Maintenance & Lubrication Schedule and Specifications

Component Specifications & Capacities

Engine Specifications	
Make	CUMMINS
Model	QSM11
Combustion Cycle	Four Stroke
Aspiration	Charge Air Cooled
Number Of Cylinders	6
Displacement	10.8 liters

Air Intake	
Make	Donaldson
Type	Dry
Model	FVG
Size	16 in. DIA.
Element	WASHABLE
Safety Element	YES

Converter	
Make	CLARK
Model	8000 Series
Wheel Dia.	16.7 in.
Pump Drive Ratio	1.057:1

Transmission	
Make	CLARK
Model	6000 Series
Flange Size	8.5C Input / 9C Output
Filter	100 GPM - Full Flow Pressure
Charge Pump Type	Piggyback Gear
Rated Flow	50/18 GPM

Drive Axle	
Make	Clark
Model	BD71000 Series Tandem axles
Differential Ratio	4.1:1
Planetary Ratio	3.666:1
Total Ratio	20.039:1
Differential Type	Posi-Torque limited slip
Mounting Centers	34.15 in.
Pad Dowel Centers	38.50 in.
Input Rotation	C.W.
Overall Axle Length	102.38 in.
Hub Size	20 in.
Flange Size	9C

Drive Shafts	
Converter To Transmission	8.5 C
Transmission To Axle	9 C

Main Control Valve	
Make	HydroControl
Type	2 Spool Sectional
Model	HC-D25

Steering Valve	
Make	Dan Foss
Type	Orbital
Model	OSPB

Cylinder, Hydraulic - Lift	
Stroke	10.50 in.
Collapsed Length	19.87 in.
Extended Length	30.37 in.

Cylinder, Hydraulic - Steering	
Type	Double Acting
Bore Dia	4.00 in.
Rod Dia	2.00 in.
Stroke	9.813 in.
Collapsed Length	18.063 in.
Extended Length	27.875 in.

Filter, Hydraulic - Return Flow	
Make	Fairey Arlon
Filtration	10 micron
Type	Glass Media
Element	Replacement Element

Filter, Hydraulic - High Pressure	
Make	Fairey Arlon
Filtration	10 micron absolute
Type	Glass Media
Element	Replacement Element

Hydraulic Pump #1 (Steering/Imp)	
Make	Vicker
Type	Vane
Model	35VQ
Rated Flow @ 1800 RPM	45 GPM

Hydraulic Pump #2 (Implement)	
Make	Geartek
Type	Gear
Model	DB20L
Rated Flow @ 1800 RPM	28 GPM

