Operators Manual

HLT 185

Heavy Lift Transport

Allied Systems COMPANY

80-1022 (11/2012) Printed in USA

Starting with S/N 118614

⚠ 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.

Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer, birth defects, and other reproductive harm. Wash hands after handling.

Other chemicals in this vehicle are also known to the State of California to cause cancer, birth defects, and other reproductive harm.

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Section 1 - Safety Information

Important Safety Information

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

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

Safety Is Your Business

Why? Because **SAFETY**, based on knowledge, technical skill, and years of experience has been carefully built into your Wagner. 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 Wagner 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 Wagner. It's your responsibility to see that they are carried out.

Safety Symbols

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

⚠ DANGER

The "DANGER" symbol indicates a hazardous situation which, if not avoided, will result in death or serious injury. Carefully read the message that follows to prevent serious injury or death.

⚠ WARNING

The "WARNING" symbol indicates a hazardous situation which, if not avoided, could result in death or serious injury. Carefully read the message that follows to prevent serious injury or death.

⚠ CAUTION

The "CAUTION" symbol indicates a hazardous situation which, if not avoided, could result in minor or moderate injury, or equipment damage. Carefully read the message that follows to prevent minor or moderate injury.

NOTICE

The "NOTICE" symbol alerts to a situation that is not related to personal injury but may cause equipment damage.

NOTE: …The term "**NOTE**" highlights operating procedures or practices that may improve equipment reliability and/or personnel performance, or to emphasize a concept.

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.

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 to the equipment.

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

Safety Regulations

- Each country has its own safety legislation. It is in the operator's own interest to be conversant with these regulations and to comply with them in full. This also applies to local bylaws and regulations in force on a particular work site.
- Should the recommendations in this manual deviate from those in the user's country, the national regulations should be followed.

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, then proceed slowly. However, you must not operate 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 machine. Because of special conditions, your company's material handling 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 outside the cab, or its attachments. A person may ride inside the cab only if the unit is equipped with a "buddy seat" and safety belt.
- Do not operate this machine if you know of malfunctions, missing parts, and/or mis-adjustments. These situations can cause or contribute to an accident or damage to the machine. Stop the machine immediately if problems arise after starting.
- Do not operate the machine before disconnecting the hydraulic tank or engine block heaters. The hydraulic tank heater and/or engine block heater use a 110 or 220 V AC 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 electrical shock. Extension cords to the hydraulic tank and/or engine block heater must be properly grounded.
- Do not start the engine if the key had been marked with a **"DO NOT START"** or **"RED"** tag.
- Never operate any of the cab controls from anywhere other than the operator's seat.
- Sound the horn to alert personnel in the area before starting the engine, and make sure everyone is clear. Be sure that all controls are in neutral before starting the engine.
- Be aware that several people can stand in the engine compartment, completely out of sight of the operator. Be sure to check under the unit before boarding.
- Never pass a load over ground personnel or other equipment. Sound the horn and wait for the area to be cleared before moving the machine or load.
- Be accurate in load placement. It's important to know what the load will do when it's released.
- Lower or move the load to the ground before leaving the cab or shutting down the engine.
- High voltage electricity can discharge to ground 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 will damage equipment.

Hydraulic Hazards

Be aware of the hazards of pressurized hydraulics:

- Wear personal protective equipment, such as gloves and safety glasses, whenever servicing or checking a hydraulic system.
- Assume that all hydraulic hoses and components are pressurized. Relieve all hydraulic pressure before disconnecting any hydraulic line.
- Never try to stop or check for a hydraulic leak with any part of your body; use a piece of cardboard to check for hydraulic leaks.

- Small hydraulic hose leaks are extremely dangerous, and can inject hydraulic oil under the skin, even through gloves.
- Infection and gangrene are possible when hydraulic oil penetrates the skin. See a doctor immediately to prevent loss of limb or death.

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.

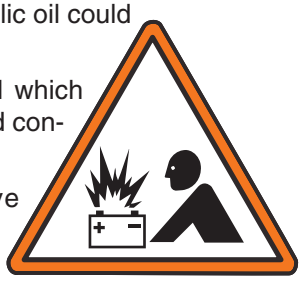
- Do not attempt to make adjustments, or perform maintenance or service unless you are authorized and qualified to do so.
- Unless specified in service procedures, never attempt maintenance or lubrication procedures while the machine is moving or the engine is running.
- Keep hands, feet, long hair and 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 performing maintenance or service under the machine:
- Move the machine to a level surface, engage the parking brake, lower the carriage to the ground and stop the engine.
- Tag the key switch with a **"DO NOT START"** sign and remove the key.
- Block the tires to keep the machine from rolling.

  NOTE: Local laws and regulations may require that additional safety measures be taken. Please consult local authorities.

- 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.

⚠ WARNING

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

- Before making adjustments to the engine or chassis electrical system, disconnect the battery. An electrical spark could cause a fire, explosion or severe burns.
- Before welding anywhere on the unit, disconnect the batteries.
- 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.
- Do not enter fuel or hydraulic tanks without proper safety equipment. Check you local government safety regulations for confined space entry requirements.

Crushing or Cutting Prevention

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

⚠ WARNING

WARNING : Drive shaft spins at engine speed when engine is running regardless of transmission gear selection.

- Where there are steering linkages, the clearance in the linkage area will increase or decrease with movement of the steering. Stay clear of all rotating and moving parts.
- Keep objects away from moving fan blades. They will throw or cut any object or tool that falls or is pushed into them.
- Do not use a kinked or frayed wire rope cable. Wear gloves when handling the wire rope cable.
- Retainer pins or bolts, when struck with force, can fly out and injure nearby persons.
- Chips or other debris can fly off objects when struck. Make sure no one can be injured by flying debris before striking any object.
- Wear protective glasses when striking a retainer pin or bolt to avoid injury to your eyes.
- Do not attempt to lift the machine with the tow eyes on the front and rear of the vehicle. These are for towing only. Consult Allied Systems for lifting instructions.
- Wear a hard hat, protective glasses and other protective equipment as required by job conditions.
- Keep hands, feet, long hair and clothing away from power-driven parts. Do not wear loose fitting clothing or jewelry while performing maintenance and lubrication.
- Make certain all protective guards and covers are secured in place on the machine.
- Never rely on the hydraulic system to support any part of the machine during maintenance or lubrication.

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.

Burn Prevention

- Use caution when working around hot oils. Always allow lubricating and hydraulic oil to cool before draining. Burns can be severe.
- Diesel fuel and hydraulic oil are flammable. Do not smoke when checking levels or filling tanks. Keep open flames and sparks away from the machine.
- Never overfill the fuel or hydraulic tanks. Any overflow could cause a fire. Immediately repair any hydraulic or fuel leaks and clean up any spills.
- DO NOT remove the radiator cap when the engine is hot. The coolant will be under pressure and can flash to steam with explosive force, causing severe burns. To prevent burns, remove the radiator cap only when the engine is cool.
- At operating temperature, the hydraulic tank is hot and can be under pressure.

- Relieve all pressure in air, oil, fuel or cooling systems before any lines, fittings or related items are disconnected or removed.
- Before disconnecting hydraulic lines, be sure to lower all loads and relieve all hydraulic pressure. The load could fall on you, or escaping hydraulic oil could cause severe personal injury.
- Batteries produce explosive gases. Keep sparks, flame and cigarettes away. Ventilate when charging or using in an enclosed space. Always shield your eyes when working near batteries. When removing battery cables, always turn the battery disconnect switches OFF first, then disconnect the (-) negative cable. When installing a battery, always connect the (+) positive cable first. This procedure will help to prevent a spark which could cause an explosion.

- Before making adjustments on the engine or electrical system, disconnect the battery. An electrical spark could cause a fire, explosion or severe burns.
- Batteries contain sulfuric acid which can cause severe burns. Avoid contact with skin, eyes or clothing.

Fire or Explosion Prevention

- All fuels, most lubricants and some coolant mixtures are flammable. Do not smoke while refueling or in a refueling area. Do not smoke in areas where batteries are charged, or where flammable materials are stored.
- Keep the machine free of oil, grease, chips, 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.
- Batteries in parallel may be located in separate compartments. See the “Starting the Engine Section” in this guide for specific instructions.
- Inspect for and remove all combustible materials from engine area before starting the machine and periodically throughout the work shift 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 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.
- Clean and tighten all electrical connections. Check daily for loose or frayed electrical wires. Have all loose or frayed electrical wires tightened, repaired or replaced before operating the machine.
- Keep all fuels and lubricants stored in properly marked containers and away from all unauthorized persons.
- Store all oily rags or other flammable material in a protective container, in a safe place.
- Remove all flammable materials such as fuel, oil and other debris before they accumulate on the machine.

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 proper 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!
- Stop the machine and turn off the engine in the clearest area available.
- Lower the carriage.
- If your machine is equipped with a fire suppression system, and that system has not automatically been activated, manually activate the system.

⚠ WARNING

WARNING: The hand held extinguisher is intended to be used to help prevent reflash only. Always exit the machine before using, and position yourself with an exit at your back for means of escape in case the extinguisher malfunctions or something unexpected happens.

- 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 service or replace the extinguishers and fire suppression system before returning to work.

Lines, Tubes, Hoses and Cylinders

- Do not bend or strike high pressure lines. Do not install bent or damaged lines, tubes or hoses.
- Repair any loose or damaged fuel and oil lines, tubes and hoses. Leaks can cause fires.

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

- End fittings damaged, displaced or leaking.
- Outer hose covering chafed or cut and wire reinforcing exposed.
- Outer hose covering ballooning locally.
- Evidence of kinking or crushing of the flexible part of the hose.

This vehicle may be equipped with an Extreme Service Elevating Cylinder (ESC). This cylinder is equipped with an internal accumulator which is charged through an external valve. Consult the service manual for detailed instructions and procedures.

⚠ WARNING

WARNING: HIGH PRESSURE CYLINDER
Do not remove any parts until all pressure has been relieved to avoid possible personal injury. See Maintenance Section for charging and adjustment procedures.

Poison Hazards

⚠ DANGER

Batteries contain sulfuric acid. Avoid contact with skin, eyes or clothing. Antidote:

EXTERNAL - Flush with water.

INTERNAL - Drink large quantities water or milk. Follow with milk of magnesia, beaten egg or vegetable oil. Call physician immediately.

EYES: Flush with water for 15 minutes and get prompt medical attention. Batteries produce explosive gases. Keep sparks, flame, cigarettes away. Ventilate when charging or using in enclosed space. Always wear eye protection when working near batteries

Asbestos Information

Caution should be used to avoid breathing dust that may be generated when handling components containing asbestos fibers. If this dust is inhaled, it can be hazardous to your health. Components in Allied Systems products that may contain asbestos fibers are brake pads and lining assemblies, clutch plates and some gaskets. The asbestos used in these components is usually bound in a resin or sealed in some way. Normal handling is not hazardous as long as airborne dust which contains asbestos is not generated.

If dust which may contain asbestos is present, there are several common sense guidelines that should be followed.

- Never use compressed air for cleaning.
- Avoid brushing or grinding of materials containing asbestos.
- For clean up, use wet methods or a vacuum equipped with a high efficiency particulate air (HEPA) filter.
- Use exhaust ventilation on permanent machining jobs.
- Wear an approved respirator if there is no other way to control the dust.
- Comply with applicable rules and regulations for the work place.
- Follow environmental rules and regulations for disposal of asbestos.
- Avoid areas where asbestos particles may be in the air.

Electrical Hazards

- An electric shock could be fatal. Ensure power to the Heavy Lift Transport is “OFF” before opening electrical panels.
- All electrical cables and connectors must be in good condition (free of corrosion, damage, etc). Use caution in wet weather to avoid danger from electrical shock. Never attempt electrical testing or repair while standing in water.
- Do not wear electrically conductive jewelry, clothing, or other items while working on the electrical system.

Hot Oil Hazards

- Burns from hot oil can be severe; always allow lubricating and hydraulic oil to cool before draining.

