TECHNICAL MANUAL

SEALVAC™ VACUUM BOTTOM DRAIN UNIT

200, 400, 600 Gallon Capacity

(909, 1818, 2728 Litres)

SI AVIATION

Spokane, Washington

SealVac™

Vacuum Series

ONE YEAR LIMITED WARRANTY

Seller warrants the 200, 400, 600 gallon SV/ SVU SealVac™ 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 or technical manual derived from this manual. Our obligation under this Warranty shall be limited to the repair or exchange of SI manufactured 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 three 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 prepaid.

Other manufacturers' components warranties apply as their warranty reads.

This warranty does not extend to damage caused be 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 the unit.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE NOT SET FORTH IN 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 THE UNIT.

TABLE OF CONTENTS

SECTION 7. PARTS BREAKDOWN FIGURES			
1.	**SV/ SVU Overview, major components**	6.5	SVU Vacuum System, Reference
2.	**Funnel Isolation & Low Point drain valve**	**7.**	**Auto-Shutoff Valve, Safety Feature**
3.	**Front Undercarriage Assembly**	**8.**	**Funnel, Telescoping, Major Assy's**
3.1	Wheel Hub, Front	8.1	Funnel Section, 8 Ft., 12 Ft., 16 Ft.
3.2	King pin/ Spindle, Front Undercarriage	8.2	2 1/2" Telescoping Section, All
3.3	Steering Arm, Front Undercarriage	8.3	3" Telescoping Section, All
4.	**Rear Undercarriage, 200 series**	8.4	3 1/2" Telescoping Section, 12 & 16 Ft.
4.A	**Rear Undercarriage, 400 & 600 series**	8.5	4" Telescoping Section, 16 Ft. only
4.1	Axle, Rear	8.6	Base Clamp, Telescoping Funnel, All
4.2	Rear Brake Assembly	8.7	Cover, Funnel
4.3	Brake Rod	**9.**	**Cover, Manway Assembly**
4.4	Hub & Drum, Rear, Assembly	**10.**	**Suction Plate, Standard Round**
5.	**Wheel & Tire Assembly, All series**	**11.**	**Suction Plate, Oval**
6.	**SVU Vacuum System Assembly**	**12.**	**Suction Plate, Elongated**
6.1	Cover, Primary Vacuum Generator, SV/ SVU	**13.**	**Probe, Fuel, Assembly**
6.2	Air Manifold, Primary/ Secondary, Reference	**14.**	**Duplex Hose, Shielded**
6.3	Air Manifold, Primary/ Secondary	**15.**	**Hose, Depuddle, 25 feet, SV/ SVU**
6.3	Air Manifold System	**16.**	**Hose, Utility, 1 1/4"**
6.4	Secondary Vacuum Generator	**17.**	**Alignment Tool**

Section 1.0 Specifications

TABLE 1.0 SEALVAC™ SPECIFICATIONS 200 - 400 - 600 series						
	200		400		600	
	SV	SVU	SV	SVU	SV	SVU
DIMENSIONS Imperial / Metric	**Inches / Centimeters**					
LENGTH	104" / 265 cm	104" / 265 cm	116" / 295 cm	116" / 295 cm	116" / 295 cm	116" / 295 cm
TRACK WIDTH	59" / 150 cm	59" / 150 cm	76" / 193 cm	76" / 193 cm	76" / 193 cm	76" / 193 cm
TOTAL WIDTH*	59" / 150 cm	68" / 173 cm	76" / 193 cm	82" / 208 cm	76" / 193 cm	89" / 226 cm
HEIGHT	52" / 132 cm	55" / 140 cm	54" / 137 cm	57" / 145 cm	59" / 150 cm	62" / 158 cm
WEIGHT EMPTY Imperial / Metric	**Pounds / Kilograms**					
SINGLE WALL	1150 / 521	1200 / 544	1350 / 613	1400 / 635	1555 / 705	1605 / 728
DOUBLE WALL	1350 / 613	1400 / 635	1650 / 748	1700 / 771	2085 / 946	2135 / 768
CAPACITY Imperial/ Metric	200 Gal. / 909 Ltr.		400 Gal. / 1818 Ltr.		600 Gal. / 2728 Ltr.	
	Feet / Meters					
TURN RADIUS - Outside Wheels to Outside Wheels	28' / 8.5 M		31' / 9.5M		31' / 9.5M	
Grounding Reel Cable Length	50' / 15.25 M		50' / 15.25 M		50' / 15.25 M	
Ground Clearence	6" / 15.25 cm @ Tow Bar 8" / 20.25 cm @ axle		6" / 15.25 cm @ Tow Bar 8" / 20.25 cm @ axle		6" / 15.25 cm @ Tow Bar 8" / 20.25 cm @ axle	
AIR SOURCE REQUIREMENTS -	**IMPERIAL** - 60 CFM @ 100 PSI with 3/4" inner diameter supply air hose. **METRIC** - 1.7 m³/min @ 6.9 bar with 19 mm inner diameter supply hose.					
	200		400		600	
Optional Equipment Items	SV	SVU	SV	SVU	SV	SVU
	Feet / Meters					
Duplex Hose	**NA**	35' / 10.6 M	**NA**	35' / 10.6 M	**NA**	35' / 10.6 M
Depuddle hose, inner diameter 3/4" / 19 mm	**NA**	25' / 7.6 M	**NA**	25' / 7.6 M	**NA**	25' / 7.6 M
Depuddle hose, inner diameter 1 1/4" / 31.75 mm	35' / 10.6 M 50' / 15,25 M	35' / 10.6 M 50' / 15,25 M	35' / 10.6 M 50' / 15,25 M	35' / 10.6 M 50' / 15,25 M	35' / 10.6 M 50' / 15,25 M	35' / 10.6 M 50' / 15,25 M