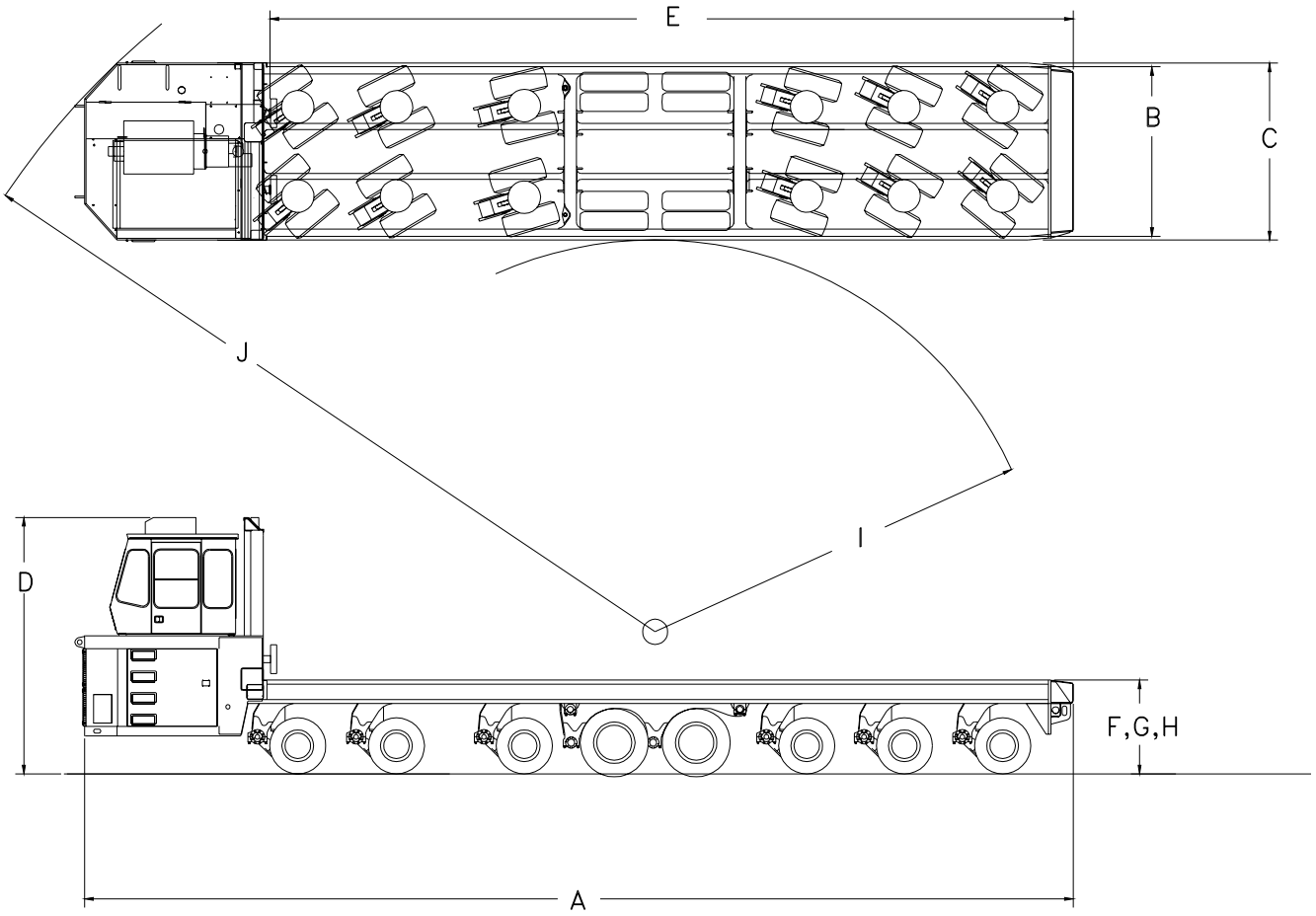
Hydraulic Pump #3 (Pilot)	
Make	Parker
Type	Gear
Model	PGP
Rated Flow @ 1800 RPM	3 GPM

Brakes - Drive Axle	
Make	CLARK
Type	Air Brake
Style	Hub Mounted, Cam operated Drum
Size	16.5x7(.3 lining)
Air Chamber Size	36 in. Max

Tank - Fuel	
Capacity	85 Gallons
Level Indicator	Sight Gauge and Gauge in Cab

Tank - Hydraulic	
Capacity	110 Gallons
Level Indicator	Sight Gauge

Tires
Drive ..... (8) 10:00 X 20 NHS Wide Wall Hauler-LT 16 Ply *
Steer ..... (24) 35 X 15-15 NHS Deep Mine Lug-24 Ply *
* @ 150 psi - Foam Filled



Physical Dimensions

A.	Overall Length	51’-9”
B.	Width Deck	106.5”
C.	Width Overall	111”
D.	Overall Height Elevated	170”
E.	Platform Length	518”
F.	Platform Lowered	47”
G.	Platform Ride Height	60.5”
H.	Platform Travel	20”
I.	Turning Radius Inner	240”
J.	Turning Radius Outer	480”

Weights

Gross Vehicle Weight	474000 Lbs.	237 Tons
Payload Capacity (including pallet)	370000 Lbs.	185 Tons
Tare Weight	104000 Lbs.	52 Tons
Axle Line Loaded	59250 Lbs.	29.6 Tons
Tire Loading/Tire	14812 Lbs.	7.4 Tons

Lubricants and Capacities

System and Tank Capacities

Engine Crankcase ..... 10.2 U.S. Gallon (37.3 liters)
Cooling System ..... 19 U.S. Gallon (72 liters)
Transmission/Converter ..... 19 U.S Gallon (72 liters)
Axle - Differential ..... 35 U.S Gallon (16.6 liters)
Axle - Planetary Hubs (each) ..... 16 U.S Gallon (7.6 liters)
Hydraulic Tank ..... 110 U.S. Gallon (416 liters)
Fuel Tank ..... 85 U.S. Gallon (321 liters)

