

Operator's Manual

Allied SW-100F Steelworker



Allied Wagner



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.

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General



Figure 1-1 Wagner Steelworker

1.1 Introduction

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

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

The Wagner Steelworkers are designed and developed specifically to handle steel slabs and steel scrap.

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

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

Allied Systems Company
21433 SW Oregon Street
Sherwood, Oregon 97140 USA
Phone: (503) 625-2560

1.2 Intended Use Statement

This machine is designed for handling steel slabs and steel scrap up to 100,000 lbs (45,359 kg). Refer to the load chart (Figure 1-4) for specific rated lifting capacities. Use in any other way is considered as contrary to the intended use. Compliance with and strict adherence to the conditions of operation, service and repair as specified also constitute essential elements of the intended use.

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

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

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

1.3 Machine Identification

The model and serial number of your vehicle provide Allied Systems with a way to keep record of each machine. Each Wagner Steelworker has the S.N. stamped into the chassis, on the left side of the machine near the rear wheel, as shown in Fig. 1-2. Additionally, the nameplate, mounted on the rear left side of the cab near the cab door, provides the model and serial number of your vehicle.

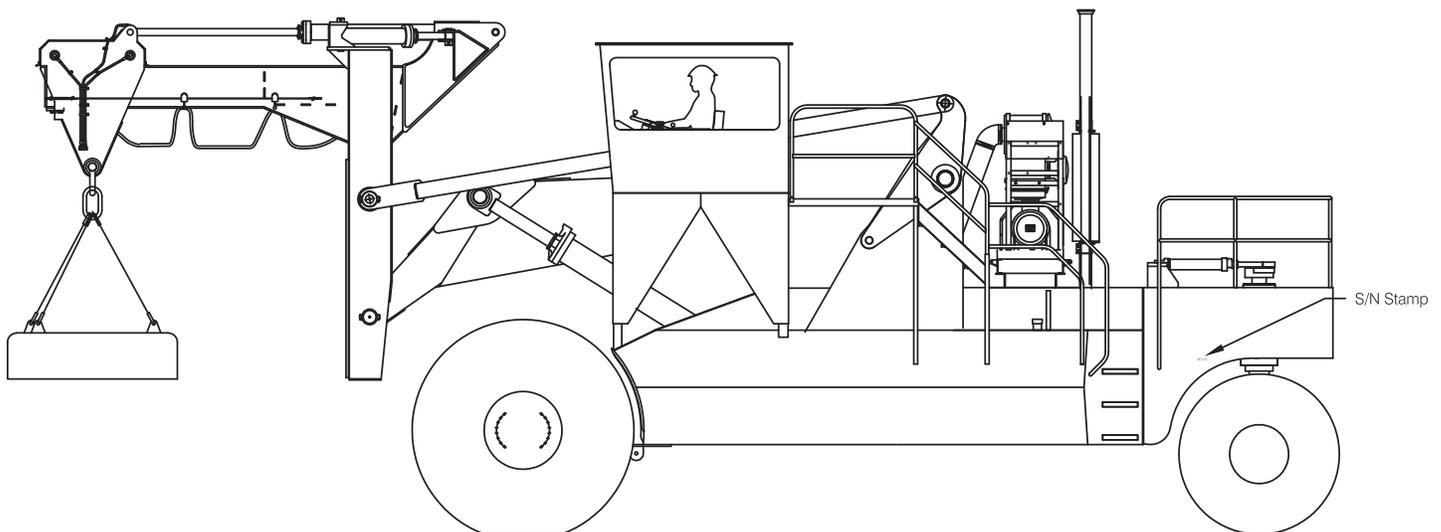


Fig. 1-2 Machine Identification

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.

A typical lubrication plate is shown in Fig. 1-3. These plates are securely fastened to the cab superstructure on the rear, left side, near the nameplate. The lubrication plate lists specifications for the initial factory fill of lubricating oils and greases. For further lubrication information, see Section 6 of this manual.



WAGNER

21433 S.W. Oregon Street
 Sherwood, Oregon
 Phone: 503-625-2560

INITIAL FACTORY FILL

COMPONENT	LUBRICANT
Engine - Caterpillar and Cummins	Mobil Delvac® 1300 Super 15W-40
Transmission/Converter - All	Mobilfluid® 424
Drive Axle - Clark and Rimpull	Mobilube® HD 80W-90
Hydraulic System (Non-Wet Disc Brakes)	Mobil DTE® 13M
Hydraulic System (Wet Disc Brakes)	Mobilfluid® 424
Hydraulic Brake System	Mobil® Multi-Purpose ATF
General Chassis Lubrication	Mobilgrease® Special

P/N 243014

For the nearest Mobil lubricant supplier, or for technical information,
 call 1-800-662-4525.

Fig. 1-3 Lubrication Plate

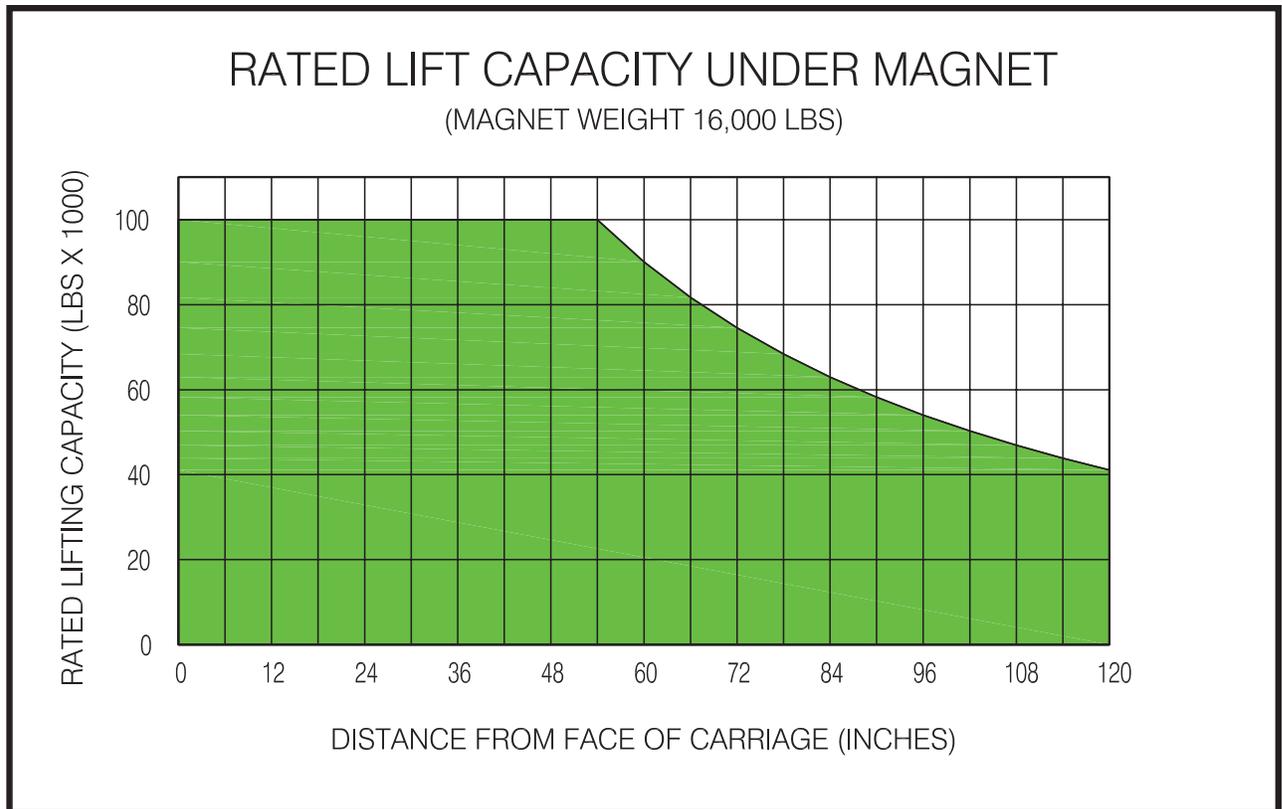
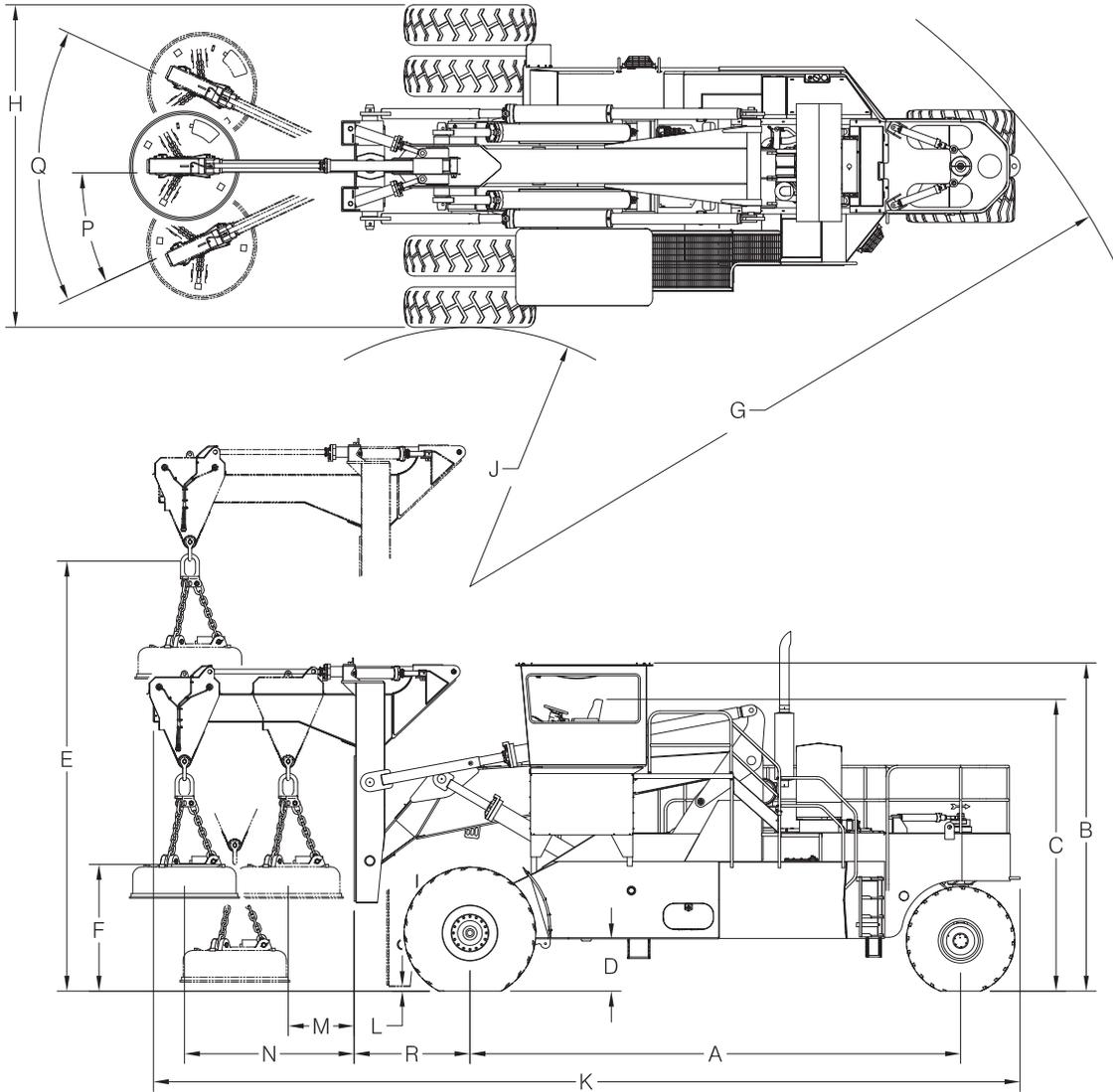


Fig. 1-4 Load Chart

1.4 Specifications, SW100F



Dimensions (approximate)

A. Wheelbase	26' 0" (7,925 mm)
B. Height to Top of Cab.....	17' 7" (5,359 mm)
C. Height without Cab.....	15' 4" (4,674 mm)
D. Ground Clearance Chassis	2' 11" (889 mm)
E. Max Height under Hook	23' 3" (7,087 mm)
F. Min Height Under Hook.....	7' 5" (2,261 mm)
G. Turning Radius Tail Swing	35' 6" (10,820 mm)
H. Width Outside Chassis Tires	16' 7" (5,055 mm)
J. Inside Turning Radius.....	12' 11" (3,937 mm)
K. Overall Length (Incl. Magnet Boom).....	46' 7" (14,199 mm)
L. Min Height Under Carriage	0' 9" (229 mm)
M. Carriage Face to CL of Magnet Min	3' 6" (1,067 mm)
N. Carriage Face to CL of Magnet Max	9' 0" (2,743 mm)
P. Boom Swing Each Way	25°
Q. Boom Swing Total.....	50°

R. Drive Axle CL to Carriage Face (down).....	4' 6" (1372 mm)
Drive Axle CL to Carriage Face (level)	6' 9" (2057 mm)
Drive Axle CL to Carriage Face (up)	5' 9" (1753 mm)

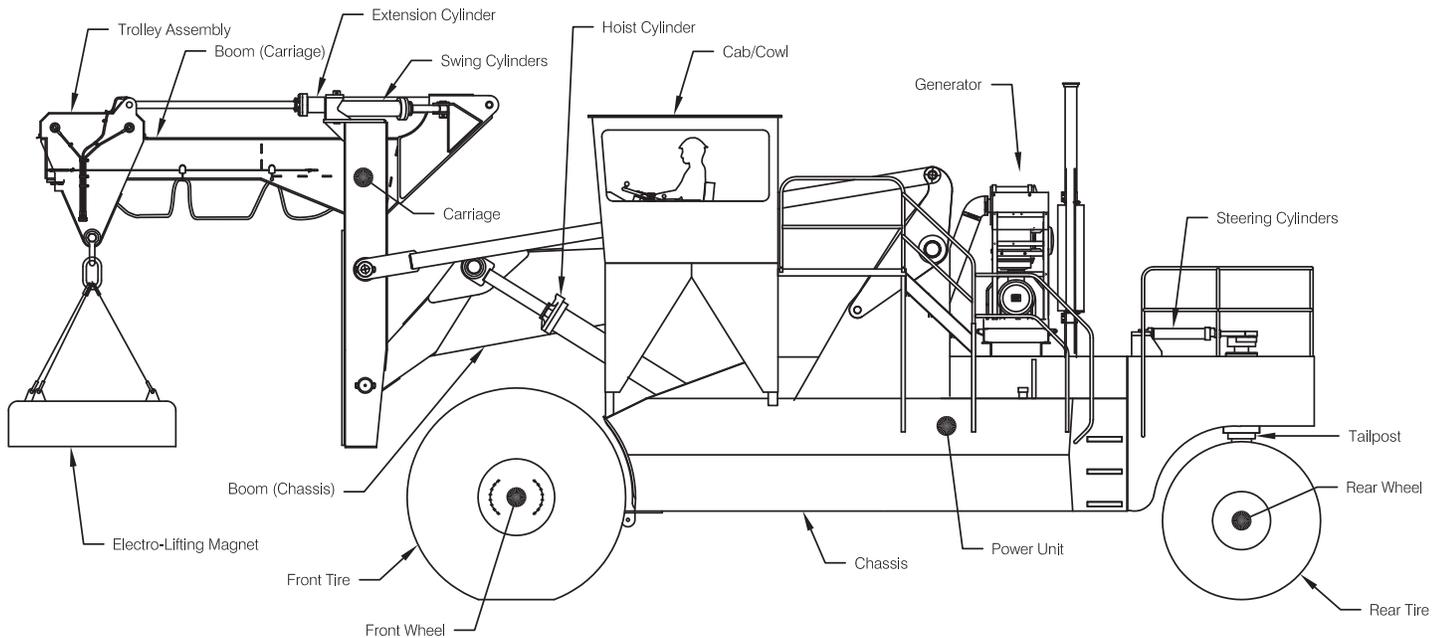
Weights and Functions (approximate)

Unit Weight (with magnet)	175,900 lbs (79,786 kg)
Drive End.....	118,500 lbs (53,751 kg)
Tail End.....	57,400 lbs (26,036 kg)
Rated Lift Capacity 54"LC	100,000 lbs (45,360 kg)

Magnet

Diameter - up to.....	72"
Capacity - up to	100,000 lbs (45,360 kg)
Temperature Range.....	220°F to 270°F
Includes:	Magnet Controller

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



Engine

Make and Model Cummins Electronic QSX15
 Max Horsepower 360 @ 2100 RPM
 Max Torque 1215 Ft/Lbs @ 1400 RPM
 Bore and Stroke 5.5" x 6"
 No. of Cylinders 6
 Displacement 915 Cu/In (15.0 liters)

Air Cleaner

Donaldson Two Stage Dry Type

Electrical System

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

Torque Converter

Clark 8000 Series Single Stage, 3 Elements

Transmission

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

Range.....	Ratio	Speed (Unladen)
1.....	4.39:1	3.5 mph (5.6 km/h)
2.....	2.45:1	6.0 mph (9.7 km/h)
3.....	1.38:1	10.5 mph (16.9 km/h)
4.....	0.77:1	17.5 mph (28.2 km/h)

Axles

Fabricated Housing Allied Wagner
 Make Clark
 Model FD-85501 Series
 Type Planetary
 Brakes Air over Hydraulic Disc
 Brake Size 32" Diameter (813mm)

Tires

Size (Driver) Dual 24.00 x 35
 Size (Tail) 26.5 x 25

Hydraulic System

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

Steering Cylinder (2) 4" x 20" (102mm x 508mm)
 Hoist Cylinder (2) 10" x 86.6" (254mm x 2200mm)
 Tilt Cylinder (2) 10" x 44" (254mm x 1118mm)
 Extension Cylinder (1) 6" x 66" (152mm x 1676mm)
 Swing Cylinder (2) 6" x 16" (152mm x 406mm)

Service Refill Capacities

Fuel Tank 450 Gals (1703 liters)
 Hydraulic Oil 334 Gals (1264 liters)
 Crankcase w/Filter 11 Gals (42 liters)
 Cooling System 22.5 Gals (85 liters)

Intentionally Blank

Section 2

Safety



2.1 Safety Is Your Business

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

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

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

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

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

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



CAUTION

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



WARNING

WARNING: Whenever potential personal injury or death situations exist, requiring correct procedures or practices for prevention, this “WARNING” symbol is used. This safety alert symbol indicates important safety messages in this manual. When you see this symbol, carefully read the message that follows and be alert to the possibility of personal injury or death.

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

2.2 Operation Warnings

- You must be trained in the operation of this machine prior to operation.
- Be extremely careful if you do not normally operate this machine. Reorient yourself to the machine before starting, and then proceed slowly. However, you must not operate it without having previously received proper training.
- Know your company’s safety rules. Some have site specific directions and procedures. The methods outlined in this manual provide a basis for safe operation of the Steelworker. Because of special conditions, your company’s procedures may be somewhat different from those shown in this manual.
- Always face the ladder when going up and down ladders. Maintain three points of contact.
- 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 any 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.

- Do not operate the machine before disconnecting hydraulic tank or engine block heaters (if installed).
- The hydraulic tank heater and/or engine block heater use a 110 or 220VAC external power source. An electrical shock could be fatal.
- All electrical cables and connectors must be in good condition. Use caution in wet weather to avoid danger from electric shock. Extension cords to the hydraulic tank and/or engine block heater must be properly grounded.
- 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.
- Lower the carriage before leaving the cab or shutting down the engine.
- High voltage electricity 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. AVOID CONTACT WITH METAL SURFACES. DO NOT PERMIT ANYONE TO COME INTO CONTACT WITH THE MACHINE’S STRUCTURE.**



WARNING

WARNING: Remain at least 25 feet from high voltage electrical wires. Failure to do so may result in injury or death and may cause damage to the equipment.

- Never energize the electro-lifting magnet when personnel are nearby.
- Never attempt to operate any lifting device designated as out of service.
- Be sure all electrical connections are in good working condition and securely attached to the proper receptacle.
- When handling hot material, (300° F or hotter), keep magnet’s exposure to material to a minimum.
- Be sure no foreign material is between the magnet lifting surface and material to be handled, and that the lifting surface of both is clean.

- Make sure the air gap between the magnet's pole-shoes and the lifting face of the material to be handled is at a minimum before energizing the magnets.
- Make sure the load is centered under the magnet before lifting. Avoid uneven lifts.
- Wait a minimum of five (5) seconds after energizing the magnet before attempting to lift the load, to allow the magnetic field to fully generate.
- Do not allow the load or the magnet to come in contact with any obstruction.
- Never carry the load over or near personnel, and never allow personnel to stand on top of the load.
- Make certain that the load is stable and resting on a surface that can support its weight safely before de-energizing the magnet. Never drop a load.
- The rated load capacity of the magnet is valid when any air gap between the lifting face of the material and the magnet is less than 1/8", and more than 70% of the magnet's lifting face is in contact with the material. Any gap greater than 1/8", or contact less than 70% of the magnet's lifting face derates the maximum load. Consult the Winkle Spare Parts & Operating Instruction Manual (Allied Form #80-916) for details.
- When disconnecting magnets after operating, wait at least 5 minutes after power has been cut before unplugging. See the Winkle Spare Parts & Operating Instruction Manual (Allied Form #80-916) for details.
- Before performing maintenance or service under the machine:
 - * Move the machine to a level surface, engage the parking brake, and stop the engine.
 - * Tag the key switch with a "DO NOT START" sign and/or remove the key.
 - * Block the tires to keep the machine from rolling.
- Never rely on the hydraulic system to support any part of the machine during maintenance or lubrication. Never stand under a component that is supported only by the hydraulics. Make sure it is resting on its mechanical stops. If necessary, support components with appropriate safety stands.
- Use caution when working around hot fluids. Always allow lubricating and hydraulic oils to cool before draining. Burns can be severe.
- Use extreme caution when using compressed air to blow parts dry. The pressure should not exceed 30 psi (208 kPa) at the nozzle. Never use air to blow yourself off. Air pressure penetrating your skin can be fatal.
- Engine exhaust fumes can cause death. If it is necessary to run the engine in an enclosed space, remove the exhaust fumes from the area with an exhaust pipe extension. Use ventilation fans and open shop doors to provide adequate ventilation.
- DO NOT remove the radiator cap when the engine is hot. The coolant will be under pressure and can flash to steam with explosive force, causing severe burns. To prevent burns, remove the radiator cap only when the engine is cool.
- Before disconnecting hydraulic lines, be sure to lower all loads and relieve all hydraulic pressure. The load could fall on you, or escaping hydraulic oil could cause severe personal injury.
- Batteries contain sulfuric acid which can cause severe burns. Avoid contact with skin, eyes or clothing.
- Batteries produce explosive gases. Keep sparks, flame and cigarettes away. Ventilate when charging or servicing in an enclosed space. Always shield your eyes when working near batteries. When removing battery cables, always turn the battery disconnect switch(es) 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.

