PERMADUR INDUSTRIES, INC.
MAGNETICS DIVISION LOADPOSITIONER DIVISION
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Instruction Manual

Series 408
Vacuum Lifter w/1500 Power Pac, 25' Load Beam, 4ea. 7' Crossarms

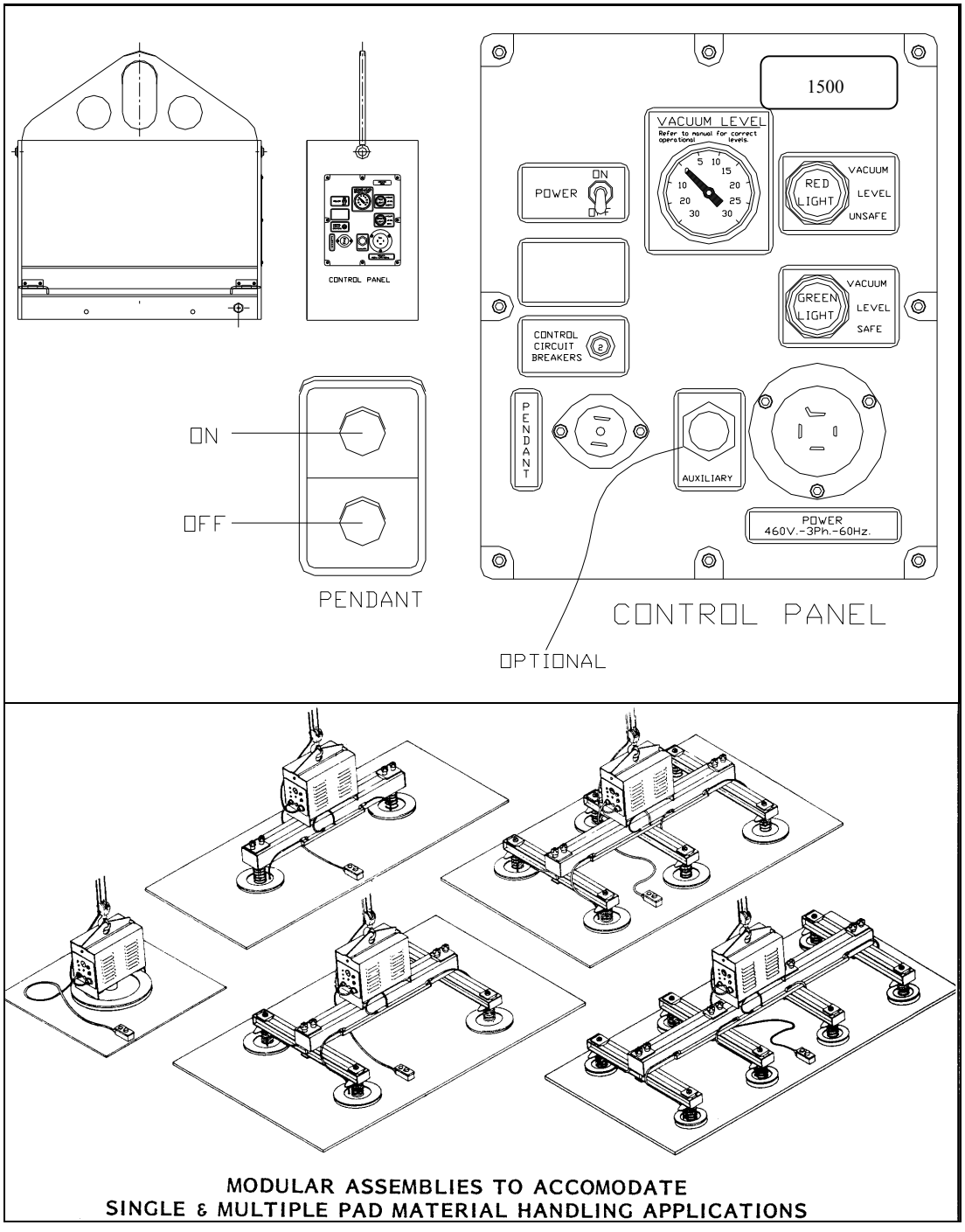
Power Supply: 460/3/60 VAC
Rated System Capacity: 12500 lbs.
Rated Capacity of (8ea.)VPN-24-30 Pads: 1565 lbs each
System Weight: 3300lbs.

Serial Number 063014VAC/14-20740

ASME BTH-1
Design Category B
Service Class 2

July 2014

1500 Power Pac *with* Non-Lubricating Pump



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BELOW-THE-HOOK VACUUM LIFTING UNITS
OPERATOR CHECK LIST

ALWAYS – INSPECT ALL BELOW THE HOOK LIFTING UNITS PRIOR TO ATTEMPTED OPERATION! (SEE OPERATIONS AND MAINTENANCE MANUAL)

ALWAYS – ASCERTAIN THAT THE COMBINED WEIGHT OF THE LIFTER AND THE LOAD DO NOT EXCEED THE HOIST AND/OR CRANE CAPACITY!

ALWAYS – ASCERTAIN LOAD TO BE LIFTED IS WITHIN DESIGN LIMITS!

ALWAYS – CHECK LIFTER ADJUSTMENTS FOR CORRECT SETTINGS!

ALWAYS – PLACE LIFTER GENTLY ON LOAD FROM A TRUE VERTICAL POSITION!

ALWAYS – CENTER LIFTER ON LOAD OR ON THE CENTER OF GRAVITY TO INSURE A BALANCED LIFT!

ALWAYS – ASCERTAIN THERE IS NO INTERFERENCE FROM SURROUNDING MATERIALS WHICH WILL AFFECT A FREE AND CLEAR LIFT!

ALWAYS – CHECK FOR LOOSE ITEMS, SUCH AS TOOLS, ETC. WHICH MAY FALL OFF DURING THE LIFTING OPERATION!

ALWAYS – IMMEDIATELY CALL AREA SUPERVISOR FOR ANY SUSPECTED DAMAGE OR ALTERED UNIT PERFORMANCE PRIOR TO CONTINUED OPERATIONS!

ALWAYS – IMMEDIATELY REPORT UNSAFE CONDITIONS, DEFECTS OR BROKEN ITEMS TO AREA SUPERVISOR!

ALWAYS – WARN AREA PERSONNEL THAT THE LIFTER IS ABOUT TO PERFORM A LIFTING FUNCTION! ADVISE TO KEEP CLEAR!

ALWAYS - ASK YOUR AREA SUPERVISOR IF THERE ARE ANY QUESTIONS REGARDING ANY LIFTING APPLICATION - NEVER ATTEMPT OPERATION IN AN UNCERTAIN MANNER!

READ & UNDERSTAND THE OPERATIONS MANUAL

GUIDELINES FOR OPERATION

NEVER – ALLOW LIFTER TO BE USED FOR TRANSPORTATION OR LIFTING OF PERSONNEL!

NEVER – OPERATE LIFTER IN EXCESS OF RATED LOAD BOTH IN CAPACITY AND/OR SIZE RESTRICTIONS!

NEVER – DAMAGE OR REMOVE TAGS, LABELS OR INFORMATION PLATES FROM LIFTER UNIT!

NEVER – LEAVE UNATTENDED LOAD SUSPENDED FOR ANY REASON! PLACE LOAD IN DESIGNATED SET DOWN AREA AND PROPERLY STORE LIFTER PRIOR TO LEAVING AREA!

NEVER – ALLOW LIFTER TO BE USED BY UNTRAINED PERSONNEL!

NEVER – TREAT LIFTER IN AN ABUSIVE MANNER! DO NOT SKID, DRAG OR SLIDE THE LIFTER ON ANY SURFACE!

NEVER – ATTEMPT LIFTING LOAD WITH OUT CHECKING ALL SUSPENSION AND LOAD SUPPORTIVE HARDWARE FOR CORRECT INSTALLATION!

NEVER – USE LIFTER FOR ANY APPLICATION FOR WHICH IT HAS NOT BEEN DESIGNED!

NEVER – ATTEMPT LIFTING AN UNBALANCED LOAD!

NEVER – TRANSPORT LOADS OVER PERSONNEL!

NEVER – ATTEMPT LIFTING WITH AN OBVIOUSLY “ALTERED OR MODIFIED” LIFTING UNIT

NEVER – ATTEMPT LIFTING FUNCTIONS AT ANY ANGLE OTHER THAN VERTICAL! DO NOT SKID, DRAG, OR SLIDE LIFTER ON ANY SURFACE!

NEVER – ALLOW DAMAGED OR BROKEN LIFTER TO BE USED IN ANY APPLICATION! SECURE UNIT IN AN “OUT OF SERVICE” CONDITION AND REPORT DAMAGE IMMEDIATELY TO AREA SUPERVISOR!

READ & UNDERSTAND THE OPERATIONS MANUAL!