Recommended Lubricant Specifications Table

Engine

Prevailing Ambient Temperature	Fluid to be Used
Cummins	**MIL-L-2104D**
-13°F (-25°C) to 95°F (35°C)	SAE 10W-30
14°F (-10°C) and above	SAE 15W-40
32°F (0°C) and above	SAE 20W-40

Transmission/Coverter Hydraulic System

Prevailing Ambient Temperature	Fluid to be Used
	MIL-L-2104E
30°F (-1°C) and above	SAE 30 Transmission Fluid
-10°F (-23°C) and above	SAE 10W Transmission Fluid
-30°F (-34°C) and above	SAE 80W-90 Transmission Fluid
-65°F (-55°C) to 0°F (-18°C)	MIL-L-46167
All	Grade 10 TYPE C-2 - C-3

Axle

Prevailing Ambient Temperature	Fluid to be Used
	MIL-L-2105C
-40°F (-40°C) to -10°F (-23°C)	SAE 75W
-40°F (-43°C) to 0°F (-18°C)	SAE 75W-80
-13°F (-34°C) to 100°F (37°C)	SAE 80W-90
10°F (-12°C) above	SAE 85W-140

Chassis and Driveshaft Lubrication

Prevailing Ambient Temperature	Fluid to be Used
0°F (-18°C) and above	NLGI Grade 2 Lithium Base Extreme Pressure Multi-purpose Grease.
-25°F (-32°C)	NLGI Grade 0 Lithium Base Extreme Pressure Multi-purpose Grease.

Brakes

Prevailing Ambient Temperature	Fluid to be Used
All	D.O.T. #3 Brake Fluid

Main Hydraulic System

Prevailing Ambient Temperature	Fluid to be Used
All	Mobil DTE 13M

Fuel Specifications

Prevailing Ambient Temperature	Fluid to be Used
All	No. 2 Diesel

Note:

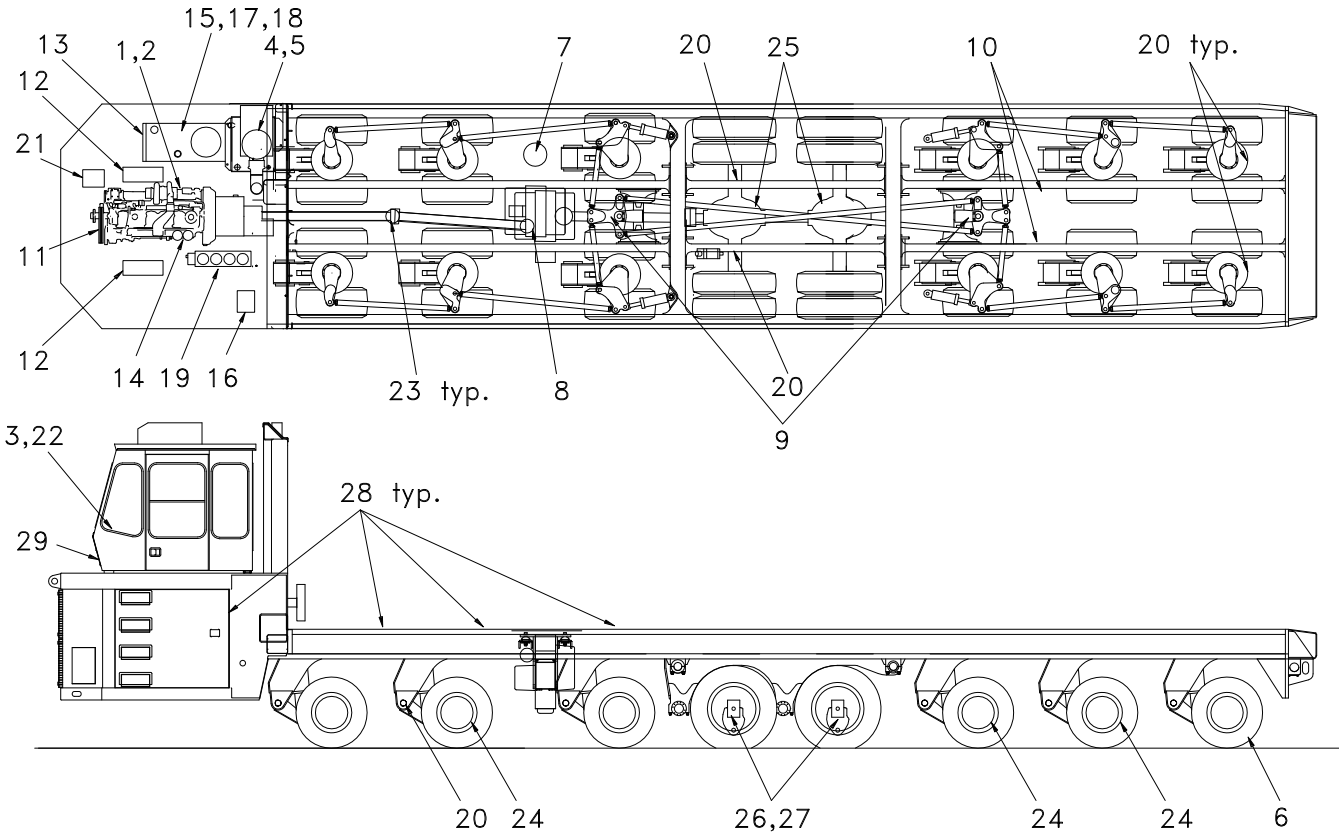
Hydraulic Fluid must be kept clean. Any fluid added to the reservoir must be filtered through a 10 Micron screen. It is important to service filters and breathers at the correct hourly intervals.

