

KEEP FOR FUTURE REFERENCE



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INSTRUCTIONS

International Version

MODEL NUMBER: MRPT89ACO

SERIAL NUMBER: _____
(please see serial label and record number here)

MANUAL ROTATOR / POWER TILTER 1000
AC-VOLTAGE
WITH HIGH-DUTY TILT OPTION



***READ ALL INSTRUCTIONS AND WARNINGS
BEFORE OPERATING THIS LIFTER***



DESIGNED FOR THE MATERIALS HANDLING PROFESSIONAL

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WARNINGS



Powr-Grip is pleased to offer the most reliable vacuum lifters available. Despite the high degree of security provided by this product, certain precautions must be observed to protect the operator and others.



Always wear personal protective equipment that is appropriate for the material being handled. Follow trade association guidelines.

Always operate the lifter under conditions approved for its design (see INTENDED USE: OPERATING ENVIRONMENT).

Never operate a lifter that is damaged, malfunctioning, or missing parts.

Never operate a lifter if the sealing edge of any vacuum pad is cut or otherwise damaged.

Never remove or obscure warning labels.

Never operate a lifter if the Load Capacity or any warning appears to be missing or obscured.

Always make certain the contact surfaces of the load and all vacuum pads are clean prior to applying the pads (see MAINTENANCE: VACUUM PAD MAINTENANCE).

Never exceed the Load Capacity or attempt to lift loads the lifter is not designed for (see INTENDED USE: LOAD CHARACTERISTICS).

Never attempt to lift cracked or broken glass with this lifter.

Always position the vacuum pads correctly on the load prior to lifting (see OPERATION: TO APPLY THE PADS TO A LOAD).

Never lift a load when any vacuum indicator shows inadequate vacuum.

Never touch the vacuum release controls during a lift. This may result in loss of vacuum and release of the load.

Never allow people to ride on the lifter or the load being lifted.

Never lift a load higher than necessary or leave suspended loads unattended.

Never lift a load over people.

Always keep other personnel far enough away from the lifter to avoid injury in the event of an unexpected load release.

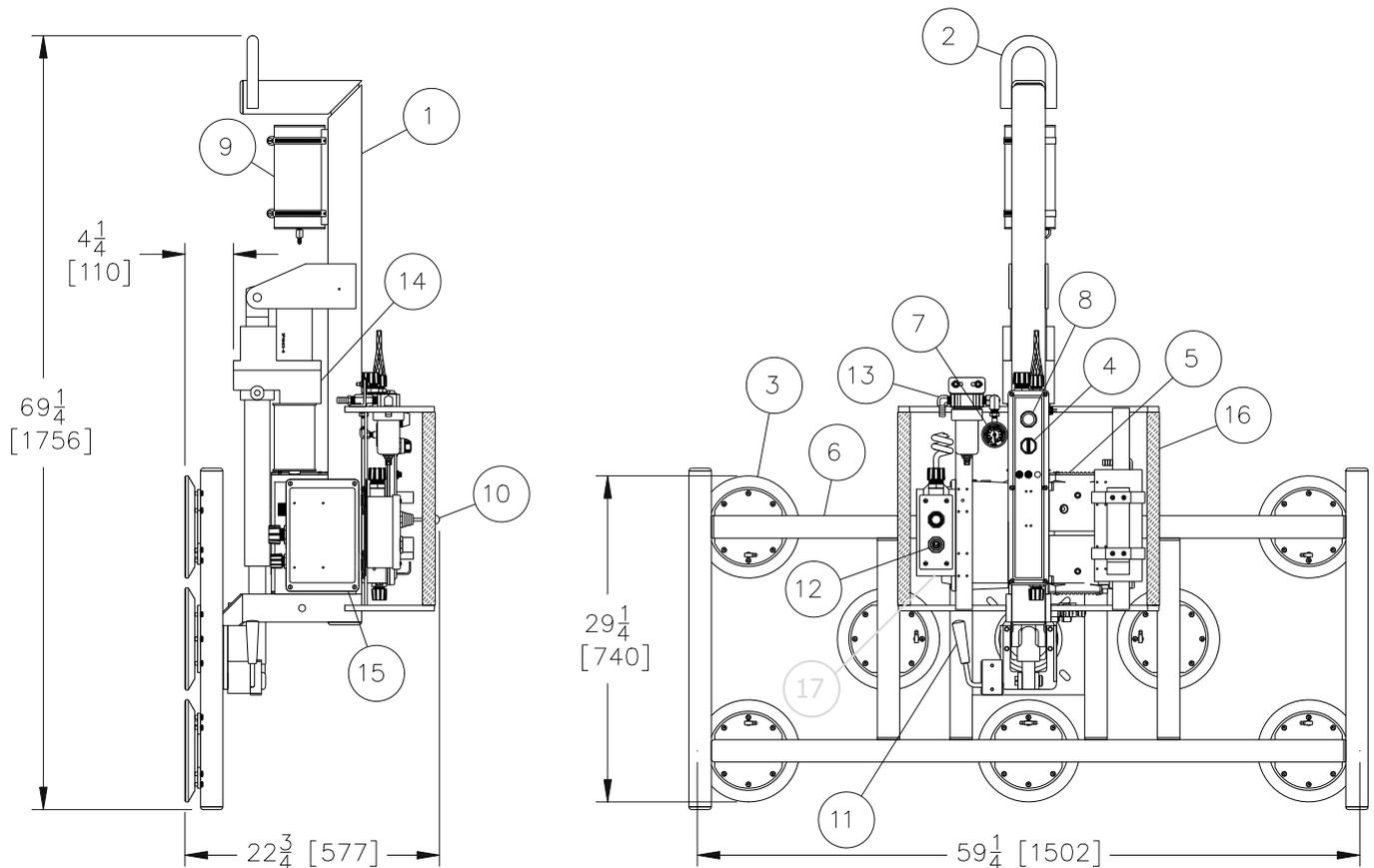
Always place the power control in the inactive position and, when possible, disconnect the power source before opening any enclosure on the lifter. (Only applicable to powered lifters)

Always remember that modifications to the lifter may compromise its safety. Wood's Powr-Grip cannot be responsible for the safety of a lifter that has been modified by the customer. For consultation, contact Wood's Powr-Grip (see LIMITED WARRANTY).

Always employ a ground fault circuit interrupter when connecting the power cable to the power source.

OPERATING FEATURES

Note: Components featured in the following instructions for assembling, operating or maintaining the vacuum lifter are underlined> on their first appearance in each section.



Standard MRPT89AC shown without options.

- | | | |
|----------------|---------------------------|---------------------------------|
| 1 LIFT BAR | 7 VACUUM GAUGE | 12 VACUUM RELEASE BUTTON |
| 2 LIFT BAIL | 8 VACUUM LIFT LIGHT | 13 AIR FILTER |
| 3 VACUUM PAD | 9 VACUUM RESERVE TANK | 14 TILT ACTUATOR |
| 4 POWER SWITCH | 10 TILT TOGGLE SWITCH | 15 Enclosure with VACUUM SWITCH |
| 5 VACUUM PUMP | 11 ROTATION RELEASE LEVER | 16 CONTROL HANDLE |
| 6 PAD FRAME | | 17 MOVABLE CONTROL PENDANT |

ASSEMBLY

- 1) Open the shipping container and remove all materials for restraining or protecting the vacuum lifter. Save the container for use whenever the lifter is transported.
- 2) Connect the power cable from the lifter to the power source as follows: Identify the label indicating the voltage range (V) and frequency (Hz) required to power the lifter (located where power cable connects to lifter). Wire the female connector provided to an appropriate current-protected power source.

 **WARNING: Wiring must be done by qualified personnel, taking all appropriate safety precautions.**

Note: Be advised that brown-outs, overtaxed generators, extension cords, and other conditions can reduce power input at the lifter. If the lifter does not receive adequate power while lifting, this could result in an unexpected load release and a risk of injury to the operator or others.

 **WARNING: Lifter that does not receive adequate power while lifting could experience unexpected load release.**

The power source must be equipped with a ground fault circuit interrupter, in order to reduce the risk of electrical shocks.

 **WARNING: Power source must be equipped with ground fault circuit interrupter.**

Make certain the power cable is routed so that it does not become tangled while operating the lifter. Then push the power cable's male connector into the female connector and twist to secure them together.

- 3) Suspend the lifter from a crane as follows: Select hoisting equipment (crane and hoist, when applicable) rated to carry the maximum load weight plus the lifter weight (see SPECIFICATIONS: Maximum Load Capacity and Lifter Weight).

Note: Any application of the lifter must conform to all statutory or regulatory standards that relate to the hoisting equipment when used in its geographical location (eg, relevant OSHA standards in the USA).

Raise the lift bar of the lifter to a vertical orientation: Engage the tilt actuator as though tilting a load to the flat position (see OPERATION: TO TILT THE LOAD); at the same time, manually lift on the lift bar to assist the tilt actuator's movement, in order to avoid damaging the actuator.

CAUTION: Always provide manual assistance to tilt actuator when raising lift bar to vertical position.

Attach the hoisting equipment hook to the lift bail and use the hoisting equipment to raise the lifter out of the shipping container. Be careful to avoid damaging any vacuum pads.

 **WARNING: Hoisting equipment hook must be fitted with restraining latch to prevent lift bail from slipping off under any circumstances.**

Note: Some hoisting equipment hooks could interfere with an upright load that extends beyond the lifter's pad frame. If the load would contact the hook during lifter operation, the operator must prevent this by attaching a sling (or other rigging that does not interfere with the load) between the hook and the lift bail.