CHECKLIST FOR SAFE & CAREFUL OPERATION

Use Lifter only after its functions and operations are fully understood
(Review manufacturer's operating instructions carefully)

Do Obey all stop signals – Regardless of who gives them	DON'T Ride load or lifter, unless lifter has been designated for personnel
DO Be sure load is free to lift slings.	DON'T Lift with worn, twisted, knotted, or kinked rigging.
DO Be sure lifter is full engaged with load and properly seated in lifting hook	DON'T Use lifter as secondary crane hook or load beam
DO Use lifter to handle only loads it was specified to handle	DON'T Use lifter other than specified applications
DO Lift loads for proper balance	DON'T Allow improper tipping of load
DO Set load down gently	DON'T Bang load down
DO Be sure combined weight of lifter and load does NOT exceed the Hoist capacity	DON'T Deface capacity, weight or any safety or instruction marking on lifter
DO Operate within all equipment capacity	DON'T Overload lifter or hoist or crane
DO Be sure nothing can fall from load during lifting cycle	DON'T Pick up a load having loose parts that could fall off
DO Start lift gently	DON'T Jerk or abuse equipment
DO Operate within specified minimum and maximum load size ranges	DON'T Pick up loads larger or smaller than specified dimension capabilities
DO Pick up all loads with hoist line vertical	DON'T Lift load with hoist line at an angle
DO Carry load over specified areas ONLY	DON'T Carry loads over personnel
DO Keep lifter clean & operational at all times	DON'T Store lifter until it is clean & ready for reuse
DO Store lifters in designated places for safety & protection	DON'T Leave lifter suspended from crane hook with or without load – PARK IT
DO Inspect for wear, damages or missing parts	DON'T Neglect "LITTLE" damages
DO Mark lifter "OUT OF SERVICE" and report when any damage is noticed	DON'T Remove an "OUT OF SERVICE" sign without supervisor's approval
DO Keep full records on each lifter as to: INSTRUCTIONS, INSPECTIONS & SERVICE MODIFICATIONS	DON'T Make alterations or modifications to lifter without manufacturer's written approval
DO Train each new operator in the proper use	DON'T Only train the first operator and assume that he will train the next one

BELOW THE HOOK OPERATIONS
PERSONNEL – QUALIFICATIONS

VACUUM LIFTING DEVICES

If, in the performance of daily job related activities, a person is required to operate vacuum lifting equipment such operation shall be performed by trained and approved personnel who have the required qualifications listed below.

OPERATOR QUALIFICATIONS

Qualifications of operators for below-the-hook lifters in general and vacuum lifting units in specific shall include proper usage instruction by a designated person with on the job proficiency testing prior to operational release to the proposed operator.

Proper qualifications procedures and capabilities need to address, but are not limited to, the following areas.

A. Routine pre-operation inspection of the below-the-hook vacuum lifting unit.

B. The purpose, intent, and operation of all indicators, lights, gauges, etc. located on the vacuum lifting unit.

C. Miscellaneous adjustments of various lifters components to accommodate various sizes and types of loads for which the lifter has been designated.

D. Record keeping requirements, as required by state and federal authorities.

E. Emphasis on load related technique, i.e. placement of lifter on load, special vacuum pad adjustment(s), centering the lifter on the load or center of gravity to perform balanced lifts, relationships of thin load materials as well as size and weight considerations.

F. Never exceed lifter capacity limitations for any reason what so ever!

G. The proper engagement and usage of all attachments, adapters, or equipment modifications for special application requirements.

INTRODUCTION

Your Permadur 515 Series Vacuum Lifter has been carefully designed to provide dependable service in a demanding application. The operating instructions included in this manual will help you obtain maximum performance and safety from your unit. Reading and following the directions in the maintenance section will insure your unit of a long and productive life.

RECEIVING INSPECTION AND TESTING

Your Permadur 515 Series Lifter should be checked on arrival for shipping damage. REPORT ANY DAMAGE IMMEDIATELY TO THE CARRIER'S AGENT.

Your unit may have been disassembled for shipping. It should be reassembled and checked for loose clamps, vacuums hoses, nuts and bolts.

Prior to putting your Lifter into routine operation, read the operating instructions and perform the "PROOF LOAD TEST" as described in this manual.

STORAGE

DO NOT store your Lifter for any appreciable length of time by allowing it to rest on the vacuum pads. To do so will shorten the life of the seal rings.

OPERATING PRINCIPLES

The Permadur 515 Series Lifter is attached to the surface of the load by creating a partial vacuum (negative pressure) over the area covered by the vacuum pads. Actually, it is the atmospheric pressure on the outside of the pad and material, which holds the object with predictable certainty to the pad. The vacuum circuit is used to create and control the vacuum. The electrical control circuit is used to control the vacuum lifter.

When the POWER switches on the control panel and the control pendant are in the ON position, the four way, direct solenoid operated vacuum control valve is de-energized, allowing the vacuum pump to evacuate air from the pads through the filter, the control valve and the muffler. The check valve prevents air from reentering the pads should the vacuum pump stop, as in case of a power failure.

At the same time that air is evacuated from the pads, it is also drawn from the vacuum reserve tank through a second check valve. The vacuum reserve solenoid valve is held in the closed position as long as electrical power is supplied to the unit. If the power is interrupted, however, the solenoid is de-energized connecting the reserve tank directly to the pads. The vacuum in the pads is thereby maintained for a period of several minutes until power is restored or the load is safely lowered.

To release the vacuum pads from the load, once it has been positioned, the pendant control switch or the panel switch is thrown to the “Vacuum Off” position. This energizes the 4-way vacuum control valve solenoid. The valve then connects the pad vacuum line to the exhaust side of the vacuum pump, and the muffler to the intake (vacuum) side of the pump. This process forces air to the vacuum pads releasing the vacuum and facilitating their removal from the load.

OPERATING INSTRUCTIONS

1. Be sure power supply to be used is the same as shown on Lifter. Any power cords used should be of the grounding type to insure operator safety, and should be of heavy enough gauge to carry the amperes drawn by the Lifter without introducing excessive voltage drop.

2. If the vacuum unit is extremely cold, bring it to room temperature before attempting to start it.

3. Turn the unit on by moving the POWER switch on the control panel to the ON position. The red indicator lamp should light. If the vacuum pump motor fails to start, turn the POWER switch OFF and refer to the troubleshooting section of this manual.

4. Position the pads to support the load evenly, then lower the unit onto the material to be lifted centering the lifter on the load.

5. If your unit is equipped with hand-operated shutoff valves at each pad, be certain to open enough of them to provide safe lifting capacity for the intended load.
   NOTE: If all the valves are closed, the red and green safety lights will give a false indication.

6. Set POWER ON/OFF switch on the control panel and the PENDANT ON/OFF switch to the ON position, attaching the lifter to the load.

7. The vacuum gauge on the control panel will now indicate the system vacuum level in inches of mercury (Hg.). The gauge reading will begin to rise. When it reaches 21 Hg inches, the red lamp will go off and the green lamp will light. As soon as the green light has come on, the load may be lifted and moved. The gauge reading should continue to increase to 25 Hg inches or more.

   CAUTION: DO NOT attempt to lift the load if the green lamp does not come on, even if the vacuum gauge indicates that an adequate level has been reached. Because of their respective positions in the vacuum system, the lights are a more reliable indication of sufficient vacuum than is the gauge.

8. When the load has been lowered into its new position, push the Vacuum Release button on the control pendant. The vacuum will be released and the red lamp will light, indicating the lifter is ready to be raised and repositioned on the next load. Raise lifter slowly until all pads clear the load.

   NOTE: The POWER ON/OFF switch on the control panel should be left in the ON position. It is provided primarily for maintenance purposes. In the POWER OFF position, it overrides the control pendant switches and holds the unit in the POWER OFF condition (no vacuum).

EQUIPMENT DESCRIPTION

PERMADUR 515 SERIES LIFTER

This unit supplies and controls the vacuum used to attach the lifting pads to the load. It houses a vacuum pump, vacuum reserve tank, direct solenoid-operated vacuum control valve, vacuum reserve valve, check valves, muffler, and the main control panel with its indicators and switches.

The vacuum reserve system is a safety feature that prevents sudden loss of vacuum in the event of a power or equipment failure.

Mounted on the control panel are the main POWER ON/OFF switch, red and green vacuum level indicator lights, and a combination vacuum and pressure gauge to aid in checking equipment performance, and one circuit breaker.

Access to the vacuum pump, filter, muffler, valves, vacuum switch, etc., chamber is provided by two full length covers, one on each side, which hinge at the top and are held down at the bottom by spring loaded latch-pins. To remove the cover, pull latch-pins at lower corners, pull, lift, pullout until latch-pins clear frame, and lift the cover upwards.

To open the control box, remove six screws holding the control panel on and remove panel being careful not to tangle the wiring harness. Four flat head machine screws hold the control box in place while the cover is loose. POWER SHOULD BE DISCONNECTED BEFORE REMOVING THE CONTROL PANEL. Caution should be used when laying loose control panel aside to insure that none of the panel-mounted components are damaged.

CONTROL PENDANT

The control pendant houses a push-button switch that parallels the panel-mounted vacuum switch.

VACUUM LIFTING PADS

When more than one pad is used, they are connected in an array by means of a load beam and crossarms.

In multiple pad configurations, vacuum lines and manifolds connect all the pads to the unit. Hand-operated shut off valves are used when it is necessary to disconnect certain pads from the vacuum circuit. These valves must be set as described in STEP 5 under Operating Instructions.

When using a multi-pad arrangement, pads should be equally spaced on material being lifted to insure that each pad will carry its share of the load. THIS IS AN ABSOLUTE MUST WHEN USING PADS AT FULL WORKING LOAD LIMIT.

LOAD BEAM

The load beam is fabricated from structural tubing and is connected to the Permadur 515 Series Lifter by two high shear strength bolts that are retained by standard nuts, hand tighten. These bolts allow fast assembly or disassembly of the Permadur 515 SERIES LIFTER. BE SURE NUTS ARE IN PLACE AND HAND TIGHTENED BEFORE MAKING ANY LIFT.

EQUIPMENT DESCRIPTION

LOAD BEAM

One of the members of the load beam is normally utilized as additional vacuum reserve and increases the power-off holding time of a lifter. DO NOT drill or puncture these members in any way unless properly tested for leakage before being put into service.

Crossarms or pads can be adjusted along the beam length by loosening the bar knobs which clamp the crossarm or pad in place and sliding it to the desired position. When a crossarm or pad is in position retighten the bar knobs.

CROSSARMS

Crossarms are constructed from structural steel members and are fabricated in varying lengths to fit the application requirements.

Crossarms may or may not be equipped with a vacuum manifold. Normally, a manifold will be supplied when there are more than 3 pads per crossarm or when crossarms are over 6 feet long.

Pads can be adjusted along a crossarm by loosening the hand lock that clamps the sliding pad mount in place and by sliding it to the desired position. When pad is in position, retighten the hand lock.

COMPONENT DESCRIPTION

The following paragraphs provide data on the components and sub-assemblies that make up your Permadur 515 Series Lifter. Instructions for performing adjustments and repairs are included.

