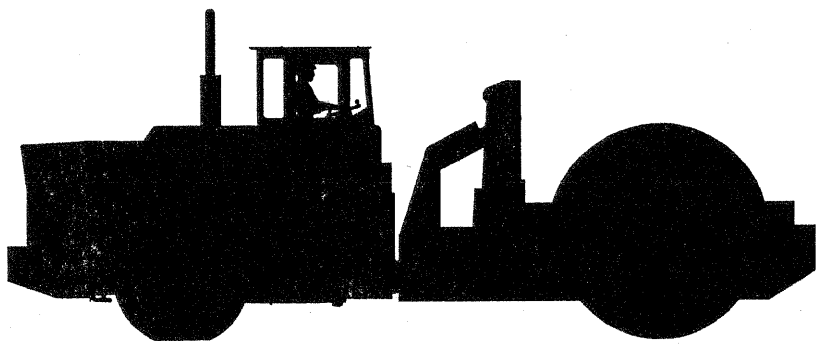
Operator's Manual

CP160

Coil Packer



Serial Number: _____

(Record Serial Number Here)

Allied Systems COMPANY

80-647 (10/00) 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.

CP160 Coil Packer Operator's Manual

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General Information

1.1 Introduction

This manual is your guide to correct operation and maintenance of the CP160 Coil Packer. Become familiar with it, understand it, and use it. Read this manual carefully prior to operation and before performing maintenance on your machine. It will help you to understand the unit, its capabilities and its limitations.

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

If you require information not found in this manual, please contact the factory at:

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

1.2 Intended Use Statement

This machine is designed for the transporting of sheet metal coils. 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 also constitute essential elements of inteded use.

For maximum safety and efficiency, the Coil Packer 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 of liability resulting from damage or injury.

1.3 Unit Identification

The Coil Packer's model and serial number plates are fastened to the the right side of the cab superstructure. Always have model and serial numbers available when requesting parts, service or operation information. Record the unit serial number on the front cover of this manual.

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

1.4 Specifications

Engine

Make and Model ..... Caterpillar 3406E
Max Horsepower ..... 360 @ 2100 RPM
Max Torque ..... 1080 Ft-Lbs @ 1400 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 8000 Series, Stall Ratio 2.54:1

Transmission

Clark 6000 Series Power Shift; 4 Speeds Fwd/Rev

Speeds:	Unloaded	Loaded
	3.3 mph (5.3 km/h)	3.3 mph (5.3 km/h)
	5.9 mph (9.5 km/h)	5.9 mph (9.5 km/h)
	10.5 mph (16.8 km/h)	10.0 mph (16.0 km/h)
	18.9 mph (30.6 km/h)	13.6 mph (21.8 km/h)

Axles

Fabricated Housing ..... Allied Wagner
Make ..... Clark 25D Wheel Ends
Model (Chassis) ..... 21D4354 with Posi-Torque
Type ..... Planetary
Brakes (Chassis) ..... Wet Disc
Brakes (Bogie) ..... Hydraulic Disc

Tires

Front ..... 30.00 x 51 Radial
Rear ..... 29.5 x 29 Radial

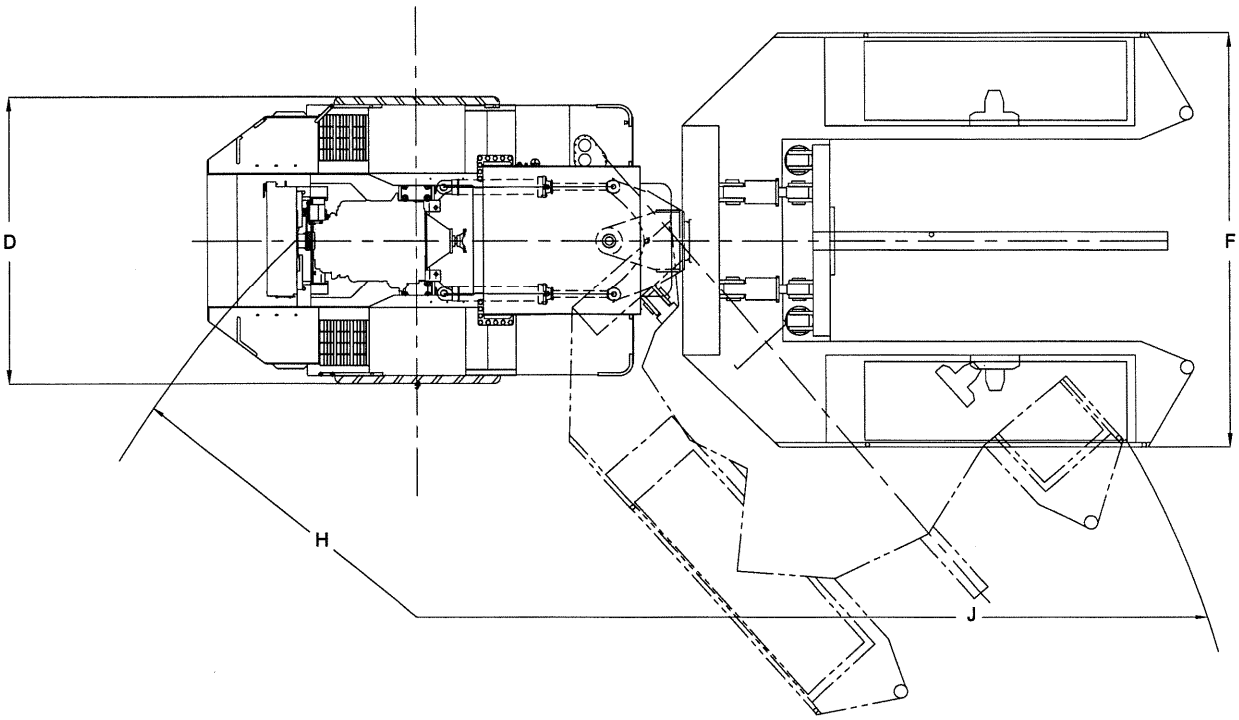
Hydraulic System

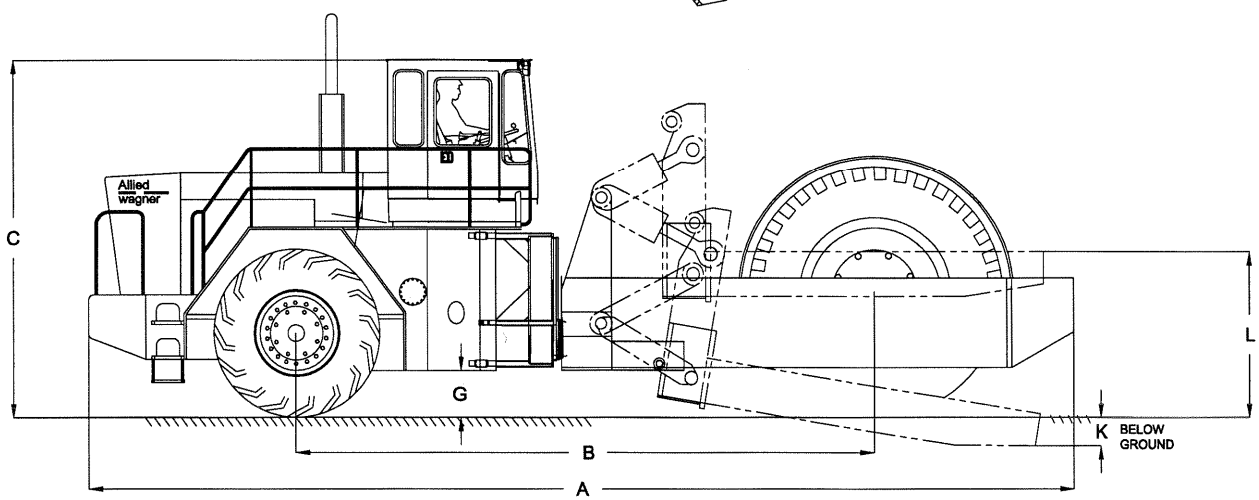
Steering Pump ..... 70 gpm
Implement Pump ..... 50 gpm
Tilt Cylinder (2) ..... 11" X 15.25" (279mm x 387mm)
Hoist Cylinder (2) ..... 8" x 44" (203mm x 1118mm)
Steering Cylinder (2) ..... 6" x 32" (127mm x 613mm)