Compressed Air Hazards

- When using compressed air to dry parts, pressure should not exceed 30 psi (200 kPa).
- Air pressure penetrating your skin can be fatal. Never direct compressed air at anyone.

Safety Equipment

- Ensure test equipment is in good condition.
- If an instrument must be held while taking measurements, ground the case of the instrument before energizing equipment.
- Do not touch live equipment or personnel working on live equipment while holding a multimeter. Some types of measuring devices should not be grounded; do not hold such devices while taking measurements.
- Prevent personal injury or equipment damage by using a lifting device with a lifting capacity greater than twice the weight of any equipment to be lifted.
- Always use personal protective equipment (PPE) appropriate to the situation. This may include the use of hearing protection, eye protection, a respirator, a hard hat, leather gloves, steel toed boots, etc.

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Section 2 - Specifications

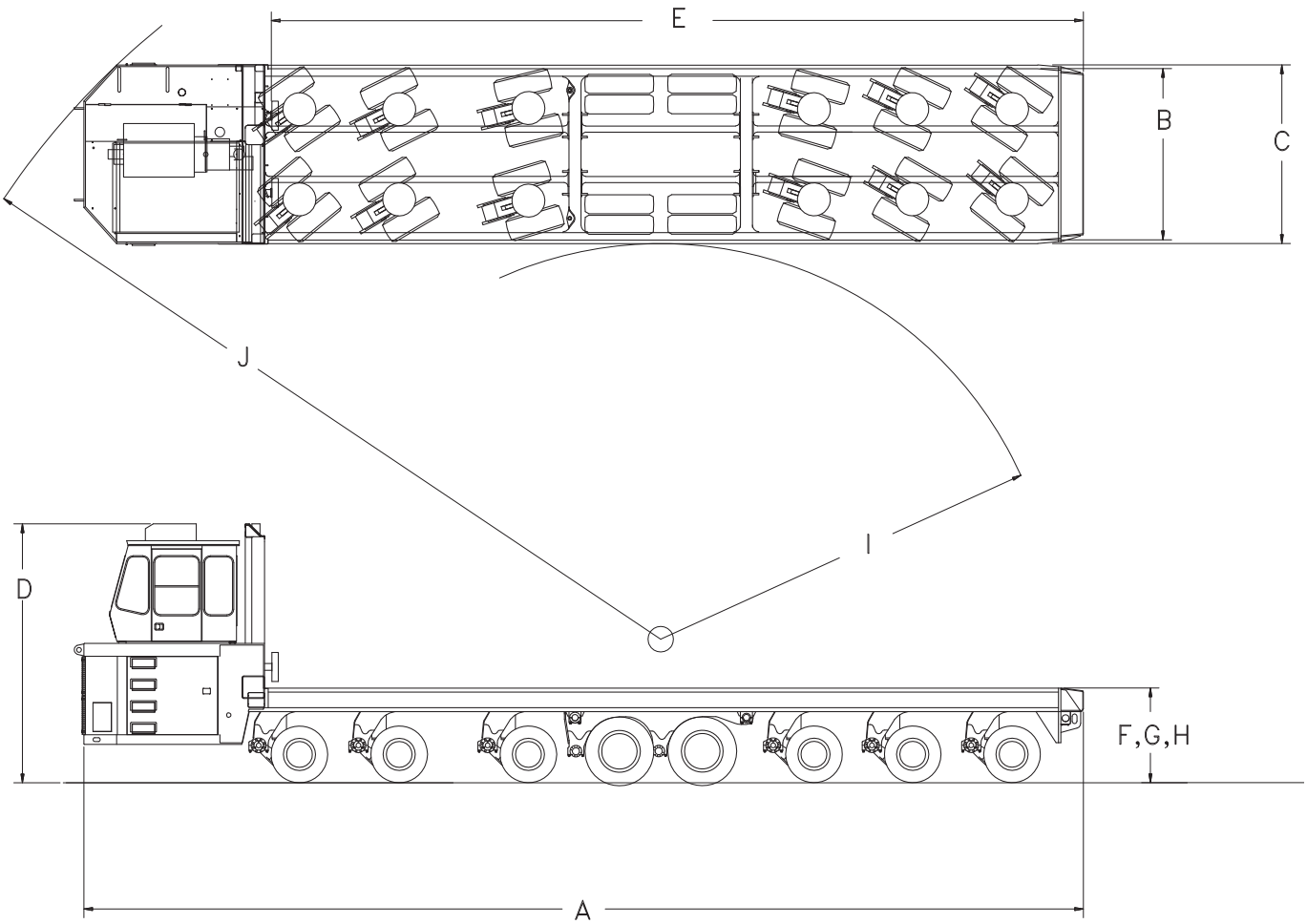


Figure 1 - Heavy Lift Transport

Physical Dimensions (approximate)

A.	Overall Length	621”	(51’-9”)
B.	Width Deck	106.5”	(8’-10.5”)
C.	Width Overall	111”	(9’-3”)
D.	Overall Height Elevated	170”	(14’-2”)
E.	Platform Length	518”`	(43’-2”)
F.	Platform Height (min)	48.5”	(4’-1”)
G.	Platform Height (max)	68.5”	(5’-9”)
H.	Platform Recommended Transport Height	61.5”	(5’-2”)
I.	Turning Radius Inner	240”	(20’-0”)
J.	Turning Radius Outer	480”	(40’-0”)

Weights (approximate)

Gross Vehicle Weight	474,000 Lbs.	237 Tons
Payload Capacity (including pallet)	370,000 Lbs.	185 Tons
Tare Weight	104,000 Lbs.	52 Tons
Axle Line Loaded	59,250 Lbs.	29.6 Tons
Tire Loading/Tire	14,812 Lbs.	7.4 Tons

Section 3 - Operator Instructions

Machine Start and Stop Procedures

NOTICE

Always refer to engine manufacture manual(s) before starting or performing any maintenance on engine.

Engine Pre-Start

1. Make sure the engine 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.
3. Check for emergency/parking brake engagement: Pull knob to set the spring applied axle mounted spring brakes. This brake will apply automatically when air pressure drops below 60 psi.
4. Place transmission in neutral (see Transmission Shift Controller on page 16)
5. Give warning that you are going to start the engine. Remember, there is ample space within the engine, transmission, and driveline compartments for people, and you cannot see them from the cab. Be sure the area around the unit is clear of all personnel and obstructions.
6. Turn the key switch to the “ON” position. The parking brake indicator light should illuminate.

Engine Start-up

1. Turn the key switch to the start position.

   NOTE: If engine does not start within 30 seconds, allow the starter to cool for two minutes before re engagement.

2. When 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.
3. If a rise in oil pressure of the engine or transmission is NOT observed within FIVE seconds, or a rise in air pressure is not seen in TEN seconds, shut down the engine and have maintenance check it out.
4. Warm the engine at idle until the air pressure reaches at least 60 psi, then recheck that the transmission is in neutral and the parking brake applied. Continue to warm the engine at 1000 RPM until the engine temp reaches at least 130°F, and the air pressure rises to 120 psi.
5. Observe the gauges for proper readings and operation; also, check the operation of all safety equipment and accessories.
6. Select gear speed, release parking brake and press accelerator for movement.

Engine Shut-Down

1. Lower throttle to idle speed, and let the engine idle for a minimum of (5) minutes in order to normalize internal engine temperatures.
2. Meanwhile, place all controls in neutral and set the emergency brake.
3. To stop the engine, turn the key switch to “OFF” position.

Troubleshooting

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

Engine

NOTICE

Always refer to engine manufacture manual(s) before starting or performing any maintenance on engine.

Symptom	Probable Cause	Corrective Action
Engine turns over but fails to start	Emergency shutdown control pulled out	Push control in
	Fuel tank empty	Fill tank
	Fuel shutoff valve at tank closed	Open valve
	Fuel filter blocked	Replace filter
Engine fails to turn over	Battery disconnect switches open	Close switches
	Transmission not in neutral	Place lever in neutral
	Battery low	Have charging system checked
	Battery terminals corroded or loose	Clean and tighten terminals
Engine runs unsteadily and power output low	Insufficient fuel supply	Clean fuel strainers, replace filter, fill tank, tighten fuel lines
	Contaminated fuel	Drain tank and lines, clean strainers, replace fuel
	Wrong fuel	Drain tank and fill with proper fuel
	Air intake restricted	Remove restriction
Exhaust smokes badly	Too much oil in sump	Drain to proper level
	Air intake restricted	Remove restriction
Engine overheats	Radiator fins restricted	Clean fins
	Low coolant level	Check coolant level, fill as needed
Engine oil pressure low	Low oil level	Check oil level
	Oil leaks	Tighten connections
	Contaminated oil	Change oil and filters

Transmission Converter *

Symptom	Probable Cause	Corrective Action
Transmission or converter overheats	Low oil level	Fill to proper level
	Oil cooler restricted	Remove restriction
Lack of power	Low engine rpm at converter stall	Have engine checked (governor)

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

Hydraulic System

Symptom	Probable Cause	Corrective Action
No response to controls	Closed tank shutoff valve	Open valve
	Low oil level	Fill tank to proper level
Sluggish operation or response to controls	Hydraulic oil cold	Allow adequate warm-up time
	Low oil level	Fill tank to proper level
	Suction leak	Correct suction leak
	Plugged tank breather	Replace breather
	Restriction in circuit	Remove restriction, check filters
	Pump speed too slow	Check engine speed
Excessive noise	Cavitation	Eliminate restriction in suction line Replace tank breather
	Aeration due to insufficient oil	Fill tank to proper level Correct suction leak
	Tubing vibrating	Tighten mounting clamps
Hydraulic system overheating	Low oil level	Fill tank to proper level
	Operating over pressure reliefs	Correct operating procedure

Air and Brake Systems

Symptom	Probable Cause	Corrective Action
Loss of braking efficiency	Low air system pressure	Allow system pressure to build
Brakes won't release	Low air system pressure	Allow system pressure to build

Electrical System

Symptom	Probable Cause	Corrective Action
Engine fails to turn over	Battery disconnect switch(es) open	Close switch(es)
	Neutral start switch open	Place transmission shift lever in neutral
	Battery low	Have start/charge system tested
	Battery terminals corroded or loose	Clean and tighten terminals
	Other connections loose	Tighten connections
Voltmeter indicates discharge	Alternator drive belt slipping	Tighten or replace belt
	Loose or corroded battery connections	Clean and tighten terminals

Operator Controls

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.