1. MAIN VACUUM SYSTEM

A. VACUUM PUMP: The vacuum pump incorporated in your Permadur 515 Series Lifter is a rotary vane, oil-less type. It is designed for continuous duty under 26" Hg. Vacuum operating temperatures up to 230 degrees F. are normal. **NEVER LUBRICATE AN OIL-LESS VACUUM PUMP**. The carbon vanes and sealed motor bearings require no oil.
The pump vanes are made of hard carbon and are precision ground. They should last 5,000 to 10,000 hours, depending upon the vacuum level at which the pump is run. Routine checking and replacing of filter and muffler as wall as periodic flushing of the pump chamber will help prolong vane life. For flushing instructions, refer to periodic maintenance section of this manual.

The four vanes can readily be replaced by removing the end plate shroud and exchanging new for worn, broken vanes. Use compressed air to clean out the pump chamber prior to inserting new vanes, especially if one of the old vanes has broken.

Sometimes when a vane breaks, a piece will wedge between the top of the rotor and the body opening. The clearance, which should be .002", may be checked with a feeler gauge. The rotor should be turned while the clearance is being checked so that all points of the circumference will clear. To reduce the top clearance to .002", tap VERY LIGHTLY on the top of the body with a miniature hammer.

NEVER remove rotor. *DO NOT* loosen bolts on body or mounting brackets as this will alter the preset clearance between the rotor & these parts. Under most situations, rotor & tolerance ring shouldn't be replaced in the field.

WARNING: When servicing, all power to the motor must be de-energized and disconnected. All rotating components must be at a standstill.

DANGERS: To prevent explosive hazard, DO NOT pump combustible liquids or vapors with this pump.

B. FOUR WAY CONTROL VALVE: The vacuum to the pads is controlled by a four-way, two-position, spring offset, direct acting single solenoid, sub-base mounted, valve connected as follows.

Port P	- To Filter Outlet Port/Reserve Valve
Port B	- To Vacuum Pump Inlet/Reserve Tank
Port EA	- To Bronze Muffler
Port A	- To Pump Exhaust Filter/Muffler Outlet Port
Port EB	- To Bronze Muffler

COMPONENT DESCRIPTION

B. FOUR WAY CONTROL VALVE (con't.):
As a safety feature, the valve is in the "Vacuum On" position when the solenoid is de-energized. The valve is energized by throwing either the panel switch or the pendant

switch to the "Vacuum Off" position. The exhaust air of the vacuum pump is then forced into the line to the pads supplying the air pressure required for a quick release.

Replacement of the valve DOES require disconnection of piping and wiring.

A non-locking, manual operator is standard to aid in machine set-up and testing. The operator is recessed to prevent accidental operation.

This valve has its own matched set spool and sleeve, precision machined to millionths of an inch, eliminating always-troublesome dynamic O-Ring seals.

C. PRESSURE RELIEF VALVE: This valve is located on the exhaust side of the vacuum pump, between the pump and the exhaust filter. Its purpose is to prevent pressure buildup at the pump. This condition can occur during the "Vacuum Off" cycle if all the pad valves are closed or if the filter or vacuum line is clogged. This valve should NOT be set to release at a pressure greater than 10 PSI.

D. VACUUM RELIEF VALVE: This valve is located on the inlet side of the vacuum pump, between the pump and the four-way control valve. Its purpose is to limit vacuum buildup at pump to 26" Hg. This is the maximum continuous rating of the vacuum pump.

E. CHECK VALVE: One of the check valves used in the vacuum lifter is located between the vacuum pump intake port and the four-way valve. It is installed so as to permit air to be pumped from the vacuum system, but to prevent air from entering the system when the vacuum pump is not running. Unit is equipped with a viton seal that has an operating temperature range of from –20 degrees F. to 350 degrees F. Maximum cracking pressure is 1 PSI.

F. FILTER AND MUFFLER: The vacuum filter is located in the vacuum line between the pads and the four-way control valve. It prevents dirt and foreign matter from entering the vacuum pump and valves.

The exhaust filter serves two purposes. It not only acts as a muffler but also filters out the contaminants of the pump exhaust before exhaust passes through the control valve. CAUTION: This filter may reach a temperature of 230 degrees F.

The muffler serves two purposes. During the "Vacuum On" cycle, it reduces the noise of the vacuum pump exhaust. In the "Vacuum Off" condition, it filters the release air entering the pump.

It is very important to keep both the filter and the muffler in good condition to insure maximum system efficiency and long pump life. Refer to periodic maintenance section of this manual for maintenance of these components. Just twist off the old element and twist on the new. No bolts to remove. No time-consuming cleaning operations. Disposable filter element pays for itself with lower maintenance and downtime costs. The 3 PSI isolated by-pass valve in the cast aluminum housing head prevents more than a 6" Hg. vacuum drop in event filter clogs.

COMPONENT DESCRIPTION

G. THREE-WAY HAND-OPERATED SHUT-OFF VALVES: Hand valves, located on or very near each vacuum pad, are provided when it is necessary to shut off certain pads from the circuit. In most cases, the valve is three-way type so that the pad can be connected to either the vacuum system or an open port. This feature provides an escape for the slight vacuum formed in the pad when it lowers onto the material and thereby prevents the unused pads from sticking to the load during the release cycle.

Operation is performed by simply sliding the external sleeve to the "On" position. The exhaust ports are closed and the vacuum line opens to the vacuum pad. Sliding the sleeve in the opposite direction opens the exhaust ports venting the vacuum pad; and at the same time, shuts off the vacuum line. A patented body detent holds sleeve in the "On" position.

2. VACUUM RESERVE SYSTEM:

A. RESERVE TANK: A vacuum reserve system is provided to insure a source of vacuum to the pads for a period of time after a power or pump failure. The reserve tank is evacuated to full vacuum each time a load is lifted.

B. CHECK VALVE: The second check valve (same as above) in the Permadur 515 Series Lifter is connected between the vacuum reserve tank and side port B of the four-way control valve is such a way that air can be evacuated from the tank during the "Vacuum On" cycle, but cannot re-enter the tank when the lines are pressurized during the "Vacuum Off" cycle. The reserve tank, therefore, does not have to be completely evacuated each time a load is lifted, cutting down the length of time needed to attach the pad to the load.

C. VACUUM RESERVE VALVE: The check valve is paralleled by a solenoid actuated, spring effect, normally open, two-way valve which is connected as follows:

Port marked "2"	- To tank
Port marked "3"	- To "P" Port of 4-Way Control Valve
Port Marked "1"	- Plugged

When energized, the valve is held in the closed position. The solenoid is fed directly from the vacuum pump power line, so that in case electrical power is lost to the vacuum pump motor the valve will open, connecting the vacuum reserve tank to the pad vacuum circuit.

3. CONTROL AND MONITORING SYSTEM

A. SWITCHES:
One toggle switch is included on the control panel. The toggle switch turns the Permadur 515 Series ON and OFF.

The second, a pushbutton switch on the control PENDANT, operates of the four-way control valve. The control panel POWER ON/OFF switch should be left in the ON position; otherwise, it will override the PENDANT switch.

COMPONENT DESCRIPTION

B. CIRCUIT BREAKERS: One thermal circuit breaker is used and located on the control panel. Circuit breaker No. 1 is rated at 2 amps; it protects the control circuit. The breaker has a recessed, reset button that cannot be manually pulled out to disconnect the circuit. The button has a red band around it for visible trip indication. To reset, push plunger in.

C. INDICATOR LIGHTS, VACUUM SWITCH AND VACUUM GAUGE: Both a vacuum gauge and a pair of indicator lights are provided to indicate the vacuum level. The vacuum gauge serves as a diagnostic instrument during testing and maintenance of the unit, and provides a means of checking vacuum level during power failure. It is recommended that a periodic inspection of the vacuum gauge be made with an accurate test gauge and that the vacuum gauge be replaced if off more than + 1" Hg. The red and green indicator lights are actuated by a vacuum switch connected to the pad side (inlet) of the vacuum line filter. When the vacuum level reaches 21" Hg, the vacuum switch disconnects the red from the power line and connects the green light to indicate the sufficient vacuum has developed for lifting.

The vacuum switch may be adjusted, if necessary, to adjust the vacuum level. Make adjustments by turning the adjustment screw (see page 24). To increase the inches of mercury, turn the adjustment screw clockwise. To decrease the inches of mercury, turn the adjustment screw counter clockwise.

Before adjusting the switch, replace the vacuum filter with a new filter. A partially clogged filter will cause the panel-mounted gauge to indicate a higher vacuum level than that at the vacuum switch. If adjusted under this condition, the switch will trip at a level too low for sufficient capacity to lift the load.

It is recommended that a periodic inspection of the vacuum switch be made with an accurate test gauge assembly, and that the vacuum switch be adjusted to compensate for any variables.

PERIODIC MAINTENANCE

Performing these few simple maintenance steps will prolong life of your Permadur 515 Series Lifter and will insure you of the greatest operating safety. It is recommended that this schedule be followed as closely as possible.

A. DAILY:

Perform filter and muffler check.
Perform proof load test.

B. WEEKLY:

Check seal rings, hoses, and fittings.
Check for loose bolts and nuts, as well as for structural damage.
Test vacuum gauge reading.
Test vacuum switch setting.
Lubricate pad slide valves with one drop of light oil on each side of slide valves and shift valve several times.
Lubricate load beams and accessories, if required.
Check vacuum four-way control valve spool (DO NOT LUBRICATE).

C. QUARTERLY:

Clean vacuum pump chamber by flushing. The Permadur 515 Series Lifter requires ***NO*** lubrication.
DO NOT ATTEMPT TO LUBRICATE THE MOTOR OR PUMP ASSEMBLY.
Check vacuum gauge for accuracy using an accurate test gauge assembly.
Check red and green indicator light operation level with an accurate test gauge assembly.

D. PERFORMING PROOF LOAD TEST:

The proof load test should be conducted daily to verify that the Permadur 515 Series Lifter safety features are operating properly. In effect, the test simulates an electrical power failure so that the performance of the vacuum reserve system can be checked.