 ***WARNING: Any sling used must be rated to carry maximum load weight plus lifter weight.***

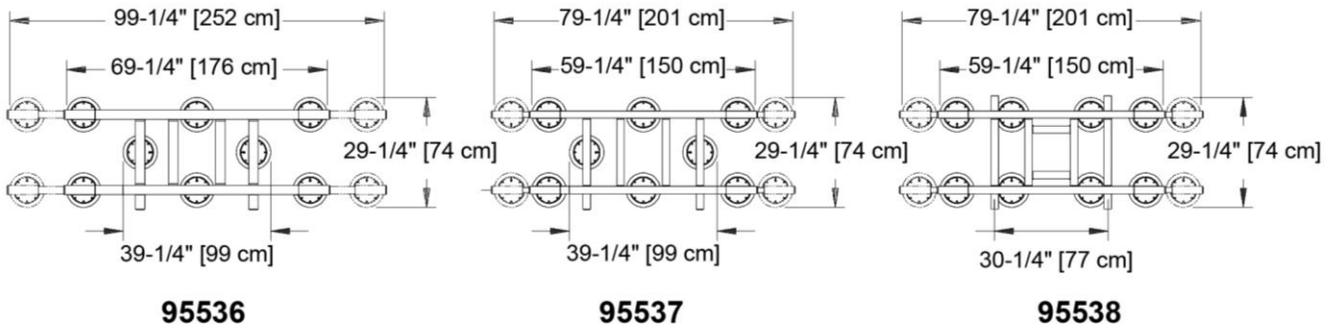
A hoist control pendant can be attached to the lifter by inserting it into the pendant basket provided. Remove the pad covers and save them for use whenever the lifter is stored. Now the lifter is operational.

- 4) If the lifter is equipped with one or more pad frame options, arrange the pad frame in the configuration that will provide optimal support of the load while lifting (see PAD FRAME OPTIONS to follow). See separate instructions to assemble and employ the pad frame.
- 5) Perform Operational and Load Tests for the lifter as directed in MAINTENANCE: Testing Schedule.

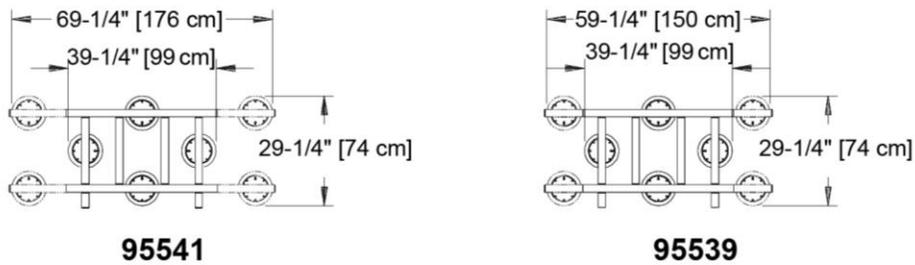
PAD FRAME OPTIONS

The following illustrations show which Pad Spread dimensions are possible for the lifter when equipped with various pad frame options, as indicated:

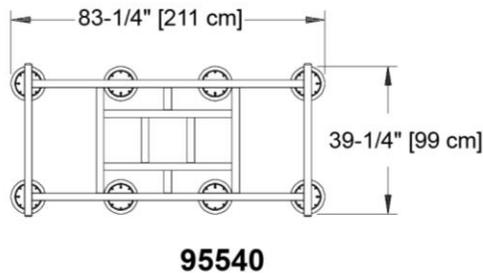
Telescoping Pad Arms



Removable Pad Arms



Interchangeable Pad Arms



(Custom Sized Pad Frames Also Available)

INTENDED USE

LOAD CHARACTERISTICS

 **WARNING:** *This lifter is NOT intended for lifting hazardous materials, such as explosives or radioactive substances.*

The operator must verify that the lifter is intended to handle each load, in accordance with the following requirements:

- The load must not exceed the maximum allowable weight specified under Load Capacity (see SPECIFICATIONS).
- The load must be a single piece of nonporous or semiporous material with a flat and relatively smooth contact surface.³ To determine whether the load is too porous or rough, perform the test under Vacuum Level on Other Surfaces (see OPERATION: TO APPLY THE PADS TO A LOAD).
- The load's contact surface must be suitable for obtaining a friction coefficient of 1 with the lifter's vacuum pads (see MAINTENANCE: VACUUM PAD MAINTENANCE: Friction Coefficient), as verified by a friction test, or capacity should be derated appropriately. If necessary, contact Wood's Powr-Grip for help in conducting a friction test.
- In order to avoid damaging the vacuum pads, the load's surface temperature must not exceed the allowable Operating Temperatures (see SPECIFICATIONS). However, if such an application cannot be avoided, Wood's Powr-Grip does offer a heat-resistant rubber compound and other solutions which may enable you to lift loads with higher surface temperatures. Contact Wood's Powr-Grip or an authorized dealer for more information.
- While the *minimum* length and width of the load are determined by the Pad Spread (see SPECIFICATIONS), the *maximum* length and width are determined by the allowable overhang, or the amount of load material that can extend sideways beyond the vacuum pads without breaking or otherwise being damaged.

The allowable overhang depends on the kind of load material being lifted, the thickness of the material, and the angle at which it is handled (if any). Since materials such as glass, stone or sheet metal each have different physical properties, the allowable overhang must be evaluated separately for each type of load. If necessary, contact Wood's Powr-Grip or an authorized dealer for help in determining the recommended overhang in a specific situation.

- 1" [2.5 cm] is the maximum allowable thickness of loads at the maximum weight (see SPECIFICATIONS: Load Capacity). However, allowable thickness increases as load weight decreases. If necessary, contact Wood's Powr-Grip for help in determining the maximum thickness permitted when handling any specific load.

Note: Vacuum pads can stain or deform load surfaces with light colors or soft coatings. The operator should test such surfaces for detrimental effects before using the lifter on them.

³ Lifters that feature concave vacuum pads can also attach to some kinds of curved loads. Since curvature affects the lifting capacity, contact Wood's Powr-Grip for help in determining the Load Capacity for a particular curved load.

OPERATING ENVIRONMENT

The operator must determine whether the lifter is intended to be used in each work environment, in accordance with the following restrictions:

 **WARNING: Never use lifter in dangerous environments.**

- This lifter is not intended for use in any environment that is inherently dangerous to the operator or likely to compromise the lifter's ability to function. Environments containing explosives, caustic chemicals and other dangerous substances must be avoided when using the lifter.
- The lifter's work environment is limited by the Operating Elevation and Operating Temperatures indicated in SPECIFICATIONS.
- The lifter's work environment must be free of metal particles or any other contaminants that could damage lifter components through airborne contact or any other means of transmission in the environment. If such contaminants cause a vacuum pump failure, they could result in a load release and possible injury to the operator or others nearby.

 **WARNING: Environmental contaminants could result in vacuum pump failure.**

- Using the lifter in wet environments may require the operator to take special precautions: Moisture on contact surfaces of the load or vacuum pads diminishes the lifter's slip resistance, thereby reducing the lifting capacity (see MAINTENANCE: VACUUM PAD MAINTENANCE: Friction Coefficient).

 **WARNING: Moisture reduces slip resistance of vacuum pads.**

Although the lifter's exterior surfaces can tolerate some exposure to water vapor, they are not designed to be water-tight. Submerging the lifter or using it in rain may damage lifter components; these and similar conditions must be avoided.

-
- **!!-CE-!!** If the lifter is employed in a construction area, CE Standard EN 13155 requires the use of a secondary positive holding device, such as a sling system, designed to support the load in case of a vacuum system failure.

 **WARNING: Where CE Standards apply, secondary positive holding device is required for lifting loads in construction zones.**

DISPOSAL OF THE LIFTER

After the vacuum lifter has reached the end of its service life, you must dispose of the lifter in compliance with all local codes and regulatory standards that are relevant for the geographical region.

OPERATION

BEFORE USING THE LIFTER

The operator must determine whether the lifter is capable of performing each intended task, in accordance with the SPECIFICATIONS and INTENDED USE sections of this *INSTRUCTIONS* manual. In addition, all of the following preparations must be completed prior to lifting any load.

Taking Safety Precautions

The operator must be trained in all relevant industry and regulatory standards for the operation of the vacuum lifter in its geographical location (eg, ASME B30.20 in the USA).

The operator must read and understand this *INSTRUCTIONS* manual, including all **WARNINGS**, before using the lifter. If necessary, contact Wood's Powr-Grip or an authorized dealer for assistance.

 **WARNING: Always wear appropriate personal protective equipment.**

The operator must wear any personal protective equipment and take any other precautions required to handle the load safely. Consult appropriate trade association guidelines to determine what precautions are necessary for each type of load material.

Performing Inspections and Tests

Perform all inspections and tests required by the INSPECTION and TESTING SCHEDULES (see MAINTENANCE). In addition, if the lifter has been in storage, always conduct a VACUUM TEST before placing it in service (see MAINTENANCE).

CAUTION: Examine each air filter regularly, and empty when necessary.

The lifter is equipped with one or more air filters to help protect the vacuum system from contaminants.⁴ In order for a filter to function, the operator must empty the filter bowl before enough liquid accumulates to contact any portion of the filter element (see MAINTENANCE: AIR FILTER MAINTENANCE).

⁴ In order for the operator to use the lifter on wet load surfaces, it must be equipped with 2 or more filters that are connected *in series*. However, see MAINTENANCE: VACUUM PAD MAINTENANCE: Friction Coefficient before using the lifter on wet load surfaces.

TO APPLY THE PADS TO A LOAD

Generating Vacuum Flow

Place the main power switch in the "on" (I) position. This engages the vacuum pump, causing air to be drawn immediately at the vacuum pads.⁵

⚠ *WARNING: Never turn power off during operation; keep pump running throughout lift.*

The lifter is designed for the vacuum pump to run continuously. Placing the power switch in the "off" (O) position during lifter operation could result in the release of the load and possible injury to the operator (see TO LIFT AND MOVE THE LOAD: In Case of Power Failure to follow).

Positioning the Lifter on the Load

Make certain that the contact surfaces of the load and all vacuum pads are free of any contaminants that could prevent the pads from sealing against the load (see MAINTENANCE: VACUUM PAD MAINTENANCE).