2.3 Maintenance Warnings

Maintenance, lubrication and repair of this machine can be dangerous unless performed properly. Each person must satisfy himself that he has the necessary skills and information, proper tools and equipment, and that his work method is safe, correct, and meets his own company's requirements.

- Do not attempt to make adjustments, or perform maintenance or service unless you are authorized and qualified to do so.
- Unless specified in service procedures, never attempt maintenance or lubrication procedures while the machine is moving or the engine is running.
- Keep hands, feet, long hair and clothing away from power-driven parts. Do not wear loose fitting clothing or jewelry while performing maintenance and lubrication in these areas.
- Always perform all maintenance and lubrication procedures with the machine on level ground, parked away from traffic lanes.

- Before making adjustments to the engine or chassis electrical system, disconnect the battery. An electrical spark could cause a fire, explosion or severe burns.
- It is essential to personnel safety that safe ladders, personnel lifts and/or scaffolding be used while servicing this machine. Always use safety tread walks and hand holds to reach lubrication points or to inspect or adjust the machine. These areas can be dangerously slick under conditions of rain, frost or oil smears.
- Proper maintenance is essential to ensure the integrity of the lifting device. Any system failure that interrupts current to the magnet will cause an unexpected drop of the magnet load. Potential failures include:
 1. Engine failure
 - a. Running out of diesel fuel
 - b. Failure of the DC generator to engine coupling
 - c. Low oil pressure causing engine shutdown
 - d. Electrical failure of the alternator and battery charging system
 - e. A dirty air cleaner
 - f. A dirty or plugged fuel filter
 - g. Water or dirt in the fuel system
 - h. Failure to maintain the proper engine RPM's due to governor failure or mis-adjustment of engine speed
 - i. Loose or broken fan/alternator belt
 2. Blown fuses in the magnet safety disconnect switch
 3. Badly worn generator brushes
 4. Generator failure due to excessive heat causing damage to the field windings
 5. Dirty or badly worn "Lift" contact tips in the magnet controller
 6. Failure of the cable reel (if so equipped)
 7. Chopped magnet leads



WARNING

WARNING: Always disconnect all electrical power when servicing the magnet or engine-generator set. Failure to do so may cause severe personal injury or death.

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 hoist 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 the 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 lifting or moving of persons.



WARNING

The DC magnet generator connection to the engine has rotating parts. Keep clear during operation. Be sure to wear the proper ear and eye protection when servicing the engine-generator set. Failure to do so may cause severe personal injury or death.

- Routine inspection and maintenance of the magnet and engine-generator will help ensure proper operation and avoid unexpected dropping of the magnet load.

2.4 Fire Safety



WARNING

WARNING: Diesel fuel and hydraulic oil are flammable. Never smoke while handling fuel or working on the fuel system. The fumes in an empty fuel container are explosive. Never cut or weld on fuel lines, tanks, or containers. Keep open flames and sparks away from the machine.

Avoiding Fire and Explosion Hazards

- Keep the machine free of oil, grease, and trash accumulations. Regular pressure washing and/or steam cleaning is recommended for fire prevention and general safety. Use an approved solvent to clean machine parts. Never use gasoline or diesel fuel.
- Inspect for and remove all combustible materials from engine area before starting the machine and periodically throughout the workshift as required. These materials build up in tight corners and are highly combustible. To do a thorough job, remove the access panels.
- Remove any debris from the operator's compartment after each work shift.
- Inspect the driveshaft and brakes for debris and remove as necessary.
- 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.
- Shut off the engine and electrical equipment while filling the fuel tank. Use extra caution when fueling a hot engine. Always ground the fuel nozzle against the filler neck to avoid sparks.
- Handle all solvents and dry chemicals according to procedures identified on manufacturer's containers. Work in a well-ventilated area. Make sure you know where fire extinguishers are kept and how to use them.
- Avoid spilling fuel. If a spill occurs, wipe it up immediately.
- Always ensure that excess grease and oil accumulation, including spillage, is cleaned up immediately.
- Inspect the machine daily for potential fire hazards and make any necessary repairs immediately.
- Maintain the engine cooling system to avoid overheating.
- Check all the electrical wiring and connections for defects, and repair or replace as necessary. Keep battery terminals clean and tight.
- Never perform welding operations until the entire machine has undergone a thorough cleaning. In addition, cover rubber hoses and have at least a fire extinguisher at hand.
- Hydraulic fluid is flammable. Do not weld on or near pipes, tubes, or hoses that are filled with fluid.
- Store flammable starting aids in a cool, well ventilated location.
- Remember, there is always a risk of fire.

Fire Fighting Equipment

All Wagner units built after November 1, 2004 are supplied with a hand held fire extinguisher. If your unit is not so equipped, Allied Systems Company recommends that an appropriately rated fire extinguisher be installed. A 20 pound ABC rated extinguisher is the minimum size recommended. Install it within easy reach of the operator in a position that protects it from damage. Use only a "quick release" type of mount.

- Keep your fire extinguisher(s) and fire suppression system, if so equipped, fully charged and in good working order. Know how to use them. Allied Systems recommends that you, upon receiving your machine, contact your local authorized service center for your fire suppression system. Have your systems fully checked and verified before putting your machine into service.
- Read and understand the instructions printed on the canister and learn how to operate them. Learn how to remove the canisters from their mounting brackets in the shortest amount of time.
- Service the extinguisher and the fire suppression system according to the manufacturer's specifications. Service after every use, no matter how short a time, and never operate the machine without both in full working order.
- Fire prevention features provided by the manufacturers should be maintained in operational condition and should be used to supplement the operator's fire prevention efforts. In no case should the features be used or assumed as replacement for diligent operator efforts at preventing fires.

Fire Suppression

- Do not panic.
- Lower the carriage.
- Stop the machine and turn off the engine in the clearest area available.
- If your machine is equipped with a fire suppression system, and that system has not automatically been activated, manually activate the system from either actuator (cab or chassis).
- Calmly exit the machine.
- Take the extinguisher and proceed to the source of the fire calmly.
- Though the manufacturer's instructions may vary, normally aim at the base of the fire.
- Even when the fire seems to be out, stand by with the extinguisher until the fire area is dead cool. Check this by removing any panels and looking for hot spots.
- Locate the cause of the fire and correct it before restarting the machine.
- Have your local authorized service center for your fire suppression system thoroughly inspect the entire machine and recharge or replace the extinguishers and fire suppression system before returning to work.

Instruments and Controls

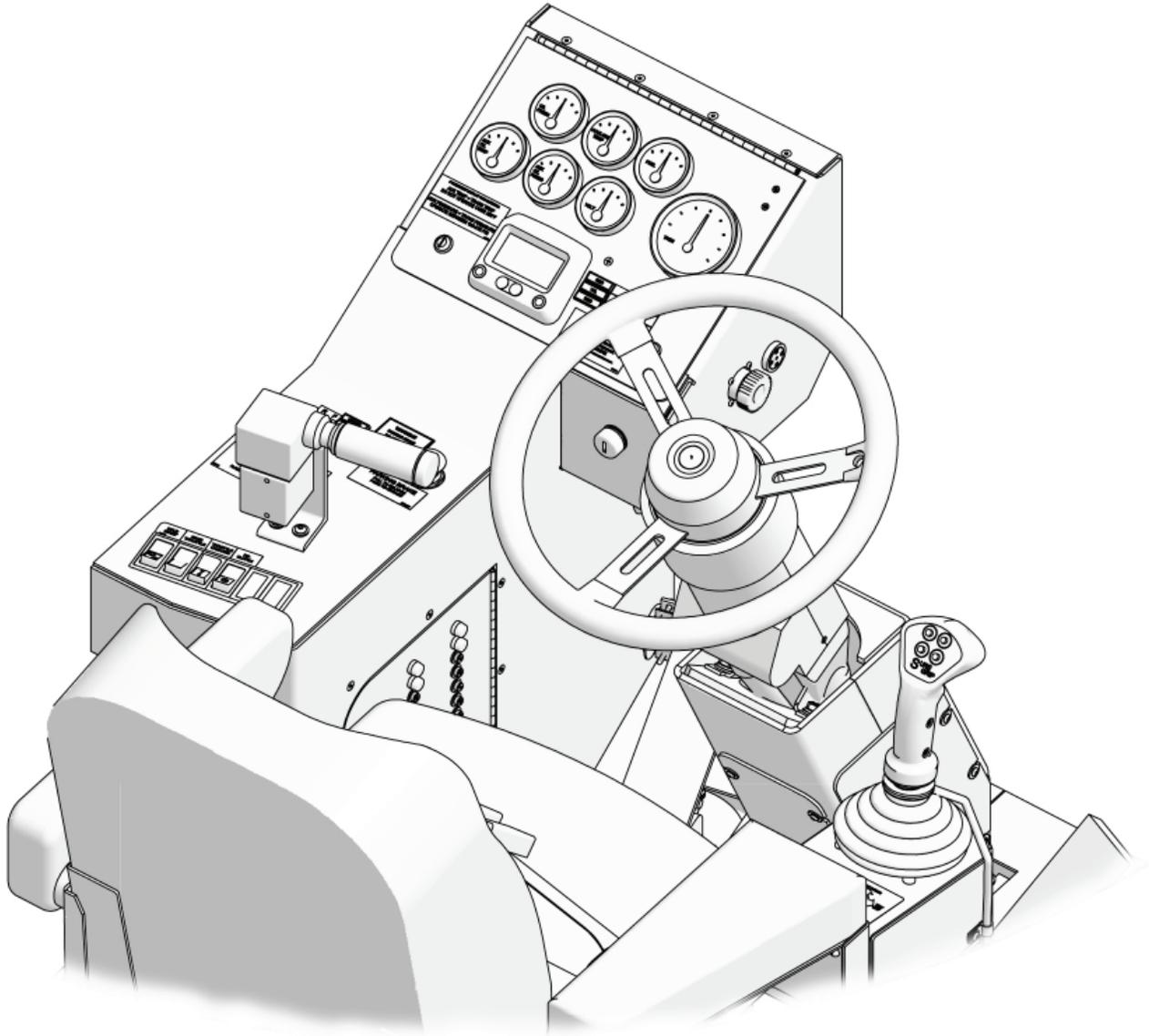


Fig. 3-1 Instruments & Controls

3.1 General

Become thoroughly familiar with the location and use of all instruments and controls before operating this machine. Check all instruments immediately upon starting, again after reaching operating temperatures, and at frequent intervals

during operation to assure proper care through prompt detection of irregularities. If any of the instruments do not register properly, stop the engine and have the problem corrected as soon as practical.

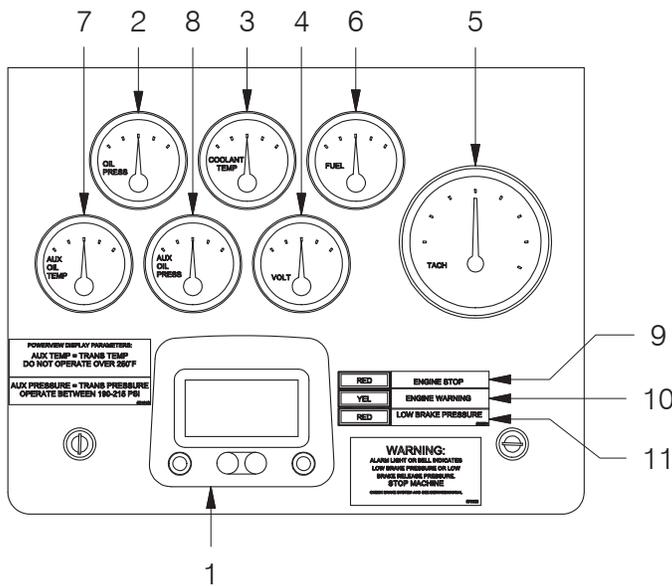


Fig. 3-2 Instrument Panel

3.2 Instruments

Note: Your instrument panel may vary from the configuration shown here.

1. Powerview Display Module

The Powerview Display Module is a multi-function tool that enables the operator or service personnel to view many different engine parameters as well as engine service codes.

See Section 3-10 for more information regarding the operation of the Powerview Display Module.

2. Engine Oil Pressure Gauge

Displays engine lubricating oil pressure. Determines pressure only - not amount.



CAUTION

CAUTION: Should this pressure drop below that required by the manufacturer's specifications during operation, STOP THE ENGINE IMMEDIATELY AND DETERMINE THE CAUSE.

3. Engine Coolant Temperature Gauge

Displays engine coolant temperature. If the temperature holds steady at 220° F or higher, discontinue operation,

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

4. Voltmeter

The voltmeter indicates the voltage condition of the electrical system - whether the alternator is or isn't charging. The numbers indicate volts (acceptable range is 20-28 volts).

5. Tachometer

An electrical tachometer indicating engine revolutions per minute (rpm). To read, multiply the indicated number by 100. Example: 20 x 100 = 2000 rpm

6. Fuel Level Gauge

The fuel level gauge indicates how much fuel is remaining in the tank.

7. Transmission Oil Temperature

Displays converter oil temperature. This gauge should read below 250° F. If the temperature exceeds the maximum allowance, discontinue operation and report to appropriate service personnel.

8. Transmission Oil Pressure

Displays the oil pressure that the transmission clutches use. Clutch pressure should be between 180 and 220 psi at engine idle speed. The pressure should not vary more than 5 psi between the four speed ranges.

9. Engine Stop Light (red)

This light 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.

10. Engine Warning Light (yellow)

This light indicates a non-fatal engine control monitor (ECM) error. Engine will derate, and shutdown may be approaching.

11. Low Brake Pressure Warning Light

A warning light on the dash signals the operator if the accumulator is under 1200 psi, or if a low actuator pressure condition exists. It is normal for the light to come on when starting the machine, but it should go off within 10 seconds. If the warning light stays on there is a problem in the charge circuit, and the system needs to be checked. A warning will also sound if the brake actuator pressure falls below 1200 psi (see item 12).

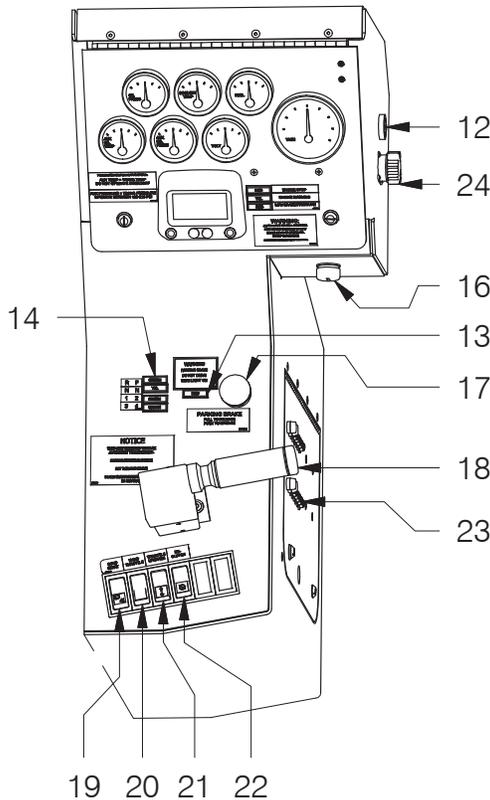


Fig. 3-3 Left Hand Console

12. Low Brake Pressure Warning Alarm

An alarm will sound when the hydraulic pressure in the brake accumulators drops below 1200 psi. See item 11 above. An alarm indicates a serious condition. Correct the malfunction before operating the machine.

13. Parking Brake Indicator Light (red)

This light indicates that the parking brake is ON, and the key switch is ON.

14. Transmission Indicator Lights

These lights indicate the current state of the transmission. Shift the transmission with item 18.

3.3 Operation Controls

16. Key Switch Start

The key switch is used to start and stop the engine and to turn the accessories on and off. This is a four position switch: ACC, OFF, RUN and START. When turning the key clockwise from the center, or OFF position, the first position to the right is RUN. The second 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 operation only.

17. Parking Brake Control

To apply the parking brakes, push the button in. To release the brakes pull the button out.

18. Transmission Direction and Range Control

- Push forward to the “F” position to engage in forward.
- Center in the “N” position for neutral.
- Pull back to the “R” position to engage in reverse.
- Twist the control forward to shift up.
- Twist the control backwards to shift down.

IMPORTANT: Always let up on the throttle slightly when shifting speed ranges. This will significantly reduce shock loads to drivetrain components during shift. Also, you should always reduce engine rpm when downshifting, as you can over-speed the engine.

19. Cold Start Control Switch

This control supplies a measured amount of ether to the intake manifold to aid cold engine starting.

20. Hand Throttle Switch On/Off

Over rides foot throttle. To engage flip switch into the on position. Used with item 21.

NOTE: For engine warm up only.

21. Hand Throttle Up/Down Switch

Adjusts RPM's up or down when adjacent switch (item 20) is engaged.

22. Declutch Control Switch

If the control is ON, the declutch system automatically shifts the transmission into neutral when you apply the service brakes. This allows you to perform all hydraulic functions at any rpm smoothly, without causing converter stall or other unnecessary strains on the brake 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. This control should be left in the ON position for normal operations.

23. Fuses and Circuit Breakers

Electrical Protection. Push to reset. Circuit breakers are located on the side panel of the left hand console. Fuse amperage is noted on decal.

24. Data Link Port

The data link port allows service personnel to get readings from the engine control module (ECM).

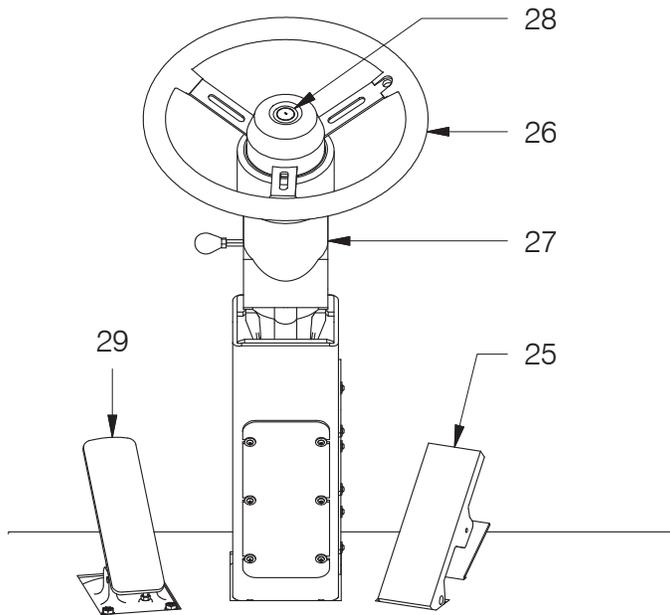


Fig. 3-4 Steering & Pedals

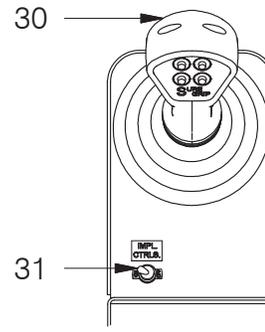
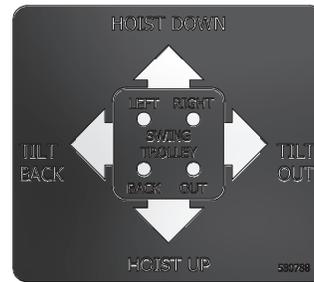


Fig. 3-5 Implement Controls

25. Accelerator Pedal

Foot controlled engine accelerator pedal.

26. Steering Wheel and Column

27. Telescopic and Tilt Steering Column

To move telescopic wheel in or out, pull lever up to release the lock. To tilt steering wheel, push lever down.

28. Horn Button on Steering Column

Center hub of steering wheel contains horn button. Depress to sound horn.

29. Brake Pedal

Will also “declutch” the transmission if the declutch switch (item 22) is ON.

3.4 Implement Controls

30. Hoist and Tilt Joystick

- Single lever (mono-stick) control for hoist and tilt. Use buttons for swing and trolley travel.
- Push the lever forward to lower the carriage.
- Pull the lever back to raise the carriage.
- Move the lever right to tilt out.
- Move the lever left to tilt in.
- Push the top left button to swing the carriage left.
- Push the top right button to swing the carriage right.
- Push the bottom left button to retract the trolley.
- Push the bottom right button to extend the trolley.

31. Implement Control - Shut Off Switch

Place this switch in the OFF position when there is any danger of inadvertently moving the implement control levers during service or repair while the engine is running. With the switch in the OFF position, the implement controls are shut off. On machines with the optional swing-up armrest, lifting the seat control module will also shut off the controls.

3.5 Cab Environmental Controls

- 32. Defrost ON/OFF**
Directs air to the front window. Lift the lever up to turn the defrost on, push it down to turn it off.
- 33. Fan Switch**
This three position switch controls the fan speed, either low, medium, or high.
- 34. Heat / Cool Push-Pull Knob**
This knob controls the temperature climate control. Push the knob in for cooling, pull the knob out for heat.
- 35. Heat / A/C Switch**
This three position switch is either OFF, or set to HEAT or A/C.
- 36. A/C Temperature Knob**
Rotate this knob to control the A/C temperature.
- 37. Fresh / Recirculated Air Selector**
Pull this knob out for recirculated air, push it in for fresh air.

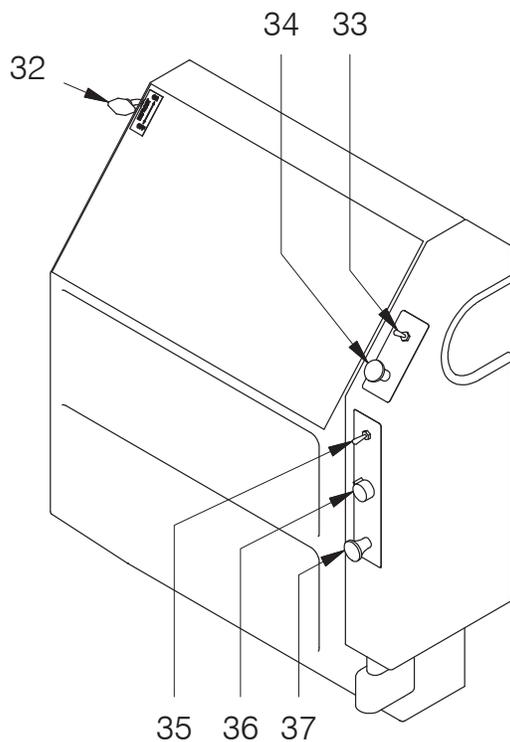


Fig. 3-6 Cab Environmental Controls

3.6 Seat Controls

- 38. Seat Rotate Lever**
This lever locks seat in forward position and allows rotation for operator ingress and egress.
- 39. Seat Slide Release Lever**
This lever allows the seat assembly to move forward and rearward, independent of the mounted joystick.
- 40. Seat Air Suspension Adjustment**
This knob adjusts the seat's air suspension.
- 41. Seatbelt**
The operator should fasten the seatbelt whenever the machine is being operated.
- 42. Right Armrest Assembly**
The right armrest assembly, including the mounted joystick (item 30) swings up to allow clearance for ingress and egress of the operator from the cab. The implement controls will not function when the armrest assembly is raised.