1. Position your Permadur 515 Series Lifter over a sheet of nonporous material such as steel or aluminum.

2. Adjust the crossarms and the vacuum pads to properly support the load.

3. Lower the unit onto the material so that all pads make contact. If the pads are equipped with shutoff valves, they should all be set to the “vacuum on” position.

4. Set the POWER ON/OFF switch to the ON position..

5. Set both the POWER ON-Off switch on the control panel and the control pendant switch to the ON position.

6. Wait until the red lamp goes out and the green lamp lights, indicating that it is safe to lift the load. Note the reading of the vacuum gauge. It should stabilize at 25” Hg. or greater.

PERIODIC MAINTENANCE

D. PERFORMING PROOF LOAD TEST (cont'.):

7. Lift the vacuum unit and the material so that the load is between 1 and 2 inches above its rest position.

8. Simulate a power failure by pushing the POWER ON/OFF switch to the OFF position. Observe the vacuum gauge indication. If the reading drops more than 1" Hg. in two minutes, the system should be checked for leaks. Refer to the troubleshooting section of this manual for guidance in locating leaks.

E. PERFORM FILTER AND MUFFLER CHECK:

The filter and muffler check should be performed daily to verify that these units are not contaminated more than recommended for efficient operation. A clogged filter or muffler will impede the flow of air into the pump. The condition of these units can be checked by starting the vacuum pump with no material attached to the pads and all hand-valves open to the vacuum system and:

FILTER:

1. Set both the POWER ON/OFF switch on the control panel and the control pendant switch to the ON position

2. The vacuum gauge should read less than 4" Hg.

3. If the reading is higher, the filter unit should be replaced.

MUFFLER:

1. Switch filter and muffler spin-off units. The muffler unit is now where the filter unit was and vice versa.

Follow steps 1, 2, and 3 under "Filter" above.

F. FLUSHING VACUUM PUMP CHAMBER:

After a period of time, foreign material will collect in the pump chamber, since the filters cannot trap all impurities. Periodic flushing of the pump will remove most of the trapped material.

Flushing is accomplished by disconnecting the two hose stems that connect the two hoses from the vacuum pump to the four-way control valve. Run several teaspoons of solvent* into the intake hose while pump is operating. After all the solvent has passed through the pump, replace the hose stems to their proper location.

WARNING: DO NOT USE KEROSENE OR OTHER COMBUSTIBLE SOLVENTS TO FLUSH UNIT. USE ONLY GAST AH255B FLUSHING SOLVENT OR EQUIVALENT.

TRACING LEAKAGE

Troubleshooting is always easier if one has a good understanding of how the equipment is intended to operate. The operating principles, piping, and wiring diagrams located in this manual should be reviewed before repairing and servicing this unit.

A. TESTING FOR LEAKS:

Should the unit fail the proof load test, there is a leak somewhere in the vacuum system. A process of elimination can most readily determine the location of the leak. Check the Permadur 515 Series 1500 Power Pac first, if it tests good, other sections of the vacuum system are connected one at a time until the leaky section is found. Disconnect the vacuum hoses connecting the 1500 Power Pac to the load beam (to the vacuum pad in a single pad system). Perform a power-off vacuum test in the same manner as outlined for the proof load test; start the pump, switch the vacuum on and allow the gauge reading to increase to 25" Hg. or higher. Then stop the pump and observe the gauge. If the reading drops more than 1" Hg. in two minutes, the leak is located in UNIVAC. If not, the leak is in the piping to the vacuum pads, in the vacuum pad themselves, or the load beam reserve tanks. During test when hoses are disconnected, plug open ends.

If the leakage is external of the UNIVAC, reconnect the hoses to the load beam assembly. Disconnect the reserve tank hose main vacuum and repeat the power-off vacuum test. If leakage is still indicated, the leak is in the piping to the pads or to the pads themselves. If not, it is in the reserve tanks. Isolate the pads by closing the 3-way hand valves. Plug open ports. Continue the process of elimination until the location of the leak is pinpointed.

The following components should be checked as possible sources of vacuum leaks:

Seal Rings – check for cracks, cuts or other damages.
Vacuum Pads – check for cracks and loose bolts.
Vacuum Hoses – check for breaks, cuts, pinch marks, and loose fittings.
Vacuum Filter – check for looseness and damaged seal.
Vacuum Relief Valve – check for improper setting or broken spring.

B. TRACING VACUUM - LEAKS:

If the tests have shown that leakage is occurring within the UNIVAC, the same process of elimination may be used to trace the problem to its source. As before, a power-off test is performed as each portion of the vacuum systems is disconnected. Refer to Permadur drawings located within this manual.

Disconnect the vacuum hose that connects the vacuum filter to the four-way control valve by unscrewing the hose stem from the valve. Plug open the port in the valve with the test gauge and conduct a power-off vacuum test. If the vacuum reading holds nearly constant, the leak is in the vacuum filter. If not, continue the process of elimination until leakage is located.

The check valve and the four-way valve located between the vacuum pump and the filter can be tested by starting the pump and allowing full vacuum to build up. Stop the pump and place a hand over the exhaust port of the muffler. If any vacuum draw can be felt, one of the two valves is defective. In most cases, the check valve will be at fault.

C: THREAD CONNECTIONS:

All thread connections should be drawn up tight using pipe dope. Care should be taken to prevent pip dope and other foreign material from entering the vacuum system.

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TROUBLE SHOOTING GUIDE

Successful troubleshooting first involves careful observation of the symptoms and then elimination, one by one, for the possible causes of the problem. The following chart provides a logical approach to troubleshooting your UNIVAC. It is a starting process to isolate parts with damage or defects caused by improper operating procedures**.**

PROBLEM	PROBABLE CAUSES	REMEDY
Vacuum pump will not run	No power to unit	Check power source
	Tripped pump circuit breaker	Reset if tripped. Check cause if tripping repeats
	Defective pump/motor unit	Check, to repair or replace as required
	Defective ON-Off switch	Check , replace as required
	Loose or damaged wiring	Meter check, repair or replace as required
	Unit at extremely low temperature	Bring unit to room temperature before starting
	Dirty vane chamber	Flush pump assembly
Vacuum pump runs hot	Excess foreign matter in pump chamber	Flush pump assembly, replace vanes
	Worn vanes	Check, replace as required
	Vanes hanging up	Flush pump assembly, replace vanes
	Low incoming voltage	Check and correct as required
	High ambient temperature	Shield unit
No or low vacuum reading on vacuum gauge	Improper vacuum pad seal	Check, replace as required
	Clogged filter or muffler	Check , replace as required
	Damaged pad or seal ring	Check , replace as required
	Loose or damaged hoses or fittings	Check , repair or replace as required
	Defective gauge	Check , replace as required
	Defective gauge line	Check, to clean or replace as required
	Defective 4-way valve	Check, to clean or replace as required
	Pump vanes hanging up	Flush pump assembly, replace vanes as required
	Defective pump	Check, to return for repair or replace as required
	Porous or perforated material; rough, dirty, and /or foreign particles on surface	Check by using unit on clean, non-porous material such as steel or aluminum

TROUBLE SHOOTING GUIDE

PROBLEM	PROBABLE CAUSES	REMEDY
Green lamp will not light	Burned out bulb	Replace unit
	Tripped control circuit breaker	Reset if tripped, check cause if tripping repeats
	Defective vacuum switch	Check, replace as required
	Loose or damaged wiring	Check, repair or replace as required
	Vacuum switch not adjusted properly	Check, align as required
	Unit remained in "Vacuum Off" cycle	Check for defective vacuum switch
	See 'Unit remains in "Vacuum Off" cycle'	
Red lamp will not light	Vacuum retained in vacuum circuit	Vent lines or switch to release mode
	See "Green lamp will not light"	
Unit remains in "Vacuum On" cycle	Vacuum On-Off switch is in the "Vacuum On" position	Switch to "Vacuum Off" position
	Tripped control circuit breaker	Reset if tripped, check cause if tripping repeats
	Defective 4-way valve coil	Check for power on coil, press manual override to check operation
	4-way valve hanging up	Check, manually shift, clean or replace as required
	Loose or damaged wiring	Check, repair or replace as required
	Defective vacuum On-Off pushbuttons	Check, replace as required
	Delayed release	Check vacuum relief valve setting and operation
Unit remains in "Vacuum Off" cycle	Vacuum On-Off switch is in the "Vacuum Off" position	Switch to "Vacuum On" position
	Tripped control circuit breaker	Reset if tripped, check cause if tripping repeats
	Defective 4-way valve coil	Check for power on coil, press manual override to check operation
	4-way valve hanging up	Check, clean or replace as required
	Loose or damaged wiring	Check , repair or replace as required
	Defective vacuum On-Off pushbuttons	Check, replace as required

TROUBLE SHOOTING GUIDE

PROBLEM	PROBABLE CAUSES	REMEDY
Delayed Vacuum release	Clogged filter or muffler	Check, clean or replace as required
	Improper vacuum pad seal	Check, replace as required
	Damaged vacuum pads or seal rings	Check for cracks, loose or broken bolts, cut or torn seal rings, excessive seal ring wear, deformed seals, replace as required
	Defective reserve system valve	Check, replace reserve valves as required
	Loose or damaged wiring on reserve valve	Check , repair or replace
	Defective 4-way valve	Check, replace as required
	Vacuum pump vanes hanging up	Check, replace vanes as needed: flush pump assembly
	Worn vacuum pump	Replace vanes or replace the vacuum pump
	Vacuum relief valve	Check for proper setting and operation
	Porous and/or perforated material	Test on non-porous material, for example, steel or aluminum
	Clogged, loose or damaged hosed and/or fittings	Check, to clean, repair or replace as required
Early Vacuum release	Clogged filter or muffler	Check, clean or replace as required
	Loose or damaged wiring on reserve valve	Check, repair or replace as required
	Defective reserve valve	Check, repair or replace as required
	Defective 4-way valve	Check, replace as required
	Vacuum pump vanes hanging up	Check, replace as required
	Worn vacuum pump	Check, replace vanes or replace vacuum pump as required
	Pressure relief valve	Check for proper setting and operation
	Clogged, loose or damaged hoses or fittings	Check, to clean, repair or replace as required

