

OPERATION & SERVICE MANUAL

WHEEL-MOUNTED PORTABLE COMPRESSOR \ 1600 CFM



D1600PH1CU4(AF)

CUMMINS DIESEL ENGINE

TIER 4 FINAL

DOCUMENT INFORMATION

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Revision: 00

CONTACT INFORMATION

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RECORD KEEPING

Record the model and serial number of the compressor for future reference when contacting the factory for service or parts.

Model Number: _____

Serial Number: _____

DISCLAIMER

Although this manual is checked for conformity with the machines described, we cannot guarantee that all errors will be excluded. Necessary corrections will be made in future editions of this manual. This manual is subject to change without notice.

REVISION HISTORY

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WARRANTY

Sullivan-Palatek Portable Air Compressor STANDARD WARRANTY

Sullivan-Palatek warrants its new portable air compressor products to be free from defects in material and workmanship, subject to the following provisions:

Warranty Registration: To validate the warranty for each product the purchaser shall complete and return the Warranty Registration Form within 30 days of delivery to the first user or rental.

Warranty Period: The warranty period for applicable Sullivan-Palatek products is as follows (subject to the Exclusions and Limitations noted below):

Air ends on new machines – stator and rotor assembly: Single stage compressor models: the first to expire; 42 months from shipment by Sullivan-Palatek or 36 months from delivery to the first user. **Two stage high pressure** compressor models: the first to expire; 30 months from shipment by Sullivan-Palatek or 24 months from delivery to the first user.

Remainder of new portable air compressor machines: the first to expire; 18 months from shipment by Sullivan-Palatek or 12 months from delivery to the first user.

Parts, accessories and attachments sold separately from machines, excluding warranty replacement parts and hand tools: the first to expire; 6 months from shipment by Sullivan-Palatek or 3 months from delivery to the first user.

Warranty replacement parts: remainder of the original warranty period of the replaced part.

Sullivan-Palatek's Obligations: Sullivan-Palatek's exclusive obligations under its warranty are (i) to repair or replace any defective part at Sullivan-Palatek's option and subject to return of defective parts, (ii) to pay the reasonable cost of making the repair or reinstalling the replacement part, and (iii) for air compressors having two or more axles, reimbursement of up to four hours travel labor and up to 200 miles (100 miles travel radius) per event to make repairs. Reimbursement rates for travel and mileage are set at the discretion of Sullivan-Palatek and are subject to change without notice.

Purchaser's Responsibility: Purchaser shall (i) give Sullivan-Palatek written notice of any warrantable failure of any Sullivan-Palatek product within the applicable warranty period, (ii) make the product available for repair at a Sullivan-Palatek authorized repair facility, (iii) pay all costs of returning failed parts to Sullivan-Palatek, (iv) pay shipping costs for replacement parts, (v) pay reasonable travel expenses for field repairs performed at purchaser's request, and (vi) pay the costs of investigating performance complaints that are not covered by this warranty.

Exclusions and Limitations: Air end seals are not warranted. Engines, tires and batteries are not warranted by Sullivan-Palatek but are warranted only by the manufacturers of these components. Sullivan-Palatek has no obligation for product failures or defects resulting from overloading, misuse, neglect, accident, failure to comply with Sullivan-Palatek's product manual, or failure to install product improvements provided by Sullivan-Palatek. Use of attachments, accessories or service parts not supplied or recommended by Sullivan-Palatek may void the warranty of that product. Sullivan-Palatek has no obligation to pay costs of returning defective parts to Sullivan-Palatek or shipping replacement parts to purchaser.

THIS WARRANTY IS SULLIVAN-PALATEK'S ONLY WARRANTY OF ITS PORTABLE AIR COMPRESSOR PRODUCTS AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED. ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE ARE EXCLUDED. SULLIVAN-PALATEK HAS NO OBLIGATION UNDER THIS WARRANTY OR OTHERWISE (REGARDLESS OF THE FORM OF ACTION) FOR SPECIAL, CONSEQUENTIAL OR INCIDENTAL DAMAGES, INCLUDING WITHOUT LIMITATION LOST PROFITS OR LOST INCOME. THE TOTAL RESPONSIBILITY OF SULLIVAN-PALATEK FOR CLAIMS, LOSSES, LIABILITIES OR DAMAGES, WHETHER IN CONTRACT OR TORT ARISING OUT OF OR RELATED TO ITS PRODUCTS SHALL NOT EXCEED THE PURCHASE PRICE OF THE COVERED PRODUCT.

This warranty applies to all Sullivan-Palatek portable air compressors shipped after November 1, 2015 unless expressly superseded by a later warranty. In the event of any conflict between this warranty and earlier warranty statements, the terms of this warranty will apply.

10.31.15



ABOUT THIS MANUAL

II.1 SAFETY INSTRUCTIONS

Instructions for the safe operation and maintenance of the Sullivan-Palatek air compressor are located throughout this manual. These instructions are presented with different labels according to the level of risk involved, described as follows:

WARNING! *is used when death or personal injury could occur if the instruction is not followed.*

CAUTION! *is used when damage to property could occur if the instruction is not followed.*

NOTE! *is used to inform the reader of installation, operation or maintenance information that is important but not hazardous.*

II.2 MANUAL ORGANIZATION

Anyone operating or servicing the Sullivan-Palatek air compressor should read this entire manual and be familiar with its information. The following is a quick guide to the contents in this manual:

SECTION 1: SAFETY

This section contains important basic information regarding general safety precautions for maintaining and operating air compressors.

SECTION 2: TRANSPORTING AND LOCATING

This section contains instructions and safety guidelines for transporting and locating a portable air compressor.

SECTION 3: OPERATION

This section contains an overview of general operating safety, initial start-up procedures, how to start and stop the air compressor, in addition to guidelines for operating under extreme conditions.

SECTION 4: COMPONENT DESCRIPTION

This section contains information about how the different systems and components function within an air compressor.

SECTION 5: MAINTENANCE

This section contains a maintenance schedule and step-by-step instructions for performing common maintenance procedures. A list of recommended spare parts to keep on hand is also included.

SECTION 6: TROUBLESHOOTING

This section contains symptoms, causes and remedies for common air compressor malfunctions.

II.3 SUPPLEMENTAL DOCUMENTS

For more detailed information on certain components or optional equipment specific to this compressor, supplemental documents are provided, including the Engine Operator's Manual, Controller Operator's Guide, and the Parts & Specifications Manual.

1 SAFETY

TOPICS IN THIS SECTION:

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|---|---|
| » General Safety | 2 |
| » Pressure Release | 2 |
| » Fires and Explosion | 2 |
| » Moving Parts | 3 |
| » Toxic and Irritating Substances | 4 |
| » Hot Surfaces, Sharp Edges, Sharp Corners and Vacuum | 5 |
| » Electrical Shock | 5 |
| » Entrapment | 5 |

**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.

1.1 GENERAL SAFETY

Safety is a prime consideration in the design and manufacture of the compressor components. Ultimately, the responsibility for safe operation rests with the individuals who use and maintain the compressor. The following safety precautions are offered as a guide for the safe operation and maintenance of this machinery:

- » Only trained and authorized personnel who have read and understand this user's manual should operate the air compressor. Failure to follow the instructions, procedures, and safety precautions in the manual will increase the possibility of accidents and injuries.
- » Never start the air compressor unless it is safe to do so. Do not attempt to operate the air compressor with a known unsafe condition. If an unsafe condition exists or maintenance is required, tag the air compressor and render it inoperative by disconnecting the battery so others who may not know of the unsafe condition cannot attempt to operate it until the unsafe condition is corrected.
- » Use and operate the air compressor only in full compliance with all pertinent Federal, State and Local codes or requirements including OSHA, EPA and other relevant agency requirements.
- » Do not modify the compressor or install attachments without consulting the manufacturer.
- » Known and potential hazards associated with the operating and servicing of portable air compressors are detailed in the following pages. Not all hazards can be anticipated and the operator of the equipment is ultimately responsible for identifying hazardous and dangerous conditions, avoiding dangerous operation and preventing accidents.

1.2 PRESSURE RELEASE

- » Remove the pressure from air, oil, and cooling circuits before disconnecting pipes, fittings or related items. Pay attention to the possible residual pressure when you disconnect a device from a pressurized circuit.
- » Do NOT try to detect pressure leaks with your hands. It is not always possible to identify a leak from a tiny hole. Use a piece of paper or wood to locate a suspected leakage. Wear safety glasses when detecting leaks.
- » Oil, fuel, or compressed air can cause injuries. Fluid leaking under pressure has enough force to penetrate under the skin and cause serious bodily injuries.
- » Do not open sump (receiver) oil filler cap when compressor is running and air system is pressurized. Shut down the compressor and bleed the sump (receiver) pressure to zero before removing the oil filler cap.
- » Do not remove cooler cap while the engine is running, or immediately after the engine stops. Wait until the coolant temperature is below its boiling point, then loosen cap slowly to its stop to relieve any excess pressure. Make sure coolant is not boiling before removing cap completely, and protect yourself by wearing safety glasses.

1.3 FIRES AND EXPLOSION

1.3.1 FUEL & LIQUIDS

WARNING! *Fire or explosion can result from spilled fuel, oil and other flammable liquids.*

- » Refuel at a service station or from a fuel tank designed for the purpose. Ground the machine to mobile dispensers prior to refueling.
- » Immediately clean up any spills or leaking fuel, battery electrolyte, oil, or anti-freeze solution.
- » Keep sparks, flames, and other sources of ignition away and do not permit smoking in the vicinity when adding fuel, checking or adding electrolyte to batteries, checking or adding oil, or when refilling air line anti-icing systems with anti-freeze.
- » Replace damaged fuel tanks or lines. Do not store or attempt to operate the compressor with any known leaks in the fuel system or oil lines.
- » Do not permit liquids to accumulate in bottom of the compressor frame. Prevent contact with acoustical surfaces of the air compressor. Wipe down using an aqueous industrial cleaner or steam clean as required. If necessary, remove acoustical material, clean all surfaces and then replace acoustical material. Do not use flammable solvents for cleaning purposes.
- » Anti-freeze compound used in airline anti-icing systems contains methanol, which is flammable. Use systems and refill with compound only in well-ventilated areas, away from heat, open flames, or sparks. Do not expose any part of these systems or the anti-freeze compound to temperatures above 150°F

(65°C). Vapors from the anti-freeze compound are heavier than air. Do not store compound or discharge treated air in confined or unventilated area. Do not store containers or anti-freeze compound in direct sunlight.

- » Store flammable liquids in suitable containers and cabinets, away from sources of sparks and heat.

1.3.2 BATTERIES AND WIRING

WARNING!

Fire or explosion can result from electrical arcing from terminal, battery connections and improperly grounded equipment.

- » Do NOT check the battery charge by placing a metal object between the terminals. Use a voltmeter or a hydrometer.
- » Do NOT charge a frozen battery. There is risk of explosion. If the battery is frozen, heat it up to at least 61°F (16°C).
- » Do NOT charge a battery that is in excess of 113°F (45°C).
- » Disconnect the grounded (negative) battery connection prior to attempting any repairs or cleaning inside the enclosure. Tag the ground cable with a warning not to reconnect until servicing is complete.
- » Keep electrical wiring, battery terminals and other terminals in good condition. Replace any wiring that has cracked, cut, abraded, or otherwise degraded insulation. Replace terminals if worn, discolored or corroded. Keep all terminals clean and tight. Turn off battery charger before making or breaking connections to the battery. Wear a face shield whenever servicing or working on the battery.
- » Keep tools and other grounded conductive objects away from exposed live electrical parts to avoid arcing, which might serve as a source of ignition.
- » Always avoid electrical parts when washing the compressor.

1.3.3 COMBUSTIBLES

- » Prior to welding or making weld repairs on the compressor, remove any acoustical material or other material that may be damaged by heat or that may support combustion. Remove and isolate negative battery cable.
- » Do not operate compressor under low overhanging leaves or permit leaves and foliage to contact hot exhaust system surfaces when operating in forested areas.
- » Do not expose dry grass, grass cuttings, oil, or any other flammable material to exhaust gases. Always keep the engine and muffler clean.
- » Keep oily rags, trash, leaves, litter, or other combustibles out of and away from the compressor.
- » Keep a suitable fully charged class BC or ABC fire extinguisher or extinguishers nearby when servicing and operating the compressor.

1.4 MOVING PARTS

- » Make sure all personnel are clear of the compressor prior to starting, operating, or shutting off the compressor.
- » Keep hands, arms, and other parts of the body, as well as clothing, away from belts, pulleys, and other moving parts.
- » Wear snug fitting clothing and confine long hair when working around compressors or any machinery.
- » Avoid slips and falls when working around the compressor. Keep hands, feet, floors, controls, and walking surfaces clean and free of oil, water, anti-freeze, or other liquids to minimize the possibility of slips or falls. Use extreme caution when ground is covered with ice or snow.
- » Do not attempt to operate the compressor with the fan guard or other guards removed. Keep access doors closed except when repairing, adjusting or performing service, or when starting or stopping the compressor.
- » Shut down engine before servicing, especially when adding fuel, oil, coolant, lubricants, airline anti-freeze compound, or battery electrolyte. The engine must also be shut down before making adjustments. Restart engine to check adjustment. If adjustment is incorrect, shut down the engine again, readjust, then restart engine to recheck the adjustment.