Center the lifter's pad frame to within 2" [5 cm] of the load center, since off-center loading can cause the load to rotate unexpectedly or interfere with the lifter's tilt capability (see TO ROTATE THE LOAD EDGEWISE OR TO TILT THE LOAD to follow), and it may also damage the lifter.⁶ Make sure that all vacuum pads will fit entirely on the load's contact surface (see SPECIFICATIONS: Maximum Pad Spread) and that they will be loaded evenly while lifting (see SPECIFICATIONS: Per-Pad Load Capacity). Then apply the lifter to the load until all pads seal against the contact surface.

Note: If a vacuum pad has been lying against a hard object (as during shipping), it may be slightly distorted. Although initially it may be difficult to apply the pad to a load, this condition should correct itself with continued use.

⚠ *WARNING: Do not disconnect control pendant during lifter operation.*

The movable control pendant is not intended to be disconnected during lifter operation. Disconnecting the control pendant is likely to result in a load release and injury to the operator or others nearby.

Reading the Vacuum Gauge

The vacuum gauge indicates the current vacuum level in the lifter's vacuum system. The *green* range indicates vacuum levels sufficient for lifting the maximum load weight, whereas the *red* range indicates vacuum levels that are **not** sufficient for lifting the maximum load weight. The gauge needle should show a sudden surge in vacuum as the vacuum pads seal against the load.

⁵ If the vacuum pump or any other powered component fails to function while the power switch is in the "on" position, make sure the lifter is connected correctly to an appropriate power source, as directed in the ASSEMBLY section. If so, examine each circuit breaker (adjacent to power switch) to determine whether it has interrupted the electrical circuit to the component. Although the operator can reset the circuit breaker, the power interruption may indicate an electrical problem that requires attention. Correct any deficiency before resuming normal operation of the lifter (see wiring diagram provided).

⁶ The lifter is designed to handle the maximum load weight (see SPECIFICATIONS: Maximum Load Capacity) when the load's center of gravity is positioned within 2" [5 cm] of the pad frame's center point. Occasional loading deviations are permissible, provided that the operator can maintain control of the load at all times and that the load weight is low enough to avoid damaging the lifter.

If it takes more than 5 seconds for the vacuum level to reach 5" Hg [-17 kPa], press on any pad that has not yet sealed.

Vacuum Level on Optimal Surfaces

When the lifter is attached to clean, smooth, nonporous load surfaces, it should be able to maintain a vacuum level in the green range on the vacuum gauge, except when used at high elevations (see SPECIFICATIONS: Operating Elevation). If not, perform the VACUUM TEST (see MAINTENANCE) to determine whether there is a deficiency in the vacuum generating system.

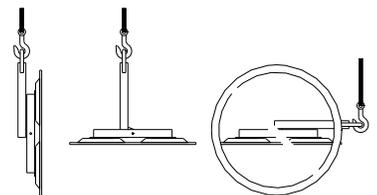
Vacuum Level on Other Surfaces

When the lifter is attached to contaminated, rough or porous load surfaces, it may not be able to maintain a vacuum level in the green range on the vacuum gauge, due to leakage in the seal between the vacuum pads and the load surface. In the case of contamination, thoroughly clean the contact surfaces of the load and the vacuum pads (see MAINTENANCE: VACUUM PAD MAINTENANCE: Cleaning), and reapply the lifter to the load. If the load has rough or porous surfaces, ***the operator must conduct a test to determine whether the lifter is designed to lift the load***, as follows:

- 1) Make sure the lifter's vacuum generating system is functioning correctly (see MAINTENANCE: VACUUM TEST).
- 2) Apply the vacuum pads to the load as previously directed.
- 3) When the vacuum level registers above 16" Hg [-54 kPa] on the vacuum gauge (see To LIFT AND MOVE THE LOAD: Load Capacity and the Lift Light to follow), place the power switch in the "off" (⊖) position.
- 4) Raise the load a minimal distance, to assure that it is supported by the lifter.
- 5) Monitor the vacuum gauge while the load is suspended for 5 minutes: ***The lifter must maintain a minimum vacuum level of 10" Hg [-34 kPa] during this time.*** If not, the load does not possess the characteristics required for using this lifter.⁷

To Lift and Move the Load

 ***WARNING: Lift bar must be oriented vertically to lift load.***



Load Capacity and the Lift Light

A lifter's Load Capacity is rated at a vacuum level of 16" Hg [-54 kPa] (see SPECIFICATIONS). After the lifter has attained this level, the green vacuum lift light turns on to indicate that the lifter is ready to lift the maximum load weight.

 ***WARNING: Never attempt to lift load unless green lift light is illuminated.***

Do not attempt to lift the load unless the lift light is illuminated; such an attempt could result in a load release and possible injury to the operator.

⁷ Certain load materials are too rough or porous to allow the lifter to form a seal which can be maintained for 5 minutes without power. However, in geographical locations where CE Standards do not apply, it may be possible to use the lifter to lift such loads. Contact Wood's Powr-Grip for more information.

Monitoring Vacuum Indicators

The vacuum lift light and the vacuum gauge must remain completely visible to the operator, so that they can be monitored throughout the entire lift.

 **WARNING: Vacuum indicators must be visible to operator throughout entire lift.**

The lifter's vacuum pump runs continuously to maintain sufficient vacuum for lifting the maximum load weight. If the vacuum system experiences leakage while the lifter is attached to the load, the lift light turns off automatically, to signal the reduction in vacuum to the operator.

If the lift light turns off while you are lifting a load, make sure the vacuum gauge shows a vacuum level of 16" Hg [-54 kPa] or higher. If not, move away and stay clear of the load until it can be lowered to the ground or a stable support.

 **WARNING: Stay clear of any suspended load while vacuum level is lower than 16" Hg [-54 kPa].**

Discontinue lifter use until the cause of the vacuum loss can be determined. If the lift light does not turn on when the lifter is attached to clean, smooth, nonporous materials, the leakage is likely to be in the vacuum system. In this event, perform the VACUUM TEST (see MAINTENANCE) and inspect the vacuum pads for damage (see MAINTENANCE: VACUUM PAD MAINTENANCE: Inspection). If the vacuum loss cannot be remedied immediately, perform inspection and maintenance as needed to identify and correct any deficiency before resuming normal operation of the lifter.

Controlling the Lifter and Load

When the vacuum indicators show that the lifter is ready, use the hoisting equipment to raise the lifter and load as needed to clear any obstacles in their path. Use the control handles to keep the lifter and load in the desired orientation while they are suspended from the crane. Once sufficient clearance is established, the load can be rotated or tilted as desired (see TO ROTATE THE LOAD EDGEWISE or TO TILT THE LOAD to follow).

In Case of Power Failure

The lifter is equipped with a vacuum reserve tank, designed to maintain vacuum temporarily in case of a power failure.

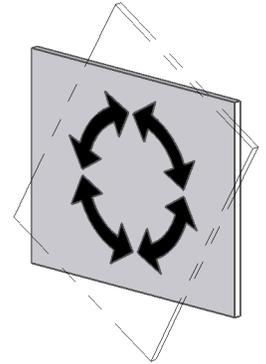
 **WARNING: Stay clear of any suspended load in the event of a power failure.**

Although the lifter is designed to support the load for at least 5 minutes without power, this depends on many factors, including the condition of the load and the lifter's vacuum system (see INTENDED USE: LOAD CHARACTERISTICS and MAINTENANCE: VACUUM PAD MAINTENANCE, VACUUM TEST). If a power failure occurs, keep all personnel clear of the suspended load until it can safely be placed on the ground or a stable support. Correct any deficiency before resuming normal operation of the lifter.

TO ROTATE THE LOAD EDGEWISE

 **WARNING:** *Make sure load is positioned correctly on lifter (see To APPLY); unbalanced loads may rotate unexpectedly when latch is disengaged.*

Remember that the load is longer in its diagonal dimensions than in its side dimensions. Make sure there is sufficient clearance for the load to rotate without contacting the operator or any nearby objects. Keep the load under control at all times, using hand cups or other appropriate means. Pull the rotation release lever to disengage the rotation latch, and rotate the load to the desired position. To stop the load's motion automatically at each quarter turn, simply let go of the rotation release lever immediately after initiating the rotation, so that the rotation latch engages at the next stop. Whenever rotation is not required, keep the rotation latch engaged, to prevent accidental damage to the load and possible injury to the operator.

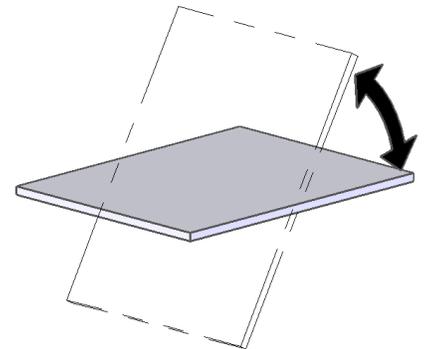


TO TILT THE LOAD

CAUTION: *Make sure load is positioned correctly on lifter (see To APPLY); unbalanced loads may damage lifter.*

Remember that the load requires more vertical space when tilted to the upright position, as well as more horizontal space when tilted to the flat position. Make sure there is sufficient clearance for the load to tilt without contacting the operator or any nearby objects.

A tilt speed controller is located on the lift bar, to govern the speed of tilt movement: Make sure the controller's power switch is activated (green light illuminated),⁸ and set the 2 controller dials to adjust tilt speed as desired. The dial marked "TILT #1" controls the speed of pad frame movement from the horizontal orientation to the vertical; whereas the dial marked "TILT #2" controls the speed of pad frame movement from the vertical orientation to the horizontal. Use extra care if a speed over 50% is selected, since tilt motion may be faster than expected.



The tilt toggle switch on the movable control pendant controls the powered tilt motion: To tilt the load towards the flat position, push the toggle up; to tilt the load towards the upright position, push the toggle down. Releasing the toggle switch locks the load in any position within the 90° range of tilt movement.

⁸ The controller's power switch controls the power supply to the actuator motor and brake, as well as the controller; consequently, powered tilt only functions when the controller power is engaged.