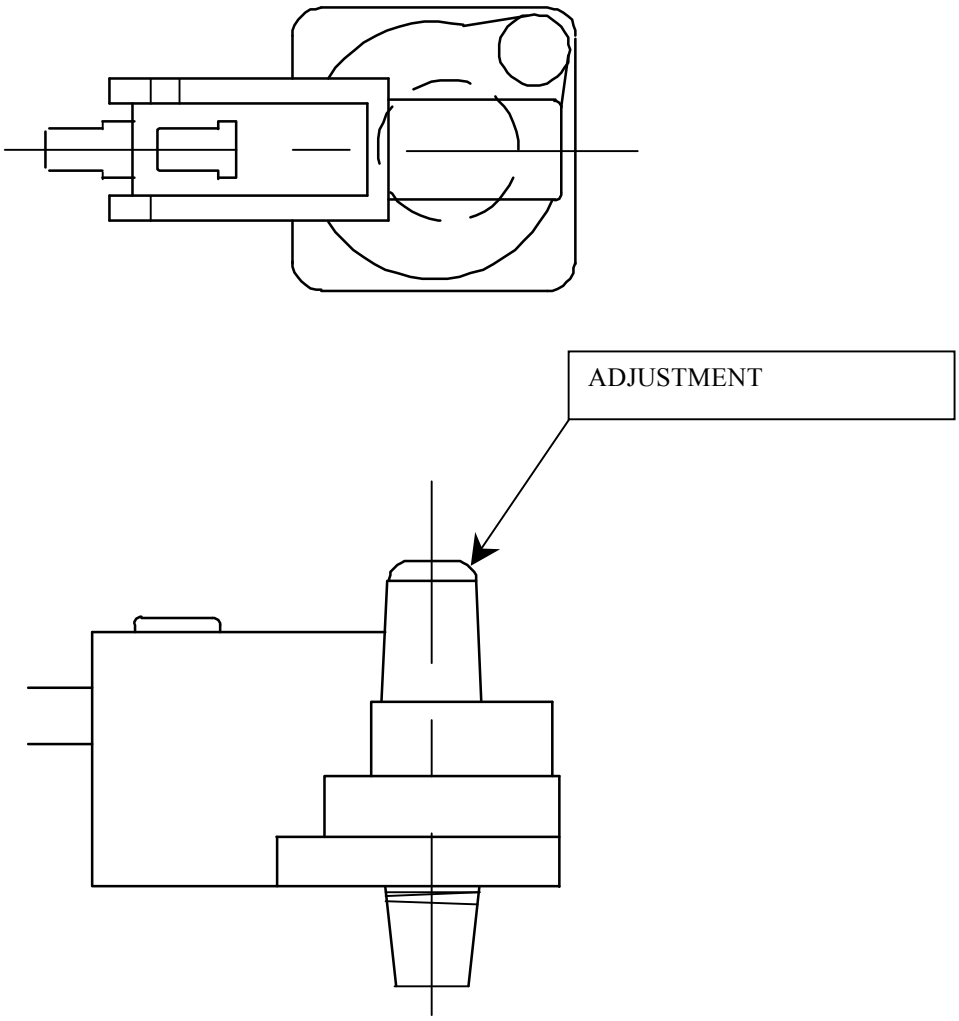
TROUBLE SHOOTING GUIDE

PROBLEM	PROBABLE CAUSES	REMEDY
Circuit breakers trip	Low incoming voltage	Check, and correct as required
	Short in the electrical circuit, loose or damaged wires	Check, repair or replace as required
	Pressure relief valve set above 10 PSI	Check, adjust as required
	Vacuum relief valve set above 26" Hg	Check, adjust as required
	Vacuum pump stops working	Check for broken vanes or foreign matter in assembly. Flush pump assembly, replace vanes.
	Defective Vacuum pump	Check to return for repair or replace as required
Excessive vacuum loss during "Proof Load Test"		Refer to section on "Tracing Leakage", Page 18
Noisy vacuum pump	Sticking vane	Run the pump for a short period. If noise continues, flush the pump assembly and replace vane
	Broken vane	Check, replace as required. Refer to vacuum pump section on "Component Description", Page 12
Green lamp On, no vacuum at pads	Shut-Off valve is in the closed position	Change the Shut-Off valve to the open position to provide safe lifting capacity for the intended load
	Vacuum line to pad clogged or kinked	Check, to clean or replace as required
	Vacuum line quick coupler loose	Check, re-connect or replace as required
	Loose material on surface of load that is plugging the pad port	Remove loose material at pad port
	Defective automatic pad shut-off device	Check, repair or replace as required
	Defective vacuum switch	Check, replace as required
	Low vacuum switch setting	Check, adjust as required
Unit will not lift load	Load over rated capacity of unit	DO NOT load over unit's rated capacity
	Material peeling from outer pads	Check pads for proper spacing and adjust as required
	Individual pad(s) pulls loose under load	Check, adjust pad elevation even with other pads
	Material surface not flat	Use compensating pad mountings for uneven surfaces
	Small pads mixed with large pads	Check , correct
	Sheets of material stuck together	Separate sheets before attempting to lift the load

KEY FACTORS

MARKINGS ……..	Load Capacity & Empty Weight shall be clearly marked on every Lifter
WEIGHT OF LOAD ……..	Must be within capacity of lifter
WEIGHT OF LIFTER & LOAD ……	Must be within capacity of Hoist & Crane
WEIGHT OF DISTRIBUTION OF LOAD	Must not overload any one part of the lifter
HEADROOM ……..	Headroom must be sufficient for loaded lifter and the purpose of the lift
DAMAGE RISK TO LOAD ……..	Protect fragile loads from damage throughout lift cycle
DAMAGE RISK TO LIFTER ……	Protect lifter from abuse by the loads being lifted
VERSATILITY ……	Because lifters are versatile be sure correct lifter is used
STORAGE …….	Lifter shall be stored and protected in designated location when not in use
INSPECTION …….	Lifter must be inspected at frequent regular intervals
CERTIFICATION …….	Lifter must be approved for use after each inspection
SERVICE RECORD …….	Permanent inspection and maintenance records should be kept on all lifters
RESPONSIBILITY ……	The lifter operator should exercise full responsibility for safe lifting operation at all times
HOUSEKEEPING …….	Good housekeeping promotes safety in ALL operations
SPECIAL CONSIDERATIONS ……	Consult manufacturer in hazardous or unusual environment conditions such as:
	TEMPERATURE CORROSION MOISTURE ABRASION ALTITUDE

VACUUM SWITCH ADJUSTMENT PROCEDURES



*Remove end cap plug with fingernail or edge of knife to expose the adjustment screw. Insert screwdriver and rotate this screw clock wise or counter-clockwise to increase or decrease the vacuum level setting for the switch actuation.

*CAUTION:

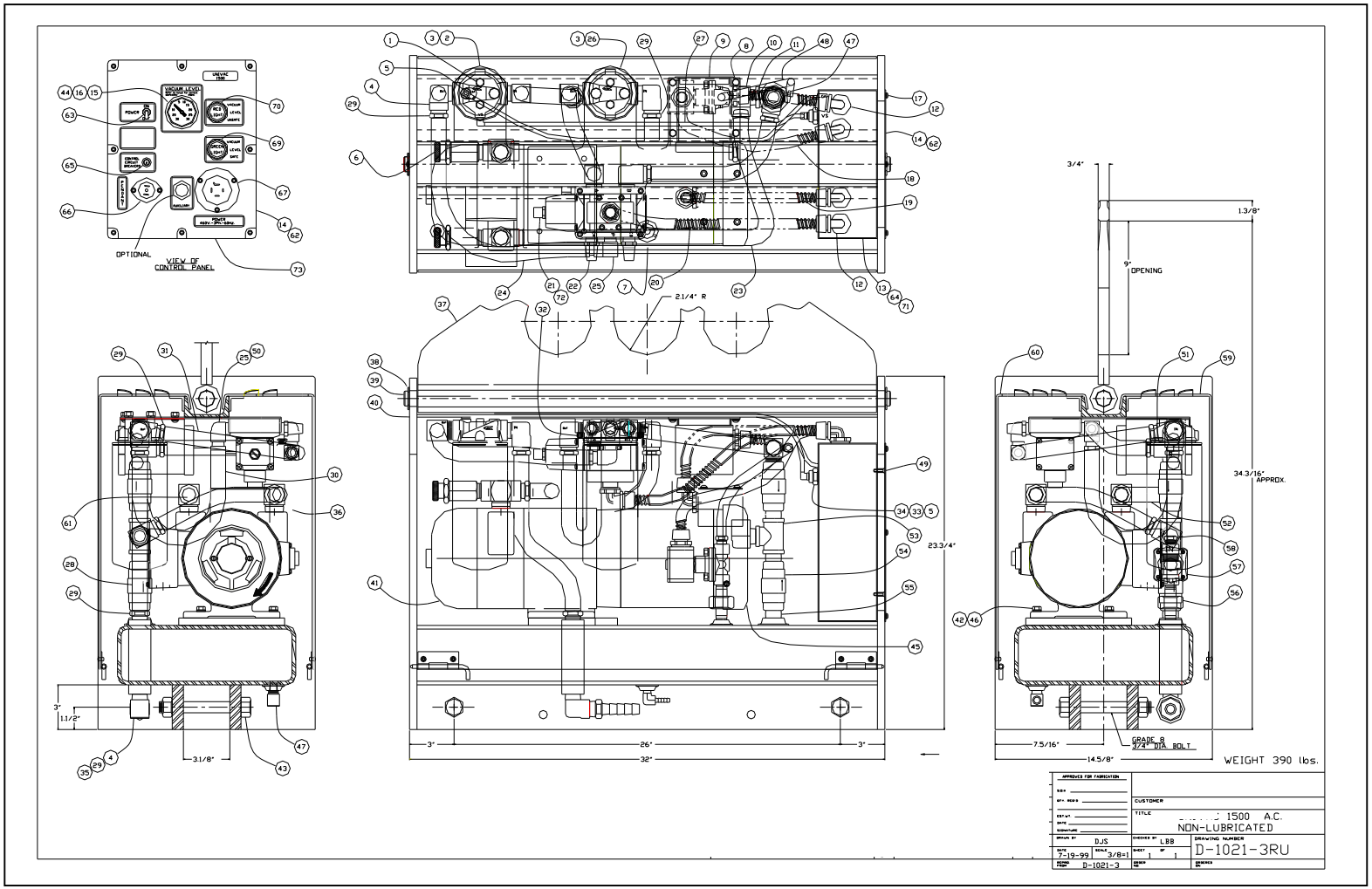
Do not force or over tighten nut against end stops.

