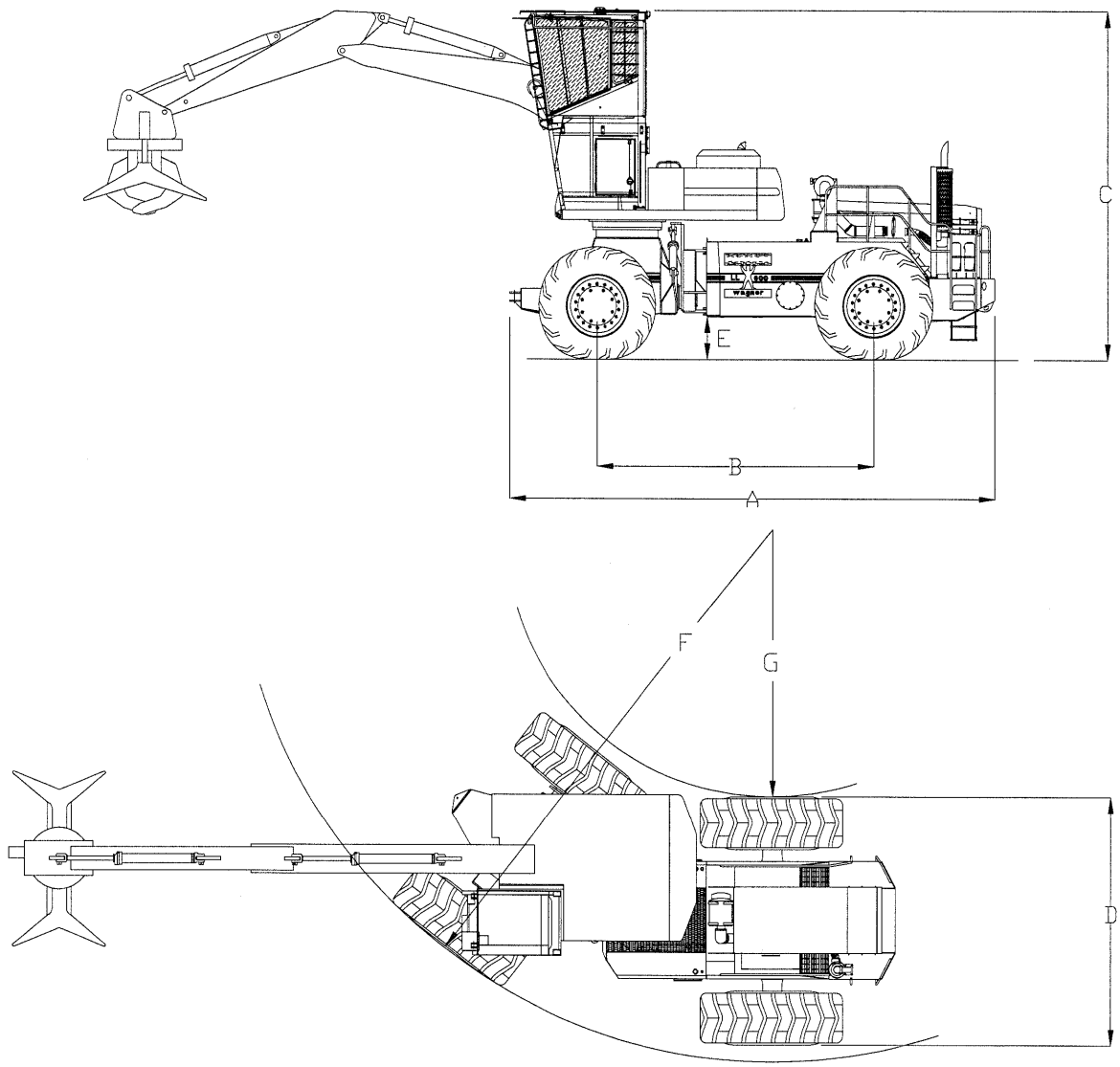
Service Refill Capacities

Fuel Tank ..... 224 Gals (848 liters)
Hydraulic Oil ..... 224 Gals (848 liters)
Crankcase w/Filter ..... 9 Gals (34 liters)
Cooling System ..... 17.5 Gals (66 liters)

