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SealVac™

FUEL DRAIN SYSTEM

Model Numbers SVU412 and SVU416

PARTS, OPERATION and MAINTENANCE MANUAL

U.S. Patent No. 5,117,876 - Other Patents Pending

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Section 1: Introduction

- 1.1 To obtain optimum benefit from your **SealVac™** unit, it is recommended that all operating personnel read and understand this manual prior to operation.
- 1.2 Upon receipt of the **SealVac™** unit, a visual inspection should be made to determine that it is complete and has not sustained any damage during transportation.

Section 2: Safety

2.1 Potential Fire Or Explosion

- 2.1.1 Due to the nature of fuel, care should be exercised to eliminate all sparks and open flame in the area of the unit.
- 2.1.2 A 50 foot radius area around the unit for no smoking, sparks, or open flames is usually a good practice. It is strongly recommended all local or other regulations be consulted for further restrictions.

CAUTION: *The SealVac™ unit should never be used inside of an enclosed area. Proper ventilation is required at all times.*

2.2 Venting of Aircraft

- 2.2.1 Prior to any defueling to the aircraft you must insure proper venting to the aircraft fuel tanks or fuel cells or damage to the aircraft will occur.

2.3 Telescoping Drain

- 2.3.1 Care should be exercised in using the telescoping drain funnel to prevent injuring fingers between clamps by dropping sections.

2.4 Grounding

- 2.4.1 To eliminate static sparks, the unit is equipped with grounding reels which should be connected prior to draining or filling operations.

2.5 Towing

- 2.5.1 Make sure the tow bar is securely attached to the towing vehicle.
- 2.5.2 Before moving the bowser unit, check to assure the parking brake is released.
- 2.5.3 Maximum allowable towing speed is 15 MPH.

2.6 Parking

- 2.6.1 Parking brake must be applied when filling and draining or when left unattended.

2.7 Air Supply

CAUTION: Check the air pressure of supply lines to the vacuum generator to assure it is not in excess of 100 PSI.

2.8 Inspections

- 2.8.1 Inspection of tires, undercarriage, tow bar, vent, valves, hoses, sight gauge, reflectors, safety labels, etc., should be inspected on a periodic basis. It is recommended these inspections be performed weekly.
- 2.8.2 Internal inspection will be necessary to insure structural integrity and cleanliness. It is recommended that internal inspections be performed at least every (6) six months.

2.9 Vacuum Manway

- 2.9.1 Insure the manway cover is provided with a "lock out" devised to prevent accidental closing of the manway while doing internal inspections and to prevent unwanted elements from being introduced to the fuel supply.

2.10 Hoses

- 2.10.1 Inspect hoses daily prior to usage. The hoses should be extended, as it normally would be for operation. Check for evidence of blistering, carcass saturation or separation, cuts, nicks or abrasions that expose reinforcement materials. Look for slippage, misalignments or leaks at the couplings. If coupling slippage or leaks are found the cause of the problem shall be determined. All defective hoses should be removed for service.

- 2.11 Vacuum Governor: The **SealVac™** unit is provided with a pre-adjusted vacuum governor. See maintenance for adjusting.

CAUTION: When entering confined spaces such as the interior of the SealVac™ unit, care should be taken to provide proper breathing equipment and a separate person dedicated solely to a safety watch of the person inside. It is strongly recommended that all local or other regulations be consulted.

Section 3: Operation

3.1 Intended Use

- 3.1.1 The unit is intended for use in draining and collection of fuel from aircraft and the transportation to a disposal site. Any other use is prohibited and may void any and all warranties.

3.2 Parking Brake

- 3.2.1 The unit is equipped with a mechanically operated parking brake. The brake should be applied prior to disengaging the tow bar. The brake should be applied when filling or draining tank, or whenever left unattended.

3.3 Tow Bar and Undercarriage

- 3.3.1 The unit is equipped with steerable front wheels controlled by the tow bar.
- 3.3.2 Care should be taken not to jackknife the unit when backing up.
- 3.3.3 Tire inflation should be checked and maintained as described in the maintenance section.
- 3.3.4 Before towing, check to see the brake is disengaged, grounding reels and hoses are disconnected, valves are closed, tow bar is securely attached to the towing vehicle, telescoping drain is collapsed and its lid is closed and secured, that the manway and vacuum covers are closed, secured and latched.
- 3.3.5 The unit is equipped with a tow bar latch to hold it in the upright position.

3.4 Telescoping Drain Assembly

- 3.4.1 The unit is equipped with a telescoping drain assembly that is capable of being adjusted up to 16'0" high.
- 3.4.2 To Raise:
(1) Loosen top clamp if necessary.
(2) Grasp top section with one hand and lift until the top clamp raises

approximately 6 inches.

- (3) Tighten clamp securely with the other hand.
- (4) Reposition lifting hand by grasping tube below tightened clamp and lift until next clamp is raised approximately 6 inches.
- (5) Repeat steps 1-4 until desired height is obtained or assembly is fully extended.

3.4.3 To Lower:

- (1) Tightly grasp bottom extended tube with one hand and loosen the securing clamp.
- (2) Slowly lower tube, hand over hand, until the following clamp is resting on the loosed clamp.
- (3) Repeat steps 1 and 2 until all sections are lowered.

3.4.4 Funnel is equipped with a nitrile rubber seal around the top edge to allow placement against the underside of a wing.

3.4.5 When not in use, telescope should be collapsed and the cover closed to eliminate contamination.

3.5 Vacuum Assembly

3.5.1 This assembly is equipped with an air powered Primary Vacuum Generator.

3.5.2 The Primary Vacuum Generator is intended for vacuum bottom draining or vacuum depuddling fuel and condensation.

3.5.3 The use of a Primary Vacuum Generator for the delivery of fuel into the **SealVac™** Fuel Drain System is based upon many optimal benefits. The vacuum generator is economical to operate, compact in size, low in cost, with minimal maintenance and built to quality construction with no moving parts and yet is capable of delivering as much as 17.0"Hg at 120CFM.

3.5.4 When compressed air is forced through the double conical nozzle within the Primary Vacuum Generator, velocity increases and the pressure decreases. The vacuum generators operate on this principle, which creates vacuum without a single moving part making it safe for moving flammable liquids.

CAUTION: *If other objects such as rock or metallic pieces are vacuumed into the vacuum chamber, they may create a hazard due to sparks.*

3.5.5 Vacuum is started by attaching a recommended air supply of 60CFM at 90 PSI and turning on the air supply valve.

- 3.5.6 The sediment chamber is equipped with a screened drain opening. This opens directly into the main tank.
 - 3.5.7 The Vacuum Cover Assembly is provided with (4) four ½" quick connect ports for attaching the shielded duplex 35' static dissipating hose assemblies.
 - 3.5.8 There are (2) two small Secondary Vacuum Generators provided that supply vacuum through the (4) four ¼" Vacuum Generator Cover quick connect ports. These ports connect to the shielded duplex 35' static dissipating hose assemblies, and provide the vacuum required to attach the **SeaVac™** Standard or Dual-Disk Suction Plates to the aircraft.
 - 3.5.9 The vacuum generator is equipped with an **AutoVac™** shutoff mechanism preventing overflowing. When the level of product is full, the valve shuts off and shuts off the air supply to the Primary Vacuum Generator.
 - 3.5.10 The vacuum assembly is supplied with 50 feet of 1 1/4" static dissipating aircraft sueling hose and a ball valve on the vacuum suction outlet.
 - 3.5.11 Note: If for any reason the Vacuum Cover is removed from the sediment chamber be sure to reconnect the ground when reinstalling, and before use.
- 3.6 Vacuum Bottom Draining Operation
- 3.6.1 Introduction: The **SeaVac™** Fuel Drain System facilitates a new, safe, more efficient method of bottom draining aircraft. It allows up to four fuel cells/tanks to be vacuum drained simultaneously through their drain valves, while maintaining a sealed, closed system between the aircraft fuel cells and the **SeaVac™** Defueler. The connections to the drain valves are easily adaptable to most conventional poppet style valves. Bottom draining is accomplished by first attaching either the **SeaVac™** Standard Suction Plate or the **SeaVac™** Dual-Disk Suction Plate to the exterior aircraft surface. This is accomplished without any mechanical attachment to the drain itself, instead using vacuum pressure to adhere the Suction Plate to the aircraft surface. The **SeaVac™** Fuel Probe is then inserted into the Suction Plate Hub, sealing off the potential for any human or environmental contact with fuel.

As the **SeaVac™** Fuel Probe is inserted into the hub, the Actuator Pin on the **SeaVac™** Fuel Probe engages the poppet allowing fuel to be vacuumed from the aircraft fuel cell/tank.

The fuel flow can be visually monitored both at the Drain Tool Assembly and at the **SeaVac™** Defueler. After visually verifying that the flow of fuel has ceased, the fuel probe is slowly removed from the hub, completing a safe, fast, and environmentally clean bottom draining operation.

3.6.2 Model Selection and Components

3.6.2.1 The **SealVac™** Standard Drain Tool Assembly can be used on any bottom drain valve that is in an open area and can be easily centered over the bottom drain valve without obstructions.

3.6.2.2 The **SealVac™** Dual-Disk Drain Tool Assembly can be used in most applications. It is best used on the C-17 aircraft or any place where the bottom drain valve is too close to an obstruction and the Standard Drain Tool Assembly will not center around the bottom drain valve.

3.6.2.3 Each **SealVac™** Drain Tool Assembly comes with a **SealVac™** Fuel Probe that inserts into the center of the hub in the Drain Tool Suction Plate. The **SealVac™** Fuel Probe has an Actuator Pin that threads into the center of its tip. This Actuator Pin adjusted at the proper length will open the bottom drain valve when the Fuel Probe is fully inserted. The standard Actuator Pin length is $\frac{1}{4}$ " above the top of the sealing gasket that is in the fuel probe hub. This standard Actuator Pin is strictly a guide. You may find that a longer Actuator Pin will give you better depression into the bottom drain valve. Supplied is a variety of different length Actuator Pins with two different style heads. The large round-headed pin fits well with the C-5 bottom drain without having to remove the center plastic portion.

3.6.2.4 The **SealVac™** Fuel Probe, which is identical for each Drain Tool Assembly, inserts into the suction plate or dual-disk style hub the same way. Notice two small stainless steel roll pins that protrude out of the side of the fuel probes. These pins are 180 degrees apart and will line up with two grooves located on the inside bore of the Dual-Disk hub or the in the center of the Suction Plate. The roll pins when lined up with the grooves in the hubs inner bore will allow the fuel probe to be inserted fully into the hub. With the probe fully inserted you should be able to twist the probe 90 degrees until the roll pins in the fuel probe hit a pressed stop pin located on the recessed portion of the center hub. With the fuel probe in place and twisted until it hits the stop, the fuel probe is locked into place.

3.6.2.5 The **SealVac™** Drain Tool Assemblies come with a wide array of Actuator Pins with lengths in $\frac{1}{8}$ " progressions. Note: If you select a pin length that is too long the fuel probe will not insert fully into the hub.

3.6.2.6 The **SealVac™** Fuel Drain System comes with (2) shielded duplex, 35', ½" static dissipating hose assemblies that will quick couple to one of the ports on top of the **SealVac™** Vacuum Cover. This cover mounts on top of the sediment chamber. The shielded duplex, 35' long ½" static dissipating hose assembly also has a portable hose hanger with a hook located 36" in from the Fuel Probe end of the hose. This hook is designed to be attached to the railing around the working platform and support the top end of the hose. The 36" long pigtail section with the Fuel Probe is the same for both models. The other ½" hose end attaches to the multiport quick disconnect located on the **SealVac™** Vacuum Cover.

3.6.2.7 Where the main air supply is attached to the air inlet fitting you will note a (4) way fitting (cross) directing airflow to each side just past the main air supply twist connector. Attached to each fitting is a ball valve and a clear air line that attaches to the small Secondary Vacuum Generators mounted on the inside of the weather protective hood. Each small generator has a hard plumbed manifold (one on each side of the hood with (2) ports that have a ¼" brass male quick disconnect. This portion of the vacuum system is used to supply vacuum to the suction area of each suction plate that attaches to the aircraft surface.

3.6.2.8 On the vacuum cover there are (4) ½" ports two on each side, each has a ball shut off valve and a female quick disconnect. The shielded duplex, 35' long ½" static dissipating hose assemblies have a ¼" and ½" quick disconnect on both ends. The hose end with the ¼" female quick disconnect and the ½" male quick disconnect will attach to the **SealVac™** Vacuum Cover and the ¼" male quick disconnect port located on both sides of the **SealVac™** Vacuum Generator weather protective hood.

3.6.2.9 This attachment procedure is the same for all for ports. Where the main air supply attaches, you will see a ½" ball valve directly inline with the four way fitting that branches off to the small Secondary Vacuum Generators. This ½" ball valve when opened will allow air to flow through the Primary Vacuum Generator and pull a vacuum on the entire tank. The (2) ¼" ball valves to both sides operate the (2) Secondary Vacuum Generators that supply vacuum to the suction plates.

3.6.3 Vacuum Bottom Draining Operation

3.6.3.1 Place the **SealVac™** Fuel Drain System under aircraft in accordance with standard procedures.

3.6.3.2 Attach grounding reel cables to required points per your standard regulations.

- 3.6.3.3 Attach air supply line to the vacuum generator fitting.
- 3.6.3.4 Remove a 35' shielded duplex static dissipating hose assembly from the vacuum cover hanger and place in position on stand or working platform.
- 3.6.3.5 Using the portable hose hanger attachment on hose attach to work platform railing.
- 3.6.3.6 Select *the* **SeaVac™** Standard Drain Tool Assembly or **SeaVac™** Dual-Disk Drain Tool Assembly.
- 3.6.3.7 A good clean sealing surface is required around the low point drain for the Suction Plate, to vacuum seal. If the aircraft has seams or uneven surfaces or artificial mating surface may need to be considered.
- 3.6.3.8 At this time you are ready to proceed by turning on the main air supply and the valves that allow air to flow to the (2) Secondary Vacuum Generators on each side of the Primary Vacuum Generator Cover.
- 3.6.3.9 The 35' hose that is on the work platform and also runs down to the ½" quick disconnect and ball valve on top of the Vacuum Cover can now be activated by turning on the ball valve. This will put the ½" black static dissipating hose under vacuum and allow fuel to be drawn into the tank when the attachment is made to the aircraft.
- 3.6.3.10 With the Drain Fuel Assembly that you choose to use and the corresponding Probe in hand proceed to the top of the work platform. At this time attach the small clear vacuum line running from the Suction Plate to the corresponding female disconnect on the duplex hose assembly.
- 3.6.3.11 Before attaching the 3' long Fuel Probe hose to the 35' duplex hose assembly check to be sure that you have vacuum to the suction plate port. This port is located between the rubber-sealing rings on the suction plate. Opening the brass slide valve 08-0020-10 can do this. This valve is attached directly to the suction plate on one end and is quick coupled to the clear hose that is part of the duplex hose assembly. To actuate the slide valve push the outer sleeve on the slide valve towards the suction plate. With the slide valve activated place your finger over the hole on the suction port side of the suction plate and you should feel the suction. If you do not feel suction move the slide ring on the slide valve the other direction and check for vacuum on the suction side again. If you do not have any suction make sure all of the valves are open, all of the quick disconnects are securely coupled and that the secondary vacuum generators are turned on.

- 3.6.3.12 Lightly coat the suction plate seals with petroleum jelly, using fingers to evenly apply. Note: On the Standard Suction Plate coat both inner and outer seals. On the Dual-Disk Suction Plate coat the two-cup seals only.
- 3.6.3.13 With suction to the Suction Plate off, center the hub over the Aircraft bottom poppet drain fitting by visually aligning hub center with bottom drain center. (Note: Hub must be aligned properly with bottom drain or the probe will not engage to the proper depth.) Activate the secondary vacuum by sliding the slide valve toward the cups. Press the Suction Plate firmly up against the surface that you are trying to attach to and the vacuum should hold it in place. Note: Always check the edge of the rubber sealing rings to make sure that they are smooth and have not been damaged in any way. If the sealing rings have any nicks or are deformed in any way it will affect the way it seals. This could make the suction plate pull away prematurely from the surface that it is attached to. If sealing rings are damaged replace before using the system.
- 3.6.3.14 Now couple the Fuel Probe section of hose (this section is approx 36"long) to the 35' Duplex hose using the quick disconnects. With the probe section now attached, you should feel suction around the holes in the end of the Fuel Probe. These holes are around the Actuator pin that depresses the center of the sump/bottom drain valve. On the side of the probe you will see a small valve with a button head. This is the Vacuum Bleeder Valve. It should be pressed in when inserting the Suction Plate into the center hub or when removing the probe.
- 3.6.3.15 Lightly coat the probe "O-Ring" seal with petroleum jelly, using fingers to evenly apply.
- 3.6.3.16 With the **SeaVac™** Fuel Probe in hand and vacuum flowing through the probe suction holes, depress the Vacuum Bleeder Valve and insert the probe into the hub of the Suction Plate. With the probe inserted and locked into position you should see fuel flowing through the clear section of ½" hose attached on the probe end. Note: If the probe is fully inserted and there is no flow of fuel the probe needs to be removed and a longer pin inserted. Remember to depress the Vacuum Bleeder Valve when removing the probe, if you don't it will create a vacuum lock and make removing the probe more difficult. With the probe removed replace the center pin with a pin ¼" longer and reinsert with the same procedure as before. With the probe inserted you should see a flow of fuel through the **FuelFlow™** Viewing Section. Once you see fuel you can now release the vacuum bleeder valve. This will allow you to be able to pull a full column of fuel.

3.6.3.17 If you need to stop the flow of fuel, begin removing the probe by depressing the Vacuum Bleeder Valve and turn the probe until the pins on the side of the probe are aligned as described. As you start to pull the probe down watch the flow of fuel through the FuelFlow™ Viewing Section. Keep pulling the probe down until the flow stops. Remember to keep the bleeder valve depressed. Once you see that there is no more fuel running through the FuelFlow™ Viewing Section you can pull the probe out of the Suction Plate. Note: If the flow of fuel continues at a very slow pace this may indicate that there may be some FOD trapped between the sealing surfaces of the bottom drain valve. This can be overcome by pushing the probe in and out a number of times allowing fuel to flush the obstruction from the valve.