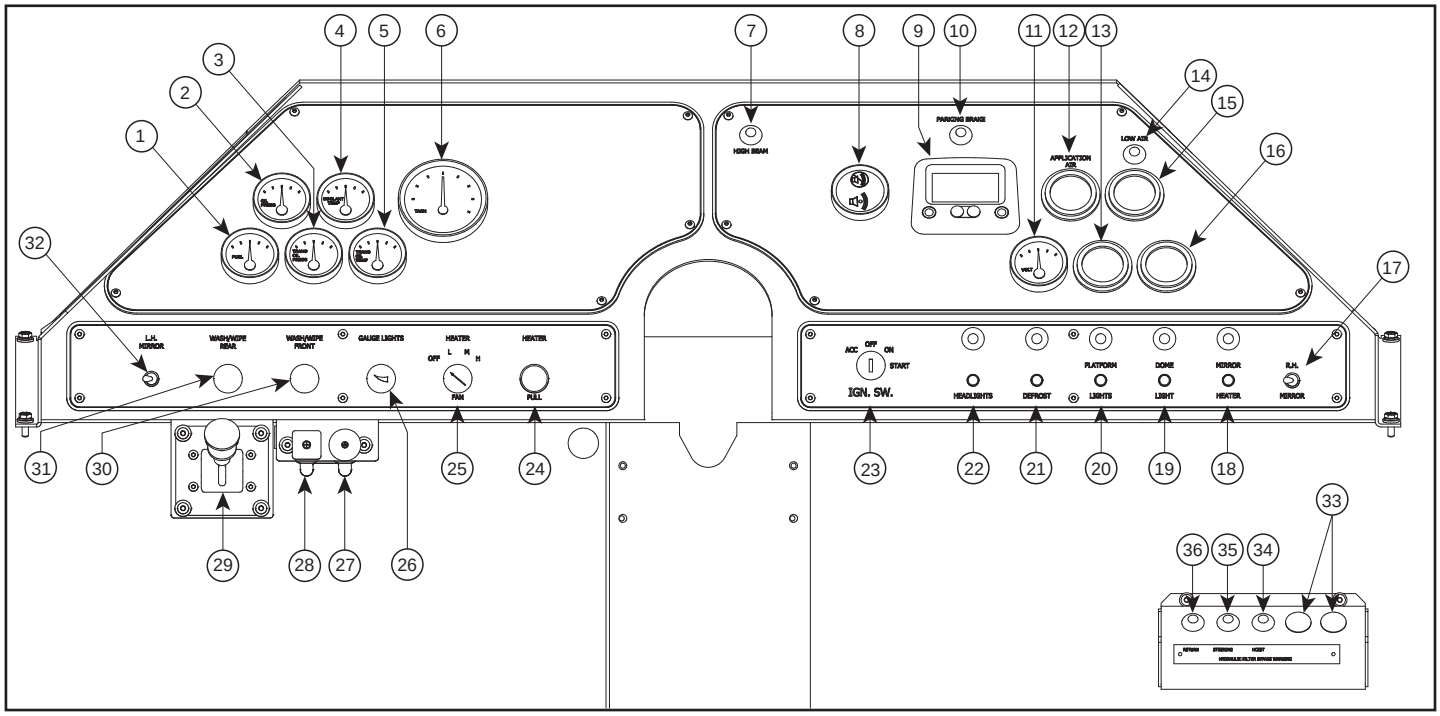


Figure 2 - Dashboard Controls

1. **Fuel Level Gauge**
   The fuel level gauge indicates how much fuel is remaining in the tank.

2. **Engine Oil Pressure Gauge**
   Displays engine lubricating oil pressure. Determines pressure only - not amount.

3. **Transmission Oil Pressure Gauge**
   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.

4. **Engine Coolant Temperature Gauge**
   Displays engine coolant temperature.

5. **Transmission Oil Temperature Gauge**
   Displays Transmission oil temperature. This gauge should read below 200° F. If the temperature exceeds the maximum allowance, discontinue operation and report to appropriate service personnel.

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

7. **High Beam Indicator Light**
   Illuminates when high beam has been switched on.

8. **Audible Alarm**
   Audible alarm sounds when signaled by the PowerView.

9. **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.

10. **Parking Brake Indicator Light**
    If the key switch is ON, and the parking brake is ON, this light will be ON.

11. **Voltmeter Gauge**
The voltmeter indicates the operating voltage of the electrical system - whether the alternator is or isn't charging. The numbers indicate volts (acceptable range is 12-14 volts).

12. **Air Pressure Gauge**
The air pressure gauge indicates system air pressure. Operating pressure is between 60 to 120 psi.

13. **Ammeter Gauge**
Displays positive or negative current electrical charge.

14. **Low Air Indictor Light**
Illuminates if air pressure is below 60 psi.

15. **Air Pressure Gauge**
Displays air pressure for brakes.

16. **Hydraulic Oil Temperature Gauge**
Displays hydraulic oil temperature. Do not operate machine in production use until hydraulic oil temperature has reached operating temperature (approximately 21° C / 70° F).

17. **Mirror Position Switch - Right Hand**
Toggle switch to adjust position of mirror.

18. **Mirror Heater**

19. **Dome Light Switch**
ON/OFF

20. **Platform Lights Switch**
ON/OFF

21. **Defroster Fan Switch**
ON/OFF
Three position switch located on fan: L-Off-H

22. **Headlights Switch**
High Beam
On
Off

23. **Ignition Switch**
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.

24. **Heater Pull**
ON/OFF

25. **Heater**
Control: Low/Medium/High

26. **Gauge Lights**
Dims and brightens gauge lights.

27. **Parking Brake Fail Safe (Green)**
If there is not enough air to release the parking brake, push and hold the green fail safe button while driving to a safe location. Contact your maintenance department for inspecting air system.

28. **Parking Brake (Yellow)**
Pull to engage parking brake, push to release.

29. **Shutter Control Lever**
Opens and closes the heat shield shutter on the rear window of cab.

30. **Wash/Wipe Front**
Off | Low | Med | High
Push for windshield fluid.

31. **Wash/Wipe Rear**
Off | Low | Med | High
Push for windshield fluid.

32. **Mirror Position Switch - Left Hand**
Toggle switch to adjust position of mirror.

33. **Blank**

34. ***Hoist System Filter Indicator Light**

35. ***Steering System Indicator Light**

36. ***Return Filter Indicator Light**

* These lights indicate the condition of the high pressure supply filters. With the machine running and at operation temperature, the lights should be OFF. If the light(s) illuminate and stay on, filter service is required.

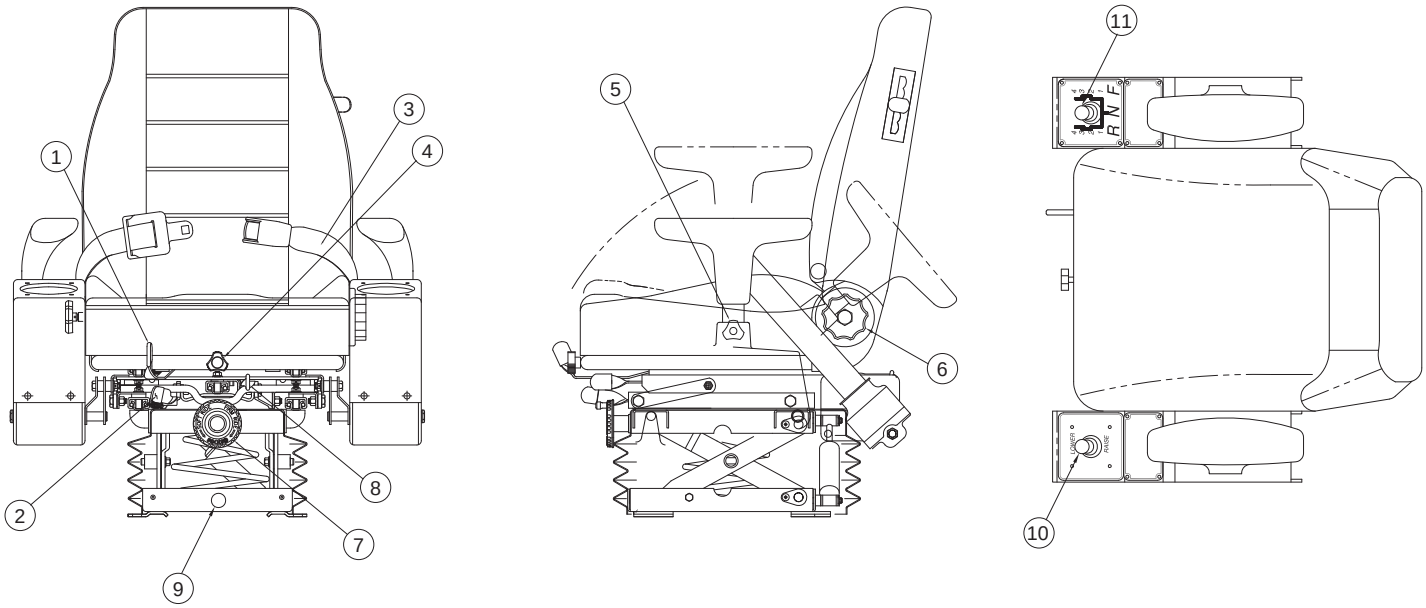


Figure 3 - Seat and HLT Operating Controls

1. **Seat Adjust Track Set**
   Adjusts seat forward and back.

2. **Seat & Armrest Adjust Track Set**
   Adjusts seat and arms forward and back.

3. **Seat Belt**
   Always buckle up for safety.

4. **Seat Cushion Rake Angle Adjustment Knob**
   Adjusts angle of seat cushion.

5. **Seat Armrest Adjustment Knob**
   Adjusts height and angle of armrest.

6. **Seat Back Adjustment Knob**
   Adjusts angle of backrest.

7. **Seat Suspension Resistance Adjustment Knob**
   Adjusts firm or soft suspension.

8. **Seat Height Adjustment Lever**
   To lower seat, push lever towards left side of cab and push downward on seat. To raise seat, push lever towards left side of cab while moving your self upward out of seat.

9. **Seat Rotation Lock**
   Pull and rotate seat to unlock.

10. **Raise/Lower Switch**
    Pull back to raise. Push forward to lower.

11. **Transmission Shift Controller**

Forward Travel
Push shift controller to “F” side while selecting 1,2,3 or 4th gear.

Neutral Position
Push shift controller to “N” center position.

Reverse Travel
Push shift controller to “R” side while selecting 1,2,3 or 4th gear.

NOTICE

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.

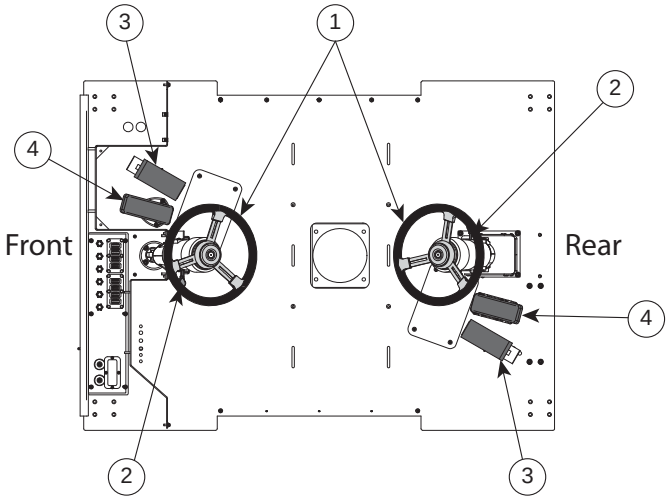


Figure 4 - Steering and Pedal Controls

1. **Steering Wheel and Horn**
   Center hub of steering wheel contains horn button. Depress to sound horn.

2. **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.

3. **Accelerator Pedal**
   Foot controlled engine accelerator pedal.

4. **Brake Pedal**
   Depress to use brakes.

⚠ WARNING

WARNING: Excessive pumping of brake pedal may use all system air. The low air indicator light will illuminate and audible alarm will sound when the system air drops below 60 psi. When this happens, stop the vehicle and let the system air charge.

Raise or Lower Machine

Use the Elevate/Lower Switch (Item 10, previous page) to raise or lower the vehicle. To set the vehicle's height to its travel position, lower vehicle to its lowest height, then raise approximately 13".

⚠ CAUTION

CAUTION: The vehicle height MUST be set to its travel position (raise machine approximately 13" from lowest position) before driving. Failure to properly set the vehicle's height may cause severe equipment damage.

Weigh Load System

The remote control display allows the operator to monitor the weight of the load on the machine. The display is located in the right rear corner of the cab, and is illustrated in Figure 5.

The display has three modes; "Run" Mode (normal operation), "Weight Calibrate" and "Transmission Setup" mode. In "Run" Mode, shown in Figure 5, the display indicates the weight in each quadrant, total weight, FWD/N/REV as well as BRAKE and IDLE inputs.

The weigh load system is calibrated at the factory, but may be recalibrated at any time by the operator as required. Press the "Weight Calibrate" button to switch the display to that mode. Figure 6 illustrates the display in "Weight Calibrate" Mode (Step 1 is illustrated). There are four steps to the Calibration process.

In "Weight Calibrate" Mode, the scroll up/down keys are used to navigate through the steps. The first step (calibration screen 2) is to establish the "zero" weight for the bed. Make sure that the bed is empty, and set the vehicle to its middle position (see previous section). Press "set" to reset each quadrant to its new "zero" point.

For step two (screen 4), place a load of known weight on the bed, set the vehicle to its middle position, and press "set". The closer the weight is to the machine's maximum capacity, the more accurate the calibration will be.

The third step (screen 6) is to enter the known weight. This is done by using the "raise" and "lower" keys and pressing "set" when correct. Screen 7 shows the entered and stored values.