Loader

See Caterpillar Specifications

Dimensions



Dimensions (approximate)

A.	Overall Length	30' 7" (9314 mm)
B.	Wheelbase	17' 3" (5258 mm)
C.	Cab Height (With 325B)	20' 11" (6375 mm)
D.	Outside Chassis Width (Tires)	15' 1" (4597 mm)
E.	Ground Clearance (Chassis)	2' 11" (889 mm)
	Ground Clearance (Differential)	2' 8" (813 mm)
F.	Turning Radius - Outside	33' 8" (10,262 mm)
G.	Turning Radius - Inside	16' 8" (5080 mm)

Weights and Functions (approximate)

Unit Weight (With CAT 325B)	131,400 lbs	(59,600 kg)
Bogie End	79,400 lbs	(36,000 kg)
Chassis End	52,000 lbs	(23,600 kg)
Articulation		38° each way
Oscillation		15° each way

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Safety Summary

Important Safety Information

Most accidents involving product operation, maintenance and repair are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs. A person must be alert to potential hazards. This person should also have the necessary training, skills and tools to perform these functions properly. Management should ensure that only qualified, properly trained and equipped personnel operate and maintain this equipment.

Read and understand all safety precautions and warnings before operating or performing lubrication, maintenance and repair on this product.

Safety Is Your Business

Why? Because SAFETY, based on knowledge, technical skill, and years of experience has been carefully built into your LL600 Prime Mover. 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.

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 machine. It's your responsibility to see that they are carried out.

Precaution Warnings

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

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.

Allied Systems cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this publication are therefore not all inclusive. If a tool, procedure, work method or operating technique not specifically recommended by Allied Systems is used, you must satisfy yourself that it is safe for you and others. You should also ensure that the product will not be damaged or made unsafe by the operation, lubrication, maintenance or repair procedures you choose.

Operation Warnings

You must be trained in the operation of this machine. 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 yard rules. Follow specific loading directions and procedures. The methods outlined in this manual provide a basis for safe operation. Because of special conditions, your company's handling procedures may be somewhat different from those discussed 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 uses an 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.
- 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.

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.

Perform all maintenance unless otherwise specified as follows:

1. Vehicle supported on certified safety stands at the four corners.
2. The engine is stopped.
3. The start switch key is off and the key is removed.

Note: Please be advised that the following Safety Procedures are intended to compliment the established regulations of your Corporate Safety Committee.

General Warnings

- 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.
- Before performing maintenance or service under the machine, move the machine to a level surface, engage the parking brake and stop the engine.

- Remove the ignition key and attach a "DO NOT OPERATE" or similar warning tag to start switch or controls before servicing or repairing the machine. Refer to OSHA's Lockout/Tagout standard for detailed procedures.
- Block the tires to keep the machine from rolling.
- Never stand under a component that is supported only by the hydraulics. Make sure it is resting on its mechanical stops.
- 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.
- 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.
- When using pressure air for cleaning, wear a protective face shield and protective clothing.
- Maximum air pressure from the nozzle must be less than 30 psi (205 kPa) for cleaning purposes.
- Do not enter fuel or hydraulic tanks without proper safety equipment. Check your local government regulations for confined space entry requirements.
- Keep the machine, especially the deck, walkways and steps, free of foreign material, such as debris, oil, tools and other items which are not part of the machine.
- Secure all loose items such as lunch boxes, tools and other items which are not part of the machine.
- Know the hand signals and who gives them. Accept signals from one person only.
- Put Maintenance fluids in approved container only. Never put maintenance fluids into glass containers.
- Report all needed repairs.
- Do not allow unauthorized personnel on the machine.
- Make sure that all clamps, guards and heat shields are installed correctly to prevent vibration, rubbing against other parts and excessive heat during operation.
- Always have the supplied fire extinguisher on the machine and know how to use it. Inspect and have it serviced as recommended on its instruction plate.