1.5 TOXIC AND IRRITATING SUBSTANCES

WARNING! *Do not use air from this compressor for breathing air. Breathing unfiltered air from this compressor can result in serious injury or death.*

NOTE! *Under specific guidelines and in full compliance with OSHA Standards 29 CFR 1920 and any other federal, state, or local codes or regulations compressed air can be used for breathing air. Sullivan-Palatek does not provide equipment and instructions for this application and its products are not produced for this application or use.*

- » Operate the compressor only in open or well-ventilated areas.
- » Carbon monoxide will kill. If the machine is operated indoors, discharge the engine exhaust outdoors and be certain there are no exhaust system leaks that can discharge exhaust within the building.
- » Locate the compressor so that exhaust will not be carried toward personnel, air intakes servicing personnel areas or toward the air intake of any other portable or stationary compressor.
- » Fuel, oil, coolant, lubricant, and battery electrolyte used in the compressor are typical of the industry. Care should be taken to avoid accidental ingestion or skin or eye contact. In the event of ingestion or contact, seek medical treatment promptly. Do not induce vomiting if fuel is ingested. Wash with soap and water in the event of skin contact.
- » Wear an acid-resistant apron and a face shield or goggles when servicing the battery. If electrolyte is spilled on skin or clothing, immediately flush and wash with large quantities of water.
- » Do not use airline anti-icing systems in airlines supplying respirators or other breathing air utilization and equipment, and do not discharge air from these systems in unventilated or other confined areas.
- » Wear goggles or a full face shield when adding anti-freeze compound to air line anti-icing systems. The anti-freeze compound used in airline anti-icing systems contains methanol and is toxic, harmful, or fatal if swallowed. Avoid contact with the skin or eyes and avoid breathing the fumes. If contact with eyes, wash eyes with large quantities of clean water for at least 15 minutes. Medical attention should be obtained immediately. If swallowed, induce vomiting by administering a tablespoon of salt in a glass of clean, warm water until vomit is clear, then administer two teaspoons of baking soda in a glass of clean water. Lay down and cover eyes to exclude light. Seek medical assistance.
- » Do not store airline anti-icing system anti-freeze compound in operator's cabs or in unapproved containers.
- » Do not mix different types of antifreeze. The mixture may cause a chemical reaction and release harmful substances.

1.5.1 DIESEL EXHAUST FLUID (DEF)

PURITY

- » DEF is a precisely mixed solution of 32.5% high purity chemical grade urea and 67.5% de-ionized water. It must meet the requirements outlined in ISO standard 22241-1 to prevent potential SCR system damage.
- » Store in a cool, dry, well-ventilated area, between 15°F and 77°F (-9°C and 25°C) to maintain DEF integrity.
- » DEF should not be exposed to direct sunlight for long periods of time, as the urea will decompose.
- » Failure to use specific tooling and fittings will result in corrosion and contamination of the DEF supply.
- » Avoid transfer containers when possible to avoid contamination. If transfer containers must be used, keep the container clean and dedicated for DEF.

CORROSION

- » DEF is corrosive and must be stored in tanks constructed of specific materials, as approved by ISO 22241-3:2017.
- » DEF spills must be cleaned up immediately, and machine or engine surfaces should be wiped clean and rinsed with water.
- » Spilling DEF onto hot components will cause harmful vapors.

CAUTION! **Poor handling practices will contaminate the DEF supply and potentially lead to fault codes and emission system failures.**

1.6 HOT SURFACES, SHARP EDGES, SHARP CORNERS AND VACUUM

- » Avoid contact with hot oil, hot coolant, hot surfaces, and sharp edges and corners.
- » Keep all parts of the body away from all points of air discharge and away from hot exhaust gases.
- » Wear personal protective equipment, including gloves, safety glasses and head covering when working in, on, or around the compressor.
- » Keep a first aid kit available. Seek medical assistance promptly in case of injury. Do not ignore small cuts and burns—these may lead to infection.
- » Keep all loose clothing and parts of the body away from engine and/or compressor intakes or air filter intakes.

1.7 ELECTRICAL SHOCK

- » Keep the towing vehicle or equipment carrier, compressor hoses, tools, and all personnel at least 10 feet from power lines and buried cables. Greater separation from power lines may be prudent when working around high voltage. Contact the utility company for guidance.
- » Keep all parts of the body, any hand-held tools, or other conductive objects away from exposed live parts of the compressor electrical system. Maintain dry footing, stand on insulating surfaces and do not contact any other portion of the compressor when making adjustments or repairs to exposed live parts of the electrical system.

1.8 ENTRAPMENT

- » Make sure all personnel are out of compressor before closing and latching enclosure doors. Larger compressors can hold a man. If it is necessary to enter the enclosure to perform service or adjustments, secure the access door in the open position to avoid the possibility of others closing and latching the door and inform personnel before entering the enclosure.

2 TRANSPORTING AND LOCATING

TOPICS IN THIS SECTION:

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| » Drawbars and Brake Actuators | 8 |
| » Preparing to Tow | 9 |
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| » Parking or Locating Compressor | 10 |

2.1 RECEIVING

Each compressor is operated and tested at the factory before shipment. This testing assures that the unit is operating properly and that the compressor will deliver its rated capacity. Regardless of the care taken at the factory, there is a possibility that adjustments may be altered or damage may occur during shipment. For this reason it is recommended that the unit be checked for proper operation and carefully inspected before it is put in service. The machine should be observed for any possible malfunction during the first few hours of operation.

NOTE!

Satisfactory performance of the compressor depends upon the operator's knowledge of the controls, instruments, and recommended operating procedures. Consequently, the preceding sections of this manual and also the entire Engine Operator's Manual should be read and understood before attempting to start and operate this machine.

2.2 LIFTING

- » Properly drain and dispose of any fluids in the containment frame before lifting.
- » This compressor is provided with a lifting bail for routine lifting and loading onto trucks, oil platforms, or similar equipment. It is not intended for extended airlift such as via helicopter.
- » Prior to lifting inspect the lifting bail and points of attachment for the following: cracked welds; cracked, bent, corroded or degraded members; loose bolts or nuts. **Do not lift machine if any of these items are found to be defective.**
- » Make sure entire lifting, rigging, and supporting structure is in good condition and has a rated capacity of at least the net weight of the compressor plus an additional 10% allowance for the weight of snow, ice, mud, or stored tools and equipment. If you are unsure of the weight, then weigh the compressor before lifting.
- » Make sure lifting hook has a functional safety latch, or equivalent, and is fully engaged before lifting compressor from the ground.
- » Support the compressor by using slings under the main frame with appropriate spreader bars when airlifting the machine. Lift only in full compliance with OSHA Standards 29 CFR 1910 subpart N, and other applicable regulations.
- » Do not attempt to lift in high winds.
- » Keep all personnel out from under and away from the compressor when suspended.
- » Lift compressor slowly and smoothly, without jerking. Tilting movements must be limited and rotation must be prevented.
- » Lift compressor no higher than necessary, use guidelines and have spotters properly located.
- » Do not leave suspended compressor unattended.
- » Set compressor down only on level surfaces capable of supporting at least its net weight plus an additional 10% allowance for the weight of snow, ice, mud, or stored tools and equipment.
- » If the compressor is provided with parking brakes, make sure they are set; and always block or chock both sides of all running wheels plus drawbar stabilizer leg before disengaging the lifting hook.

2.3 DRAWBARS AND BRAKE ACTUATORS

WARNING!

Proper alignment and installation of mounting hardware is essential when installing the drawbars and actuators. Check nut threads and start attachment bolt by hand to prevent cross-threading. Failure to comply with this warning may cause property damage and serious bodily harm or death. Maintain torque within recommended ranges.

2.3.1 RECOMMENDED TORQUE RANGES FOR DRAWBARS AND ACTUATORS

| APPLICATION | SAE GRADE SCREW | TORQUE (LB-FT) DRY | TORQUE (LB-FT) LUBE |
|------------------------------|-----------------|--------------------|---------------------|
| DRAWBAR | 5/8 UNC G8 | 225 | 175 |
| DRAWBAR | 3/4 UNC G8 | 400 | 315 |
| DRAWBAR | 7/8 UNC G8 | 640 | 510 |
| DRAWBAR | 1 UNC G8 | 960 | 760 |
| ACTUATOR ASSEMBLY (optional) | 7/8 UNC G5 | 455 | 360 |

2.4

PREPARING TO TOW

- » Properly drain and dispose of any fluids in the containment frame before towing.
- » Before beginning to tow the compressor, test brake operation, including breakaway switch operation if provided.
- » Damaged or worn towing components can result in separation of the compressor from the towing vehicle during towing. Inspect all towing components of both the compressor and towing vehicle for cracks, excessive wear or damage. Check for loose or damaged bolts, nuts or other fasteners. Replace or repair any damaged or worn parts before towing the compressor.
- » The towing vehicle and its coupling device and points of attachment must be rated for towing the wet weight of the air compressor and the weight of stored tools, hose and other equipment plus parasitic accumulation such as mud, snow and ice.
- » Always back the towing vehicle to the compressor and position it for coupling the compressor.
- » The coupling device must be fully engaged, closed, locked and the safety latches are engaged.
- » Use a lifting device such as a jack or chain hoist to lift or lower unit to avoid injury to yourself or others. Do not attempt to raise or lower drawbar by hand if the weight is more than can be safely handled.
- » Avoid pinch and crushing injury. Keep hands and fingers clear of the coupling device and all other pinch points. Keep feet clear of drawbar in case it should slip.
- » The towing restraint chains must be attached to the tow vehicle to support the drawbar in the event of accidental uncoupling. Cross chains under front of drawbar before passing them through points of attachment on towing vehicle. Pass each towing restraint chain through its point of attachment on the towing vehicle. Hook each chain to by passing the grab hook over, not through, a link.
- » The coupling device must be free to move throughout the full range of travel while towing. Verify that other components, wires, chains and vehicle attachments do not interfere with or restrict motion of any part of the compressor.
- » Make sure chain length, and if provided, brake and electrical interconnections have sufficient slack to prevent strain when turning and maneuvering. All chains and connections must be supported so they cannot drag or rub on road, terrain, or towing vehicle surfaces. Dragging or rubbing of this equipment will cause wear resulting in damage, and render this equipment inoperative.
- » Fully retract front stabilizer screw jack. If a retractable caster wheel is provided, pull the lock pin, raise and fold the caster wheel, then make sure pin is re-engaged to secure caster wheel in full up and locked position with the wheel horizontal.
- » Tires must be in good condition, the correct size and load range, and be inflated to the specified pressures. Do not change tire size or type.
- » Wheel lug nuts must be tightened to the specified torque.
- » If provided, make sure all stop, tail, directional, and clearance lights are operating properly and that lenses are clean and unbroken. Ensure that all reflectors and reflecting surfaces on the compressor are clean and functional.
- » Make sure air delivery hoses are disconnected or fully retracted and secured on hose reels, if provided.
- » Make sure all access doors and toolbox covers are closed and latched. If the compressor is large enough to hold a man, make sure all personnel are out before closing and latching access doors.
- » Make sure parking brakes on towing vehicle are set and that wheels are chocked or blocked before releasing the compressor parking brakes, if provided.

2.5

TOWING

WARNING!

Maintain proper torque on wheel lug nuts:

SINGLE AXLE: 85 to 95 LB-FT

TWO AND THREE AXLE: 65 to 75 LB-FT

Failure to maintain lug tightness may result in a wheel loosening and leaving the compressor and causing injury or death or property damage.

- » Non-braked compressors must be towed by a vehicle having a net weight at least 2 times higher than the total weight of the towed compressor ready for use.
- » Observe and follow all local, state, and federal traffic laws. Note and adhere to speed limits and minimum highway speed.

- » Do not exceed maximum towing speeds. Reduce speed accordingly, as dictated by posted signs, weather, road, or terrain conditions.
- » Remember that portable air compressors may approach or exceed the weight of the towing vehicle. Maintain increased stopping distance accordingly.
- » Grades in excess of 15° (27%) or any grade that would over-extend the towing or braking ability of the towing vehicle should be avoided.
- » When towing the compressor, avoid potholes, rocks, rough terrain, obstructions and soft shoulders. Damage to the undercarriage and suspension can result.
- » Do not permit any person to ride in or on the compressor while being towed. Serious injury can result.
- » Make sure the area behind and under the compressor is clear of all persons, animals and obstructions prior to backing.
- » Do not permit anyone to stand or ride on the drawbar, or to stand or walk between the compressor and the towing vehicle. Serious injury or death can result.

2.5.1 MAXIMUM RECOMMENDED TOWING SPEED ON SMOOTH, DRY ROADS

Single and two axle compressors: 55mph (89kmh)

WARNING! *Failure to comply with maximum towing speed may cause property damage and serious bodily injury or death.*

2.6 PARKING OR LOCATING COMPRESSOR

- » Park or locate compressor on level ground or across grade.
- » Make sure compressor is parked or located on a firm surface that can support its weight.