TO RELEASE THE PADS FROM THE LOAD

 **WARNING:** *Load must be fully supported before releasing vacuum pads.*

When the load is at rest and fully supported, push the vacuum release button on the movable control pendant to force air into the vacuum pads, quickly breaking the vacuum seal. After the pads have disengaged completely from the load, move the lifter away. Continue to hold the release button until the pads are well away from the load; otherwise, the lifter would reattach itself to the load.

AFTER USING THE LIFTER

Place the main power switch in the "off" (⊖) position.

CAUTION: *Do not set the lifter against any surfaces which could soil or damage the vacuum pads.*

Built-in parking feet can be used to support an unloaded lifter when not suspended from a crane: Make sure the pad frame is oriented vertically with the parking feet at the bottom. Use the hoisting equipment to gently lower the lifter until the parking feet support its entire weight. Make sure the lifter leans securely against an appropriate support; then detach the hoisting equipment hook from the lift bail.

If the lifter is transported to another location, use the original shipping container and secure the lifter so as to protect the vacuum pads and all other components from damage while in transit.

Storing the Lifter

Use the covers supplied to keep the vacuum pads clean.

.....
!!-CE-!! In accordance with CE Standard EN 13155, the lifter is designed to rest on relatively horizontal surfaces without tipping over. To store the lifter in this way, set the lifter with the pads facing downward on a clean, smooth, flat surface. Then lower the lift bar to a horizontal orientation (see OPERATION: TO TILT THE LOAD) and place a support under the lift bail. However, see the Note immediately following.
.....

Note: Storing the lifter with its pad frame and lift bar in the horizontal orientation could damage the tilt actuator, if the lift bar is not supported. Avoid placing the lifter in this position; or if this is unavoidable, place a support under the lift bar. Also be sure to provide manual assistance to the tilt actuator when raising the lift bar to the vertical position (see ASSEMBLY).

MAINTENANCE



WARNING: *Make sure power cable is disconnected from power source before servicing lifter.*

Note: One or more wiring diagrams may be provided in the final section of this *INSTRUCTIONS* manual for reference when servicing the lifter or trouble-shooting a deficiency.

INSPECTION SCHEDULE

Perform inspections routinely, according to the following frequency schedule:

Every-Lift Inspection

- Examine the vacuum pads and load surface for contamination or debris (see VACUUM PAD MAINTENANCE to follow).
- Examine the vacuum pads, controls and indicators for visual damage (see VACUUM PAD MAINTENANCE to follow).

If any deficiency is detected during the inspection, correct it before using the lifter and perform the Frequent Inspection to follow.

Frequent Inspection

(following every 20-40 hours' use; or whenever lifter is out of service for 1 month or more)

- Examine the lifter's structure for visual damage.
- Examine the vacuum system (including vacuum pads, fittings and hoses) for visual damage.
- Examine the air filter for conditions requiring service (see AIR FILTER MAINTENANCE to follow).
- Perform the VACUUM TEST to follow.
- Check for unusual vibrations or noises while operating the lifter.

If any deficiency is detected during the inspection, correct it before using the lifter and perform the Periodic Inspection to follow.

Periodic Inspection

(following every 250-500 hours' use; or whenever lifter is out of service for 1 year or more)

- Examine the entire lifter for external evidence of looseness, excessive wear, deformation, cracks, excessive corrosion, dents to structural or functional components, cuts, or any deficiency which might constitute a hazard.
- Inspect all parts of the electrical system for damage, wear or contamination that could constitute a hazard, in compliance with all local codes and regulatory standards that are relevant for the geographical region.

CAUTION: *Be sure to use appropriate cleaning methods for each type of electrical component, as specified by codes and standards. Improper cleaning can damage components.*

- Keep a written record of all Periodic Inspections.

If any deficiency is detected during the inspection, correct it before using the lifter. If necessary, return the lifter to Wood's Powr-Grip or an authorized dealer for repair (see LIMITED WARRANTY).

Infrequent Use

If a lifter is used less than 1 day in a 2-week period, perform the Periodic Inspection *each time before using the lifter*.

TESTING SCHEDULE

Perform these tests when placing the lifter in service *initially* and *each time following a repair or modification*. Correct any deficiency and retest before using the lifter.

Operational Tests

- Perform the VACUUM TEST to follow.
- Test all features and functions of the lifter (see OPERATING FEATURES, OPERATION and MAINTENANCE).

Load Test

Prove that the lifter can lift 100% of its Maximum Load Capacity (see SPECIFICATIONS), using an actual load or an equivalent simulation.⁹ Employ the following method to test with an actual load:

- 1) Place a test load with appropriate LOAD CHARACTERISTICS (see INTENDED USE) on a stable support. Make sure the load is oriented in the upright position.¹⁰
- 2) Apply the vacuum pads to the load as previously directed.
- 3) When the vacuum level registers above 16" Hg [-54 kPa] on the vacuum gauge, place the power switch in the "off" position (○).
- 4) Raise the load a minimal distance, to assure that it is supported by the lifter.
- 5) Hold the load for 5 minutes. The load must not slip or fall during this time period. If it does, conduct a VACUUM TEST and inspect each vacuum pad as indicated under VACUUM PAD MAINTENANCE: Inspection (see sections to follow). Correct any deficiency that is found and retest the lifter.

Note: See MAINTENANCE topics to follow for additional directions about inspecting and testing specific lifter components.

⁹ ASME Standard B30.20 requires the lifter to be tested to 125% of its Load Capacity.

¹⁰ Flat Lifters are exempt from this requirement.

MAINTENANCE SCHEDULE

Unless specified elsewhere in this *INSTRUCTIONS* manual, the lifter does not require maintenance on a routine basis. Instead, maintenance must be performed whenever a deficiency is indicated by routine inspections or tests. Any maintenance warranted must be performed before resuming normal operation of the lifter.

VACUUM PAD MAINTENANCE

Friction Coefficient

The friction coefficient represents the lifter's ability to resist load slippage when the load is oriented in any position except horizontal. If the contact surfaces of either the load or the vacuum pads are not clean, dry and in good condition, slippage is more likely to occur.

The Load Capacity of most Powr-Grip lifters is based on a friction coefficient of 1 (only Flat Lifters are exempt from this requirement). However, a vacuum pad's ability to maintain this friction coefficient is reduced by factors such as contamination, wear, age and exposure to sunlight, as well as the condition of the load's contact surface (see INTENDED USE: LOAD CHARACTERISTICS). Pads that have surface contamination must be thoroughly cleaned (see Cleaning discussion to follow). Over time, the rubber in a pad may experience hardening or leaching of chemicals, resulting in stiffness or surface glaze. Pads that exhibit wear, stiffness or glaze must be replaced. In addition, all pads should be replaced on a regular basis, preferably after no more than 2 years, to ensure that the friction coefficient is not compromised. If necessary, contact your dealer or Wood's Powr-Grip for more information.

Inspection

Inspect each vacuum pad for the following deficiencies routinely, as directed in the preceding INSPECTION and TESTING SCHEDULES. Correct any deficiency before using the lifter.

- Contaminates on the pad face or sealing edges: Soil build-up can prevent pads from sealing adequately or reduce the friction coefficient (see discussion preceding). Follow the directions to clean pads as necessary (see discussion to follow).
- Filter screen missing from pad face: This screen helps prevent debris from plugging the vacuum hose and the air filter. Replace any missing screen immediately (see REPLACEMENT PARTS LIST).
- Nicks, cuts or abrasions in sealing edges: Pad damage can reduce the lifting capacity of the lifter. Replace any damaged pad immediately (see REPLACEMENT PARTS LIST).¹¹

 **WARNING: Replace vacuum pad if sealing edge has any nicks, cuts or abrasions.**

- Wear, stiffness or glaze: See Friction Coefficient preceding. Replace any pad that exhibits wear, stiffness or glaze (see REPLACEMENT PARTS LIST).

¹¹ If the lifter is equipped with VPFS10T or VPFS625 pads, the sealing edge is the replaceable sealing ring. When it is damaged, install a new sealing ring insert. In such cases, see TO REPLACE SEALING RING INSERT IN VACUUM PAD to follow.

Cleaning

Regularly clean the face of each vacuum pad to remove oil, dust and any other contaminants. Acceptable cleaning agents include soapy water and other mild cleansers. Do *not* use solvents, petroleum-based products (including kerosene, gasoline and diesel fuel) or any harsh chemicals for cleaning. Do *not* use unauthorized rubber cleaners or conditioners, such as those intended for cleaning tires or vinyl surfaces, because those products can leave a hazardous film on vacuum pads which significantly reduces their lifting capacity (see Friction Coefficient preceding). The use of any unauthorized cleaning agent is prohibited because it could damage the pad and/or create a hazard to the operator or others.

 **WARNING: Never use solvents, gasoline or other harsh chemicals to clean vacuum pad.**

 **WARNING: Never use unauthorized rubber cleaners or conditioners to clean vacuum pad.**

To prevent liquid from contaminating the vacuum system during cleaning, cover the suction hole in the recess for the filter screen or make sure the pad faces downward. Use a clean sponge or lint-free cloth to apply an authorized cleanser and wipe the pad face clean. A toothbrush (or similar brush with bristles *that do not harm rubber*) may be used to remove contaminants clinging to sealing edges.¹² Wipe all residue from the pad face, and allow the pad to dry completely before using the lifter.

VACUUM TEST

Test the vacuum system for leakage routinely, as directed in the preceding INSPECTION and TESTING SCHEDULES.

- 1) Clean the face of each vacuum pad as previously directed (see VACUUM PAD MAINTENANCE: Cleaning).
- 2) Apply the lifter to a clean, smooth, nonporous surface. The surface should be flat or possess no more curvature than the lifter is designed for (if any).¹³
- 3) When the vacuum level registers above 16" Hg [-54 kPa] on the vacuum gauge, place the power switch in the "off" position (○) and leave the pads attached to the surface.
- 4) Monitor the vacuum gauge: *The vacuum level should not decrease by more than 4" Hg [-14 kPa] in 10 minutes.*

 **WARNING: If lifter fails vacuum test, discontinue use immediately.**

Correct any deficiency in the vacuum system before using the lifter. Contact Wood's Powr-Grip or an authorized dealer for assistance.