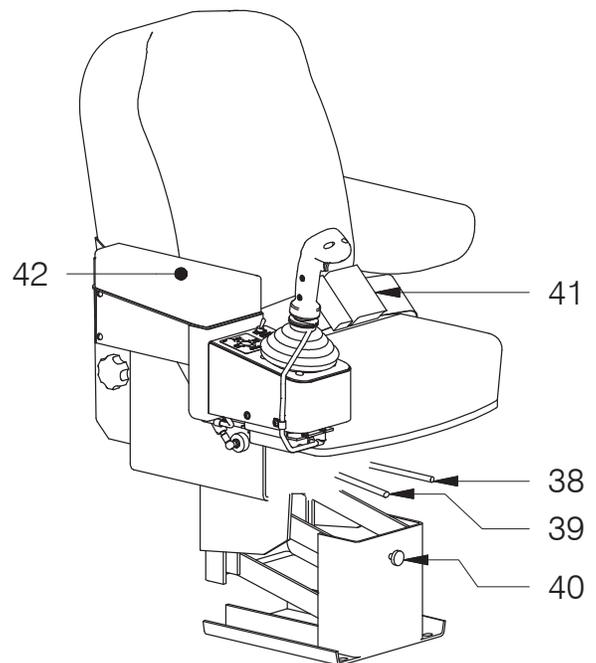


Fig. 3-7 Seat Controls

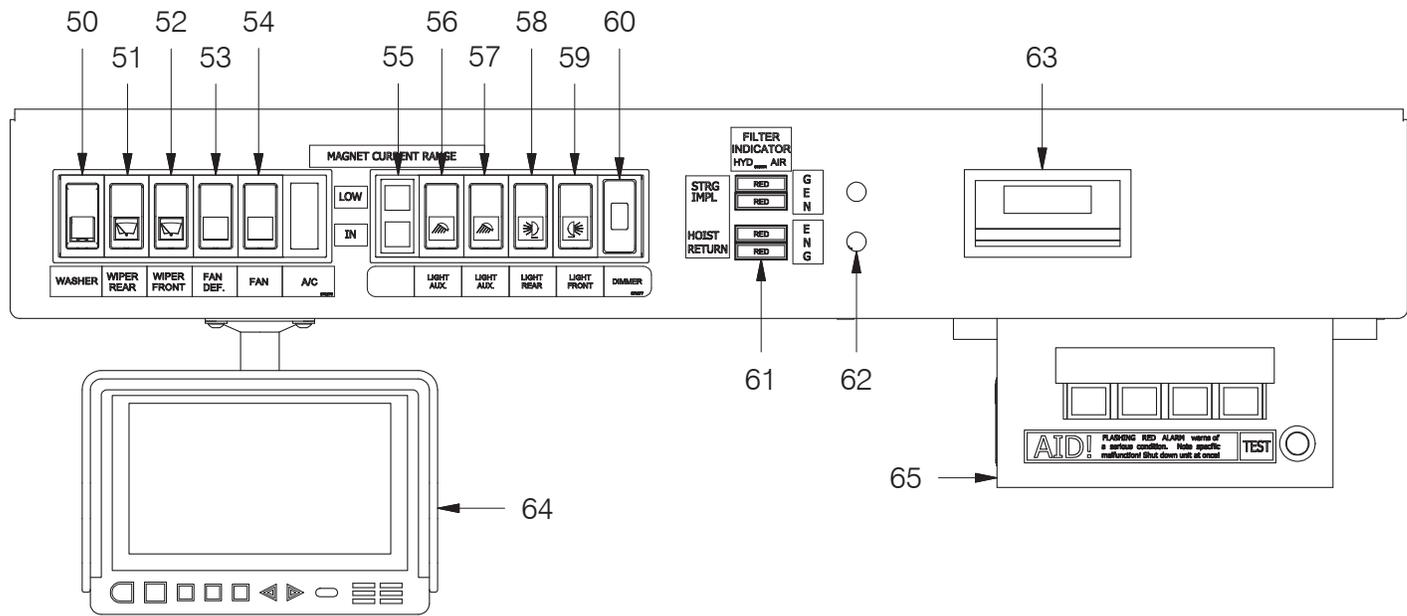


Fig. 3-8 Overhead Controls

3.7 Overhead Controls

50. Windshield Wash Switch
Three position: R-Off-F

51. Rear Windshield Wiper ON / OFF Switch
Three position: Off-L-H

52. Front Windshield Wiper ON / OFF Switch
Three position: Off-L-H

53. Defroster Fan Switch (window mounted fan)
Two position: Off-On
A second switch is located on the fan for low-high.

54. Fan Switch
Two position: Off-On
A second switch is located on the fan for low-high.
Optional defroster fan behind operator.

55. Magnet Current Range Indicator Lights
These lights indicate the state of the electrical current to the electro-lift magnet. The bottom light is green, indicating that the current is IN range. The top light is red, indicating that the current is too LOW.

56. Auxiliary Light Switch (Optional)
Auxiliary light is mounted on the front of the ROPS.

57. Auxiliary Lights Switch (Optional)
ON / OFF switch for rear ROPS mounted lights.

58. Rear Light Switch
Chassis mounted rear lights.

59. Front Light Switch
Cab mounted front lights.

60. Panel Lights Dimmer Control
Dims and brightens rocker switch and filter indicator lamps on the instrument and control panels.

61. Filter Indicator Lights
These lights indicate the condition of the filters. With the machine running and at operation temperature, the green lights should be on. If the red light(s) come on and stay on, filter service is required immediately.

NOTE: In cold operating conditions, these lights may come on and flicker until oil reaches operating temperature. This is normal.

62. Fuses
Monitor System - 5 amp fuse.
Load Indicator - 3 amp fuse.

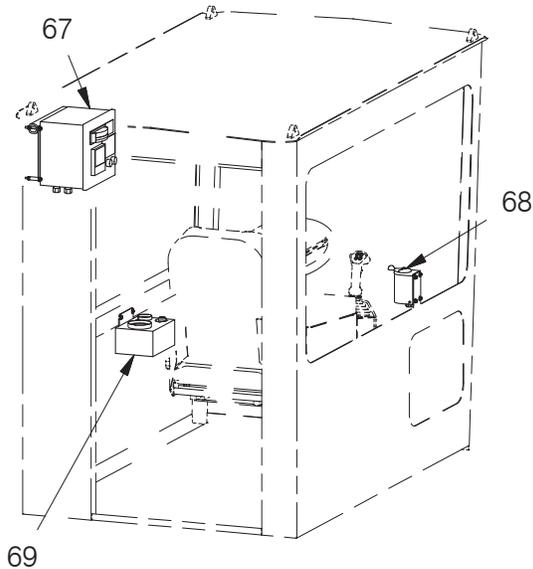


Fig. 3-9 In-Cab Magnet / Generator Controls

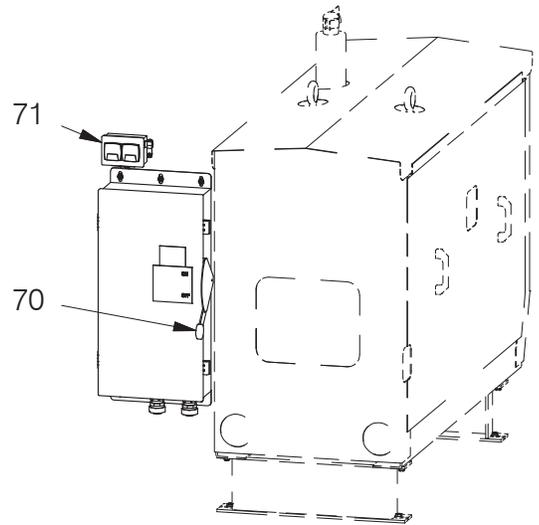


Fig. 3-10 Chassis Magnet / Generator Controls

63. Load Indicator

Indicates the weight of the load. To calculate, multiply the reading by 1000 for the weight of the load in pounds.

64. Camera Monitor

Displays the image transmitted by either of two cameras mounted on the right side of the machine; one camera is aimed to the front, the other to the rear.

65. AID (Alarm Indicating Device) System

This Audio Visual warning system indicates an alarm condition for hydraulic oil temperature or level, or transmission oil temperature or level. An alarm indicates a serious condition. Shut down the machine at once, and correct the malfunction before resuming operation.

66. Dome Light Switch (Not Shown)

ON/OFF switch, mounted on light.

3.8 Magnet / Generator Controls

67. Magnet Monitor

Includes an ammeter and voltmeter that indicate the current and voltage to the magnet during operation. When the GREEN light is illuminated, the current is within normal range. When the RED light is illuminated, the current to the magnet is too low.

68. Master Switch

This two position switch is used to energize the electro-lift magnet. When the switch is on the "LIFT" position, the magnet is energized. When the switch is in the "DROP" position, the magnet is de-energized.

69. Generator Indicator Panel

Includes a tach/hour meter, four function gauge, remote start key switch, and a 2 position throttle switch.

70. Safety Disconnect Switch

This fused switch may be used to disconnect electrical current between the generator and the magnet controls. Refer to drawing WI-1791D-E001 in section 19 of the Winkle Spare Parts & Operating Instructions Manual for details.

71. Magnet Meter Package

Includes an ammeter and a voltmeter, used to indicate the current and voltage to the magnet during operation.

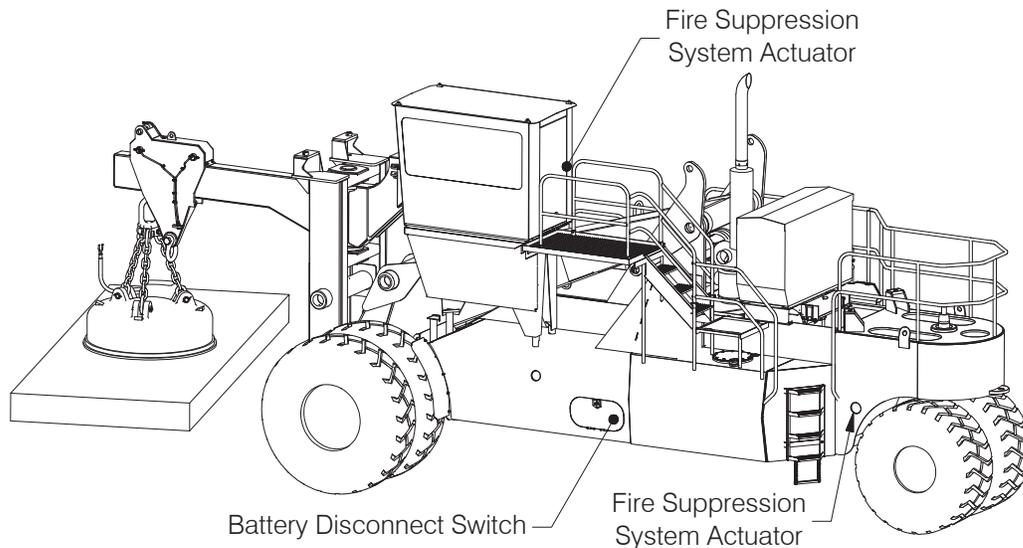


Fig. 3-11 Fire Suppression System Actuators and Battery Disconnect Switch Locations

3.9 Safety Controls

72. Fire Suppression System

Two fire suppression system actuators are provided. Either one will set off the system. One is located in the cab, mounted to the right hand rear wall of the cab. The other is mounted on the chassis, at ground level, just to the right of the left side boarding ladder. See Figure 3-11. Memorize the location of each.

In case of fire, pull the safety pin on the actuator, strike the button, and LEAVE THE VEHICLE. Fire retardant will be released, the engine will shut down and the batteries will be disconnected from the electrical system. 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.

73. Battery Disconnect Switch

The battery disconnect switch is mounted inside the access panel on the left side of the machine. See Fig 3-11, and locate this switch on your machine. 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 and repair, to prevent unauthorized starting or electrical shorts. Turn the switch counterclockwise to disconnect the battery.

NOTE: Allow 30 seconds between ignition key off and battery disconnect off events to avoid erroneous ECM fault code on electronic engines.



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

NOTE: On machines equipped with a fire suppression system, the batteries are automatically disconnected and engine is shut down whenever the system is actuated.

74. Air Filter Indicator

Standard location is mounted on the air cleaner housing. It indicates air filter restriction by showing "red" zone, the element must be serviced as soon as possible. To reset the indicator, press the button on top. See Fig 3-12.

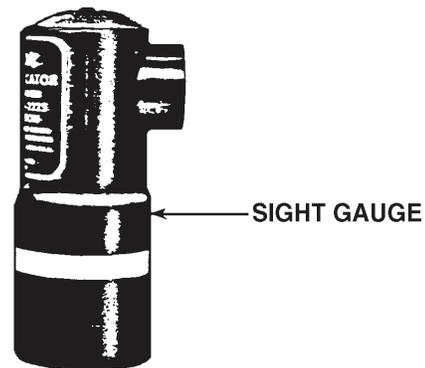


Fig. 3-12 Air Filter Indicator

3.10 Powerview Display Module

General

Your Wagner Steelworker is equipped with a PowerView display module, a multifunctional tool that enables you to view many different engine or transmission parameters and service codes. The system allows you to accurately monitor the modern electronic engine and transmission installed on your Steelworker. The PowerView includes a graphical backlit LCD screen. It has excellent contrast and viewing from all angles. Back lighting can be controlled via menu or external dimmer potentiometer. The display can show either a single parameter or a quadrant display showing four parameters simultaneously. Diagnostic capabilities include fault codes with text translation for the most common fault conditions. The PowerView has four buttons using self-calibrating charge transfer activation technology, which eliminates the concern for pushbutton wear and failure. In addition, operators can navigate the display with ease.

Display Parameters

The following are some of the engine and transmission parameters displayed by the PowerView in English or Metric units, as well as in Spanish, French, or German (when applicable, consult engine or transmission manufacturer for SAE J1939 supported parameters):

- Engine RPM
- Engine Hours
- Machine Hours
- System Voltage
- % Engine Load at the current RPM
- Coolant Temperature
- Oil Pressure
- Fuel Economy
- Throttle Position
- Engine Manifold Air Temperature
- Current Fuel Consumption
- Transmission Oil Pressure
- Transmission Oil Temperature
- Transmission Gear Position
- Active Service Codes
- Stored Service Codes (when supported)
- Set Units for display (English or Metric)
- Engine Configuration Parameters

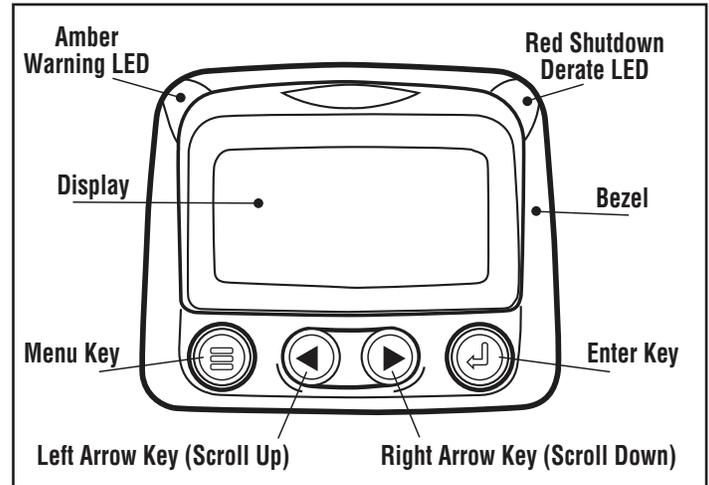


Fig. 3-13 Powerview Faceplate Features

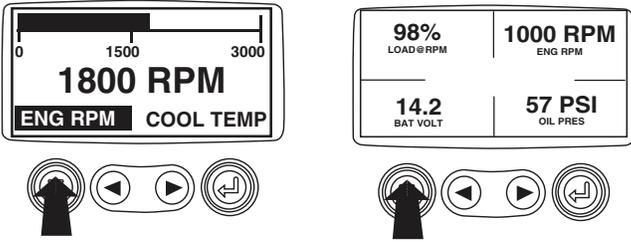
Keypad Functions

The keypad on the PowerView is a capacitive touch sensing system. There are no mechanical switches to wear or stick, and the technology has been time proven in many applications. It operates in extreme temperatures, with gloves, through ice, snow, mud, grease, etc., and it allows complete sealing of the front of the PowerView. The 'key is touched' feedback is provided by flashing the screen. The keys on the keypad perform the following functions:

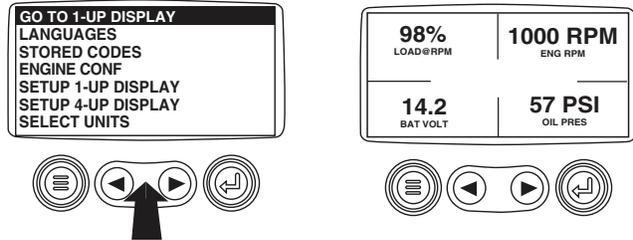
- »  **Menu Key** - The Menu Key is touched to either enter or exit the menu screens.
- »  **Left Arrow** - The Left Arrow Key is touched to scroll through the screen either moving the parameter selection toward the left or upward.
- »  **Right Arrow** - The Right Arrow Key is touched to scroll through the screen either moving the parameter selection toward the right or downward.
- »  **Enter Key** - The Enter Key (also known as Enter Button) is touched to select the parameter that is highlighted on the screen.

Main Menu Navigation

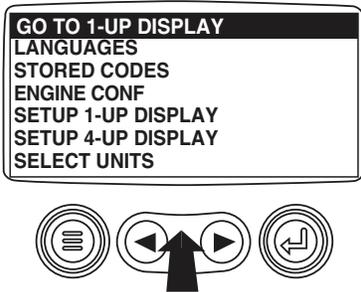
- Starting at the single or four engine parameter display, touch "Menu".



- Touch the "Arrows" to scroll to the desired menu item or touch "Menu" to exit the Main menu and return to the engine parameter display.

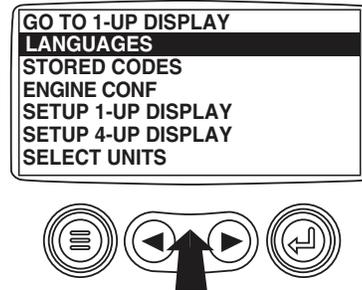


- The first seven items of the "Main Menu" will be displayed. Touching the "Arrow Buttons" will scroll through the menu selection.

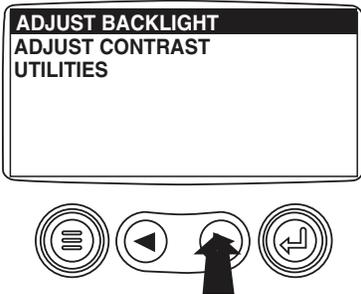


Selecting a Language

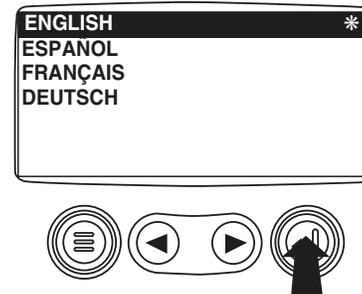
- Starting at the main menu display use the "Arrows" to scroll to the "Language" menu and once highlighted touch the "Enter" button.



- Touching the right arrow button will scroll down to reveal the last items of "Main Menu" screen highlighting the next item down.



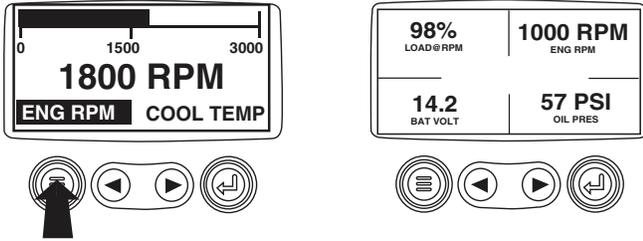
- The language choices will be displayed. Use the "Arrow" buttons to scroll through the selections and touch "Enter" to make a selection.



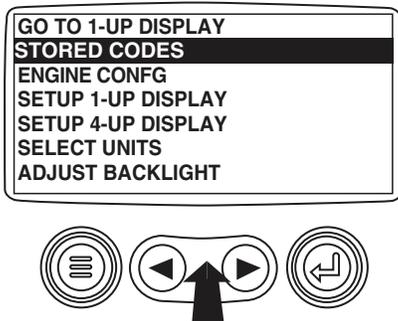
- Now that you have selected the language, touch the "Menu" button to return to the main menu display.

Stored Fault Codes

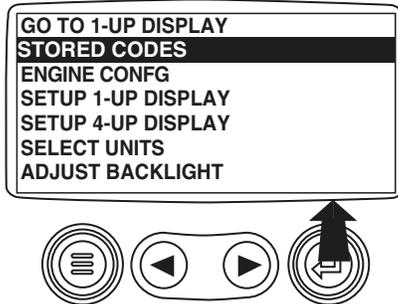
- Starting at the single or the four engine parameter display touch the “Menu button”.



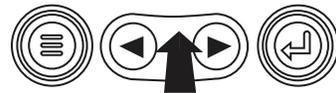
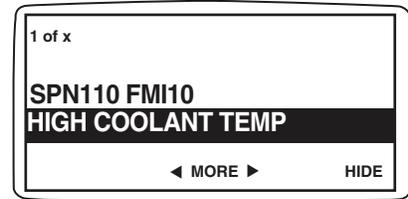
- The main menu will pop up on the display. Use the “Arrow Buttons” to scroll through the menu until the Stored Fault Codes is highlighted.



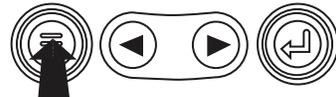
- Once the “Stored Fault Codes” menu item has been highlighted, touch the “Enter Button” to view the “Stored Fault Codes” (when applicable, consult engine or transmission manufacturer for SAE J1939 supported parameters).