3.6.3.18 Before shutting the vacuum system off make sure the fuel suction line is clear. This is done by looking at the Fuelflow™ viewing section on the end of the line where it is attached to the vacuum cover. Once you see no more fuel passing through the line you can then turn the vacuum system off. In order to evacuate all of the fuel from the hose the line must be open on the far end. This can be done by leaving the probe end attached until the line is clear.

3.6.4 Vacuum Depuddling: Included with the SealVac™ Fuel Drain System is one 25', half inch static dissipating flexible depuddling hose for quick, safe removal of unusable fuel. This 25' depuddling hose quick-connects to the 35' Duplex hose making a 60' length of static dissipating hose for the depuddling operation.

3.7 Grounding Reels

3.7.1 The unit is supplied with grounding reels.

3.7.2 Before filling, draining, or vacuuming, the grounding reels must be attached to the aircraft or object being serviced and an appropriate ground.

3.8 Drain Valves

3.8.1 The unit is equipped with a 1-1/2" NPT ball valve with a camlock connector.

3.9 Sample Port

3.9.1 The unit is equipped with a 1/2" NPT valve for use as a sample port.

3.10 Telescoping Drain Assembly

3.10.1 The unit is equipped with a sump and flow controlling ball valve with a removable screen for cleaning.

3.11 Vacuum Manway

3.11.1 The **SealVac™** unit is equipped with a quick opening manway assembly for internal inspections.

3.11.2 The manway is equipped with a flip locking cross arm assembly to ensure sealing and securing the cover in place.

3.12 Vacuum Governor

3.12.1 The vacuum governor has been preset at the factory and needs no further adjustments. See maintenance should adjustments or replacement be needed.

Section 4: Maintenance

4.1 Parking Brake

4.1.1 The unit is equipped with a parking brake assembly consisting of a 7" diameter brake drum with 2-1/4" wide brake shoes.

4.1.2 The shoes are activated via a mechanical linkage, eccentric and lever.

4.1.3 Adjustment may be necessary as the shoes wear.

- (1) Tightening is accomplished by removing the bolt through one yoke and screwing yoke in to shorten connecting rod.
- (2) Do not over tighten or brakes may drag when released.

4.1.4 Replacement of shoes.

- (1) Remove wheel.
- (2) Remove nut retaining hub and drum assembly.
- (3) Disconnect actuating rod.
- (4) Remove shoe retainers.
- (5) Install new shoes.
- (6) Replace shoe retainers.
- (7) Adjust actuator rod length.
- (8) Replace wheel.

4.2 Under Carriage and Tow Bar

- 4.2.1 The unit is equipped with steerable front wheels, fixed rear wheels, and a tow bar.
- 4.2.2 Maintenance should consist of the following:
 - (1) King pin bushing, turning bushings and tie rod ends are self lubricating and need no additional maintenance.
 - (2) Pack wheel bearing at intervals not to exceed three (3) months.
 - (3) Check tire pressure weekly. Pressure should be maintained at 60 PSI.
- 4.2.3 Tow bar pivot pin and hook ring should be inspected monthly for excessive wear or cracks.

4.3 Telescoping Drain Assembly

- 4.3.1 The telescoping Drain Assembly consists of stainless steel housing permanently attached to the tank and multiple tube sections.
- 4.3.2 The stainless tube and four largest aluminum tubes are equipped with a clamp assembly.
- 4.3.3 Each aluminum tube is crimped on the lower end which acts as a stop to prevent the tube from sliding through the clamp.
- 4.3.4 Disassembling of the telescope assembly is accomplished by rotating the four sections 180 degrees from normal position and gently lifting each section so that the crimped edge on the tube is aligned with the slot on the clamp.

4.4 Vacuum Assembly

- 4.4.1 The vacuum assembly consists of a vacuum chamber with an air powered vacuum generator mounted on a removable cover. The cover is held in place by three (3) latches.
- 4.4.2 The vacuum chamber is equipped with an **AutoVac™** shut off mechanism. Label each air hose and locations prior to disconnecting for maintenance. The assembly is pre-adjusted at the factory and should not need further adjustment.
- 4.4.3 The vacuum generator is attached to the chamber cover. It is equipped with a filtered exhaust silencer which should be cleaned at six (6) month intervals or more often depending on the amount of use and conditions. Remove and wash with soap and water. Thoroughly dry and reinstall.

- 4.4.4 All vacuum hoses should be inspected monthly for cracks. Any sudden loss of vacuum suction power may indicate a crack in the vacuum hose lines. Replace if any cracks, deformation or any leakage is visible.
 - 4.4.5 The cover gasket should be inspected monthly for deterioration. This gasket should be pliable and free from weather checking.
 - 4.4.6 Check both inner and outer Suction Plate seals prior to each usage, Replace if any cracks or deformation is visible.
 - 4.4.7 Check the "O-Ring" Seal on the **SealVac™** Fuel Probe prior to each usage. Replace if any cracks or deformation is visible.
 - 4.4.8 Check probe tips to ensure that they are not bent or damaged. Replace as required.
 - 4.4.9 Check all components regularly.
- 4.5 Grounding Reels
- 4.5.1 Grounding reel cables should be pulled out, cleaned and inspected monthly.
 - 4.5.2 Cable clamps and ends should be inspected for loose connections monthly.
- 4.6 Sight Gauge
- 4.6.1 The sight gauge should be inspected monthly for loose connections and weathering of clear tubing.
- 4.7 Vacuum Manway
- 4.7.1 Inspect the manway gasket weekly for cuts, cracks and galling. Replace as needed.
- 4.8 Vacuum Governor
- 4.8.1 The vacuum governor has been preset at the factory and should need no further adjustments.

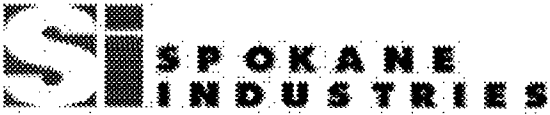
4.8.2 Should adjustments be required:

- (1) A ½" nipple on the lid of the vacuum pot is provided for the attachment of a vacuum gauge.
- (2) The air supply must be started from 0 pressure and slowly opened while simultaneously adjusting the vacuum governor until you reach the desired operating range.

CAUTION: (1) The governor must not be adjusted outside of the designed operating range. To do so may damage the tank. Improper adjustments will nullify the factory warranty.

Section 5: Trouble Shooting

<u>SYMPTOM</u>	<u>PROBABLE CAUSE</u>	<u>PROBABLE CORRECTIONS</u>
The unit does not track or steer correctly or steers Loosely	Bent King Pin housing see section 5.2.1 Item#7	Replace King Pin Housing
	Defective Tie Rod End see section 5.2.1 Item#12	Replace Tie Rod End
	Loose or worn out Bushings see section 5.2.1 Items#11,16 or 18	Replace as needed
Toe Bar does not stay in The upright position	Broken or stretched spring see section 5.2.1 Item #26	Replace as needed
Parking Brake does not work	Needs adjustment	Adjust as per instructions in sections 4.1.0
	Needs repairing	Replace as needed see section 5.2.3
Vacuum System does not Have much suction	Defective lower drain stop gasket see section 5.6 Item#2	Replace as needed
	Not enough air pressure to operate generator, see section 3.5.3 and 4.4	Increase air pressure and volume
	Plugged outlet Filter see section 5.6	Replace or clean as required
Telescoping Drain will not stay up	Loose clamp handles	Tighten handles a little tighter
Telescoping Drain is over flowing	Tank is full	Empty main tank
	Clogged screen or strainer, see section 4.7 and or 5.5	Remove and clean as required



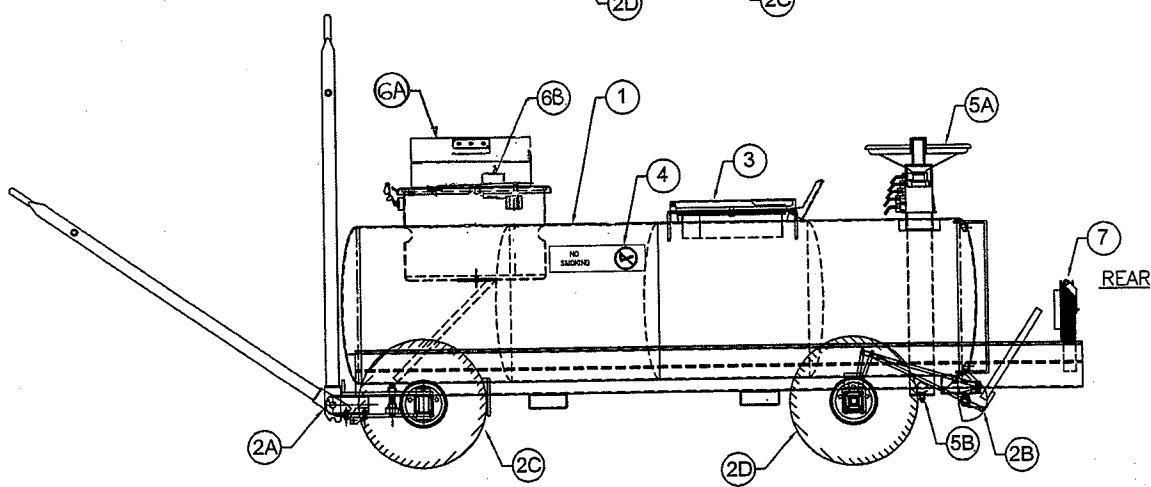
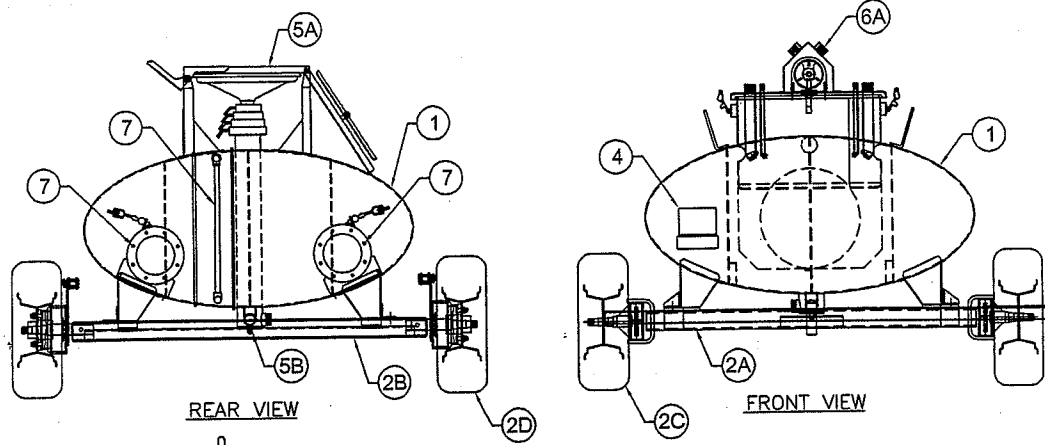
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Section 6: Replacement Parts

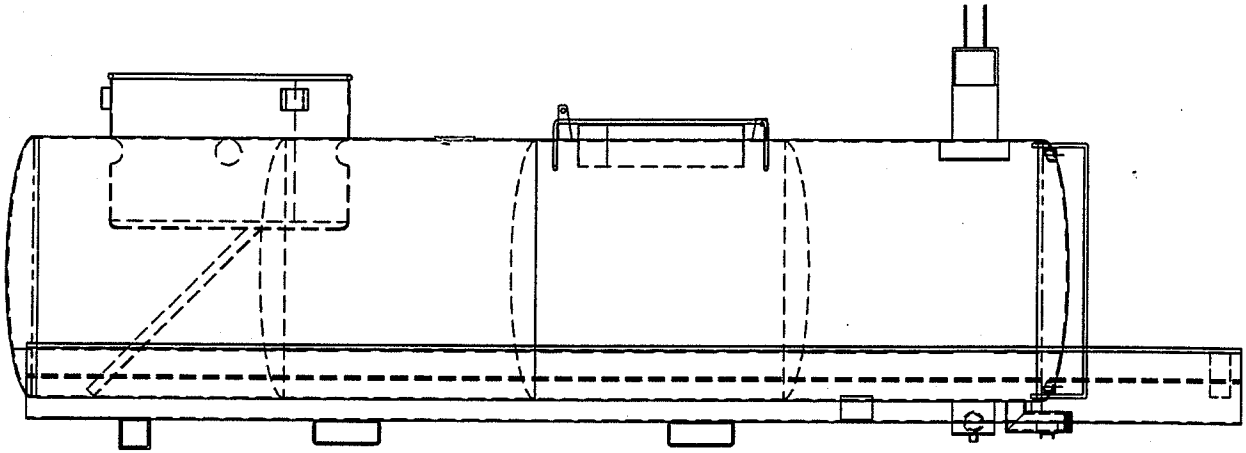
This section provides information for identification of parts for ordering. To order, it is important to have the Model Number, Subassembly Number, Part Number and Description. Parts may be ordered by calling or writing to:

Spokane Industries, Inc.
Aircraft Products Division
P.O. Box 3303
Spokane, WA 99220-3303
Telephone: 509-928-0720
Tele Fax: 509-927-0826

You are welcome to visit us at www.spokaneindustries.com

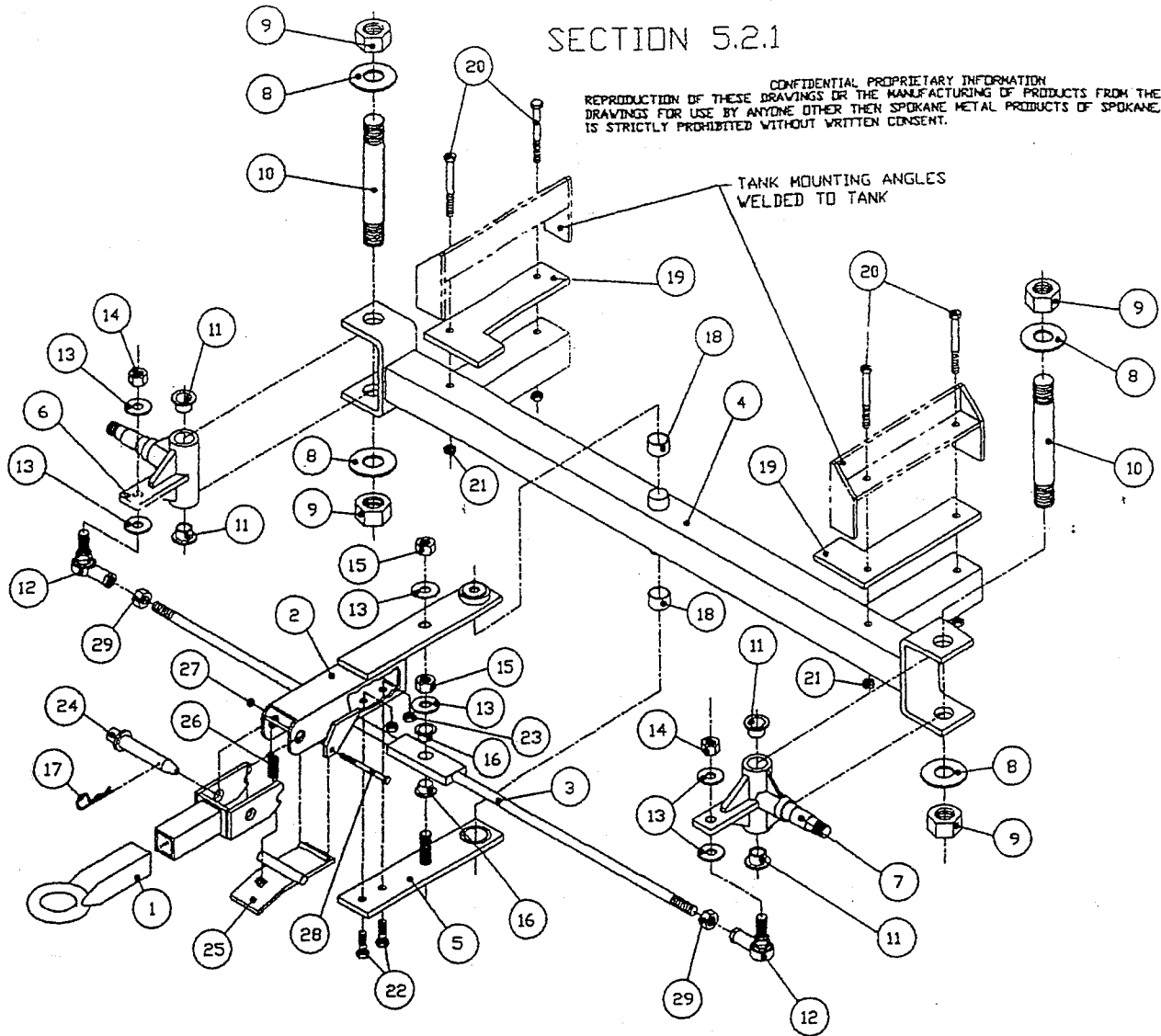


Description	Page
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MAIN TANK ASSEMBLY NO. SMP-19235
MAJOR ASSEMBLY - TANK WELDMENT

<u>Item</u>	<u>Sub Assy.</u>	<u>Part No.</u>	<u>Qnt.</u>	<u>Description</u>	<u>Wt.#</u>
1		SMP-19235	1	Stainless Steel Tank Weldment	398