¹² If these cleaning methods are not successful, contact Wood's Powr-Grip or an authorized dealer for assistance.

¹³ Any test material used must be fully and independently supported, and capable of bearing the lifter's weight. Do not use the lifter to lift the test material during the vacuum test.

TILT COMPONENTS MAINTENANCE

High-Duty Tilt Actuator

Powered tilt motion is performed by a 90-volt DC, ball screw linear actuator, or "tilt actuator".

The only user-replaceable parts of the actuator motor are the brushes. Check the brushes initially after 42,000 tilt cycles and every 20,000 tilt cycles thereafter.¹⁴ Replace the brushes if their square section is worn to a length of 5/16" [8 mm] or less (see REPLACEMENT PARTS LIST).

The ball screw and guide bearings are prelubricated and should not require any additional lubrication. Although the tapered load bearings also are prelubricated, use the grease zerk on the side of the bearing housing to apply a small amount of light, general-purpose grease to them after every 20,000 tilt cycles. *Do not over-lubricate.*

The brake is preset and should provide consistent braking for the tilt function. In the event that the brake friction surfaces become worn (indicated by excessive drift), contact Wood's Powr-Grip for rebuilding.

The limit switches which control stroke length also are preset and should not need adjustment. However, if adjustment is required, proceed as follows:

CAUTION: Exercise special care when adjusting limit switches because excessive actuator motion can damage lifter components.

- 1) Determine which end of the stroke needs to be adjusted, and identify the limit switch governing the stroke limit in that direction.
- 2) Determine which direction to move the limit switch in order to produce the desired adjustment: Rotating the limit switch's arm on the splined shaft changes the position of the roller in relation to the corresponding contact surface on the lifter's rotation hub. To *reduce* the stroke length, move the roller of the limit switch *towards* the contact surface. To *increase* the stroke length, move the roller of the limit switch *away from* the contact surface.
- 3) Note the current position of the limit switch's arm on the shaft. Then loosen the socket-head screw on the arm, rotate the arm in the appropriate direction on the shaft, and tighten the socket-head screw to secure the arm.
- 4) Check the stroke length and repeat steps 1-3 as necessary to obtain the desired adjustment.

Tilt Speed Controller

Tilt speed and power are governed by the tilt speed controller (located on lift bar), which operates on 120 volts AC to produce an adjustable 0 to 90 volts DC for the actuator motor, and a constant 90 volts DC for the actuator brake.

The tilt speed controller has 2 speed control dials. The *upper* dial (marked "TILT #1") controls the speed of actuator *extension*. The *lower* dial (marked "TILT #2") controls the speed of actuator *retraction*.

The speed controller's internal settings for minimum and maximum motor speeds, acceleration and deceleration rates, and motor torque are preset and should not need adjustment. If any of these settings needs adjustment, contact Wood's Powr-Grip for instructions.

¹⁴ "Tilt cycle" indicates full 90° travel in *both* directions.

 **WARNING: When replacing fuses, power supply wire must be disconnected from controller to prevent contact with dangerous voltages.**

The speed controller's hot and neutral lines have 15-amp, normal blow fuses that are user-replaceable.

Tilt Function Troubleshooting

If the tilt function experiences one of the following problems, investigate the possible causes indicated. Correct any deficiency prior to resuming normal use of the lifter.

If line fuse blows repeatedly:

- Motor of tilt actuator may be overloaded.
- Actuator motor's armature or power supply wire may be shorted or grounded: Disconnect the power supply wire from the armature. An ohmmeter reading on the armature connections should read from 1.25 to 4.00 ohms. A reading from either side of the armature connections to the motor frame should read "open" (use high ohm scale).
- Actuator motor's brushes may be worn.

If actuator motor does not function and line fuse has not blown:

- Power switch for tilt speed controller may not be activated.
- Torque trim pot (inside controller enclosure) may need to be adjusted clockwise.
- Speed selected on controller dial may be too low for load resistance.
- Actuator motor's connections may be loose or motor's brushes worn.

If actuator motor runs at full speed regardless of speed controller setting:

- Speed controller may be shorted or defective.
- Speed controller's potentiometer may be defective.

If actuator moves excessively fast during retraction stroke under heavy loads, regardless of speed controller setting:

- External speed limiting resistor may be defective or disconnected.

AIR FILTER MAINTENANCE – LARGE

(For 4.4 oz [130 ml] bowl size filters)

Filter Function and Conditions Requiring Service

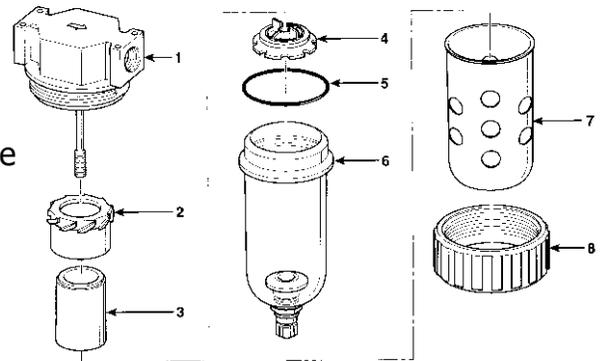
An air filter prevents solid particles and liquid from contaminating components in the vacuum system.

CAUTION: *Examine air filter regularly and empty when necessary.*

Liquid must not contact any portion of the filter element; remove trapped liquid regularly. Replace the element if it has an overall dirty appearance, or if there is a noticeable increase in the time required to attain full vacuum. (Refer to REPLACEMENT PARTS LIST for filter element kit.)

Filter Service Procedures

- 1) Unscrew the threaded collar (8) from the body (1). Support the body while twisting the collar, to protect the vacuum line fittings from being damaged. Then remove the bowl guard (7) and the bowl (6).
- 2) Determine whether the filter element (3) needs to be replaced (see Conditions Requiring Service preceding). *If so*, proceed to step 3.



If not, remove any liquid or contaminants from the bowl; clean the old bowl seal (5) with mild soap and water; and skip to step 7.

- 3) Unscrew the baffle (4), and remove the element and deflector (2).
- 4) Discard the element and the bowl seal (5).
- 5) Clean all internal parts and the bowl, using mild soap and water only. *Do not* use any other cleaners.
- 6) Install the deflector and a new filter element; then screw the baffle back on (tighten gently, finger tight) to hold the element in place.
- 7) Lubricate the new or cleaned bowl seal, using a mineral base oil or grease (such as the lubricant furnished in the filter element kit). *Do not* use synthetic oils, such as esters, or silicones.
- 8) Place the bowl seal around the rim of the bowl. Then install the bowl on the body, taking care to avoid contaminating the filter element with lubricant.
- 9) Install the bowl guard and the collar, tightening it only hand-tight (28-32 in-lbs [316-362 N-cm] torque).
- 10) Test the vacuum system to be certain the air filter does not leak (see VACUUM TEST preceding, if applicable).

⚠ WARNING: When the air filter is being used on a *vacuum* system, rather than with pressure, using the twist drain to remove liquid from the bowl is *not* recommended. **Never** disturb the twist drain, as contaminants could lodge in the drain seal and cause a vacuum leak.

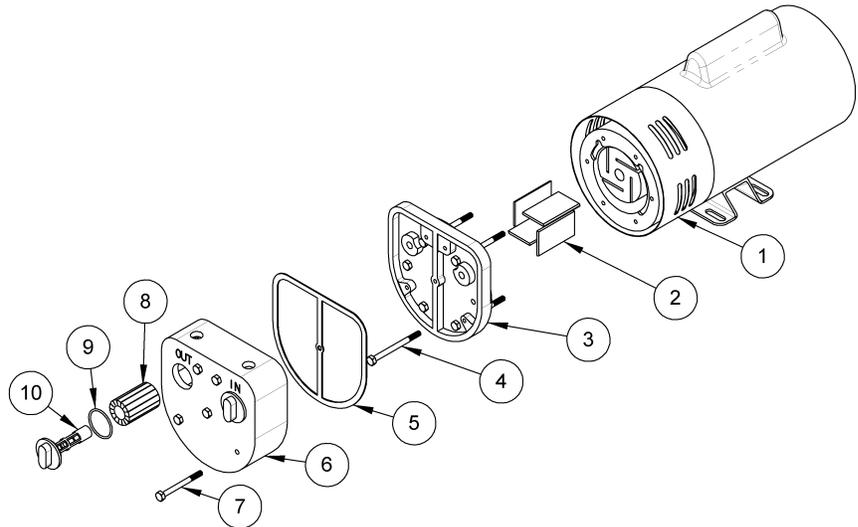
VACUUM PUMP MAINTENANCE – GAST 0523-101Q-SG588DX

⚠ WARNING: Before proceeding with any maintenance, disconnect power source.

Disassembly/Reassembly Procedure

(includes replacing the air filters, vanes and gasket—see REPLACEMENT PARTS LIST)

- 1) Remove the end caps (10), O-rings (9) and air filters (8) from the sound chamber (6) of the vacuum pump.
- 2) Remove the five bolts (7) and remove the sound chamber (6).
Note: If any liquid is discovered in the sound chamber, thoroughly dry all interior surfaces of the pump prior to reassembly.
- 3) Remove the six bolts (4) from the endplate (3), and separate the endplate from the rotor housing. The shroud (1) surrounding the rotor housing will loosen as well.
- 4) Note the orientation of the bevel on the vanes (2) for step 5. Then remove the vanes by sliding them out the end of the rotor. If needed, rotate the rotor by hand to position the vanes for easier access.
- 5) Make sure that the rotor and housing are clean and free of debris. Orient the new vanes (2) like the old ones by matching the bevel. Then insert the new vanes by sliding them into the empty slots in the rotor.
- 6) Reinstall the endplate (3) and secure it with the six bolts (4) previously removed.
- 7) Remove the gasket (5), and make sure that the contact surfaces between the endplate and sound chamber are clean. Install a new gasket and reinstall the sound chamber (6). Then secure the sound chamber with the five bolts (7) previously removed.
- 8) Replace the air filters (8). Then reinstall the O-rings (9) and end caps (10).