WARNING! *Do not park or operate compressor in or around flammable material.*

- » Park or locate compressor to cause the prevailing wind to direct the exhaust fumes and radiator heat away from the compressor air inlet openings and to prevent ingestion of dust and debris from the work site.
- » Set parking brakes and disconnect breakaway switch cable and all other interconnecting electrical and brake connections, if provided.
- » Block or chock both sides of all wheels.
- » Block or chock both sides of drawbar stabilizer leg or jack.
- » Unhook chains and remove them from the points of attachment on the towing vehicle, then hook chains to each other on drawbar or wrap chains around the drawbar in order to keep them off the ground.
- » If provided, lower front screw jack and rear stabilizer legs. Make sure the ground is firm and capable of supporting the weight of the compressor.
- » If the compressor is provided with a swivel caster wheel, pull pin and lower caster wheel, then make sure pin is re-engaged to secure caster wheel in the full-down and locked position.
- » Disconnect coupling device, keeping hands and fingers clear of all pinch points. Do not attempt to lift the drawbar of portable compressors by hand if the weight is more than you can safely handle - usually weights in excess of 50 pounds. Use a lifting device such as a jack or chain hoist to lift the drawbar to avoid injury to yourself or others.
- » Keep feet clear of drawbar at all times to avoid crushing accidents in case it should slip from your hands or otherwise fall to the ground.

NOTE! *These guidelines also apply for locating and securing non-towed compressors (skid mounted and utility models). Reference to towing may not apply.*

3 OPERATION

TOPICS IN THIS SECTION:

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| » Preparing for Initial Start-Up | 12 |
| » Normal Starting | 12 |
| » Loading | 12 |
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| » Low Fuel/Adding Fuel | 13 |
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| » Operating Under Extreme Conditions | 14 |
| » Pneumatic Tools Application | 15 |
| » Jump-Starting Battery | 16 |

3.1 GENERAL OPERATING SAFETY

- » Allow at least ten feet of unobstructed area in front of cooling air inlets and outlets to ensure good airflow.
- » If compressor is connected to a common header with one or more compressors, a check valve must be provided between each compressor and header.
- » Check instruments periodically during operation. If readings are abnormal, refer to *Chapter 6 TROUBLESHOOTING* on page 37.
- » Make sure that the correct type and viscosity of lubricating oils and fuel are used, especially in extreme ambient temperatures.
- » Keep batteries fully charged and properly maintained.

3.2 PREPARING FOR INITIAL START-UP

Inspect the compressor, engine, and other assemblies for damage or loose connections which might have occurred during shipment. Detect and repair leaks immediately.

1. Check the engine's crankcase oil level. If required, add oil as recommended in the Engine Manual.
2. Check the radiator coolant level. Also, if the machine will be exposed to sub-freezing temperatures, check the specific gravity to ascertain the freezing point of the coolant.
3. Fill the fuel tank with fuel recommended in the Engine Manual. Do not use unapproved containers, e.g. buckets, bottles, or jars. Use fuel storage containers and approved dispensers.

CAUTION!

Never add gasoline to diesel fuel tank - serious damage to the engine will result.

4. Check Diesel Exhaust Fluid (DEF) level. If necessary fill with DEF meeting ISO 22241-1 standard.
5. Check battery posts and cable clamps to ensure they are properly connected.

3.3 NORMAL STARTING

1. Close service valves.
2. Turn on Battery Disconnect Switch, located on the streetside of the unit (*Figure 3-1*).
3. Press the top of the ignition switch to ON position (*Figure 3-2*).
4. Press again and hold the top of the ignition switch. This will engage the starter and the engine will turn over. Release the switch when the engine starts.
5. Before the controller will allow the machine to be loaded the engine water temperature must be >100°F, the compressor discharge temperature must be >125°F and the sump tank pressure >70 psi.

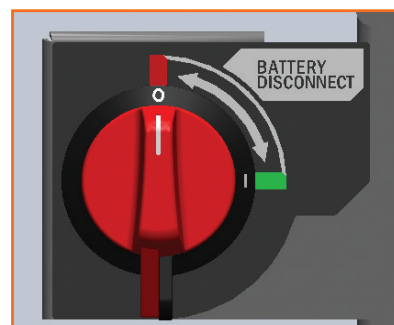


FIGURE 3-1. BATTERY DISCONNECT SWITCH

CAUTION!

If the engine stops, do not attempt to restart with the oil receiver under pressure.

3.4 LOADING

1. Load the compressor by pressing the top right (R1) button on the SPEC PV780 PowerView Controller interface, located on the instrument panel.
2. Confirm load pressure by selecting (R1) again.
3. The unit will remain on the last used setting.

3.5 UNLOADING

1. To Unload, press the R1 button on the controller. This will automatically return the compressor to the UNLOADED state and the engine will throttle down and the inlet valve will close.



FIGURE 3-2. IGNITION SWITCH ON INST. PANEL

3.6 NORMAL STOPPING

1. After the unit is unloaded, press the ignition switch to **OFF**. This will put the machine into a mandatory cooldown state. The machine will continue to run for 4 minutes (240 seconds) and will automatically shut off. **DO NOT STOP THE MACHINE during this process. Damage to the engine may result.**
2. If continued use of the machine is required before the timer expires, return the ignition switch to the **ON** position. The display will revert back to the Home screen.

NOTE! *The machine will only enter Cooldown if the engine RPM exceeds 1500 RPM for any reason since first started.*

3. After the engine has shut down, **wait at least 2 minutes** before turning off the Battery Disconnect Switch. This is required by engine manufacturers to allow the engine to properly shut down the engine ECM(s).
4. The Master Disconnect **MUST** be turned off when the machine is not in use. The batteries will be drained if it is not turned off.

NOTE! *For more detailed information on the display, including menu navigation and warning screens, please refer to the Murphy PowerView 780 Controller Operator's Guide.*

3.7 EMERGENCY STOP

Press the E-stop button.

3.8 LOW FUEL/ADDING FUEL

When the fuel level reaches 10% of capacity, a warning screen on the display will appear. At 8% of capacity the LOW FUEL icon on the display begins to flash. Between 8–7% capacity the compressor is forced to unload. At <7% capacity the machine shuts down.

The compressor will need to be shut down in order to add fuel. The following steps will need to be completed before attempting to restart the engine:

1. Follow normal stopping procedures in 3.6 *Normal Stopping*.
2. Fill fuel tank with Ultra Low Sulfur Diesel fuel only.
3. Press the ignition switch to ON.
4. Restart the engine. Follow procedures in 3.3 *Normal Starting*.

3.9 LOW DEF/ADDING DEF

Diesel Exhaust Fluid (DEF) is a precisely mixed solution of 32.5% high purity chemical grade urea and 67.5% de-ionized water that is injected into the exhaust system to reduce NOx emissions.

CAUTION! **DEF is corrosive and must be stored in tanks constructed of approved materials. DEF also degrades in quality if not stored in proper conditions. Refer to the Cummins Operation and Maintenance Manual for more information.**

3.9.1 WARNINGS AND STATUS

When the Diesel Exhaust Fluid (DEF) level reaches 18% of capacity, a yellow warning icon will appear on the display. At 11% of capacity multiple engine warnings will occur. At 5% capacity the engine torque will derate 37.5%, and compressor will go to idle. When the DEF tank is empty the DEF symbol will flash red and the engine shutdown light will appear, then the engine will shut down. (See *Figure 3-3 and Figure 3-4*.)

The compressor will need to be shut down in order to add DEF. The following steps will need to be completed before attempting to restart the engine:

1. Follow normal stopping procedures in 3.6 *Normal Stopping*.
2. Clean the fill area prior to refilling. Avoid transfer containers when possible. If transfer containers are used, keep the container clean and dedicated for DEF.
3. Fill DEF tank with DEF meeting ISO 22241-1 standard. Take care not to contaminate tank with dirt, debris or diesel fuel.
4. Close the access panel door completely. If left open, the DEF tank will overheat.
5. Press the ignition switch to ON.
6. Restart the engine. Follow procedures in 3.3 *Normal Starting*.

| DEF Tank Level Worldwide | | | | | | | |
|---|--|------------------------------|--|---|--|-----------------------------------|-----------------------|
| | Normal Operation | Initial Indication | Level 1 | Level 2 | | Level 3 | |
| | | | | * Reduced Performance | * Reduced Time | * Reduced Performance | * Reduced Time |
| Inducement Trigger | > 20% DEF Level Reading | <20% DEF Level Reading | < 13.5% DEF Level Reading | Mild: <7.5% DEF Level Reading Severe: 1% DEF Level Reading | Mild: < 7.5% DEF Level Reading | 3% DEF level reading + Empty Tank | 3% |
| Inducement | None | None | None | Mild: None Severe: 37.5% Torque | Mild: None | Shutdown or Idle only | Shutdown or Idle only |
| Notification | DEF Level OEM Gauge Display Required | OEM Gauge + Low DEF Lamp | OEM Display + Low DEF Level + EESF Lamp (Solid Low DEF Lamp + EESF Lamp) | OEM Display + Low DEF Lamp + EESF Lamp (Slow Flash) | OEM Display + Low Level + EESF Lamp (Fast Flash) + Stop Lamp (Solid) | | |
| * Reduced Performance and Reduced Time inducements are selectable parameters for Engine Emissions Operator Inducement Progress Configuration using Cat ET. Refer to section 18. | | | | | | | |

FIGURE 3-3. INDUCEMENT STRATEGY FOR DEF TANK LEVELS

| DEF Quality/Tampering/Dosing Interruption/Impeded EGR Worldwide | | | | | |
|--|------------------|-----------------------------------|-----------------|-----------------------|--|
| | Normal Operation | Level 1 | Level 2 | Level 3 | Safe harbor Override |
| Inducement Time 1st Occurrence | Until Fault | Q/T/D = 2.5 hours E = 35 hours | 60 Minutes | Until fault heals | 20 Minutes Initiated by 1st key cycle after Level 3 |
| Inducement Time Repeat Occurrence | Until Fault | 5 minutes | 5 Minutes | Until fault heals | 20 Minutes 1st key cycle after Level 3 |
| Inducement | None | None | None | Shutdown or Idle only | None |
| Notification (Commercial) | None | steady | Slow Flash (SF) | Fast Flash + Steady | SF |
| Note: Q = DEF Quality, T = Tampering, D = Dosing Interruption, and E = Impeded EGR | | | | | |

FIGURE 3-4. INDUCEMENT STRATEGY FOR DEF QUALITY/TAMPERING/DOSING INTERRUPTION

3.10 OPERATING UNDER EXTREME CONDITIONS

Make sure that the correct type and viscosity of lubricating oils and fuel are used, especially in extreme ambient temperatures.

3.10.1 COLD WEATHER OPERATION

- » Use the correct coolant anti-freeze solution for the lowest possible temperature expected.
- » When operating the compressor at ambient temperatures below 20°F, use lubricants suited for these conditions. Refer to 5.3 *Compressor Lubrication* on page 29 for lubricating oil specifications.
- » Optional starting aids and component pre-starting warming devices are available for some models for cold weather starting.

WARNING! *Do not inject ether starting fluid directly into air intake.*

3.10.2 HOT WEATHER OPERATION

- » Keep the engine cooling system filled with clean coolant.
- » Check the coolant level daily or before each shift.
- » Keep the outside of the radiator and oil cooler clean.
- » Locate the unit in a well-ventilated area.
- » When operating in humid conditions, drain condensate from compressor oil more frequently.

3.10.3 DUSTY OR SANDY AREAS

- » When possible, wet down the area surrounding the operating site to keep dust and blowing sand to a minimum.
- » Inspect air filters before each operating shift or daily.
- » Keep radiator and oil cooler clean. Check daily and wash or blow clean as needed.

WARNING!

Check the compressor sump oil level only when the compressor is not operating and system is completely relieved of pressure. Open pressure relief valve to ensure relief of system air pressure when performing maintenance on compressor air/oil system. Failure to comply with this warning may cause property damage and serious bodily harm or death.

3.11 PNEUMATIC TOOLS APPLICATION

WARNING!

Compressed air can be dangerous. Serious injury or death can result from the improper selection, use or application of tools and attachments to this compressor.

Never inject compressed air into a bodily orifice.

Never direct compressed air at or toward a person or animal.

Do not breathe air produced by a portable air compressor.

- » Install an appropriate flow-limiting valve between the compressor service air outlet and the shut-off (throttle) valve when an air hose exceeding 0.5-inch inside diameter is to be connected to the shut-off (throttle) valve. This is to reduce pressure in case of hose or connection failure, per OSHA Standard 29 CFR 1926.302 (as) (7).
 - » When a hose will be used to supply a manifold, install an appropriate flow-limiting valve between the manifold and each air hose exceeding 0.5-inch inside diameter that is to be connected to the manifold. This will reduce pressure in case of hose failure.
 - » Provide an appropriate flow-limiting valve for each additional 75 feet of hose in runs of air hose exceeding 0.5-inch inside diameter to reduce pressure in case of hose failure.
 - » Flow limiting valves are listed by pipe size and rated CFM. Select appropriate valves accordingly.
 - » Do not exceed manufacturer's rated safe operating pressures for these items.
 - » Secure all hose connections by wire, chain, or other suitable retaining devices to prevent tools or hose ends from being accidentally disconnected. Unrestrained disconnected hoses can flail around and cause injury or damage.
 - » Vent and release all internal pressure prior to opening any line, fitting, hose, valve, drain plug or connection. This includes components such as filters, line oilers and optional airline anti-icing systems.
-

WARNING!