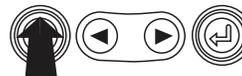
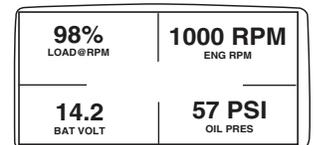
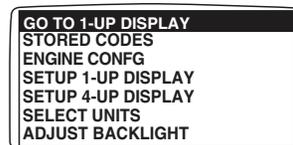
- If the word “MORE” appears above the “Arrow Buttons” there are more stored fault codes that may be viewed. Use the “Arrow Buttons” to scroll to the next Stored Diagnostic Code.



- Touch the “Menu Button” to return to the main menu.

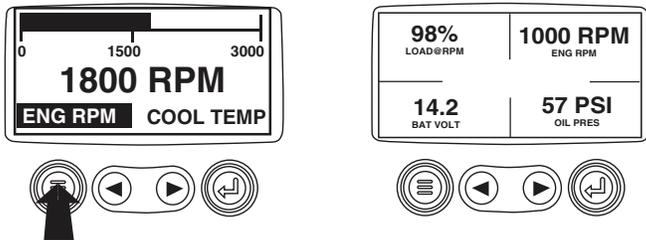


- Touch the “Menu Button” to exit the Main menu and return to the engine parameter display.

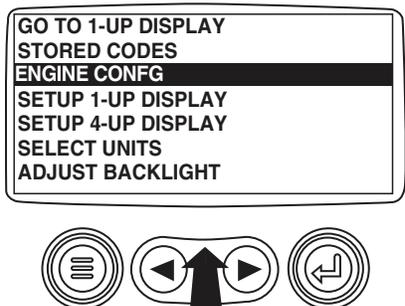


Engine Configuration Data

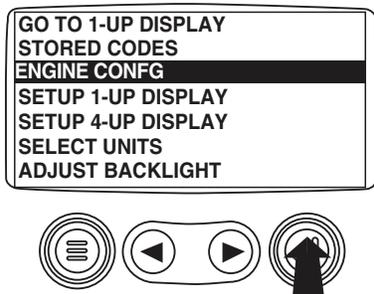
- Starting at the single or four engine parameter display touch the "Menu Button".



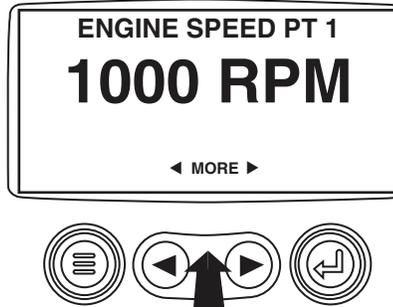
- The main menu will pop up on the display. Use the "Arrow Buttons" to scroll through the menu until the "Engine Configuration" is highlighted.



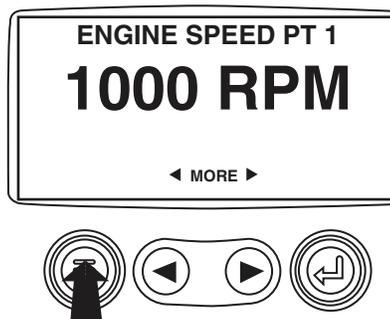
- Once the "Engine Configuration" menu item has been highlighted touch the "Enter Button" to view the engine configuration data.



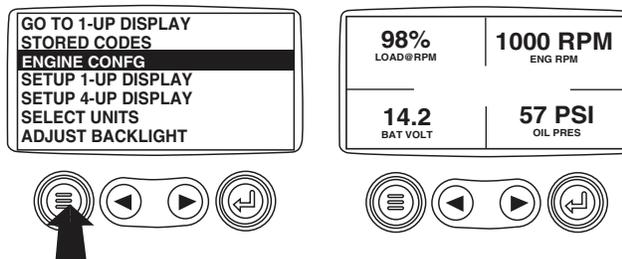
- Use the "Arrow Buttons" to scroll through the engine configuration data.



- Touch the "Menu Button" to return to the main menu.

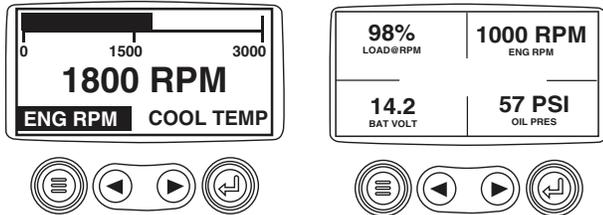


- Touch the "Menu Button" to exit the Main menu and return to the engine parameter display.



Faults and Warnings - Auxiliary Gage Fault

- During normal operation the single or four parameter screen will be displayed.



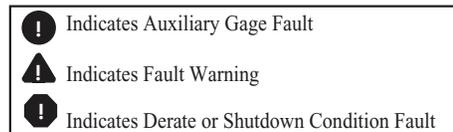
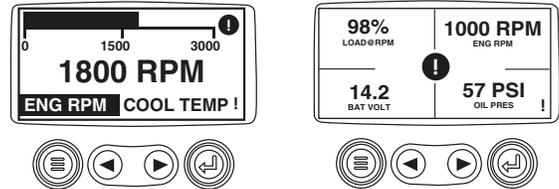
- The PVA Series of auxiliary gages can be attached to the PowerView. These auxiliary gages communicate with the Modbus master PowerView via a daisy-chained RS-485 port. If at any time during system initialization or normal operation an auxiliary gage should fail, the single or four parameter screen will be replaced with the "MLink Gage Fault" message.



- To acknowledge and "Hide" the fault and return to the single or four parameter display, touch the "Enter Button".



- The display will return to the single or four parameter screen.

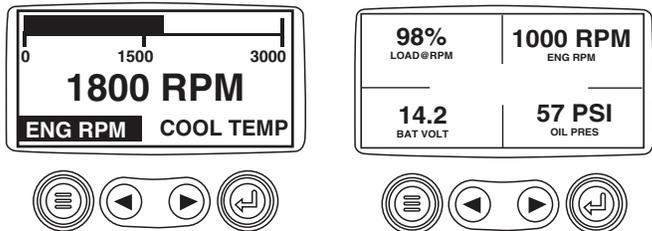


- Touching the "Enter Button" will redisplay the hidden fault. Touching the "Enter Button" once again will hide the fault and return the screen to the single or four parameter display. NOTE: The fault can only be cleared by correcting the cause of the fault condition.

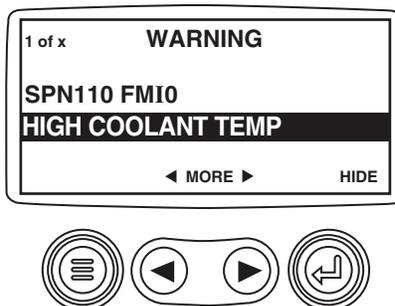


Active Fault Codes

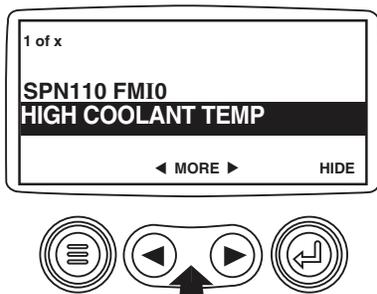
1. During normal operation the single or four parameter screen will be displayed.



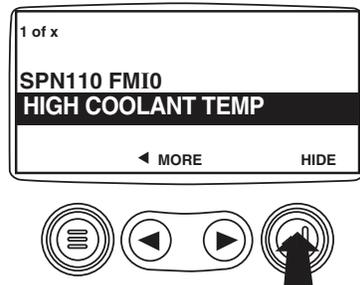
2. When the PowerView receives a fault code from an engine control unit the single or four parameter screen will be replaced with the "Active Fault Codes" message.



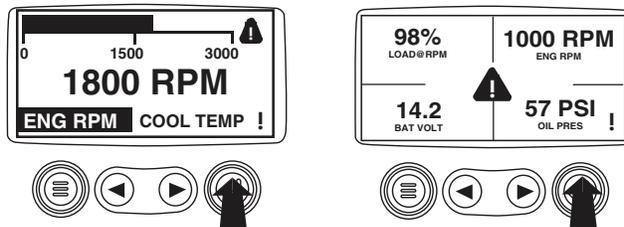
3. If the word "MORE" appears above the "Arrow Buttons" there are more active fault codes that may be viewed. Use the "Arrow Buttons" to scroll to the next "Active Fault Code".



4. To acknowledge and "Hide" the fault and return to the single or four parameter display touch the "Enter Button".



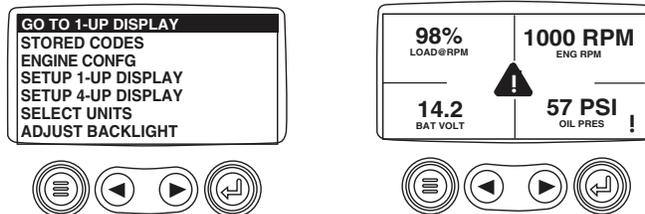
5. The display will return to the single or four parameter display, but the display will contain the "Active Fault" warning icon. Touching the "Enter Button" will redisplay the hidden fault.



6. Touching the "Enter Button" once again will hide the fault and return the screen to the single or four parameter display.

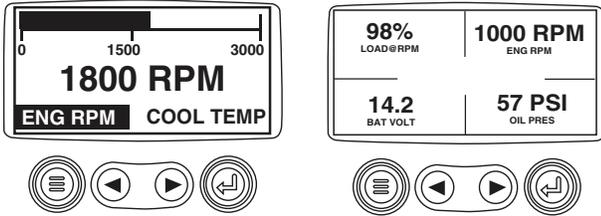


7. The Single or Four parameter screen will display the fault icon until the fault condition is corrected. NOTE: Ignoring active fault codes could result in severe engine damage.

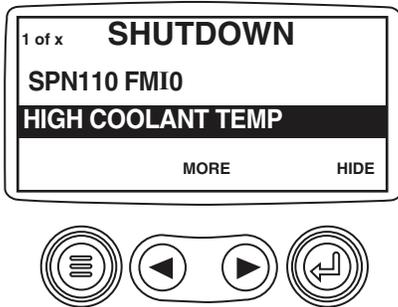


Shutdown Codes

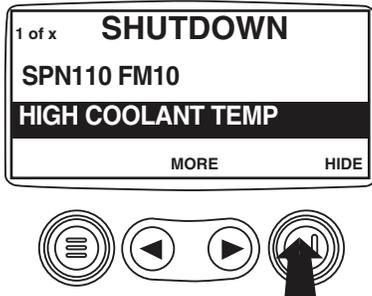
1. During normal operation the single or four parameter screen will be displayed.



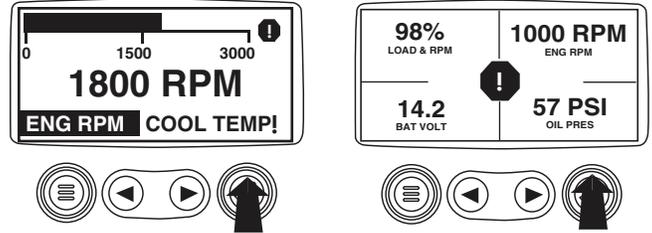
2. When the PowerView receives a severe fault code from an engine control unit the single or four parameter screen will be replaced with the "Shutdown!" message.



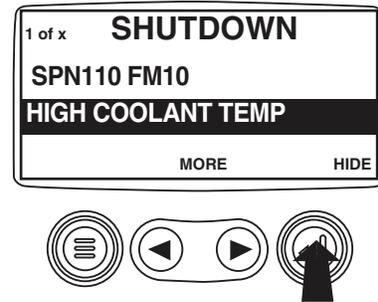
3. To acknowledge and "Hide" the fault and return to the single or four parameter display touch the "Enter Button".



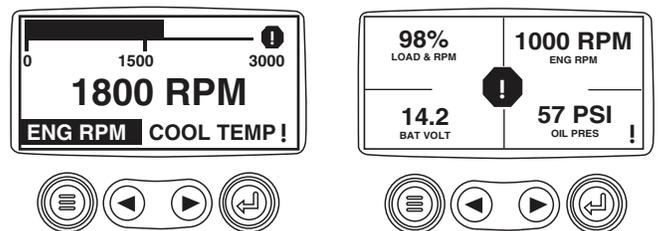
4. The display will return to the single or four parameter display, but the display will contain the "Shut Down" icon. Touching the "Enter Button" will redisplay the hidden fault.



5. Touching the "Enter Button" once again will hide the fault and return the screen to the single or four parameter display.

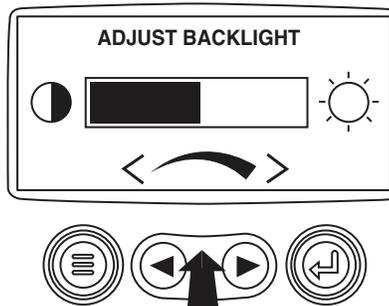
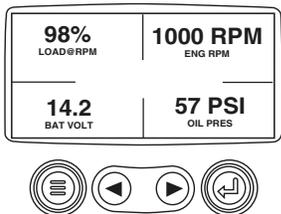
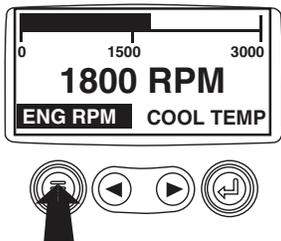


6. The Single or Four parameter screen will display the fault icon until the fault condition is corrected. NOTE: Ignoring active fault codes could result in severe engine damage.

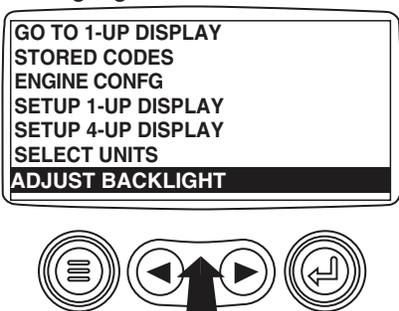


Back Light Adjustment

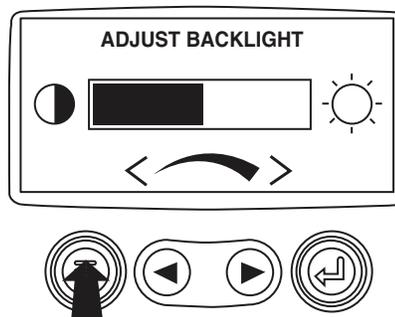
- Starting at the single or four engine parameter display touch the "Menu Button".
- Use the "Arrow Buttons" to scroll through the menu until the "Adjust Backlight" is highlighted.
- Once the "Adjust Backlight" menu item has been highlighted touch the "Enter Button" to activate the "Adjust Backlight" function.
- Use the "Arrow Buttons" to select the desired backlight intensity.



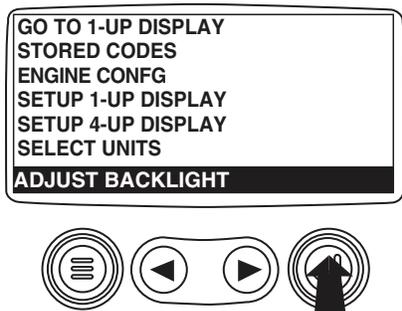
- The main menu will pop up on the display. Use the "Arrow Buttons" to scroll through the menu until the "Adjust Backlight" is highlighted.



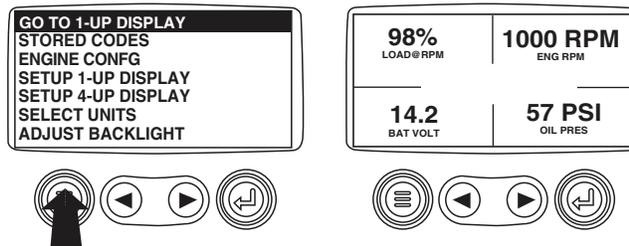
- Touch the "Menu Button" to return to the main menu.



- Once the "Adjust Backlight" menu item has been highlighted touch the "Enter Button" to activate the "Adjust Backlight" function.

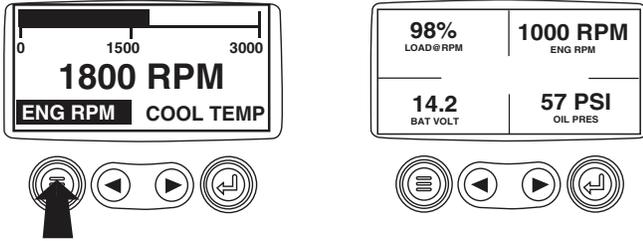


- Touch the "Menu Button" to exit the Main menu and return to the engine parameter display.

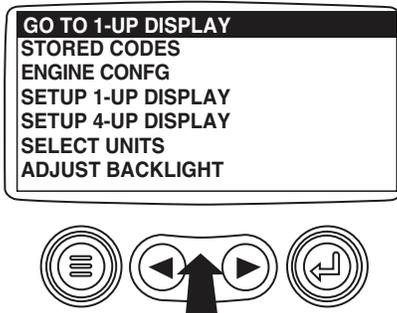


Contrast Adjustment

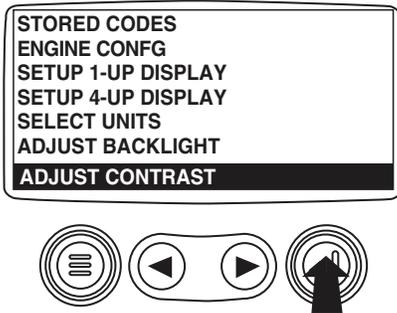
- Starting at the single or four engine parameter display, touch the "Menu Button".
- Use the "Arrow Buttons" to select the desired contrast intensity.



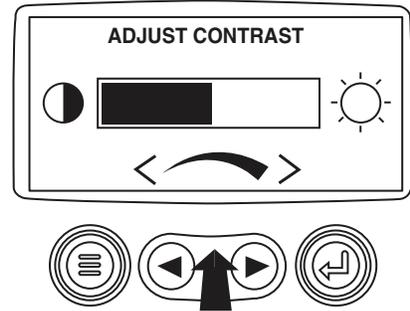
- The main menu will pop up on the display. Use the "Arrow Buttons" to scroll through the menu until "Adjust Contrast" is highlighted.



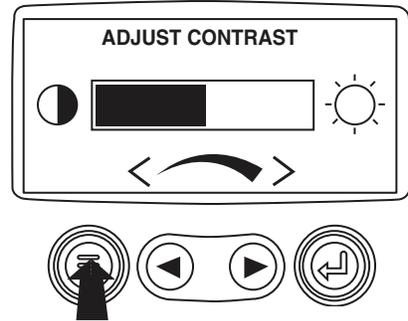
- Once the "Adjust Contrast" menu item has been highlighted touch the "Enter Button" to activate the "Adjust Contrast" function.



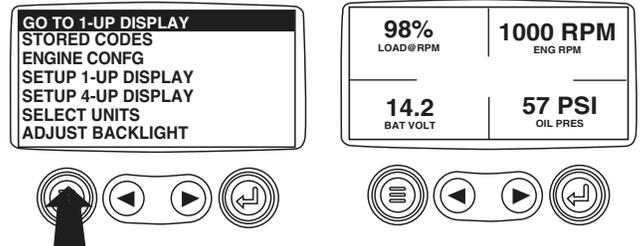
- Use the "Arrow Buttons" to select the desired contrast intensity.



- Touch the "Menu Button" to return to the main menu.

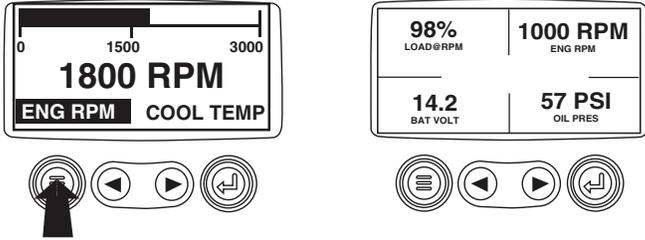


- Touch the "Menu Button" to exit the Main menu and return to the engine parameter display.

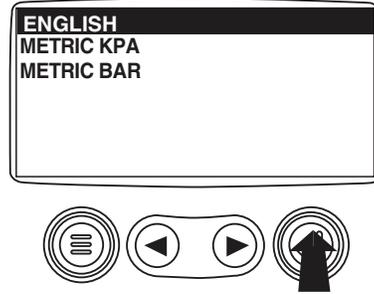


Select Units

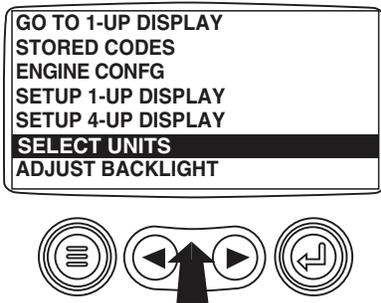
1. Starting at the single or four engine parameter display touch the "Menu Button".



5. Touch the "Enter Button" to select the highlighted units.



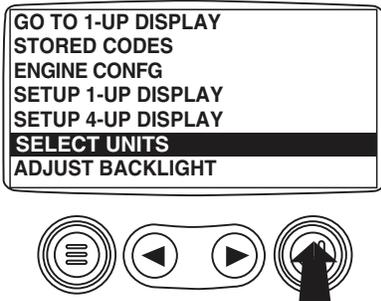
2. The main menu will pop up on the display. Use the arrow buttons to scroll through the menu until the "Select Units" is highlighted.



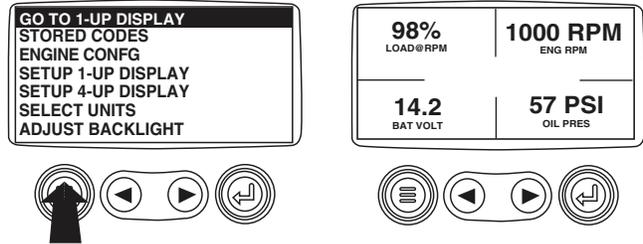
6. Touch the "Menu Button" to return to the "Main Menu".



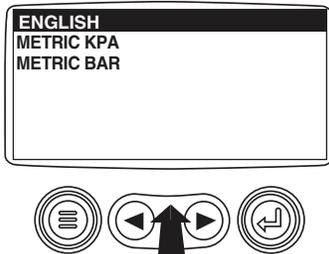
3. Once the "Select Units" menu item has been highlighted touch the "Enter Button" to access the "Select Units" function.