Anytime oil is added to top off the fluid level, the same oil as is already in the system must be used. If the same fluid is not available, another approved fluid can be added if the fluid is supplied by the same manufacturer and the amount added is not greater than 50% of the system capacity. If these conditions can not be met, the system must be drained completely and refilled.

When the fluid is changed because of ambient temperature, the system must be drained and the fluid replaced.

Because of the many types and brands of fluids that 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. It is important to change fluids and filter elements at the intervals specified in this manual.

Lubrication and Maintenance Checkpoints



Checkpoint		Interval	Checkpoint		Interval
1	Engine Oil Filter	Daily	**15**	Hydraulic return filter gauge	Daily
2	Engine Oil Level Dipstick	Daily	**17**	Hydraulic tank breather	Every 150 Hours
3	Fuel level gauge/sight gauge	Daily	**19**	Hydraulic pressure filters	Every 1000 Hours
4	Engine air cleaner (restriction/leaks)	Daily	**20**	Lubrication points	Every 250 Hours
5	Engine pre-cleaner	Daily	**21**	Cooling system (level, leaks)	Daily
6	Condition of wheels and tires	Daily	**22**	Gauges and indicators (acceptable readings)	Daily
7	Transmission filter	Every 500 Hours	**23**	Driveline lube points	Every 50 Hours
8	Transmission oil level	Daily	**24**	Brake calipers (pads, disks, and lines)	Every 250 Hours
9	Steering idler pivot lube points	Every 250 Hours	**25**	Differential oil level (2 places)	Every 250 Hours
10	Air/hydraulic brake actuator fluid level	Daily	**26**	Planetary axle housing oil level (4 places)	Every 250 Hours
11	Engine belts (condition and tension)	Daily	**27**	Drive axles - slack adjuster and cam bushing lube points	Every 250 Hours
12	Batteries	Every 250 Hours	**28**	Engine, deck an dframe access door hinges (10 places)	Every 500 Hours
13	Hydraulic Oil level sight gauge	Daily	**29**	Steering column u-joints and slip (6 places)	Every 2500 Hours
14	Engine Fuel Filters	Every 250 Hours			

Inspection, Maintenance and Lubrication Instructions

Drivetrain/Engine

For complete service, maintenance, trouble shooting and warrenty information for the drivetrain components consult the manufactures handbook included in this manual.

Suspension

General

Proper maintenance and lubrication at regular intervals will assure good performance optimizing the service life of each component. Lubrication, service intervals and service life will vary depending on usage and road conditions

It is recommended that grease points be lubricated every 250 hours unless indicated otherwise. This equates to twice monthly.

Elevating individual axles can be accomplished by lowering machine - turning cylinder ball valve to the closed position - elevating machine.

Tires should be kept within 1 inch (25mm) diameter of each other within any axle set.