Service Refill Capacities

Fuel Tank ..... 295 Gals (116 liters)
Hydraulic Oil ..... 160 Gals (604 liters)
Crankcase w/Filter ..... 11 Gals (41 liters)
Cooling System ..... 14.5 Gals (55 liters)

1.5 Dimensions





Dimensions (approximate)

A. Overall Length ..... 36' 7" (11,151mm)
B. Wheelbase ..... 21' 7" (6579mm)
C. Cab Height ..... 13' 4" (4064mm)
D. Outside Chassis Width (Tires) ..... 10' 10" (3302mm)
F. Outside Bogie Width ..... 15' 4" (4674mm)
G. Ground Clearance (Chassis) ..... 1' 9" (533mm)
H. Turning Radius - Centerline Machine ..... 22' 8" (6909mm)
J. Outside Turning Radius ..... 31' 9" (9677mm)
K. Probe Lowered Position (Below Ground) ..... 9" (228mm)
L. Probe Height (Raised) ..... 5' 4" (1626mm)

Weights and Functions (approximate)

Unit Weight	110,000 lbs	(49,896 kg)
Bogie End	61,000 lbs	(27,670 kg)
Chassis End	49,000 lbs	(22,226 kg)
Articulation		48° each way
Oscillation		15° each way

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Safety Summary

2.1 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 CP160 Coil Packer. 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.

2.2 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.

2.3 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 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.**

2.4 Maintenance Warnings

Maintenance, lubrication and repair of this machine can be dangerous unless performed properly. Each person must be satistifed that he has the necessary skills, information, 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. Support vehicle on certified safety stands at the four corners.
2. Stop the engine.
3. Make sure the start switch key is off and remove the key.

NOTE: Please be advised that the following Safety Procedures are intended to complement 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.
- It is essential to personnel safety that safe ladders,

personnel lifts and/or scaffolding be used while servicing the machine. Always use safety tread walks and handholds to reach lubrication points or to inspect or adjust the machine. Many areas on the machine can be dangerously slick in wet, frosty or oily conditions.

- 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.
- Perform all maintenance and lubrication procedures with the machine on level ground, parked away from traffic lanes.
- 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.
- 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 containers only. Never put maintenance fluids into glass containers.
- Report all needed repairs.
- Do not allow unauthorized personnel on the machine.
- Make sure all clamps, guards and heat shields are installed correctly to prevent vibration, friction against other parts and excessive heat during operation.
- Always have the supplied fire extinguisher on the machine and know how to use it. Inspect it 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 the hydraulic system to hold vehicle up. Vehicle can lower if a manual control is moved, or if a hydraulic line breaks. 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.

⚠ 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.
- Chips or other debris can fly off objects when struck, as can pins and retainer bolts. 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 piece 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 on 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.

! CAUTION !

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

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Instruments and Controls

3.1 General

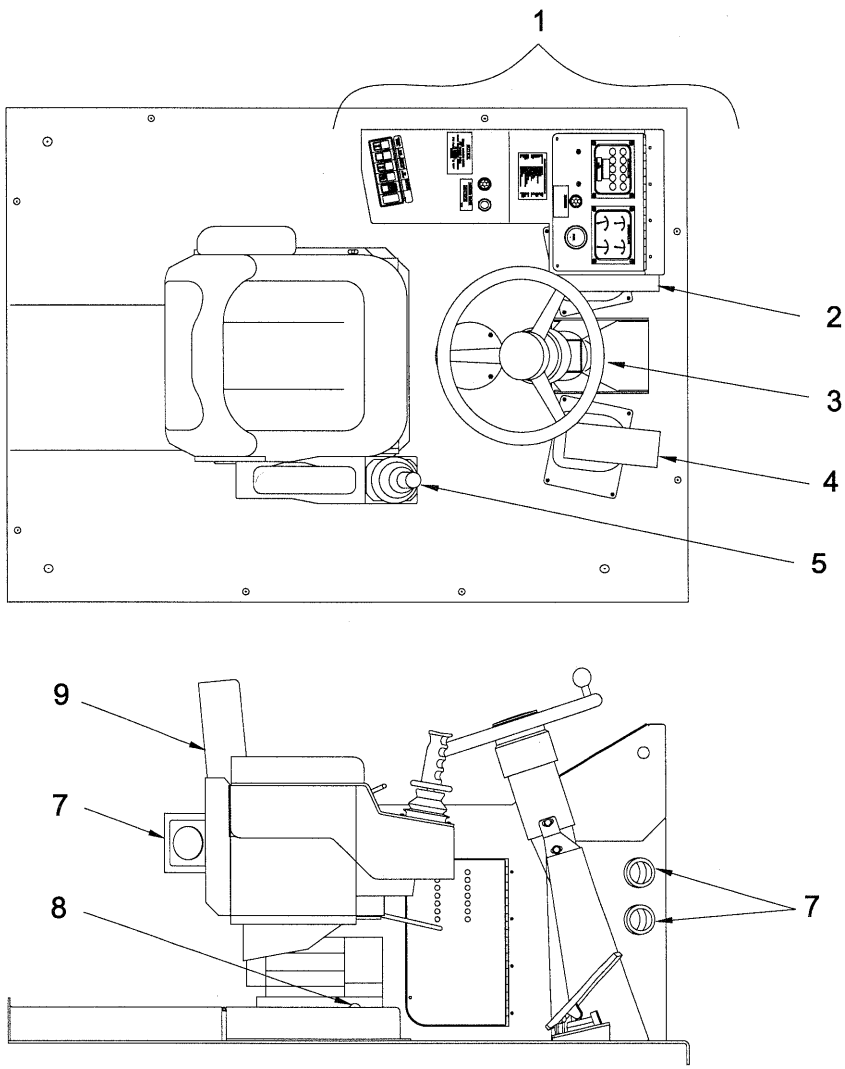
Become thoroughly familiar with the location and use of all instruments before operating the machine. Check all instruments immediately upon starting, again after reaching operating temperature, and frequently during operation. If any instrument does not operate properly, stop the engine and correct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

3.2 Operator's Platform

Most of the important controls and indicators are located on the operator's platform in the cab. Refer to Figure 3-1.