Crushing or Cutting Prevention

- Never attempt adjustments while the machine is moving or the engine is running unless otherwise specified.
- Support vehicle properly when working beneath it. Do not depend on hydraulic cylinders to hold vehicle up. Vehicle can lower if a manual control is moved, or if a hydraulic line breaks.

⚠ WARNING

WARNING : Drive shafts turn at engine speed when engine is running regardless of transmission gear selection.

- Where there are steering linkages, the clearance in the linkage area will increase or decrease with movement of the steering. Stay clear of all rotating and moving parts.
- Keep objects away from moving fan blades. They will throw or cut any object or tool that falls or is pushed into them.
- Retainer pins or bolts, when struck with force, can fly out and injure nearby persons.
- Chips or other debris can fly off objects when struck. Make sure no one can be injured by flying debris before striking any object.
- Wear protective glasses when striking a retainer pin or bolt to avoid injury to your eyes.
- Do not attempt to lift the machine with the tow eyes on the front and rear of the vehicle. These are for towing only. Consult Allied Systems for lifting instructions.
- Wear a hard hat, protective glasses and other protective equipment as required by job conditions.
- 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.
- Make certain all protective guards and covers are secured in place on the machine.

Burn Prevention

- 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.
- 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.
- 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.
- At operating temperature, the hydraulic tank is hot and can be under pressure.
- Relieve all pressure in air, oil, fuel or cooling systems before any lines, fittings or related items are disconnected or removed.
- 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 contain sulfuric acid which can cause severe burns. Avoid contact with skin, eyes or clothing.

Fire or Explosion Prevention

- All fuels, most lubricants and some coolant mixtures are flammable. Do not smoke while refueling or in a refueling area. Do not smoke in areas where batteries are charged, or where flammable materials are stored.
- Keep the machine free of oil, grease and trash accumulations. Regular steam cleaning is recommended for fire prevention and general safety.

⚠ WARNING

WARNING: If electrical jump starting is required, be aware that improper jumper cable connections can cause an explosion resulting in personal injury. When using jumper cables always connect positive (+) cable to positive (+) terminal of battery and negative (-) cable from external source to starter negative (-) terminal. (If not equipped with starter negative terminal, connect to engine block.)

- 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.
- Clean and tighten all electrical connections. Check daily for loose or frayed electrical wires. Have all loose or frayed electrical wires tightened, repaired or replaced before operating the machine.
- Keep all fuels and lubricants stored in properly marked containers and away from all unauthorized persons.
- Store all oily rags or other flammable material in a protective container, in a safe place.
- Remove all flammable materials such as fuel, oil and other debris before they accumulate on the machine.

Lines, Tubes, Hoses and Cylinders

- Do not bend or strike high pressure lines. Do not install bent or damaged lines, tubes or hoses.

- Repair any loose or damaged fuel and oil lines, tubes and hoses. Leaks can cause fires.

Do not weld or flame cut on pipes or tubes that contain flammable fluids. Clean them thoroughly with nonflammable solvent before welding or flame cutting on them. Inspect all lines, tubes and hoses carefully. Use a peice of cardboard to check for leaks. Do not use your bare hands to check for leaks. Tighten all connections to the recommended torque. Replace if any of the following conditions are found:

1. End fittings damaged, displaced or leaking.

2. Outer hose covering chafed or cut and wire reinforcing exposed.

3. Outer hose covering ballooning locally.

4. Evidence of kinking or crushing of the flexible part of the hose.

⚠ WARNING

WARNING: HIGH PRESSURE CYLINDER
Do not remove any parts until all pressure has been relieved to avoid possible personal injury.

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Instruments and Controls

Instruments

Become thoroughly familiar with the location and use of all instruments before operating the machine. Check all instruments immediately upon starting, again after reaching operating temperature, and frequently during operation. If any instrument does not operate properly; stop the engine and correct the problem.