*Total width is measured with removable storage boxes installed

Section 2.0 Safety Guidelines

2.1 This manual contains guidelines and safety recommendations for use of the Sealvac™. It is the responsibility of the end user to completely read this manual and comply with all local, state and federal laws and regulations applicable for using this equipment.

2.2 Spokane Industries Inc. is not responsible for industry specific information on safety management, employment safety, health standards, safety codes, etc. Contact your local safety manager or industrial safety representative.

NOTE: Spokane Industries Inc. is not responsible for any modifications performed on this equipment. Modifications performed by user may result in an unsafe condition for equipment or personnel and void the manufacturers warranty.

2.3 It is the responsibility of the end user to ensure persons operating this equipment:

- Are trained, authorized and permitted to use the equipment.

- Have physical and mental ability to operate this equipment safely.

- Are aware of the potential hazards associated with this equipment, including operating this equipment during adverse weather conditions.

- Do not attempt to move, service or adjust this equipment without another capable person present to provide assistance in the event of injury.

Table 2.0 Other Suggested Safety Resources (USA only)

ANSI	American National Standards Institute	
OSHA	Occupational Safety & Health Administration	Hazardous Materials, Material Safety Data Sheets (MSDS), Lockout/Tagout, Confined Space, Fire Prevention, Personal Protective Equipment (PPE)
CFR	Certified Federal Regulations	
FAA	Federal Aviation Administration	
FAR	Federal Aviation Regulations	
NFPA	National Fire Protection Association	

Always consult and follow local directives and guidance before dealing with any defueling operations.

Section 3.0 CONTROLS & INDICATORS

3.1 The Controls and Indicators section is designed to provide a description of the various controls and indicators found on the SealVac™ .

Table 3.0 CONTROLS & INDICATORS - SEALVAC™

Models - 200, 400, 600 gallon (909, 1818, 2728 Litres)

Parking Brake Handle	Used to set park brake during operation and storage.
Tank Quantity gauge	Indicates level of the fluid inside the main tank. Located on top of the main tank.
Primary Vacuum Generator Handle	Turns Primary Vacuum Generator on and off. Handle located on Sediment chamber cover, allows air to Primary Vacuum Generator. Mechanically connected to the Auto-Vac Shutoff system . **See Fig. 6 & Fig. 6.3 # 17**
Primary Vacuum Generator, 1 each.	Venturi affect Vacuum for main tank. Provides vacuum to; defueling hose of the Duplex hose assembly, Fuel Probe, and Depuddle hose. Located on top of Sediment chamber cover, underneath shroud. Manual On/ Off operation with Auto-Shutoff safety feature. **See Fig. 6, # 15**
Secondary Vacuum valves. 2 each	Provides separate On/ Off control for either left or right system. Located forward of Sediment Chamber cover. **See Fig. 6.5**
Secondary Vacuum generators, 2 each. Left and right systems, (2 connections per system)	Venturi affect continuous vacuum when external air source is provided . Provides vacuum to; vacuum line in Duplex Hose Assembly and Suction Plates. Located on top of sediment chamber cover, underneath shroud. **See Fig. 6.4 , #3**
Fuel Recovery valves, 4 each.	Mechanical connection point for defueling hose of the Duplex hose assembly. Located on top of Sediment Chamber cover, along the perimeter . **See Fig. 6, #1,2,3,4 (as assembly)**
Depuddle/ Utility hose valve, 1 each	Mechanical connection point for using Depuddle hose. Uses camlock style hose connection. **See Fig. 6, #8, 9, 10**
Depuddle/ Utility hose	Open end, general purpose hose. 2 sizes available, 3/4 inch and 1 1/4 inch. Used to remove surface fluids or fluids in other containers. **See Fig. 15 & 16**
Auto- Shutoff Assembly	Turns off Primary Vacuum Generator when tank fluid level reaches approximately 5-6 inches (12.5 -15cm) from top of tank. **See Fig. 7**