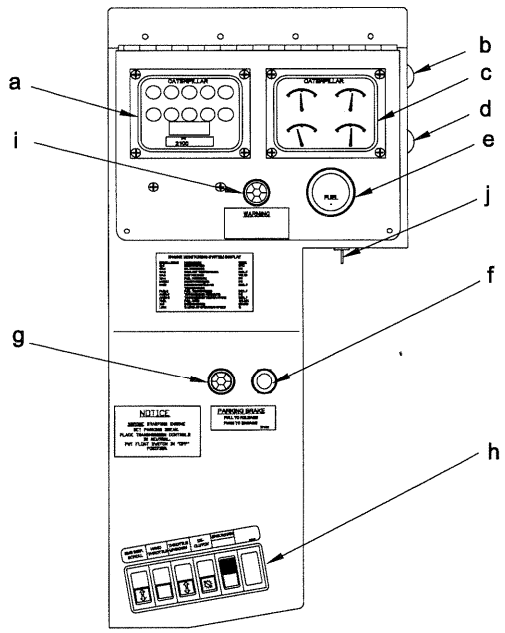
1. Instrument Panel (Refer to Figure 3-2)

The Instrument Panel on the Coil Packer consists of the following controls and indicators:



1. Instrument Panel
2. Brake Pedal
3. Steering Column
4. Accelerator Pedal
5. Joystick Controller
7. Air Conditioner/Heater
8. Battery Disconnect Switch
9. Seat

Figure 3-1: Operator's Platform



a.	Engine Monitoring System	f.	Parking Brake
b.	Engine Warning Bell	g.	Parking Brake Indicator Light
c.	Gauge Display	h.	Control Switches
d.	Low Brake Pressure Warning Buzzer	i.	Low Brake Pressure Warning Light
e.	Fuel Gauge	j.	Key Switch (Ignition)

Figure 3-2: Instrument Panel

a. The Engine Monitoring System (EMS)

The electronically controlled engine in your Coil Packer includes an Electronic Monitoring System (EMS) that monitors and processes engine operating parameters and diagnostic information. Information is displayed on the EMS display. See Figure 3-4.

Warning Lights

The EMS display includes ten warning lights; please refer to Figure 3-4. These lights alert you to problems with your engine, torque converter or transmission. If one of these warning lights comes on, stop operating the machine and notify your local Caterpillar dealer or Allied Systems Company.

⚠ CAUTION

CAUTION: Failure to stop operating your machine after one of the warning lights comes on may result in damage to the engine, torque converter and/or transmission.

Warning lights indicate the following:

- High Engine Coolant Temperature
- High Inlet Air Manifold Temperature
- High Fuel Temperature
- Low Battery Voltage
- High Transmission Oil Temperature
- Low Engine Oil Pressure
- Low Fuel Pressure
- Low Engine Coolant Level
- Engine Derate
- High Transmission Oil Pressure

The Liquid Crystal Display (LCD)

The LCD displays monitored engine and transmission parameters. Each parameter is named in bold in the list bleow. Monitored parameters displayed on the LCD include:

SPd	Engine Speed measured in rpm.
GA-1	Engine Oil Pressure measured in psi.
GA-2	Engine Coolant Temperature measured in °F
GA-3	Voltage condition of electrical system measured in volts
GA-4	Fuel Pressure measured in psi
bOOSE	Turbo Boost Pressure measured in psi
IA IR E	Intake Manifold Air Temperature measured in °F
FUEL E	Fuel Temperature measured in °F
ACCR P	Transmission Oil Pressure measured in psi
ACCR E	Transmission Oil Temperature measured in °F
FUEL	Estimated Fuel Consumption rate measured in gallons/hour
HrS	Engine Hourmeter measured in hours
LOAd	%Load on engine at operating speed

Only one parameter can be displayed at one time on the LCD. Depress and hold the EMS button (Refer to Figure 3-3) located on the control switch section of the instrument panel (Item h in Figure 3-2) to toggle between displayed parameters.

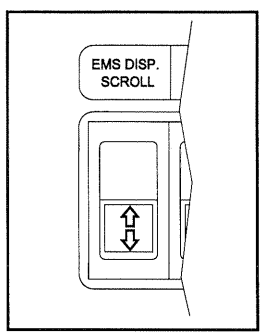


Figure 3-3: EMS Switch

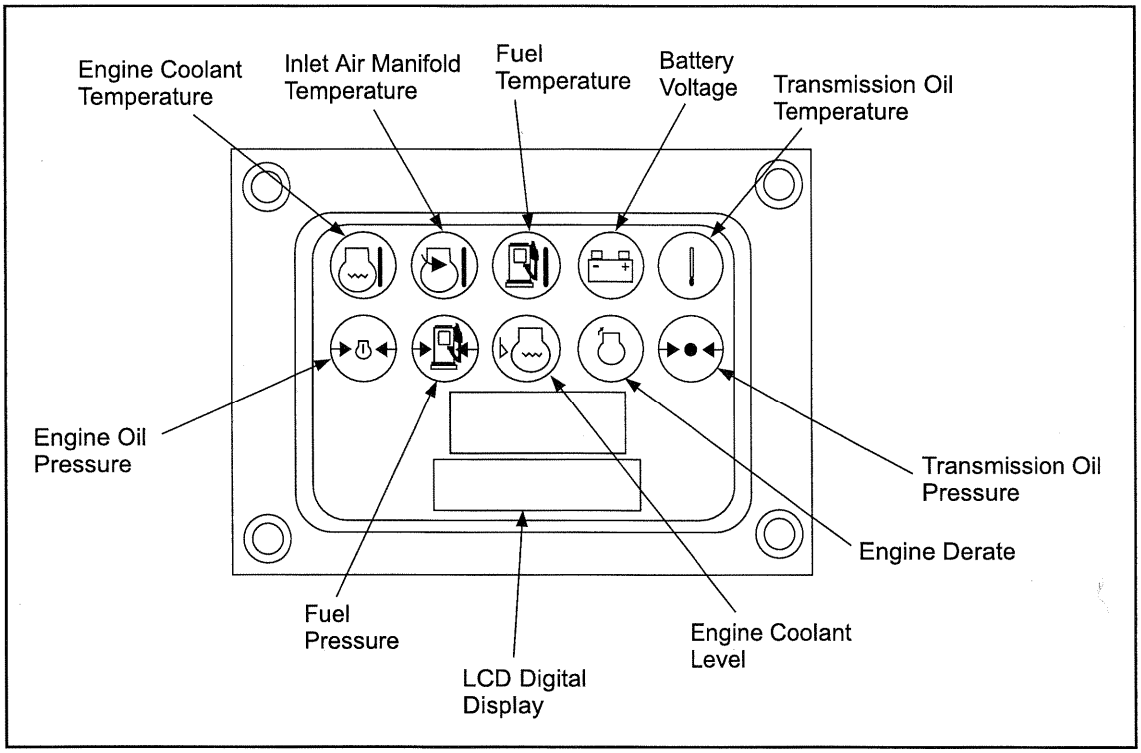


Figure 3-4: Engine Monitoring System (EMS) Display

Electronic Hand Throttle

Your Coil Packer's hand throttle is composed of two switces. See Figure 3-5.

Use the left switch to turn the hand throttle on and off. Rock and hold the right switch forward to increase the engine speed. Rock and hold the right switch backward to decrease the engine speed.

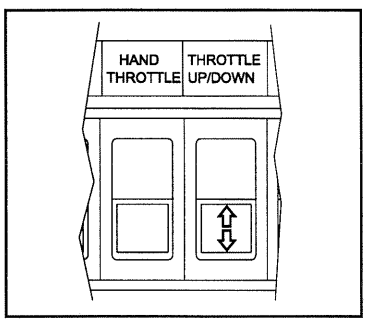


Figure 3-5: Hand Throttle

b. Engine Warning Bell

This warning bell comes on whenever engine oil pressure drops below a safe operating level or when engine temperature is excessive. On some models, the engine will shut down automatically if the problem continues.

The bell is activated only if the ignition switch is turned to ON. It also sounds briefly when the engine starts up. This ensures that the system is working.

c. Gauge Display

These are the gauges that monitor the various levels needed for safe operation of your machine. Refer to Figure 3-6.