The fourth step (screen 9), is where the calibration value is chosen. There are four values to choose from: "use" means reuse the current calibration, "old" means use the last stored calibration, "new" means use the calibration just calculated, and "dft" is the default calibration calculated at the factory. After choosing the calibration (slope), press "Run" to go back to "Run" mode.

If the transducers drop below their "zeroed" value, that transducer will read "zero" instead of its label in "Run" mode. If this occurs, the machine should be re-zeroed (calibration screen 2). The rest of the calibration steps are not needed to simply reset the "zero" point.

The second or fourth calibration screens may be used to check transducer operation. The values displayed are actual transducer inputs where 0 corresponds to 0 volts and 1023 corresponds to 5 volts.

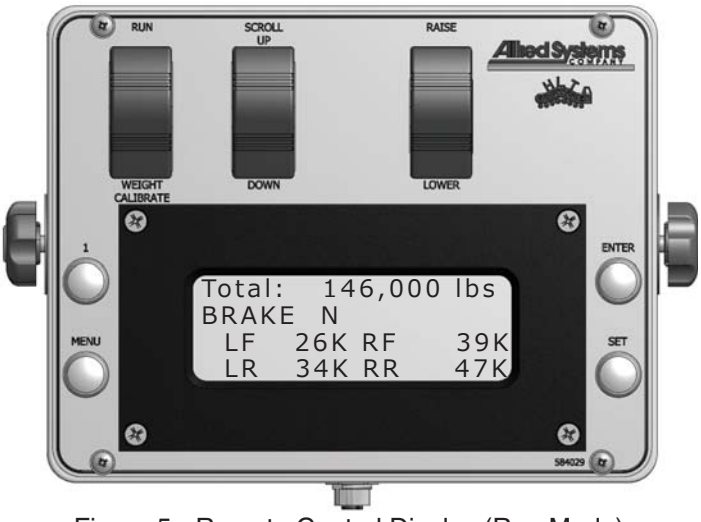


Figure 5 - Remote Control Display (Run Mode)

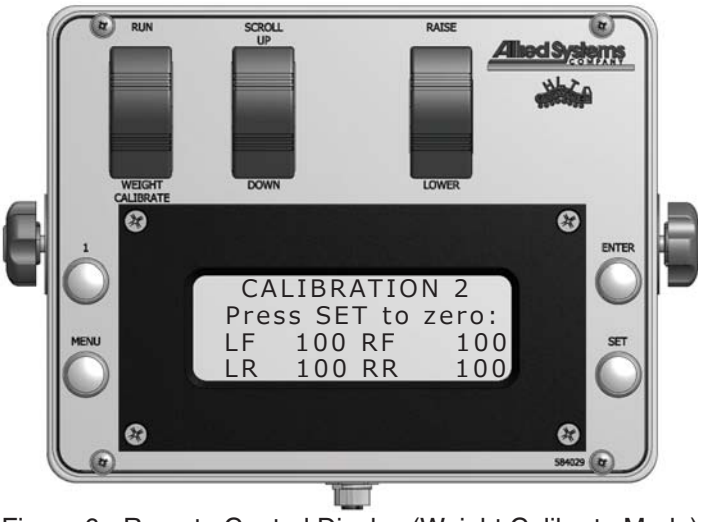


Figure 6 - Remote Control Display (Weight Calibrate Mode)

Weigh Load System Continued...

Transmission Setup mode is used to adjust “Brake Time” and “Idle Time”. The transmission setup mode consists of a “CHANGE CONTINUE” screen, three information screens and a setup/troubleshoot screen where “Brake Time” and “Idle Time” can be adjusted.

There is only one way to access the transmission setup mode to eliminate accidental adjustment. Press and hold ‘MENU’ and ‘SET’ buttons on the remote control box simultaneously within the first five seconds of turning ignition to ‘ON’ position.

The “CHANGE CONTINUE” screen (see Figure 7) is the first screen to display after entering transmission setup mode. This screen displays “Does this program control trans shift?”. This screen should display “YES” if your HLT has this option. Press button ‘1’ to toggle “YES “ or “NO”. Press ‘SET’ button to save and to continue to the next screen. Pressing the ‘ENTER’ button can also be used to access the next screen.

Note: To exit the “Transmission Setup” mode and return to the “Run” mode screen, press the ‘RUN’ rocker switch.

Figure 7 - Remote Control Display (Transmission Setup Mode)

The three information screens describe button functions on the remote control display while in “transmission setup” mode. Press ‘ENTER’ to access the next screen.

The setup/troubleshoot screen (see Figure 8) is used to adjust “Brake Time”, “Idle Time” parameters and can also be used for troubleshooting.

The top of this screen shows the state of the program logic taking in consideration the timers. For example, “BRAKE” will read OFF until the brake pedal is actually pressed for 1.00 seconds, at which time it will read ON. Transmission direction change is not allowed until both “BRAKE” and “IDLE” read “ON”.

To the right of “Brake Time” and “Idle Time” are T/F symbols. These read real time the brake and throttle switch inputs. “T” means the brake pedal is applied, where “T” mean the throttle pedal is released (at idle).

The bottom row displays the status of the two outputs “FWD” and “REV”, where ‘T’ means the output is powered and ‘F’ means unpowered. Forward power is on pin P2B1 and Reverse power is on pin P2B2 located on the DVC10 module.

The “Brake Time” is the amount of time the brake pedal must be applied before allowing transmission direction change. Typically this should be set to 1 second. Use the ‘SCROLL UP’/’SCROLL DOWN’ rocker switch to adjust the brake time.

The “Idle Time” is the amount of time the foot must be off the throttle pedal before allowing direction change. Typically this should be set to 1 second to allow the engine to drop in RPM and produce less wear on drive train components. Use the ‘RAISE’/’LOWER’ rocker switch to adjust the “Idle Time”.

Hold ‘SET’ to save and exit this setup/troubleshoot menu and return to the main screen.

Figure 8 - Remote Control Display (Setup/Troubleshoot screen)

Camera/Monitor Locations and Controls

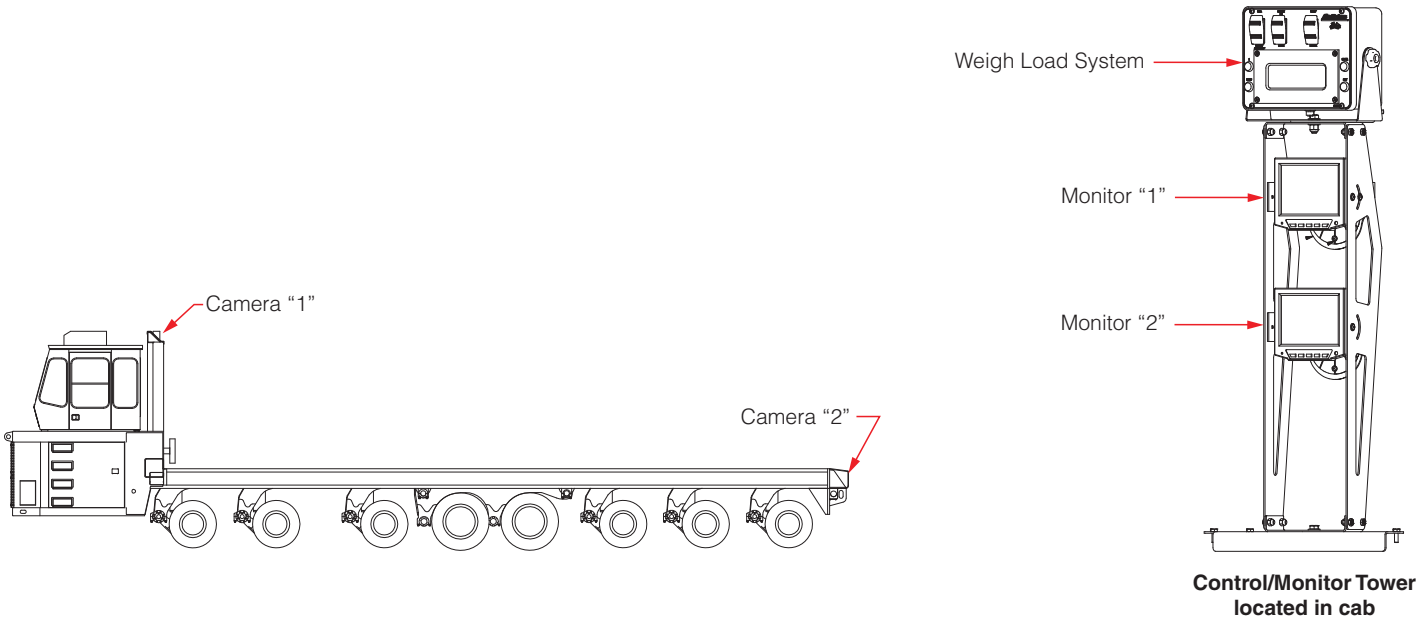


Figure 9 - Camera/Monitor Locations

The camera/monitor system on the HLT consists of two cameras and two monitors. Camera "1" views the load deck of the HLT and can be displayed on monitor "1". Camera "2" views behind the HLT and can be displayed on monitor "2".

General monitor control instructions below.

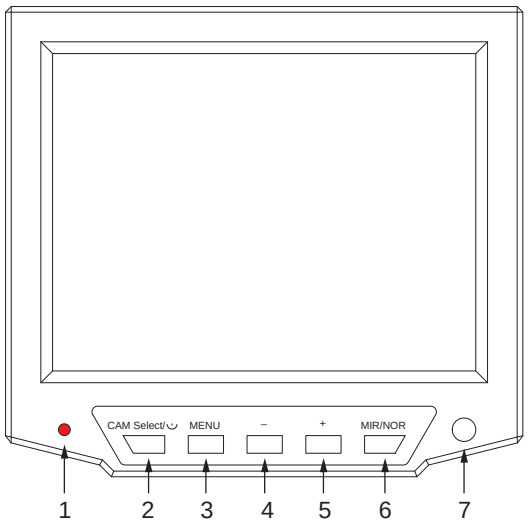


Figure 10 - Monitor

1. **Power Indicator Light**
   Light is red when powered on.

2. **Camera Selector and Power button**
   Press to power on or off.

3. **Menu button**
   Press lightly to get access to contrast, brightness and volume control.

4. **(-) button**
   Press lightly for decreasing a selected feature in the menu.

5. **(+) button**
   Press lightly for increasing a selected feature in the menu.

6. **MIR/NOR button**
   Mirror/ Normal option. Press lightly to set up the monitor image reverse.

7. **Day/Night Sensor**
   Brightness of monitor adjusts automatically and can be adjusted in the menu.

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

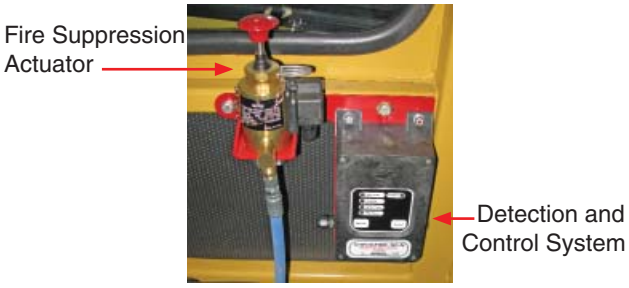


Figure 11 - Fire Suppression System

Two fire suppression system actuators are provided. Either one will set off the system. One is located in the cab. The other is mounted on the engine compartment door on the left side of the vehicle. Memorize the location of each. Many machines are equipped with an optional automatic fire detection and activation system, as shown in Figure 11.

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.

⚠ CAUTION

All maintenance and servicing should be performed by a qualified service technician from your local authorized service center for your fire suppression system.