BILL OF MATERIALS

BILL OF MATERIALS			
SYM.	QTY.	MATERIAL	EST. WT.
1	4	1/4"-20UNC HEX HD BOLT x 1/2" LG W/ LOCKWASHER & FLAT WASHER	
2	1	ZAF-07-03-3 & 5, ZAF-07 SERIES, 3/4 NPT PORTS, 3 PSI BYPASS, 1/8NPT IN LOCATIONS 3 & 5, SPIN-ON-FILTER HEAD 55-1012	
3	2	AE-10L, 10 MICRON, SPIN-ON FILTER ELEMENT 55-1004	
4	7	116A-E, 3/4NPT 90° STREET ELBOW BRASS	
5	3	69DB-4A,.170"ID x 1/8NPTM x 90° HOSE BARB	
6	1	#AA307, 3/4NPT PRESSURE RELIEF VALVE 55-2303	
7	1	#AA308, 3/4NPT VACUUM RELIEF VALVE 55-2304	
8	4	1/4-20UNC HEX HD BOLT x 3/4" LG W/ LOCKWASHER & ST'D NUT	
9	1	#150SV1A, 0.150 KVA, 240 x480 PRIMARY VOLTS, 120/240 SECONDARY VOLTS, SINGLE PHASE, 60 Hz. TRANSFORMER 55-1115	
10	2	P038NBK, 3/8 TRADE SIZE STRAIGHT POLYTUFF FITTING	
11	1	B2038, 3/8 POLYTUFF-2 TUBING x 6" lg	
12	6	P0389NBK, 3/8 TRADE SIZE 90° POLYTUFF FITTING	
13	1	C-1021-3-6U, ELECTRICAL BOX 55-0802 (A-SE12x10x4NK)	7.5
14	1	C-1021-3-1U, CONTROL PANEL 55-0402	2.6
15	1	T6UU, 30" Hg. TO 15 PSI, 1/4NPT, V-C COMPOUND GAUGE 55-1101	
16	1	69DB-4B,.170"ID HOSE x 1/4NPTM x 90° HOSE STEM (ANDERSON)	
17	8	#10-32UNF BUTTON HD SOCKET HD CAP SCREW x 1/2"lg W/ LOCKWASHER	
18	1	B2038, 3/8 POLYTUFF-2 TUBING x 12" lg (HUBBELL)	
19	1	B2038, 3/8 POLYTUFF-2 TUBING x 8.1/2" lg (HUBBELL)	
20	1	B2038, 3/8 POLYTUFF-2 TUBING x 15" lg (HUBBELL)	
21	1	NVS4134-0209D, 1/2NPT, 4-WAY, 2 POS., SPRING OFFSET, 115/120V, SINGLE DIRECT SOLENOID OPERATED, SUBPLATE MT'D VALVE FOR VACUUM SERVICE (SMC) 55-2806	
22	2	ASP-4, 1/2"NPT MUFFLER 55-1603	
23	1	881-12, 3/4"ID x 17.1/2"lg, SAE 100R4 HOSE	
24	1	881-12, 3/4" ID x 12.1/2"lg, SAE 100R4, HOSE	
25	4	116A-D, 1/2"NPT x 90° STREET ELBOW BRASS	
26	1	ZAF-07-00-0, ZAF-07 SERIES SPIN-ON FILTER HEAD 55-1009	
27	2	0.156 ID TUBING x 26"lg	
28	1	881-12, 3/4" ID SAE 100R4 HOSE x 11"lg	
29	10	201A-12E, 3/4" ID HOSE x 3/4"NPT HOSE BARB	
30	1	881-12, 3/4" ID SAE 100R4 HOSE x 26"lg	
31	1	881-12, 3/4" ID SAE 100R4 HOSE x 32"lg	
32	4	1/4"-20NC,SOCKET HD BOLT x 1.1/2 lg W/ LOCKWASHER &STD. NUT	
33	1	V510028PT, VACUUM SWITCH 55-1102	
34	1	129A-A, 3/4"-16 x 1/8"NPTF BULKHEAD FITTING (ANDERSON)	
35	1	881-12, 3/4" ID SAE 100R4 HOSE x 20"lg	

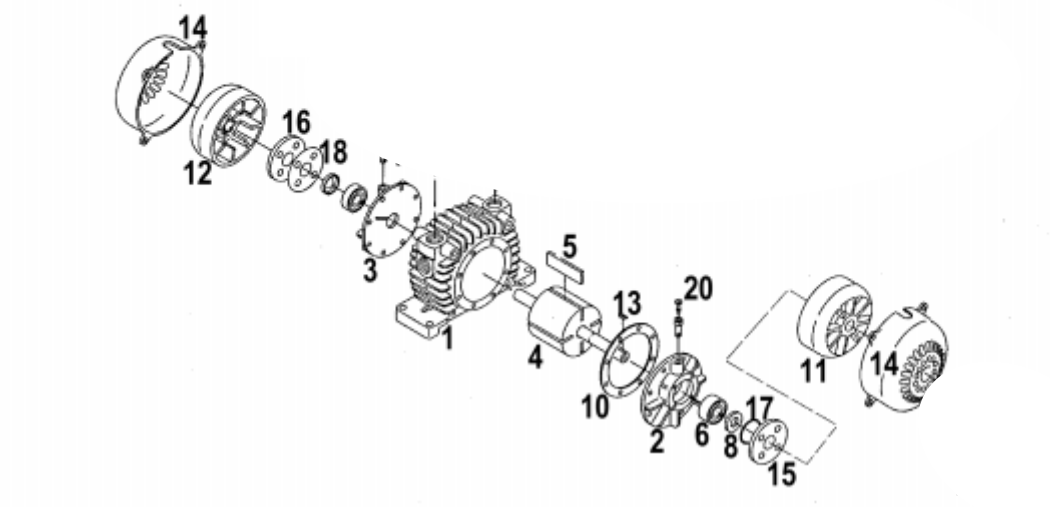
BILL OF MATERIALS			
SYM.	QTY.	MATERIAL	EST. WT.
36	1	B-1021-3-6, SPECIAL 3/4NPT FEMALE BRANCH TEE 55-1143	
37	1	C-1024-3U, BAIL 55-4100	
38	2	5304-100, KLIPRING	
39	1	B-1025-3, BAIL PIN 55-1432	7.2
40	1	D-1022-3U, FRAME ASSEMBLY 55-4201	195
41	1	#2565-V103, MODEL 2565,NON-LUB. SEPARATE DRIVE W/O MOTOR 55-2210	43
42	4	3/8-16UNC HEX HD BOLT x 1.1/2" W/ LOCKWASHER	
43	2	3/4"-10UNC x 7"lg HEX HEAD CAP SCREW W/HEX NUT GRADE 8	
44	1	103A-B,1/4NPT COUPLING	
45	1	M3554-MOD,1.1/2 HP,1725RPM, TEFC 208-230/460 VOLTS, 60 Hz, 3 PH, RIGID BASE MOTOR W/ CONDUIT BOX 180 FROM FEET, 56 FR 55-1504	35
46	4	5/16-18UNC HEX HD BOLT x 3/4" LG W/ LOCKWASHER	
47	2	HE1-4B, 1/4"ID HOSE x 1/4"NPTF x 90° HOSE BARB	
48	1	801-4, 1/4" ID PUSHLOK HOSE x 11.1/2"lg	
49	4	10-32UNF FLAT HD PHILLIPS TAPP'G SCREW x 3/4" LG	
50	3	201A-12D, 3/4"ID HOSE x 1/2NPTM HOSE BARB	
51	1	B-1021-3-1, SPEC 3/4NPT 90° ST EL 55-1142	
52	1	881-12, 3/4" ID SAE 100R4 HOSE x 16lg	
53	1	4429K254, 3/4"NPTF THREATED BRASS PIPE TEE	
54	2	375-3/4, CHECK VALVE 55-0102	
55	3	112A-E, 3/4NPT x 1.5/16"lg CLOSE BRASS NIPPLE	
56	1	3000-375, 3/8NPTM NIPPLE UNION	
57	1	VX2242V-03N-3C/115V,3/8NPT, N.O., 2-WAY, 1 SOLENOID VALVE FOR 29" Hg. VACUUM SERVICE 55-2816	
58	1	201A-4C, 1/4" ID HOSE x 3/8"NPTM HOSE BARB	
59	1	T-1052 CAPLUG 55-1443	21
60	2	D-1023-3LU, LEFT COVER ASSEMBLY 55-0703	21
61	1	3600x12, 3/4NPT BRASS MALE BRANCH TEE	
62	1	UNIVAC 1500,230/460VPANEL DECAL	
63	1	90-0001 SPST ON/OFF TOGGLE SW 55-1103	
64	1	LC1D12F7, CONTACTOR 55-1123 LRD08, OVERLOAD RELAY 55-1124	
65	1	W58-XB1A4A-2, 2 AMP RESETTABLE CIRCUIT BREAKER 55-0208	
66	1	HBL7596N FLANGED RECEPTACLE 55-1112	
67	1	HBL2435 FLANGED INLET 55-1119	
69	1	C3CONTROLS 22MM PILOT LIGHT W22U-120I-WLG 55-1118	
70	1	C3CONTROLS 22MM PILOT LIGHT W22U-120I-WLR (RED) 55-1117	
71	1	1492 TERM. STRIP C/W (3) -CA1L BLKS,(12) -F1 BLKS,(1) 7"lg -N1 RAIL,(2) -N23 END ANCHOR	
72	1 SPARE	NVS 4134-0009D,ITEM 21 W/O SUB-PLATE VAC CONT VALVE	
73		ELECTRICAL SCHEMATIC C-1021-3-2EU	