Table 3.0 Controls and Indicators, continued

Auto Shutoff Bypass Valve	Allows user to bypass air signal from Auto Shutoff valve assembly that pressurizes linear actuator mounted to the Primary Vacuum Generator On/ Off handle. **See Fig. 6.3, # 9**
Vacuum Regulator/Relief Assembly	Regulates the internal vacuum for the main tank and defueling hose of the Duplex Hose assembly. Set at 8 in. mg. Regulator is preset during manufacture, there is **NO** adjustment allowed. **See Fig. 6, # 17, 18**
Alignment Tool	Used to align Suction Plate Fuel Probe port with center of sump drain**. See Fig. #17**
Suction Plate Assembly, 3 different versions **Round**	Used as a general purpose Suction plate, designed for surfaces with minor obstructions or imperfections. All 3 connect to the vacuum hose of the Duplex Hose assembly. **See Figs. 10**
Oval	Used to bridge imperfections such as rivets or panel seams near sump drain that may affect sealing ability of suction plate. **See Fig. 11**
Elongated	Slightly longer than Oval Plate, used to bridge imperfections such as rivets or panel seams near sump drain that may affect sealing ability of suction plate. **See Fig. 12**
	All Suction Plates come with 2 knife edge Viton seals. One adheres the Suction Plate to the surface, the other increases surface adhesion and creates a fluid seal around the Fuel Probe during operation.
Duplex Hose Assembly	Consists of 2 hoses that are mechanically housed as one unit. One hose is the main de-fueling hose, the other hose provides vacuum. Each hose connects to the SealVac™ on one end, the other ends connect to the Fuel Probe and Suction Plate assemblies.
Fuel Probe and Hose Assembly	Inserts into Suction Plate, manually adjusted pin raises sump drain to release fuel. Connects to end of Duplex Hose. Contains clear hose section for visual verification. Vacuum release valve allows air for fluid evacuation of defueling hose. **See Fig, 13**
Sediment Chamber Screen	A steel perforated screen located beneath the Primary Vacuum Generator. Used to collect foreign matter before fluid enters the main tank. Must remove Sediment cover to access screen.
Low Point Drain Valve Assembly	Drains tank when tank reaches maximum capacity. See **Fig. 2, # 5, 6, 7**
Telescoping Funnel Isolation Valve	Telescoping funnel is gravity feed only. Valve isolates funnel assembly during SealVac™ Operations. **See Fig. 2, #6**

Section 4.0 BASIC OPERATION OF SEALVAC™

4.1 This section contains information necessary for the operation and maintenance of the SealVac™. The SealVac™ is designed to provide a portable, safe, self-contained, de-fueling system for the aviation industry.

4.2 **Pre-Towing the SealVac™.** Items in Table 4.0 need to be accomplished before towing the SealVac™ .

Table 4.0 PRE-TOWING SAFETY CHECKLIST

ITEM DESCRIPTION	PRE-TOWING CHECK	VISUAL INSPECTION	CORRECTIVE ACTION
Tires, Tire Pressure		Check for damage and proper tire inflation.	Replace tire if damaged. Inflate to manufacturers specifications on tire sidewall
Brakes		Ensure BRAKE handle is in the OFF position	
Tank		Visually inspect for cracks or leaks. Ensure tank is securely fastened to the rolling undercarriage. Check that Manway cover is closed and latched.	Repair cracks or leaks before use. Tighten fasteners if loose.
Hoses, Grounding Clamps and wires		Ensure all hoses and ground wires clamps are secured for transportation. Inspect hoses, clamps and wires for serviceability.	Replace hoses, grounding clamps or wires before use if found to be beyond repair.
Valves		Visually inspect to ensure all valves are in the closed position. Check for leaks.	Close all valves. If leaks are found, repair or replace item before using.
Storage Boxes		Ensure boxes are secured to mounting rails, internal items are secured for transportation, hinged covers are closed and latched, no items are on top of latched covers.	Tighten mounting hardware, store internal items to prevent damage to seals, close and latch covers, remove items on top of covers.

4.3 Operational Definitions.

CAUTION Indicates an operation or condition that, if not observed, could result in equipment or property damage.

WARNING Indicates an operation or condition that, if not observed, could result in possible injury or death.