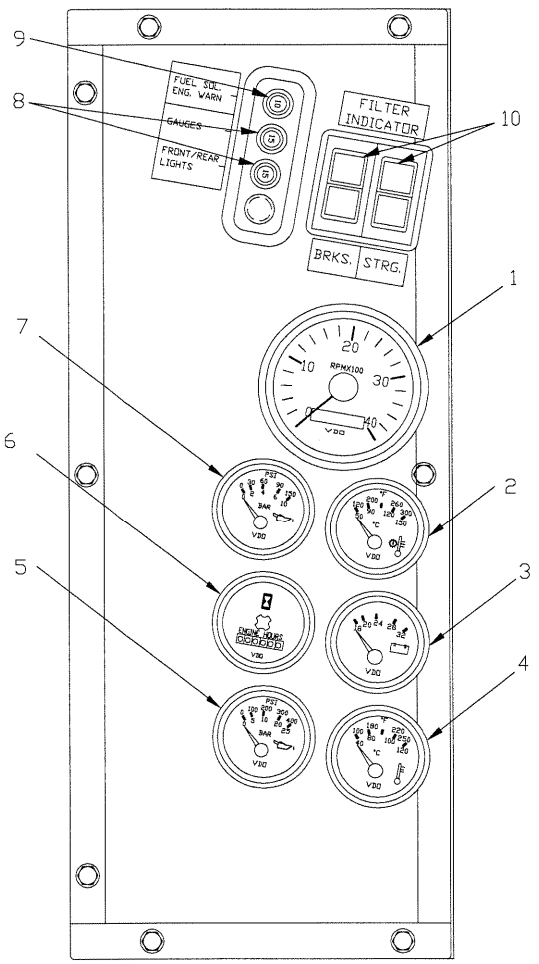


Figure 3-1 - Instrument Panel

The Prime Mover's instrument panel in located on the plexiglass covered side of the junction box. The junction box is located on the valve plate, forward of the engine. See Figure 3-1, above.

1. Tachometer
The electric tachometer indicates engine revolutions per minute (rpm). Multiply the indicated number by 100 to get the engine RPM.

2. Engine Coolant Temperature Gauge
If the engine coolant temperature holds at 200° F (93° C) or higher, discontinue operation, allow the engine to idle for 3 to 5 minutes, and shut the machine down. Determine the cause of the problem before continuing.

3. Voltmeter
The voltmeter indicates the voltage condition of the electrical system. During operation the gauge should read between 22 and 28 volts.

4. Converter/Transmission Oil Temperature
This gauge displays the Converter/Transmission oil temperature. It should be between 200° F (93° C) and 250° F (121° C). If the temperature exceeds 250° F (121° C), discontinue operation, determine the cause of the problem before continuing operation.

5. Transmission Oil Pressure
The transission oil pressure should be between 180 and 200 psi with the parking brake set, an oil temperature of 180° and 200° F (82° - 93° C), and the engine at idle (400-600 rpm). The pressure should not vary by more than 5 psi between the four speed ranges.

6. Engine Hourmeter
Activated by the engine oil pressure, the hourmeter records the elapsed time of actual engine operation.

7. Engine Oil Pressure
This gauge displays the oil pressure only, not volume. Should the pressure drop below the level required by the engine manufacturer, **stop the engine immediately**.

8. 15 Amp Circuit Breakers
Protects indicated 15 amp electrical circuit. Push to reset.

9. 10 Amp Circuit Breakers
Protects indicated 10 amp electrical circuit. Push to reset.

10. Filter Indicator Lights
These lights indicate the condition fo the specified filter element. With the machine running at operating temperature, a green light indicates that the filters are operating properly. A red light means the filter element should be replaced.

The Prime Mover's operator's instrument panel is located in the cab. It consists of a series of indicator lights and a buzzer which monitor the engine, brake and transmission conditions.