New Units

When new axles are placed in service, it is important that wheel nuts are checked and tightened after the first 2 hours of operation.

Wheel bearing temperature should be checked after five hours of continuous operation, by placing your hand on the outside of the wheel hub. A comparison between hubs should be equal. If a hub is found to be considerably warmer than the rest, the wheelbearings should be inspected or proper pre-load and lubricant.

Knee joint connections house journal bearings and should be lubricated after 24 hours of operation. Inspect and adjust following the procedure described later in this section.

The lower arm axle connection should be retorqued after 24 hours of operation to approximately 400 lb/ft or until the axle cannot be rotated over lower arm trunion. Elevate axle to do this - axle must be parallel to the deck, i.e. neutral position, BEFORE torquing.

Steer Suspension

⚠ WARNING

Warning: 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.

Wheel bearings and hubs should be cleaned and repacked at 5,000 hour intervals or yearly. To lubricate wheel bearings, jack up axle sufficiently for wheels to clear ground. Remove hub cap, spindle nuts, and disc brake calipers. Pull hub and rotor assembly forward until it is free from the axle spindle. Remove inner bearings from spindle and inspect grease retainer to see that seal ring is free. Clean bearings, very thoroughly, with cleaning solvent (mineral spirits), and dry the bearings. Inspect bearings for pits, chipping or wear; replace if necessary. Inspect brake rotors for scoring. If rotors are scored, they must be turned smooth or replaced. Inspect calipers and lines for leaks. Replace calipers and repair lines as necessary. inspect brake lining for wear. Replace if necessary.

Bearings should be re-packed with wheel bearing grease suitable for prevailing temperatures. (see Lubrication Spec Table) In packing bearings, the lubricant must be packed carefully between the rollers, by hand or with a packer, and must not be just spread on the outside. Care must be exercised to see that dirt, grit, lint, or other contaminants do not get into the bearings.

Remove all old grease from inside hub and wash with cleaning solvent (mineral spirits), and dry thoroughly. Inspect cups for wear, pits or scratches; If any of this is evident, replace the cups. Fill the space in the hub between the two bearing cups with grease.

Remove all old grease from the axle spindle with cleaning solvent (mineral spirits). After drying, spread a thin coat of grease over spindle.

When reassembling, care should be taken to see that the inner bearing is properly seated. Slide the hub and rotor assembly onto axle spindle and push into position. Be sure to support properly so as to avoid damaging spindle threads. Install outer bearing, spindle nuts, and hub cap.

To adjust bearings, tighten the spindle nut and turn hub and rotor assembly to assure proper seating of bearings. The bearings should be adjusted in accordance with procedure listed below:

1. Assemble bearings, new seal, and hub, on axle spindle.
2. Install inner bearing adjustment nut on spindle with dowel facing out.
3. Tighten to 50 lb/ft torque (68 N. M) while rotating hub back and forth.
4. Back off adjusting nut: 1/3 turn (120 degrees).
5. Install nut retainer (perforated washer) reverse retainer, if necessary to engage dowel adjusting nut.
6. Install jam nut and tighten to 350 lb/ft. (475 N. M).
7. Install hub cap gasket and hub cap.

Lining Replacement

At regular intervals, depending on usage and road conditions, it is necessary to inspect brake lining for wear. The thickness of the block, when new, is 5/16 inch (8mm) and
can be worn down to within 1/1 6 inch (1.5mm) of the rivet heads, or approximately 5/32 inches (4mm).

Turntable Bearing

Bearing should be lubricated every 250 hours. There is 6 lube points located around the inside circumference. Lubricant is delivered to all points via a grease distributor
block located within the turntable well.

Elevating Cylinder

Bearings should be lubricated every 250 hours. There are 2 lube points - upper and lower bearings.

Knee Joint

Knee joint journal bearings should be lubricated every 250 hours. There are two lube points - inside and outside at the knee joint.

The journal bearings should be inspected for wear every 2500 hours. Relieve weight from axles. Elevate axle and push lower arm side to side or with a fore - aft rocking motion of the tires feel for any play between the turntable and the lower arm.

Axle Connection

The axle connection should be checked and adjusted as required every 1000 hours. The axle connection is a non lubricated connection. It functions by the deflection of the compressed polyurethane bushing.