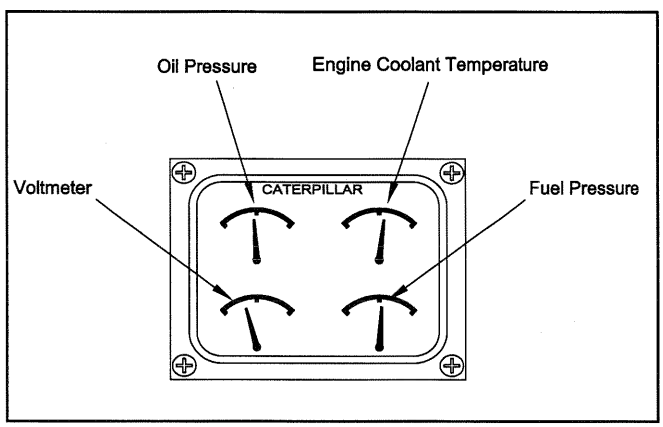


Figure 3-6: Gauge Display

Oil Pressure

Determines only the pressure of the oil in the system, not the amount. Should this pressure drop into the red area to the left of the gauge during operation, **stop the engine immediately and determine the cause.**

Engine Coolant Temperature

Displays engine coolant temperature. If the temperature holds steady at in the red area to the right of the

gauge, discontinue operation, allow the engine to idle for 3 to 5 minutes, then shut it down. Determine the cause before continuing operation. If a coolant hose failure occurs, shut the engine down immediately.

Fuel Pressure
Determines the pressure of the fuel, not the amount. Should this pressure drop into the red area to the left of the gauge during operation, **stop the engine immediately and determine the cause.**

Voltmeter
Indicates the voltage condition of the electrical system, i.e. whether the alternator is charging or not.

d. Low Brake Pressure Warning Buzzer
A warning buzzer sounds if the accumulators are under 1600 psi.

e. Fuel Level Gauge

f. Parking Brake
Refer to figure 3-1 for the parking brake location. Push the knob in to apply the parking brake and pull it out to release it.

g. Parking Brake Indicator Light
This light comes on when the key switch is on and the parking brake is engaged.

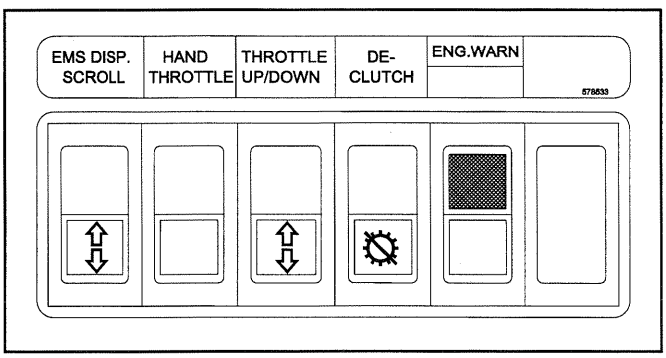


Figure 3-7: Control Switches

h. Control Switches (Refer to Figure 3-7)

EMS Display Scroll
Pressing on this button allows you to scroll through the parameters displayed on the LCD on the EMS display.

Hand Throttle
Use this switch to turn on the electronic hand throttle.

Throttle Up/Down
Rock switch forward and hold down to increase engine speed; rock switch backward and hold down to decrease engine speed.

Declutch
Turns the Declutch system ON or OFF. If the control is on, the system automatically shifts the transmission into neutral when you apply the brakes. This allows you to perform all hydraulic functions at any rpm smoothly, without causing converter stall or other unnecessary strains on the brakes or drivetrain components.

If downgrades are encountered, the control may be turned to the off position, and the transmission will remain in gear when the brakes are applied.

NOTE: This control should be left in the OFF position for normal operations.

Engine Warning Light
This light comes on whenever engine oil pressure drops below a safe operating level or when engine temperature is excessive. The light is also activated when the ignition switch is turned to on. This ensures that the system is working.

i. Low Brake Pressure Warning Light
This warning light comes on if the accumulators are under 1600 psi. It is normal for the light to come on when starting the machine, but it should go off in under 10 seconds. If the warning light stays on, there is a problem in the charge circuit and the system needs to be checked.

j. Key Switch (Ignition)
The key switch is used to start and stop the engine and to turn the accessories on and off. This switch has four positions: ACC, OFF, RUN and START.

When turning the key clockwise from the center (the OFF position), the first position to the right is RUN. The second position is START. The START position is spring-loaded, and will return the key to the RUN position when released. ACC is to the left of OFF; this position is used for accessories only.

2. Brake Pedal
Refer to Figure 3-1 for the location of the brake pedal. Will also declutch the transmission if the declutch switch is on.

3. Steering Column (Refer to Figure 3-8)
The steering column features the following controls:

- **Turn Signal**
- **Horn**

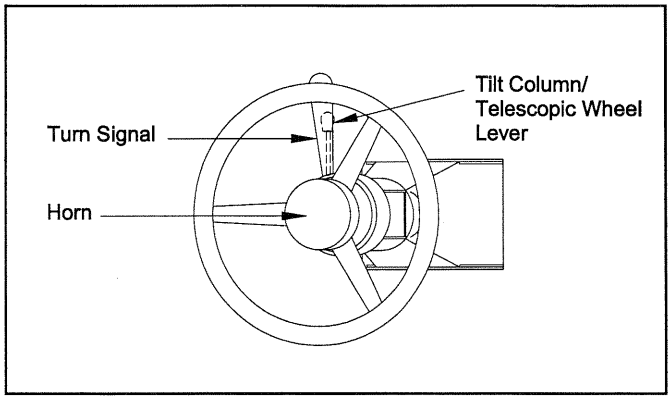


Figure 3-8: Steering Column

- **Tilt Column/Telescopic Wheel Lever**
  To tilt steering column, pull lever back. To move telescopic wheel in or out, push on the lever.

4. Accelerator Pedal (Refer to Figure 3-1)

5. Joystick Controller

This single-lever (mono-stick) joystick controls both hoist and tilt functions. Refer to Figure 3-9.

- Push the lever forward to lower the probe.
- Pull the lever back to raise the probe.
- Push the lever to the left to tilt the probe back.
- Push the lever to the right to tilt the probe out.

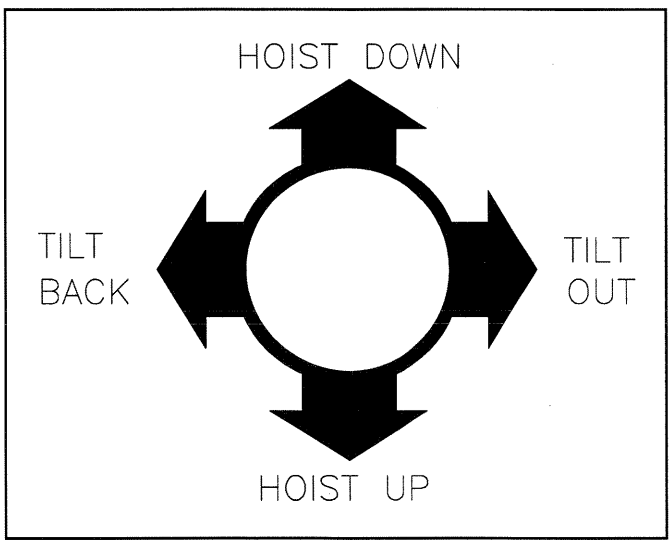


Figure 3-9: Joystick Control Functions

7. Air Conditioner

Please refer to Figure 3-10 for the air conditioner/heater switches and controls.