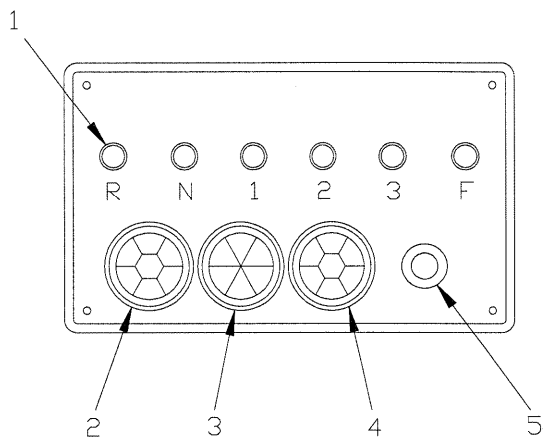


Figure 3-2 - Operator's Instrument Panel

1. Transmission Status Indicator Lights
When lit the transmission is in the indicated gear. "R" indicates reverse; "N" indicates neutral; "F" indicates forward; and, "1", "2" and "3" indicate first, second and third gears respectively.

2. Brake Pressure Warning (Red)
When this light is lit, it indicates that the brake pressure oil is low. Stop the machine, determine the problem and correct the problem before continuing operation.

3. Engine Warning Buzzer
Buzzer warns of low engine oil pressure or high coolant temperature. Stop the machine, determine the problem and correct the problem before continuing operation.

4. Engine Warning Light (Red)
A red light warns of low engine oil pressure or high coolant temperature. Stop the machine, determine the problem and correct the problem before continuing operation.

5. Swivel Lock Light (Green)
A green light indicates that the swivel lock is engaged. It is now safe to load and unload logs.

Key Switch

The key switch is used to start and stop the Prime Mover's engine and to turn the accessories on and off. This is a four-position switch: ACC, OFF, RUN and START.

When turning the key clockwise from the center, or OFF position, the first position is RUN. The second position is START. The start position is spring loaded and will return the key to the RUN position after starting. The ACC position, located to the left of OFF, is used for accessories only.

Foot Pedal Controls

Foot pedal controls for the Prime Mover are fanned out in front of the operator's seat. Pedals control steering, braking and engine speed.

Steering is controlled using the steering pedal located furthest left. This pedal rocks forward and backward to steer left or right.

To stop the machine depress the brake pedal. The brake pedal is located between the steering pedal and the engine throttle pedal.

The engine throttle pedal is located furthest right. This pedal controls engine speed, rpm.

Transmission Shift Controls

Transmission shift controls are located on the left and right joysticks in the upper works. The right trigger switch shifts up, and the left trigger switch shifts down. Three forward speeds, neutral, and two reverse speeds can be selected. The operator's instrument panel indicates which speed is selected.

Parking Brake

The park brake is set and released using a rocker switch located to the right of the operator.

Swivel Lock

The swivel is locked and unlocked using a switch located to the right of the operator. The operator's instrument panel indicates if the swivel is in the locked or unlocked position.

⚠ WARNING

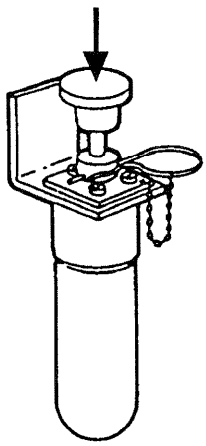
Warning: Always engage the swivel lock before loading and unloading logs. Without the swivel lock engaged the machine will be unstable. Failure to lock the swivel may result in damage to the machine and/or personal injury.

Chassis Lights

The chassis lights are turned on and off using a rocker switch located to the right of the operator.

Fire Suppression System Actuator (Optional)

A manual suppression system actuator is located in the cab and on the chassis. Either actuator can set off the system. Locate and memorize the location of each actuator.



IN CASE OF FIRE:

1. Remove Safety Pin
2. Strike Button

Figure 3-3 - Fire Suppression System Actuator

If possible, take the hand-held fire extinguisher and LEAVE THE VEHICLE. After the system has discharged, watch carefully for flare-ups and spot fires.

Notify the Fire Department and/or service personnel as soon as possible.