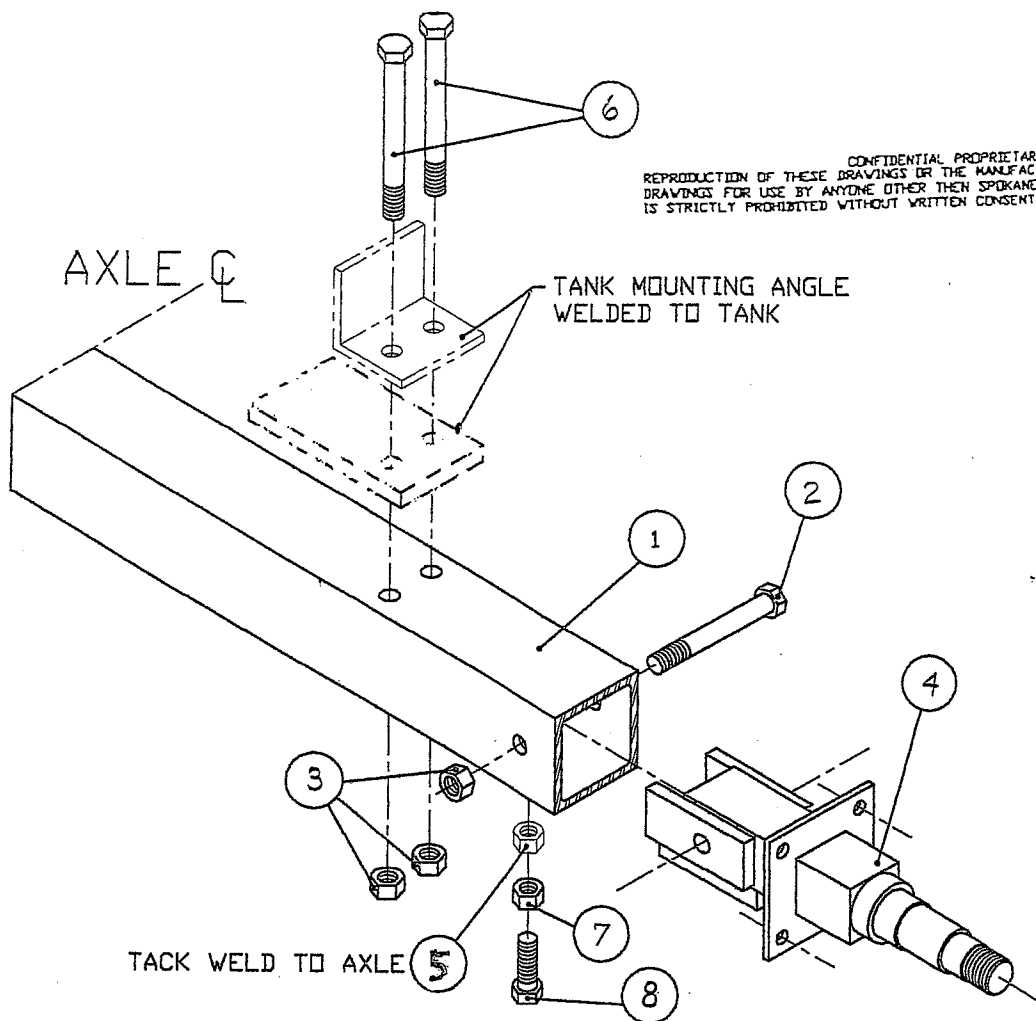


AXLE, FRONT ASSEMBLY NO. 08-1018U
MAJOR ASSEMBLY - AXLE ASSEMBLY

<u>Item</u>	<u>Sub Assy.</u>	<u>Part No.</u>	<u>Qty.</u>	<u>Description</u>	<u>Wt.#</u>
	08-1018U			Axle, Assembly, Front	
1		07-1103	1	Tow Bar	29
2		07-1104	1	Arm, Steering	16
3		07-1005U	1	Tie Rod	7.3
4		07-1107U	1	Axle, Front	53
5		07-1016	1	Steering Arm, Lower Plate	6.1
6		05-1009	1	Sleeve, King Pin, Right	24

ASSEMBLY NO. 08-1018U
MAJOR ASSEMBLY - AXLE ASSEMBLY (Continued)

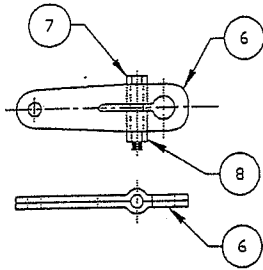
<u>Item</u>	<u>Sub Assy.</u>	<u>Part No.</u>	<u>Qnt.</u>	<u>Description</u>	<u>Wt.#</u>
7		05-1009	1	Sleeve, King Pin, Left	24
8		02-11131	4	Washer, King Pin	1
9		02-12131	4	Nut, King Pin	2
10		05-1010	2	King Pin	11
11		03-1013	4	Bushing, King Pin Sleeve	1
12		03-1016	2	Ends, Tie Rod	5
13		02-11072	5	Washers, Tie Rod	.2
14		02-12071	2	Nuts, Tie Rod Ends	1
15		02-12071	1	Nut, Tie Rod Pivot	.5
16		03-1015	2	Bushing, Tie Rod Pivot	.8
17		02-1300	2	Cotter Pin	.2
18		03-1014	2	Bushing, Axle Pivot	1
19		06-1023	2	Mounting Pad, Tank	4
20		02-1503	4	Bolts, Tank Mounting	1.3
21		02-12041	4	Nuts, Tank Mounting	.5
22		02-1502	2	Bolts, Turning Arm Clamp	.32
23		02-12041	2	Nuts, Turning Arm Clamp	.2
24		02-1304	1	Hitch Pin	2
25		07-1020	1	Toe Latch	3.1
26		04-1054	1	Spring, Toe Latch	.5
27		02-1201	1	Nut, Toe Latch	.1
28		02-1501	1	Bolt, Toe Latch	.2
29		02-12141	2	Hex Nut, Tie Rod	.2



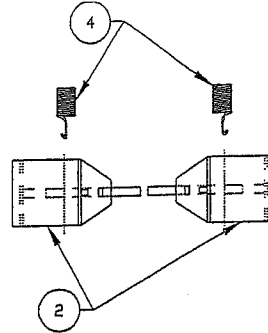
AXLE, REAR ASSEMBLY NO. 08-1010U
MAJOR ASSEMBLY - AXLE ASSEMBLY

<u>Item</u>	<u>Sub Assy.</u>	<u>Part No.</u>	<u>Qnt.</u>	<u>Description</u>	<u>Wt.#</u>
1	08-1010U	05-1023U	1	Axle Assembly, Rear	40
2		02-1505	2	Axle, Rear Weldment	.6
3		02-12041	2	Bolts, Mounting Spindle	.5
4		05-1022	2	Nuts, Mounting Spindle	17
5		06-1012	2	Spindle, Rear	1
6		06-1012	2	Mounting Pad, Tank	1
7		02-1503	4	Bolt, Tank Mounting	1.3
8		02-12041	4	Nuts, Tank Mounting	.5
		02-10041	2	Bolt, Spindle Stabilizer	.5

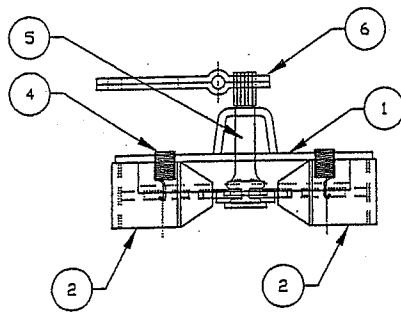
BRAKE, PARKING ASSEMBLY NO. 10-100030
MAJOR ASSEMBLY - BRAKE, PARKING



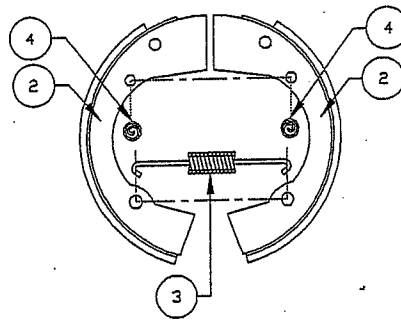
CAM LEVER OPERATOR DETAIL



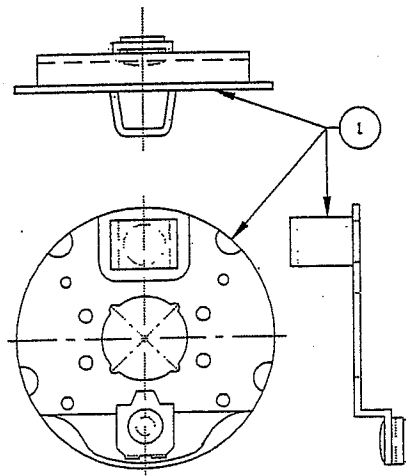
BRAKE SHOE / HOLD DOWN SPRING DETAIL



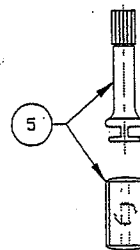
BRAKE/CAM/LEVER/BACKING PLATE ASSY



BRAKE SHOE / SPRING ORIENTATION
RETURN SPRING

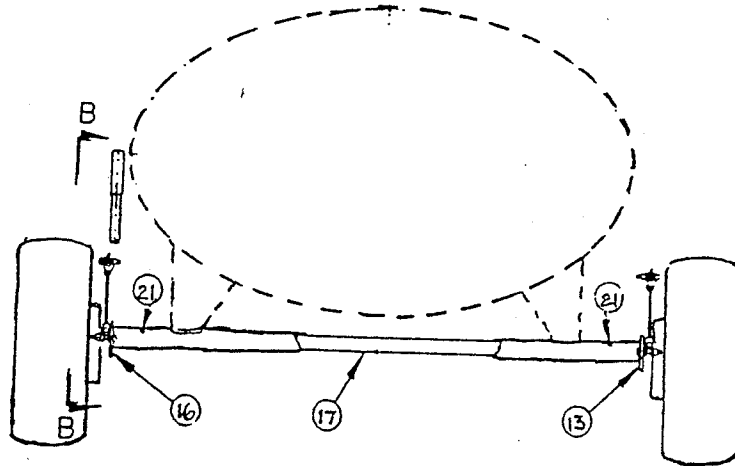


BACKING PLATE DETAIL

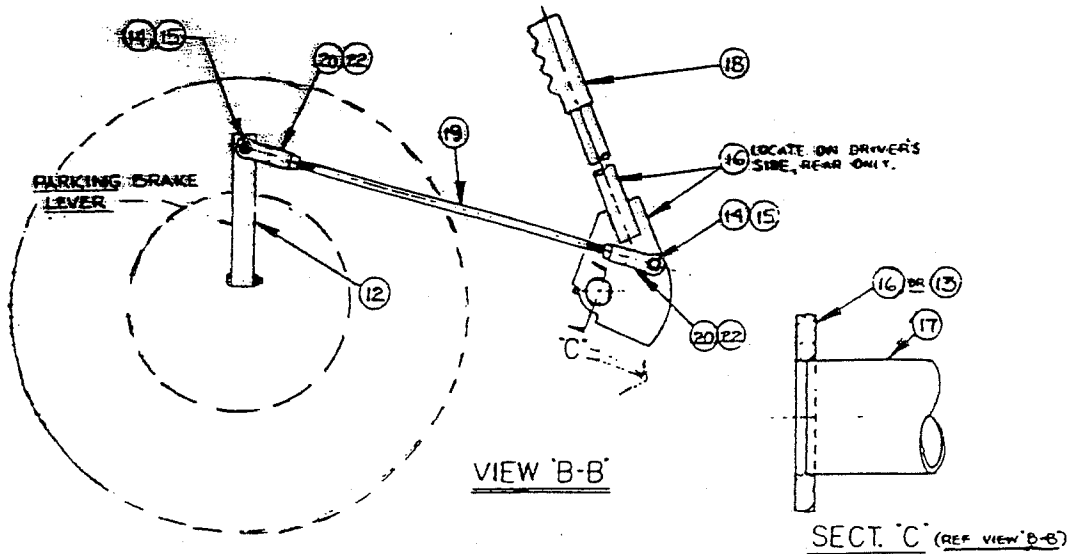


CAM DETAIL

ASSEMBLY NO. 10-100030 - CONTINUED
MAJOR ASSEMBLY - BRAKE, PARKING

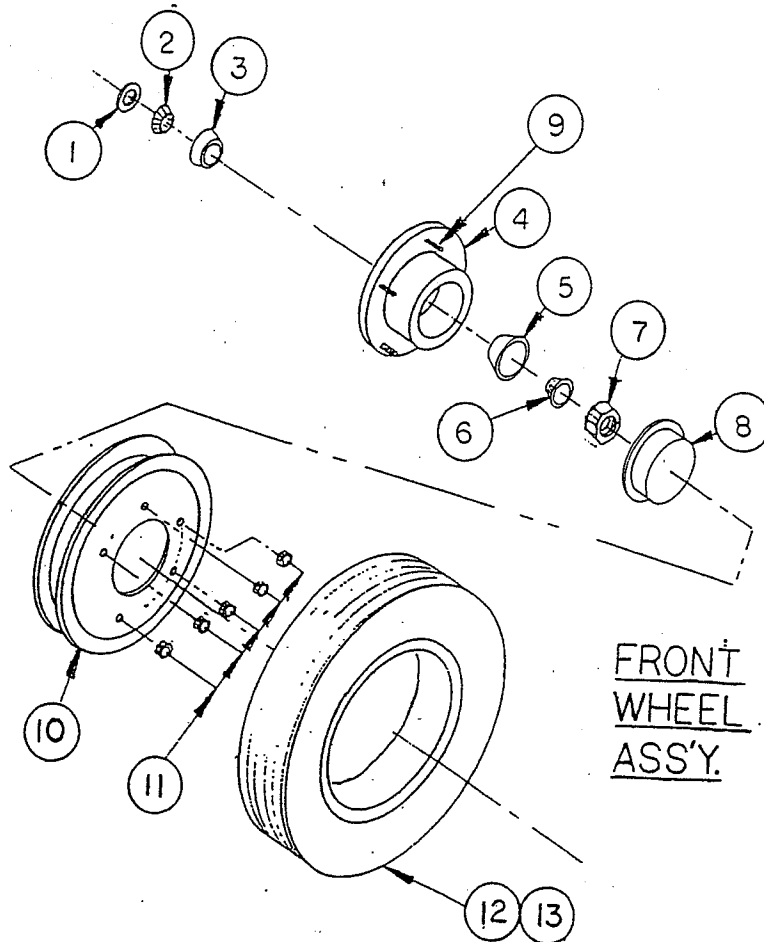


REAR VIEW
NTS



**ASSEMBLY NO. 10-100030 - CONTINUED
MAJOR ASSEMBLY - BRAKE, PARKING**

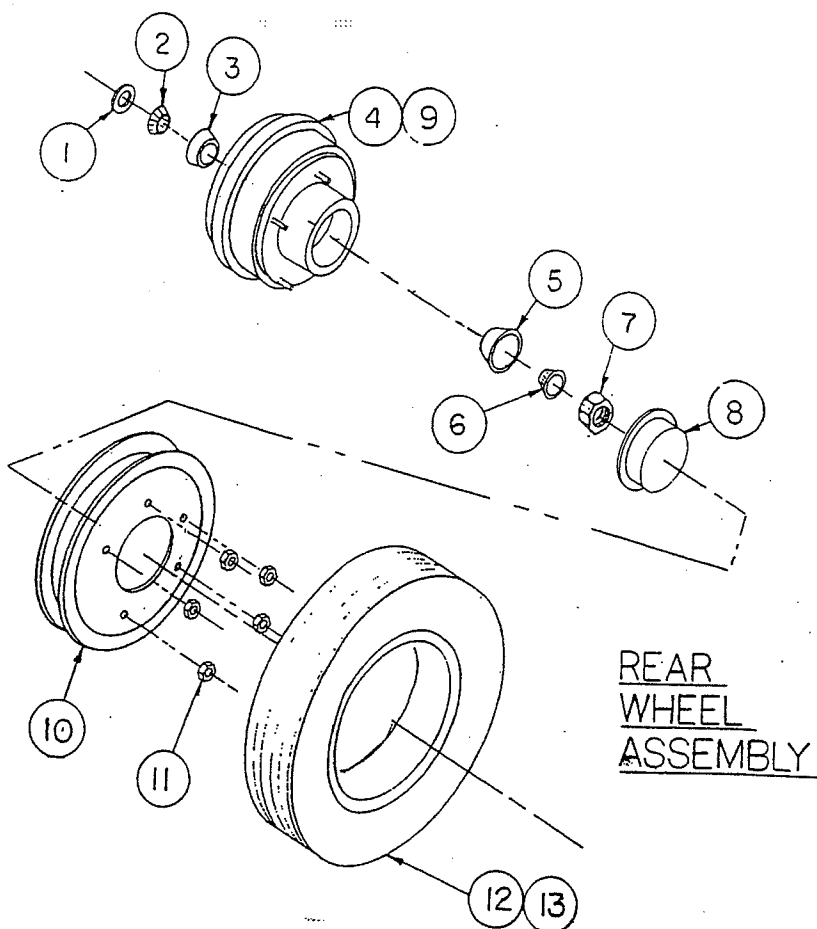
<u>Item</u>	<u>Sub Assy.</u>	<u>Part No.</u>	<u>Qty.</u>	<u>Description</u>	<u>Wt.#</u>
	08-1007	04-1063	2	Brake Assembly	
1		04-1023	1	Brake, Plate Assembly	7
2		04-1024	1	Brake, Shoe Assembly	4
3		04-1026	2	Brake, Shoe Lever Spring	1
4		04-1025	2	Brake, Shoe Lever	1
5		02-1400	2	1/2" Retaining Ring	.2
6		02-1303	2	Anchor Pin	.2
7/8		04-1027	2	Adjusting Screw Assembly	.7
9		02-12031	4	Nut	.2
10		02-11031	4	Lockwasher	.1
11		02-10031	4	Bolt, 7/16" Shoulder	.5
12		04-1030	1	Brake, Control Arm	3
	08-1008U			Brake Linkage Assembly	
13		05-1025	1	Cam, Brake Linkage	1.4
14		02-10012	1	Bolt	.4
15		02-12021	1	Nut	.1
16		07-1033U	1	Brake Handle, Fabd Sub-Ass	5.4
17		01-8104U	1	Brake Handle, Connector	4
18		04-1055	1	Grip, Vinyl	1
19		05-1026	1	Rod, Brake Linkage	1
20		04-2516	4	Yoke Ends	.5
21		03-1020	2	Grease Fitting	.5
22		02-100231	4	Jam Nut, 3/8"	.5



FRONT
WHEEL
ASS'Y.