- **Fan Control**
  Use this to control the amount of air coming through the louvers. Has four positions: OFF through MAX.
- **Heater/Air Conditioner Selection**
  This switch has three positions: HEAT, OFF and A/C.
- **Air Temperature Control**
  Use this knob to adjust the air temperature range from COLD to HOT.
- **Louvers**
  Use these to adjust the direction of air flow.

8. Battery Disconnect Switch (Refer to Figure 3-1)

The battery disconnect switch is located beneath the seat to the right. This switch isolates the batteries from the electrical circuits and should be set to OFF when the machine is not in use, or during maintenance or repair to prevent unauthorized starting and electrical shorts. Turn the switch counter-clockwise to disconnect the battery.

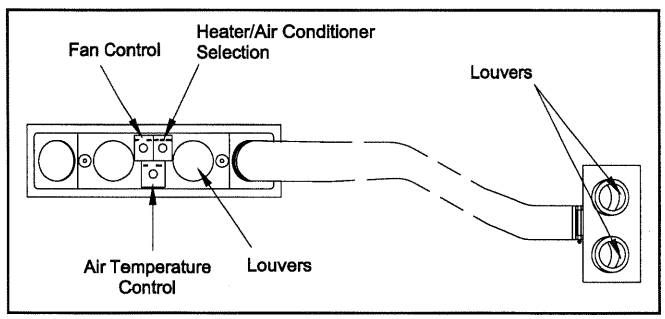


Figure 3-10: Air Conditioner/Heater Unit

⚠ CAUTION

CAUTION: If any arc welding is to be carried out on the machine's structure, it is extremely important that both disconnect switches be OFF. If the switches are left on, severe damage to the electrical circuit can result.

9. Seat (Refer to Figure 3-1)

The whole seat assembly can be rotated and moved forward and backward, while the seat itself can be moved relative to the armrests. These positions, in addition to the height of the seat, can be adjusted by using various levers located underneath the seat.

3-3 Overhead Controls

Besides the controls on the operator's platform, various switches and controls are located on a panel above the dash. Please refer to Figure 3-11.

NOTE: Phantom lines indicate optional items. Please refer to the machine master sheet for all the options installed on your model.

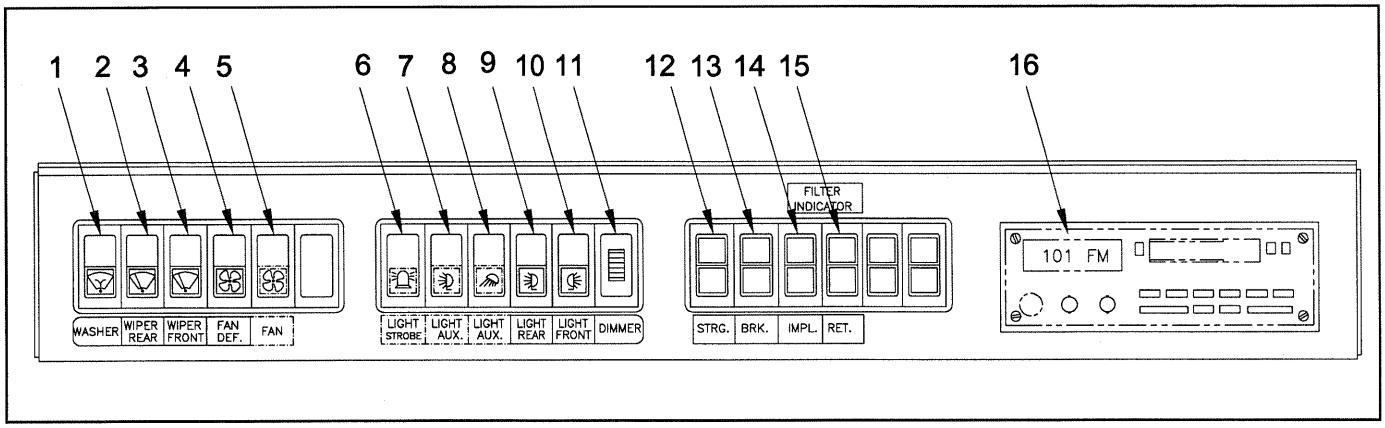


Figure 3-11: Overhead Panel

1. Windshield Washer Switch

2. Rear Windshield Wiper Switch

3. Front Windshelf Wiper Switch

4. Fan Defroster Switch

5. Fan Switch (For Window-Mounted Fan; Optional) Please note that a second switch is located on the fan itself.

6. Strobe Light Switch (Optional)

7. Rear Auxiliary Light Switch (Optional)

8. Top Auxiliary Light Switch (Optional)

9. Rear Light Switch

10. Front Light Switch

11. Panel Lights Dimmer Control

12. Steering Filter Indicator *

13. Brake System Supply Filter Indicator *

14. Implement Filter Indicator *

15. Return Filter Indicator *

* These lights indicate the condition of the various filters. With the machine running and at operating temperature, the indicators should be green. If the red lights come on and stay on, the filter elements are restricted and should be changed immediately.

16. Stereo AM/FM Radio and Cassette Player (Optional)

NOTE: These lights (Items 12-15) may come on and flicker until oil reaches operating temperature. This is normal.

3-4 Other Controls

Fire Extinguisher (Hand-Held)
Located on the right side of the chassis

Fire Suppression System Actuator (Optional)
Located on the right cab wall, behind the seat. Refer to Figure 3-12. In case of fire, pull the safety safety pin on the actuator and strike the button. Fire retardant will be released, then engine will shut down and the batteries will be disconnected from the electrical system.

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: Two fire suppression system actuators are provided. Either one can set off the system. One is located behind the operator's seat. The other is mounted on the chassis, at ground level, to the left of the RH boarding ladder. Memorize the location of each. Some machines are equipped with an optional automatic fire detection and activation system.

Circuit Breakers
The circuit breakers are located inside the side panel of the left-hand console. These protect the electrical circuit. Push to reset.

Transmission Shifter
This control is located on the left-hand console. The shifter controls both the direction of the transmission and the gear range.

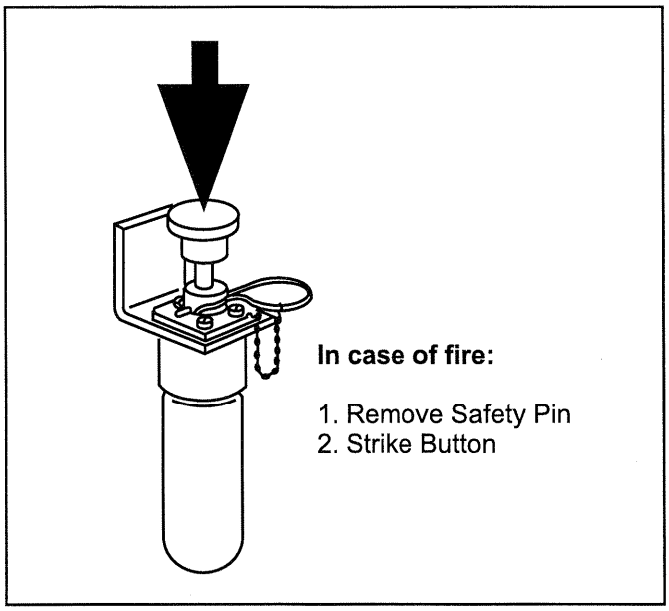


Figure 3-12: Fire Suppression System

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Operation

4.1 Introduction

Skill and alertness on your part are essential for maximum productivity as well as the safety of yourself and others. The operating instructions in this manual are here to help you get the maximum use of your Coil Packer, with the greatest possible safety. Become completely familiar with all of the instruments and controls. Learn the unit, its capabilities and limitations.