Serious injury can result from the direct discharge of compressed air. Do not allow personnel to be in line or front of the discharge opening of the service valve, hoses or tools or other points of compressed air discharge.

Serious injury or death may result from horseplay with air hoses and compressed air. HORSEPLAY - DO NOT DO IT, DO NOT ALLOW IT!

3.12 JUMP-STARTING BATTERY

WARNING!

Always wear an acid-resistant apron, face shield with goggles, and gloves when working with batteries! Batteries may contain hydrogen gas which is explosive and flammable! Keep flames, sparks and any other source of ignition away. Batteries also contain acid which is corrosive and poisonous. DO NOT allow battery acid to contact eyes, skin, or fabrics. Serious personal injury or property damage could result! Flush any contacted areas thoroughly with water immediately and seek medical attention.

1. Make sure both compressor and starting vehicle have the ignition "OFF" before connecting the jumper cables.
 2. Remove all vent caps from the battery or batteries in the compressor. Do not permit dirt or foreign matter to enter the open cells. (The use of maintenance-free batteries may eliminate this step.)
 3. Check fluid level. If low, bring to a proper level before attempting to jump-start. (The use of maintenance-free batteries may eliminate this step.)
 4. Attempt jump-starting from another vehicle or equipment with a negative ground electrical system and with the same voltage and battery size as the battery or batteries supplied with the compressor.
-

WARNING!

Do not attempt to jump-start using motor generator sets, welders, or other sources of DC power. Serious damage may result.

5. Bring the starting vehicle beside the compressor, but do not permit metal-to-metal contact between the compressor and the starting vehicle. Set the parking brakes of the compressor (if provided) and the starting vehicle, or chock or block both sides of all wheels.
6. Place the starting vehicle in neutral or park, turn off nonessential accessory electrical loads and start its engine.
7. Use only jumper cables that are clean, in good condition, and are heavy enough to handle the starting current.

CAUTION!

Prevent accidental contact between jumper cable terminal clips or clamps or any metallic portion of either the compressor or the starting vehicle to eliminate the possibility of arcing, which might serve as a source of ignition.

NOTE!

Positive battery terminals are usually identified by a plus (+) sign on the terminal and the letters POS near the terminal. A negative sign (-) or the letters NEG near the terminal usually identify the negative battery terminals.

8. Connect one end of a jumper cable to the positive (POS) battery terminal in the starting vehicle. When jumpstarting a 24V compressor, and if the starting vehicle is provided with two (2) 12V batteries connected in series, connect the jumper cable to the positive (POS) (+) terminal of the ungrounded battery.
9. Connect one end of the other jumper cable to the grounded negative (NEG) terminal of the battery in the starting vehicle. When jump starting a 24V compressor, and if the starting vehicle is provided with (2) 12V batteries connected in series, connect the jumper cable to the negative (NEG) terminal of the grounded compressor battery.
10. Check your connections.

CAUTION!

Do not attempt to start a 24V compressor with a 12V system in the starting vehicle. Do not apply 24V to a 12V system in the compressor.

11. Connect the other end of the same jumper cable to a clean portion of the compressor engine block away from fuel lines, the crankcase breather opening, and the battery.
12. Start the compressor following normal procedure. Avoid prolonged cranking—damage to the starter may occur. Allow the compressor to warm up.
13. When the compressor is warm and operating smoothly at normal idle RPM, disconnect the jumper cable from the engine block on the compressor, and then disconnect the other end of the same cable from the grounded negative (NEG) terminal of the battery on the starting vehicle.

14. Disconnect the other jumper cable from the positive (POS) (+) terminal of the battery in the compressor, or if provided with (2) 12V batteries connected in series, from an ungrounded battery in the compressor, and then disconnect the other end of the same jumper cable from the positive (POS) (+) terminal of the battery in the starting vehicle, or from the positive (POS) (+) terminal of the ungrounded battery in the starting vehicle if it is provided with two (2) 12V batteries connected in series.
15. Remove and carefully dispose of the dampened cloths. They may be contaminated with acid. Replace vent caps.

4 COMPONENT DESCRIPTION

TOPICS IN THIS SECTION:

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| » Engine | 20 |
| » Aftertreatment System | 20 |
| » Air End Assembly | 20 |
| » Discharge System | 20 |
| » Lubrication System | 21 |
| » Capacity Control System | 22 |
| » Telemetry | 23 |
| » Electrical and Protective Circuit System | 23 |
| » Engine Shutdown Protection | 23 |
| » Noise Control Systems | 24 |
| » Instrument Panel | 24 |

4.1 PORTABLE COMPRESSOR PACKAGE

The compressor is a single stage, oil-flooded lubricated rotary screw air compressor. The compressor package is available as a portable wheel-mounted unit, utility mounted unit, or galvanized skid-mounted unit for offshore applications. All models are enclosed in a weather-resistant acoustical enclosure.

The complete operating unit consists of a diesel engine for power, compressor assembly, air/oil separator system, cooling system for the engine and compressor oil, instrumentation, pneumatic control system, and acoustical enclosure.

4.2 ENGINE

The compressor is powered by a diesel engine. For detailed information on the engine refer to the Engine Operators Manual provided with each compressor.

4.2.1 ENGINE COOLING SYSTEM

The engine cooling system utilizes a conventional engine radiator, thermostat, water pump, and fan to maintain the engine coolant at a desired operating temperature.

4.2.2 ENGINE TO COMPRESSOR DRIVE

The compressor and engine are connected through a non-lubricated spline coupling. It consists of a drive ring registered and bolted directly to the engine flywheel and either a splined hub or a disc attached to the compressor drive shaft. Because of low starting torque, no clutch is required.

4.3 AFTERTREATMENT SYSTEM

The compressor uses a Tier 4 Final engine equipped with an aftertreatment system that is compliant with all current non-road EPA emissions regulations. A Selective Catalytic Reduction System (SCR) ensures engine emissions meet EPA requirements.

4.4 AIR END ASSEMBLY

The compressor assembly is an oil flooded, positive displacement, single-stage rotary screw unit. Components include a stator housing, male and female rotors, bearings, and bearing supports. Engine power is transferred to the male rotor through a coupling and, if a gear-driven unit, through gears in the gear housing. The male rotor drives the female rotor.

4.4.1 COMPRESSION CYCLE

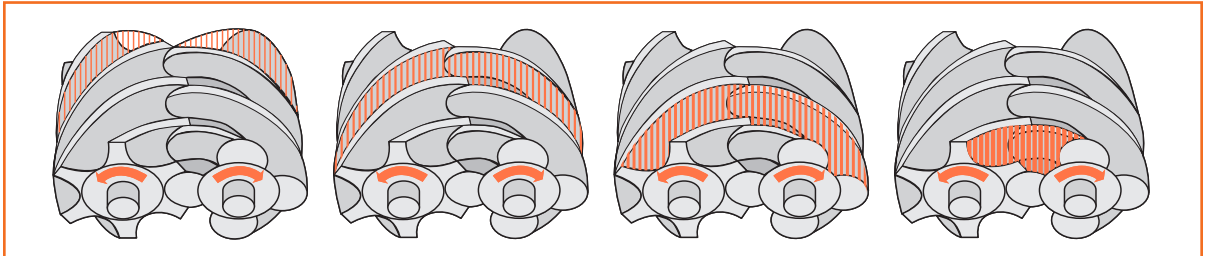


FIGURE 4-1. COMPRESSION CYCLE

Air at atmospheric pressure is drawn in through the inlet and compressed by the rotation of the rotors. During the compression cycle, oil is injected into the compressor performing three important functions:

1. Lubricate the rotating parts and bearings.
2. Provide cooling for the compressed air.
3. Seal the running clearances between the rotors.

4.5 DISCHARGE SYSTEM

4.5.1 RECEIVER/SUMP

From the compressor discharge, oil-laden air enters the receiver/sump tank above the oil level and most of the oil is separated from the air by gravity. The oil runs downward and accumulates for recirculation, while the remaining oil mist passes through the separator element. The oil separator is located in the upper portion of the receiver/sump. When air is demanded at the service line, it passes through the separator element, which provides the final stages of air/oil separation.

4.5.2 MINIMUM PRESSURE VALVE

The minimum pressure valve is located at the service air outlet (at the top of the separator). This valve serves to maintain a minimum discharge pressure of 65 to 80 psig in operation, which is required to assure proper air/oil separation. At normal operating pressure of 90 to 150 to psig, this valve is wide open effectively removing any restriction to airflow.

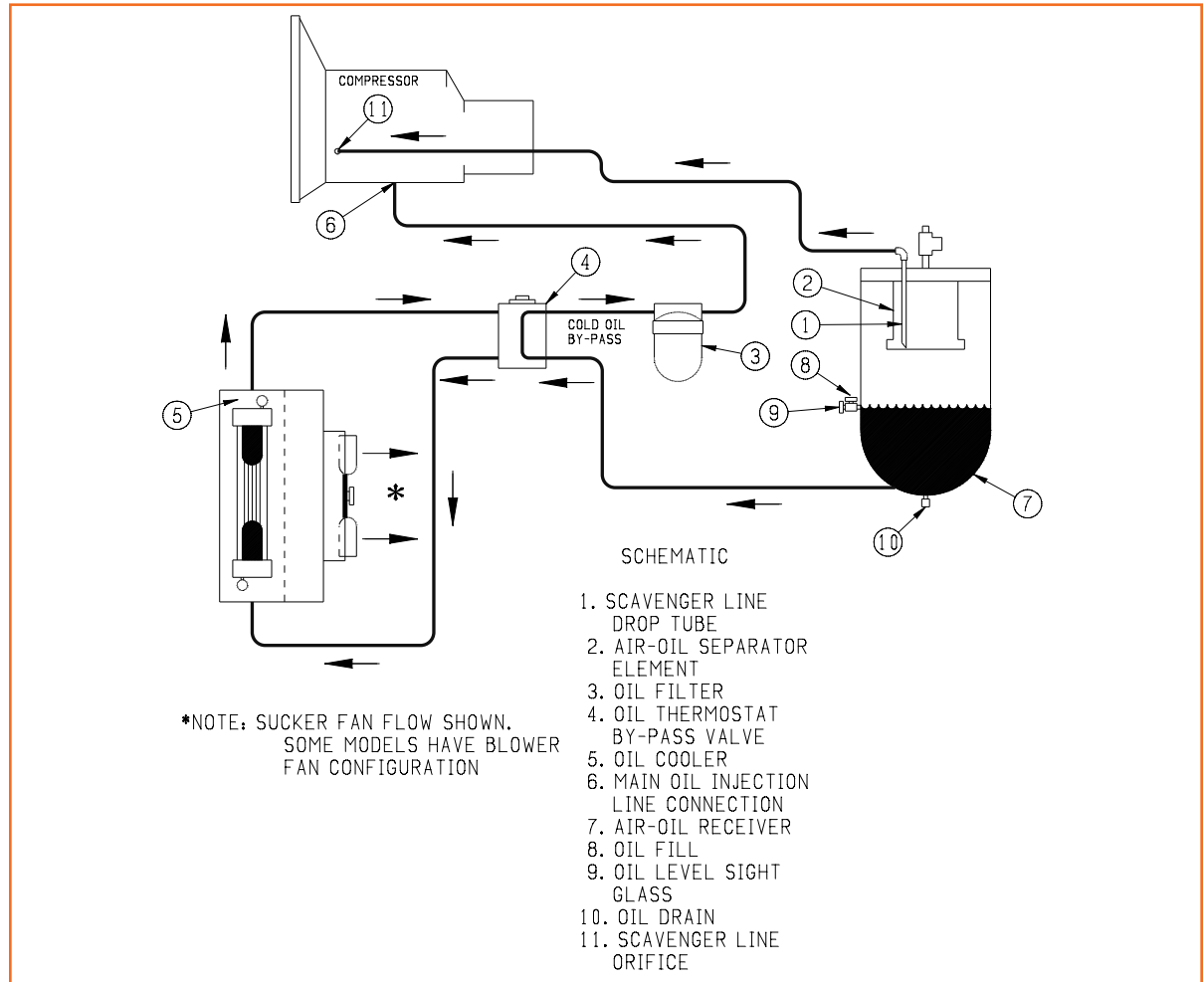


FIGURE 3-2. DIAGRAM, OIL PIPING 185-375 (REV 00)

Oil from the compressor oil sump at compressor discharge pressure is directed through the cooling system and oil filter to a lower pressure region of the compressor stator. At the same time, oil is directed to the bearings and shaft seal of the compressor. The oil-laden air is then discharged back into the sump.

The compressor cooling system consists of an oil cooler mounted adjacent to the engine radiator. Cooling air is pushed through the cooler by the engine fan while oil is circulated through it by the receiver/sump pressure.

4.6.1 THERMAL BYPASS VALVE

The thermal bypass valve is the center of the compressor temperature regulating system. The valve is designed to be fully open, allowing oil to bypass the cooler until the oil temperature reaches 110°F. Above 110°F, the valve gradually closes down and becomes completely closed when the oil temperature reaches approximately 180°F. The thermal bypass valve has a built-in pressure relief feature so that a pressure drop across the valve of 50 psi will cause it to open. If the oil cooler should become plugged the thermal valve will open regardless of temperature.