WHEEL ASSEMBLY, FRONT ASSEMBLY NO. 10-100042
MAJOR ASSEMBLY - WHEEL ASSEMBLY, FRONT

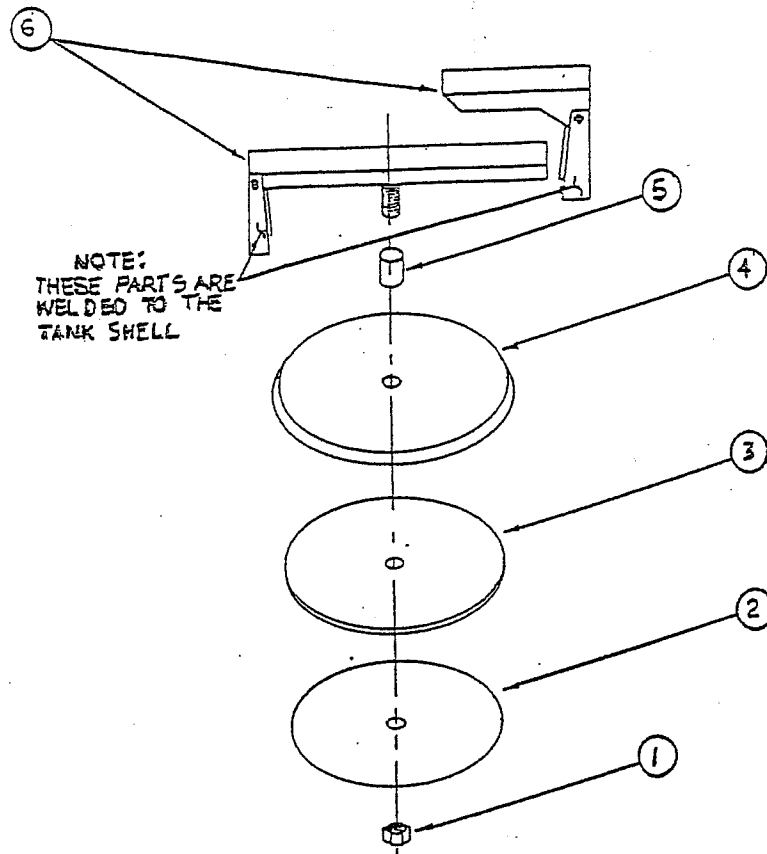
<u>Item</u>	<u>Sub Assy.</u>	<u>Part No.</u>	<u>Qnt.</u>	<u>Description</u>	<u>Wt.#</u>
	08-1011	04-1050	2	Bearing & Hub Assembly	
1		04-1012	1	Seal, Bearing	1
2		04-1013	1	Bearing, Inner	3
3		04-1015	1	Cup, Inner	2
4		04-1017	1	Hub, Wheel	7
5		04-1016	1	Cup, Outer	4
6		04-1014	1	Bearing, Outer	3
7		02-1205	1	Spindle Nut	1
8		04-1019	1	Dust Cap	1
9		02-1017	5	Studs, Hub	1
0	8-10061	04-10201	2	Tire/Wheel/Tube Assembly	
10		04-1020	1	Wheel, Split Rim, 10"	9.5
11		04-1021	5	Lug Nuts, Wheel	1
12		04-10221	1	Tire, 10"	4
13		04-1045	1	Tube Assembly	11



REAR
WHEEL
ASSEMBLY

**WHEEL ASSEMBLY, REAR ASSEMBLY NO. 10-10052
MAJOR ASSEMBLY - WHEEL ASSEMBLY, REAR**

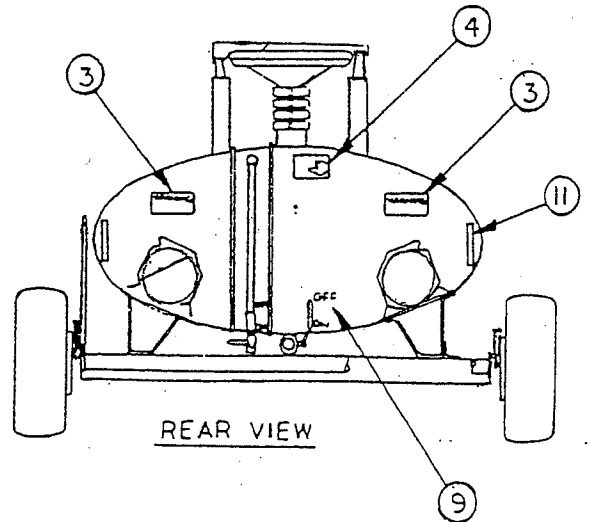
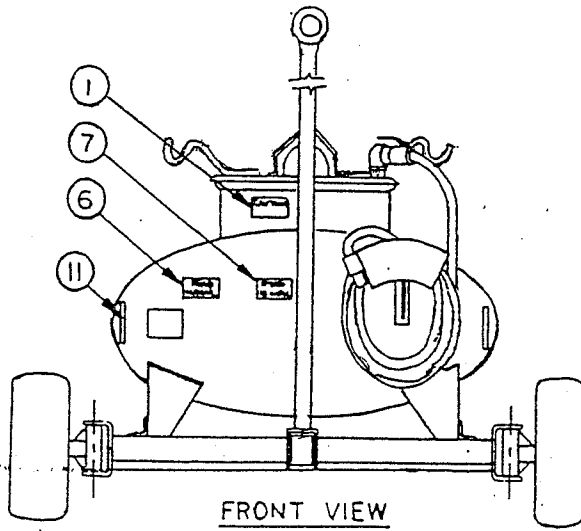
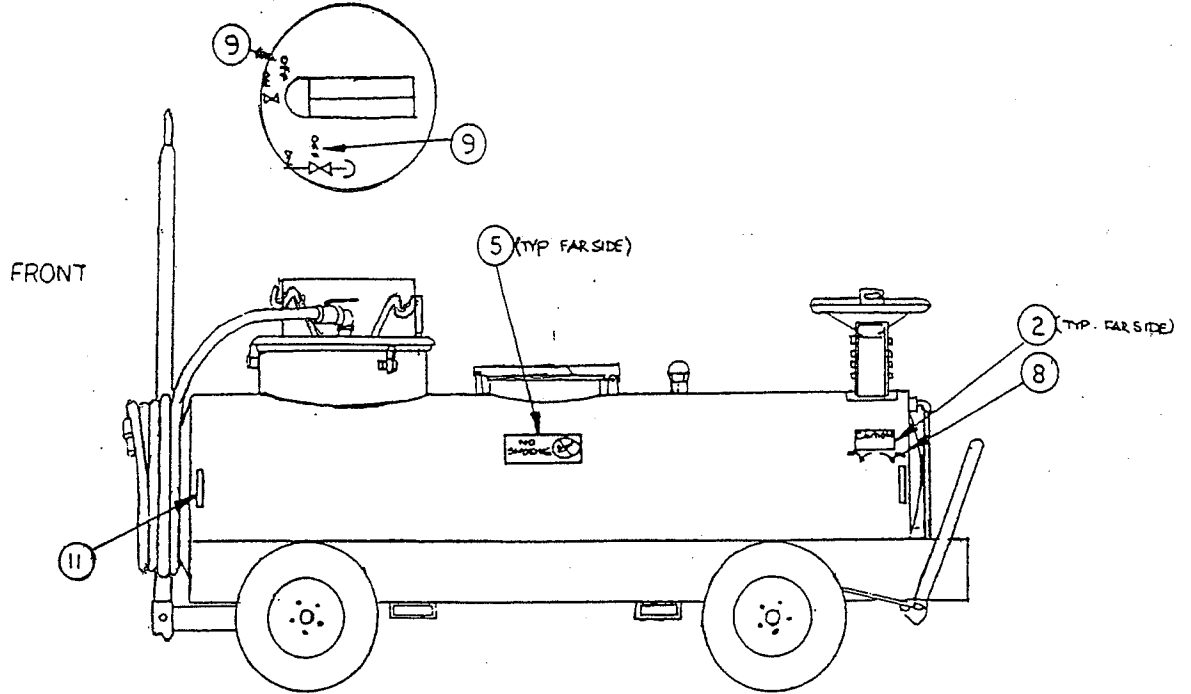
<u>Item</u>	<u>Sub Assy.</u>	<u>Part No.</u>	<u>Qnt.</u>	<u>Description</u>	<u>Wt.#</u>
	08-10111	04-1062	2	Bearing & Hub Assembly	
1		04-1012	1	Seal, Bearing	1
2		04-1013	1	Bearing, Inner	3
3		04-1015	1	Cup, Inner	2
4		05-1008	1	Hub/Brake Drum Sub-Assy	16
5		04-1016	1	Cup, Outer	4
6		04-1014	1	Bearing, Outer	3
7		02-1205	1	Nut, Spindle	1
8		04-1019	1	Dust Cap	1
	08-10061	04-1020	2	Tire/Wheel/Tube Assembly	
10		04-10201	1	Wheel, Split Rim	9.5
11		04-1021	5	Lug Nuts, Wheel	1
12		04-10221	1	Tire, 10"	4
13		04-1045	1	Tube Assembly	11



VACUUM MANWAY ASSEMBLY NO. 08-1025
MAJOR ASSEMBLY - MANWAY ASSEMBLY

<u>Item</u>	<u>Sub Assy.</u>	<u>Part No.</u>	<u>Qty.</u>	<u>Description</u>	<u>Wt.#</u>
1	08-1025	07-1039S	1	Manway Cover Assembly	5
2		01-8222S	1	9-1/2" Cross Arm Sub-Assy	4
3		01-93455S	1	Spacer	.5
4		01-86001	1	Cover	5
5		06-25025	1	Gasket	1
6		07-2303	1	Gasket Retainer	2
7		02-1206	1	Nut	.5
8		02-10013	1	Bolt	1
9		02-10014	1	Bolt	1
10		02-1202	2	Nut	.5

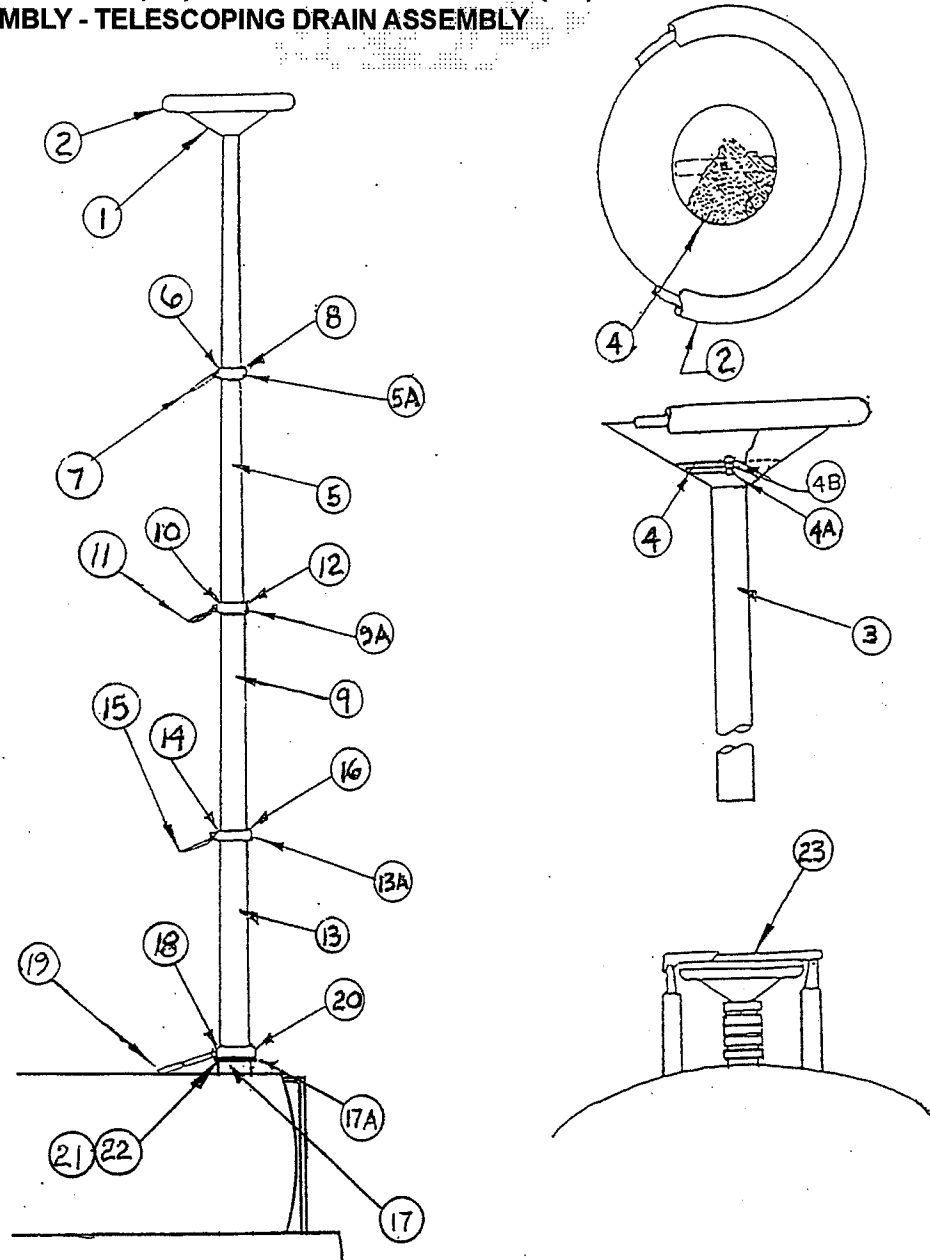
DECAL PACKAGE ASSEMBLY NO 10-100070
MAJOR ASSEMBLY - DECAL PACKAGE



**ASSEMBLY NO 10-100070 - CONTINUED
 MAJOR ASSEMBLY - DECAL PACKAGE**

<u>Item</u>	<u>Sub Assy.</u>	<u>Part No.</u>	<u>Qnt.</u>	<u>Description</u>	<u>Wt.#</u>
	10-100070		1	Decal Assembly	
1		06-1002	1	Caution, Vacuum System	.1
2		06-1003	1	Caution, Parking Brake	.1
3		06-1004	2	Warning, Grounding Reels	.1
4		06-1005	1	Warning, Telescoping Drain	.1
5		06-1006	2	Danger, No Smoking	.2
6		06-1007	1	Notice, Read Manual	.1
7		06-1008	1	Maximum Towing Speed 15MPH	.1
8		06-1010	1	Off/On, Parking Brake	.1
9		06-1011	8	Off/On, Drain Valve	.1
11			8	Reflector Tape	.1

TELESCOPING FUNNEL (12') ASSEMBLY 08-1034U (12')
MAJOR ASSEMBLY - TELESCOPING DRAIN ASSEMBLY

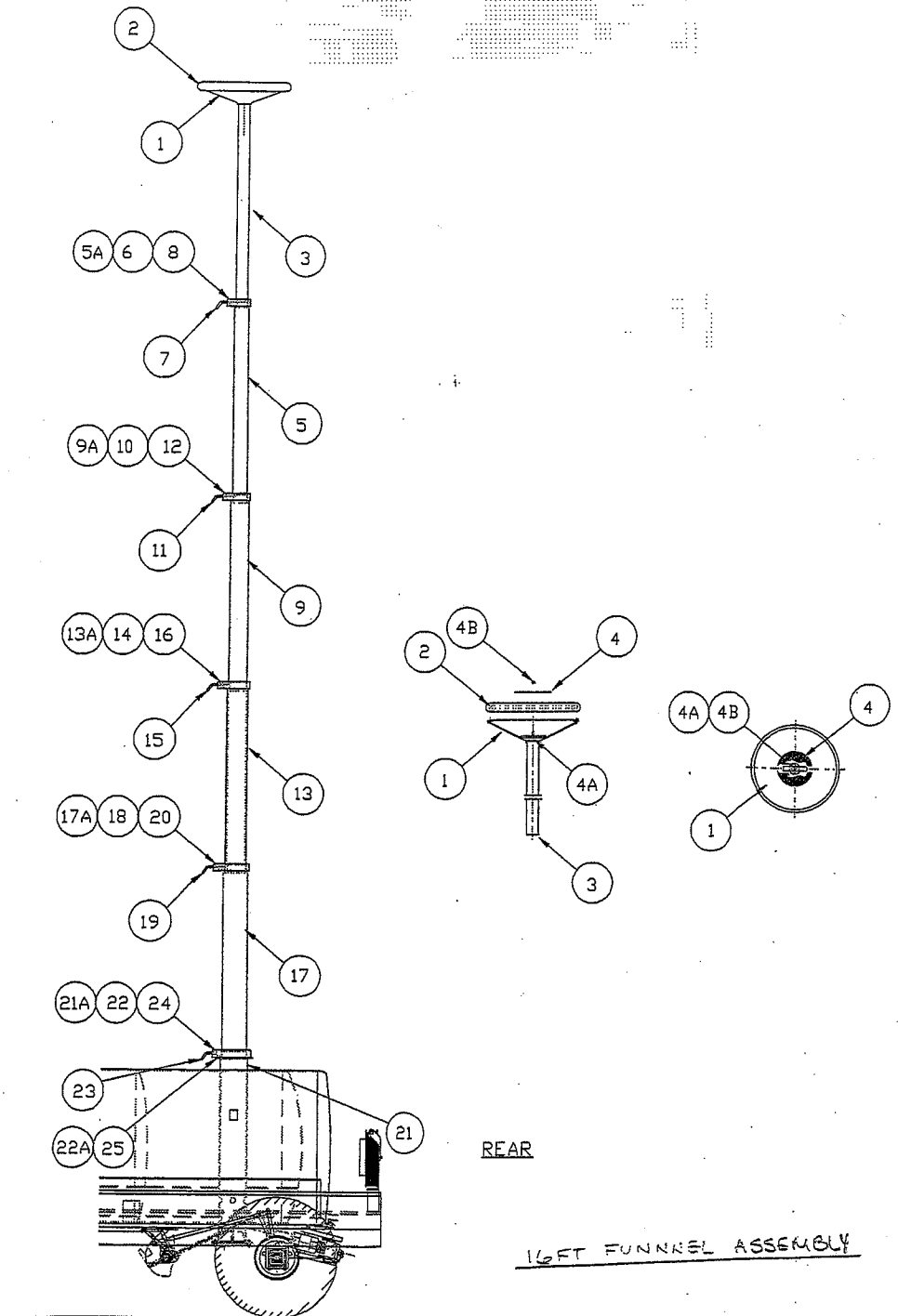


12 FT FUNNEL ASSEMBLY

ASSEMBLY 08-1034U (12') - CONTINUED
MAJOR ASSEMBLY - TELESCOPING DRAIN ASSEMBLY

<u>Item</u>	<u>Sub Assy.</u>	<u>Part No.</u>	<u>Qty.</u>	<u>Description</u>	<u>Wt.#</u>
	07-10541		1	Drain Funnel Section Assembly	
1		01-8250	1	Drain, Top (funnel)	5
2		06-1022	1	Gasket	.7
3		01-92402	1	Tubing, 2" OD	
4		04-1039	1	Screen	.5
4A		2-10002	1	Bolt, 1/4"	.2
4B		02-1200	1	Nut, 1/4"	.1
	08-1017u		1	Telescoping Sect. Assembly, 2-1/2" OD	
5A		05-10271	1	Clamp, 2"	
5		01-9242	1	Tubing, 2-1/2" OD	
6		05-10051	1	Wedge, 1"x11/16"x1 1/4"	.2
7		05-10181	1	Clamp Handle	.3
8		02-1005	1	Set Screw	.1
	08-1027U		1	Telescoping Sect. Assembly, 3" OD	
9A		05-10281	1	Clamp, 2-1/2" OD	
9		01-92452	1	Tubing, 3" OD	
10		05-10021	1	Wedge, 1"x7/8"x1 9/16"	.3
11		05-10181	1	Clamp Handle	.3
12		02-1005	1	Set Screw	.1
	08-1028U		1	Telescoping Sect. Assembly, 3-1/2" OD	
13A		05-10291	1	Clamp, 3" OD	
13		01-9248	1	Tubing, 3-1/2" OD	
14		05-10031	1	Wedge, 1"x1 1/16"x1 13/16"	.4
15		05-10181	1	Clamp Handle	.3
16		02-1005	1	Set Screw	.1
	07-1014U		1	Telescoping Sect. Assembly, 4" O.D.	
17A		05-10301	1	Clamp, 3-1/2" OD	
17		01-9259	1	Tubing, 4" OD	
18		05-10041	1	Wedge, 1"x1 7/32"x2 1/8"	.5
19		05-10181	1	Clamp Handle	.3
20		02-1005	1	Set Screw	.1
	07-1041U		1	Telescoping Sect. Assembly, 4-1/2" O.D.	
21A		01-92565S	1	Tube, 4-1/2" O.D.	
21		05-10302	1	Base Clamp, 4"	4.4
22		05-10051	1	Wedge, 1"x1"x21/2"	.6
22A		04-10561	1	Base Flange	
23		05-10181	1	Clamp Handle	.3
24		02-1005	1	Set Screw	.1
25		02-100121	4	Mounting Bolts, 1/4-16x3/4"	.2
26		08-1026	1	Cover Assembly	5