NOTE: Some machines are equipped with an optional automatic fire detection and activation system.

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Maintenance and Lubrication

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 Prime Mover at top operating efficiency. The maintenance and lubrication procedures given here can be performed with a minimum of shop tools.

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 Allied Systems Company Representitive.

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 Load.

   The machine should be unloaded, with the unit down.

⚠ WARNING

Never rely on the hydraulics 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 or safety stands.

4. Install Swivel Locking Pin

   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. See Figure 4-1.

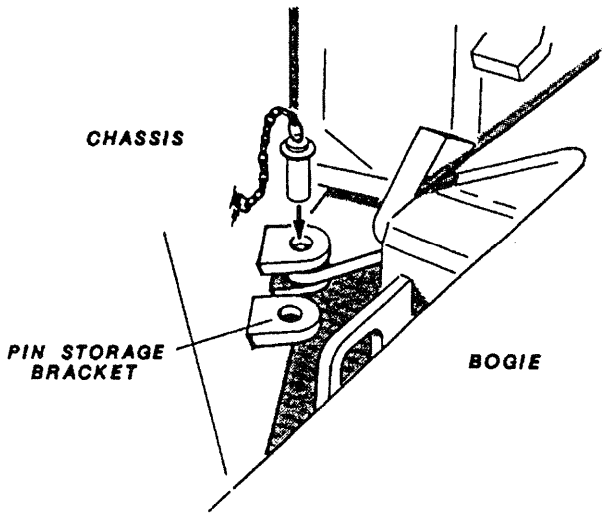

Figure 4-1 - Swivel Locking Pin

5. Stop the Engine

⚠ WARNING

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.

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 operators 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.

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)
- 2500 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 overemphasized. 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.

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.

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 department 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.

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 Allied Representitve for complete information and assistance in establishing a scheduled oil sampling analysis program for your equipment.