Safety First

Your co-workers depend on you to operate safely. Before operating the machine, read and observe the safety precautions given in this manual. **Be a safe operator.** A good safety record can be rewarding.

4.2 General

The Wagner Coil Packer is easy to operate, even though it has the capacity to handle tremendous loads and perform many operations. To get the most production from this unit with the least effort, and in a safe, reliable manner, it's important to become familiar with all the components and their functions.

Drivetrain

The drivetrain consists of a diesel engine, a torque converter combined with a full power shift transmission, drivelines and a planetary drive axle.

Engine

The electronic dielsel engine is equipped with an electric starting motor and cold weather starting aid and will start in the same easy way as your automobile. We want to emphasize the importance of maintaining the correct engine rpm, for maximum engine service life and proper hydraulic pump operation.

Torque Converter

The torque converter is connected directly to the engine flywheel, eliminating a manually operated clutch, thereby simplifying operation and reducing operator fatigue. It also, to a major degree, hydraulically protects the engine, transmission, drivelines and axle from damaging shock loads and harmful engine lugging and stalling—provided the correct engine rpm is maintained. It also multiplies engine torque in each transmission gear range, automatically adjusting the power output to the load demand.

Transmission

The transmission is a "full power shift - full reversing" unit. "Full power shift" means that the transmission can be shifted from one range to the next, either up or down. When shifting down, the engine rpm must be reduced sufficiently to prevent over-speeding the engine when the lower range engages.

IMPORTANT: Never shift the range selector up or down without momentarily relaxing the throttle pedal. Severe damage to the drivetrain could result.

"Full reversing" means that you have approximately the same speeds forward and reverse in all speed ranges.

⚠ CAUTION

CAUTION: Always brake to a full stop when changing directions. Drivelines are not strong enough to withstand the forces created when tons of vehicle and load are reversed suddenly.

The transmission uses constant mesh gearing in all ranges, forward and reverse. All gears are engaged by means of hydraulically controlled multiple disc clutches, through the control valve actuated by the shift lever in the cab.

Drivelines

Drivelines transmit the engine torque (after being multiplied by the converter and transmission) to the drive axle.

Drive Axle

The drive axle not only supports the unit, but also further multiplies the engine torque through gear reductions. The first reduction occurs at the ring gear and pinion in the differential. The second reduction is made in the outer planetary ends of the axle.

Chassis & Bogie

The chassis & bogie assembly is fully articulated (hinged for steering), and can swivel to negotiate rough terrain. Steering is accomplished by hydraulic cylinders.

Hydraulic System

The Wagner Coil Packer features advanced hydraulic engineering principles. Instead of a single pump operating each function, all multiple pump applications have a primary and a secondary function. When any pump output is not being used for its primary function, instead of returning directly to the reservoir, the control valve diverts its flow to its secondary function. This principle is known as "power beyond".

The steering system is a sophisticated hydrostatic type designed specially for heavy mobile equipment. This system has proportional control with load sensing. As the name suggests, it is a system in which the load is sensed, where the sensed signal is used to control the priority valve in

the flow amplifier valve, so that oil flow and oil pressure precisely match momentary demands.

A steering unit mounted on the steering column provides a fixed displacement of oil per revolution of the wheel. This flow is amplified by the flow amplifier valve by a factor of 8. With this system, it is possible to combine the steering and working hydraulics. A priority valve built into the flow amplifier valve ensures that the steering system has first priority on oil from the pump.

4.3 Break-In Period

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

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

Generally speaking, proceed with a new engine as follows:

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

NOTE: Study and follow the engine's operation manual for specific breaking-in information.

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

4.4 Start and Stop Procedures

Engine Pre-Start

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

Pre-start Inspection

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

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

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

Engine Oil Level

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

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

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

⚠ CAUTION

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

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

⚠ WARNING

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

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

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

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

Hydraulic Oil Level

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

⚠ WARNING

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

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

Transmission Oil Level

Always check the transmission oil level prior to starting the engine. The level should be checked after engine warm-up, with the transmission at normal operating temperature. The fill tube is located at the front of the transmission by the output shaft. Always check the level with the engine running, at operating temperature, with the transmission in neutral. The oil level should be between the "H" (high) and "L" (low) marks. See the high and low stopcocks in the front of the transmission. Fill with approved fluid only (See Lubricant Specification Chart, Section 5).

"Walk Around" Inspection

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

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

Tires

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

Engine Pre-start

1. Make sure that oil and coolant levels have been checked before attempting to start the engine.
2. Sit in your normal operating position and adjust the seat for your personal comfort. It is recommended that you wear your seat belt.
3. Check for emergency/parking brake engagement: pull the knob to set the brake.
4. Place the transmission range selector in the "neutral" position.

NOTE: All current Wagner units are equipped with a neutral start switch that prevents the engine from starting unless the transmission is in neutral.

5. Give warning that you are going to start the engine. Make sure that all personnel are clear of the machine, as you may not be able to see them from the cab. Be sure that the area around the machine is clear of all obstructions.

⚠ WARNING

WARNING: DO NOT start the engine if the key switch has been tagged with a "Do Not Start" or "red" tag.

6. Turn the key switch to the ON position. The emergency brake light and circuit lights should come on. Also, the engine protection system bell and light should come on.
7. Check that the emergency shutdown control is pushed IN.

Engine Start-up

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

⚠ CAUTION

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

In cold weather it may be necessary to use the cold weather starting procedure, if so equipped.

2. After the engine starts, let it idle. Do not accelerate. Remember, high rpm and full load conditions on cold oil can severely damage the engine, transmission and hydraulic system. The engine warning light and bell should go out within a few seconds after starting. If engine oil pressure fails to rise sufficiently after ap-

proximately 40 seconds of running, the engine may automatically shut down.

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

3. If a rise in oil pressure of the engine or transmission is not observed within 5 seconds, or a rise in air pressure is not observed in 10 seconds, shut down the engine and have maintenance determine the cause of the problem. Do not operate the machine until the problem has been corrected.
4. Warm the engine at idle until the air pressure reaches at least 60 psi, then recheck that the transmission is in neutral and that the parking brake is applied. Using the hand throttle, continue to warm the engine at 1000 rpm until the engine temperature reaches at least 130° F, and the air pressure rises to 120 psi.
5. Release the hand throttle. Meanwhile, observe the gauges for proper readings and operation. Also, check the operation of all safety equipment and accessories.

Cold Weather Starting Procedure (Optional)

NOTE: For maximum engine protection and easier starting:

Keep the batteries fully charged.

Keep the fuel clean and free of water.

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

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

⚠ WARNING

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

Temperatures below 32° F (0° C):

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

Temperatures below 0° F (-18° C):

⚠ CAUTION

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

If the machine will be shut down for several hours or longer with ambient temperatures below 32° F (0° C), the hydraulic tank heater should be plugged in as soon as the machine is shut down. This will help to maintain hydraulic oil temperature.

⚠ WARNING

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

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

Engine Shut-down

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

⚠ CAUTION

CAUTION: Except in emergencies, never shut

the engine down immediately after operation. Allow the engine to idle for at least 5 minutes. Failure to do this could cause severe engine damage.

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

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

4.5 Using Booster Batteries

⚠ WARNING

WARNING: Batteries produce explosive gases. Keep sparks, flame and cigarettes away. Ventilate when charging or using in an enclosed space. Always shield your eyes when working near batteries.