Front Panel Indicators

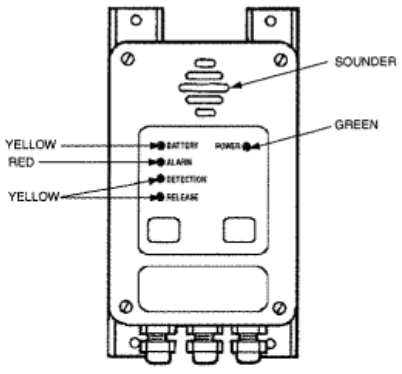


Figure 12 - Detection and Control System

Battery Trouble (Yellow)
LED pulses once every 10 seconds when indicating battery trouble.

The yellow battery trouble LED will pulse when a low power condition is detected in either of the connected supplies (internal or external). If only one power source is used, the control module will automatically ignore the unconnected circuit upon resetting the control module. If a power source is once connected and recognized, a subsequent loss of that power source will be recognized as a Battery Trouble condition. If a power source is once connected, recognized, and then disconnected, the disconnected supply can be ignored by operating the RESET button.

Power Normal (Green)
LED pulses once every 3 seconds when indicating normal power.

The green Power Normal LED pulses “on” once every 3 seconds indicating power is normal from both sources of input power. If the power drops below an acceptable level from either the internal or external source of input power, the green Power LED will be extinguished. If only one source of power is used, the green Power LED will extinguish when the voltage level drops below an acceptable level.

Alarm (Red)
The alarm LED will flash if an alarm condition exists. An alarm condition is caused by operation of the detection circuit or operation of the manual pull/pressure switch input circuit. The alarm condition will continue until the source of the alarm is removed and the control module is reset.

DETECTION CIRCUIT ACTIVATION MODE - Upon receipt of an input to the detection circuit, the Alarm LED and the sounder will pulse at a rate of 2 times per second and will continue at this rate until the first time delay period has expired.

After the first time delay, a second time delay mode is initiated. This causes the LED and sounder to pulse at a rate of 4 times per second.

After discharge, the LED and sounder will continue to pulse at a rate of 4 times per second for 30 seconds. After that, it will switch to the trouble mode and pulse once every 10 seconds.

ELECTRIC MANUAL RELEASE MODE - The first time delay mode will be by-passed and the LED will pulse at a rate of 4 pulses per second. After the time delay setting is reached, it will pulse another 30 seconds at the same rate. After that, the control module will go into the post-discharge mode, at which time the Alarm LED and Release LED will pulse at a rate of one pulse per 10 seconds.

PRESSURE SWITCH CIRCUIT (FEED BACK) ACTIVATED MODE - When this mode is actuated, the Alarm LED will pulse a minimum of 30 seconds at 4 pulses per second. The control module will then go into the post-discharge mode and the Alarm and Release LED will pulse at a rate of one pulse per 10 seconds.

Release Trouble (Yellow)
The Yellow Release LED and the audio will pulse at a rate of once every 10 seconds when a trouble condition is detected in the release circuit. The control module will return to normal when the trouble condition is cleared.

The Release Trouble will also pulse after the system has completed a discharge cycle or a pressure switch feed back signal has been received. The trouble signal in this condition is used to indicate a recharge of the fire suppression system is necessary. A Release Trouble under either of these conditions can only be cleared by resetting the control module.

Detection Trouble (yellow)
The Yellow Detection Trouble LED and the audio pulse once every 10 seconds when the control module detects a trouble in the detection circuit. The control module will automatically return to normal when the trouble is cleared.

Sounder (Audio)
The sounder gives the audio indication for all alarm and trouble outputs. The sounder will pulse at the same rate as the visual corresponding LED.

The sounder gives the audio indications of the various outputs. The sounder is rated at 85 dB at 2 ft (0.6 m).
The pulse rates are as follows:

Alarm - Time Delay 1 = 2 pulses per second
Time Delay 2 = 4 pulses per second

Trouble - 1 pulse per 10 seconds

Loss of Power - 1 pulse per 10 seconds

Release Circuit Fired - 4 pulses per second for 30 seconds, then 1 pulse per 10 seconds

Low Battery - 1 pulse per 10 seconds

Front Panel Buttons

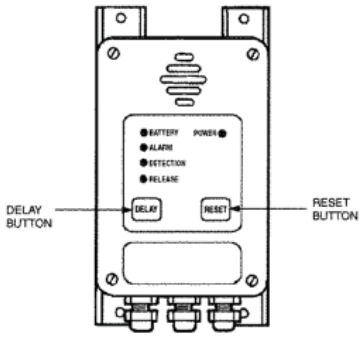


Figure 13 - Detection and Control System

Delay
Pushing the “DELAY” button during the first time delay cycle will restart the time delay cycle. If the second time delay cycle has already started, the “DELAY” button will have no effect.

The “DELAY” button can also be used to check the diagnostics function. By depressing the delay button when the system is in the trouble condition, the LEDs will flash a pattern code. Each pattern code indicates a certain type of trouble. The code pattern is prioritized. The first trouble must be fixed before addressing the next one. Once the first trouble is taken care of, depressing the “DELAY” button will cause the LEDs to indicate the code for the next trouble, if there is one. When the “DELAY” button is pressed, three short audio and visual indications will acknowledge the switch has been depressed properly.

In a post discharge condition, pressing the DELAY button will silence the alarm relay if the alarm relay has been programmed to silence.

Reset
The “RESET” button is used to re-initialize the control panel. When depressed, it provides an indication that all LEDs and the sounder are functional.

It is used to upload the manual programming into the control module.

If trouble(s) has not been cleared, the trouble indication will reappear after the RESET button is pressed.

When the “RESET” button is pressed, three short audio and visual indications will acknowledge the switch has been depressed properly.

Powerview Display Module

General

Your Heavy Lift Transporter 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 Transporter. 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 which may be displayed in standard or metric units as well as in English, Spanish, French, Italian, or German languages (when applicable, consult engine or transmission manufacturer for SAE J1939 supported parameters):

- Engine RPM
- Engine hours
- System voltage
- Percent 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 gear position
- Engine configuration parameters
- Active fault codes
- Stored fault codes

Faceplate Features

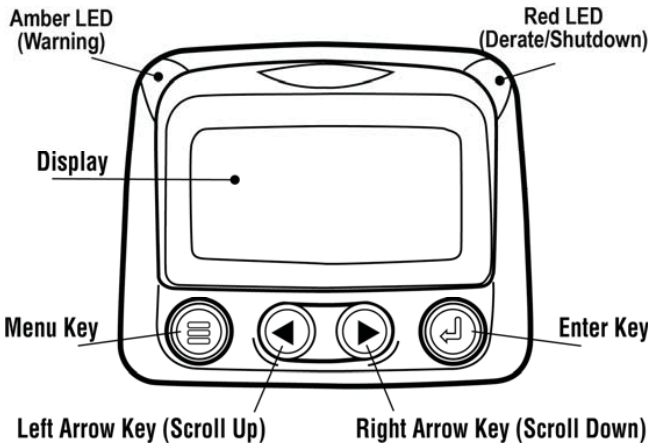


Figure 14 - Powerview Faceplate Features

Keypad Functions

The keypad (see Figure 14) on the PowerView display is a capacitive touch sensing system. There are no mechanical switches to wear or stick. The keys on the keypad perform the following functions:

» **Menu Key** - Enter or exit menu screens.

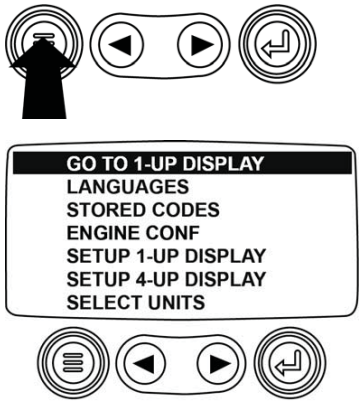
» **Left Arrow** - Scroll the screen or move the parameter selection to the left or upward.

» **Right Arrow** - Scroll the screen and move the parameter selection to the right or downward.

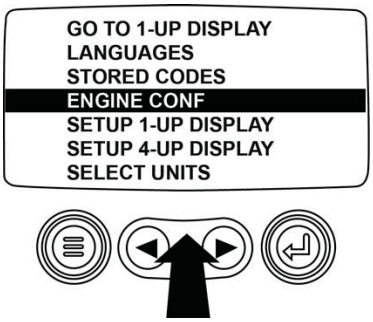
» **Enter Key** - Select a menu or parameter or hide/view an active fault code.

Basic Navigation

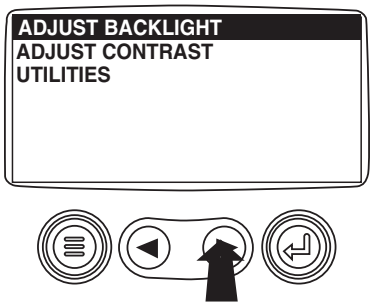
1. When Menu is pressed, the main menu items are displayed.



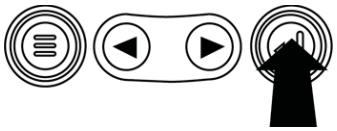
2. Touching the Arrow Keys will move the selection bar to other menu items.



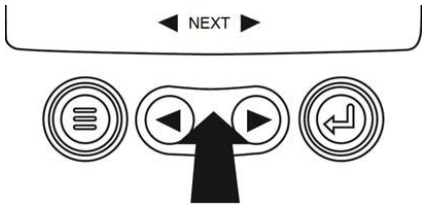
3. Certain menus have multiple pages of items. Scrolling past the top item or bottom item on the current page will reveal other menu items on additional pages.



4. When the desired item is highlighted by the cursor, pressing Enter will select that item and display the corresponding screen.



5. Anytime the word NEXT appears above the Arrow Keys there are more screens that may be viewed. Use the Arrow Keys to scroll to the next screen of information.



Operation

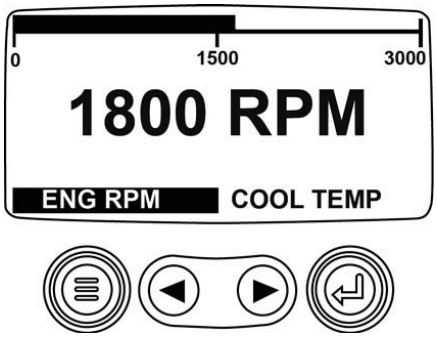
PowerView Menus (First Time Start Up)

1. When power is first applied to the display, the Murphy logo appears.

2. If the Engine ECU is broadcasting a 'Wait to Start' message, this screen will be shown. Engine manufacturers typically recommend against starting the engine while this message is broadcast from the ECU. Once the ECU stops broadcasting this message, this screen will no longer be displayed.

3. Once the engine has started, the single engine parameter appears with the engine RPM displayed.

   Pressing the Right Arrow Key will display the coolant temperature. The screen can be changed to other parameters by pressing Menu.



Setting Up The Display

The screen may be configured to display a single engine parameter (1-up display), or four parameters at once (4-up display). Default options are provided or you may customize the display by selecting the parameters you want.

1-Up Display

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, and Oil Pressure.
Custom Setup – This option allows for the modification of which 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.

Up Display Settings

1. Touch Menu and use the Arrow Keys to highlight SETUP 1-UP DISPLAY, then press Enter.

2. To select USE DEFAULTS, highlight the option and press Enter. A message indicating “RESTORED TO DEFAULTS” is displayed.

3. To select CUSTOM SETUP, highlight the option and press Enter. A list of engine parameters is displayed.

4. To select a parameter, use the Arrow Keys to scroll and highlight the parameter, then touch Enter.

   Selected parameters are indicated by a # symbol to the right, and represent the order in which the parameter will be displayed.

5. To deselect a selected parameter and remove it from the list of displayed parameters, highlight the parameter and touch Enter.

6. Continue to scroll and select additional parameters for the CUSTOM 1-UP DISPLAY. Touch Menu at any time to return to the CUSTOM SETUP menu.

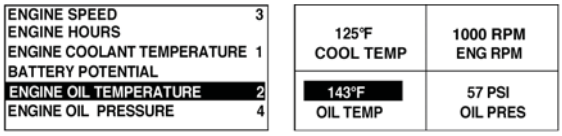
7. Selecting the AUTOMATIC SCAN ON function will cause the 1-up display to scroll through the selected set of parameters one at a time.

