



MAINTENANCE & LUBRICATION

CHD60

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Maintenance and Lubrication

General

A machine that receives regular care from its operators and mechanics generally rewards them with decreased down-time 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.

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. A single swivel locking pin can be installed with the bogie turned right or left. Both pins can be used to lock the bogie in a straight line with the dozer.

Note: Never operate the dozer with the locking pins in the locked position. Damage to the machine could result.

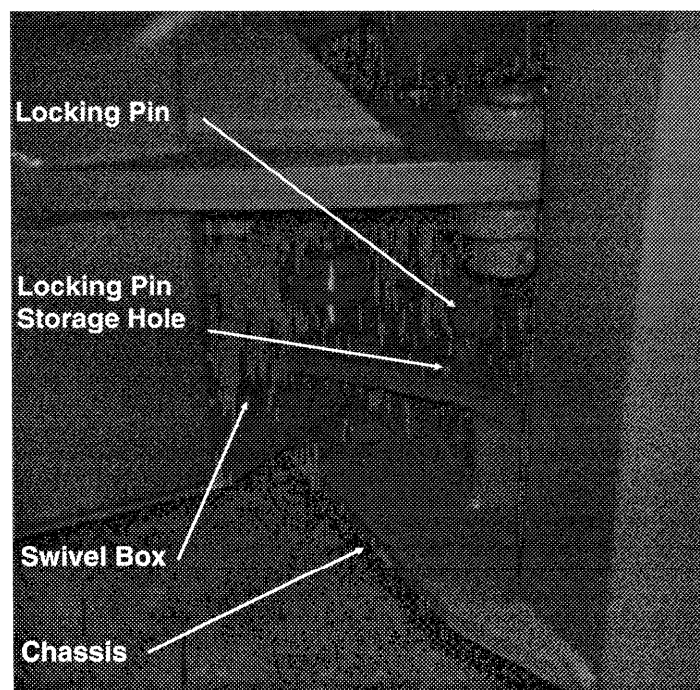


Fig. 1 Swivel Locking Pin

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.

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 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.

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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 on page 10, Maintenance Procedures. These procedures consist of checks that can be performed by the operator.

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

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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
16	ENGINE (Check oil level - check for leaks)	<input type="checkbox"/>	<input type="checkbox"/>	_____
8	HYDRAULIC TANK (Check oil level - check for leaks)	<input type="checkbox"/>	<input type="checkbox"/>	_____
1	RADIATOR (Check coolant level - check for leaks)	<input type="checkbox"/>	<input type="checkbox"/>	_____
3	AIR CLEANER (Check indicator - clean or change element as required, empty dust cup)	<input type="checkbox"/>	<input type="checkbox"/>	
7	ENGINE BELTS (Check for adjustment and wear)	<input type="checkbox"/>	<input type="checkbox"/>	
1	RADIATOR & OIL COOLER (Are fins clean and unobstructed?)	<input type="checkbox"/>	<input type="checkbox"/>	
18	WHEELS & TIRES (Check condition and pressure)	<input type="checkbox"/>	<input type="checkbox"/>	_____
—	LUBRICATE CHASSIS (Refer to lube chart)	<input type="checkbox"/>	<input type="checkbox"/>	

After Starting Engine - Check The Following:

16	ENGINE (Does it sound normal?)	<input type="checkbox"/>	<input type="checkbox"/>	
11	INSTRUMENTS (Check for normal readings)	<input type="checkbox"/>	<input type="checkbox"/>	
11	CONTROLS (Check for normal operation)	<input type="checkbox"/>	<input type="checkbox"/>	
5	EXHAUST SYSTEM (Check for leaks and excessive smoke)	<input type="checkbox"/>	<input type="checkbox"/>	
4	AIR INTAKE SYSTEM (Check for leaks and damage)	<input type="checkbox"/>	<input type="checkbox"/>	
10	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 _____

Lubrication Points**10 HOURS**

REF		FITTINGS
9	STEERING CYLINDER PINS	4
15	HOIST CYLINDER PINS	2
28	DUMP CYLINDER PINS	4
14	SIDE TILT CYLINDER PINS	2
29	LIFT ARM TO BUCKET PINS	2
6	HINGE PIN - UPPER *	1
24	HINGE PIN - LOWER *	1