7. Touch the "Menu Button" to exit the Main menu and return to the engine parameter display.

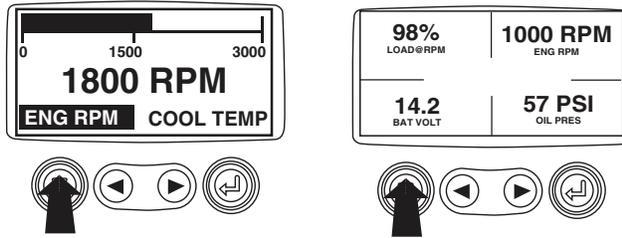


4. Use the arrows to highlight the desired units. "English" for Imperial units i.e. PSI, °F or Metric kPa, Metric Bar for IS units i.e. kPa, Bar, °C.

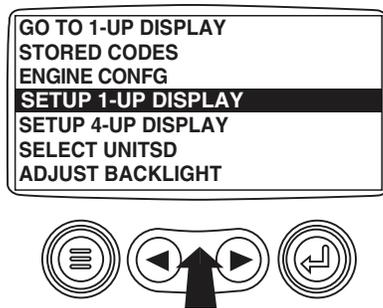


Setup 1-Up Display

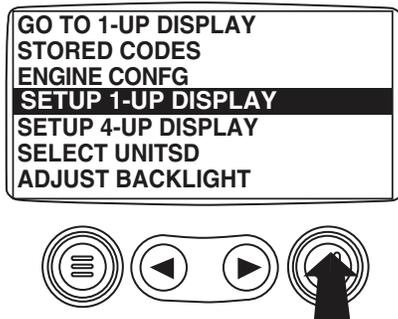
- Starting at the single engine parameter display, touch the "Menu Button".



- The main menu will pop up on the display. Use the "Arrow Buttons" to scroll through the menu until the "Setup 1-up Display" is highlighted.



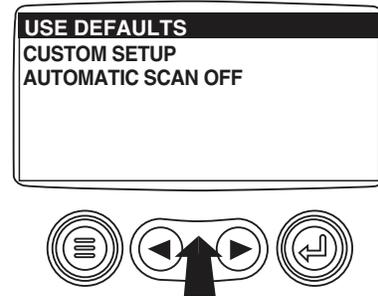
- Once the "Setup 1-up Display" menu item has been highlighted touch the "Enter Button" to access the "Setup 1-up Display" function.



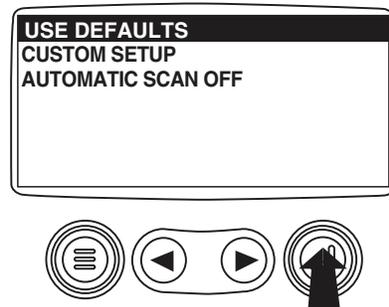
- Three options are available for modification of the 1-Up display.

- Use Defaults** – This option contains a set of engine parameters: Engine Hours, Engine RPM, System Voltage, Battery Voltage, % Engine Load at Current RPM, Coolant Temperature, Oil Pressure.
- Custom Setup** – This option allows for the modification of what parameter, the number of parameters, and the order in which the parameters are being displayed.
- Automatic Scan** – Selecting the scan function will cause the 1-Up Display to scroll through the selected set of parameters one at a time, momentarily pausing at each.

- Use Defaults** - To select "Use Defaults" use the arrow buttons to scroll to and highlight "Use Defaults" in the menu display..

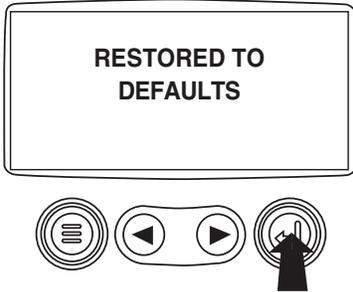


- Touch the "Enter Button" to activate the "Use Defaults" function.

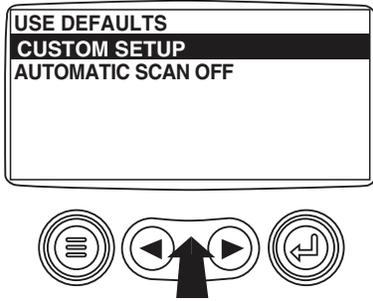


Setup 1-Up Display (Cont)

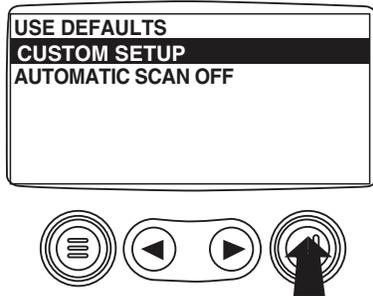
7. A message indicating the “Single Engine” parameter display parameters are reset to the factory defaults will be displayed, then the display will return to the “Custom Setup” menu.



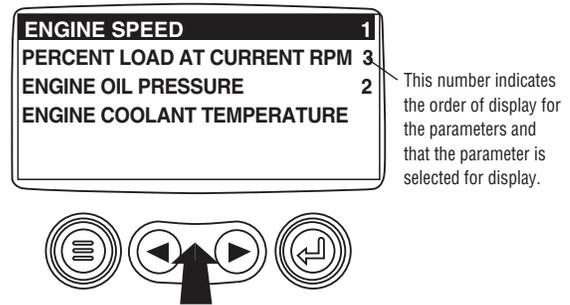
8. **Custom Setup** - To perform a custom setup of the 1-Up Display, use the arrow buttons to scroll to and highlight “Custom Setup” on the display.



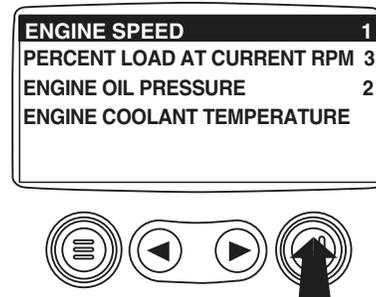
9. Touching the “Enter Button” will display a list of engine parameters.



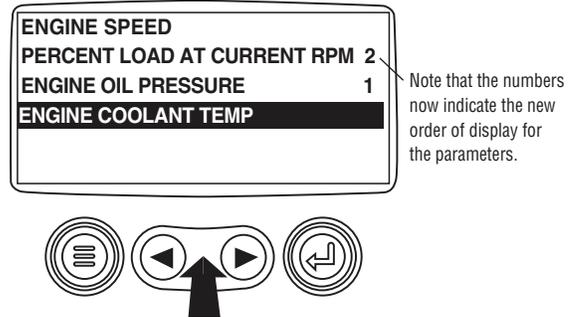
10. Use the “Arrow Buttons” to scroll to and highlight a selected parameter (parameter with a # symbol to right of it).



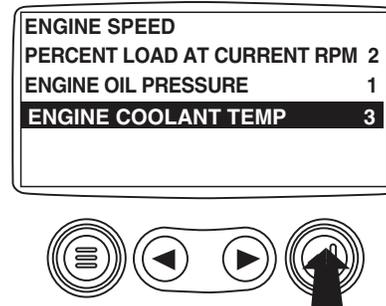
11. Touch the “Enter Button” to deselect the selected parameter removing it from the list of parameters being displayed on the 1-up display.



12. Use the “Arrow Buttons” to scroll and highlight the desired parameter that has not been selected for display.



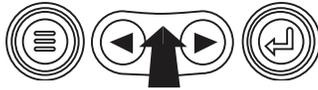
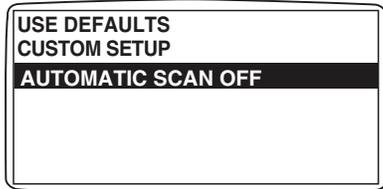
13. Touch the “Enter button” to select the highlighted parameter for inclusion in the Single Engine Parameter Display.



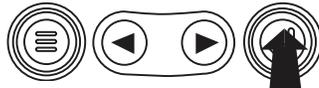
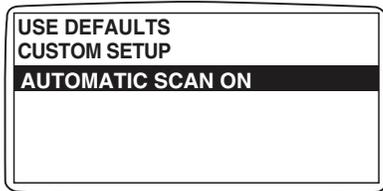
Setup 1-Up Display (Cont)

14. Continue to scroll and select additional parameters for the custom 1-Up Display. Touch the "Menu button" at any time to return to the "Custom Setup" menu.

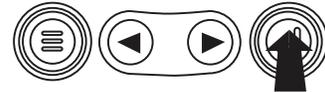
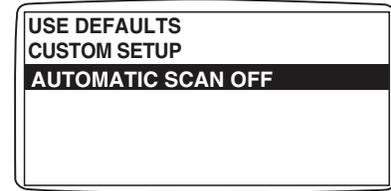
15. **Automatic Scan** - Selecting the scan function will cause the 1-Up Display to scroll through the selected set of parameters one at a time. Use the "Arrow Buttons" to scroll to the "Automatic Scan" function.



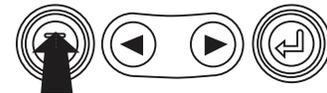
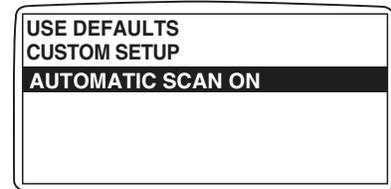
16. Touching the "Enter Button" toggles the "Automatic Scan" function on.



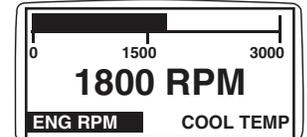
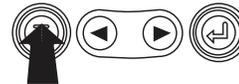
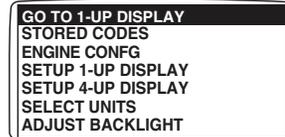
17. Touching the "Enter Button" again toggles the "Automatic Scan" function off.



18. Once the "Use Defaults", "Custom Setup" and "Automatic Scan" functions have been set, touch the "Menu Button" to return to the main menu.

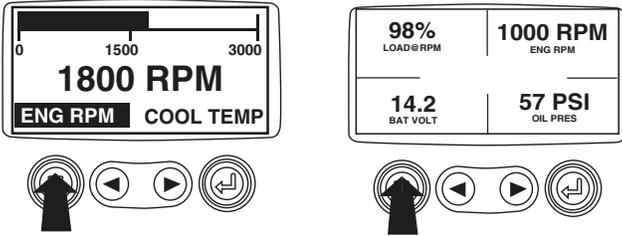


19. Touch the "Menu Button" to exit the Main menu and return to the engine parameter display.

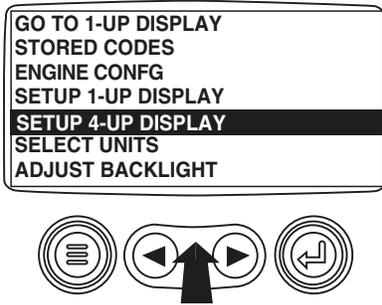


Setup 4-Up Display

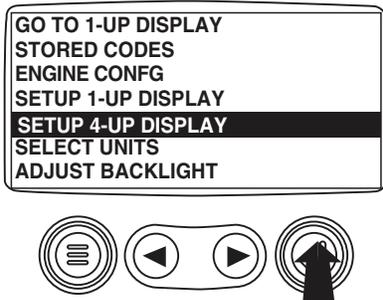
- From the single or four engine parameter display touch the "Menu Button".



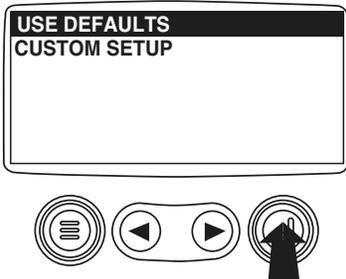
- The main menu will pop up on the display. Use the "Arrow Buttons" to scroll through the menu until the "Setup 4-Up Display" is highlighted.



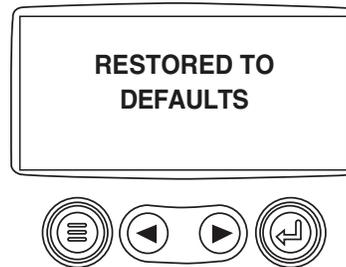
- Once the "Setup 4-Up Display" menu item has been highlighted touch the "Enter Button" to activate the "Setup 4-Up Display" menu.



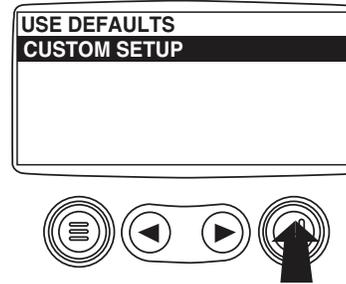
- Touch the "Enter Button" to activate the "Use Defaults" function. This action will reset the unit to the factory default.



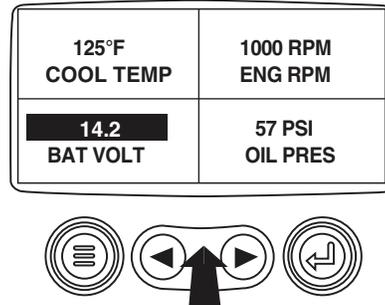
- The "Use Defaults" screen will be displayed during the resetting period then will automatically return to the "Setup 4-Up Display" menu.



- Select the "4-Up Custom Setup" from the "4-Up Setup" menu.



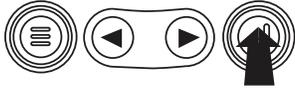
- The quadrant with the backlit parameter value is the current selected parameter. Use the "Arrow Buttons" to highlight the parameter value in the quadrant you wish to place a new parameter.



Setup 4-Up Display (Cont)

8. Touch the “Enter Button” and a list of parameters will appear.

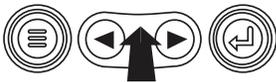
125°F COOL TEMP	1000 RPM ENG RPM
14.2 BAT VOLT	57 PSI OIL PRES



9. The parameter that is highlighted is the selected parameter for the screen. Use the “Arrow Buttons” to highlight the new parameter to be placed in the quadrant selected in the previous screen.

ENGINE SPEED	3
ENGINE HOURS	
ENGINE COOLANT TEMPERATURE	1
BATTERY POTENTIAL	
ENGINE OIL TEMPERATURE	2
ENGINE OIL PRESSURE	4

The number to the right of the parameter indicates the quadrant in which it is displayed.
 1. = Upper Left Quadrant
 2. = Lower Left Quadrant
 3. = Upper Right Quadrant
 4. = Lower Right Quadrant



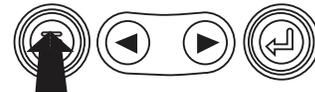
10. Touch the “Enter Button” to change the selected parameter in the quadrant to the new parameter.

ENGINE SPEED	3
ENGINE HOURS	
ENGINE COOLANT TEMPERATURE	1
BATTERY POTENTIAL	2
ENGINE OIL TEMPERATURE	
ENGINE OIL PRESSURE	4



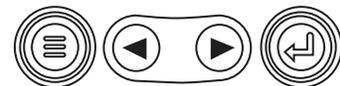
11. Use the “Menu Button” to return to the “4-UP Custom Setup” screen.

ENGINE SPEED	3
ENGINE HOURS	
ENGINE COOLANT TEMPERATURE	1
BATTERY POTENTIAL	
ENGINE OIL TEMPERATURE	2
ENGINE OIL PRESSURE	4



12. The parameter in the selected quadrant has changed to the parameter selected in the previous screen.

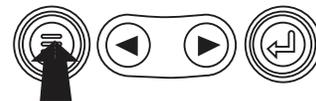
125°F COOL TEMP	1000 RPM ENG RPM
143°F OIL TEMP	57 PSI OIL PRES



13. Repeat the parameter selection process until all spaces are filled.

14. Touch the “Menu Button” to return to the main menu.

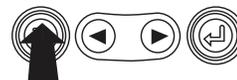
125°F COOL TEMP	1000 RPM ENG RPM
143°F OIL TEMP	57 PSI OIL PRES



15. Touch the “Menu Button” to exit the Main menu and return to the engine parameter display.

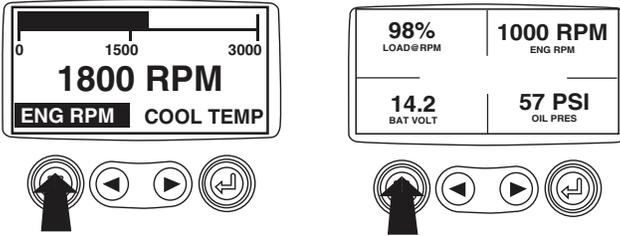
GO TO 1-UP DISPLAY
STORED CODES
ENGINE CONFG
SETUP 1-UP DISPLAY
SETUP 4-UP DISPLAY
SELECT UNITS
ADJUST BACKLIGHT

125% COOL TEMP	1000 RPM ENG RPM
143°F OIL TEMP	57 PSI OIL PRES

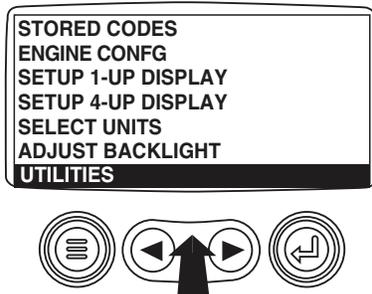


Utilities (Information and troubleshooting)

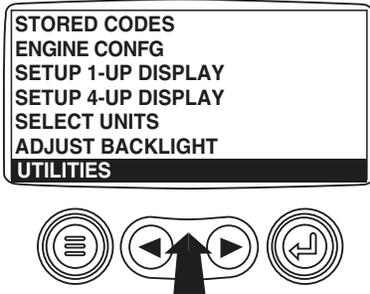
- Starting at the single or four engine parameter display, touch the "Menu button".



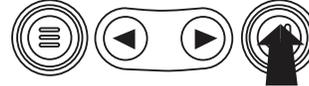
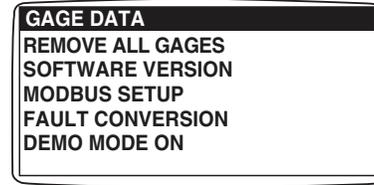
- The main menu will be displayed. Use the "Arrow buttons" to scroll through the menu until the "Utilities" is highlighted.



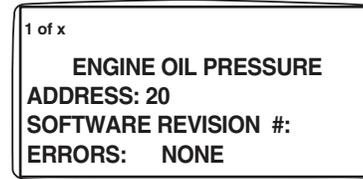
- Once the "Utilities" menu item has been highlighted, touch the "Enter Button" to activate the "Utilities" functions.



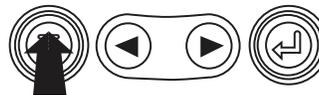
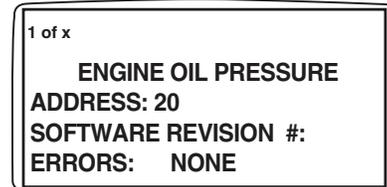
- Touch "Select" to enter the "Gage Data" display. When "Gage Data" is selected the PowerView will communicate with the analog gages at a fixed rate of 38.4k Baud, 8 data bits, no parity check, 1 stop bits, half duplex.



- Use the "Arrow buttons" to scroll through the items or touch "Menu" to return to the "Utilities" menu.



- Touch "Menu Button" to return to the "Utilities" menu.



Utilities (Information and troubleshooting, cont)

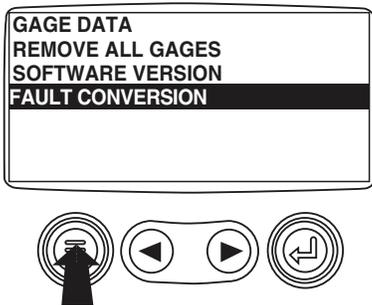
7. Use the “Arrows” to highlight “Remove All Gages”. Touch “Select” to clear gage data from memory. It takes a moment to clear all gages.



8. When the gage data has cleared, the display automatically returns to the “Utilities” menu. Scroll to “Software Version”. Touch “Select” to view the software version currently in the PowerView.



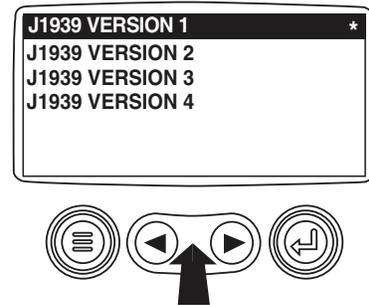
9. Touch “Menu” to return to “Utilities”. Highlight “Fault Conversion” using the “Arrows”. Touch “Select” to enter the Fault conversion menu.



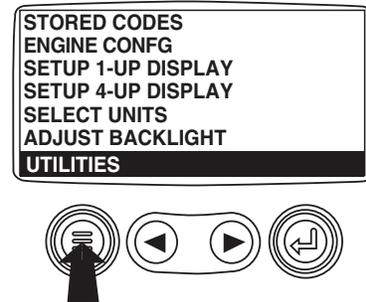
10. Use the “Arrows” to scroll and highlight the version then touch “Select” and an asterisks appears to the right of the selection.

NOTE: There are four (4) different methods for converting fault codes. The PowerView always looks for J1939 Version 4 and can be set to use one of the 3 other J1939 versions. Most engine ECU's use Version 4, therefore in most cases adjustment of this menu option will not be required.

Upon receiving an unrecognizable fault, change to a different J1939 Version. If the fault SPN does not change when the version is changed, the ECU generating the fault is using Fault Conversion method 4. If the SPN number does change but is still unrecognizable, try changing to another J1939 Version not yet used and continue to check the SPN number.

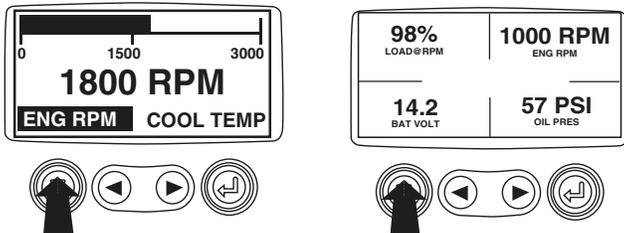


11. Touch the “Menu” button to return to “Utilities” menu. Touch the “Menu” button again to to return to the “Main” menu.

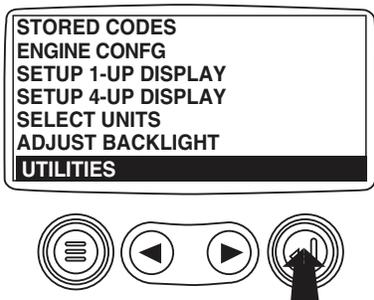


MODBUS Setup

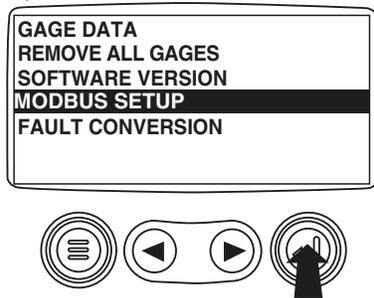
- Starting at the single or four engine parameter display, touch the "Menu button".