- | | |
|---------------------------|--------------------------------|
| 1 SHROUD | 6 SOUND CHAMBER |
| 2 VANES (4x) | 7 BOLTS FOR SOUND CHAMBER (5x) |
| 3 ENDPLATE | 8 AIR FILTER (2x) |
| 4 BOLTS FOR ENDPLATE (6x) | 9 O-RING (2x) |
| 5 GASKET | 10 END CAP (2x) |

VACUUM PUMP MAINTENANCE – GAST N70

⚠ WARNING: Before proceeding with any maintenance, disconnect power source.

If the vacuum pump takes too long to attain full vacuum, it may require maintenance. Replace worn parts as necessary to obtain acceptable pump performance (see REPLACEMENT PARTS LIST).

A) Disassembling the Head Assembly

- 1) Note or mark the orientation of the pump heads (2) and valve plate (3) for reassembly.
- 2) Remove the eight head screws (1), and then remove the two heads (2) and valve plate (3).
- 3) Remove the four head O-rings (8) and the two cylinder O-rings (9) from the valve plate (3). The O-rings will be replaced later.

B) Replacing the Head-Side Leaf Valves

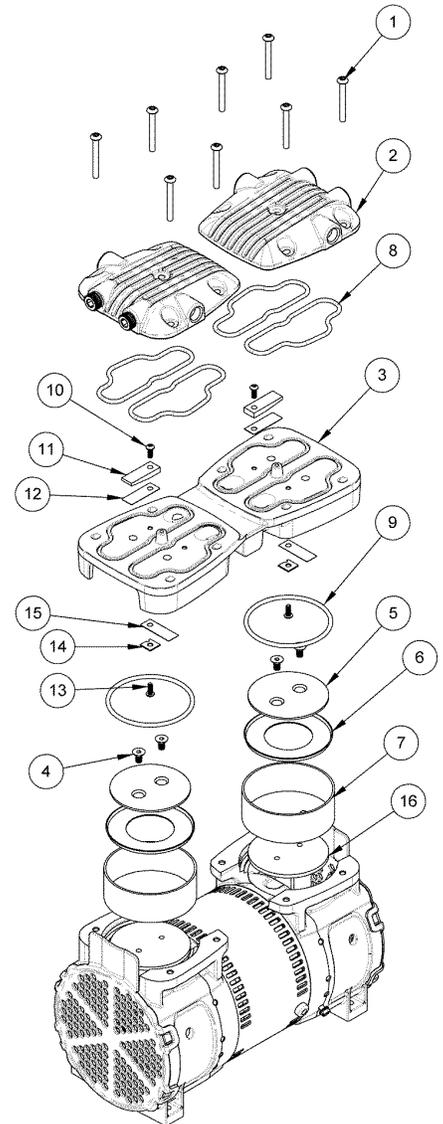
- 1) Note the orientation of the valve limiters (11) for reassembly.
- 2) Remove the two long valve screws (10) from the head side of the valve plate (3), and then remove the two valve limiters (11) and (exhaust) leaf valves (12).
- 3) Install new leaf valves (12) and reinstall the valve limiters (11) and long valve screws (10).

C) Replacing the Cylinder-Side Leaf Valves

- 1) Note the orientation of the valve retainer plates (14) for reassembly.
- 2) Remove the two short valve screws (13) from the cylinder side of the valve plate (3) and then remove the two retainer plates (14) and (intake) leaf valves (15).
- 3) Install new leaf valves (15) and reinstall the retainer plates (14) and short valve screws (13).

D) Disassembling the Cylinder Assembly

- 1) Note the orientation of the cylinders (7) and cups (6) for reassembly.
- 2) Remove the four retainer screws (4) from the two retainer plates (5). Remove the cylinders (7), leaving the retainer plates and cups (6) inside.
- 3) Invert the cylinders (7) and push the retainer plates (5) out through the top. The cylinders and cups (6) will be replaced next.



E) Replacing the Cylinders and Cups

- 1) Push one push rod (16) all the way down, and then position a new cylinder (7) over the push rod.
- 2) Place a retainer plate (5) into a new cup (6) and insert these parts together into the top of the cylinder (7). Then push both parts down until the retainer plate contacts the push rod (16).
- 3) Install two new retainer screws (4) to secure the retainer plate (5) to the push rod (16). Tighten the screws securely.
- 4) Press down on the cylinder (7) just installed to hold it in place, and then push the other push rod (16) all the way down.
- 5) Repeat steps 1–5 to install the second cylinder, cup and retainer plate.

F) Replacing O-Rings and Reassembling the Head Assembly

- 1) Install two new cylinder O-rings (9) into the valve plate (3), and position the valve plate on the top of the cylinders (7).
- 2) Install four new head O-rings (8) into the valve plate (3), and position the two heads (2) on top of the valve plate.
- 3) Make sure that the valve plate (3) and heads (2) are oriented in their original positions, and secure the heads to the pump using the eight head screws (1).

Reference Number	Availability	Quantity	Description
1	*	8	Head Screws (T25 Torx)
2	*	2	Head
3	*	1	Valve Plate
4	△	4	Retainer Screw (T20 Torx)
5	*	2	Retainer Plate
6	△	2	Cup
7	△	2	Cylinder
8	△	4	Head O-ring
9	△	2	Cylinder O-ring
10	*	2	Long Valve Screw (T15 Torx)
11	*	2	Valve Limiter
12	△	2	Leaf Valve (Exhaust)
13	*	2	Short Valve Screw (T15 Torx)
14	*	2	Retainer Plate
15	△	2	Leaf Valve (Intake)

* Special Order – Non-Stocked Item

△ Included in service kit #66178

VACUUM SWITCH ADJUSTMENT

Vacuum Switch Function

A vacuum switch controls the vacuum lift light for an AC lifter (see OPERATING FEATURES for location of vacuum switch). After the lifter attains a vacuum level sufficient for lifting the maximum load weight (hereafter, "minimum lifting level"), the vacuum switch automatically turns on the lift light. When vacuum decreases to a level that is lower than the minimum lifting level (as when releasing a load), the vacuum switch automatically turns off the lift light again, until the minimum lifting level is regained.

Conditions Requiring Readjustment

At the factory, the vacuum switch is set to the minimum vacuum level specified for Load Capacity (see SPECIFICATIONS). However, shipping vibrations or shocks, normal wear, or other conditions may adversely affect this adjustment. Periodically verify the switch adjustment by comparing how the vacuum lift light functions in relation to the vacuum level registered on the vacuum gauge, as follows:

- If the lift light *turns on before* vacuum attains the minimum lifting level, it is likely that the air filter's element is dirty. **Any filter element that obstructs airflow must be replaced** (refer to AIR FILTER MAINTENANCE preceding). Otherwise, the lift light would turn on at vacuum levels that are not sufficient to lift the maximum load weight.
- If the lift light *does not turn on after* vacuum increases to a level much *higher* than the minimum lifting level, the light bulb may be burned out. If this condition persists after the bulb has been replaced, the vacuum switch may need to be adjusted to turn on the lift light at a lower vacuum level. Otherwise, the operator might wait unnecessarily for the lift light to turn on, after the lifter has already attained sufficient vacuum to lift the maximum load weight.
- If the lift light *does not turn off before* vacuum decreases to a level *lower* than the minimum lifting level, the vacuum switch **must be adjusted to turn off the lift light at a higher vacuum level**.¹⁵ Otherwise, the lift light would remain on at vacuum levels that are not sufficient to lift the maximum load weight.

Adjustment Procedure

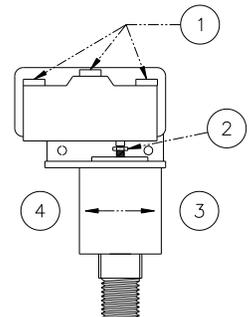
- 1) Using a 1/4" open-end wrench (as provided), turn the adjustment screw about 1/6th turn at a time (approximately one flat of the screw head).

To make the vacuum lift light turn *on* at a *lower* vacuum level, turn the screw *clockwise* (when viewing vacuum switch from end with electrical connectors).

To make the lift light turn *off* at a *higher* vacuum level, turn the screw *counter-clockwise* (when viewing vacuum switch from end with electrical connectors).

- 2) Recheck the vacuum switch setting following each 1/6th turn of the adjustment screw. In order to test the adjustment accurately, release the vacuum pads completely before reapplying them to a test surface.

When the vacuum switch is adjusted correctly, the lift light turns on only *after* vacuum increases to a level higher than the minimum lifting level; and the lift light turns off again *before* vacuum decreases to a level lower than the minimum lifting level.



- 1 ELECTRICAL CONNECTORS
- 2 ADJUSTMENT SCREW
- 3 LIGHT OFF AT HIGHER VACUUM
- 4 LIGHT ON AT LOWER VACUUM

¹⁵ In order to observe lifter functions while vacuum is decreasing, it may be necessary to create a controlled leak in the vacuum system (e.g., by breaking the seal between one or more vacuum pads and the test surface).