Elevate axle (axle must be parallel to the deck), i.e. neutral position and then torque the lower arm axle connection to approximately 400 lb/ft or until the axle cannot be rotated over lower arm trunion.

Drive Suspension

General

The drive axles and suspension are housed within an isolated module. The connenction between the main frame and the drive module is accomplished by means of four steel encased rubber bushings, coupling with a standard axle hanger arrangement.

The axle connection is a non lubricated connection. To inspect bushings place a tapered end bar between the main frame and drive frame close to the hanger-bushing arrangement and pry down to see if play exists. Visually inspect for collapsed or extruded rubber or wear/defects in the hanger.

Elevating Cylinder

Bearings should be lubricated every 250 hours. There are 2 lube points - upper and lower bearings.

Knee Joint

Knee joint journal bearings should be lubricated every 250 hours. There are two lube points - inside and outside at the knee joint.

The journal bearings should be inspected for wear every 2500 hours. Relieve weight from axles. Elevate axle and push lower arm side to side or with a fore - aft rocking motion of the tires feel for any play between the turntable and the lower arm.

Axle Connection

Bearings should be lubricated every 250 hours. There are 2 lube points - upper and lower bearings.

The axle connection should be checked and adjusted as required every 1000 hours. The axle connection is a non lubricated connection. It functions by the deflection of the compressed polyurethane bushing.

Torque Arms

The torque arm tapered ball sockets are permantly sealed and do not require additional lubrication. With brakes applied and engine running, (approx. 1000

rpm) put the machine into forward then reverse gear. Watch for movement or play within the ball socket and within the taper of the mounting bracket. Replace worn parts. Before dismantling torque arm, measure the length center to center. Re-assemble to the same length.

Drive Axles

See Clark-Hurth service manuals included in this manual.

Daily Service Check List

10 HOURS OR DAILY

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, are fins clean and unobstructed?)			
5	Air Cleaner (Check indicator, clean or change element, empty dust cup)			
6	Engine Belts (Check for adjustment and wear)			
7	Air Tanks (Check drain valves for correct operation)			
8	Wheels and Tires (Check condition and pressure)			
9	Hydraulic Brake Fluid (Check fluid level)			

After Engine Startup, Check the Following				
Item		**OK**	**No**	**Add**
1	Engine (Does it sound normal?)			
2	Air Intake System (Check for leaks and damage)			
3	Exhaust System (Check for leaks and excessive smoke)			
4	Instruments and Controls (Check for normal operatoin and readings)			
5	Transmission (Check oil level at operating temperature, check for leaks)			
6	Lights and Back-up Horn (Check operation)			

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_____

Service Maintenance Check Lists

50 HOURS OR WEEKLY

1	Repeat Previous Intervals	OK_____	NO_____
2	Lubricate Drive Shaft	OK_____	NO_____
3	Check for fluid leaks - (oil, fuel and water)	OK_____	Repair_____
4	Check brakes for adjustment and wear	OK_____	Repair_____
5	Check wheel lug nuts and studs mechanically	OK_____	Repair_____
6	Record engine RPM	High_____	Stall_____
7	Empty dust bowl on air filter	OK_____	NO_____
8	Check for structural damage (bending, cracking & broken welds)	OK_____	Repair_____

250 HOURS OR MONTHLY

1	Repeat Previous Intervals	OK_____	NO_____
2	Lubricate service points per lube chart	OK_____	NO_____
3	Take engine oil sample for analysis*	OK_____	NO_____
4	Change engine oil and filter*	OK_____	NO_____
5	Check axle differential oil level	OK_____	Add_____
6	Check axle planetary oil level	OK_____	Add_____
7	Change cooling system filter	OK_____	NO_____
8	Check all hydraulic pressures and record	OK_____	NO_____
9	Check fire suppression actuator	OK_____	Repair_____
10	Check disk brake calipers. pads, rotors and lines	OK_____	Repair_____
11	Check and adjust the parking brake	OK_____	NO_____
12	Check battery electrolyte level	OK_____	Add_____

* 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.