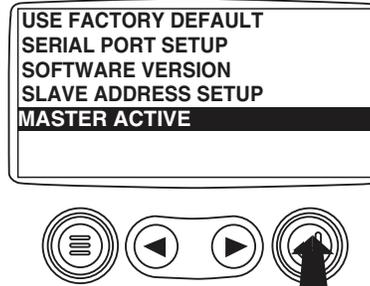
- The main menu will be displayed. Use the "Arrow buttons" to scroll through the menu until the "Utilities" is highlighted, then touch "Enter".



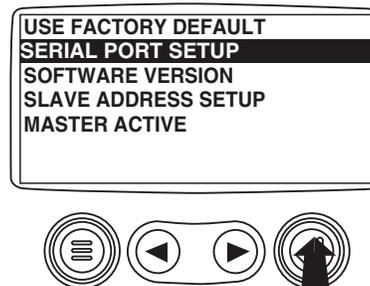
- Once in the "Utilities" menu use the "Arrows" to scroll through the menu until the "Modbus Setup" menu is highlighted, then touch "Enter".



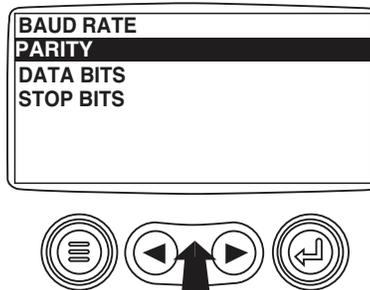
- Use the "Arrows" to scroll down to and highlight either the "Slave Active or Master Active" modes. Touch the "Enter" button to toggle between master and slave.



- Use the "Arrows" to scroll to the "Serial Port" menu to highlight it, then touch "Enter".



- Use the "Arrow" button to scroll to each selection to configure the MODBUS values for your application.



- When finished, touch "Menu" to return to the previous screen.

Functional Description

4.1 Introduction

Wagner steelworkers provide the capability to handle steel slabs up to 100,000 lbs in weight.

The functions and capabilities of the steelworker are the result of several systems working together: Power Unit, Drivetrain, Hydraulic System, Electrical System, and the Operator.

4.2 Power Unit

Engine

The engine is the heart of the machine. These units are equipped with diesel engines carefully selected for the intended use of the vehicle. They will provide the power needed for operation. Almost every system on the vehicle depends on the engine. It provides the power for the drive train, hydraulic system, and electrical system.

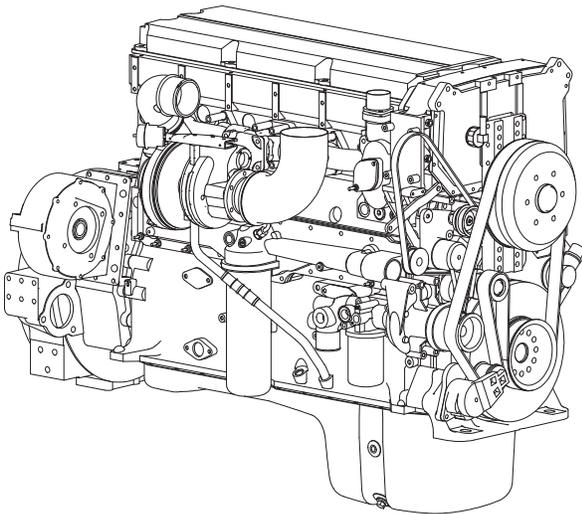


Fig. 4-1 Engine (Cummins QSX Shown)

Torque Converter

Located between the engine and transmission, the torque converter allows the engine and transmission to spin independently by using a chamber filled with oil. That oil is spun by a centrifugal pump, attached to the engine, putting the oil into motion. That motion is then captured by a turbine attached to the transmission causing it to spin. This allows the vehicle to be stopped without shutting off the engine or depressing a clutch pedal.

Air Intake System

The air intake system is critical to the life of the engine, it prevents dust and debris from entering the engine air system causing premature engine wear and possible failure. When a two stage, dry type cleaner is used, both the outer and inner elements are required to fully protect the engine from contamination.

4.3 Drivetrain

Transmission

The transmission changes the gearing from the engine to the wheels. It allows the machine to move forward, run in neutral, or to move in reverse. It also allows the vehicle to move at a faster speed because it shifts into different gears allowing the engine to run at a lower rpm, yet spin the wheels faster. An engine can only spin a certain rpm before damage is done. Without being able to change gears the speed at which the machine is traveling just before that point would be the maximum speed of the vehicle.

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.



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.

Note: Clutch pressure should always be between 180 and 220 PSI. Reference Service Manual.

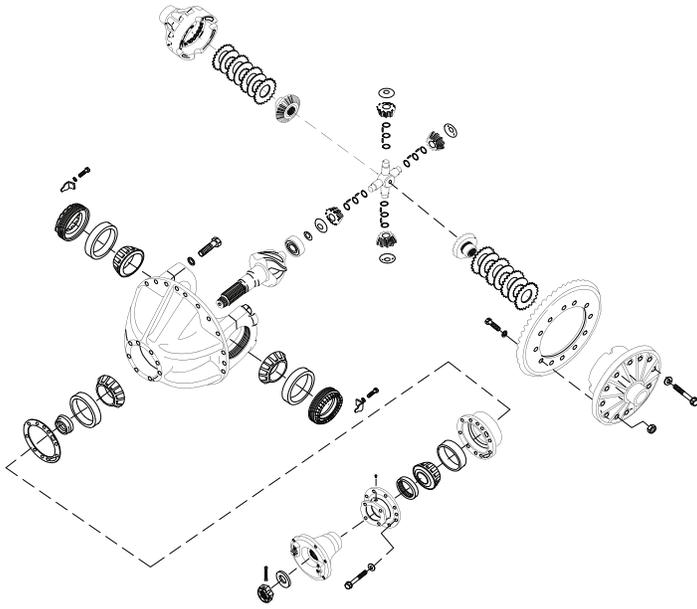


Fig. 4-2 Differential Assembly

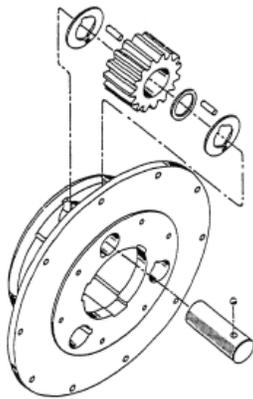


Fig. 4-3 Planet Assembly

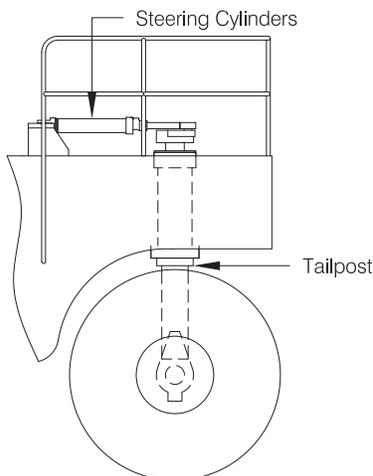


Fig. 4-4 Tailpost Assembly

Drivelines

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

Differential

The differential is what converts the rotational energy from the engine into rotational energy that drives the wheels. In order to do this a series of gears is used to transfer the motion from being perpendicular to that of the wheels into motion that powers the wheels. These gears reduce the number of rotations from the engine to the wheels, and allows the wheels on each side of the vehicle to spin at different rates necessary to make turns.

Planet Assembly

The planet assembly is the final gearing reduction between the engine and the wheels. It is located at the end of the axles, mounting flush with the hub. The planet has three planet gears which are driven by a sun gear attached to the axle shaft. The planet assembly is bolted to the hub causing it to spin much slower than the original input speed from the differential.

Tailpost

The tailpost is what allows the steelworkers to make turns. With the rear wheels mounted to it at ground level, the tailpost is also attached to the chassis of the machine and to the steering cylinders. This post rotates when the hydraulic steering cylinders are activated, causing the machine to turn.

4.4 Hydraulic System

Steering

The steering system consists of the steering control unit and a flow amplifier valve.

When the steering unit is activated, a controlled oil flow is directed to the flow amplifier valve. This oil flow is amplified and the total flow is directed to the steering cylinders.

The steering unit provides a fixed displacement of oil per revolution of the steering wheel and the amplification factor of the flow divider valve is 8. Therefore, total oil output is eight times the output of the steering control unit.

With this system it is possible to combine the steering and working hydraulics. The priority valve ensures that the steering has first priority on oil flow from the hydraulic pump. The oil flow not used for steering is then sent via the "EF" line (excess flow) to the working hydraulics. If the steering wheel is not turned, the entire oil flow is directed to the working hydraulics with minimal pressure loss.

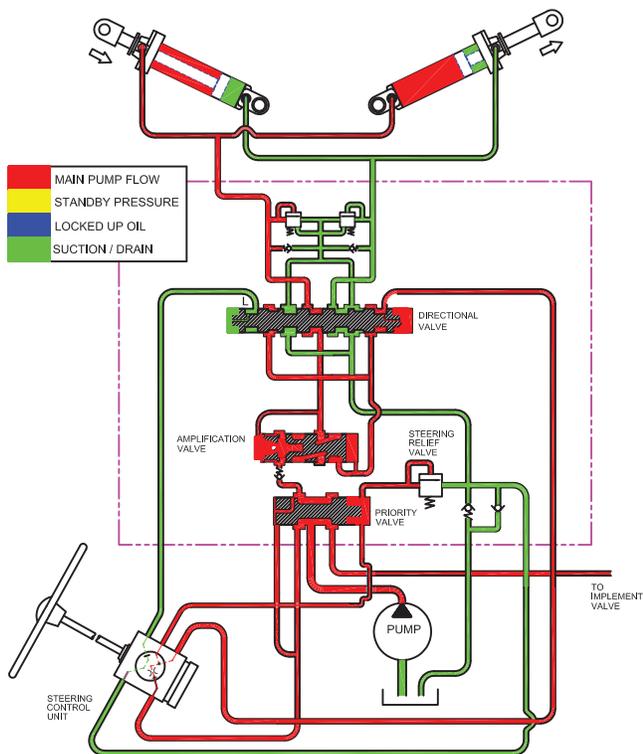


Fig. 4-5 Steering System (Right Turn)

Implements

The hydraulic system is what provides the capability for your steelworker to perform many operations. When the hydraulic pumps are activated, they move hydraulic oil from one area to another. This fluid is non-compressible; therefore, it will occupy the same volume as before the system is actuated. As the oil is moved, the force is multiplied by changing the diameter of the line it is moved through. This allows work to be done with much less effort. These pumps have a primary function, and if that function is being used, the pump output is directed directly to that action. If the primary function is not in use, the flow is then directed to aid other functions which are being used. Accumulators are used to aid the hydraulic pumps. They store a certain amount of fluid under a preset pressure which is released when needed. These accumulators are charged with nitrogen to apply the necessary pressure to the hydraulic fluid.

Declutch

The Declutch system, when engaged, automatically shifts the transmission into neutral when the brakes are applied. This allows more power to be provided to the implements (hoist, tilt, etc). Because the power is not being unnecessarily shared, it allows the machine to be more productive. It is controlled by a pressure switch in the brake line which sends an electronic signal to the transmission. The transmission then shifts into neutral.

The principle applied to the controlled operation of this system is called "load sensing." As the name suggests, it is a system in which the load is sensed or registered. The sensed signal is used, in this example, to control the priority valve in the flow amplifier valve so that oil flow and oil pressure precisely match momentary demands.

Service Brakes

Wagner steelworkers use a hydraulically applied service disc brake. It uses a fixed caliper with a floating disc, with pistons on one side of the disc. A mineral oil based fluid is used as brake fluid.

Parking Brake

Wagner steelworkers are equipped with spring applied / hydraulically released parking brakes. Without the engine running, the operator may release the brakes approximately six times before losing brake hydraulic pressure.

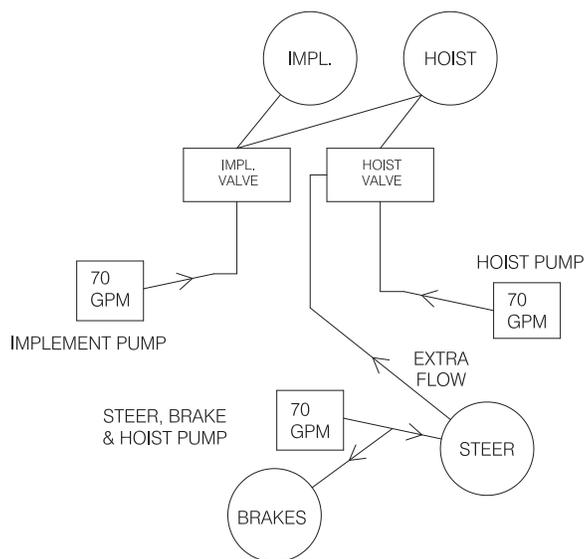


Fig. 4-6 Hydraulic Flow Chart

4.5 Electrical System

Batteries

Your Wagner's electrical system is powered by two 12 volt lead acid batteries connected in series. At 0° F these batteries supply 1300 cranking amps. They are 20.75" x 11" x 9.63" and weigh approximately 130 lbs.

Ignition

The ignition system uses an electric starting motor, activated with a key switch, much like the one on your personal vehicle.

Gauges

The gauges in your vehicle are powered through the electrical system. They must receive an electrical signal to provide a reading.

The Powerview is a little more complex. This instrument displays a variety of information to the operator. This gauge will also display vital information, from the engine, for service personnel to use at a later time.

Controls

Many of the operator's controls are electronic in nature. The transmission control stick must send electronic information to the transmission; the implement stick does the same for the hydraulic system. The throttle controls, both hand and foot, are also part of the electrical system.

Lights

Standard and optional external lighting groups enhance safety by providing illumination of surroundings during night time and adverse weather conditions. Similarly, interior lighting provides the operator with a visual reference of machine controls and instrumentation. Exterior lighting has the added benefit of equipment visibility to ground based personnel.

Filter Indicator Lights

These lights keep you informed on the condition of your on machine filters. They help to protect the machine by displaying a red light when the filters need to be serviced to protect the components.

Automatic Fire Suppression System (Optional)

The automatic detection on your fire suppression system uses an independent electrical system to detect a fire and to deploy the system. If the automated electrical system fails, there is a manual override the operator can use to deploy the system if needed.

The system consists of an automatic detection wire, an automatic control module, a squib, nitrogen cartridges, and two manual actuators. The automatic detection wire has two spring steel conductors separated by a heat sensitive insulator. When the insulator melts, the two conductors make contact, tripping the system. The squib is an electrically actuated component. When heated, the squib detonates a tiny explosive charge creating enough pressure to puncture the seal in the nitrogen cartridge. Nitrogen cartridges provide the pressure required to actuate the system. The actuators can also be operated manually by pulling the safety pin and striking the button which punctures the nitrogen cartridge seal.

Options & Accessories

The electrical system is not only necessary to operate and protect the machine, but it is also used to make it a comfortable piece of equipment to operate. The A/C and heater unit requires the power from the electrical system to control the temperature inside the cab. The optional stereo system also uses it to play your favorite music while you work.

Section 5

Operation

5.1 Introduction

You, the operator, have a key position in your company's material handling operation. Skill and attentiveness on your part are essential for maximum productivity as well as the safety of yourself and those around you.

The operating instructions in this manual are intended to help you get the maximum use of your Steelworker, with the greatest possible safety. Become completely familiar with all of the instruments and controls. Learn the machine, its capabilities and limitations. Study the operating techniques given so that through experience, you can develop additional techniques of your own and contribute to the success of your team.

Safety First

Your coworkers 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.

Material Handling

The Wagner Steelworker was developed for handling steel slabs up to 100,000 lbs in weight.

5.2 Break in Period

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

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

Generally speaking, proceed with a new engine as follows:

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

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

5.3 Start and Stop Procedures

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

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 in section 6 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 drainback time is recommended (if the engine has been running) to obtain an accurate reading.

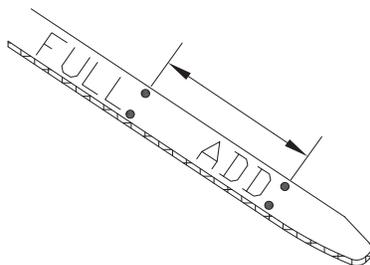


Fig. 5-1 Typical Dipstick

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 6). Do not overfill.

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. 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 antifreeze 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.



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 engine is cool.

Hydraulic Oil Level

Always check the hydraulic oil level prior to operation. The dipstick is located on the right-hand chassis deck, to the left of the boarding ladder. See Fig. 5-2. **Important:** See warning on facing page for tank venting procedure.

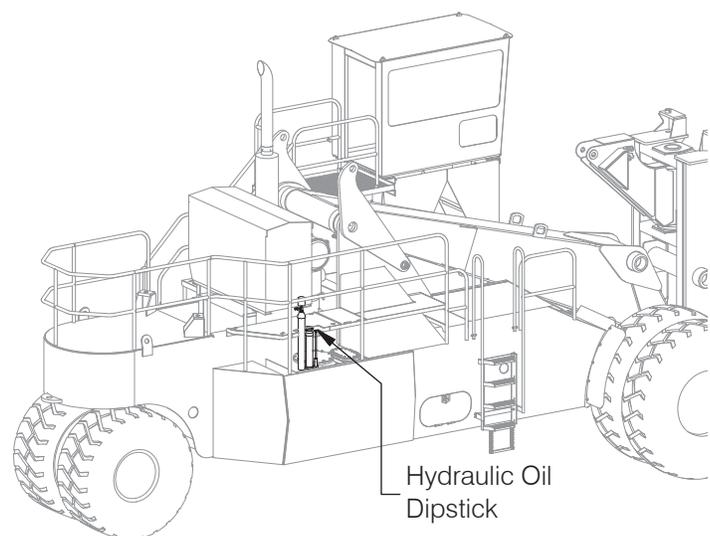


Fig. 5-2 Hydraulic Oil Fill Location

The oil level should be checked with the hoist cylinder extended. 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 6). Do not overfill.



WARNING

WARNING: Always open the tank breather petcock (located on the breather pipe) before removing the plug in the filter cover plate or adding oil at the return manifold. Failure to vent tank can result in personal injury and / or a substantial oil spill. Be sure to close the petcock before operating the machine.

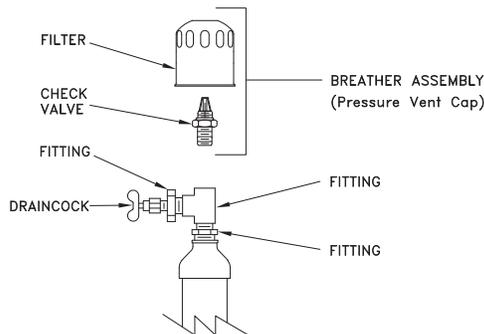


Fig. 5-3 Tank Breather Assembly

Transmission Oil Level

Always check the transmission oil level prior to starting the engine to be sure there is oil in the sump. The safe operation level should be checked after engine warm-up, with the transmission at normal operating temperature. The fill tube is located at the top of the transmission and is accessed under the boom, in front of the control valves. Always check the level with the engine running, at operating temperature, with the transmission in neutral. The oil level should be between the “H” (high) and “L” (low) marks. Fill with approved fluid only (See Lubricant Specification Chart, Section 6).

“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 PreStart

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. Wear your seat belt.
3. Check for emergency/parking brake engagement: Push the knob to ensure the brake is set.
4. Place the transmission range selector in the “neutral” position, “N” on the gear quadrant, with the bucket float switch in the “off” position if so equipped.

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

5. Give warning that you are going to start the engine. 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 parking brake light and panel lights should come on.

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.

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.

If engine oil pressure fails to rise sufficiently after approximately 40 seconds of running, the engine may automatically shut down.

IMPORTANT: Your Steelworker is equipped with an audiovisual engine protection system. If oil pressure drops below a safe level, coolant temperature becomes excessive, or coolant level drops too low, the engine warning light 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 comes on.

3. If a rise in oil pressure of the engine or transmission is not observed within 5 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. Check that 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.
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

In cold weather it may be necessary to use cold weather starting procedures. **(Note: Cummins Engine Only)**

1. Depress cold start switch and hold. This fills the chamber with a metered amount of ether.

2. Crank the engine then release cold start switch. This injects the metered amount of ether into the engine intake manifold.
3. As the engine starts repeat only if necessary to keep the engine running.

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.



CAUTION

CAUTION: Excessive amounts of starting fluid when cranking engine will cause engine damage.



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 in 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.



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.

Temperatures below 0° F (-18° C)

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. Be sure to connect the heater to the proper source with correct voltage. 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. All connections to 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 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 five minutes. Failure to do this could cause 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.

5.4 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 with 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 shut off.
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 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 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 that could cause an explosion.
5. Start the engine in the normal manner.
6. After engine has been started, disconnect the negative cable first, then remove the positive cable.



WARNING

WARNING: When removing battery cables, always disconnect the (-) negative cable first. When installing battery cables, always connect the (-) negative cable last. This procedure can prevent a spark at the battery which could cause an explosion. When possible, 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.

5.5 Moving, Stopping and Steering

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. The stopping distance varies, depending on load and speed. To avoid collisions, be sure to allow ample stopping distance.

2. 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.

3. Place the De-clutch control in the ON position.
4. Lift the carriage, if required, to clear any obstructions you might encounter.
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.



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

Steering

8. With the operator facing the front, steering the wheel clockwise will turn the machine right, while turning the wheel counterclockwise 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.

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

5.6 Lifting a Load

1. Approach the load to be lifted. The machine should be on a flat, level surface, free of obstructions.
2. Make sure that your intended load is not in excess of the maximum allowable load, as determined from the Load Chart. See Fig 1-4.
3. Place the machine so that the magnet is approximately centered over the intended load. See Fig 5-4.
4. Make sure that the surface of the load and the lifting surface of the magnet are both free of foreign material.
5. Use a combination of the hoist, tilt, swing and trolley controls on the joystick (see page 3-4) to gently lower the magnet until it is resting directly on the load to be lifted, directly above the load's center of gravity. See Fig 5-5.
6. Make sure that any air gap between the surface of the magnet and the load is less than 1/8".
7. Additionally, make sure that the load covers a minimum of 70% of the magnet's lifting face. Any air gap greater than 1/8", or contact less than 70% of the magnet's lifting face derates the magnet's maximum load. Consult the Winkle Spare Parts & Operating Instruction Manual (Allied Form #80-916) for details.
8. Make sure that no personnel are near the magnet or the load. Sound the horn to alert nearby personnel that the magnet is to be energized.
9. Energize the magnet by moving the master switch (see page 3-7) to the "LIFT" position.
10. Allow a full five (5) seconds for the magnetic field to fully generate before attempting to lift the load.
11. Use the hoist and tilt controls on the joystick to lift the load to the minimum height required to clear any obstacles in the intended travel path. See Fig 5-6.
12. Use the trolley controls to move the load back so that it is resting against the carriage face. See Fig 5-7.