4.4 Preparation for Use

ALL - Ensure availability of an air supply unit capable of providing 60 CFM @ 100 PSI (1.7 m³/min @ 6.9 bar) during the defueling process. Unit must be able to maintain continuous operation during de-fueling process.

ALL - Inspect Duplex hose, Vacuum hose assemblies and depuddle hoses for cuts, cracks and wear. Any conditions that affect safety to personnel or operation or the SealVac™ requires that affected hose be replaced.

SVU - Inspect suction plate knife edge Viton seal surfaces for deformity or damage caused during storage. Deformed seals can be re-formed by hand, seals with cuts need to be replaced.

SVU - Inspect vacuum line On/ Off valve at the suction plate, ensure valve is securely threaded into suction plate, tighten if necessary. A loose On/ Off valve will affect suction plate adhesion.

SVU - Ensure all valves for Duplex hose assemblies operate smoothly and can be positioned in the full OPEN and CLOSED positions. If valves can not be fully opened or closed, determine cause and either repair or replace valve as necessary.

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4.5 FUEL PROBE ASSEMBLY PIN HEIGHT ADJUSTMENT: SVU Only

Due to the variety of fuel drain sump designs and locations it will be necessary to adjust the height of the fuel probe pin. There is no exact measurement that can be used for all, but once the fuel probe pin height has been set it will usually work on most locations on one particular aircraft. Each SealVac™ comes with a pin kit which has two types of pins; straight and button head, in a variety of lengths. The straight pin will be the most common, the button head style should be used on larger diameter drain sumps. **Other than the initial pin setting, the adjustment procedures will need to be performed while actually performing the de-fueling process. Fuel Probe installation and removal, Section 4.6, steps 17 and 18, will be where the adjustments are made.**

1. Install the shortest straight pin from the pin kit, ensure pin is seated into fuel probe end but do not over tighten, you may have to remove it.

2. After any pin change, pay attention to the fuel flow, this will help determine the optimal pin height. Slowly increase pin lengths until you see the fuel start flowing through the clear hose. Ideal fuel flow is indicated by a solid stream with minimal air bubbles. Once this is establish, you have set the proper pin length. After defueling, with the fuel probe removed, secure the pin but **DO NOT** over tighten, the pin may have to be removed in the future. Proceed to Bottom Draining Operation, Section 4.6

Section 4, Operation of SealVac™ continued next page

4.6 BOTTOM DRAINING OPERATION: SVU Only, SV models begin at step 4.8

CAUTION: Before using the SealVac™ for bottom draining operations, ensure the SealVac™ has been drained or has the capacity for the amount of fuel to be drained.

1. Position SealVac™ and set parking brake.
2. Ground SealVac™ to approved grounding points.
3. Connect air source to SealVac™ air connection **(see Fig. 6)**
4. Remove Duplex drain hoses, fuel probes and suction plates from storage, lay Duplex hoses on the ground and straighten.
5. Connect Duplex Hose to any fuel recovery valve quick disconnect **(See Fig. 6, #4)**
6. Connect fuel probe assembly to opposite end of Duplex hose, ensure probe pin is securely threaded into end of probe.
7. Connect Duplex Hose vacuum line to secondary Vacuum connector on SealVac™ vacuum cover **(See Fig. 6.5)**
8. Turn on air source.
9. Open appropriate fuel recovery valves and secondary vacuum valves.
10. Open Primary Vacuum Generator valve **(Fig. 6)**
11. Connect suction plate vacuum line to vacuum line on end of duplex hose.
12. Test for vacuum at Suction Plate by moving vacuum slide valve towards suction plate, you should hear air movement. **(See Fig.11, # 4).** If no sound is present, determine cause. **See Troubleshooting, Table, 6.1**
13. Transport suction plate, petroleum jelly, alignment tool and duplex hose to bottom drain location.

WARNING: If working on an elevated maintenance platform, attach duplex hose hanger strap to maintenance platform to reduce weight pulling on the Suction Plate.

14. Apply a thin coating of petroleum jelly to the knife edge viton seal on the Suction Plate face.
15. Insert alignment tool into suction plate, turn it 90º. Turn on vacuum by moving vacuum valve towards suction plate. Slightly tilt the plate, visually align probe tip with center of sump drain, level suction plate with surface and press firmly with alignment tool and against plate body.
16. Turn alignment tool 90º opposite and remove.

CAUTION: Ensure Primary Vacuum generator is ON, fluid will flow immediately when Fuel Probe is inserted. Suction affect from Fuel Probe increases Suction Plate adhesion around drain area, ensuring fluid drains into Fuel Probe end. .