8. Once the USE DEFAULTS, CUSTOM SETUP and AUTOMATIC SCAN functions have been set, touch Menu once to return to the main menu, or twice to display the 1-up display screen.

Up Display

The 4-up display places the parameter data into four areas of the screen known as quadrants. Factory defaults for the 4-up display include coolant temperature, engine speed, oil pressure, and battery voltage. You may customize the 4-up display with parameters you define for each quadrant.

1. Touch Menu and use the Arrow Keys to highlight SETUP 4-UP DISPLAY, then press Enter.
2. To select USE DEFAULTS, highlight the option and press Enter. A message indicating “RESTORED TO DEFAULTS” is displayed.
3. To select CUSTOM SETUP, highlight the option and press Enter. The 4-up display appears.
4. The quadrant with the backlit parameter value is the currently selected parameter. Use the Arrow Keys to select which quadrant you wish to edit.
5. Touch Enter and a list of parameters will appear. The parameter that is highlighted is the selected parameter for the screen. 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

6. Use the Arrow Keys to highlight the new parameter to be placed in the quadrant that was selected in step 4 and touch Enter.
7. Touch Menu to return to the 4-UP CUSTOM SETUP screen.
8. The parameter in the selected quadrant has changed to the parameter selected in the previous screen.
9. Repeat the parameter selection process until all spaces are filled.

Main Menu Options

This section describes the features listed on the main menu of the PowerView. These menu options are displayed whenever you touch Menu. The Arrow Keys allow you to scroll the items, and Enter selects the highlighted option.

Selecting a Language

From LANGUAGES, you may select ENGLISH, ESPANOL, FRANCAIS, ITALIANO, or DEUTSCH. The currently selected language is indicated by an asterisk.

Stored Fault Codes

Select this and PowerView requests and displays stored fault codes from the engine ECU. If the engine does not support this function, a “Timeout ECU Not Responding” message displays.

Engine Configuration Data

This allows you to scroll through and view the engine’s configuration data. If the engine does not support this function, a “**No Engine Configuration Data**” message displays

Service Reminders

SERVICE REMINDERS permit you to RESET REMINDERS or MODIFY REMINDERS for changing engine oil, air filters, and hydraulic oil or for servicing the engine and/or machine.

NOTE: Service Reminders are internal reminders within PowerView. Once a Service Reminder is active, warnings will show SPN 916 and FMI 17. Check PowerView Service Reminders prior to calling Technical Support.

1. Use the Arrow Keys to highlight Service Reminders and touch Enter.
2. The Service Reminders options display. Use the Arrow Keys to select either Reset Reminders or Modify Reminders, and then touch Enter.
3. If you select Reset Reminders, use the Arrow Keys to highlight the Reminder you wish to edit. Touch Enter
4. The Reminder name appears at the top of the screen. The action (ON or OFF) displays mid-screen, and two choices display at screen bottom. Touch Menu to Cancel the action. Touch Enter to choose Reset.

5. If you select Modify Reminders, use the Arrow Keys to highlight the Reminder to modify and touch Enter.

6. The Reminder name appears at top screen. The hour alue displays mid-screen and allows you to set the number of hours to elapse before a Reminder prompts. Bottom screen shows Cancel and Save. Touch Cancel to discard changes and return to Reminders list.

7. Use the right Arrow Key to increment the highlighted number. Use the left Arrow Key to move to the next number space.

8. Touch Save. The Modify Service Reminder screen displays. Touch YES to save or NO to return to the Reminders list.

9. A modified Reminder displays a (+) at right of Reminder name when successfully completed. Follow the above steps to modify other Reminders.

When finished, touch Menu to return to the Main Menu.

Select Units

From SELECT UNITS, you may select how information is displayed:

- ENGLISH for Imperial units (PSI, F)
- METRIC KPA
- METRIC BAR for IS units (kPa, Bar, C).

Backlight Adjustment

ADJUST BACKLIGHT allows you to select the desired back-light intensity.

Contrast Adjustment
From ADJUST CONTRAST, you may select the desired contrast intensity.

Utilities Menu

UTILITIES provide troubleshooting features and displays information about the PowerView configuration.

Gage Data

View information for optional connected PVA (PowerView Analog)gauges.

Remove All Gauges

Reset the gage memory on the PowerView.

Software Version

This screen lists Configuration, Firmware, Languages, and Bootloader versions for this PowerView unit. You may need this information if requesting assistance from Technical Support.

Analog Input

With Analog Input highlighted, press Enter. You select from two settings:

- BACKLIGHT DIMMER: Note - The unit accepts an optional backlighting dimmer (0-1k Ωpotentiometer).

- FUEL LEVEL: touch Enter to reach the Set Low Fuel Level screen. Then, touch Enter to reach Low Fuel % screen. Use the right Arrow Key to increase, or left Arrow Key to decrease the percentage of remaining fuel at which to send a warning. The default is 20%.

  NOTE: The PowerView accepts an optional Murphy fuel sender (recommend Model ES2F) for fuel level information. Custom setup for a non-Murphy fuel sender is available. See the Fuel Sender Calibration document on the PV101-A Literature tab at www.fwmurphy.com.

OEM

The OEM menu is the last item on the Utilities menu. You must have a password to access the OEM menu. Once in the OEM Menu, select an item by highlighting it and touching Enter to reach additional screens.

ENTER PASSWORD screen – Enter 3482 in the numeric spaces provided. Start at the furthest left numeric value and use the Left Arrow Key to increment the number and th the Right Arrow Key to move to the next numeric position. The following items are in the OEM Menu.

MODBUS® Setup

To set the MODBUS, highlight MODBUS SETUP and touch Enter.

1. There are four selections: Use Factory Defaults, Serial Port Setup, Slave Address Setup, and Master Active/Slave Active. You can toggle between Slave Active (which is SCADA/remote Modbus master) and Master Active (which is Auxiliary gauges). Highlight your selection and touch Enter.
2. If in Slave Active, select SERIAL PORT SETUP and touch Enter.
3. Scroll through the Serial Port Setup list and make selections for BAUD RATE, PARITY, DATA BITS, and STOP BITS to configure the serial port parameters for your Modbus slave application.

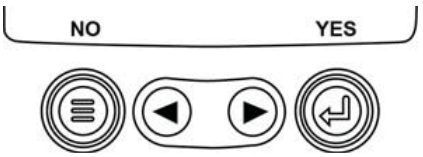
CANBUS Data Rate

Touch Enter to reach the six CANBUS data rates. Use the Arrow Keys to highlight your choice and touch Enter to make the selection.

Select Engine ECU

Highlight Select Engine ECU and touch Enter.

1. The message “LISTEN TO ECU: ALL” displays as the default setting. This message indicates the PV101 is listening to all devices on the network.
2. To change the setting to a specific address, touch the Arrow Keys to scroll through the selections (0-253, and ALL).
3. Once the target address displays, touch Enter.
4. A confirmation screen displays; selecting NO (Menu) returns to the SELECT ENGINE ECU screen. Selecting YES (Enter) stores the selected address and returns to the OEM menu.



Set Source Address

Allows setting the source claim address for the PowerView on the CAN Network. Options are Auto Claim or 0 to 253.

Restore All Defaults

PowerView automatically resets after the restore defaults is complete. RESTORING ALL FACTORY DEFAULTS displays when this is selected.

Clear Machine Hours

Use this to clear machine hours internal to PowerView outside of ECU hours.

Set Machine Hours

Machine hours calculate internally when the RPM is greater than 50 and the engine is not broadcasting hours. Use this if you want to track hours for just the machine.

Fuel Setpoints

Highlight and touch Enter to select Fuel Setpoints.

- Touch Enter to turn Fuel Setpoints ON or OFF.
- Once in the Fuel Setpoint screen you can choose to set the Empty Setpoint, Set Fuel Setpoint, Show Fuel Setpoints, Clear Fuel Setpoints, or choose to set the fuel setpoints for ¼, ½, and ¾ fuel tank levels.

Fuel Setpoints must be ON to work with a non-Murphy fuel sender. Modifying fuel setpoints is a complex process. To assist you in configuring for a Murphy Fuel Sender or programing for a non-Murphy Sender, go to the FW Murphy Web site (www.fwmurphy.com/pv101), locate PV101 Display and under the Literature tab, locate the document Fuel Sender Calibration.

Faults and Warnings

The PowerView provides two means for detecting faults and warnings: visual LEDs on the casing (See “Faceplate Features”) and fault indicators on the display.

Visual Indication

- Amber LED (Warning)
- Red LED (Derate / Shutdown)

Fault Indicators

Auxiliary Gage Fault

Warning

Derate / Shutdown

Auxiliary Gage Fault

Murphy’s PVA Gauges can be attached to the PowerView. If an auxiliary gage should fail, the 1-up or 4-up display will be replaced with the fault message “GAGE NOT RESPONDING”.

NOTE: The fault can only be cleared by correcting thecause of the fault condition.

Active Fault Codes

When the PowerView receives a fault code from an engine, the 1-up or 4-up display will be replaced with the active fault codes message.

Derate / Shutdown Codes

When the PowerView receives a severe fault code from an engine control unit the 1-up or 4-up display will be replaced with the SHUTDOWN message.

Acknowledging Fault Codes

1. To acknowledge and hide the fault and return to the 1-up or 4-up display, touch Enter. The display will return to the 1-up or 4-up display, but the display will contain the shutdown icon.
2. Touch Enter to redisplay the hidden fault. Touch Enter once again will hide the fault and return the screen to the 1-up or 4-up display.

Troubleshooting

You may see the following messages displayed. Each gives you specific information about the engine, ECU, or PowerView.

WAIT TO START PREHEATING - The ECU is broadcasting a ‘Wait to Start’ message. Engine manufacturers typically recommend against starting the engine while the ECU is broadcasting this message. Once the ECU stops broadcasting this message, this screen will no longer be displayed on the PowerView.

CANBUS FAILURE - The PowerView has not received any valid J1939 CAN messages for at least 30 seconds.

TIMEOUT ECU NOT RESPONDING - The PowerView sent a request to the ECU for Stored Fault Code (DM2) information, and the ECU did not respond to the request. This message on the PowerView indicates the ECU may not support Stored Fault Code (DM2) functionality over J1939.

NO STORED CODES - The PowerView sent a request to the ECU for Stored Fault Code (DM2) information, and the ECU responded. There are zero stored codes.

NO GAGE DATA - The PowerView has no record of gauges connected to the RS485 bus.

The following messages are displayed in place of a parameter value

NO DATA - The PowerView has not received data for the selected parameter for at least 5 seconds.

NOT SUPPORTED - The ECU is sending a message that it does not support this parameter.

DATA ERROR - The ECU is sending a message that there is a data error with this parameter. If not, then specifically on the PV101, FUEL LEVEL has been selected for display, and the ANALOG INPUT has been set to FUEL LEVEL, but no Murphy Fuel Sender has been connected to the analog input.

The following messages concern information about the PV101.

One of the 4-UP quadrants is empty - No parameter has been selected for display in this quadrant.

Display is not readable, either very dim or very dark - The LCD contrast may have been over or under adjusted. Press and hold the MENU key for approximately 5 seconds. This will reset the LCD contrast setting to factory default.

Section 4 - Maintenance & Lubrication

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

Safety Precautions

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

1. **Read This Manual.**
   Be sure you understand the procedures outlined in this manual before attempting to carry them out. Pay particular attention to any safety warnings presented. If you have any questions, don't hesitate to ask your Allied Representative.
2. **Perform Maintenance on Level Ground.**
   The machine should be on level ground and clear of traffic lanes whenever possible. The parking brake should be set and the wheels blocked.
3. **Remove Load.**
   The machine should be unloaded, with the vehicle height set to its lowest position.