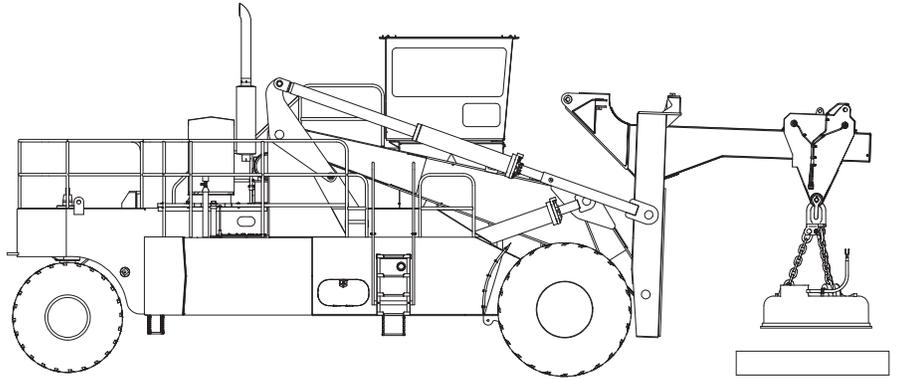


Fig. 5-4

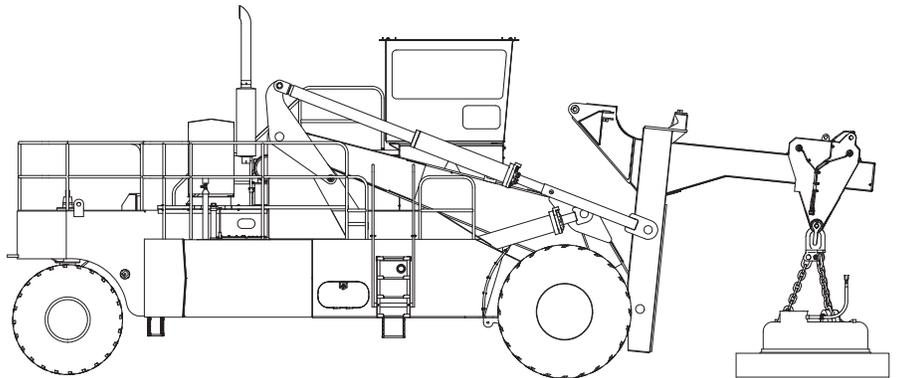


Fig. 5-5

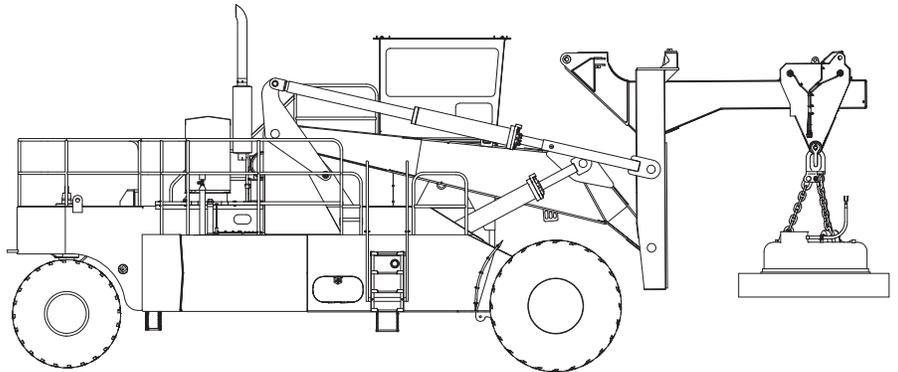


Fig. 5-6

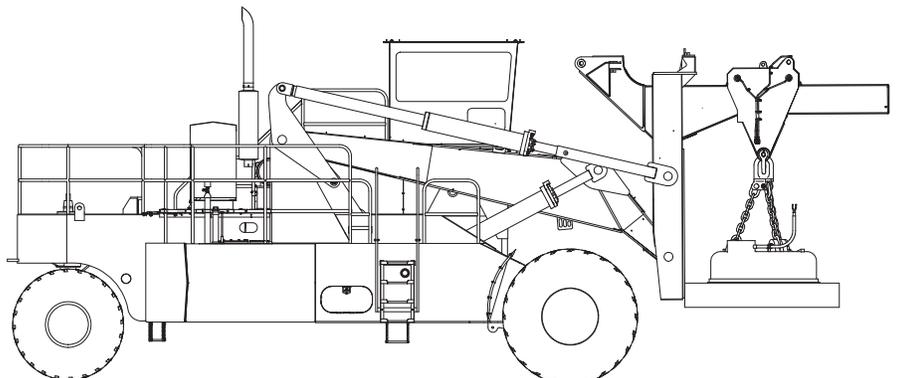


Fig. 5-7

5.7 Travelling with a Load

1. Reduce speed when travelling with a load. Travel at a speed that allows you to maintain control of your load at all times. Make sure the load remains resting against the carriage face.
2. Do not allow the load to swing significantly.
3. Be aware that while travelling with a load, stopping distances will be increased.
4. Make sure that neither the magnet, the carriage, nor the load strikes any obstacles while travelling.

5.8 Releasing a Load

1. Move the machine so that the load is approximately centered over its destination.
2. Make sure that the intended destination for the load is a level surface, and able to safely support the load.
3. Use the joystick controls to precisely position the load, and slowly lower it into position.
4. When the load is resting at its destination, make sure that it is stable, and that the supporting surface or structure is stable and will safely support the load before de-energizing the magnet.
5. De-energize the magnet by moving the master switch (see page 3-7) to the “DROP” position.



WARNING

Note: Despite the use of the label “DROP” on the master switch, the load should never be actually be dropped, but should be resting at its destination before de-energizing the magnet.

6. Allow a full five (5) seconds for the magnetic field to dissipate before attempting to lift the magnet from the load. Once dissipated, lift the magnet to a suitable height to clear any obstacles while travelling to the next load.

5.9 Extending Magnet Life

Magnets are specifically designed for holding material with magnetic force. Any other use is neither intended nor advised. Any misuse of the magnet may cause damage to the magnet, and may endanger personnel or equipment. For example:

1. DO NOT use magnets as drop balls or wrecking balls to break up cast scrap.
2. DO NOT use magnets to straighten stacks of material (i.e. “bumping” slab stacks in cooling beds).
3. DO NOT use magnets as drag weights for railcars.
4. DO NOT use magnets to straighten bent billets, slabs, or blooms.
5. DO NOT set the magnet directly on the ground when not in use. It should be set on wooden blocks to avoid moisture getting drawn into the magnet.

The above list is a sample of just some of the ways that magnets are misused; there are many other misuses possible. Any use other than what is intended may damage the magnet, or shorten its effective service life.



Fig. 5-8

5.10 In Case of Fire (Units With Optional Fire Suppression System)

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. **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 inspected, refilled and recharged before resuming operation. All maintenance and servicing should be performed by a qualified service technician from your local authorized service center for your fire suppression system.

IMPORTANT: Each unit is equipped with two actuators. One is located in the cab, mounted to the right hand rear wall of the cab. The other is mounted on the chassis, at ground level, just to the right of the left side boarding ladder. 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 and additional operator information.



WARNING

Inspect for and remove all combustible materials from engine area before starting the machine and periodically throughout the workshift as required. These materials build up in tight corners and are highly combustible. See Section 2-5 for fire safety information.

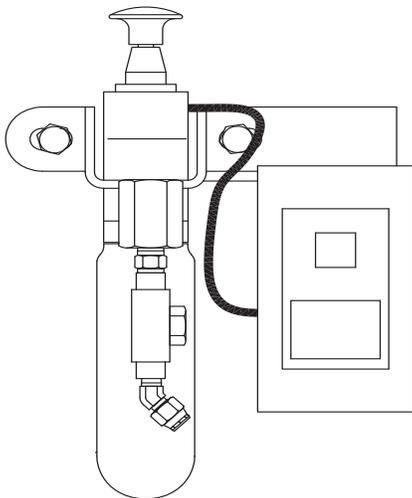


Fig. 5-9

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Section 6

Maintenance and Lubrication

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

6.2 Safety Precautions

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

1. Read This Manual

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

2. Perform Maintenance on Level Ground

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

3. Remove Loads

The machine should be unloaded, with the carriage resting on the ground, or with the boom on a boom rest.



WARNING

WARNING: Never rely on the hydraulic system to support any part of the machine during maintenance or lubrication. NEVER stand under a component that is supported only by the hydraulic system. Make sure it is resting on its mechanical stops or safety stands. If necessary, support components with appropriate safety stands.

4. Stop the Engine

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

Use Safe Ladders / Scaffolding

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

6.3 Preventive Maintenance

Preventive maintenance is a system that is designed to detect problem areas and prevent equipment failure and maximize machine availability. 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.

Benefits of Preventive Maintenance

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

Preventive Maintenance

- **Promotes Safety-** properly maintained equipment is better able to operate within its design specifications and react positively to the operator's control.
- **Improves Equipment Availability-** by minimizing the chances of breakdown.
- **Reduces Unexpected Downtime-** unexpected downtime is expensive and detracts from normal scheduled maintenance.
- **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 prevention 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.

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 (semiannually)
- 2000 Hours (annually)

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

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.

6.4 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 the machine. The comments he or she 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 the checklist, should be used to report defects found when making maintenance checks at the beginning of each shift.

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

Using the Checklist

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

Shift maintenance details are provided in section 6.10, Maintenance Procedures. These procedures consist of checks that can be preformed by the operator.

6.5 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

The 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.

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.

6.6 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 oil is hot and well mixed to ensure an accurate analysis. Contact your Wagner dealer for complete information and assistance in establishing a scheduled oil sampling analysis program for your equipment.

6.7 Lubricant Selection & 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. Our purpose in compiling these specifications is to provide a guide to aid in the selection of a lubricant that will give the most satisfactory service.

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.

When changing fluids use the following guidelines:

- Add only filtered fluids.
- 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.

Listed below are the lubricants used for initial factory fill:

ENGINE - Caterpillar & Cummins
Mobil Delvac 1300 Super 15W-40

TRANSMISSION/CONVERTER
Mobilfluid 424

DRIVE AXLES
Mobilube HD 85W-140

Clark Posi-Torque (Differentials)
Lubrizol #6178 Additive

HYDRAULIC SYSTEM
Mobilfluid 424

GENERAL CHASSIS LUBRICATION
Mobilgrease Special No. 2

The above lubricants will be used on all WAGNER steel-worker units unless 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.

6.8 Hydraulic Oil Cleanliness

Oil is a vital part of any machine's service life, but the cleanliness of that oil may be more important than you think. When using clean oil (low ISO code), component life expectancy can increase dramatically. Dirty oil can cause more damage to your machine than you may think. Dirt in the oil can cause permanent wear within the machine limiting the service life dramatically.

Scale numbers, which represent what is called the ISO 4406 code, are used to represent the cleanliness of your oil. They allow you to study current contamination levels and set goals for the future. Refer to figure 6-1 to help you better understand this rating scale. The system works by giving a 3-part code which represents the number of particles per milliliter (mL) of oil depending on particle size. The first number is representative of particles greater or equal to 4µm, the second 6µm, and the third 14µm. So an oil with the rating 12/17/9 would represent that there are between 20 to 40 4µm sized particles per ml, 640 to 1300 6µm sized particles per ml, and 2.5 to 5 particles 14µm sized particles per ml present in that particular oil.

NOTE: The "/" used in the code in no way represents a ratio in the scale. It is used only as a divider between numbers.

NOTE: The ISO 4406 code was changed in 1999 to ISO 4406-1999. At times the old standard may still be used so be sure you know what version of the code you are dealing with. ISO 4406-1987 (old) had only two numbers and different sizes for particles represented by each number. In that code the first number represented particles 5µm and the second number was for particles 15µm.

There are many ways oil can become contaminated, including but not limited to poor care at the refinery, in transport, at your site, or within the machine its self. New oil is not necessarily going to be as clean as desired and may need to be filtered before adding it to the tank.

Filtration, storage and handling procedures are the most crucial elements to providing clean oil for your machinery. A few important steps in a oil cleanliness program are:

- Test your current oil cleanliness levels so you know what to compare your cleaned oil to.
- Carefully evaluate your handling and storage practices.
- Set goals for your company for cleanliness standards.
- Start improvements in filtration, storage, and handling practices.
- Observe and record your progress and return on investment.

Number of Particles Per 1 mL of Fluid		
ISO Code	Minimum	Maximum
1	0.01	0.02
2	0.02	0.04
3	0.04	0.08
4	0.08	0.16
5	0.16	0.32
6	0.32	0.64
7	0.64	1.3
8	1.3	2.5
9	2.5	5
10	5	10
11	10	20
12	20	40
13	40	80
14	80	160
15	160	320
16	320	640
17	640	1300
18	1300	2500
19	2500	5000
20	5000	10000
21	10000	20000
22	20000	40000
23	40000	80000
24	80000	160000
25	160000	320000
26	320000	640000
27	640000	1300000
28	1300000	2500000

Fig. 6-1 ISO 4406-1999 Fluid Cleanliness Codes

Recirculating filtration systems can greatly help you achieve and maintain your cleanliness goals. For smaller jobs a cart mounted system used on strategic intervals is acceptable for this propose. These units can also be used to filter new oil before it is ever put into a machine. At times with larger jobs a permanently installed system may be required to meet your needs. Cartridge type filters are common in this type of system so make sure to change them and thoroughly clean the system between lubricants to avoid cross contamination.

CAUTION

CAUTION: DO NOT use the filters on the machine to initially clean your oil. Doing so will result in unfiltered oil contaminating your system before it can be filtered.

A change in storage and handing techniques is often the most cost effective way to help with the cleanliness of your oil. To help prevent moisture from entering the storage drum during the “breathing process” contain the temperature in your storage area to a small range. Providing a storage space free of dirt and moisture will also help with this.

Another simple step is to buy cleaner oil. Your company can specify the cleanliness of the oil you purchase. It will likely be more expensive but with the increase in machinery life it is worth the cost. If this is the way your company decides to get clean oil make sure to test it upon arrival to make sure you are actually receiving what you are paying for.

Allied Systems recommends that oil with minimum cleanliness 21/19/16 be used in your Wagner when changing and topping off fluids. After an overhaul it is recommended that a cleanliness of at least 25/22/16 be used. Exceeding these levels could cause damage to your machine.

6.9 Lubrication Points (See Fig 6-2)

10 HOURS

Before engine startup, check the following:

- ① STEERING CYLINDER PINS
- ② BOOM TO CHASSIS PINS
- ③ BOOM TO CARRIAGE PINS *
- ④ & ⑤ HOIST CYLINDER PINS *
- ⑥ & ⑦ TILT CYLINDER PINS
- ⑧ SWING CYLINDER PINS *
- ⑨ & ⑩ TRAVEL CYLINDER PINS *
- ⑪ ROLLERS *
- ⑫ SHACKLE *
- ⑬ CARRIAGE SWIVEL *

* When operating in water, lubricate submerged points more frequently

50 HOURS

⑬

DRIVELINE **

** Use handgun or lower pressure adaptor; lubricate sparingly.

500 HOURS

⑭

TAILWHEEL BEARING

⑮

TAILPOST



WARNING

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

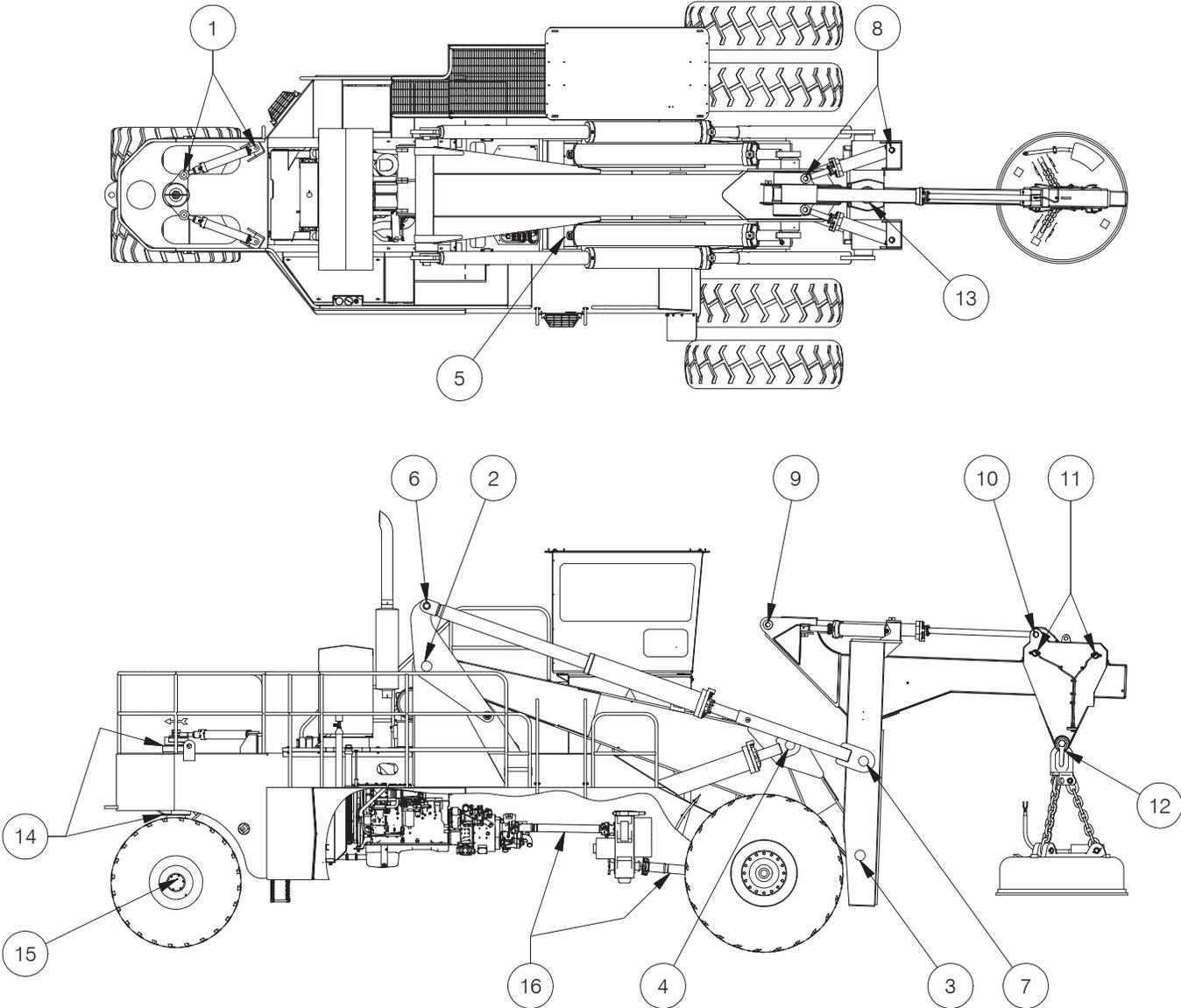


Fig. 6-2 Lubrication Chart

Note: Due to variations in engine types and machine models, the indicated location the exact location of elements may not be exact. Consult your specific service manual for exact locations.

6.10 Shift Maintenance Checklist (See Fig 6-3)

EVERY 10 HOURS OR DAILY

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

Before Starting Engine - Check The Following:

REF	ITEM	OK	NO	ADD
1	ENGINE (Check oil level - check for leaks)	<input type="checkbox"/>	<input type="checkbox"/>	_____
2	HYDRAULIC TANK (Check oil level - check for leaks)	<input type="checkbox"/>	<input type="checkbox"/>	_____
3	RADIATOR & OIL COOLER (Check coolant level - check for leaks; are fins clean and unobstructed?)	<input type="checkbox"/>	<input type="checkbox"/>	_____
4	AIR CLEANER/INTAKE SYSTEM (Check indicator - clean or change element as required, empty dust cup, check for leaks and damage)	<input type="checkbox"/>	<input type="checkbox"/>	
5	ENGINE BELTS (Check for adjustment and wear)	<input type="checkbox"/>	<input type="checkbox"/>	
6	WHEELS & TIRES (Check condition and pressure)	<input type="checkbox"/>	<input type="checkbox"/>	_____
7	AIR TANK (Check drain valves for correct operation)	<input type="checkbox"/>	<input type="checkbox"/>	
—	LUBRICATE CHASSIS (Refer to lube chart)	<input type="checkbox"/>	<input type="checkbox"/>	
—	WALK AROUND INSPECTION of structure: welds, leaks, damaged components, etc...	<input type="checkbox"/>	<input type="checkbox"/>	
—	FIRE SAFETY CHECK (Check for accumulated debris in engine compartment, etc)	<input type="checkbox"/>	<input type="checkbox"/>	

After Starting Engine - Check The Following:

8	ENGINE (Does it sound normal?)	<input type="checkbox"/>	<input type="checkbox"/>	
9	INSTRUMENTS (Check for normal readings)	<input type="checkbox"/>	<input type="checkbox"/>	
9	CONTROLS (Check for normal operation)	<input type="checkbox"/>	<input type="checkbox"/>	
10	EXHAUST SYSTEM (Check for leaks and excessive smoke)	<input type="checkbox"/>	<input type="checkbox"/>	
11	TRANSMISSION - After warming to operation temp.- (Check oil level - check for leaks)	<input type="checkbox"/>	<input type="checkbox"/>	_____

Note Anything Abnormal or in Need of Repair

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

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

Notes:

- See Section 6.11 for additional service/maintenance checklists (weekly, monthly, etc).
- See Section 6.12 for maintenance procedures for daily checklist.