REPLACEMENT PARTS LIST

Stock No.	Description	Qty.
96212AM	Actuator - High-Duty - 12" [305 mm] Stroke	1
95500AM	Vacuum Pump - Rotary Vane Type - 4-SCFM [113 liters/minute] - 100/120/240 V AC	1
67075	Potentiometer - 20 kOhm	2
67050	Resistor - 15 Ohm - 1000 W	1
66178	Pump Service Kit (for wobble piston pump)	1
66175AB	Pump Gasket (for rotary vane pump)	1
66175	Pump Vanes/Filters Kit (for rotary vane pump)	1
66125	Vacuum Pump - Wobble Piston - 4-SCFM [113 liters/minute] - 100/120/240 V AC	1
65444	Vacuum Hose - 1/2" [12.7 mm] ID (approx. 50" [127 cm] in length)	1
65443	Vacuum Hose - 3/8" [9.5 mm] ID (approx. 52" [132 cm] in length)	1
65440AM	Vacuum Hose - 1/4" [6.3 mm] ID x 120" [305 cm] length - Coiled	4*
65440	Vacuum Hose - 1/4" [6.3 mm] ID (approx. 208" [528 cm] in length*)	1
65438	Vacuum Hose - 1/8" [3.2 mm] ID (approx. 6" [15 cm] in length)	1
65301	Handle Grip Foam (approx. 34 1/2" [88 cm] in length)	1
65212	Check Valve - 1/4 NPT	1
65211	Check Valve - 1/8 NPT	1
65010	Pad Spring - Coil Type	8
64461	Circuit Breaker - 10 A	1
64459MZ	Circuit Breaker - 8 A	1
64459	Circuit Breaker - 5 A	1
64381	Motor Brushes (for tilt actuator)	2
64289	Bulb - 24 V - Bayonet (for vacuum lift light)	1
64262	Green Lens (for vacuum lift light)	1
64236	Vacuum Switch - 1/4 NPT	1
64227	Circuit Board for Speed Controller	1
64191	Contact Block (for power switch)	1
55952	Solenoid Valve Manifold Assembly - 24 V AC - High Flow	1
53132	Hose Fitting - Tee - 5/32" [4.0 mm] ID	4
53128	Pad Fitting - Tee - 5/32" [4.0 mm] ID	2
53122	Pad Fitting - Elbow - 5/32" [4.0 mm] ID	6
49506TA	Vacuum Pad - Model VPFS9 / 9" [23 cm] Diameter	8
49180	End Plug - 3" x 3" x 1/4" [76.2 mm x 76.2 mm x 6.4 mm] Tubing Size	2
49122	End Plug - 2" x 2" x 1/4" [50.8 mm x 50.8 mm x 6.4 mm] Tubing Size	8
29353	Pad Cover	8
16132	Filter Element Kit (for 4.4 oz [130 ml] bowl size air filter)	1
15910	Vacuum Gauge - 1/8 NPT - CBM Type	1
15794	Handle for Rotation Release Lever	1
15650AM	360° Rotating Union - 3/8 NPT	1
15632	Pad Filter Screen - Small	8
10900	Shoulder Bolt - Socket Head - 5/16" X 1/2" X 1/4-20 Thread (for mounting pads)	48

* Quantity varies, depending on options selected.

**SERVICE ONLY WITH IDENTICAL REPLACEMENT PARTS,
AVAILABLE AT WPG.COM OR THROUGH AN AUTHORIZED WPG DEALER**

LIMITED WARRANTY

Powr-Grip products are carefully constructed, thoroughly inspected at various stages of production, and individually tested. They are warranted to be free from defects in workmanship and materials for a period of one year from the date of purchase.

If a problem develops during the warranty period, follow the instructions hereafter to obtain warranty service. If inspection shows that the problem is due to defective workmanship or materials, Powr-Grip will repair the product without charge.

WARRANTY DOES NOT APPLY WHEN:

Modifications have been made to the product after leaving the factory.

Rubber portions have been cut or scratched during use.

Repairs are required due to abnormal wear and tear.

The product has been damaged, misused, or neglected.

If a problem is not covered under warranty, Powr-Grip will notify the customer of costs prior to repair. If the customer agrees to pay all repair costs and to receive the repaired product on a C.O.D. basis, Powr-Grip then will proceed with repairs.

TO OBTAIN REPAIRS OR WARRANTY SERVICE

For purchases in *North America*:

Contact the Technical Service Department at Wood's Powr-Grip Co. When factory service is required, ship the complete product—prepaid—along with your name, address and phone number to the street address hereafter.

For purchases in *all other localities*:

Contact your dealer or the Technical Service Department at Wood's Powr-Grip Co. for assistance.

Wood's Powr-Grip Co., Inc.
908 West Main St. / P.O. Box 368
Laurel, MT USA 59044

phone 800-548-7341

phone 406-628-8231

fax 406-6

TYPE: STANDARD	FILE DIRECTORY: FILE [SHEET]: 700- W04 [W05]
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WPG	
STANDARD PARTS N/A	
240VAC 4SCFM WOBBLE PISTON VAC PMP WIRING SCHEMATIC D700-W04 [W05]	
SIZE: A	SCALE: NONE
REVISION: 02.A	ECN NUMBER: 4328
ECN DATE: 05/09/2017	EST. WEIGHT: N/A

WIRE LEGEND: CONTROLLED BY WIRING SYMBOLS DRAWING EXCEPT AS NOTED AND BELOW.
LINE STYLES AND WIDTHS FOR WIRE UNLESS NOTED OTHERWISE:

.....	18AWG	N/A	N/A
-----	16AWG	N/A	N/A
	14AWG	N/A	N/A
	12AWG	N/A	N/A

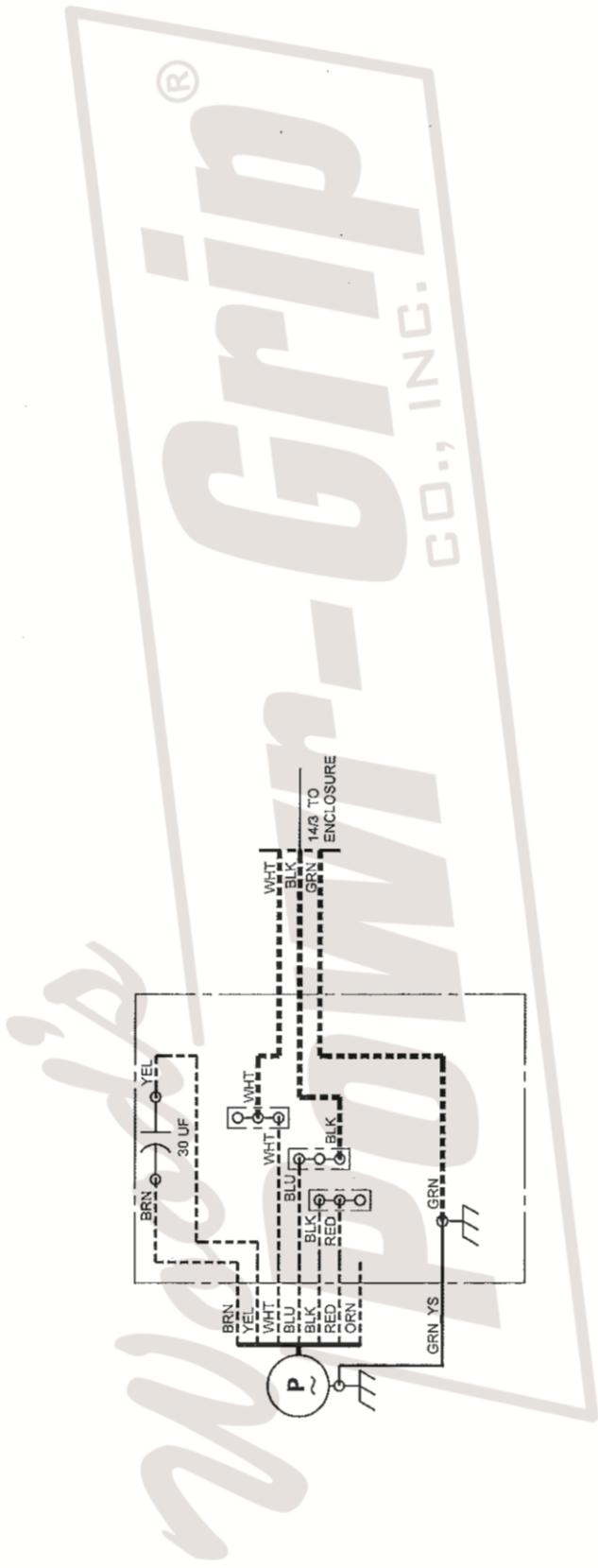
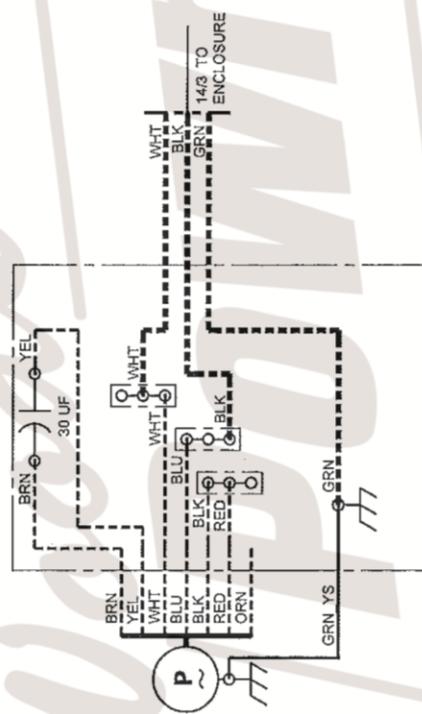
PRODUCT MANAGER: GARY B.
DATE: 02/05/2016

CHECKED: *CR*

APPROVED: *Chen*

DATE: 05-17-17

DATE: 5-17-17



DIRECTORY: H:\Working\STD\715-SOLELECN\2935\ 715-W01 [B-W01]

TYPE: STANDARD

WIRE LEGEND: CONTROLLED BY WIRING SYMBOLS DRAWING EXCEPT AS NOTED AND BELOW. LINE STYLES AND WIDTHS FOR WIRE UNLESS NOTED OTHERWISE.