4.6.2 OIL RETURN LINE

The oil that is not removed by the air/oil separator gravitates to the bottom of the air/oil separator and is returned through an orifice in the oil return scavenger line assembly. The assembly consists of a pickup tube, return line hose, a line strainer and a sight glass/orifice. Flow can be observed through the sight glass. Flow is generated via differential pressure between the high pressure sump tank and the lower pressure region of the compressor.

4.6.3 OIL FILTER

A full-flow canister-style oil filter is supplied to protect the compressor unit from solid contaminants. The filter has an internal bypass valve to assure adequate oil flow with cold oil or a plugged oil filter element. The filter canister can be removed with a strap wrench.

4.7 CAPACITY CONTROL SYSTEM

The control system is designed to match air supply to air demand and to prevent excessive discharge pressure when the compressor is operating but air is not being used. Control of air delivery is accomplished by both by inlet valve regulation and engine speed control as directed by the controller.

The following overview explains the operation of the control from a condition of “no load” to a condition of “full capacity” at working pressure. For the working pressure range of your machine, refer to applicable data in the Specifications section.

The inlet valve cylinder pressure chamber is pneumatically connected to the dry side of the receiver via the pressure regulator valve. When the receiver tank pressure is below the set point of the regulator valve no pressure will exist in the inlet valve chamber. Under these conditions, the inlet valve will remain wide open, causing the compressor to deliver full capacity.

As the demand for air decreases, the receiver pressure will rise, and when this pressure level exceeds the set point of the pressure regulator valve, control signal pressure will be allowed to enter the inlet valve chamber, which in turn will move the modulating piston and the valve plate to a closed condition, thereby throttling the incoming air.

When less than full capacity is required, receiver pressure increases, thereby opening the pressure regulator, which allows a signal from the pressure transducer to reduce the engine speed until it matches the air requirements from 100% down to 60%. From 60% down to 0% both engine speed reduction and inlet valve modulation act together to reduce air output.

NOTE!

The compressor can only produce its maximum rating of air flow at rated pressure (rated CFM at rated psig). If the tank pressure continues to decrease when the machine is at full speed and the inlet valve fully open, a larger capacity compressor or multiple compressors may be required for the customer's job needs.

4.7.1 INLET VALVE

The inlet valve controls the amount of air being allowed into the compressor unit and is the heart of the compressor control system. On start-up the inlet valve will be closed allowing only a small amount of air past the poppet/butterfly valve to slowly build pressure in the receiver tank. The machine will continue in this unloaded state with no service air available until the engine has reached operating temperature.

Once the compressor and engine reach operating temperature, the compressor can be put into the load state. In the load state the inlet valve cylinder will receive air from the selected pressure regulator and will start pushing the butterfly valve open, allowing atmospheric air to enter the compressor. Now air will be available at the service valve for customer use. The further the butterfly valve opens, the more service air is available for use.

The load regulator can sense how much to open the inlet valve by reading the pressure in the receiver tank. If the pressure in the receiver is increasing, the job requires less air. If the receiver tank pressure is decreasing, the job requires more air. This is what is called “0 to 100% capacity control”.

4.7.2 BUTTERFLY VALVE

The air intake system consists of a normally closed butterfly valve used in conjunction with a pneumatic type inlet valve. During start-up the butterfly valve remains closed, which results in reduced engine load. The butterfly valve has a built-in passage that permits a small amount of air to enter the compressor. As the pressure increases the butterfly valve begins to open, admitting more air to the compressor.

4.7.3 SHUTDOWN BLOWDOWN VALVE

The shutdown blowdown valve relieves pressure in the system upon shutdown. It is closed when the compressor is in operation; however, at shutdown, the inlet valve closes, the unit becomes pressurized and sends a pressure signal to open the normally closed blowdown valve.

4.7.4 RUNNING BLOWDOWN VALVE

This valve functions automatically in response to the system pressure. When the unload signal is received from the controller, the running blowdown valve is opened allowing a small quantity of pressurized sump air to be vented to atmosphere.

4.7.5 RECIRCULATION VALVE

The recirculation valve allows air under the inlet to keep the compressor from cavitating, thereby increasing air end life. The recirculation valve functions automatically in response to the regulated control pressure.

When it receives the unload signal to the inlet valve, the recirculation valve opens, allowing a small amount of pressurized sump air to be recirculated through the compressor. This air holds a positive pressure signal on the inlet side of the air end to prolong the shaft seal life.

4.8 TELEMETRY

Telemetry allows remote monitoring of machine operation data in real time via GPS tracking. This is standard on all large tandem-axle compressors, and provides the means to record and transmit certain compressor and engine measurements.

4.9 ELECTRICAL AND PROTECTIVE CIRCUIT SYSTEM

The compressor electrical system is a 12-volt negative ground system used on smaller-capacity (185–375 CFM) compressors and a 24-volt negative ground system used on larger-capacity (750–1800 CFM) compressors. It is equipped with a protective circuit to minimize damage. Damage could be caused by high compressor discharge temperature, high engine water temperature, or low engine oil pressure. Refer to wiring diagrams as required. The following conditions will cause automatic shutdown of the compressor:

- » Compressor discharge temperature (CDT) of approximately 265°F (129°C). A warning is shown when the temperature reaches 245°F (118°C).
- » Low engine oil pressure (EOP) dependent upon engine manufacturer's specifications.
- » High water temperature (EWT) dependent upon engine manufacturer's specifications.
- » Low fuel (LF) warning at approximately 11% of the fuel tank. The LOW FUEL icon will flash at 8% of capacity. At 3% the compressor will be forced to unload. Diesel Exhaust Fluid (DEF) level of 5% capacity will derate the engine, and the compressor will go to idle. When the DEF tank is empty the engine will shut down.
- » Coolant temperature specified by engine manufacturer.

4.10 ENGINE SHUTDOWN PROTECTION

- » Sullivan-Palatek uses electronically controlled engines in the 185–1800 CFM line of compressors. Personnel operating and maintaining these compressors MUST be familiar with and understand the operation and protection features available with these engines.

WARNING! *Failure to follow the electronic control warnings and attempts to override, bypass, or ignore these warnings can lead to severe engine damage. This damage will not be covered by either the engine manufacturer's or Sullivan-Palatek's warranty.*

- » Electronically controlled engines have software that monitor engine parameters during operation. If the parameters exceed the normal operating threshold, the engine software will take appropriate actions to protect the engine from damage. There are two levels of action: derate and shutdown. If either of these actions are initiated, the software will also activate the yellow warning sign and red engine shutdown/diagnostic warning sign on the Sullivan-Palatek Electronic Controller (SPEC).

4.10.1 ENGINE DERATE

The engine will derate the power output of the engine in an attempt to correct the parameters that are out of range. In almost every case, power deration will result in the engine stalling, which will protect the engine from damage.

NOTE! *The yellow warning will be lit on the SPEC screen when this occurs.*

4.10.2 ENGINE SHUTDOWN

The second level of protection in the controller is engine shutdown. If the derate feature cannot correct the unsafe parameters or the engine does not stall, the controller will shut down the engine to protect it from damage.

NOTE! *The warning and shutdown information will be lit on the SPEC screen when this occurs.*

If either of these protection features activate, the engine requires inspection by an authorized engine manufacturer's Dealer before attempting to run the machine again.

WARNING! *Failure to inspect and correct the fault in the engine or at the point of the external sensor will result in repeated derates and shutdowns, which can lead to engine damage.*

NOTE! *The engine software stores all derate and shutdown information to be reviewed by the engine manufacturer's representative. Attempts to restart the compressor without repairing the fault sensed by the protection system will be recorded in the engine software and will void the engine manufacturer's warranty. The Sullivan-Palatek warranty DOES NOT COVER the engine. The engine and its components are warranted only by the engine manufacturer.*

Operators, rental customers and anyone responsible for the operation and maintenance of this compressor MUST be instructed and briefed on the proper responses to control module warnings. In particular, they must be instructed to report warning instances and not attempt to restart the compressor until faults are cleared by certified personnel.

4.11 NOISE CONTROL SYSTEMS

Noise control systems incorporated in this compressor have been designed to meet the requirements of federal noise control regulations. The principal components of the noise control systems include the enclosure, engine exhaust system, and compressor intake system. The enclosure has been designed to provide the required noise reduction while maintaining a good distribution of cooling airflow to the radiator and oil cooler.

4.12 INSTRUMENT PANEL

The instrument panel contains all the necessary controls and instrumentation for operation. It is enclosed by a lockable, hinged door. Following is an explanation of the principal controls and instruments:

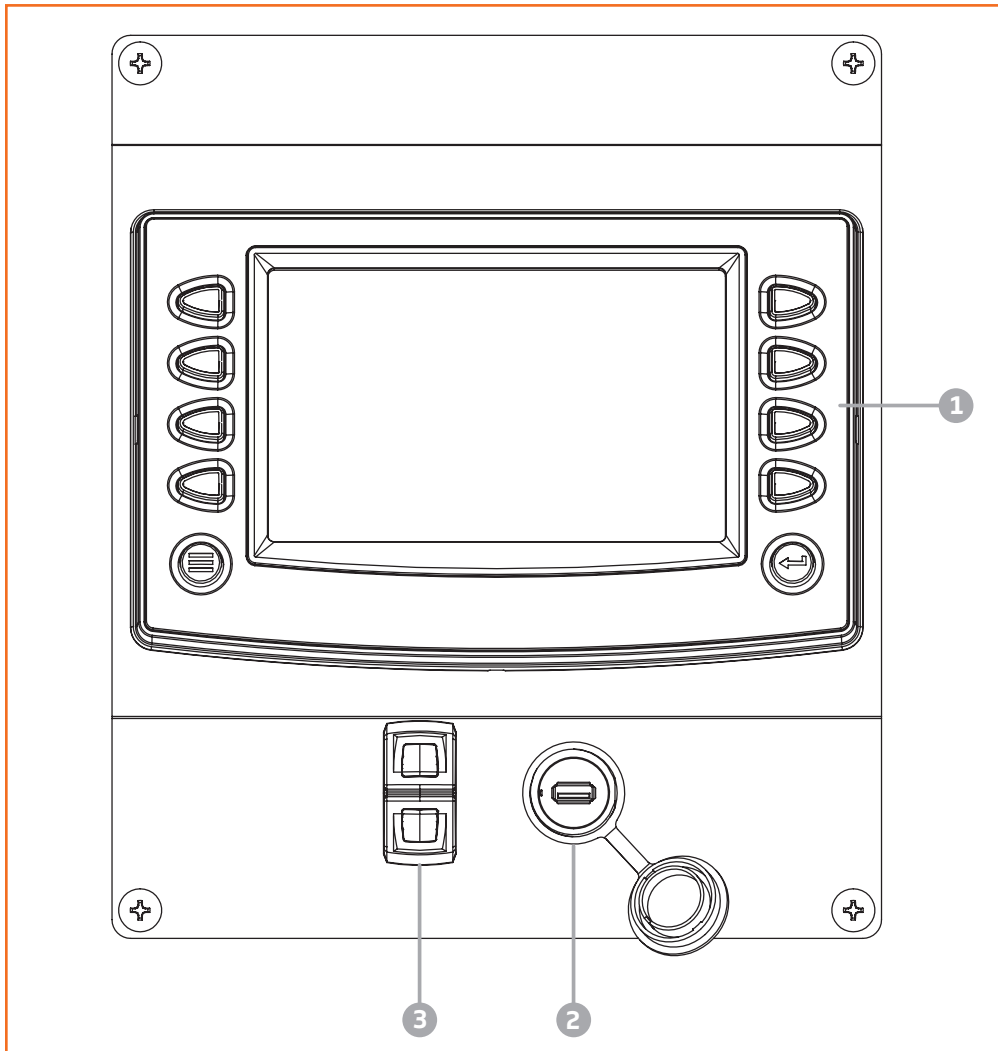


FIGURE 4-3. INSTRUMENT PANEL

| ITEM | NAME | DESCRIPTION |
|------|---|---|
| 1 | Sullivan-Palatek Electronic Controller (SPEC) | Monitors the engine and compressor parameters, displays warning and shutdown information, and displays engine diagnostic information from the engine ECU. |
| 2 | Ignition Switch | ON position electrically energizes engine starter motor solenoid. |
| 3 | USB Port | Used to acquire data files for diagnostics. |

4.12.1 SULLIVAN-PALATEK ELECTRONIC CONTROLLER (SPEC) MODEL PV780

The SPEC monitors all critical compressor and engine parameters and provides warning and shutdown information. Parameters monitored include engine speed, engine temperature, compressor temperature, engine oil pressure, battery voltage and fuel level. The SPEC provides warning and shutdown information from high compressor temperature or low fuel level. It also has complete engine diagnostic capabilities that can read and display fault codes from the J1939 CANBUS.

NOTE!

For more in-depth information on the display, including menu navigation and warning screens, please refer to the *Murphy PowerView PV780 Controller Operator's Guide*.