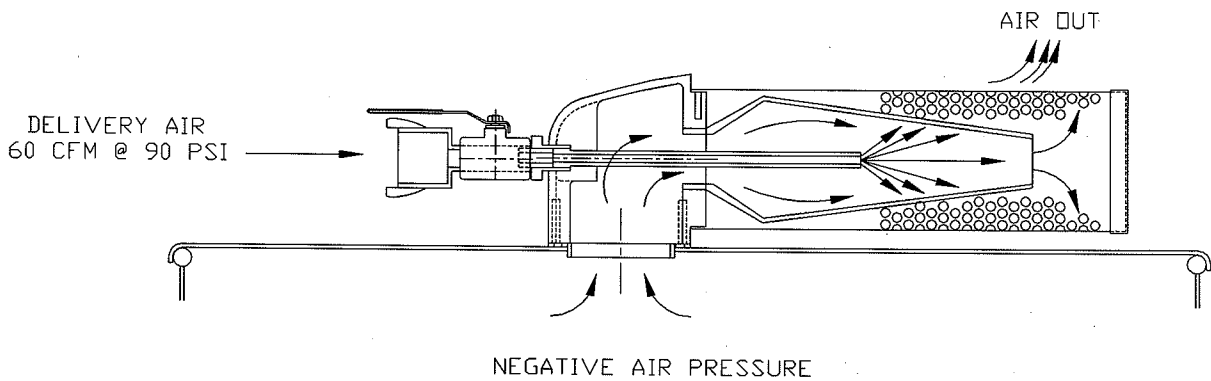
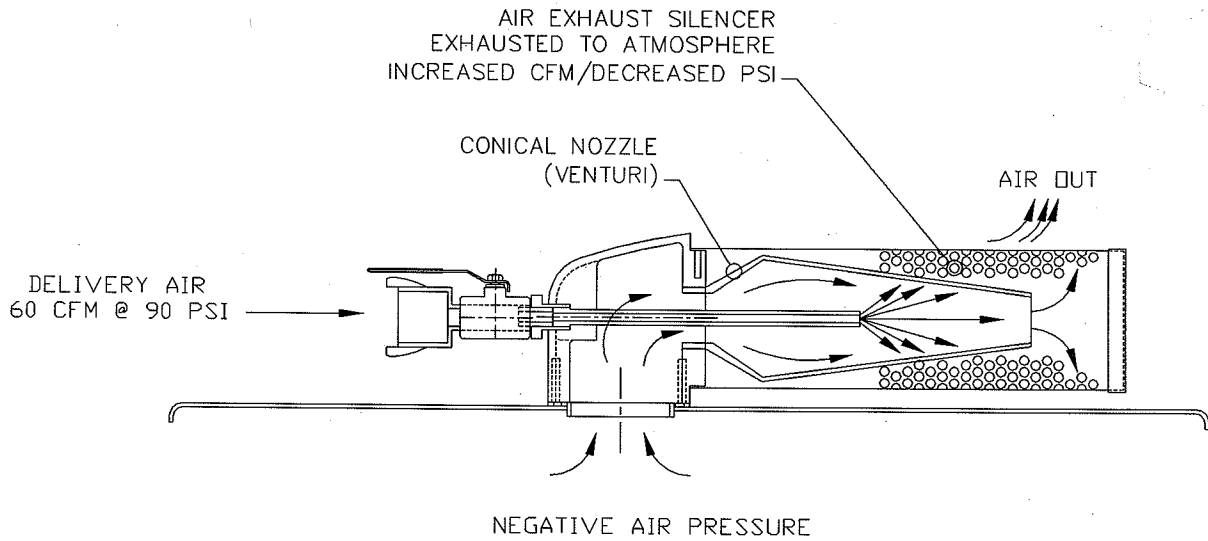
TELESCOPING FUNNEL (16') ASSEMBLY 08-1034U (16')
MAJOR ASSEMBLY - TELESCOPING DRAIN ASSEMBLY



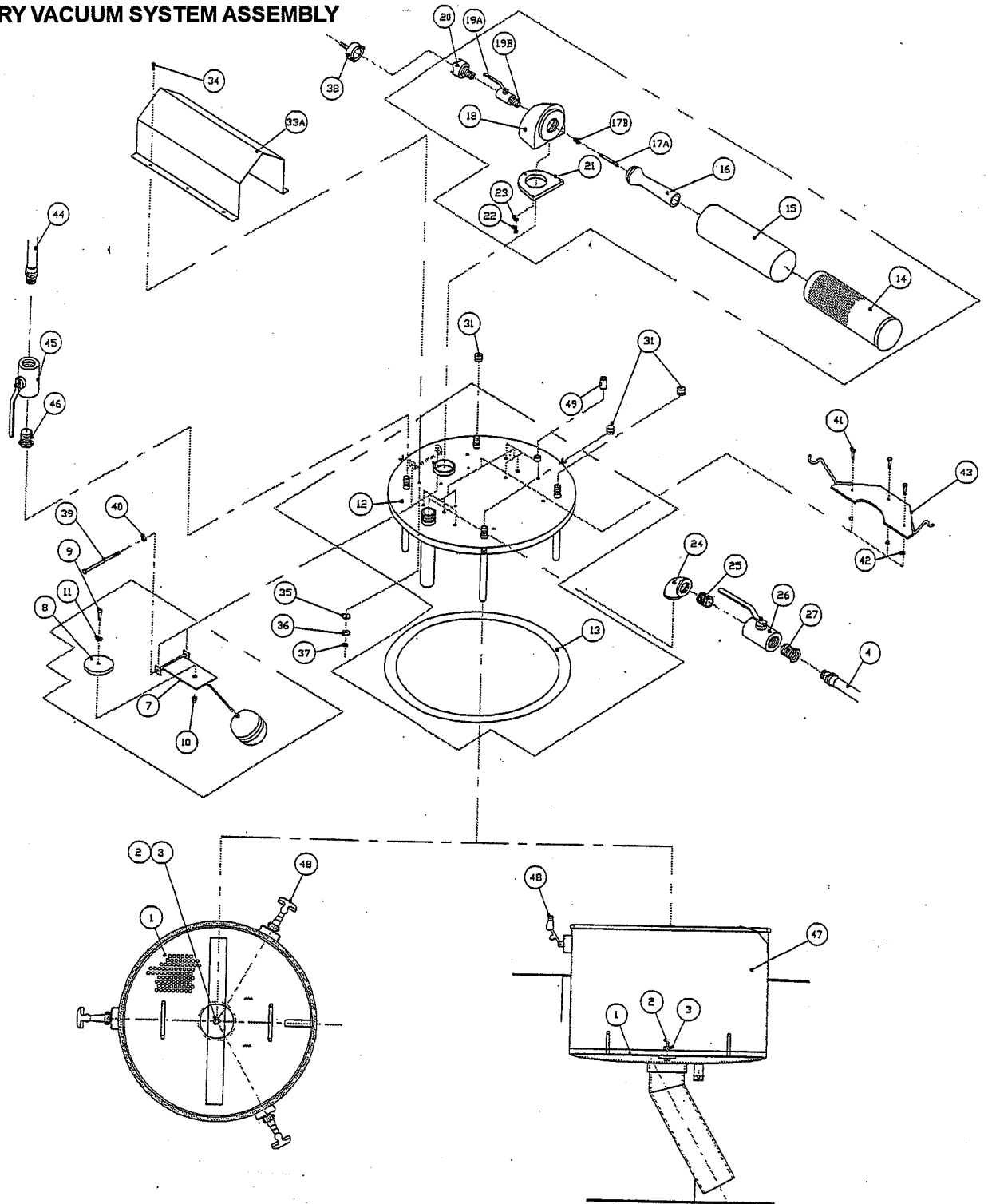
ASSEMBLY 08-1034U (16') - CONTINUED
MAJOR ASSEMBLY - TELESCOPING DRAIN ASSEMBLY

<u>Item</u>	<u>Sub Assy.</u>	<u>Part No.</u>	<u>Qnt.</u>	<u>Description</u>	<u>Wt.#</u>
	07-10541		1	Drain Funnel Section Assembly	
1		01-8250	1	Drain, Top (funnel)	5
2		06-1022	1	Gasket	.7
3		01-92402	1	Tubing, 2" OD	
4		04-1039	1	Screen	.5
4A		2-10002	1	Bolt, 1/4"	.2
4B		02-1200	1	Nut, 1/4"	.1
	08-1017u		1	Telescoping Sect. Assembly, 2-1/2" OD	
5A		05-10271	1	Clamp, 2"	
5		01-9242	1	Tubing, 2-1/2" OD	
6		05-10051	1	Wedge, 1"x11/16"x1 1/4"	.2
7		05-10181	1	Clamp Handle	.3
8		02-1005	1	Set Screw	.1
	08-1027U		1	Telescoping Sect. Assembly, 3" OD	
9A		05-10281	1	Clamp, 2-1/2" OD	
9		01-92452	1	Tubing, 3" OD	
10		05-10021	1	Wedge, 1"x7/8"x1 9/16"	.3
11		05-10181	1	Clamp Handle	.3
12		02-1005	1	Set Screw	.1
	08-1028U		1	Telescoping Sect. Assembly, 3-1/2" OD	
13A		05-10291	1	Clamp, 3" OD	
13		01-9248	1	Tubing, 3-1/2" OD	
14		05-10031	1	Wedge, 1"x1 1/16"x1 13/16"	.4
15		05-10181	1	Clamp Handle	.3
16		02-1005	1	Set Screw	.1
	07-1014U		1	Telescoping Sect. Assembly, 4" O.D.	
17A		05-10301	1	Clamp, 3-1/2" OD	
17		01-9259	1	Tubing, 4" OD	
18		05-10041	1	Wedge, 1"x1 7/32"x2 1/8"	.5
19		05-10181	1	Clamp Handle	.3
20		02-1005	1	Set Screw	.1
	07-1041U		1	Telescoping Sect. Assembly, 4-1/2" O.D.	
21A		01-92565S	1	Tube, 4-1/2" O.D.	
21		05-10302	1	Base Clamp, 4"	4.4
22		05-10051	1	Wedge, 1"x1"x21/2"	.6
22A		04-10561	1	Base Flange	
23		05-10181	1	Clamp Handle	.3
24		02-1005	1	Set Screw	.1
25		02-100121	4	Mounting Bolts, 1/4-16x3/4"	.2
26		08-1026	1	Cover Assembly	5

**PRIMARY VACUUM SYSTEM ASSEMBLY
PRIMARY VACUUM GENERATOR**



ASSEMBLY NO. 08-0001U
PRIMARY VACUUM SYSTEM ASSEMBLY



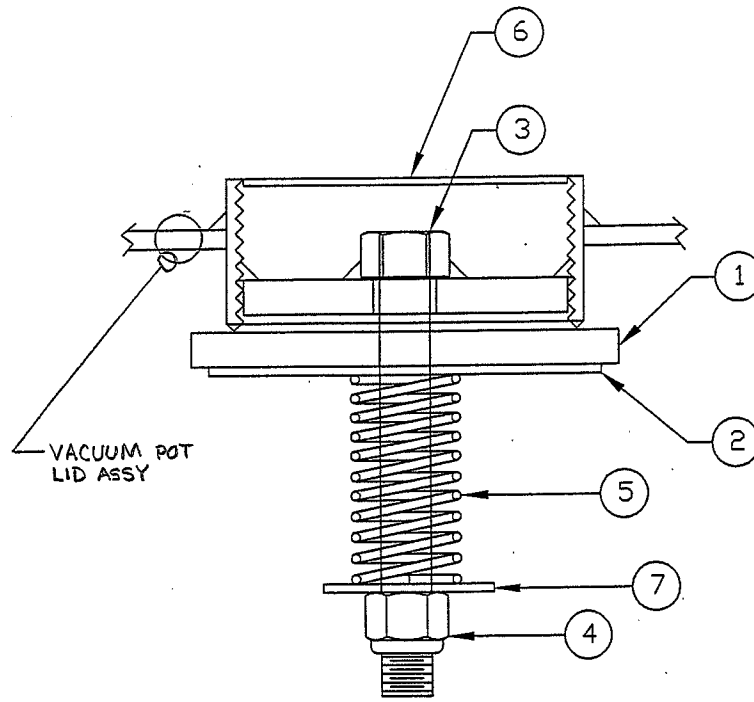
**ASSEMBLY NO. 08-0001U - CONTINUED
 PRIMARY VACUUM SYSTEM ASSEMBLY**

<u>Item</u>	<u>Sub Assy.</u>	<u>Part No.</u>	<u>Qty.</u>	<u>Description</u>	<u>Wt.#</u>
	08-1000		1	Drain Stop Assembly	
1		07-1000	1	Drain Stop Arm	3.5
2		04-1000	1	Gasket	1.5
3		02-10016	1	Bolt	.1
4		02-10002	1	Bolt	.1
5		02-1100	1	Flatwasher	.1
6A		02-1201	1	Nut	.1
6B		02-1200	1	Nut	.1
	08-1001		1	Overflow Stop Assembly	
7		07-1109	1	Float Sub. Assembly	4
8		04-1001	1	Gasket	.1
9		02-10003	1	Bolt	.1
10		02-1200	1	Nut	.1
11		02-1100	1	Flatwasher	.1
	08-1002		1	Cover Assembly	
12		07-1022	1	Lid	5
13		06-1022	1	Gasket	2.7
	08-1003		1	Nortech Vacuum Head Assy.	
14		04-1004	1	Exhaust Housing	9.5
15		04-1005	1	Exhaust Silencer	4.7
16		04-1006	1	Venturi	2.2
17		04-1007	1	Air Jet	2.7
18		04-1008	1	Venturi Box	2.7
19		04-1032	1	Valve	5.8
20		04-1056	1	Coupler	1.7
21		04-1010	1	Gasket	.1
22		02-10010	3	Bolt	.1
23		02-11001	3	Washer	.1
	08-1004		1	Accessories	
24		03-1001	1	Elbow	2
25		03-02922S	1	Nipple	.5
26		04-10321	1	Valve	3
27		03-1002	1	Hex Bushing	.2
28		03-1003	1	Nipple	.1
29		03-10101	1	Hose Clamp	.1
30		06-1016	1	Hose	15
31		03-1021	4	Pipe Cap (Optional)	1
32		07-1019	1	Lid	24
33		07-1034U	1	Cover, Vacuum Generator	8
34		02-10010	6	Bolt	.1
35		06-1021	6	Washer	.1
36		02-1100	6	Washer	.1
37		02-1200	6	Nuts	.1
38		04-1057	1	Coupler	.5
39		02-10016	1	Bolt	.5