Maintenance and Lubrication Section 6

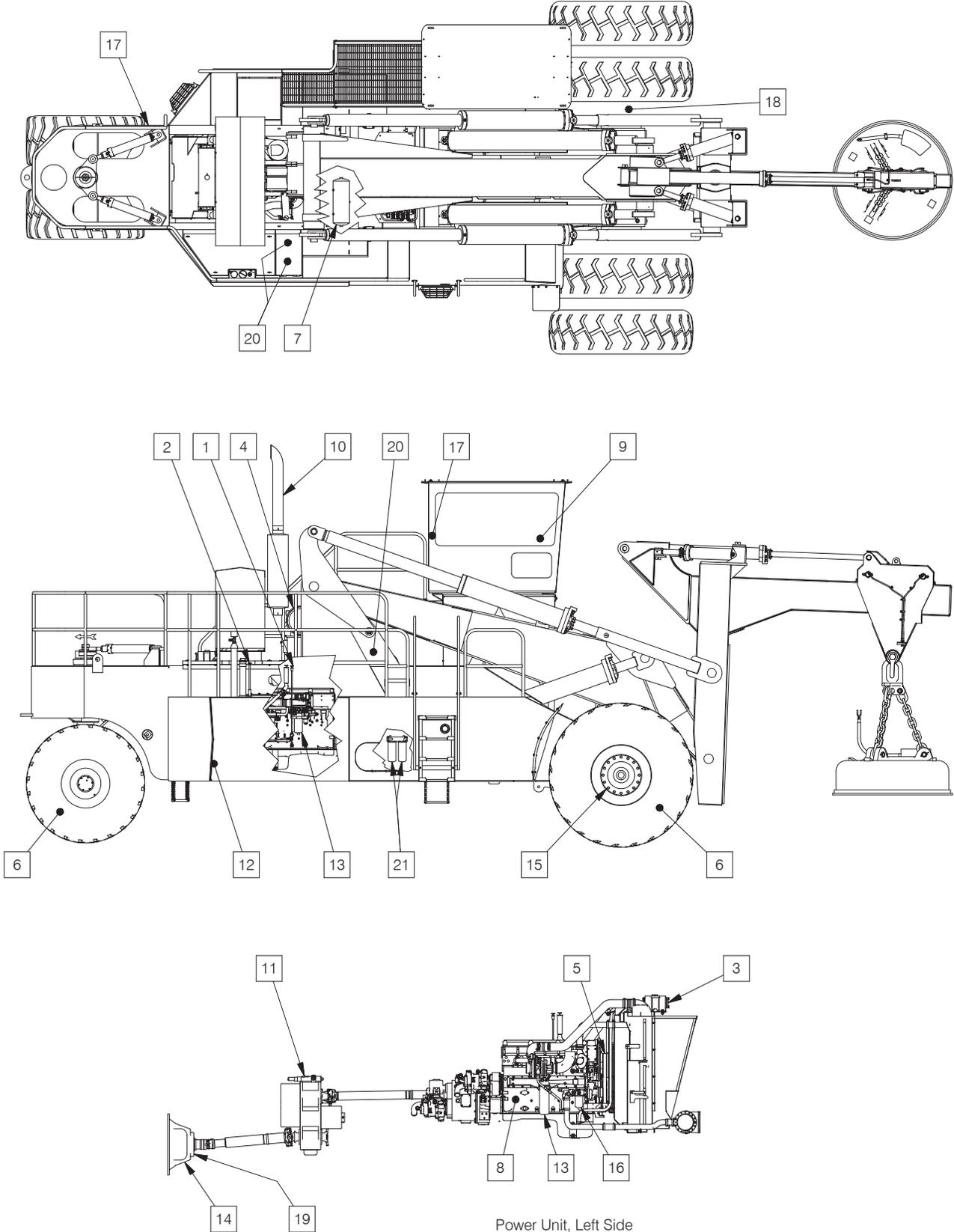


Fig. 6-3 Maintenance Chart

Note: Due to variations in engine types and machine models, the indicated location the exact location of elements may not be exact. Consult your specific service manual for exact locations.

6.11 Maintenance Checklist

EVERY 50 HOURS OR WEEKLY

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

EVERY 250 HOURS OR MONTHLY

1. Repeat the 50 hour check		OK _____	NO _____
2. Change engine oil & filters*	<u>13</u>	OK _____	ADD _____
3. Take engine oil sample for analysis*		OK _____	NO _____
4. Check axle differential oil level**	<u>14</u>	OK _____	ADD _____
5. Check axle planetary oil level**	<u>15</u>	OK _____	ADD _____
6. Change cooling system filter	<u>16</u>	OK _____	REPLACE _____
7. Check all hydraulic pressure and record		OK _____	NO _____
8. Check fire suppression actuator	<u>17</u>	OK _____	NO _____
9. Inspect brake system & components	<u>18</u>	OK _____	REPAIR _____
10. Check and adjust the parking brake (if required)	<u>19</u>	OK _____	ADJUST _____

EVERY 500 HOURS OR QUARTERLY

1. Repeat the 250 hour check		OK _____	NO _____
2. Service fuel filters*		OK _____	REPLACE _____
3. Service Hydraulic filters*	<u>20</u>	OK _____	REPLACE _____
4. Service Transmission filters*	<u>21</u>	OK _____	REPLACE _____
5. Take oil samples from transmission, axle, and hydraulic system for analysis*		OK _____	NO _____
6. Check accumulator pressures		OK _____	NO _____
7. Check expander pivot pin torque (see page 6-13)		OK _____	NO _____

EVERY 1000 HOURS OR SEMI-ANNUALLY

1. Repeat the 500 hour check		OK _____	NO _____
2. Change transmission oil and filters	<u>21</u>	OK _____	ADD _____
3. Clean and flush cooling system		OK _____	ADD _____
4. Check pins and bushings for wear		OK _____	REPLACE _____
5. Steam clean machine, inspect for cracks		OK _____	NO _____

EVERY 2000 HOURS OR ANNUALLY

- | | | | |
|--|--|--|---|
| <ol style="list-style-type: none"> 1. Repeat the 1000 hour check 2. Drain, flush and fill differential* 3. Drain, flush and fill planetaries* 4. Change hydraulic oil and filters* | <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto; display: flex; align-items: center; justify-content: center;">14</div> <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto; display: flex; align-items: center; justify-content: center;">15</div> <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto; display: flex; align-items: center; justify-content: center;">20</div> | OK _____
OK _____
OK _____
OK _____ | NO _____
ADD _____
ADD _____
ADD _____ |
|--|--|--|---|

* Normal drain period and filter change intervals 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.

WARNING

****WARNING: Pressurized Axle (Optional)**
Front Axle housing is under 3 psi pressure.
Before checking axle oil level, first shut off
air supply to axle housing bulkhead.

Repairs:

Problem: _____

Parts: _____

Mechanic: _____	Hours Labor: _____
Operator: _____	Supervisor: _____
Machine Model: _____	Equipment No: _____
Date: _____	Hour Meter: _____
Shift: _____	

6.12 Daily 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 Fig. 6-4 (Maintenance Chart). This provides an additional aid in locating each check point.

Before Starting Engine

1 Engine Oil Level

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

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

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



CAUTION

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

Use only approved engine oil (see Lubricant Specifications Chart, page 6-4). Do not overfill. Check engine for leaks.

2 Hydraulic Oil Level

Always check the hydraulic oil level prior to operation. The fill cap is located on the RH chassis deck. Oil poured into the fill cap is directed through the return filters before entering the tank to keep your oil as clean as possible.



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 tank can result in injury or a substantial oil spill. Be sure to close the petcock before operating the machine.

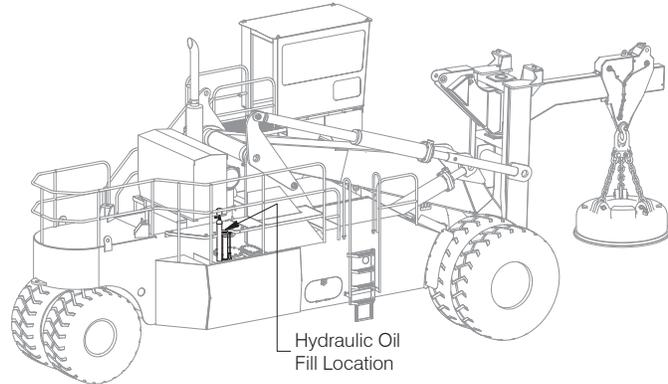


Fig. 6-4 Hydraulic Oil Fill Location

The oil level should be checked with the hoist cylinders retracted (down). The oil level should be at or near the “H” (high) mark on the dipstick. Fill with approved hydraulic fluid as required (see Lubricant Specifications Chart, page 6-4). Do not overfill.

3 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 antifreeze when adding water.



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.

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

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

4 Air Cleaner
 The air cleaner is a Donaldson two stage 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 if the filter is restricted. If red appears in the indicator window, clean or change the element and press the reset button on the indicator.

5 Engine Belts
 Check the tension of the drive belts by pressing with the thumb halfway between pulleys. The belts should not deflect more than the values shown in the table (Fig. 6-5). If any belt is loose or worn, report to maintenance for corrective action. Consult the manual supplied with your engine for serpentine belt inspection procedures.

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

Fig. 6-5 Belt Deflection

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

7 Air Tank Valves (If Applicable)
 Visually inspect the valves and connections for damage or leaks. There should be signs of water coming from the drain hoses. If not, report the condition to maintenance.

12 Structural Inspection
 Steam clean the machine and inspect for structurally cracks. If cracks are present repair before resuming operation. Refer to WSB0369 for information on how to properly weld structural cracks.

After Starting Engine

8 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.

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

4 Air intake system
 Inspect all connections for damage, loose clamps, 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. See Section 6.14.

10 Exhaust System
 Check for 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.

11 Transmission Oil Level
 The level should be checked after engine warm up, with 180 to 200 showing on the transmission temperature gauge. The dipstick and fill tubes are located on the chassis deck, directly above the transmission. Check oil level with engine running at idle, at operating temperature, and with the transmission in neutral. The level should be between the "H" (high) and "L" (low) marks. Fill with approved fluid only. See Lubricant Specifications Chart, Page 6-4. Do not overfill. Inspect for leaks.

6.13 Air Intake System Maintenance Procedures

General

The air cleaner is critical to the life of the engine. It prevents dust and debris from entering the engine air system, causing premature engine wear and possible failure. When a two stage, dry type air cleaner is used, air passes through the outer, primary filter elements installed; both are required to fully protect the engine from contamination.

Air Cleaner Connections

Check the intake tubes between the air cleaner outlet and the turbocharger for cracks or wear, and that all clamps are in place and are tight.

- Replace any worn or damaged tubes and tighten any loose clamps.

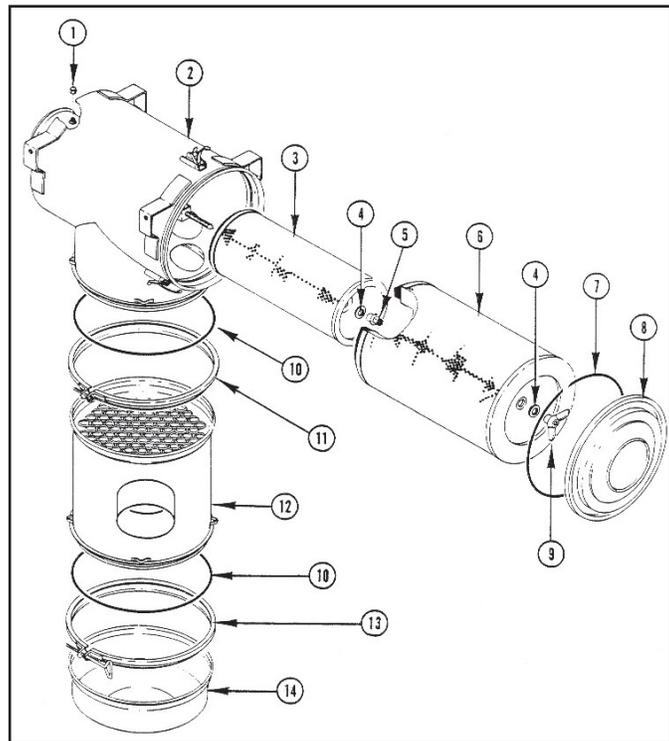


Fig. 6-6 Air Intake System (Typical)

Servicing the Air Cleaner

A rubber evacuator is installed on the bottom of the air cleaner housing to allow daily removal of debris from the air cleaner.

- Squeeze the evacuator to allow the debris to fall out.

An indicator may be located on the air tube. It is provided to alert the operator that the elements are plugged and in need of service. Air cleaner service requirements will vary with your operating conditions. In extremely dusty conditions, this gauge should be constantly monitored, as frequent air cleaner service will be necessary.

1. Loosen the wing nut in the center of the air cleaner end cap and remove the end cap.
2. Remove the outer, primary air filter and clean the inside of the air cleaner housing thoroughly. Remove the evacuator tube and clean it and the evacuator.

IMPORTANT: DO NOT remove the inner, safety element UNLESS you are replacing it. It should be replaced each time the primary element is changed for the third time or if the primary element is ruptured. The safety element should not be cleaned or disturbed in any way.

3. Examine the primary filter element. If dust is present on the inside surface, or if it shows signs of damage, it **MUST** be replaced.
4. Blow compressed air through the element, from inside outward, to remove any particles from the element.
5. Wash the primary element in non-foaming detergent for approximately fifteen minutes then rinse with warm tap water from inside outward until the water that passes through the element is clear.
6. Allow the primary element to air dry then examine the condition using a bright light shining through the element from inside outward.

Servicing the Air Pre-Cleaner

- When the level of debris in the pre-cleaner bowl reaches the full line, remove the pre-cleaner, empty it and reinstall it. (See dust cap interval)

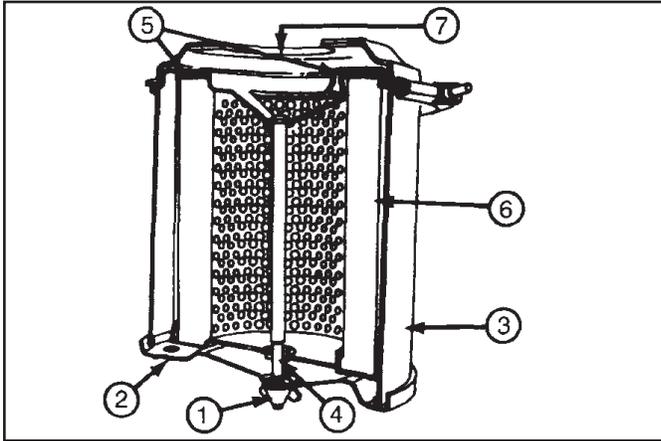


Fig. 6-7 Element Replacement

Air Cleaner Element

NOTE: The illustrations in this section show typical parts. The particular engine parts may vary.

Cleaning

The paper element (6) in a dry-type air cleaner can be cleaned several times by using compressed air to remove the dirt, approximately 207 kPa [30 psi]. Do not hold the air jet too close to the paper element when cleaning, and always blow air from the inside out.

Elements that have been cleaned several times will finally clog and airflow to the engine will be restricted. After cleaning, check the restriction as previously described. Replace the element if necessary.



CAUTION

Caution: Holes, loose end seals, dented sealing surfaces and other forms of damage render the cleaner inoperative and require immediate element replacement.

Replacement

1. Remove the wing-nut (1) that secures the bottom cover (2) to the cleaner housing (3). Remove the cover.
2. Pull the element (6) down from the center bolt (4).



CAUTION

Caution: Pull the cover and the element straight out when removing them from the housing to avoid damage to the element.

3. Remove the gasket (5) from the outlet end (7) of the housing.

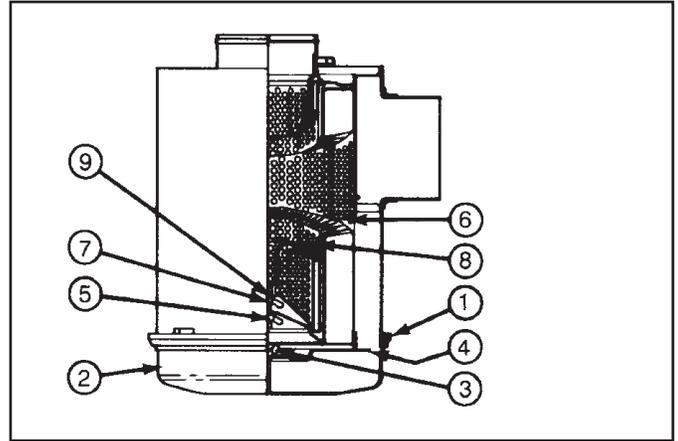


Fig. 6-8 Dual - Heavy Duty Dry - Type Element

Dual - Heavy Duty Dry-Type Element - Replacement

Heavy-duty air cleaners combine centrifugal cleaning with element filtering before air enters the engines.

Before disassembly, wipe dirt from the cover and the upper portion of the air cleaner. To clean the dual types:

1. Loosen the wing bolt (1), and remove the band securing the dust pan (2).
2. Loosen the wing nut (3). Remove the dust shield (4) from the dust pan (2). Clean the dustpan and shield.
3. Remove the wing nut (5) and secure the air cleaner primary element (6) in the air cleaner housing. Inspect the rubber-sealing washer on the wing nut (9).
4. Clean the element from the inside out with compressed air not exceeding 207 kPa [30 psi]. Inspect the element after cleaning. Install the cleaned primary element or a new element.
5. Make sure the gasket washer is in place under the wing nut before tightening.
6. Assemble the dust shield and dustpan again. Position them to the air cleaner housing and secure with the band.

On Dual Element Type Cyclopac Cleaner

1. Check the air restriction indicator. If the air restriction is excessive, disassemble the air cleaner, remove the wing nut (7) and replace the safety element (8).
2. Assemble the air cleaner as described above

Air Filter Service Indicator

This gauge indicates filter element condition without filter disassembly. The service sight gauge indicates filter contamination by showing “red” or “green” in the sight gauge. The visible amount of red on the indicator will increase as the dust in the element increases.

For maximum engine performance the filter should be changed or cleaned immediately after the “red” signal locks in full view.

- To reset the service gauge, press the button on the top of the gauge.

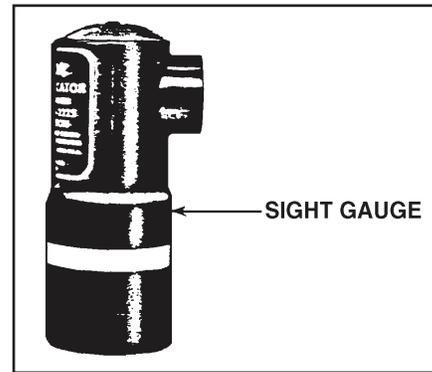


Fig. 6-9 Air Filter Service Indicator

6.14 Operator Troubleshooting

The following tables lists the most common problems that be solved using the corrective actions listed in this table, may be encountered by operators. If the problem cannot notify maintenance personnel.

Engine*

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Engine turns over but fails to start	Fuel filter blocked	Replace filter
	No power to fuel solenoid	Check electrical circuit to solenoid
	Fuel tank empty	Fill tank
	Fuel shutoff valve at tank closed	Open valve
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 unsteady and power output low	Insufficient fuel supply	Clean fuel strainers, replace filter, fill tank, tighten fuel lines
	Contaminated fuel	Drain tank, lines, clean strainers, and replace fuel
	Wrong fuel	Drain tank and fill with proper fuel
	Air intake restricted	Remove restriction
Exhaust smokes badly	Too much oil in sump	Drain to proper level
	Air intake restricted	Remove restriction
Engine overheats	Radiator fins restricted	Clean fins
	Low coolant level	Check coolant level
Engine oil pressure low	Low oil level	Check oil level
	Oil leaks	Tighten connections
	Contaminated Oil	Change oil and filters

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

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Transmission / Converter*

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

* Also see 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
	Implement controls switch "off"	Turn switch to "on"
Sluggish operation or response to controls	Hydraulic oil cold	Allow adequate warm-up time
	Low oil level	Fill tank to proper level
	Suction leak	Correct suction leak
	Plugged tank breather	Replace breather
	Restriction in circuit	Remove restriction, check filters
	Pump speed too slow	Check engine speed
Excessive noise	Cavitation	Eliminate restriction in suction line Replace tank breather
	Aeration	Fill tank to proper level Correct suction leak
	Tubing vibration	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 open	Close switch
	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

6.15 Maintenance Specifications

Hydraulic Pressure Relief Settings

NOTE: Hydraulic pressures should be set at engine idle (750 rpm) and double checked at maximum rpm. Over-ride should not be over 50-100 psi on control valves. Check or set (see form 80-925 for setting procedure) pressures in sequence shown when hydraulic oil is hot (above 120° F). Calibrate your gauge periodically. Consult the ANSI hydraulic schematic supplied with your machine for the pressure settings required on the various valves and circuits. Set main reliefs with engine at 750 rpm. Set circuit reliefs with engine at 750 rpm.

Component Capacities & Lubrications

Component	Lubrication Type*	Capacity	
Engine Crackcase	Engine Oil	~ Refer to your engine owner's manual for engine oil capacity ~	
Fuel Tank	Diesel Fuel	~Varies by machine. Range:	400 - 475 Gallons 1514 - 1798 Liters
Cooling System	Water/ Antifreeze **	~ Varies by machine. Consult Allied Systems service department for details ~	
Hydraulic System	Hydraulic Oil	350	Gallons
		1324	Liters
Transmission System	Transmission Oil	22	Gallons
		83	Liters
Differential, Front	Gear Lube	50	Gallons
		189	Liters
Planetary Hubs (each) Front	Gear Lube	10	Gallons
		38	Liters
Chassis Grease Fittings	Chassis Grease	~ As required ~	

*See Lubricant Specifications, Page 6-4

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

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

6.16 Recommended Overhaul Schedule

To maximize efficiency and minimize downtime and costly failures, Allied Systems Company recommends the following overhaul chart to be used. When followed closely your equipment will last longer with less unexpected downtime. Contact your local Wagner dealer for “Must do Kits” including all the bearings, seals and gaskets necessary to overhaul your drivetrain components or allow your dealer to overhaul the components for you. They are authorized to overhaul and test your components.

Extreme duty is defined as continuous operation on slopes or in either poor or excellent traction conditions.

It is recommended that some components be overhauled at the same time, even if they might have some time before their required rebuild, to minimize downtime. Many components may have to be removed in order to gain access to others so the parts should all be rebuilt together. This will save you from having to tear the machine down again a few thousand operation hours later.

During the overhaul process make sure all parts are thoroughly cleaned before installation. Parts that do not receive this cleaning can cause the lubricant to become contaminated, which leads to much shorter service life. The schedule assumes maintenance, lubrication and genuine Wagner filters are used.

Recommended Drivetrain Overhaul Intervals (Hours)

Component		Standard Duty	Extreme Duty
Torque Converter		12,000	8,000
Pumps		6,750	4,500
Transmission		22,500	15,000
Differential	Front	15,000	10,000
	Rear	15,000	10,000
Planetary	Front	15,000	10,000
	Rear	15,000	10,000
Engine Tune-Up		9,000	6,000
Engine Rebuild		18,000	12,000
Steering Cylinders		9,000	6,000
Hoist Cylinders Reseal		9,000	6,000
Hoist Cylinders Rebuild		18,000	12,000
Tilt Cylinders		6,750	4,500

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