4.6 *defueling, continued on next page*

4.6 defueling operation continued

17. Lubricate Fuel Probe O-ring with petroleum jelly and insert into suction plate fully, turn 90º to lock. If Fuel Probe does not turn after insertion then pin length may too long. Fluid will flow immediately when probe is inserted.

After inserting the fuel probe look through the transparent hose section to see if you have fuel flow:

A. **No Flow** : No Fuel / Pin too short — no change in clear window.
B. **Low Flow** : Low Fuel flow — Small streams of fuel running down the inside of the clear hose, pin height may need increased.
C. **Normal Flow** : Clear steady flow, minimal air bubbles.

If No Flow or Low Flow are indicated, remove hose (4.6 step 18) and change the pin for the next longer length. **DO NOT** increase the length by more than one pin length at a time, too long of a pin may damage the sump drain and possibly cause sump drain to stay in the open position. If pin is too long it will prevent fuel probe from tuning 90º to secure into suction plate .

18. **Fuel Probe Removal** -

During defueling -To remove Fuel Probe during defueling operations before fuel tank is empty, simply depress vacuum relief valve **(See Fig. 13, #9)** on the side of the fuel probe tip. Turn Fuel Probe 90º opposite, and slowly remove Fuel Probe from Suction Plate. Ensure drain sump has closed completely, capture any residual fuel during removal. Hold vacuum relief valve to remove residual fuel in hose length.

Empty Tank - Monitor clear hose on Fuel Probe, air will begin coming through Fuel Probe when fuel tank becomes empty. Depress vacuum relief valve on the side of the fuel probe tip. Turn Fuel Probe 90º opposite, and slowly remove Fuel Probe from Suction Plate. Hold vacuum relief valve to remove residual fuel in hose length.

19. To remove Suction Plate hold firmly and slide vacuum valve away from suction plate.
20. Clean residual fuel and petroleum jelly left on sealing surfaces.
21. Turn off Primary an Secondary Vacuum generators.
22. Turn off air source
23. Close all valves.
24. Return Suction Plates and Fuel Probes into storage boxes, Duplex hoses onto hose hangars.

4.7 AUTO-SHUT OFF and BYPASS VALVE OPERATION The SealVac™ is equipped with an Auto-Shut off for over flow protection. Consisting of a intern float sensor that sends air to an actuator when the float rises. The actuator is connected to the Primary Vacuum control handle. When the actuator is pressurized it moves the control handle to the "OFF" position. If Auto-Shut off is activated it means the main tank needs to be drained. There is no bypass for the SV models. The SVU Bypass Valve allows the users to temporarily override the Auto-Shut off function. User can then cease defueling, remove the Fuel Probe from the suction plate and clear the defueling hose of residual fuel. Two persons are required to operate the Bypass Valve, one activates and holds the valve, the other removes the Fuel Probe and depresses the Fuel Probe relief valve.

After Auto-Shutoff has activated: SV model

The SV model is a simple system. When the Auto-shutoff has activated the actuator to close air flow to the primary vacuum generator, the defuel/ depuddling operation is terminated unit the tank can be drained. There are no bypass mechanisms.

After Auto-Shut has activated: SVU model

Person #1 stands near the Auto-Shut off bypass valve, **See Fig. 6.3**
Person #2, located at suction plate used during drain operations.

1. Ensure air source is on, Primary vacuum handle will be "OFF"
2. Depress Bypass Valve button, holding it in during entire operation.
3. Turn "ON" Primary Vacuum, pushing handle forward, do not hold it.
4. Depress and hold Vacuum Relief valve on fuel probe.
5. Turn Fuel Probe 90º and slowly remove, holding Vacuum Relief Valve.
6. When Probe is totally removed, release Relief Valve.
7. Keep probe elevated until Duplex Hose has had enough time to be totally drained, usually 10-20 seconds.
8. Repeat steps if more than one suction plate was used for draining.
9. With all defueling hoses drained, release Bypass Valve.
10. Auto-Shut Off will move Primary Vacuum handle to the "OFF" position.
11. Restore all equipment to the stored configuration.

4.8 Depuddle Hose - Small diameter, SVU model (optional equipment) **Fig.15**

1. Position SealVac™ and set parking brake.
2. Ground SealVac™ to approved grounding points.
3. Connect air source to SealVac™ air connection. **(See Fig. 6)**
4. Connect depuddle hose to defueling valve quick disconnect **(Fig. 6, #4)** **(Hose may be added to end of Duplex hose for additional length)**
5. Turn on air source
6. Open Primary Vacuum Generator valve by pushing handle. **(See Fig.6)**
7. Open defueling valve
8. Hose is ready for fluid removal.