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

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

⚠ WARNING

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

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

⚠ WARNING

WARNING: When removing battery terminals, always disconnect the (-) negative cable first. When installing battery terminals, always connect the (-) negative cable last. This procedure can prevent a spark at the battery which could cause an explosion. Always make the last cable connection away from the battery, such as on the engine block. Use care to keep the cables clear of the fan or any other moving parts.

4.6 Moving, Stopping and Steering

To move the machine:

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

⚠ CAUTION

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

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

⚠ CAUTION

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

4. Place the Declutch control in the ON position.
5. Release the parking brake and put the transmission range selector into 1st gear.

⚠ CAUTION

CAUTION: It is recommended that you operate in 1st gear only, until you develop a "feel" for

the machine and become familiar with all of its operating characteristics.

6. Place the shift lever into the "forward" or "reverse" position. Moving the lever not only selects the direction of travel, but also shifts the transmission from neutral to "in gear".
7. Depress the throttle pedal slowly and smoothly. Avoid sudden or jerky starts. Depress the pedal just enough to begin moving slowly.

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

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

⚠ CAUTION

CAUTION: Keep the speed low until you feel comfortable with the machine. Always bring the machine to a complete stop before changing direction. Changing direction while in motion will put tremendous loads on drivetrain components, especially the drivelines. Premature wear and failure can result.

NOTE: It is recommended that you keep the declutch control in the OFF position for normal traveling. If a downgrade is encountered, the declutch control may be placed in the OFF position, and the transmission will remain in gear while braking.

4.7 Fire Suppression System (Optional)

Your Coil Packer may be equipped with an optional fire suppression system. In case of fire, do the following:

1. Pull the safety pin on the actuator and strike the button. Fire retardant will be released, the engine will shut down, and the batteries will be disconnected from the electrical system.
2. Take the hand-held fire extinguisher, if possible, and **leave the vehicle**. After the system has discharged, watch carefully for flare-ups and spot fires. Call the fire department and/or service personnel as soon as possible.
3. Any time the system is discharged, the system must be refilled and recharged before resuming operation. Refer to the Service Manual for complete maintenance procedures.

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

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

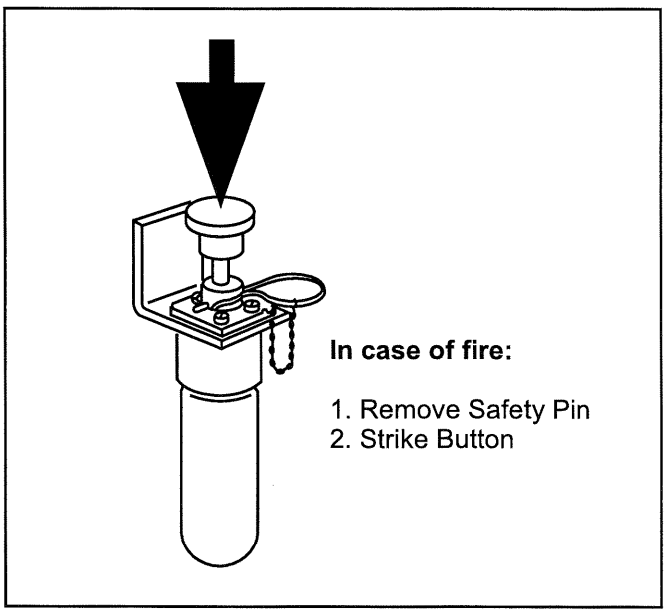

Figure 4-1 - Fire Suppression System Actuator

Maintenance and Lubrication

5.1 General

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

5.2 Safety Precautions

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

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

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.**
   All articulating 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 Coil Packer. See Figure 4-1.

NOTE: Never operate the Coil Packer with the locking pins in the locked position. Damage to the machine could result.

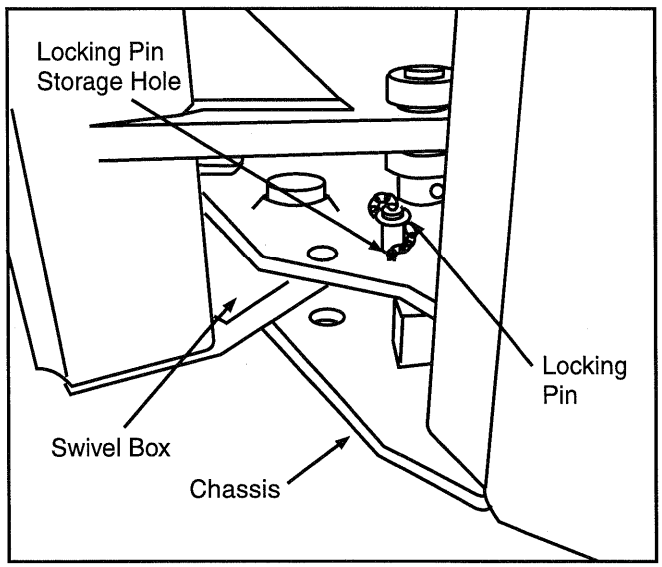

Figure 5-1: Swivel Locking Pin

5. **Stop the Engine.**
   Before performing any maintenance or lubrication, remove the key from the switch, or tag the key swtich with "DO NOT START" to ensure the engine is not inadvertently started.

⚠ WARNING

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.

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 wet, frosty or oily conditions.

5.3 Preventive Maintenance

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

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

Preventive Maintenance

- Promotes Safety - properly maintained equipment is better able to operate within its design specifications and react positively to the 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.

5.4 Shift Maintenance

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

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

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

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

Shift maintenance details are provided in 5-11, Maintenance Procedures. These procedures consist of checks that can be performed by the operator.