**ASSEMBLY NO. 08-0001U (CONTINUED)
PRIMARY VACUUM SYSTEM ASSEMBLY**

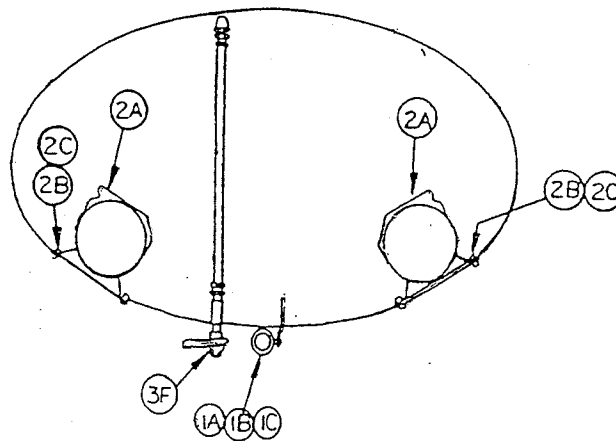
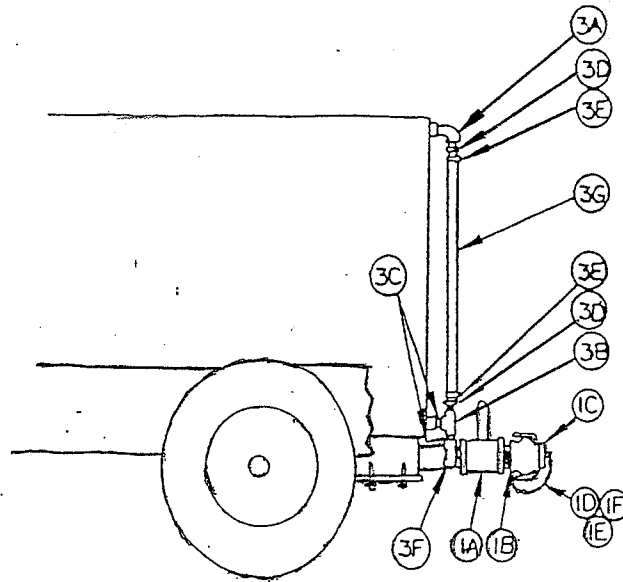
<u>Item</u>	<u>Sub Assy.</u>	<u>Part No.</u>	<u>Qnt.</u>	<u>Description</u>	<u>Wt.#</u>
40		02-1201	1	Nut	.1
41		03-10155	4	Bushing (Optional)	.5
42		04-10320	4	Ball Valve (Optional)	4
43		03-10091	4	Hose Barb (Optional)	2
44		06-10185	4	Tubing (Optional)	4
45		01-9026S	2	Hanger Plate (Optional)	3
46		02-12014	6	Hex Nuts (Optional)	.5
47		01-9172S	4	Tubing Hangers (Optional)	2.5
48		02-100115	6	Bolt (Optional)	1
49		03-101005	4	Hose Clamp (Optional)	.5



VACUUM GOVERNOR ASSEMBLY NO. 10-10015
MAJOR ASSEMBLY - VACUUM GOVERNOR

Item	Sub Assy.	Part No.	Qty.	Description	Wt.#
	08-10015			Vacuum Governor Assembly	
1		08-10015-1	1	Gasket	0.3
2		08-10015-2	1	Washer, Flat	0.1
3		08-10015-3	1	Bolt	0.2
4		08-10015-4	1	Nut	0.1
5		08-10015-5	1	Sprint, Century J-38	0.1
6		08-10015-6	1	Screen 16 Mesh	0.1
7		08-10015-7	1	Washer, Flat 91090A121	0.1

MISCELLANEOUS FIXTURES ASSEMBLY NO. 10-10110



REAR VIEW

**ASSEMBLY NO. 10-10110 - CONTINUED
 MISCELLANEOUS FIXTURES**

<u>Item</u>	<u>Sub Assy.</u>	<u>Part No.</u>	<u>Qnt.</u>	<u>Description</u>	<u>Wt.#</u>
08-1012		1	1	Drain Assembly	
1A		04-10321	1	Ball Valve	6
1B		04-1033	1	Camlock Adaptor	1.5
1C		04-10331	1	Camlock Plug	.5
1D		04-1034	1	Safety Chain	.2
1E		04-1035	1	S-Hook, Safety Link	.1
1F		04-10351	1	S-Hook, Safety Link	.1
	08-1013		1	Grounding Reel Assembly	
2		04-10361	1	Grounding Reel	12
2A		04-1036	1	Grounding Reel	12
2B		02-10040	4	Bolts	.3
2C		02-12041	4	Nuts	.1
	08-1014		1	Sight Gauge Assembly	
3		03-0017S	2	Elbow	.5
3A		03-1007	1	Tee	.5
3B		03-1008	2	Nipple	.5
3C		03-11130	2	Hose Barb	1
3D		03-1010	2	Hose Clamp	.1
3E		04-1032	1	Ball Valve	2.7
3F		06-2527	1	Tubing	.1
4					
5		04-1037	1	Vent	3

AutoVac Shut Off

Introduction

The AutoVac Shut-Off (AVSO) is designed to prevent overfilling the tank during the vacuum process. The AVSO is equipped with a float *Item 20* set to regulate the maximum tank volume at 92% allowing for fuel expansion. The AVSO operates on compressed air, the same air that operates the primary vacuum generator. Once the 92% tank liquid level point is reached the air powered cylinder *Item 25* actuates and turns off the air supply to the primary vacuum generator. The AVSO is also equipped with a bypass valve *Item 18* that allows you to override the air cylinder so that you can finish draining the hoses prior to emptying the tank. The AVSO is equipped with a twist coupler *Item 19* for fast air connection.

Operation

Start-Up

- 1) To start the AVSO first hook up an adequate air supply (60CFM @ 90PSI) to the twist coupler *Item 19*
- 2) Turn on the air control valve *Item 3* by pushing the handle *Item 27* inward so the air cylinder *Item 25* rod is not visible and compressed.
- 3) You should here the primary vacuum generator turn on.

Shut-Down

- 1) Pull the handle *Item 27* toward you so the air cylinder *Item 25* rod is visible.
- 2) The primary vacuum generator will turn off.

AVSO Override

- 1) When the tank level reaches approximately $\frac{3}{4}$ full it should be emptied.
- 2) In the event that the AVSO energizes the air cylinder *Item 25* and the air control valve *Item 3* shuts off, you can override the system so that you can finish draining the suction hoses.
- 3) Locate the bypass valve *Item 18*
- 4) Push in and hold the bypass valve push button.
- 5) Turn on the air control valve *Item 3* by pushing the handle *Item 27* inward so the air cylinder *Item 25* rod is not visible and compressed.
- 6) The vacuum generator will remain on until you let go of the bypass valve button *Item 18* at which time the AVSO will energize the air cylinder *Item 25* and shut off the air control valve *Item 3*.
- 7) When the suction lines are clear of liquid release the bypass valve push button
- 8) The primary vacuum generator will turn off.

Maintenance

Prior to each use

The AVSO requires little maintenance. It is strongly suggested that you test the AVSO operation prior to each use.

- 1) Simply turn on the AVSO as shown in the operations start-up section.
- 2) Once the primary vacuum generator has turned on simply pull up on the cylinder control valve Item 2 lever located on the top cover of the level sensor assembly Item
- 3) If the AVSO is operating correctly the air cylinder Item 25 should energize and turn off the primary vacuum generator.
- 4) If you hear any air leaks once the vacuum generator shuts off, locate and fix as required.

Check the 1/8" air lines Items 34 & 35 for leaks or cuts, replace as required.

Every Six months

- 1) Check the float Item 20 to ensure that it has no cracks or leaks.
- 2) Remove the 4 bolts that hold down the top cover of the level sensor assembly Item 1
- 3) Carefully lift up on the assembly and viewing the float Item 20
- 4) Check to ensure that the float level rod moves the operating rod Item 24 up and down with little effort.
- 5) Replace any parts as required.
- 6) Reinstall using a new gasket if required.

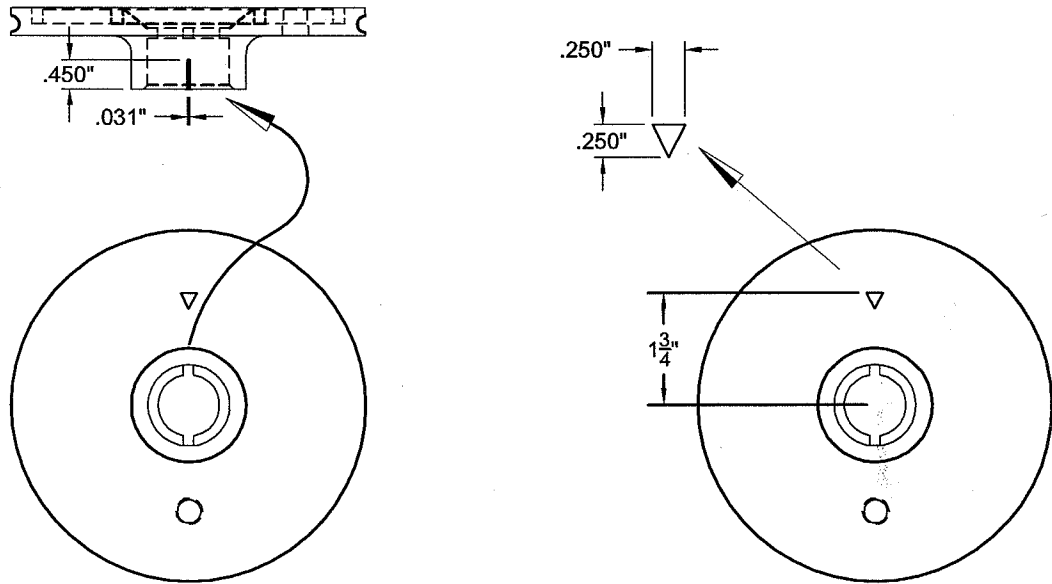
(Special Note) You must remove the 2 small quick couplers Items 8 & 10 prior to removing the vacuum lid and reinstall the 2 small quick couplers Items 8 & 10 when the vacuum lid has been reinstalled.

Trouble Shooting

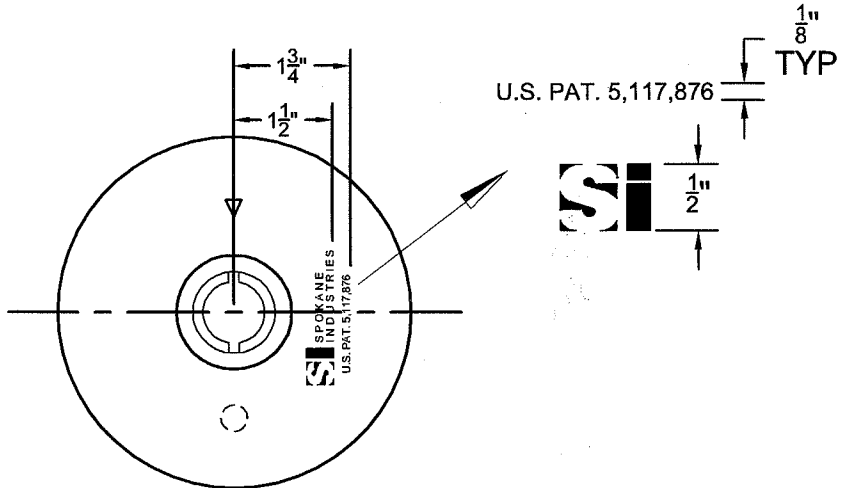
Problem: Air cylinder does not energize

- 1) Perform AVSO test as listed in the maintenance section.
- 2) If the air cylinder Item 25 does not move, check to ensure that the 1/8" air lines Items 34 & 35 are connected as shown.
- 3) Check the float Item 20 as listed in the maintenance section.
- 4) Check the cylinder control valve Item 2 by removing quick couplers Items 10 & 7
- 5) Perform the AVSO test again and listen for air coming out of the disconnected quick coupler.
- 6) If you hear air then the air cylinder Item 25 needs replacing.
- 7) If no air escapes then the cylinder control valve Item 2 requires replacing.

DRAWING/REVISION APPROVALS					
SYMB.	REQ. BY:	DESCRIPTION	DWN. BY/DATE	ENG. MGR./DATE	Q.C. MGR./DATE
		ORIGINAL ISSUE	MDD/ 12-16-91		
A	MDD	REVISED TO AUTOCAD	MDD/ 10-30-00	-	-
B		REVISED PER REQUEST	ROB/ 2-1-01	-	-
C	KEN O	REVISED FOR 2002 MODEL	MDD/ 6-26-03	KO/ 7-6-01	KO/ 7-6-01
D	KEN O	ADDED ID INSET 1.95" PER REVIEW	MDD/ 1-08-04	KO/ 1-08-04	KO/ 1-08-04
E	ENG	REVISED PER REVIEW	MDD/ 08-26-04	KO/ 08-26-04	KO/ 08-26-04
F	ENG	REVISED PER REVIEW	MDD/ 09-28-04	KO/ 09-28-04	KO/ 09-28-04



LINE UP MARKING DETAILS



STENCILING DETAILS

NOTE: B.O.M. IS FOR 1 ASSY W/ GASKETS - 1 TO 4 ASSY'S AVAILABLE PER BOWSER

ITEM	QTY.	PART No.	DESCRIPTION	MAT'L.	WGHT.
5	1	P.D.	ROLL PIN, 3/32" DIA x 1/4" LG, S/S	T304	.01
4	1	06-00688	ORING #430 B 5 1/8" ID x 5 5/8" OD	BUNA	.02
3	1	06-0074	3/16" THK x 3/8" WIDE x 2" ID GASKET, R/S#06-0072	VITON	.01
2	1	06-0075	3/16" THK x 3/8" WIDE x 4.75" OD GASKET, R/S#06-0072	VITON	.01
1	1	05-1040	5 1/2" OD ALUMINUM ROUND BAR MACHINED, R/S 01-92534	6061 T6	.6
Bill of Material				APPROX. WGHT.	.65#

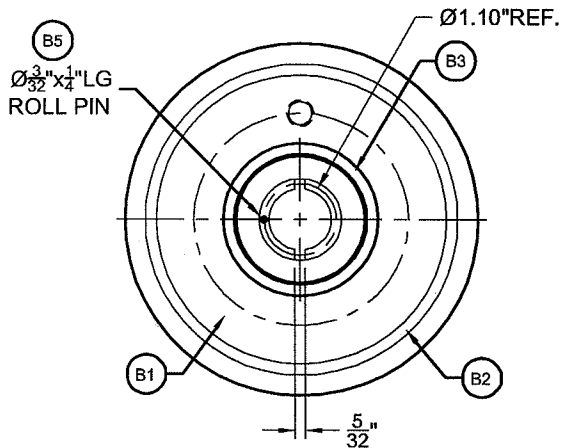


SPOKANE INDUSTRIES, INC.
Spokane Metal Products Division
P.O. Box 3303, Spokane, WA 99220 (509) 928 0720

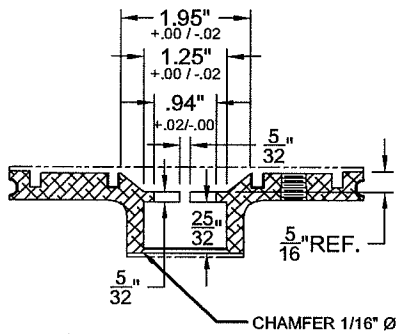
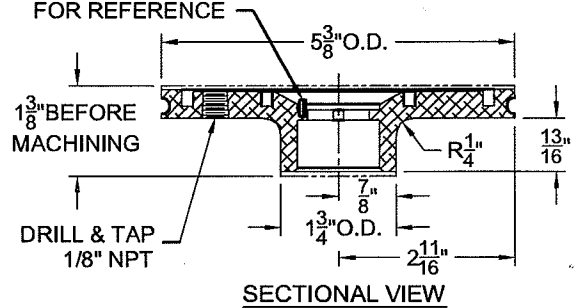
TITLE:	MACHINED SUMPING CUP DETAILS		
	BOWSER		
SIZE: A	DWG. No.: 08-0200R21	SCALE: FULL	SHT. 2 OF 2

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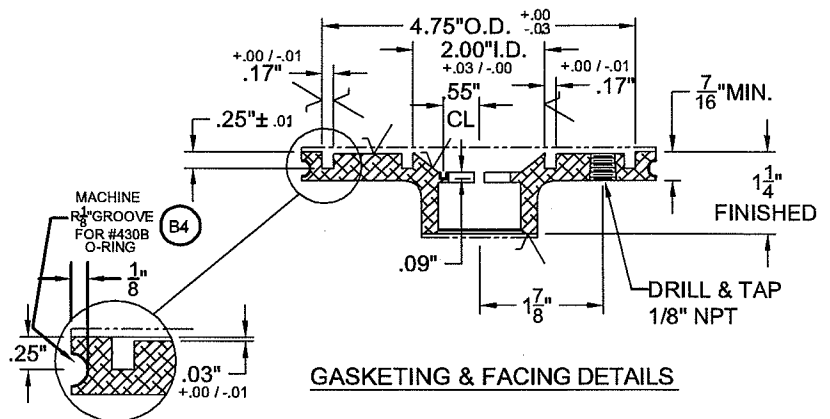
DRAWING/REVISION APPROVALS					
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		ORIGINAL ISSUE	MDD/ 12-16-91		
A	MDD	REVISED TO AUTOCAD	MDD/ 10-30-00	-	-
B		REVISED PER REQUEST	ROB/ 2-1-01	-	-
C	KEN O	REVISED FOR 2002 MODEL	MDD/ 6-26-03	KO/ 7-6-01	KO/ 7-6-01
D	KEN O	ADDED ID INSET 1.95" PER REVIEW	MDD/ 1-08-04	KO/ 1-08-04	KO/ 1-08-04
E	ENG	REVISED PER REVIEW	MDD/ 08-26-04	KO/ 08-26-04	KO/ 08-26-04
F	ENG	REVISED PER REVIEW	MDD/ 09-28-04	KO/ 09-28-04	KO/ 09-28-04



ROLL PIN SHOWN, INSTALLED FOR REFERENCE



CENTER MACHINING DETAILS



GASKETING & FACING DETAILS

SUMPING CUP NOTES

- 1) DESIGN, FABRICATE, TEST AND INSPECT IN ACCORDANCE WITH STANDARD MACHINE SHOP PRACTICE
- 2) ALL MACHINE CHUCK MARKS, SPIN MARKS, SHARP EDGES & BURRS MUST BE REMOVED.
- 3) ALL MACHINED SURFACES TO HAVE A FINISH OF 125 OR BETTER.
- 4) TOLERANCE AS NOTED.