⚠ WARNING

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

4. **Stop the Engine**

⚠ WARNING

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

Preventive Maintenance

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

Benefits of Preventive Maintenance

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

Preventive Maintenance

- Promotes Safety - properly maintained equipment is better able to operate within its design specifications and react positively to the operators control.
- Improves Equipment Availability - by minimizing the chances of breakdown.
- Reduces Unexpected Downtime - crash repairs are expensive and detract from normal scheduled maintenance.
- Reduces Equipment Abuse - provides the ability to predict component life and helps avoid operating equipment to destruction, by replacing parts before they fail.
- Allows Planning of Daily Production - by knowing the condition of available equipment.
- Allows Planning of Maintenance Man Hours - by distribution of duties and necessary lead time for parts ordering.
- Provides Complete History of Equipment - based on performance, frequency and type of repairs and actual man hours expended on maintenance.

Establishing a Preventive Maintenance Program

The key to an effective preventive maintenance program is diligence in following a maintenance schedule set at regular planned intervals. Such intervals should be made compatible with the nature of operation of the equipment and with the capabilities of the maintenance facility. In any event, the intervals and inspection requirements must be planned, regular, and consistent.

This program proposes the following basic schedule which is based on intervals generally used and accepted.

Specific maintenance should be completed using the following intervals:

- 10 hours (each shift or daily)
- 50 hours (weekly)
- 250 hours (monthly)
- 500 hours (quarterly)
- 1000 hours (semi-annually)
- 2000 hours (annually)

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

Maintenance Record Keeping

The importance of good record keeping cannot be overemphasized. Each scheduled maintenance form should be checked off as the inspections and service is performed. Quantities of replenished lubricants should be recorded, as well as hydraulic pressure readings. All discrepancies should be recorded whether remedied or pending. Operators and mechanics should sign off forms and return them to the maintenance supervisor for approval and retention in an equipment unit file.

Accurately recorded maintenance forms will give the maintenance personnel an overall view of how particular equipment is holding up under normal operating conditions. Good records, and the ease by which they can be reviewed also enable maintenance personnel to identify and evaluate problem areas and allow adjustment in the maintenance scheduling for their particular operation.

Shift Maintenance

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

Shift Maintenance Checklist

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

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

Scheduled Maintenance

Periodic scheduled maintenance is intended to be performed in a complete maintenance facility by trained mechanics. The timely scheduling and completion of these periodic inspections by the maintenance department will determine the length of downtime of a particular machine. Therefore, maintenance scheduling becomes a critical factor in the effective use of man hours and the availability of serviceable equipment.

Scheduled Maintenance Checklist

Actual operating environment governs the maintenance schedule. Some checks should be performed more often under severe conditions, such as heavy dust, extreme temperatures or extremely heavy loads.

These maintenance checklists are designed to be used as a guide until adequate experience is obtained in establishing a schedule to meet your specific needs.

A detailed list of component checks is provided with a suggested schedule basis given in hours of operation, or calendar time.

The engine manufacturer's operation and maintenance manual should be consulted for additional engine related checks and/or details.

A maintenance schedule should be established using these checklists as a guide. The result will be a maintenance program to fit your specific operation.

Using the Checklist

Although specific maintenance is identified in these checklists (starting on page 48), location and procedure references are not provided in the columns.

Scheduled maintenance is normally carried out by trained mechanics, who are knowledgeable of the equipment systems and component locations. Scheduled maintenance procedures can be found by referring to the appropriate section of the service manual.

Scheduled Oil Sampling

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

Welding

Before performing any welding, always do the following to prevent severe damage to the HLT electrical system:

1. **Set Battery Disconnect to OFF** located in the engine compartment on the right side of the HLT.

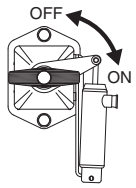


Figure 15 - Battery Disconnect Switch

2. **Disconnect ECM (Electronic Control Module)** Refer to engine manufactures manual to locate ECM connector.

3. **Disconnect PLC (Programmable Logic Controller)** or any electronic control modules if so equipped.

Maintenance Schedule Summary

Component	24 Hours	50 Hours	150 Hours	250 Hours	500 Hours	1000 Hours	1500 Hours	2500 Hours	5000 Hours	6000 Hours
Engine: QSM11	Refer engine manufactures manual(s)									
Transmission and Torque Converter:	* Check oil level with engine running at idle & oil temperature at 180 - 200°F (65-93°C) with vehicle on level ground.				* Change oil filter	* Drain and refill system. Drain with oil temperature at 180-200°F (63-93°C)				
Drive Axles:		* Lube drive shaft * Adjust brakes		* Check levels	* Oil sample			* Drain and refill system		
Hydraulics:	* Check fluid levels * Inspect for leaks * Check PDI visual indicators and temperature gauge		* Replace breather element * Oil sample if last test was above required cleanliness levels		* Oil sample	* Replace oil filter elements * Check and record pressure settings			* Drain hydraulic fluid tank, clean tank and replace fluid	
Chassis:	* Daily inspection - per chart New Vehicle Adjustments: * Brake calipers * Wheel bearings * Axle pivot * Wheel nuts at 2 hours and every 50 hours			* Lubricate and inspect per chart	* Lubricate engine access doors * Inspect steering linkage and idlers * Inspect knee joints	* Re torque axle connection drive pin		* Lubricate steering column U-joint and slip * Check accumulator charge * Inspect / Service knee joints	* Inspect and service steering axles * Inspect steering idlers	* Replace steering idler bearings

Maintenance and Lubrication Checkpoints

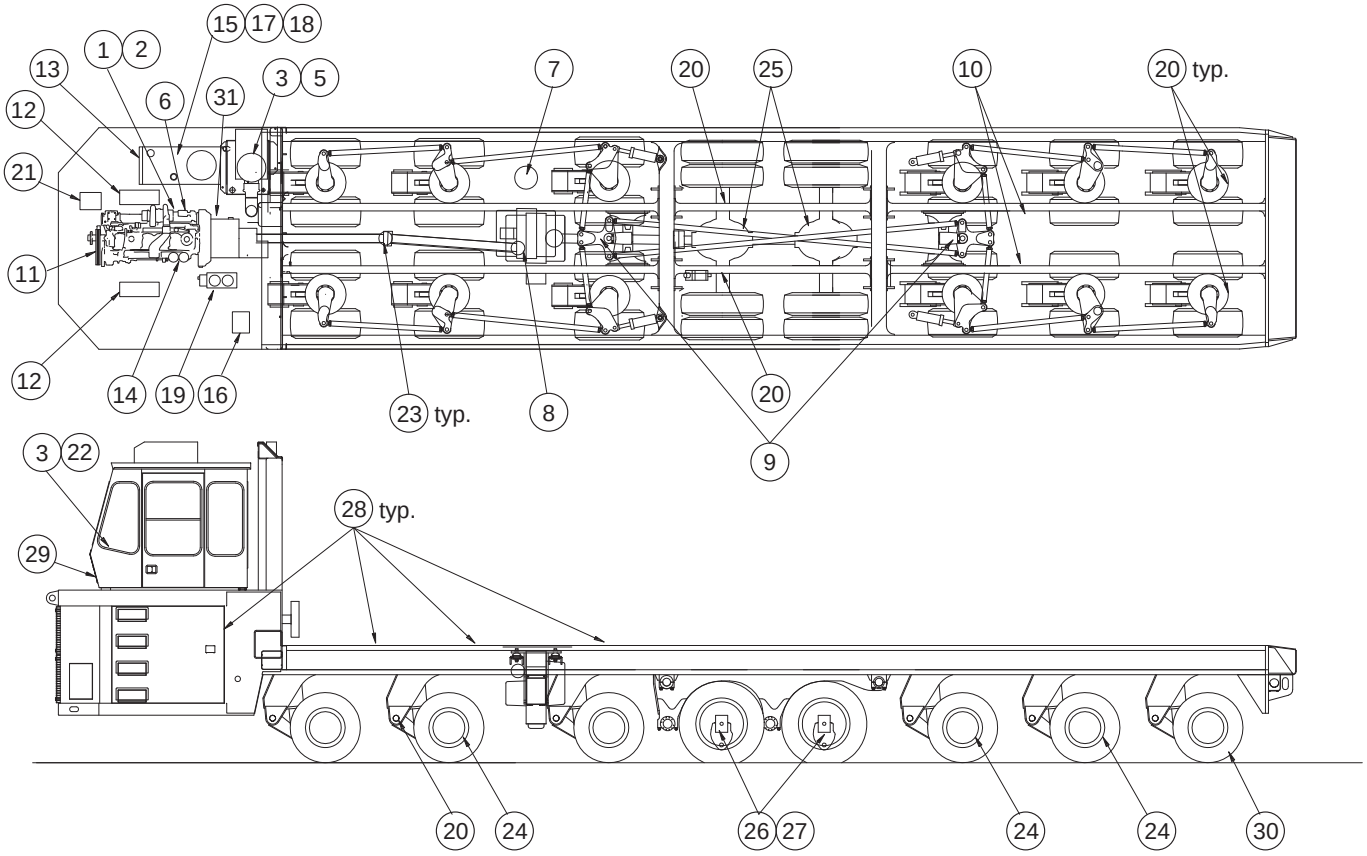


Figure 16 - HLT Checkpoints

	Checkpoint	Interval		Checkpoint	Interval
1	Engine Oil Filter	Daily	**16**	Flow divider gearbox - check oil level	Every 250 Hours
2	Engine Oil Level Dipstick	Daily	**17**	Hydraulic tank breather	Every 150 Hours
3	Fuel level gauge/sight gauge	Daily	**18**	Hydraulic suction filters	Every 1000 Hours
4	Engine air cleaner (restriction/leaks)	Daily	**19**	Hydraulic pressure filters	Every 1000 Hours
5	Engine pre-cleaner	Daily	**20**	Lubrication points	Every 250 Hours
6	Engine Coolant Filter	Every 250 Hours	**21**	Cooling system (level, leaks)	Daily
7	Engine Fuel Filters	Every 250 Hours	**22**	Gauges and indicators (acceptable readings)	Daily
8	Transmission oil level	Daily	**23**	Driveline lube points	Every 50 Hours
9	Steering idler pivot lube points	Every 250 Hours	**24**	Brake shoes, drum, linings, rollers, bushings, etc.	Every 250 Hours
10	Air/hydraulic brake actuator fluid level	Daily	**25**	Differential oil level (2 places)	Every 250 Hours
11	Engine Belts (condition and tension)	Daily	**26**	Planetary axle housing oil level (4 places)	Every 250 Hours
12	Batteries	Every 250 Hours	**27**	Drive axles - slack adjuster and cam bushing lube points	Every 250 Hours
13	Hydraulic Oil level sight gauge	Daily	**28**	Engine, deck and frame access door hinges (10 places)	Every 500 Hours
14	Transmission Filter	Every 500 Hours	**29**	Steering column u-joints and slip (6 places)	Every 2500 Hours
15	Hydraulic return filter gauge	Daily	**30**	Condition of wheels and tires	Daily
			31	Block heater cord	- -

Inspection, Maintenance and Lubrication Instructions

For complete service, maintenance, trouble shooting and warranty information for the drivetrain components consult the manufactures handbook included in the Service Manual.

Suspension - General

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

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

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

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

Suspension - New Units

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

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

Inspect knee joint connection journal bearings after 24 hours of operation. Inspect and lubricate following the procedure described later in this section.

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

Steer Suspension

⚠ WARNING

Warning: Support vehicle properly when working beneath it. Do not depend on hydraulic cylinders to hold vehicle up. Vehicle can lower if a manual control is moved or if a hydraulic line breaks

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

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

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

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

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

Steer Suspension Continued

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

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

Lining Replacement

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

Turntable Bearing

Bearing should be lubricated every 250 hours. There are six lube points located around the inside circumference.

Elevating Cylinder

Bearings should be lubricated every 250 hours. There are two lube points, one each at the upper and lower bearings.

Knee Joint

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

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

Axle Connection

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

The lower arm axle connection should be torqued to approximately 400 lb/ft or until the axle cannot be rotated over lower arm trunnion. Elevate axle to do this - axle must be parallel to the deck, i.e. neutral position, BEFORE torquing.