GENERAL ARRANGEMENT DRAWING



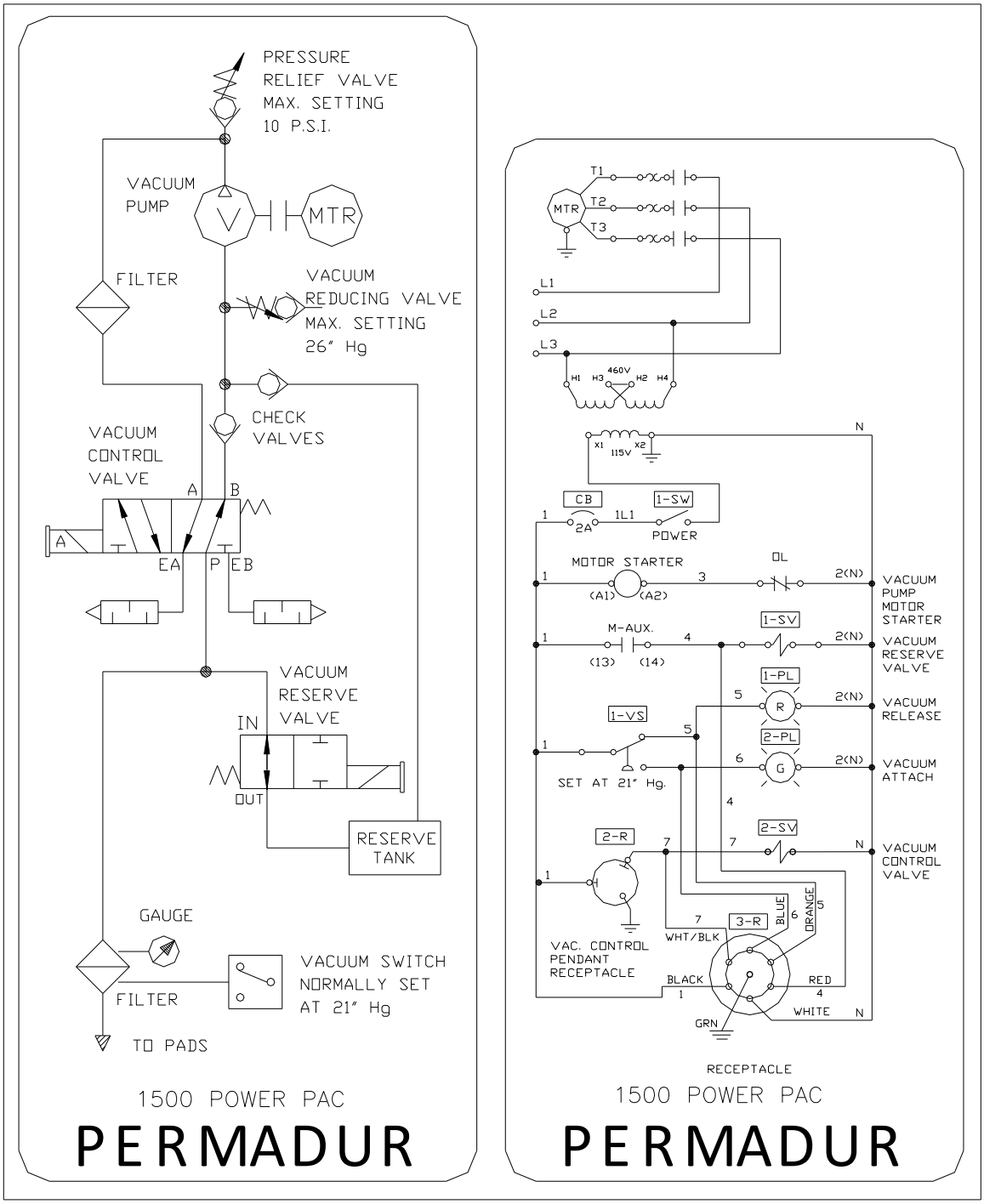
VACUUM PUMP

EXPLODED PRODUCT VIEW, PARTS & ORDERING INFORMATION



ITEM	DESCRIPTION	QTY	MODEL 2565-V103
1	BODY	1	AC101M
2	END PLATE, DRIVE.	1	AH205A
3	END PLATE, DEAD	1	AH205
4	ROTOR ASY	1	AJ993
5	VANE	4	AH195
6	BEARING DEFLECTOR	2 2	AC894 AH193
8	DRIVE END SHAFT SEAL	1	AC848
9	DEAD END SHAFT SEAL	1	AC849
10	BODY SPACER	1	AH567D
11	COOLING FAN RETAINER RING	1 1	AC326C AC448
12	COOLING FAN RETAINER RING SPRING SEP DRIVE	1 1 2	AC326B AC447 AB337
13	COUPLING KEY WASHER SEP DRIVE	1 1	AB136D AB228
14	GUARD FAN GUARD R-RING SEP DRIVE	1 1 1	AC102B AC102C AB335
15	DRIVE END CAP	1	AB339
16	DEAD END CAP	1	AG466
17	O-RING	1	AC808
18	END CAP GASKET	2	AG467

PANEL LAYOUTS AND CIRCUIT



ELECTRICAL WARNING

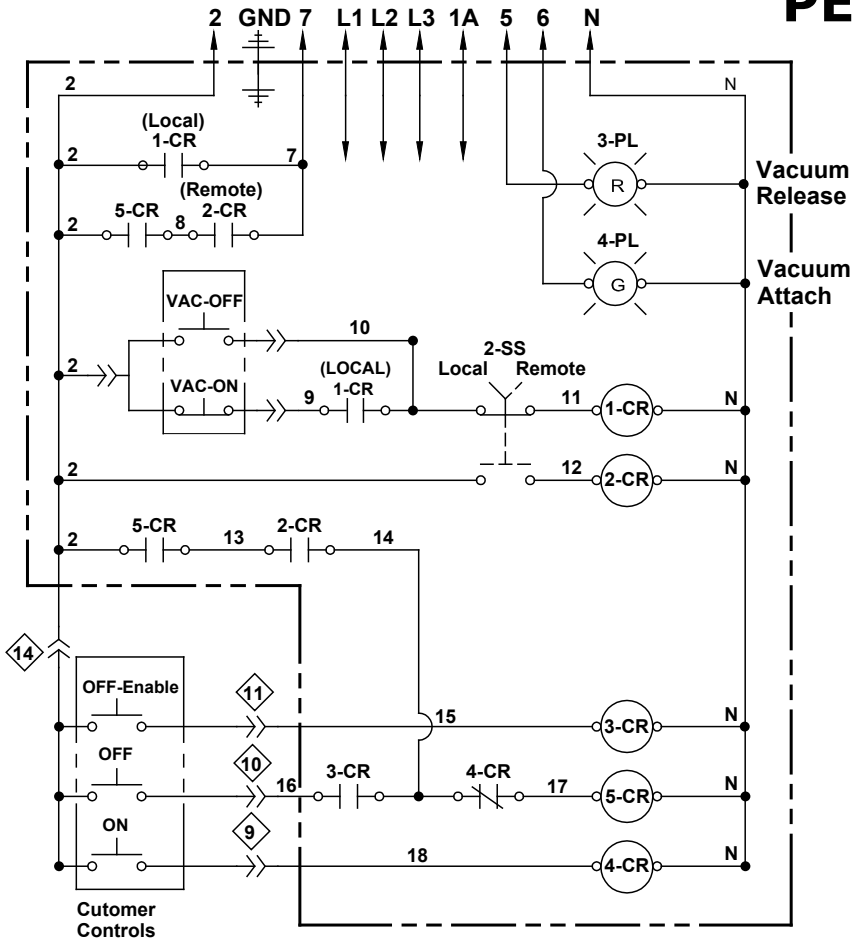
BEFORE OPERATING, INCOMING POWER CIRCUITRY TO UNIT SHOULD BE CHECKED AND TESTED BY QUALIFIED ELECTRICAL SERVICE PERSONNEL.

MACHINE SHOULD BE ELECTRICALLY SET-UP AND TESTED BY QUALIFIED ELECTRICAL SERVICE PERSONNEL.