4.8 *Large Depuddle hose, continued on next page*

Depuddle/ Utility Hose - Large diameter, SV (SVU optional equipment) **Fig. 16**

CAUTION: Due to the size and open end of the Depuddle hose user should be cautious not to ingest foreign matter that could possibly clog hose or valve. If hose is continually used, large foreign matter may build up on sediment chamber screen faster than normal, requiring shorter inspection intervals for the sediment chamber area.

1. Position SealVac™ and set parking brake.
2. Ground SealVac™ to approved grounding points.
3. Connect air source to SealVac™ air connection. **(See Fig. 6)**
4. Connect hose end to the camlock attachment provided on top the sediment chamber cover. **(See Fig. 6, #9)**
5. Turn on air source.
6. Open Primary Vacuum Generator valve by pushing handle **(See Fig.6)**
7. Open valve at connection to Depuddle hose. **(See Fig. 6, #8)**
8. Hose is ready for fluid removal.

4.9 Telescoping funnel operation - (optional equipment)

The telescoping funnel is designed as a gravity feed system, no additional support equipment is needed. The telescoping sections have been isolated internally from the SealVac™ vacuum system. This design, along with the funnel valve, allows normal SealVac™ operation without excess air coming through the funnel assembly. Use of the telescoping funnel is achieved by extending the sections to the height required and opening the funnel valve to allow the fluid to enter the tank. The Primary and/ or Secondary Vacuum generators are **NOT** used during funnel operations.

CAUTION: Before using the SealVac™ for de-fueling operations, ensure the SealVac™ has been drained or has the capacity for the amount of fuel to be defueled.

1. Position SealVac™ telescoping funnel under drain.
2. Ground SealVac™ to approved grounding points.

WARNING Raising telescoping funnel sections creates a pinch hazard for hands. Ensure sections are handled securely during the lifting process and that clamps are securely tightened before extending the next section.

3. Open cover on top of funnel, clean screen if necessary.
4. Extend funnel by raising upper section first, tightening clamp securely. Extend next section, if needed, and tighten clamp securely.
5. Open funnel isolation valve, inline with plumbing. **See Fig. 2**
6. Begin defuel process.
7. When finished, close funnel isolation valve.
8. Lower funnel sections in reverse order.
9. Close and secure funnel cover.

4.10 Draining the Main Tank - Refer to Fig. 2

1. Position SealVac™ near or over approved drain receptacle.
2. Ground SealVac™ to approved grounding points.
3. Remove valve cam lock plug. **Item # 5**
4. Open Bottom drain valve slowly.
5. Drain Completely.
6. Close drain valve, remove and store depuddle hose if used and replace protective cap.

SECTION 5.0 SV/SVU INSPECTION AND MAINTENANCE

5.1 This section provides the basic requirements to maintain the SealVac™. Take care to store all product manuals for future reference.

Table 5.0 Inspection Intervals and Component Maintenance Guide

INSPECT BEFORE EACH USE

Component	Area	Inspection	Corrective Action
Tires	Tread wear Tire Pressure	Minimum Tread - 1/16 inch (1.5 mm) See tire sidewall for correct tire pressure	Replace tire Inflate to specifications
Tow Bar	Attachment pin Hinge point	Pin is secured with retaining clip Hinge point for signs of wear or cracking	 Weld repair or replace
Defueling Valves **Fig.6, # 2**	Handles for freedom of movement	Inspect internally for obstructions, check internal ball for smoothness.	Replace valve if movement is restricted
Duplex Hose Assembly **Fig. 14**	Defuel/ vacuum hoses Hose connections	Check hoses for any damage General condition	Replace hose Replace if in-operative
Suction Plate Assemblies **Figs. 10, 11, 12**	Viton Seals Fuel probe port Vacuum hose	Check for cuts Check port for deformation, metal particles Check hose for cuts On/ Off valve for freedom of movement.	Replace seal Remove metal particles Replace cut hoses Replace valve/hose assembly
Fuel Probe Assembly **Fig.13**	O-Ring Pressure Relief valve	Cuts or wear Verify In/ Out movement	Replace O-Ring Replace Relief Valve
Main Tank	External Tank Welds Hardware	Check for damage, cracks, leakage Check for cracks, leakage Mount hardware for security to chassis	**STOP**-Call manufacturer for guidance. Tighten mount hardware

Inspection and Maintenance continued next page

Inspection and Maintenance continued,

Table 5.