Service Maintenance Check Lists

500 HOURS OR QUARTERLY

1	Repeat Previous Intervals	OK_____	NO_____
2	Take samples from transmission, axles, and hydraulic system for analysis*	OK_____	NO_____
3	Drain and refill transmission, change filter*	OK_____	NO_____
4	Service fuel filters*	OK_____	NO_____
5	Service hydraulic filters*	OK_____	NO_____
6	Lubricate engine and frame access doors	OK_____	NO_____
7	Inspect steering linkage and idlers	OK_____	Repair_____
8	Inspect brake system and components	OK_____	Repair_____

1000 HOURS OR SEMI-ANNUALLY

1	Repeat Previous Intervals	OK_____	NO_____
2	Change hydraulic oil and filters *	OK_____	NO_____
3	Clean and flush cooling system	OK_____	NO_____
4	Check pins and bushings for wear	OK_____	Repair_____

2500 HOURS OR ANNUALLY

1	Repeat Previous Intervals	OK_____	NO_____
2	Drain, flush and refill differentials *	OK_____	NO_____
3	Drain, flush and refill planetaries *	OK_____	NO_____
4	Check and recharge accumulators, record pressure	OK_____	NO_____
5	Replace hoses as required, steam clean engine, tighten mounting bolts and turbocharger mounting bolts	OK_____	Repair_____
6	Drain hydraulic tank, flush tank and refill	OK_____	NO_____
7	Lubricate steering column	OK_____	NO_____
8	Inspect Knee joints	OK_____	Repair_____

* 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.

Detail of Repairs

Problem: _____
_____
_____
_____
_____

Parts:_____
_____
_____
_____
_____
_____
_

Mechanic:_____Hours Labor:_____

Operator:_____ Supervisor:_____

Machine Model:_____ Equipment No:_____

Date:_____ Shift:_____ Hour Meter:_____

Maintenance Schedule Summary

Component	24 Hours	50 Hours	150 Hours	250 Hours	500 Hours	1000 Hours	1500 Hours	2500 Hours	5000 Hours	6000 Hours
Engine:	* Check operators report. * Check levels (oil/coolant) if make-up coolant is required, DCA4 concentration must be checked. * Visually inspect engine for damage, leaks, loose or frayed belts and listen for unusual noises. * Drain water/sediment from fuel tanks and fuel filters. * Check/Clean air cleaner, precleaner and dust pan.		* Check air cleaner piping, hoses, and clamps. * Check restriction indicator. * Clean/Change air cleaner element * Drain	* Change engine oil * Change filters: Oil full flow Oil By-Pass Fuel filter Water Filter * Clean/Change crankcase breather * Air Compressor air filter * Oil Sample			* Adjust valves and injectors	* Replace hoses as required * Check Batteries * Steam Clean engine * Tighten mounting bolts * Check turbo-charger mounting bolts		* Clean and flush cooling system * Clean and calibrate injectors and fuel pump * Inspect: Turbo-charger Vibration damper Air Compressor Fan Hub Idler Pulley Water Pump
Transmission and Torque Converter:	* Check oil level with engine running at idle & oil temperature at 180 - 200°F (65-93°C)				* Change oil filter	* Drain and refill system. Drain with oil temperature at 180-200°F (63-93°C)				
Drive Axles:		* Lube drive shaft * Adjust brakes		* Check levels	* Oil sample			* Drain and refill system		
Hydraulics:	* Check fluid levels * Inspect for leaks * Check PDI visual indicators and temperature gauge		* Replace breather element * Oil sample if last test was above required cleanliness levels		* Oil sample	* Replace oil filter elements * Check and record pressure settings			* Drain hydraulic fluid tank, clean tank and replace fluid	
Chassis:	* Daily inspection - per chart New Vehicle Adjustments: * Brake calipers * Wheel bearings * Axle pivot * Wheel nuts at 2 hours and every 50 hours			* Lubricate and inspect per chart	* Lubricate engine access doors * Inspect steering linkage and idlers * Inspect knee joints	* Retorque axle connection drive pin		* Lubricate steering column U-joint and slip * Check accumulator charge * Inspect / Service knee joints	* Inspect and service steering axles * Inspect steering idlers	* Replace steering idler bearings

Operator Troubleshooting

The following tables list 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 and lines, clean strainers, 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, fill as needed
Engine oil pressure low	Low oil level	Check oil level
	Oil leaks	Tighten connections
	Contaminated oil	Change oil and filters

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)

* Also refer to the manufacturer's Operation and Maintenance Manual for additional information.

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 due to insufficient oil	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

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