50 HOURS

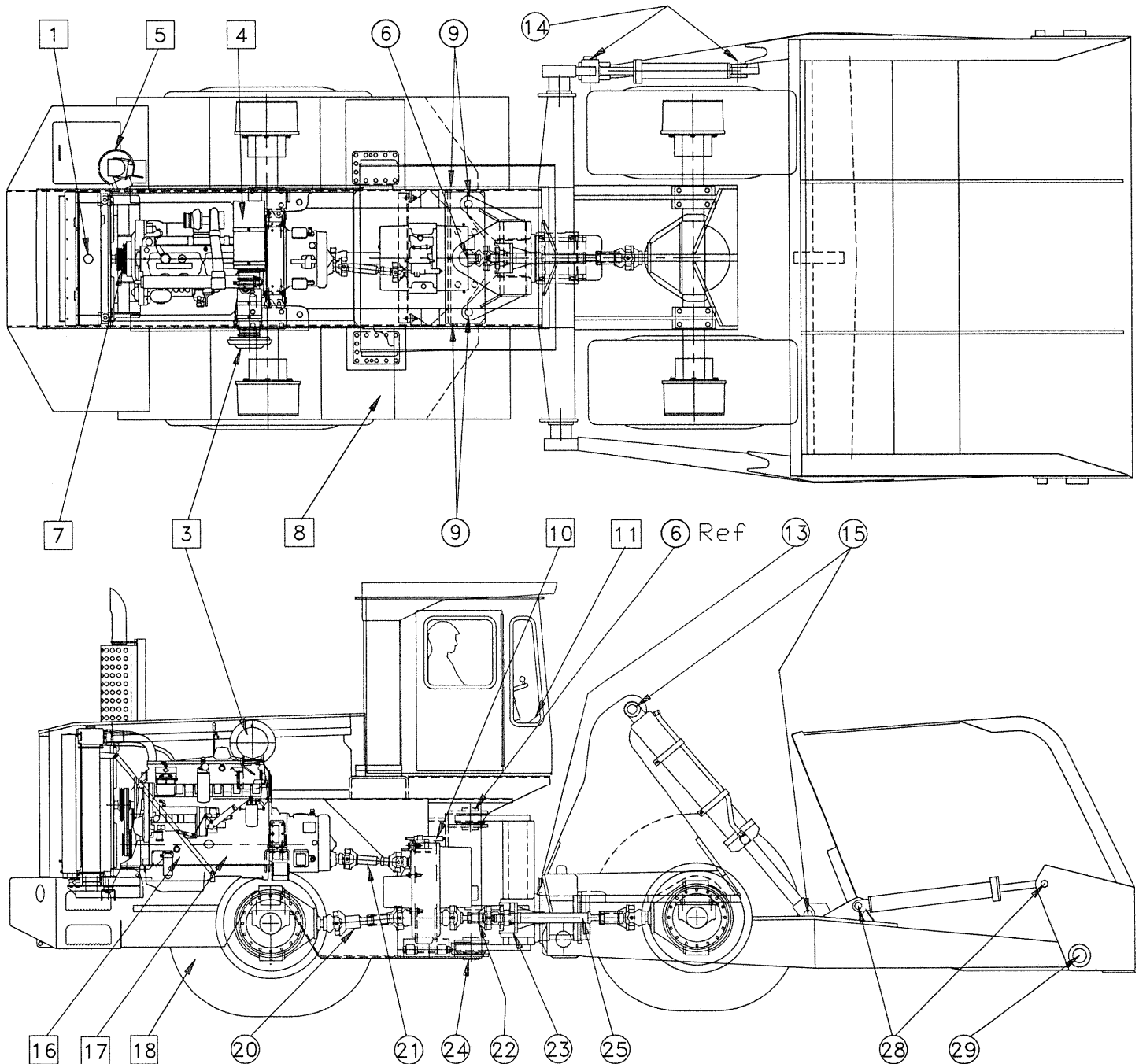
21	DRIVELINE - CONV TO TRANS *	3
20	DRIVELINE - TRANS TO REAR AXLE *	3
22	DRIVELINE - TRANS TO SWIVEL *	3
25	DRIVELINE - SWIVEL FRONT AXLE *	2
23	DRIVELINE - SUPPORT BEARING	1
13	SWIVEL BEARING	1

* Use handgun or low pressure adapter;
lubricate sparingly.

250 HOURS

7	FAN DRIVE BEARING (not all engines)	1
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Maintenance and Lubrication



○ Circled numbers indicate
Lubrication points

□ Boxed numbers indicate
Maintenance checks

FIG. 2 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.

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 _____ |

Maintenance and Lubrication

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: _____

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. 2). This provides an additional aid in locating each check point.

Before starting engine

16 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

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 17). Do not over-fill. Check engine for leaks.

8 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 17). Do not overfill.

1 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.

3 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.

7 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. 3). If any belt is loose or worn, report to maintenance for corrective action.

18 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.

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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. 3 Engine Belt Deflection

After starting engine

17 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.

11 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.

4 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.

5 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.

10 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 17. Do not over-fill. Inspect for leaks.

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

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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)

Wet Disc Brake System

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Brakes won't release	Loss of oil - See Service Manual 80-513	Have maintenance check system
Loss of braking efficiency See Service Manual 80-513 Section 4-1	Air in hydraulic brake system	Check the pump
	Loss of accumulator pressure	Have maintenance check system
	Low system pressure	Wait for system pressure to recharge

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 switch(es)
	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

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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.

Steering

Main	2550 PSI
Circuit	3500 PSI

Hoist

Main	2200 PSI
Circuit	2400 PSI

Dump

Main	2000 PSI
Circuit	2500 PSI

Side Tilt

Main	2100 PSI
Circuit	2500 PSI

Pilot Controls

Main	450 PSI
Pressure Compensator Pump	2200 PSI
Brake System Relief	2700 PSI

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 (678 N • m)
Rear	500 lb/ft (678 N • m)

Tire Inflation Pressure

Front	29.5 x 29	65 psi Max (448 kPa)
Rear	29.5 x 29	55 psi Max (380 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	186	704	Diesel fuel	
Cooling system	24.8	94	Water/antifreeze * *	
Hydraulic system	180	681	Hydraulic oil	
Transmission system	15	57	Transmission oil	
Differential	16	61	Gear lube	
Planetary hubs (each)	2.5	9.5	Gear lube	
Chassis grease fittings	—	As required	—	Chassis grease

* See Lubricant Specifications, Page 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.

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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) TYPE C-3	SAE 30	30 ° F to 140 ° F	- 1 ° C to 60 ° C
TRANSMISSION	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			
	TWIN-DISC	SAE 5W-20	-60° F to 0° F	-51° C to -18° C
AXLE	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)
AXLE		SAE 85W-140	Above 10 ° F	Above -12 ° C
	RIMPULL	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
HYDRAULIC	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 Anti-wear Hydraulic Oil (Mobil DTE 13M)	IMPORTANT: As a condition of new machine warranty, Mobil DTE 13M must be used in hydraulic system during warranty period.		
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