INSPECT ANNUALLY

Component	Area	Inspection	Corrective Action
Sediment Chamber	Screen	Check screen area for items that have been collected during defueling or de-puddle operations. Analyze if unknown origin.	Remove all items collected on screen.
Sediment Chamber	Foam rubber seal	Inspect seal for cuts (due to compression), tears, missing material	Replace seal if vacuum operation begins to deteriorate.
Main Tank	Internal/ External	Drain tank, ventilate, accomplish thorough internal and external inspection of all seams, welds and general tank condition. **Follow Local Tank Entry Procedures.**	**STOP**-If repairs are needed, call manufacturer first for guidance.
Wheels	Bearings	Inspect bearings for indications of abnormal wear, or metal flaking. Ensure bearings are properly lubricated.	Replace if necessary. Repack bearings with approved wheel bearing grease.
Funnel	Foam rubber seal **See Fig. 8.1, #4**	Inspect seal for cuts, tears, missing material	Replace seal if operation is affected.
Static grounding Reels	Cable Mount hardware	Perform Ohms check between SealVac™ and bonded cable end. Check for security of mounting hardware.	25 Ohms Max, if higher replace reel assembly. Tighten if necessary.
Brakes/ linkage	Brakes. Brake linkage cross-over shaft.	Ensure brakes maintain proper holding capability. Grease zerks on both sides. **See Fig. 4.A**	Adjust if necessary, see maintenance-**Sect.5.2.1** Grease with general purpose grease.

Maintenance continued next page

SECTION 5.0 MAINTENANCE, *continued*

5.2 The chassis and tank of the SealVac™ requires minimal preventive maintenance. The steering arm and steering spindles use Oil Lite bronze bushings which require **NO** lubrication.

5.2.1 BRAKE ADJUSTMENT. SV/ SVU Refer to figure 4.3

1. Loosen jam nut on brake linkage at rear brake assembly. **Fig. 4.3**, **#7**
2. Remove cotter pin and clevis pin. **Fig. 4.3, #1 & 2**
3. Raise clevis off of brake cam lever.
4. Turn yoke end one turn to shorten rod length. **Fig.4.3, # 8**
5 Re-align clevis with brake cam lever, temporarily reinstall clevis pin.
6. Test adjustment for proper brake lever tension, repeat step 4 if necessary.
7. Once proper adjustment is determined align clevis with brake cam lever and insert clevis pin.
8. Tighten jam nut on brake linkage.
9. Install new cotter pin into clevis pin and bend cotter pin ends.

5.2.2 SEDIMENT CHAMBER COVER REMOVAL/ INSTALLATION - SV/ SVU See Fig. 6, #14

Removal

1. Ground SealVac™ unit to approved grounding point.
2. Release rubber hold down straps around perimeter.
3. Verify all hoses are disconnected from quick disconnect points.
4. Disconnect ground wire between cover and sediment chamber side.
5. With assistance, slowly raise cover until it clears the sediment chamber.
6. Place cover on ground or table, do not damage lower tubing assemblies.
7. Inspect Chamber screen for objects or damage, clean if necessary.

INSTALLATION

1. Ensure SealVac™ is grounded to approved ground points before installing cover.
2. Inspect under side of cover for damage, repair if necessary.
3. Inspect foam rubber seal around chamber opening, a bad seal will adversely affect the primary vacuum capability.
4. With assistance, raise cover over chamber area and align.
5. Slowly lower cover, align large rubber hose with metal tubing inside chamber, ensure hose slides over metal tubing.
6. Ensure cover is flat against chamber edge, attach rubber straps.
7. Connect ground wire between cover and sediment chamber side.

SECTION 6.0 TROUBLESHOOTING THE SEALVAC™

6.1 The following troubleshooting guidelines are designed to cover most common types of problems with probable solutions to repair the condition.

Table 6.0

NO OR LOW PRIMARY VACUUM AT DEFUELING PROBE

POSSIBLE CAUSE	CORRECTIVE ACTION
Fuel tank being defueled is empty.	
Fuel tank being defueled is not vented	Verify tank is vented, check maintenance preparation for tank being defueled.
Primary air source not operating, outlet valve closed or unit is not providing required air pressure/ volume.	Ensure air source is operating, outlet valve is open and unit is providing required air.
Fuel probe pin length too short, bent or missing.	Verify pin is installed, no defects and re-accomplish Pin Height adjustment, **Sect 4.5**
Defuel valve not opened completely.	Verify "OPEN" position, ensure handle slide lock is not blocking handle position. **Fig. 6, #2**
Defueling hose disconnected at defueling valve.	Verify hose is connected and valve is "OPEN". **Fig. 6, #4**
Defueling hose is plugged, pinched, or has cuts or holes.	Inspect for damage or obstructions. Replace hose if damaged, remove obstructions if possible.
Other duplex hose/ fuel probe assemblies are connected with the defuel valves open, but are drawing air into hoses.	Close defueling valves for duplex hose assemblies not performing defuel functions.
Funnel isolation valve is open.	Close funnel isolation valve. **Fig. 2**
Sediment chamber cover foam gasket is leaking.	Remove sediment chamber cover and inspect gasket condition, replace if necessary. **Fig. 6, #16**
Sediment chamber screen is plugged with foreign matter.	Remove sediment chamber cover and inspect screen, remove foreign material if necessary. **Fig.6, # 14**
Fluid Level indicator lose.	Check security of liquid level indicator, reseal with thread sealer and tighten if necessary.
COLD CLIMATES -	
Possible frozen water in defueling drain system from previous defueling operations.	Use approved non-flammable hot air heater to thaw affected pieces. Bring indoors if necessary to thaw if no heater is available.
Possible frozen water in air source line caused by migrating condensation from air source tank	Use approved non-flammable hot air heater to thaw affected pieces. Bring indoors if necessary to thaw if no heater is available.
Primary Vacuum Generator silencer is frozen from moisture buildup.	Use approved non-flammable hot air heater to thaw affected pieces. Bring indoors if necessary to thaw if no heater is available.