FACEPLATE FEATURES

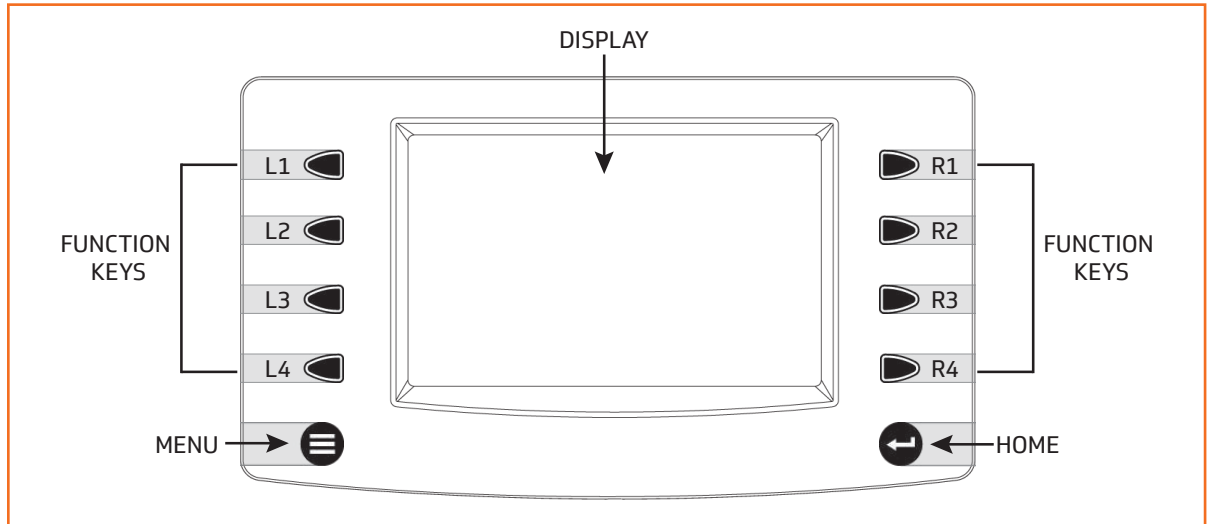






FIGURE 4-4. SPEC INTERFACE FEATURES

NAVIGATION AND KEYPAD FUNCTIONS

The keypad on the SPEC display includes 10 tactile push buttons with white LED backlight. The keys on the keypad perform the following functions:

| | | |
|---|---------|--|
|  | MENU | Pressing the MENU button at any time displays the main menu. |
|  | L1 - L4 | The left function keys correspond to the soft key commands and allow selections to be made accordingly. |
|  | R1 - R4 | The right function keys correspond to the soft key commands and allow selections to be made accordingly. |
|  | HOME | Pressing the HOME button displays the Home screen. |

4.12.2 IGNITION SWITCH

When the START button is pressed on the ignition switch, the engine starter motor solenoid is electrically energized. Using the STOP button puts the machine into a mandatory cooldown state.

4.12.3 USB PORT

The USB port on the instrument panel is where a USB device can be inserted in order to update or remove diagnostic files from the SPEC's log file. This function is reserved for Service or OEM personnel only.

5 MAINTENANCE

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5.1

MAINTENANCE SCHEDULE

| TIER 4 COMPRESSOR MAINTENANCE SCHEDULE | | | | | | | |
|---|-------------------|----|-----|------|------|----------|---------------|
| PROCEDURE | FREQUENCY (HOURS) | | | | | SEE NOTE | REFERENCE |
| | DAILY | 50 | 250 | 1000 | 2000 | | |
| Check oil level (before starting) | x | | | | | 1 | 5.3 |
| Check radiator coolant level | x | | | | | 1 | |
| Check fuel supply/DEF supply (after starting) | x | | | | | 1 | |
| Check air filter elements | x | | | | | 1,7 | 5.6 |
| Check for fuel, oil air and water leaks | x | | | | | 1 | |
| Check exhaust system rain cap (if applicable) | x | | | | | | |
| Drain water from compressor sump | | x | | | | 2 | |
| Change compressor oil filter element | | x | | x | | 6 | 5.8 |
| Change compressor oil | | | | x | x | 5 | 5.3, 5.4, 5.5 |
| Check drawbar and bolt torque (if portable) | | | x | | | 3 | 5.2 |
| Clean control system orifices | | | x | | | | |
| Check wheel lug nuts (if portable) | | | x | | | 3 | |
| Check tire pressure (if portable) | | | x | | | 3 | |
| Inspect lifting frame (before each lift) | | | x | | | 3 | |
| Check aftercooler service filters, orifices and Y-strainers | | | | x | | 8 | |
| Change compressor air filter element | | | | x | | 4,7 | 5.6 |
| Check axle spring shackles and mounting bolts | | | | x | | 4 | |
| Clean battery terminals | | | | x | | 4 | |
| Check battery hold-downs and cables for wear | | | | x | | 4 | |
| Check compressor shaft seal for leaking | | | | x | | 4 | 5.9 |
| Check air filter piping, fittings and clamps | | | | x | | 4 | |
| Check radiator hoses and clamps | | | | x | | 4 | |
| Check engine and compressor supports | | | | x | | 4 | |
| Replace air/oil separator element | | | | | x | 5 | 5.11 |
| Check and clean scavenger line and sight glass | | | | | x | 5 | |
| Check all door gaskets, hinges and latches | | | | | x | 5 | |
| Drain engine radiator coolant and replace | | | | | x | 5 | |
| Clean and flush cooling system | | | | | x | 5 | 5.13 |
| Check protective circuits and verify proper function | | | | | x | 5 | |
| Check sump pressure relief valve | | | | | x | 5 | |
| Inspect and clean oil system thermostat | | | | | | x | 6 |
| Re-pack wheel bearings (if applicable) | | | | | | x | 6 |

NOTES

1. Or every 10 hours of operation or on rent return
2. Or weekly
3. Or before returning to ready line
4. Or 6 months
5. Or annually
6. After first 50 hours of operation
7. More frequently in extreme operating conditions (dusty, humid, low temperature)
8. As controller differential warning guides you.

NOTE! For engine maintenance, please refer to the Engine Manufacturer's Maintenance Manual.

5.2

BOLT TORQUE GUIDELINES

5.2.1 INCH FASTENERS

| INCH FASTENERS TORQUE | | | | |
|-----------------------|---------------------|-------|---------------------|-------|
| Size | SAE Grade 5 (ft-lb) | | SAE Grade 8 (ft-lb) | |
| | Dry | Oiled | Dry | Oiled |
| ¼-20 | 8 | 6 | 12 | 9 |
| ⅝-18 | 17 | 13 | 25 | 18 |
| ¾-16 | 30 | 23 | 45 | 35 |
| 7/16-14 | 50 | 35 | 70 | 55 |
| ½-13 | 75 | 55 | 110 | 80 |
| 9/16-12 | 110 | 80 | 150 | 110 |
| 5/8-11 | 150 | 110 | 220 | 170 |
| ¾-10 | 260 | 200 | 380 | 280 |

5.2.2 TORQUE SEQUENCE

| TYPICAL BOLT TORQUE PATTERNS | | |
|------------------------------|----------------|----------------|
| Circular Pattern (8-Bolt) | Square Pattern | Flange Pattern |
| | | |

5.3

COMPRESSOR LUBRICATION

Change oil at least once a year, even if the normal oil change period in hours has not yet been reached.

CAUTION!

Never mix synthetic lubricants with hydrocarbon lubricants. Never mix synthetic lubricants manufactured from different base products. Severe damage to the compressor system may result.

Contamination of non-detergent mineral oils with traces of ATF, or detergent motor oils, may lead to problems such as foaming and plugging of filters, orifices, and lines. Lubricant manufacturers include a variety of additives in the blending process to enhance lubrication, product life and performance. Mixing different types or brands of lubricants is not recommended due to the possibility of a dilution of the additives or a reaction between additives of different types.

Environmental conditions in the area of compressor operation such as the presence of reactive gases or vapors in the air may lead to chemical changes and premature degradation of the lubricant. The useful life of synthetic lubricants may extend the normally recommended drain and replace period; however, the user is encouraged to closely monitor the lubricant condition and to participate in an oil analysis program with the fluid supplier. When ambient conditions exceed those noted, or if conditions warrant use of "extended life" lubricants, contact Sullivan-Palatek for a recommendation.

5.3.1 CHECK

The oil level should be checked daily.

1. Shut down the compressor (or check before the compressor is turned on).
2. Wait two minutes after the compressor stops to allow the pressure to be relieved and the oil to settle.
3. Observe the oil level in the fluid sight glass. The fluid sight glass should be ½ to ⅔ full.
4. While the compressor is running, the oil should be visible in the sight glass.

5.3.2 FILL

Before adding or changing compressor oil, completely relieve the sump of pressure. Venting the sump tank pressure relief valve will do this. Oil is added at the fill plug.

5.3.3 LEVEL

The proper oil level, when unit is shut down and oil has had time to settle, is across the center of the oil level sight glass.

WARNING!

Compressor must be shut down and pressure completely relieved from system before checking fluid levels. Open pressure relief valve to assure relief of system air pressure. Failure to comply with this warning may cause property damage and serious bodily harm or death.

5.3.4 DRAIN

Always warm compressor thoroughly prior to changing the compressor oil. A drain valve is provided at the bottom of the sump tank and oil cooler. All fluid drains are located on the curbside of the machine. When changing the oil, make sure system is completely drained to reduce potential contamination.

WARNING!

Do not attempt to drain water, remove the oil level fill plug, or break any connection in the air or oil system until all the pressure has been relieved. Check by manually opening the sump pressure relief valve. Serious injury or death may result if this warning is not followed.

5.4

WEATHER-ALL™ COMPRESSOR LUBRICANT

All of Sullivan-Palatek's portable air compressors are initially filled with Sullivan-Palatek's WEATHER-ALL HP™ Compressor Fluid at factory. This custom-formulated, multi-viscosity 5W-20 lubricant is specifically designed for long life under severe, demanding conditions. Maximum protection against scuffing and wear to bearings and rotors, and wear-control for steel and brass parts when operating at maximum pressure ratings results in extended compressor life. Extensive testing has shown this fluid exhibits excellent resistance to foaming, oil oxidation and corrosion of yellow metals and limits rust of ferrous metals.

This synthesized hydrocarbon-based fluid provides quick water separation which enhances equipment protection in wet and humid service environments. It offers an excellent viscosity index of 180 as well as low pour point of -40°F.

Sullivan-Palatek strongly advises the continued use of WEATHER-ALL to ensure optimal compressor performance, and lower equipment maintenance costs.

| LUBRICANT SPECIFICATIONS | | | |
|--------------------------|---------|---------------------|---------------|
| ISO Viscosity Grade | 32 | Normal Service Life | 1000 hours* |
| SAE Viscosity Grade | 5W-20 | Viscosity Index | 180 |
| Viscosity, cst. 210°F | 50 SUS | Pour Point | -40°C / -40°F |
| Viscosity, cst. 100°F | 170 SUS | Flash Point | 199°C |

NOTE!

These values are not intended for use in preparing specifications.

*Service life is only a guideline for typical oil life if temperature is the only variable to be considered. Many variables affect the oil life, i.e. environmental impact from various gases, dust and dirt, compressor short cycling, etc.

Sullivan-Palatek recommends oil sampling as the best guide for your fluid change interval. Changing fluid once a year may not be adequate or it can be excessive. For this reason an hourly service on lubricants is merely a guide. Please consult your factory-trained servicing distributor for questions concerning your lubricant life and Sullivan-Palatek's lubricant sampling program. See for additional information.

5.5

OIL SAMPLE FOR ANALYSIS

The first oil sample should be drawn after the compressor has run for 500 hours or 3 months. Intervals for following oil samples will be determined by the analysis results.

SAMPLE OIL FROM SUMP TANK

1. Run the compressor long enough to reach normal operating temperatures.
2. Turn compressor OFF and allow pressure to blow down to 0 psi.
3. Remove the drain plug from the end of the drain line at the bottom of the sump tank.
4. Open the drain valve and drain any water from the sump tank. Discard in an approved manner.
5. Fill the clear sample bottle (2) with oil. The sample bottle (2) must be at least one-third full.
6. Close the drain valve and replace the plug in the drain line.
7. Start the compressor according to *2.5 Normal Starting* procedures.
8. Check the oil level during operation. Add oil if necessary according to *5.3.2 Fill* procedures.



FIGURE 5-1. OIL ANALYSIS KIT (P/N K00031-005)

SUBMIT OIL SAMPLE

1. Fill out all the information on the oil sample form (3) provided with the oil analysis kit. Please make sure the form is completely and legibly filled out.
2. Place the oil sample bottle (2) inside the black canister and put the lid on.
3. Mail the sample with the form to:
Wear Check
501 Madison Avenue
Cary, NC 27513

INTERPRET RESULTS

Once the sample is processed the laboratory will e-mail the results of the oil analysis to the sender of the sample. The analysis report includes customer unit information, sample data, spectrochemical analysis, physical properties, additional test results and analysis recommendations. If previous oil samples have been submitted for analysis, that information will also be on the report. Information to assist in understanding the analysis report is included on the front of the report.