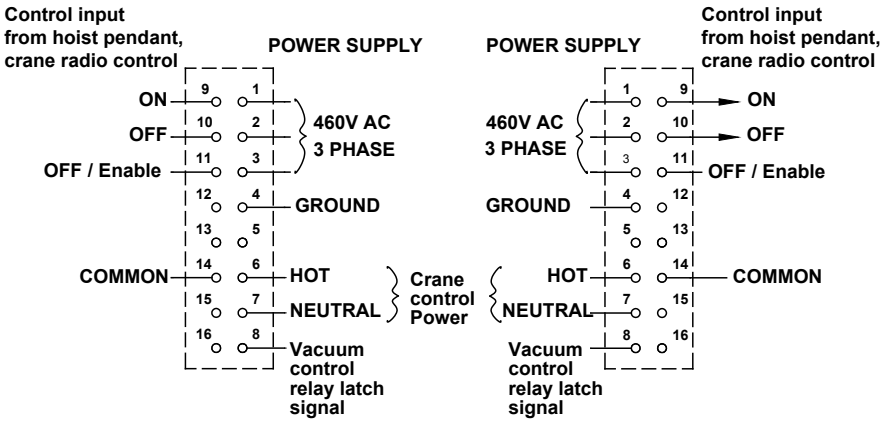
RECOMMENDED SPARE PARTS

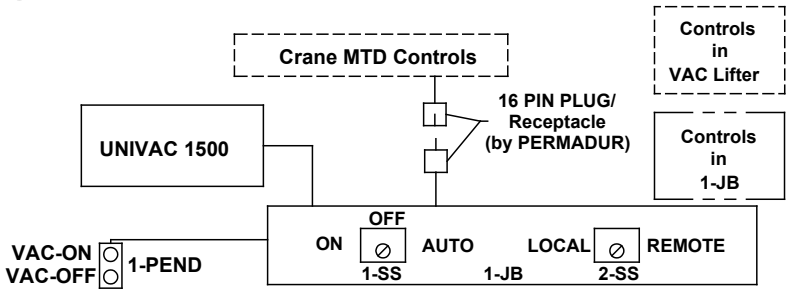
ITEM NO.	QTY USED	CATALOG NUMBER	DESCRIPTION
1.	1	AA308	¾ NPT, PRESSURE RELIEF VALVE
2.	1	ASP-4	½ NPT, MUFFLER
3.	1	NVS-4134-0209D	CONTROL VALVE
4.	1	V-5100-28-PT	VACUUM SWITCH
5.	1	AE-10L	FILTER ELEMENT
6.	1	ZAF-07-03-3 & 5	SPIN-ON FILTER HEAD
7.	1	375-3/4	CHECK VALVE
8.	1	AA308	¾ NPT RELIEF VALVE
9.	1	VX2242V-03N-3C	RESERVE VALVE
10.	1	2565-V103	VACUUM PUMP
11.	1	T6UU	VACUUM GAUGE
12.	4	AH195	VANES
13.	1	90-0001	ON-OFF TOGGLE SWITCH
14.	1	W58-XB1A4A-2	2 AMP CIRCUIT BREAKER
15.	1	B-1039-010	PENDANT VACUUM ON/OFF
16.	1	W22U-120I-WLR	RED LIGHT ASSEMBLY
17.	1	W22U-120I-WLG	GREEN LIGHT ASSEMBLY
18.	1	M3554-M00	1 ½ HP, 1.725 RPM, MOTOR
19.	12	VSN-24-30	SEAL RINGS
20.	12	B-1006-5-2	1.00” DIA x 11.00” LG., BALL BOLT

PERMADUR

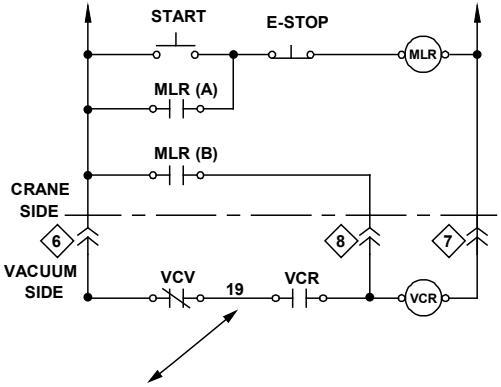


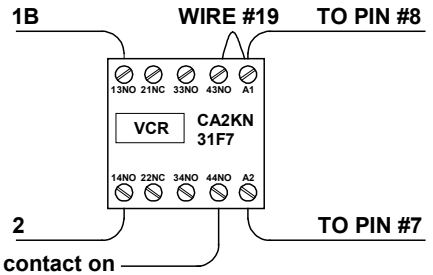
16 PIN MALE/FEMALE QUICK DISCONNECT





CRANE CONTROL POWER

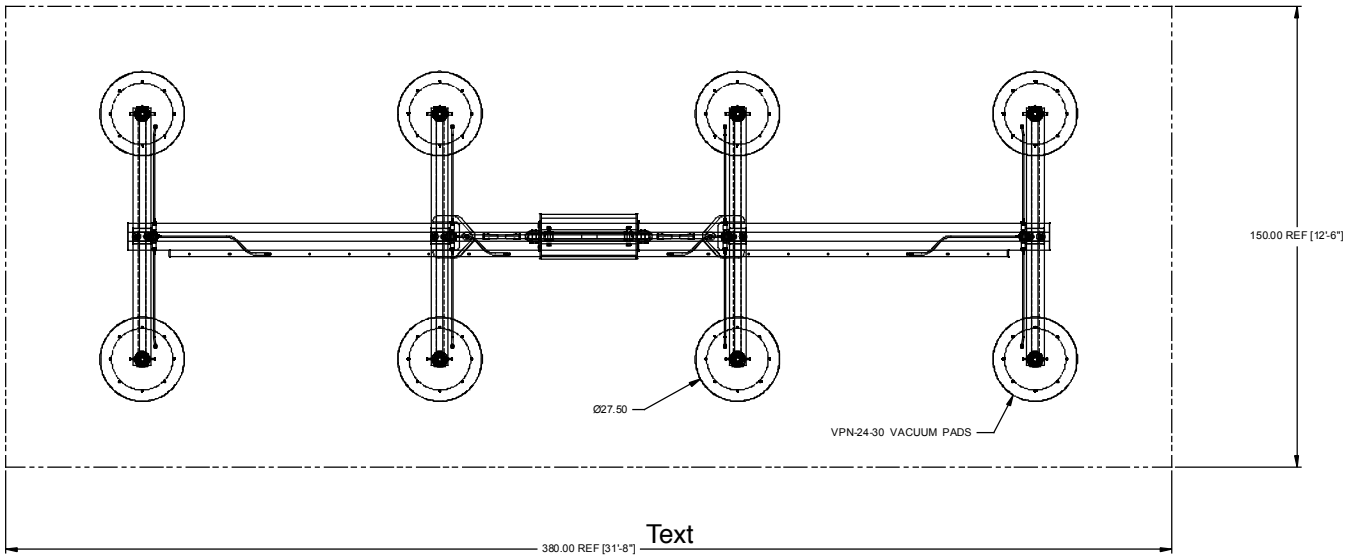




6 PIN NUMBERS ON CUSTOMER PLUG/RECEPTACLE

On Control Relay VCR use a NO Contact to provide a 'Drop-Out' circuit to keep VCR from activating again, when power is shut OFF. Connect it in line with VCV Contact that connects to PIN #6.

THIS APPROVAL DRAWING PROPERTY OF PURMADUR INDUSTRIES NOT TO BE COPIED OR REPRODUCED AND MUST BE RETURNED ON REQUEST	THIS ORDER WILL NOT BE RELEASED FOR MANUFACTURE UNTIL APPROVALS HAVE BEEN SIGNED AND RETURNED.
APPROVED ☐ APPROVED AS NOTED ☐ UNAPPROVED ☐ RESUBMIT APPROVAL WITH CHANGES. ☐	PLEASE VERIFY CRANE HOOK WILL FIT BAIL OPENING.. APPROVED ☐ UNAPPROVED ☐ SIGN. _____ DATE: _____



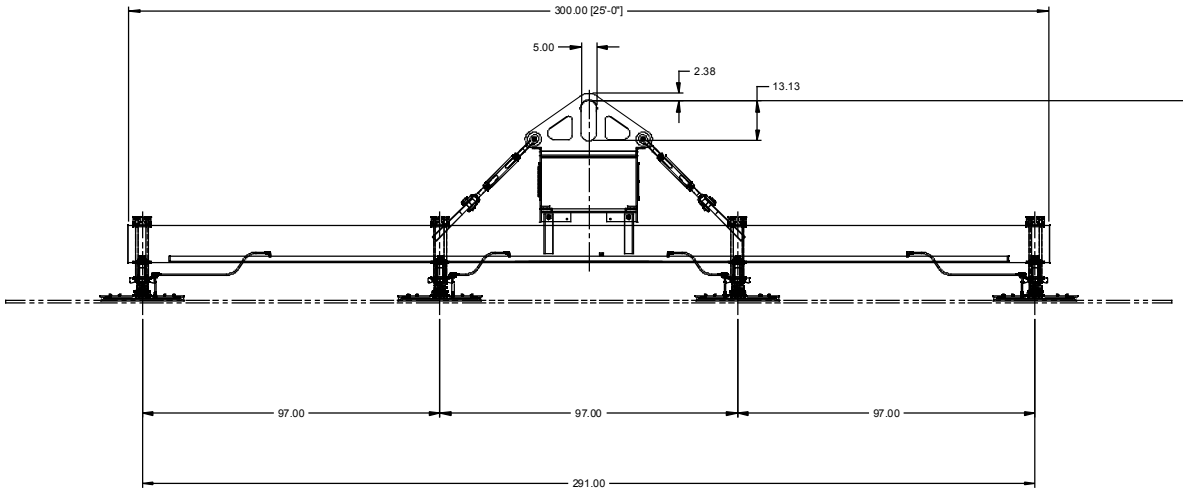
Text

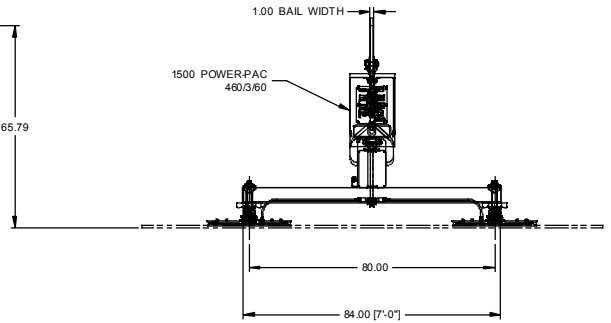
UNIT CAPACITY = 9,600 LBS.

5:1 PAD CAPACITY

UNIT WEIGHT = 3,300 LBS.

PAINT PERMADUR ORANGE
SHERWIN WILLIAMS #B54E39





SCALE: 1:20	PERMADUR 186 RT.206 SOUTH HILLSBOROUGH, NJ 08844		
DATE: 24-APR-14			
DRAWN: DJS	SERIES 408 SYSTEM W/1500 POWER PAC		
APPROVED: .			
LTR DR NO. CHANGE DRW DATE APPD	MATERIAL:	TOLERANCE UNLESS OTHERWISE SPECIFIED:	DRAWING NO. 20740 REV A