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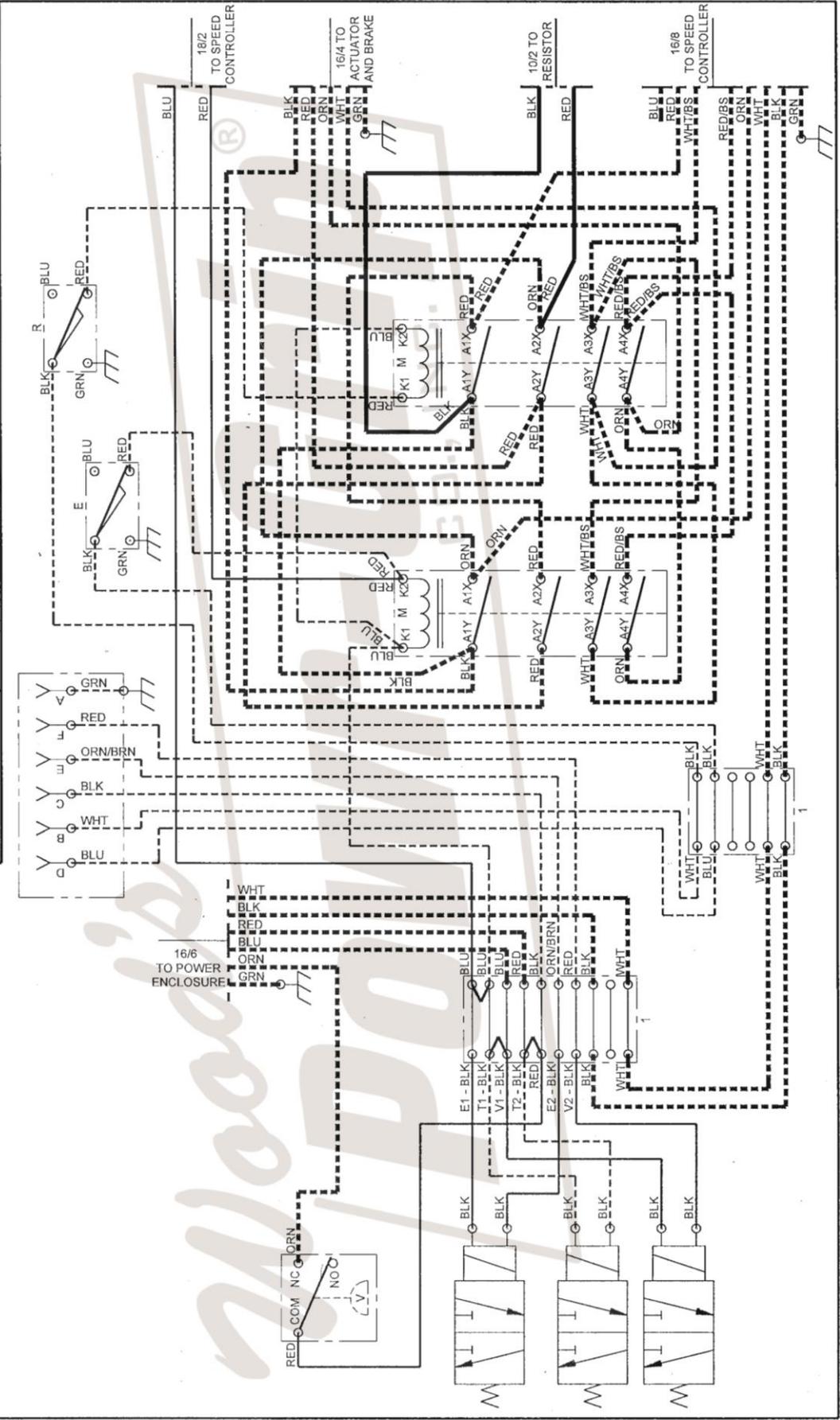
20AWG. --- 18AWG. --- 16AWG. --- 14AWG. --- 12AWG. --- 10AWG. ---

NOTES:
1) MAKE ALL RELAY CONTACTS NORMALLY OPEN.

HIGH-FLOW SOLENOID VALVE PACKAGE
HIGH DUTY ACTUATOR
24VAC VALVE WIRING DIAGRAM
D715-W01 [B-W01]

DATE: 12/10/2003
DRAWN: G. BOND
CHECKED: CR
APPROVED: *Can*

SIZE: A NONE
SCALE: NONE
REV: 4
ECN NUMBER: 2935
DATE: 07/27/2012
BY: RAS

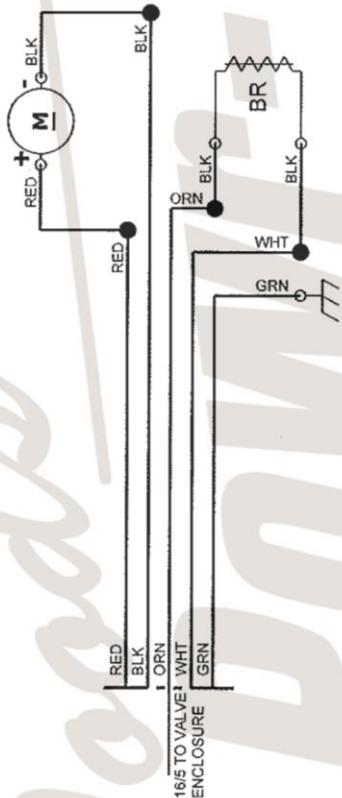
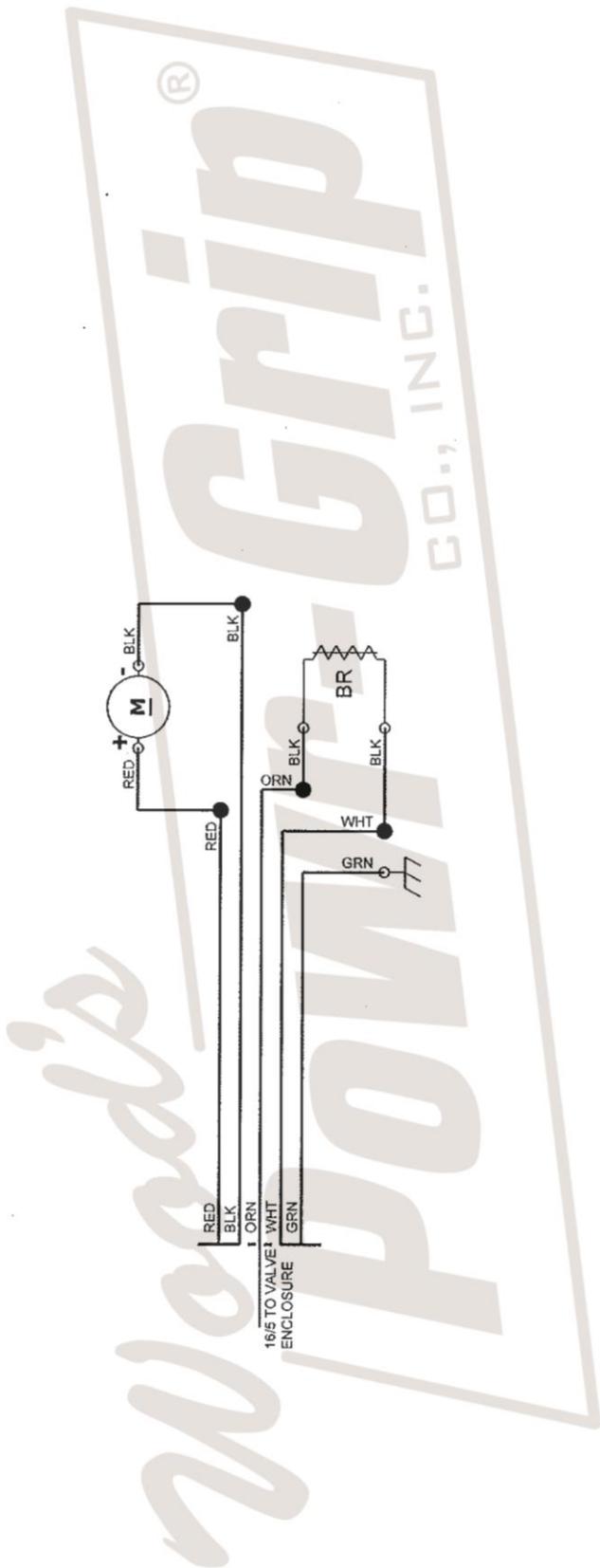


TYPE: STANDARD		FILE DIRECTORY: 720- W01 [W01]	
WIRE LEGEND: CONTROLLED BY WIRING SYMBOLS DRAWING EXCEPT AS NOTED AND BELOW. LINE STYLES AND WIDTHS FOR WIRE UNLESS NOTED OTHERWISE. --- 16AWG --- --- N/A --- --- N/A --- --- N/A ---			
PRODUCT MANAGER: JOSH E.		DATE: 01/30/2004	
CHECKED: <i>ck</i>		DATE: <i>07-29-05</i>	
APPROVED: <i>cm</i>		DATE: <i>7-29-15</i>	
SIZE: A		SCALE: NONE	REVISION: 01.A
ECN NUMBER: 3711		ECN DATE: 04/01/2015	
EST. WEIGHT: N/A		KMK	

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WPG
WOOD'S POWR-GRIP CO., INC.
 1 LAUREL MONTANA U.S.A.

HIGH-DUTY ACTUATOR
 N/A
HIGH DUTY ACTUATOR WIRING SCHEMATIC
D720-W01 [W01]



TYPE: STANDARD	FILE DIRECTORY: FILE (SHEET): 720C-W01 [C-W01]	720
WIRE LEGEND: CONTROLLED BY WIRING SYMBOLS DRAWING EXCEPT AS NOTED AND BELOW. LINE STYLES AND WIDTHS FOR WIRE UNLESS NOTED OTHERWISE: ----- N/A - - - - - N/A - - - - - 10AWG		
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HIGH-DUTY ACTUATOR DYNAMIC BRAKE RESISTOR WIRING SCHEMATIC D720C-W01 [C-W01]		
PRODUCT MANAGER: JOSH E.	DATE: 01/29/2004	
CHECKED: <i>CE</i>	DATE: <i>01-29-05</i>	
APPROVED: <i>Claw</i>	DATE: <i>7-29-15</i>	
SIZE: A	SCALE: NONE	ECN BY: KMK
REVISION: 01.A	ECN NUMBER: 3711	EST. WEIGHT: N/A
ECN DATE: 04/01/2015		