SPOKANE INDUSTRIES, INC.
Spokane Metal Products Division
P.O. Box 3303, Spokane, WA 99220 (509) 928 0720

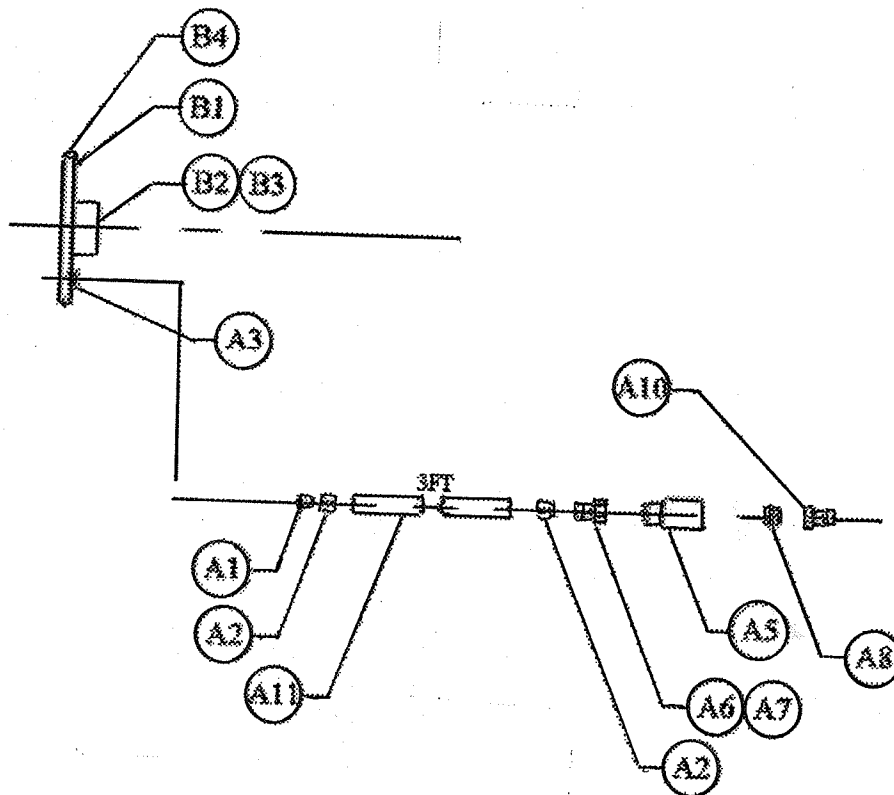
TITLE: MACHINED SUMPING CUP DETAILS
BOWSER

SIZE: A DWG. No.: 08-0200R21 SCALE: FULL SHT. 1 OF 2

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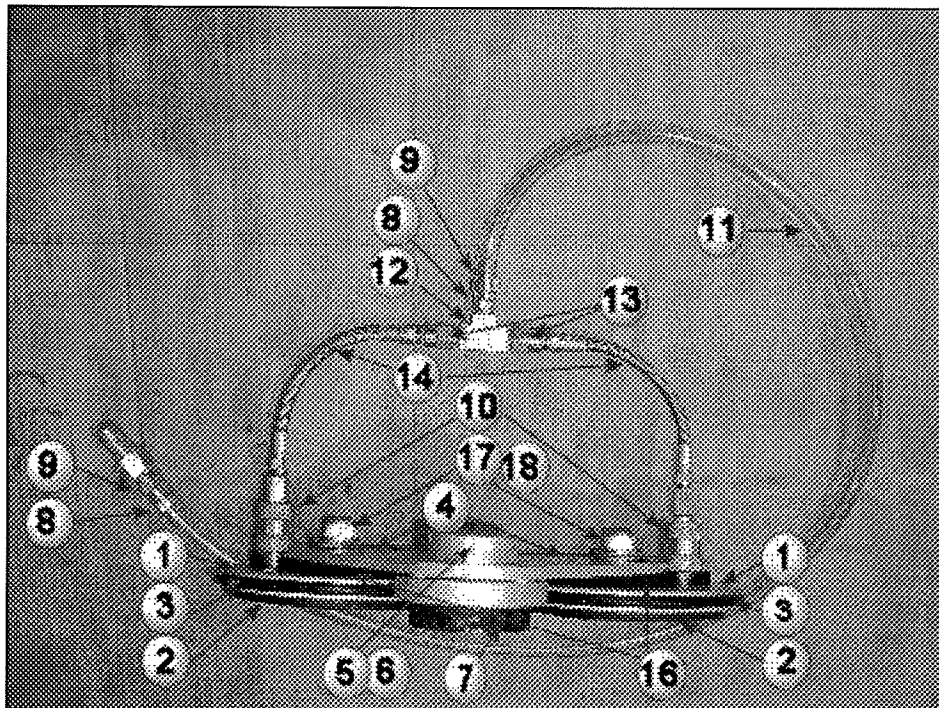
Part 08-0200 SeaVac™ Standard Suction Plate Assembly (1 Required)

Item	Part Number	Qty	Description
B1	005-1040	1	Suction Plate, Machined Alum.
B2	06-0075	1	Seal, 4.75" OD, Viton (40 Dur), 3/16 x 1/2 (R/S 06-0072)
B3	06-0074	1	Seal, 2" ID, Viton (40 Dur), 3/16 x 1/2 (R/S 06-0072)
B4	06-00688	1	O-Ring Bumper, Buna-Nitrile #460-B
A1	03-111334	1	Hose Barb, Brass, 1/8 NPT x 1/4" Barb #29-42
A2	03-10105	2	Clamp, Oitker 1/2 #11/13
A3	04-10325	1	Slider Valve, 1/8" Brass, #250
A11	06-2526	1	Tubing, 1/7 x 1/2 OD PVC x 3'-0" #510
A5	04-10099	1	Check Valve, Brass, Linde #639110
A6	03-111336	1	Hose Barb Adapter, Brass, Linde #17
A7	03-111337	1	Nut Brass, Linde #7
A8	03-111338	1	Bushing, Brass
A10	03-111397	1	Quick Disconnect, 1/4" Male #BH2-61



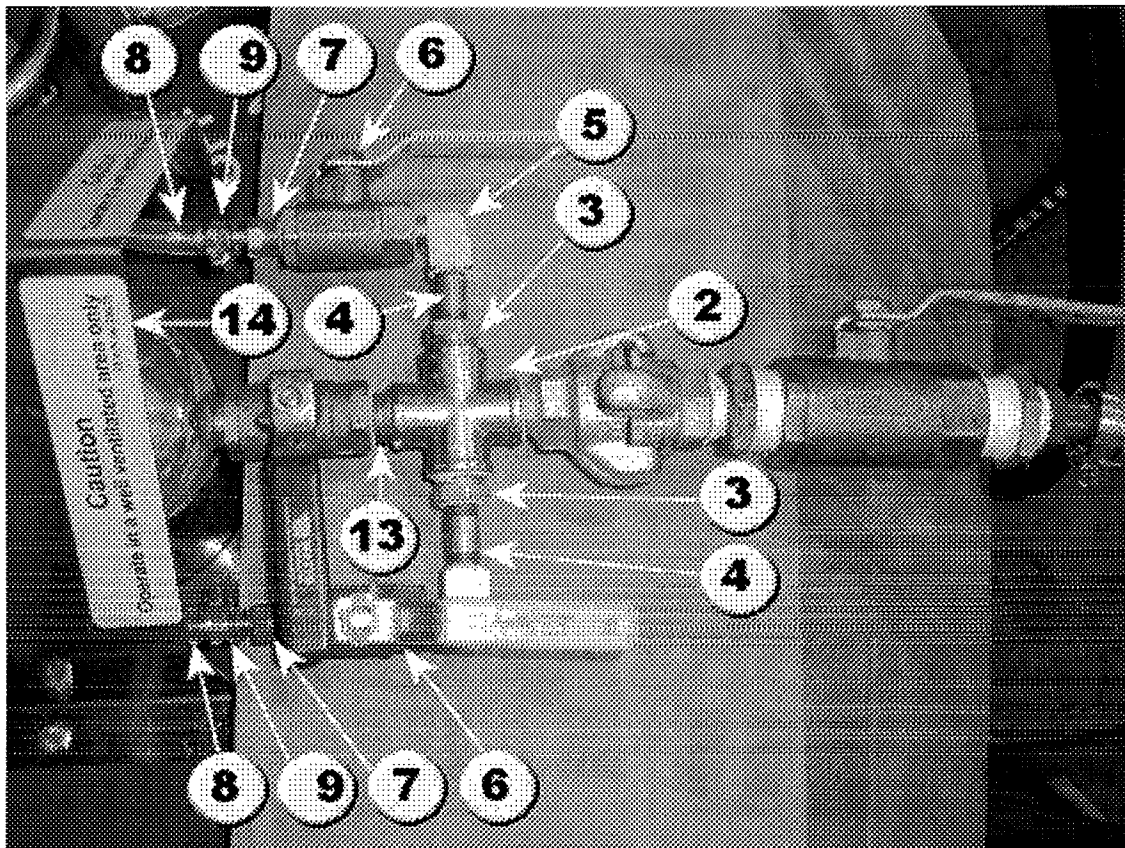
Part 08-0020 SeaVac™ Duel-Disk Suction Plate

Item	Part Number	Qty	Description
1	05-1039	2	Suction Plate, Machined Aluminum.
2	06-0075	2	Seal, 4.75" OD, Viton (40 Dur), 3/16 x 1/2 (R/S 06-0072)
3	06-00688	2	O-Ring Bumper, Buna-Nitrile #430-B
4	07-0850	1	Delta Wing Plate
5	05-10401	1	Hub, Delta Wing, Machined
6	02-1490	4	Flat Head Machine Screws #10-32 x 1/2" SS
7	06-0073	1	Hub Seals, 3/16" Soft Buna-Nitrile 3/4" W x 2" ID
8	03-111334	2	Hose Barb, Brass 1/8 NPT x 1/4" Barb #29-42
9	03-10105	2	Clamp, Oitker 1/2 #11/13
10	04-10325	2	Slider Valve, 1/8" Brass, #250
11	06-2526	1	Tubing, 1/4 x 1/2 OD PVC x 3'-0" #510
12	03-11131	1	Tee, 1/4" X 11" Lg.
13	04-10099R	2	Check valves
14	06-10168	2	Braided SS hose, 1/8" x1 11" Lg.
15	03-111397	1	Quick Disconnect, 1/4" Male #BH2-61
16	06-0076	2	Cup cushions, 1/82" sponge Buna-Nitrile, cut special
17	02-1475	2	Allen Head Bolt, SS, 1/2" x 3/4" Lg.
18	02-11025	2	Washer, Flat, SS, 1/2"



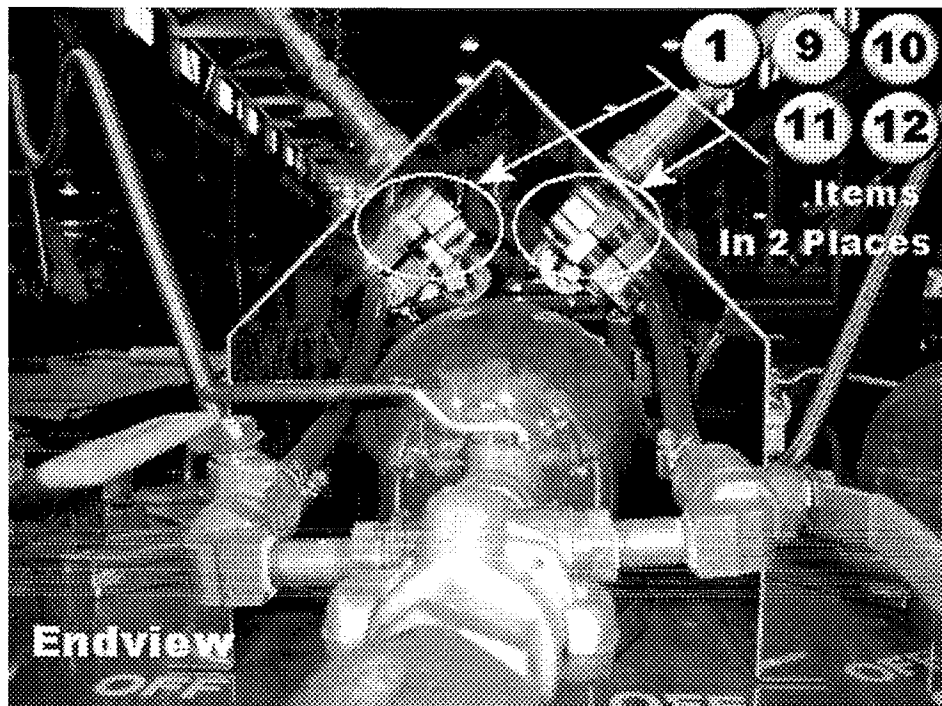
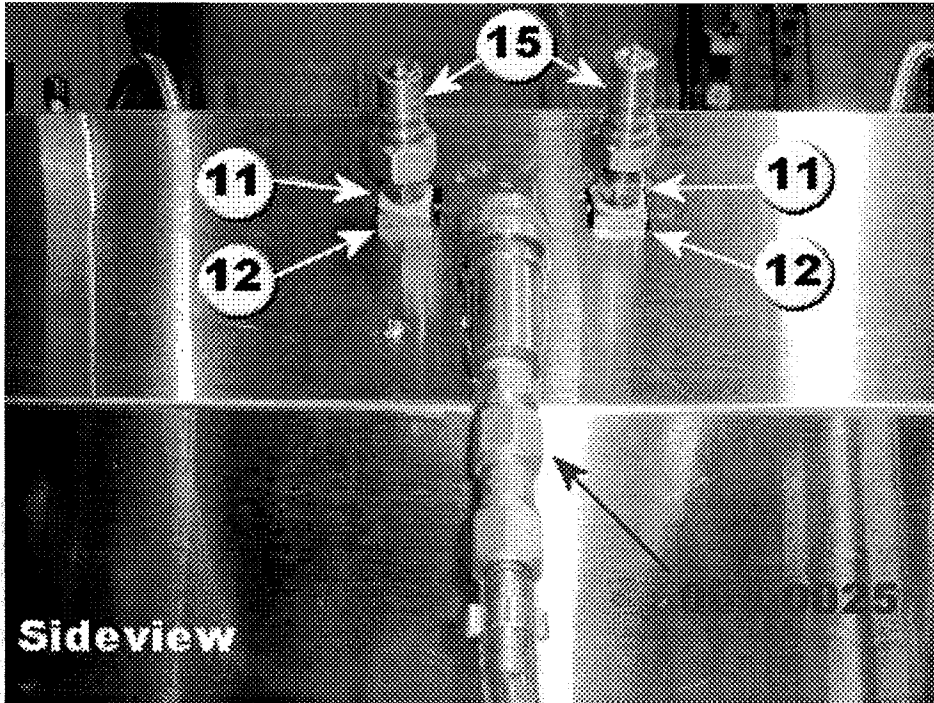
Part 08-14005 SeaVac™ Secondary Vacuum Generator Assembly

Item	Part Number	Qty	Description
1	04-100035	2	Secondary Vacuum Generator, 1/8" Intake/1/4" Outlet, #41605K14
2	03-1059	1	Cross, 1/2 Brass #3950-8
3	03-11135	4	Bushing, 1/2" x 1/4" Brass #3220-8-4
4	03-10692	2	Nipple, 1/4" x 1.5" 1g Brass #3327-4
5	03-11136	2	Street El, 1/4" x 90 #3400-4
6	04-2506	2	Valve, Ball, 1/4" Brass #70-101-01
7	03-11133	2	Hose Barb, Brass 1/4 NPT x 1/84" Barb #29-44
8	06-2565	2	Tubing, 1/4 x 1/2 OD PVC x 12" #510
9	03-10105	4	Clamp, Oikter 1/2 #11/13
10	03-111334	2	Hose Barb, Brass 1/8 NPT x 1/4" Barb #29-42
11	03-10690	2	Close Nipple, Brass, 1/4 #3325-4
12	03-11136	2	Street El, 1/4" x 90 #3400-4
13	03-10081	2	Close Nipple Br, 1/2" #3326-8
14	07-1034U	1	Cover, Vacuum Generator
15	03-111397	2	Quick Disconnect, 1/4" Male #BH2-61



Part 08-14005

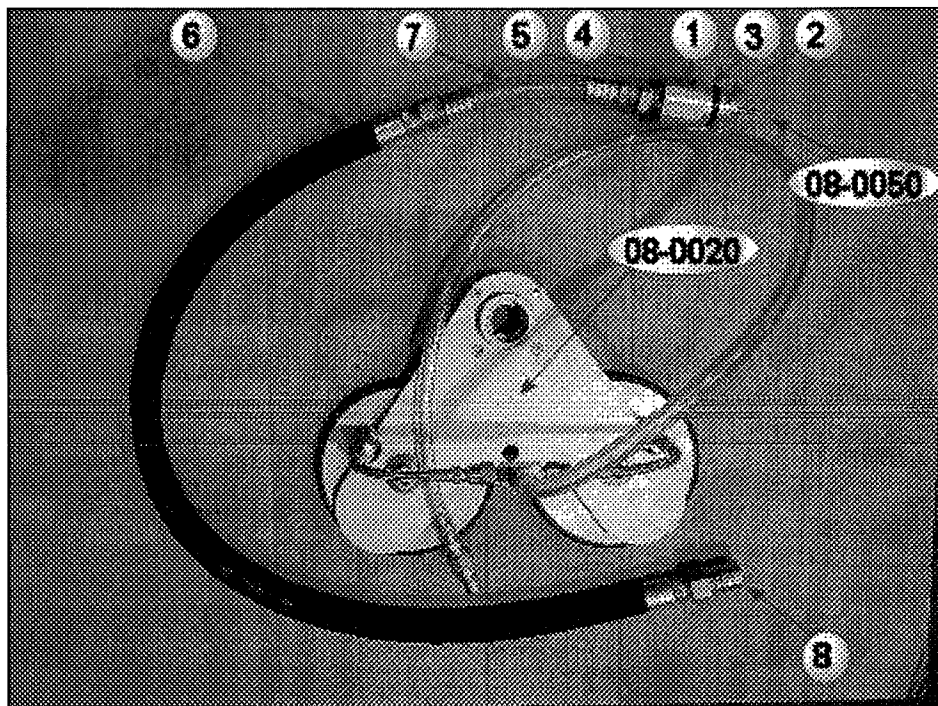
SeaVac™ Secondary Vacuum Generator Assembly - Continued