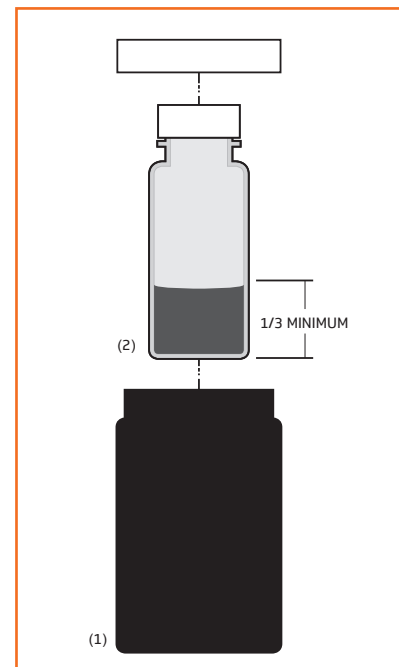


FIGURE 5-2. BOTTLE PREPARATION

5.6

AIR INTAKE FILTER

Check daily, every 10 hours of operation or on rent return. Replace every 1,000 hours or 6 months. Replace more frequently in dusty conditions. Empty the evacuator valve (dust boot) daily.

5.6.1 REMOVAL AND INSPECTION

1. Open the locking devices and remove air filter cover.
2. Remove and inspect the used primary element by turning counter-clockwise to unscrew.
3. Pull used primary element to remove.
4. Remove and inspect the secondary filter.
5. The air filter elements should be thoroughly inspected for holes by placing a lamp inside the element and carefully checking for areas of bright light passing through the element and seal.

5.6.2 INSTALLATION

1. Screw the new filter(s) into place by turning clockwise
2. Install air filter cover making sure evacuator valve is at the 6 o'clock position.
3. Place cover back on air filter and close locking devices.

5.7

DEF FILTER

Replace the Diesel Exhaust Fluid (DEF) filter every 5,000 hours, or as needed. Refer to Engine Operation and Maintenance manual for maintenance details.

5.8

COMPRESSOR OIL FILTER

Replace the oil filter element once after the first 50 hours of operation, then every 1,000 hours. Replace more frequently in extreme operating conditions.

5.8.1 INSPECTION

The compressor oil filter should be checked making sure it has the correct element and it is properly installed and not leaking.

5.8.2 REMOVAL

1. Make sure the system pressure is relieved.
2. Place oil spill pan under filter.
3. Remove oil filter element by unscrewing it from the filter head (turn counter-clockwise) and discard. The use of a strap-type wrench may be necessary.

4. INSTALLATION

5. Apply a thin film of oil to the seal of a new oil filter.
6. Screw the oil filter on by hand, turning it clockwise until the gasket seats. Then turn an additional $\frac{1}{2}$ to $\frac{3}{4}$ turn by hand. Check for leaks in operation.

5.9

COMPRESSOR SHAFT OIL SEAL

Check the compressor shaft seal for leaking oil every 1,000 hours or 6 months.

5.9.1 INSPECTION

Inspect the compressor shaft seal for signs of leaking oil.

NOTE!

If replacement is necessary, removal and installation instructions will be provided with the shaft seal kit.

5.10

OIL RETURN LINE

Check the oil return line periodically to make sure that it does not become clogged. A clogged line results in excessive oil consumption and oil in the service lines.

5.10.1 INSPECTION

Inspect oil return line for clogging.

5.10.2 CLEANING

If clogging is indicated, check and clean the entire line, including the orifice fitting at the compressor end, and the siphon tube inside the separator. Blowing with a reverse flow of compressor air will clean the line.

5.11 AIR/OIL SEPARATOR

Replace the air/oil separator every 2,000 hours, annually, or when differential exceeds 10 psi. The air/oil separator employs a unitized element.

The separator element is a single piece unit, which requires replacement when it fails to remove the oil from the discharge air. Prior to replacing the separator element be sure to check the oil return line and orifice for plugging or restrictions.

WARNING! *Prevent separator flash or fire. Maintain the separator element in proper condition and do not allow it to become plugged with dirt and oxidized oil; be certain that the sump lid is properly grounded to the sump when installing a new separator. DO NOT REMOVE THE GROUNDING STAPLES IN SEPARATOR GASKET. The combination of a build-up of dirt and oxidized oil can clog the element causing an increase in air velocity at narrow points on the element media. Elevated temperatures at these points can result in ignition of the fluid in the oil sump.*

5.11.1 REMOVAL

1. Relieve sump pressure to zero pressure.
2. Disconnect oil return line. Loosen fitting and pull siphon tube up out of separator.
3. Remove service air piping from minimum pressure valve.
4. Mark and disconnect necessary tubing at separator cover and then remove cover.

5.11.2 INSTALLATION

WARNING! *Failure to properly ground the sump lid and separator can result in the build-up of an electric charge leading to ignition inside the sump. DO NOT REMOVE THE GROUNDING STAPLES IN SEPARATOR GASKET. Failure to comply with this warning may cause property damage and serious bodily harm or death.*

1. Remove and replace element.

WARNING! *Lid and sump tank top must be clean to ensure proper grounding between element and tank. Make sure grounding staples are in top and bottom gasket.*

2. Replace separator cover; tighten bolts gradually in an opposing manner until required torque is reached. Refer to 5.2 Bolt Torque Guidelines.
3. Clean oil return line and orifice.
4. Install service air piping and reconnect all tubing. When replacing the oil return siphon tube, allow it to contact the bottom of the sump tank.

NOTE! *If the separator element has to be replaced frequently because it is plugged, it is an indication that dirt is entering the inlet system, the compressor oil filter is faulty, or the oil is breaking down. The complete inlet system, starting with the air cleaner, and all joints in piping to the inlet valve, should be checked for leaks.*

5.12 THERMAL VALVE

Inspect and clean the thermal valve if the unit shuts down because of high compressor discharge oil temperature.

5.12.1 INSPECTION

Inspect the valve by removing it from the bypass housing. Sediment particles may lodge in the valve seating surface and prevent it from opening, thereby allowing hot oil to pass directly to the compressor without being cooled.

5.13 OIL COOLER

The interior of the oil cooler should be cleaned when the pressure drop across the cooler at full load exceeds 25 psi.

5.13.1 INSPECTION

Inspect compressor oil system for signs of varnish.

5.13.2 REMOVAL

1. Drain compressor fluid.
2. Remove oil cooler.

5.13.3 CLEANING

Circulate a suitable solvent to dissolve and remove varnish and sludge.

5.13.4 INSTALLATION

1. Replace oil cooler and fill compressor with fresh oil.
2. Operate the machine normally for 50 hours. After 50 hours, change compressor oil and install a new oil filter element.

5.14 GREASE

Use a multi-purpose type grease (MKG) or multi-purpose type grease with molybdenum disulfide (MPGM) conforming to MIL-L-7866 for all parts except wheel bearings. Use wheel-bearing grease (WBG) for lubricating the wheel bearings.

5.15 AXLE OIL

Use API-GL-5 lubricant with a viscosity of SAE 80W-90.

5.16 ENGINE LUBRICATION

Refer to Engine Operation and Maintenance Manual for recommended engine lubricating oil, service intervals, and maintenance practices.

5.17 CONTROL ADJUSTMENTS

The engine speed governor and pressure regulator are preset at the Factory and normally require no servicing.

5.17.1 ENGINE SPEED

Engine speed is controlled by the Sullivan-Palatek Electronic Controller (SPEC). The full load and idle speeds are programmed at the Factory and there should be no need for adjustment. If the machine is experiencing speed problems please contact our Service Department.

5.18

RECOMMENDED SPARE PARTS

D1600PH1CU4(AF)

| ITEM | PART NUMBER | DESCRIPTION | QTY |
|------|----------------|--|-----|
| 1 | 01900522-0100 | ELEMENT, AIR FILTER PRIMARY | 4 |
| 2 | 01900522-0079 | ELEMENT, AIR FILTER SECONDARY | 4 |
| 3 | 01900522-0109 | ELEMENT, AIR 1 MICRON | 1 |
| 4 | 01900522-0110 | ELEMENT, AIR .01 MICRON | 1 |
| 5 | 01900522-0154 | ELEMENT, RACOR FILTER, FUEL/WATER SEP | 1 |
| 6 | 00520-018 | ELEMENT, OIL FILTER, COMPRESSOR 300/350 | 1 |
| 7 | 08000-321 | ELEMENT, SEPARATOR | 1 |
| 8 | 01900520-0326 | FILTER,ELEM OIL CU4 | 1 |
| 9 | 01900522-0155 | ELEMENT,FUEL FILTER CU4 | 1 |
| 10 | 01900520-0046 | FILTER, FUEL VENT 10 MICRON | 1 |
| 11 | 00823062-0008 | OIL,WEATHER-ALL, 1 GAL | 1 |
| | 00823062-0009 | OIL,WEATHER-ALL, 5GL PAIL | 1 |
| | 00823062-0010 | OIL,WEATHER-ALL, DRUM, 55 GAL | 1 |
| 12 | 3200190422-850 | SDR,0-300 PSI, 4-20MA, 1/4"NPT, 2 PIN DTCH | 3 |
| 13 | 01901174-0010 | PROBE, TEMPERATURE 4-20MA | 3 |
| 14 | 03909280-0312 | VALVE ASSY, RELAY 1/32 NC | 3 |
| 15 | 03909280-0625 | VALVE ASSY, RELAY 1/16 NC | 1 |
| 16 | 01900152-0075 | BELT, FAN CU QSX15 T4F | 1 |

NOTE!

Use only service parts supplied or recommended by Sullivan-Palatek. Use of substitutes may void warranty. See **STANDARD WARRANTY** for details.

5.19

SERVICE KITS

Service Kits are available for basic servicing of the compressor and engine. Annual Kits (wet or dry) include a year's worth of compressor and engine servicing. Line Service Kits are used for a single compressor and engine service.

| DESCRIPTION | QTY | CONTENTS | PART NUMBER |
|---------------------------|-----|---|---------------|
| SERVICE KIT, ANNUAL (WET) | 8 | ELEMENT, AIR FILTER (PRIMARY) | 00717701-0184 |
| | 8 | ELEMENT, AIR FILTER (SECONDARY) | |
| | 4 | ELEMENT, OIL FILTER (COMPRESSOR) | |
| | 2 | ELEMENT, OIL FILTER (ENGINE) | |
| | 2 | ELEMENT, FUEL FILTER | |
| | 2 | ELEMENT, FUEL/WATER SEPARATOR | |
| | 2 | FLUID, COMPRESSOR WEATHER-ALL (55 GALLON) | |
| | 1 | ELEMENT, SEPARATOR | |
| | 2 | FILTER, ENGINE COOLANT CUMMINS QSX15 | |
| SERVICE KIT, ANNUAL (DRY) | 8 | ELEMENT, AIR FILTER (PRIMARY) | 00717701-0185 |
| | 8 | ELEMENT, AIR FILTER (SECONDARY) | |
| | 4 | ELEMENT, OIL FILTER (COMPRESSOR) | |
| | 2 | ELEMENT, OIL FILTER (ENGINE) | |
| | 2 | ELEMENT, FUEL FILTER | |
| | 2 | ELEMENT, FUEL/WATER SEPARATOR | |
| | 1 | ELEMENT, SEPARATOR | |
| | 2 | FILTER, ENGINE COOLANT CUMMINS QSX15 | |
| SERVICE KIT, LINE (WET) | 4 | ELEMENT, AIR FILTER (PRIMARY) | 00717701-0186 |
| | 4 | ELEMENT, AIR FILTER (SECONDARY) | |
| | 2 | ELEMENT, OIL FILTER (COMPRESSOR) | |
| | 1 | ELEMENT, OIL FILTER (ENGINE) | |
| | 1 | ELEMENT, FUEL FILTER | |
| | 1 | ELEMENT, FUEL/WATER SEPARATOR | |
| | 1 | FLUID, COMPRESSOR WEATHER-ALL (55 GALLON) | |
| | 1 | FILTER, ENGINE COOLANT CUMMINS QSX15 | |

6 TROUBLESHOOTING

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6.1 INTRODUCTION

This section contains instructions for troubleshooting the equipment following a malfunction. Each issue or problem is followed by a list of probable causes and suggested actions to be followed in order to eliminate the cause.

The actions listed should be performed in the order listed, although the order may be varied if the need is indicated by conditions under which the problem occurred. The action which can be performed in the least amount of time and with the removal or disassembly of the fewest parts should be performed first.

6.2 SHUTDOWN

COMPRESSOR DISCHARGE TEMPERATURE

| POSSIBLE CAUSE | ACTION |
|---|----------------------------------|
| Compressor discharge temperature exceeds 265° F | Refer to 6.8 Cooling on page 41. |

FUEL

| POSSIBLE CAUSE | ACTION |
|---------------------------------------|---|
| Fuel tank empty | Fill fuel tank. Refer to 3.8 Low Fuel/Adding Fuel on page 13. |
| Water or contamination in fuel filter | Replace all fuel filters and drain the water from the fuel tank(s). |

DIESEL EXHAUST FLUID (DEF)

| POSSIBLE CAUSE | ACTION |
|----------------|---|
| DEF tank empty | Fill DEF tank with Diesel Exhaust Fluid meeting ISO 22241-1 standard. |

WIRING / HOSES

| POSSIBLE CAUSE | ACTION |
|---------------------------|---|
| Loose or broken wires | Repair/replace any loose or broken wires. |
| Broken hoses or oil lines | Repair/replace any broken hoses or oil lines. |

ENGINE

| POSSIBLE CAUSE | ACTION |
|---|--|
| Check engine faults | If fault is present, fix problem related to fault. |
| Engine coolant temperature too high/low | Check engine coolant level; add as needed. Clean the coolers. Check fan belt tension; adjust or replace as needed. Refer to engine manufacturer's manual. |
| Engine oil pressure low | Check engine oil; add as needed. Verify engine oil pressure exceeds engine manufacturer's spec with the engine running. |

If none of the above caused the shutdown, restart the engine and observe the engine oil pressure, engine water temperature, compressor discharge temperature and pressure gauges. Refer to the *Wiring Diagram in the Parts & Specifications manual* and information on the protection circuits for shutdown conditions. If it is found that low engine oil pressure or high engine water temperature is causing the shutdown, refer to the engine manufacturer's manual.