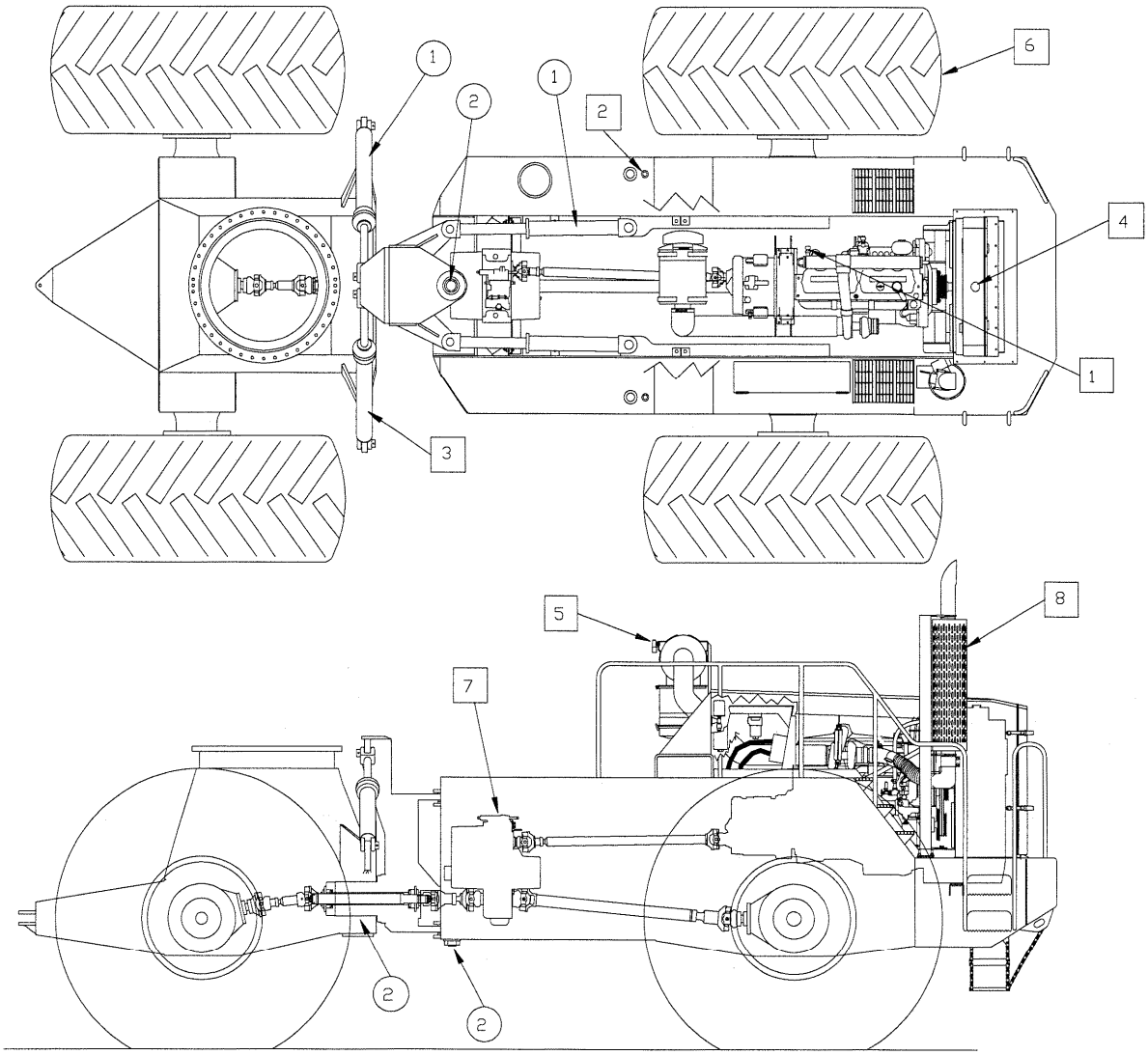

Figure 4-1 - Daily Maintenance and Service Check Points

Daily Maintenance and Lubrication

The chart shown above includes all points referenced in the Daily Maintenance and Lubrication Check List shown on the following page.

◯ Circled Numbers Indicate Lubrication Points

□ Boxed Numbers Indicate Maintenance Check Points

Note: Due to variations in engine types and models, the indicated location of engine filters (fuel, oil, coolant, etc.) are not shown. Consult your specific engine service manual.

Note: Your unit may be equipped with an optional remote lube system.

⚠ WARNING

Due to the extreme height of the upper lube points and maintenance check points, it is essential to personnal safety that safe ladders and/or scafolding be used while servicing. These areas can be dangerously slick under condition of rain, frost, ice, snow and oil smears.

Daily Maintenance and Lubrication Check List

10 HOURS OR DAILY

Before Engine Startup - Lubricate the Following

Item	Ok	No
(1) Hydraulic Cylinder Pivot Pins	____	____
(2) Swivel Box Pivot Pins, Neck Bearings and Bearing Carriers	____	____

Before Engine Startup - Check the Following

Item	Ok	No	Add
[1] Engine (Check Oil Level - Check for Leaks)	____	____	_____
[2] Hydraulic Tank (Check Oil Level - Check for Leaks)	____	____	_____
[3] Hydraulic Cylinders (Check for Leaks)	____	____	
[4] Radiator (Check Coolant Level - Check for Leaks)	____	____	_____
[5] Air In-take System (Check for Cracks or Damage)	____	____	
[6] Wheels and Tires (Check Condition and Pressure)	____	____	_____
[7] Transmission Oil Level (At "Add" Mark When Cold)	____	____	_____

After Engine Startup - Check the Following

Item	Ok	No	Add
[1] Engine (Does it sound normal)	____	____	
[5] Air Cleaner (Check Indicator)	____	____	
[8] Exhaust System (Check for Leaks and Excessive Smoke)	____	____	
[9] Instruments (Check for Normal Readings)	____	____	