5.5 Scheduled Maintenance

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

5.6 Scheduled Oil Sampling

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

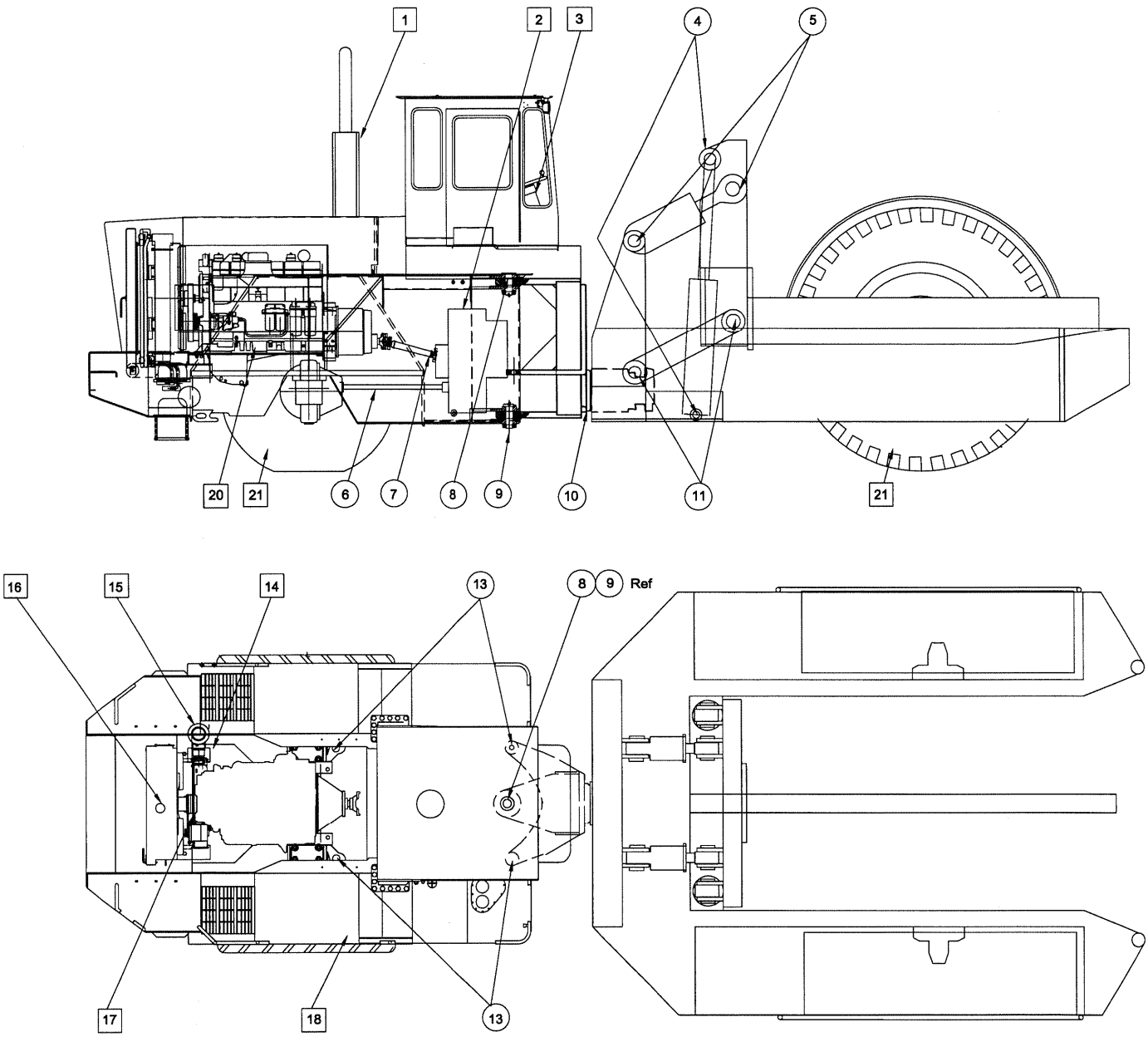

Figure 5-2: Daily Maintenance and Service Check Points

5.7 Daily Maintenance & 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 for exact locations.

⚠ WARNING

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 wet, frosty, icy, snowy or oily conditions.

5.8 Daily Maintenance and Lubrication Check List

10 HOURS OR DAILY

Before Engine Startup, Check the Following

Item		OK	No	Add
20	Engine (Check oil level, check for leaks)	____	____	_____
18	Hydraulic Tank (Check oil level, check for leaks)	____	____	_____
16	Radiator and Oil Cooler (Check coolant level, check for leaks, are fins clean and unobstructed?)	____	____	
15	Air Cleaner (Check indicator, clean or change element, empty dust cup)	____	____	
17	Engine Belts (Check for adjustment and wear)	____	____	
21	Wheels and Tires (Check condition and pressure)	____	____	_____
2	Transmission Oil Level (At "add" mark when cold)	____	____	_____

After Engine Startup, Check the Following

Item		OK	No	Add
20	Engine (Does it sound normal?)	____	____	
14	Air Intake System (Check for leaks and damage)	____	____	
1	Exhaust System (Check for leaks and excessive smoke)	____	____	
3	Instruments (Check for normal readings)	____	____	
2	Transmission (Check oil level, check for leaks)	____	____	_____

Note Anything Abnormal or In Need of Repair

Lights _____ Defroster _____ Reverse Warning Horn _____

Horn _____ Windshield Wipers _____ _____

Heater _____ Air Conditioner _____ _____

Operator _____ Supervisor _____ Date _____

Model _____ Serial Number _____ Hour Meter _____

5.9 Lubrication Points

10 HOURS OR DAILY

Before Engine Startup, Check the Following

Item		No. of Fittings
(13)	Steering Cylinder Pins	4
(4)	Hoist Cylinder Pins	2
(5)	Dump Cylinder Pins	4
(11)	Bogie to Probe Link Pins	2
(8)	Hinge Pin (Upper) *	1
(9)	Hinge Pin (Lower) *	1

50 HOURS OR WEEKLY

(6)	Driveline, Transmission to Axle	3
(7)	Driveline, Converter to Transmission	3
(10)	Swivel Bearing	1

* Use handgun or low pressure adapter; lubricate sparingly

5.10 Service Maintenance Check Lists

50 HOURS OR WEEKLY

Item	OK	No	Add/Repair
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)	____	____	____
8. Check battery electrolyte level	____	____	____
9. Check for structural damage (inspect chassis & attachments for bending, cracking & broken welds)	____	____	____

250 HOURS OR MONTHLY

Item	OK	No	Add/Repair
1. Repeat 50 hour check	____	____	
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 disc brake calipers, pads, rotors and lines	____	____	____
9. Grease all non-Lube-For-Life drivelines	____	____	
10. 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 OR QUARTERLY

Item	OK	No	Add/Repair
1. Repeat 250 hour check	____	____	
2. Take oil samples of transmission, axle and hydraulic systems *	____	____	
3. Drain and refill transmission, change filter *	____	____	____
4. Service fuel filters *	____	____	____
5. Service hydraulic filters *	____	____	____
6. Inspect brake systems & components	____	____	____

1000 HOURS OR SEMI-ANNUALLY

Item	OK	No	Add/Repair
1. Repeat 500 hour check	____	____	
2. Change hydraulic oil and filters *	____	____	____
3. Clean and flush cooling system	____	____	____
4. Check pins and bushings for wear	____	____	____

2500 HOURS OR ANNUALLY

Item	OK	No	Add/Repair
1. Repeat 1000 hour check	____	____	
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	____	____	____

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

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

Repairs

Problem: _____

_____

_____

_____

_____

_____

Parts: _____

_____

_____

_____

_____

_____

Mechanic: _____ Hours Labor: _____

Operator: _____ Supervisor: _____

Machine Model _____ Equipment No: _____

Date: _____ Shift: _____ Hour Meter: _____

5.11 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 Daily Maintenance and Service Check Points (Fig. 5-2). This provides an additional aid in locating each check point.

Before Starting Engine

20 **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 is 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, page 5-14). Do not overfill. Check engine for leaks.

18 **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

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 ican 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, page 5-14). Do not overfill.

16 **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

WARNING: Never remove the radioator 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 readiator 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 restrictions caused by leaves, paper or bent fins. Inspect the radiator cap, hoses and connectors for any signs of leakage or damage.

15 **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.

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

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

Figure 5-3: Engine Belt Deflection

After Starting the Engine

20 **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.

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

14 **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.

1 **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.

2 **Transmission Oil Level**
The level should be checked after engine warm-up, with 180° to 200° showing on the transmission temperature parameter. The dipstick and fill tubes are located on the chassis deck, directly above the transmission. Check the level with th 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 on page 5-14. Do not overfill. Inspect for leaks.

5.12 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	Having 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)

Wet Disc Brake System

Symptom	Probable Cause	Corrective Action
Brakes won't release	Loss of oil—please refer to Service Manual	Have maintenance check system
Loss of braking efficiency—**please refer to Service Manual**	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

* 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

5.13 Maintenance Specifications

Most of the required maintenance specifications, such as the hydraulic pressure relief settings, can be obtained from the Service Manual and the hydraulic schematic.

Wheel Nut Torque

Front ..... 500 ft-lb (678 N • m)
Rear ..... 315 ft-lb (427 N • m)

Tire Inflation Pressure

Front (30.00 x 51) ..... 100 psi max. (690 kPa)
Rear (29.5 x 29) ..... 55 psi max. (380 kPa)

5.14 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.