6.3

ENGINE

ENGINE FAULT

POSSIBLE CAUSE

Engine parameter out of range

ACTION

Refer to the Diagnostic Trouble Code Guide located in the engine manufacturer's manual.

Some warning faults may cause the engine to go into derate mode. Derate reduces the speed of the engine substantially.

6.4

CONTROL SYSTEM

UNIT WILL NOT LOAD

POSSIBLE CAUSE

Fuel level below 3%

ACTION

Add fuel.

Discharge temperature high

Refer to 6.8 *Cooling on page 41*.

Discharge temperature sensor below 100°F

Verify oil temperature over 100°F with infrared temperature sensor.

Sensor may be unplugged or faulty.

Load/Unload normally closed solenoid faulty

Inspect, test, and replace as needed.

Load/Unload relay is faulty

Inspect, test, and replace as needed.

Debris in control line

Inspect, and remove debris.

Dry side transducer reading below 20 psi

Verify machine is making pressure.

Transducer unplugged or faulty.

Inlet stuck in closed position

Inspect inlet actuator for problems.

UNIT WILL NOT UNLOAD

POSSIBLE CAUSE

Load/Unload normally closed solenoid stuck open or faulty

ACTION

Inspect, test and replace as needed.

Load/Unload relay is faulty

Inspect, test and replace as needed.

Inlet stuck in open position

Inspect inlet actuator for problems.

Check orifices for plugging; clean if necessary

UNIT AUTOMATICALLY UNLOADS

POSSIBLE CAUSE

Discharge temperature high

ACTION

Refer to 6.8 *Cooling on page 41*.

Fuel level low (less than 3%)

Add fuel.

Solenoid failure; loss of power to Load/Unload solenoid

Check voltage and connections. Fix and replace as needed.

ENGINE SPEED WILL NOT INCREASE

POSSIBLE CAUSE

Engine in Derate mode due to engine warning

ACTION

Engine fault must be fixed.

Bleed orifice in control system removed

Verify no control systems bleeds have fallen out.

ENGINE SPEED WILL NOT ACCELERATE OR MAINTAIN FULL LOAD SPEED

POSSIBLE CAUSE

ACTION

Compressor discharge pressure too high

Adjust the pressure to the maximum operating pressure for the machine.

Operating above maximum altitude rating for engine

Refer to engine manufacturer's recommendation for maximum altitude.

Engine problem

Consult an authorized engine repair facility.

OIL COMING OUT OF BLEED ORIFICES

POSSIBLE CAUSE

ACTION

Scavenger line plugged

Inspect and clean orifices in scavenge sight glass.

Oil system contaminated

Drain, flush system and replace oil and filters.

Air/oil separator faulty

Replace air/oil separator.

Oil level in sump tank overfilled

Drain as needed to $\frac{1}{2}$ to $\frac{2}{3}$ in sight glass.

Low operating PSI

Increase operating PSI regulator.

Incorrect operating temperature

Inspect/replace thermostat.

REGULATOR WILL NOT ADJUST +/-

POSSIBLE CAUSE

ACTION

Unit in UNLOAD status

Load compressor.

TANK OVERPRESSURE

POSSIBLE CAUSE

ACTION

Bleed orifices in control system are plugged

Remove and clean orifices.

Inlet valve stuck open

Inspect inlet actuator for problems.

Inlet valve base leaking at O-ring

Remove inlet and replace O-ring.

UNIT WON'T BUILD AIR

POSSIBLE CAUSE

ACTION

Coupling faulty

Repair or replace coupling.

6.5

AIR END

COMPRESSOR DISCHARGE TEMPERATURE FAULT

POSSIBLE CAUSE

ACTION

Oil level low

Check oil level. Add oil if needed.

Oil cooler dirty

Clean oil cooler.

Oil filter dirty/plugged

Replace oil filter.

Fan belt slipping

Check fan belt for proper tension.

Fresh air insufficient

Must have 10 feet clearance in all directions around the compressor unit.

False warning caused by faulty temperature sensor

Verify correct temperature readings.

6.6

FUEL LEVEL

LOW FUEL WARNING

| POSSIBLE CAUSE | ACTION |
|--|---|
| Fuel level is 10% capacity or less | Fill unit with fuel. Refer to 3.8 <i>Low Fuel/Adding Fuel</i> on page 13. |
| False warning caused by faulty fuel level sensor | Verify machine is topped off with diesel fuel. |

6.7

DIESEL EXHAUST FLUID (DEF)

LOW DEF WARNING

| POSSIBLE CAUSE | ACTION |
|--|--|
| DEF level is at 18% capacity (yellow warning icon) | No action needed. Monitor levels. |
| DEF level is between 11%– 5% capacity (red warning icon) | Fill DEF tank with Diesel Exhaust Fluid meeting ISO 22241-1 standard. Refer to 3.9 <i>Low DEF/Adding DEF</i> on page 13. |
| DEF level is between 5%– 0% capacity (flashing red warning icon) | Fill DEF tank with Diesel Exhaust Fluid meeting ISO 22241-1 standard. Refer to 3.9 <i>Low DEF/Adding DEF</i> on page 13. |

6.8

COOLING

COMPRESSOR OIL HIGH TEMPERATURE

| POSSIBLE CAUSE | ACTION |
|--------------------------|---------------------------------|
| Oil cooler dirty | Clean oil cooler. |
| Oil level low | Add appropriate compressor oil. |
| Thermostat failure | Replace thermostat. |
| Fan belt broken/slipping | Replace fan belt. |

ENGINE COOLANT HIGH TEMPERATURE

| POSSIBLE CAUSE | ACTION |
|--------------------------|---|
| Coolant level low | Add appropriate engine coolant. |
| Radiator dirty | Clean radiator. |
| Thermostat failure | Replace thermostat. |
| Water pump faulty | Inspect and replace water pump if needed. |
| Fan belt broken/slipping | Replace fan belt. |

COMPRESSOR OIL LEVEL IS DECREASING EXCESSIVELY

| POSSIBLE CAUSE | ACTION |
|-------------------------------|--|
| Oil line leaking | Repair or replace leaking lines and retest. |
| Oil cooler leaking | Repair or replace leaking oil cooler and retest. |
| Compressor shaft seal leaking | Replace the compressor shaft seal and retest. |
| Oil in service line | See 6.10 <i>Discharge System</i> on page 42. |
| Fan belt broken/slipping | Replace fan belt. |

6.9

FILTRATION

SERVICE AIR FILTER WARNING

| POSSIBLE CAUSE | ACTION |
|--|----------------------|
| 70 mBar vacuum pressure switch has been closed | Replace air filters. |

SERVICE OIL FILTER WARNING

| POSSIBLE CAUSE | ACTION |
|---|----------------------|
| 15 psi oil pressure differential switch has been closed | Replace oil filters. |

6.10

DISCHARGE SYSTEM

SERVICE AIR/OIL SEPARATOR WARNING

| POSSIBLE CAUSE | ACTION |
|---|--|
| Pressure differential between the wet and dry side has exceeded 10 psi for 600 seconds (10 minutes) | Verify wet and dry side pressures by referring to the Air/Oil Separator page in the Compressor Diagnostics menu on the controller. Replace air/oil separator if needed. |
| False warning caused by faulty transducers | Inspect transducers and replace if needed. |

SEPARATOR PLUGGING

| POSSIBLE CAUSE | ACTION |
|---|---|
| Dirt and dust blockage in air inlet filters | Replace the air inlet filters. |
| Check compressor oil filter element | Replace the compressor oil and filter if necessary. |

If the separator element has to be replaced frequently because it is plugging up, it is an indication that foreign material may be entering the compressor inlet or the compressor oil is breaking down. Compressor oil can break down prematurely for a number of reasons:

- » Extreme operating temperature
- » Failure to drain condensate from oil sump
- » Using the incorrect type of oil
- » Mixing different types of oil
- » Prolonged operation at extreme ambient temperatures
- » Foreign material, gases or vapors entering compressor inlet

OIL IN DISCHARGE LINE

| POSSIBLE CAUSE | ACTION |
|---------------------------------------|--|
| Oil return line plugged or restricted | Clean oil return line. |
| Separator element plugged or damaged | Inspect separator element; replace if necessary. |
| Discharge pressure below 90 psi | Raise system pressure above 90 psi. |

COMPRESSOR OIL LEAKING IN CONTROL LINES/ORIFICES

| POSSIBLE CAUSE | ACTION |
|--|--|
| Compressor oil level in sump tank too full | Check and adjust compressor oil as needed. |
| Oil return line (scavenger tube) plugged or restricted | Remove oil return line and clean. |
| Separator element plugged or damaged | Replace separator element and change compressor oil. |
| High compressor discharge temperature | <p>Check compressor oil level; add oil as needed.</p> <p>Clean oil cooler internally and externally.</p> <p>Check fan belt; adjust or replace as needed.</p> <p>Check thermal bypass valve (compressor oil thermostat).</p> <p>Change compressor oil and oil filter element.</p> |
| Discharge pressure below 90 psi | <p>Air demand may be too great. Add compressors or decrease demand.</p> <p>Adjust the discharge pressure above 90 psi.</p> <p>Check minimum pressure valve operation; rebuild/replace as needed.</p> |

DISCHARGE PRESSURE TOO LOW

| POSSIBLE CAUSE | ACTION |
|--|--|
| Too much air demand | Add additional compressor to handle the demand or decrease the air demand. |
| Service valve open | Close service valve and retest. |
| Service line leaks | Repair any leaks found and retest. |
| Compressor inlet air filter restricted | Replace the air filter and retest. |

DISCHARGE PRESSURE TOO HIGH OR RELIEF VALVE BLOWS

| POSSIBLE CAUSE | ACTION |
|----------------------------------|--|
| Inlet valve not closing properly | <p>Check the white sealing ring for poppet valve to ensure it is intact and not damaged.</p> <p>Check actuator to ensure it isn't bound up.</p> |
| Ice or debris in control lines | <p>Clean debris from control lines.</p> <p>Thaw out control lines to remove ice buildup. Direct lines so there is a low point to drain any condensate.</p> <p>Consult Factory for optional Heater Kit.</p> |
| Pressure relief valve faulty | Replace faulty pressure relief valve. |
| Oil separator plugged | Replace oil separator. |
| Inlet valve leaks at base | Replace O-ring. |
| Compressor shaft seal leaking | Replace compressor shaft seal and retest. |

PRESSURE DOES NOT BLOW DOWN AFTER SHUTDOWN

| POSSIBLE CAUSE | ACTION |
|---|---|
| Automatic blowdown valve faulty | Check operation of automatic blowdown valve; replace if necessary. |
| Air line from inlet valve or sump to blowdown valve may be restricted | <p>Verify the pilot signal is reaching the automatic blowdown valve.</p> <p>Verify the blowdown valve is plumbed correctly.</p> |

6.11 OPTION: AFTERCOOLER

SERVICE AFTERCOOLER FILTER WARNING

| POSSIBLE CAUSE | ACTION |
|---|--|
| Pressure differential between the prefilter and post filter has exceeded 20 psi | Replace aftercooler filters. |
| False warning caused by faulty transducers | Inspect transducers and replace if needed. |

6.12 OPTION: CONDENSATE KIT

CONDENSATE IN DISCHARGE AIR

| POSSIBLE CAUSE | ACTION |
|-------------------------------------|--|
| Water contaminating aftercooler air | Clean Y-Strainer and orifices in drains. |

6.13 OPTION: HEATER CONTROL KIT

HEATER PADS ARE COLD

| POSSIBLE CAUSE | ACTION |
|----------------------|-----------------|
| Rotary switch is OFF | Turn switch ON. |
| Relay is faulty | Replace relay. |

6.14 OPTION: REMOTE FUEL

LOW FUEL RAIL PRESSURE FAULT

| POSSIBLE CAUSE | ACTION |
|--|--|
| No fuel in remote fuel tank | Fill remote fuel tank with fuel. |
| Selector valves are in the incorrect position, and drawing off main tank | Verify correct position of remote fuel valves. |

6.15 OPTION: OIL REGULATOR

ENGINE OVER-FILLED

| POSSIBLE CAUSE | ACTION |
|---|---|
| Oil regulator mount adjustment too high | Adjust oil regulator mount. Refer to <i>Oil Level Regulator Kit in the Parts & Specifications manual.</i> |
| Oil regulator float stuck | Reposition oil regulator float. |

ENGINE UNDER-FILLED

| POSSIBLE CAUSE | ACTION |
|--|---|
| Oil reservoir tank empty | Fill oil reservoir tank. |
| Oil regulator mount adjustment too low | Adjust oil regulator mount. Refer to <i>Oil Level Regulator Kit in the Parts & Specifications manual.</i> |

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