Part 08-0100

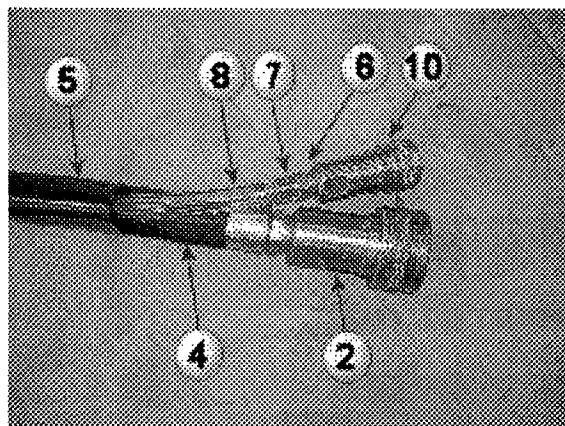
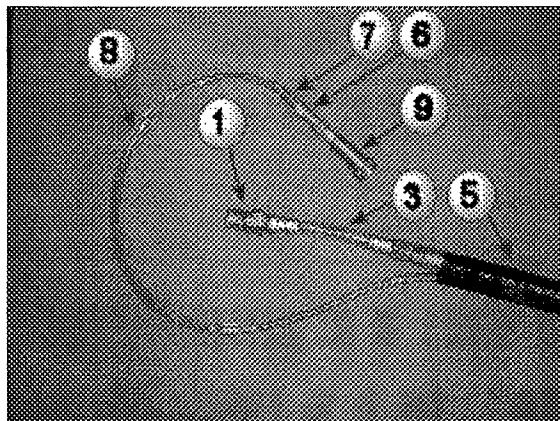
SealVac™ Fuel Probe Assembly (2 Required)

Item	SubAssy.	Part Number	Qty	Description
1		05-1037R	1	SealVac™ Fuel Probe, Machined Alum.
2		02-1350	2	Roll Pin, .3/32" OD x 1/4" LG. #92373A139 18-8 SS
3		06-00684	1	O-Ring Part No. 2-214
4		04-10328	1	Vacuum Bleeder Valve, 1/8" NPT Amflo #711
5		03-10155	1	Bushing, Brass, 3/4 TO 1/2" #3220 x 12 x 8
6		06-10166	1	Aircraft Defueling Hose, 1/2" x 3' LG w/1/2" M-NPT ends
7		04-0750	1	FuelFlow™ Viewing Section, 1/2" urethane x 7" OA Long
8		03-111395	1	Quick Disconnect 1/2 Male #BH4-61
	08-0020		1	SealVac™ Duel-Disk Suction Plate Assembly



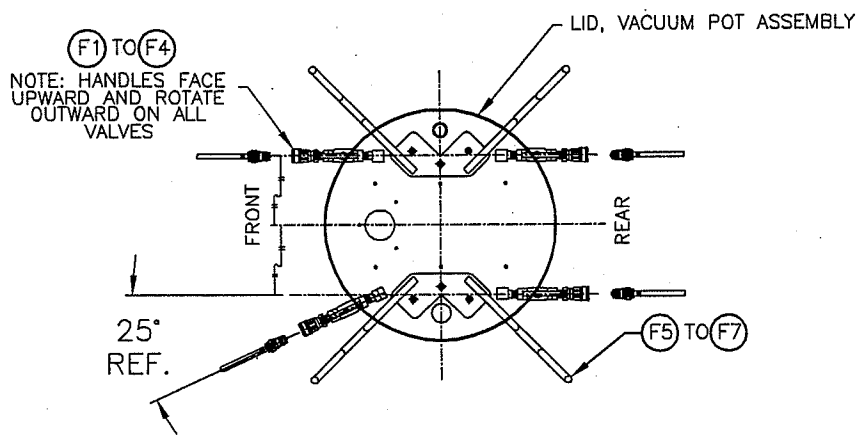
Part 08-0025 Shielded Duplex 35' Static Dissipating Hose Assembly - 2 Required

Item	Part Number	Qty	Description
1	03-111395	1	Quick Disconnect 1/2 Male #BH4-61
2	03-111394	1	Quick Disconnect 1/2 Female #BH4-60
3	04-0750	1	FuelFlow™ Viewing Section, 1/2" urethane x 7" OA Long
4	06-10166	1	Aircraft Defueling hose, 1/2" x 35'LG w/1/2" M-NPT ends
5	06-10165	1	2" black heat shrink tubing x 35'LG MC#7132K561
6	03-111334	2	Hose Barb, Bass 1/8 NPT x 1/4" Barb #29-42
7	03-10105	4	Clamp, Oitker 1/2 #11/13
8	06-2526	1	Tubing, 1/4 x 1/2 OD PVC x 35'-0" #510
9	03-111398	1	Quick Disconnect, 1/4" Female #BH2-60
10	03-111397	1	Quick Disconnect, 1/4" Male #BH2-61

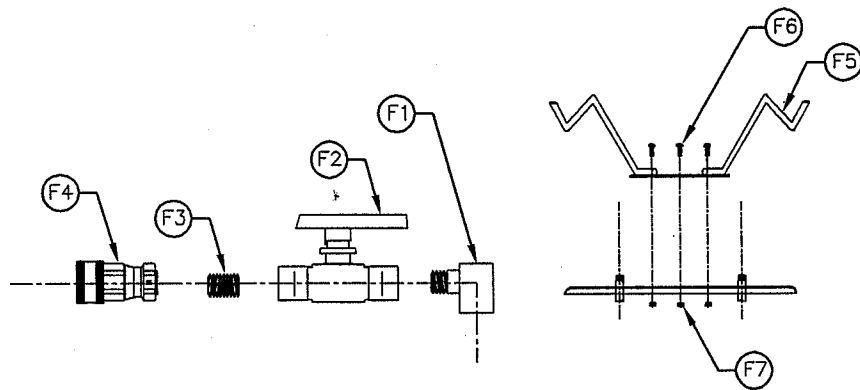


Part 08-14004 Vacuum Cover Adapter Parts (4-Ports)

Item	Part Number	Qty	Description
F1	03-1006	4	Elbow, Brass Street, 1/2" x 90 #3400-8
F2	04-2507	4	Valve, Brass, 1/2 Apollo Ball #70-103-01
F3	03-10081	4	Close Nipple, Brass, 1/2 #3326-8
F4	03-111394	4	Quick Disconnect, 1/2 Female, #BH4-60
F5	07-1075	2	New Style Hose support brackets, Consisting of:
F6	02-100115	6	Bolts, 3/8" NC 1" LG.T-304SS
F7	02-1202	6	Nuts, 3/8" NC NYLOC, T-304SS



TOP ASSEMBLY VIEW



VALVE ASSEMBLY

HOSE HANGER SUPPORT BRACKET

Section 7: Warranty

SealVac™ Fuel Drain System Models SVU412 and SVU416

One Year Limited Warranty

Seller warrants its "SealVac™ Fuel Drain System Models SVU412 and SVU416" to be free from defects in material and workmanship under the normal use and service for which the unit is intended if, but only if the unit has been properly operated, maintained and stored in accordance with printed directions contained in the product manual. Our obligation under this warranty shall be limited to the repair or exchange of equipment and parts which may prove defective within one year of the date the unit is put into service but shall in no event extend beyond a date two years from the date the unit is shipped from our plant. All transportation charges on parts returned to us for replacement under this warranty must be returned pre-paid.

This warranty does not extend to damages caused by environmental factors varying from normal design conditions, whether natural or man-made, or to units subjected to misuse, negligence or accident. This warranty likewise does not extend to the unit or any parts thereof, which have been repaired or altered improperly or in any way so as to effect adversely its stability or reliability. This warranty does not cover parts or labor required to repair or replace parts whose usefulness is exhausted due to normal operation of this unit.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE NOT SET FORTH IN A WRITING SIGNED BY AN AUTHORIZED REPRESENTATIVE OR SELLER. SELLER SHALL IN NO EVENT BE LIABLE FOR ANY CONSEQUENTIAL LOSS OR DAMAGE RESULTING FROM THE USE OR LOSS OF USE OF THIS UNIT.

AutoVac Shut Off

Introduction

The AutoVac Shut-Off (AVSO) is designed to prevent overfilling the tank during the vacuum process. The AVSO is equipped with a float Item 20 set to regulate the maximum tank volume at 92% allowing for fuel expansion. The AVSO operates on compressed air, the same air that operates the primary vacuum generator. Once the 92% tank liquid level point is reached the air powered cylinder Item 25 actuates and turns off the air supply to the primary vacuum generator. The AVSO is also equipped with a bypass valve Item 18 that allows you to override the air cylinder so that you can finish draining the hoses prior to emptying the tank. The AVSO is equipped with a twist coupler Item 19 for fast air connection.

Operation

Start-Up

- 1) To start the AVSO first hook up an adequate air supply (60CFM @ 90PSI) to the twist coupler Item 19
- 2) Turn on the air control valve Item 3 by pushing the handle Item 27 inward so the air cylinder Item 25 rod is not visible and compressed.
- 3) You should here the primary vacuum generator turn on.

Shut-Down

- 1) Pull the handle Item 27 toward you so the air cylinder Item 25 rod is visible.
- 2) The primary vacuum generator will turn off.

AVSO Override

- 1) When the tank level reaches approximately $\frac{3}{4}$ full it should be emptied.
- 2) In the event that the AVSO energizes the air cylinder Item 25 and the air control valve Item 3 shuts off, you can override the system so that you can finish draining the suction hoses.
- 3) Locate the bypass valve Item 18
- 4) Push in and hold the bypass valve push button.
- 5) Turn on the air control valve Item 3 by pushing the handle Item 27 inward so the air cylinder Item 25 rod is not visible and compressed.
- 6) The vacuum generator will remain on until you let go of the bypass valve button Item 18 at which time the ASO will energize the air cylinder Item 25 and shut off the air control valve Item 3.
- 7) When the suction lines are clear of liquid release the bypass valve push button
- 8) The primary vacuum generator will turn off.

Maintenance

Prior to each use

The AVSO requires little maintenance. It is strongly suggested that you test the AVSO operation prior to each use.

- 1) Simply turn on the AVSO as shown in the operations start-up section.
- 2) Once the primary vacuum generator has turned on simply pull up on the cylinder control valve Item 2 lever located on the top cover of the level sensor assembly Item
- 3) If the AVSO is operating correctly the air cylinder Item 25 should energize and turn off the primary vacuum generator.
- 4) If you hear any air leaks once the vacuum generator shuts off, locate and fix as required.

Check the 1/8" air lines Items 34 & 35 for leaks or cuts, replace as required.

Every Six months

- 1) Check the float Item 20 to ensure that it has no cracks or leaks.
- 2) Remove the 4 bolts that hold down the top cover of the level sensor assembly Item 1
- 3) Carefully lift up on the assembly and viewing the float Item 20
- 4) Check to ensure that the float level rod moves the operating rod Item 24 up and down with little effort.
- 5) Replace any parts as required.
- 6) Reinstall using a new gasket if required.

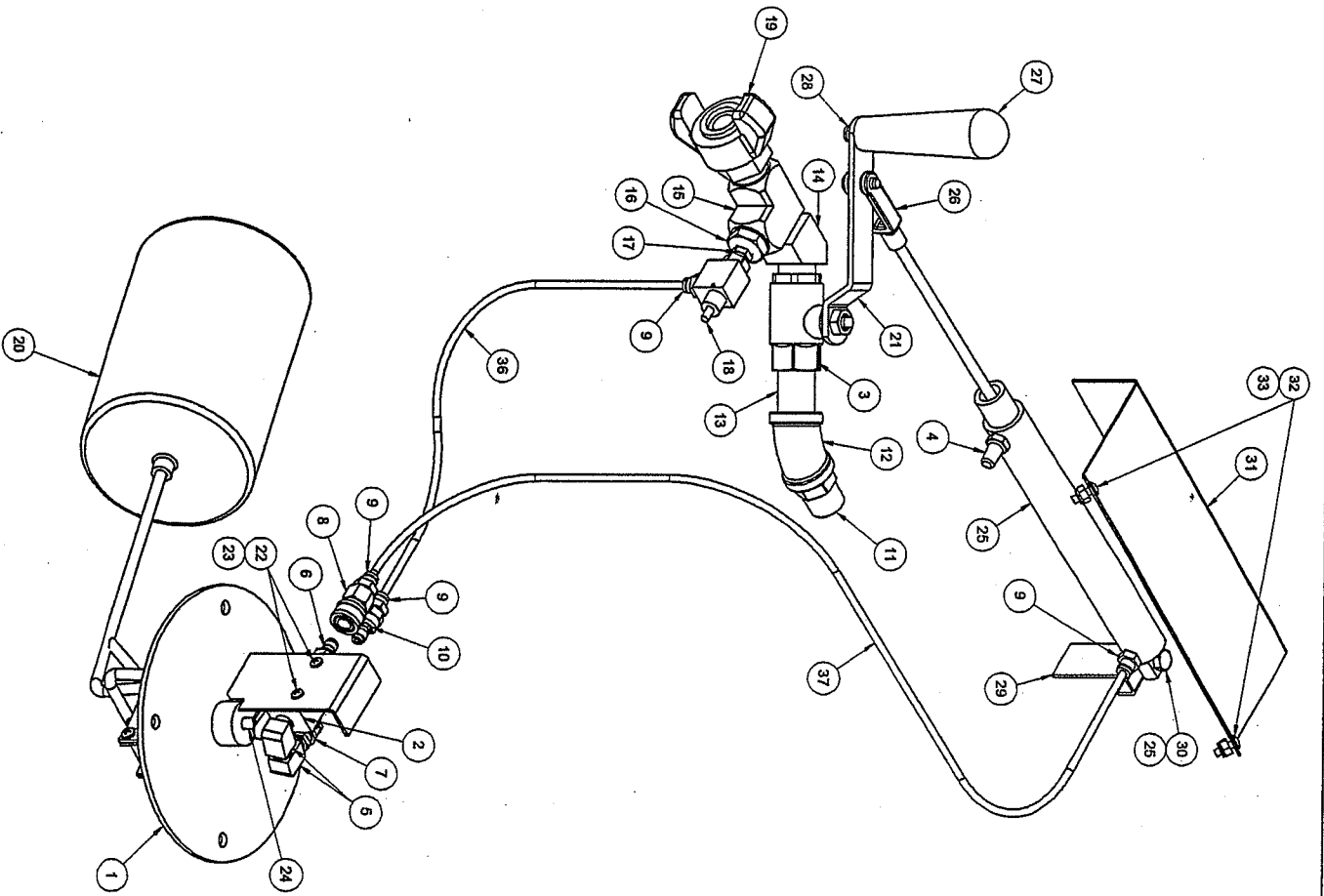
(Special Note) You must remove the 2 small quick couplers Items 8 & 10 prior to removing the vacuum lid and reinstall the 2 small quick couplers Items 8 & 10 when the vacuum lid has been reinstalled.

Trouble Shooting

Problem: Air cylinder does not energize

- 1) Perform AVSO test as listed in the maintenance section.
- 2) If the air cylinder Item 25 does not move, check to ensure that the 1/8" air lines Items 34 & 35 are connected as shown.
- 3) Check the float Item 20 as listed in the maintenance section.
- 4) Check the cylinder control valve Item 2 by removing quick couplers Items 10 & 7
- 5) Perform the AVSO test again and listen for air coming out of the disconnected quick coupler.
- 6) If you hear air then the air cylinder Item 25 needs replacing.
- 7) If no air escapes then the cylinder control valve Item 2 requires replacing.

08-1802 AUTO SHUT-OFF



ITEM	QTY	P.N.	DESCRIPTION	MATERIAL	WT
37	1	06-0100	TUBING, 1/8" x 31" LG.	Nylon	0.0
36	1	06-0100	TUBING, 1/8" x 14" LG.	Nylon	0.0
33	2	02-1211	NUT, NYLON INSERT, #8-32	Stainless Steel	0.0
32	2	02-1486	MACHINE SCREW, PAN HEAD PHILLIPS #8-32 x 1/2" LG.	Stainless Steel	0.0
31	1	01-8360	COVER, CYLINDER	Stainless Steel	0.0
30	1	02-1497	BOLT, HEX HEAD, 1/4-20 UNC x 3/4" LG.	Stainless Steel	0.0
29	1	01-8093	CLIP, BASKET	Stainless Steel	0.0
28	2	02-1260	NUT, NYLON INSERT, 1/4-20 UNC	Stainless Steel	1.0
27	1	04-10561	HANDLE	Phenolic	0.0
26	1	04-26161	YOKE, 1/4-28 UNF	Steel, Mild	1.1
24	1	05-0501	OPERATING ROD	Bronze	0.0
23	2	02-1212	NUT, NYLON INSERT, #6-32	Stainless Steel	0.0
22	2	02-1486	MACHINE SCREW, PAN HEAD PHILLIPS #6-32 x 1" LG.	Stainless Steel	0.0
21	1	01-8389	HANDLE, VALVE	Stainless Steel	1.1
20	1	06-1013	FLOAT	Plastic	4.4
19	1	04-1056	CHUCK, AIR	Aluminum	3.0
18	1	04-10327	VALVE, BYPASS	Brass	2.0
17	1	03-1077	NIPPLE, HEX, 1/8" NPT	Brass	0.0
16	1	03-10161	BUSHING, HEX, 1/2" MNPT x 1/8" FNPT	Brass	1.1
15	1	03-10057	TEE, STREET, 1/2" NPT	Brass	1.1
14	1	03-10062	ELBOW, STREET, 45 DEGREE, 1/2" NPT	Brass	2.0
13	1	03-10092	NIPPLE, 1/2" NPT x 2" LG.	Brass	2.0
12	1	03-10061	ELBOW, 45 DEGREE, 1/2" NPT	Brass	2.0
11	1	03-10083	NIPPLE, HEX, 1/2" NPT x 1 1/2" LG.	Brass	1.1
10	1	03-1071	PLUG, STRAIGHT THROUGH, 1/8" x 1/8" FNPT	Brass	0.0
9	4	03-1074	ADAPTER, HOSE, 1/8" MNPT x 1/8" HOSE	Brass	0.0
8	1	03-1074	COUPLER, STRAIGHT THROUGH, 1/8" x 1/8" FNPT	Brass	0.0
7	1	03-1073	COUPLER, STRAIGHT THROUGH, 1/8" x 1/8" MNPT	Brass	1.1
6	1	03-1072	PLUG, STRAIGHT THROUGH, 1/8" x 1/8" MNPT	Brass	0.0
5	2	03-1070	ELBOW, STREET, 1/8" x 1/8" MNPT	Brass	0.0
4	2	03-1076	MUFFLER, 1/8" NPT	Brass	0.0
3	1	04-7001	CYLINDER, AIR	Brass	2.0
2	1	04-1032	VALVE BALL, 1/2"	Brass	0.0
1	1	04-10326	VALVE, CYLINDER CONTROL	Brass	5.0
1	1	08-1801	LEVEL, SENSOR ASSEMBLY	Brass	2.0
1	1	08-1801	LEVEL, SENSOR ASSEMBLY	Brass	1.8

Parts List