Operator _____ Supervisor _____ Date _____

Unit# _____ Hour Meter (Prime Mover) _____

Service Maintenance Check Lists

50 HOURS

Item	Ok	No	Add
1. Repeat Daily Maintenance & Lubrication Check List	____	____	
2. Check for Fluid Leaks (Oil, Fuel and Water) and Correct	____	____	____
3. Check Brakes for Adjustment and Wear	____	____	
4. Check Wheel Lug Nuts and Studs Mechanically	____	____	
5. Record Engine RPM (At Idle, High Free Idle and Converter Stall)	____	____	
6. Empty Dust Cap Bowl on Air Filter	____	____	
7. Check Transmission Oil Level (At Operating Temperature)	____	____	____

250 HOURS

Item	Ok	No	Add
1. Repeat Previous Intervals	____	____	
2. Take Engine Oil Sample for Analysis	____	____	
3. Change Engine Oil and All Filters	____	____	____
4. Check Axle Differential and Planetary Oil Level	____	____	____
5. Change Cooling System Filter (If So Equipped)	____	____	____
6. Check All Hydraulic Pressures and Record (See Hydraulic Schematic)	____	____	
7. Check Fire Suppression Actuator (If So Equipped)	____	____	
8. Check Battery Electrolyte Level	____	____	____
9. Check Disc Brake Calipers, Pads, Rotors and Lines	____	____	____
10. Grease All Non-Lube-For-Life Drivelines	____	____	____
11. Check and Adjust the Parking Brake	____	____	

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

500 HOURS

Item	Ok	No	Add
1. Repeat Previous Intervals	____	____	
2. Take Oil Samples of Transmission, Axle and Hydraulic Systems	____	____	____
3. Drain and Refill Transmission, Change Filter	____	____	

1000 HOURS

Item	Ok	No	Add
1. Repeat Previous Intervals	____	____	
2. Change Hydraulic Oil Filters	____	____	

2500 HOURS

Item	Ok	No	Add
1. Repeat Previous Intervals	____	____	
2. Drain, Flush and Refill Differentials	____	____	____
3. Drain, Flush and Refill Planetaries	____	____	____
4. Check and Recharge Accumulators - Record Pressure	____	____	____
5. Replace Hoses as Required, Steam Clean Engine, Tighten Mounting Bolts and Turbocharger Mounting Bolts	____	____	____
6. Drain Hydraulic Tank, Flush Tank and Refill	____	____	____

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

Lubricant Selection and Specifications

The efficiency and useful life of mechanical equipment is as dependent on proper lubrication as on proper engineering design. The importance of proper lubrication is increased because of the greater loads and pressures imposed on present day mobile heavy equipment. For this reason, we are vitally interested in promoting widespread usage of the best possible lubricants for Allied Systems Company products.

Because many brands of fluid are available, it is not practical to test each one. Selecting the correct fluid should be done with the help of a reputable oil supplier who is responsible for the quality of the fluid. Our lubricant recommendations are based on commercial products that have given satisfactory results in normal operation. In all cases, the lubricant supplier assumes all responsibility for the performance of his product and for product liability.

Listed below are the lubricants used for initial factory fill:

Engine ..... Mobil Delvac 1300 Super 15W-40
Transmission/Converter ..... Mobilfluid 424
Drive Axle ..... Mobilube HD 80W-90
Hydraulic System ..... Mobil DTE 13M
Hydraulic Brake System ..... Mobil Multi-Purpose ATF
General Lubrication ..... Mobilgrease Special No. 2

The above lubricants will be used on all WAGNER units unless the sales order specifies that the unit is to be operated in extreme climatic conditions.

Allied Systems Company requires that lubricants meet, or exceed, the specifications of the oils listed above to avoid component failure and for warranty consideration. If a cross reference to Mobil Oil Corporation specifications is required, please consult your local lubricant dealer.

When changing fluids use the following guidelines:

- Add only filtered fluids.
- It is important to service filters and breathers at the proper hourly intervals.
- If adding lubricants other than what is currently in the reservoir, a warranty of compatibility should be obtained from the oil supplier.
- When the fluid is changed due to changes in ambient temperatures, the system should be completely drained and the fluid replaced.