Drive Suspension

General

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

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

Elevating Cylinder

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

Knee Joint

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

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

Axle Connection

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

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

Torque Arms

The torque arm tapered ball sockets are permanently sealed and do not require additional lubrication. With brakes applied and engine running, (approx. 1000 rpm) put the machine into forward then reverse gear. Watch for movement or play within the ball socket and within the taper of the mounting bracket. Replace worn parts. Before dismantling torque arm, measure the length center to center. Reassemble to the same length.

Drive Axles

See Tandem Axle maintenance and service manuals included in the Service Manual.

System Pressure Checks

System pressures can be checked by using the Isolator valve and 5000 psi gauge that is located on the left side of the HLT in the engine compartment (see Figure 17). Twist the isolator valve dial to 1 of 6 numbers and then press button on center of dial.

Hydraulic Pressure - Push to Check	
1	Right Rear Quadrant
2	Hoist Pump
3	Steering Pump
4	Right Front Quadrant
5	Left Front Quadrant
6	Left Rear Quadrant

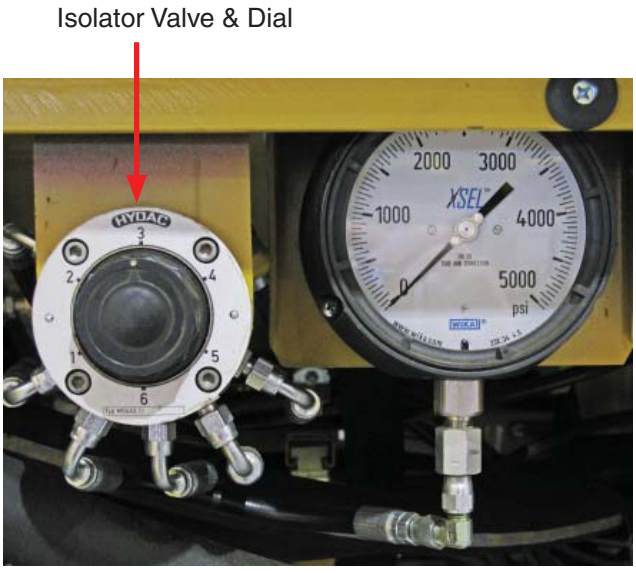


Figure 17 - Isolater Valve & Gauge

Steps for Checking and Filling the Hydraulic Tank

1. Lower the vehicle to its lowest position.
2. Shut down the machine and allow it to cool. The hydraulic oil must be cool to obtain an accurate level reading.
3. Check the hydraulic oil level on the sight gauge on the hydraulic tank. The oil level should be between the “Full Cold” mark and the “Low” mark indicated on the tank.
4. If the oil level is at the “Low” mark, add approved hydraulic oil (See Figure 18) to return the oil level to the “Full Cold” mark. Fill the tank at the fill port located on the top of the tank.

Note: the oil level will raise when the machine is warmed up, and may be above the “Full Cold” mark.

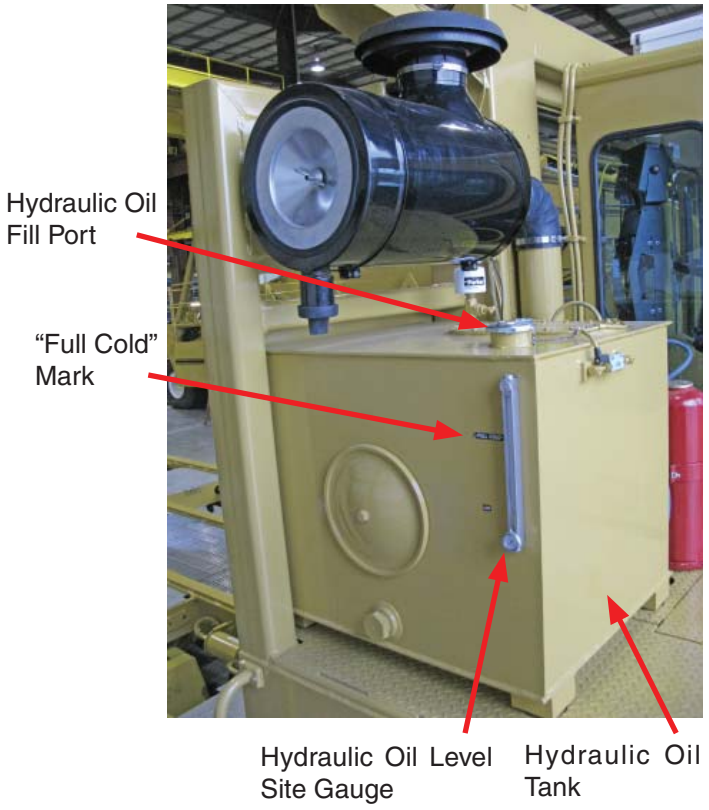


Figure 18 - Hydraulic Tank

Daily Service Check List

10 HOURS OR DAILY

NOTICE

Always refer to engine manufacture manual(s) before starting or performing any maintenance on engine.

Before Engine Startup, Check the Following

Item		OK	No	Add
1	Engine (Check oil level - check for leaks)			
2	Engine Belts (Check tension - check for damage - change as required)			
3	Hydraulic Tank (Check oil level - check for leaks)			
4	Hydraulic Cylinders (Check for leaks)			
5	Radiator & Oil Cooler (Check coolant level - check for leaks; are fins clean and unobstructed?)			
6	Air Cleaner/Intake System (Check indicator - clean / change element as required, empty dust cup, check for leaks / damage)			
7	Engine Crankcase Breather (Check)			
8	Engine Fuel Water Separator (Drain)			
9	Wheels & Tires (Check condition and pressure)			
10	Air Tank (Check drain valves for correct operation)			
11	Lubrication Check Points (See Page 16)			
12	Walk Around Inspection Of Structure (Check welds, leaks, damaged components, etc...)			
13	Fire Safety Check (Check for accumulated debris in engine compartment, etc)			
14	Fire Suppression Systems (Verify certifications are current)			

After Engine Startup, Check the Following

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

Note Anything Abnormal or In Need of Repair

Lights_____Defroster_____Reverse Warning Horn_____
Horn_____ Windshield Wipers_____
Heater_____Air Conditioner_____

Operator_____Supervisor_____Date_____
Model_____Serial Number_____Hour Meter_____

Service Maintenance Check Lists

50 HOURS OR WEEKLY

1	Repeat previous intervals	OK_____	NO_____
2	Lubricate drive shaft	OK_____	NO_____
3	Check for fluid leaks - (oil, fuel and water)	OK_____	Repair_____
4	Check brakes for adjustment and wear	OK_____	Repair_____
5	Check wheel lug nuts and studs mechanically	OK_____	Repair_____
6	Record engine RPM	High_____	Stall_____
7	Check Battery electrolyte level	OK_____	NO_____

250 HOURS OR MONTHLY

1	Repeat previous intervals	OK_____	NO_____
2	Lubricate service points per lube chart	OK_____	NO_____
3	* Take engine oil sample for analysis	OK_____	NO_____
4	* Change engine oil and filter	OK_____	NO_____
5	Change fuel filter	OK_____	NO_____
6	Check axle differential oil level	OK_____	Add_____
7	Check axle planetary oil level	OK_____	Add_____
8	Change cooling system filter	OK_____	NO_____
9	Check all hydraulic pressures and record	OK_____	NO_____
10	Check fire suppression actuator	OK_____	Repair_____
11	Check brake shoes, drum, linings, rollers, bushings, etc.	OK_____	Repair_____
12	Check and adjust the parking brake	OK_____	NO_____

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

Service Maintenance Check Lists

500 HOURS OR QUARTERLY

1	Repeat previous intervals	OK_____	NO_____
2	* Take samples from transmission, axles, and hydraulic system for analysis	OK_____	NO_____
3	Check accumulator pre-charge pressure	OK_____	NO_____
4	* Change hydraulic filters	OK_____	NO_____
5	Lubricate engine and frame access doors	OK_____	NO_____
6	Inspect steering linkage and idlers	OK_____	Repair_____
7	Inspect brake system and components	OK_____	Repair_____
8	* Change transmission filter cartridge	OK_____	NO_____

1000 HOURS OR SEMI-ANNUALLY

1	Repeat previous intervals	OK_____	NO_____
2	Change transmission oil	OK_____	NO_____
3	Change hydraulic oil per oil sample test results	OK_____	NO_____
4	Clean and flush cooling system	OK_____	NO_____
5	Check pins and bushings for wear	OK_____	Repair_____
6	Steam clean machine, inspect for structural cracks	OK_____	NO_____
7	Have ANSUL representative inspect and recertify fire suppression system	OK_____	NO_____

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

Service Maintenance Check Lists

2000 HOURS OR ANNUALLY

1	Repeat previous intervals	OK_____	NO_____
2	* Drain, flush and refill differentials	OK_____	NO_____
3	* Drain, flush and refill planetaries	OK_____	NO_____
4	Check and recharge accumulators, record pressure	OK_____	NO_____
5	Replace hoses as required, steam clean engine, tighten mounting bolts and turbocharger mounting bolts	OK_____	Repair_____
6	Drain hydraulic fluid tank, flush tank, and replace fluid	OK_____	NO_____
7	Lubricate steering column	OK_____	NO_____
8	Inspect knee joints	OK_____	Repair_____
9	Inspect and service steer axles	OK_____	Repair_____
10	Inspect steering idlers	OK_____	Repair_____
11	Clean and calibrate injectors and fuel pump	OK_____	NO_____
12	Inspect - turbocharge, vibration damper, air compressor, fan hub, idler pulley, water pump	OK_____	NO_____

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

Lubricants and Capacities

NOTICE

Always refer to engine manufacture manual(s) before starting or performing any maintenance on engine.

System and Tank Capacities (approximate)

Engine Crankcase (with engine mounted filter) ..... 10 U.S. (37.8 liters)
Cooling System (50/50 mix anti freeze) ..... Fill to full mark on surge tank.
Transmission/Converter ..... 19 U.S. Gallon (72 liters)
Axle - Differential - Rear ..... 6 U.S Gallon (22.7 liters)
Axle - Differential - Front ..... 6 U.S Gallon (22.7 liters)
Axle - Planetary Hubs (each) ..... 2 U.S Gallon (7.6 liters)
Hydraulic Tank ..... 100 U.S. Gallon (378.5 liters)
Fuel Tank ..... 87 U.S. Gallon (330.6 liters)
Flow Divider Gearbox ..... 1 U.S. Gallon (3.8 liters)

Recommended Lubricant Specifications Table

Engine

Prevailing Ambient Temperature	Fluid to be Used
-40°F (-40°C) to 68°F (20°C) -13°F (-25°C) to 68°F (20°C) 5°F (-15°C) and above	SAE 5W-30 SAE 10W-30 SAE 15W-40 (Factory Fill)

Transmission/Converter Hydraulic System

Prevailing Ambient Temperature	Fluid to be Used
30°F (-1°C) and above -10°F (-23°C) and above -30°F (-34°C) and above -65°F (-55°C) to 0°F (-18°C)	SAE 30 Transmission Fluid SAE 10W Transmission Fluid SAE 80W-90 Transmission Fluid Conoco High-Performance Synthetic Motor Oil- Spec No. 6718 Mobile 424 (Factory Fill)

Axle

Prevailing Ambient Temperature	Fluid to be Used
-40°F (-40°C) to -10°F (-23°C) -40°F (-43°C) to 0°F (-18°C) -13°F (-34°C) to 100°F (37°C) 10°F (-12°C) above	SAE 75W SAE 75W-80 SAE 80W-90 (Factory Fill) SAE 85W-140 Additive (friction modifier for posi-torque) 2-5% by volume

Chassis and Driveshaft Lubrication

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

Brakes

Prevailing Ambient Temperature	Fluid to be Used
All	-

Main Hydraulic System

Prevailing Ambient Temperature	Fluid to be Used
All	Mobile DTE-10 Excel 32

Flow Divider Gear Box

Prevailing Ambient Temperature	Fluid to be Used
Above 10°F (-12°C)	SAE 80W-90

Fuel Specifications

Fluid	Specification
Fuel	No. 2 Diesel

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

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

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

Because 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. It is important to change fluids and filter elements at the intervals specified in this manual.

NOTES