SECTION 6.0 TROUBLESHOOTING THE SEALVAC™

Table 6.1

NO OR LOW SECONDARY VACUUM AT SUCTION PLATE

POSSIBLE CAUSE	CORRECTIVE ACTION
Primary air source is not running, outlet valve closed, not connected to SealVac™ .	Ensure air source is running, outlet valve is open and hose is connected to SealVac™ .
Secondary vacuum valves in the "OFF" position.	Open corresponding secondary vacuum valve. **Fig. 6.5**
Suction Plate vacuum hose ON/ OFF slide valve in the OFF position..	Slide valve towards suction plate, the "ON" position. **Fig. 10, # 6**
Vacuum hose, of the Duplex hose assembly, not connected at SealVac™ or to Suction Plate hose.	Verify vacuum hose connection at SealVac™ and suction plate hose connection.
Check suction plate Viton Seal condition, check for cuts/ deformities, knife edge seal properly inserted into plate.	Replace seals with cuts or deformities that affect adhesion. Install seal into seal groove evenly.
Small black nylon air supply lines to secondary vacuum generators disconnected.	Check lines for security and leaks.
Secondary vacuum silencer exit is plugged or covered.	Remove any obstructions. **Fig. 6.4, #5**

SECTION 7.0 PARTS BREAKDOWN FIGURES

The following figures are supplied to assist in component identification and parts re-ordering.

When reordering, ensure the complete model number and serial number are provided to the sales representative. Write the model and serial below upon receipt of the unit to aide during reordering.

MODEL # _____ SERIAL # _____

SECTION 7.	PARTS BREAKDOWN FIGURES		
1.	**SV/ SVU Overview, major components**	6.5	SVU Vacuum System, Reference
2.	**Funnel Isolation & Low Point drain valve**	**7.**	**Auto-Shutoff Valve, Safety Feature**
3.	**Front Undercarriage Assembly**	**8.**	**Funnel, Telescoping, Major Assy's**
3.1	Wheel Hub, Front	8.1	Funnel Section, 8 Ft., 12 Ft., 16 Ft.
3.2	King pin/ Spindle, Front Undercarriage	8.2	2 1/2" Telescoping Section, All
3.3	Steering Arm, Front Undercarriage	8.3	3" Telescoping Section, All
4.	**Rear Undercarriage, 200 series**	8.4	3 1/2" Telescoping Section, 12 & 16 Ft.
4.A	**Rear Undercarriage, 400 & 600 series**	8.5	4" Telescoping Section, 16 Ft. only
4.1	Axle, Rear	8.6	Base Clamp, Telescoping Funnel, All
4.2	Rear Brake Assembly	8.7	Cover, Funnel
4.3	Brake Rod	**9.**	**Cover, Manway Assembly**
4.4	Hub & Drum, Rear, Assembly	**10.**	**Suction Plate, Standard Round**
5.	**Wheel & Tire Assembly, All series**	**11.**	**Suction Plate, Oval**
6.	**SVU Vacuum System Assembly**	**12.**	**Suction Plate, Elongated**
6.1	Cover, Primary Vacuum Generator, SV/ SVU	**13.**	**Probe, Fuel, Assembly**
6.2	Air Manifold, Primary/ Secondary, Reference	**14.**	**Duplex Hose, Shielded**
6.3	Air Manifold, Primary/ Secondary	**15.**	**Hose, Depuddle, 25 feet, SV/ SVU**
6.3	Air Manifold System	**16.**	**Hose, Utility, 1 1/4"**
6.4	Secondary Vacuum Generator	**17.**	**Alignment Tool**

Parts Breakdown Figures continued next pages