PowerFill II System

Operator´s Manual

SEI INDUSTRIES

PowerFill II System

PowerFill II Models: 2024, 2732, 3542, 4453

Revision B
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OPERATOR'S MANUAL

Please read before using the PowerFill Systems

United States Patent Pending
CANADA Patent Pending

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Installation and removal of the Power Fill II pump unit

1) **Installation:** See fig 3.10 for the following steps. Unpack the bucket and pull the IDS hub out so that the bucket is in the "deployed" position. support the bucket in the upright position
2) Remove the flange blank plate (if installed)
3) Position the pump unit to line up with the mating surface of the flange. *Note that the four socket head bolts on the flange serve to guide the discharge elbow into place*
4) Ensure that a rubber flange gasket is in position on either the flange or on the discharge elbow of the pump
5) Push the discharge elbow onto the flange and install the four 3/8UNC socket head screws to secure the pump unit. Apply only as much torque as can reasonably be applied by hand with a standard Allen key wrench
6) Attach the restrainer chains on the pump filter basket to the bottom chain on the bucket in the positions shown.
7) Tie the electrical cord from the pump to the lower shackle on the suspension line directly above the pump. Leave 8" (0.2m) of slack to allow for when the bucket has a full load of water.
8) Tie the upper part of the power cord to the suspension line at 3 points and again to the top shackle on the control head.

Note: Each pump model has a specific optimal hose cut length and restrainer chain length. If swapping the pump unit between different bucket sizes, It is recommended that the discharge hose and chains be changed as well to retain optimal function of the system. Contact SEI Industries for more information.

Pump removal:

1) Removal is the reverse of installation
2) Install the blank plate with gasket if returning the bucket to standard dip fill operations

Carry-on Tool Kit:

See fig 3.11 for the Recommended Carry –on Tool Kit – to be kept with the pump unit for easy installation and removal.

Storage and shipping notes:

- It is recommended that the pump unit be cleaned and dried before being stored for an extended period.

- It is also recommended that the pump unit and bucket be separated when shipped.

fig. 3.10 POWER FILL II INSTALLATION ON BUCKET

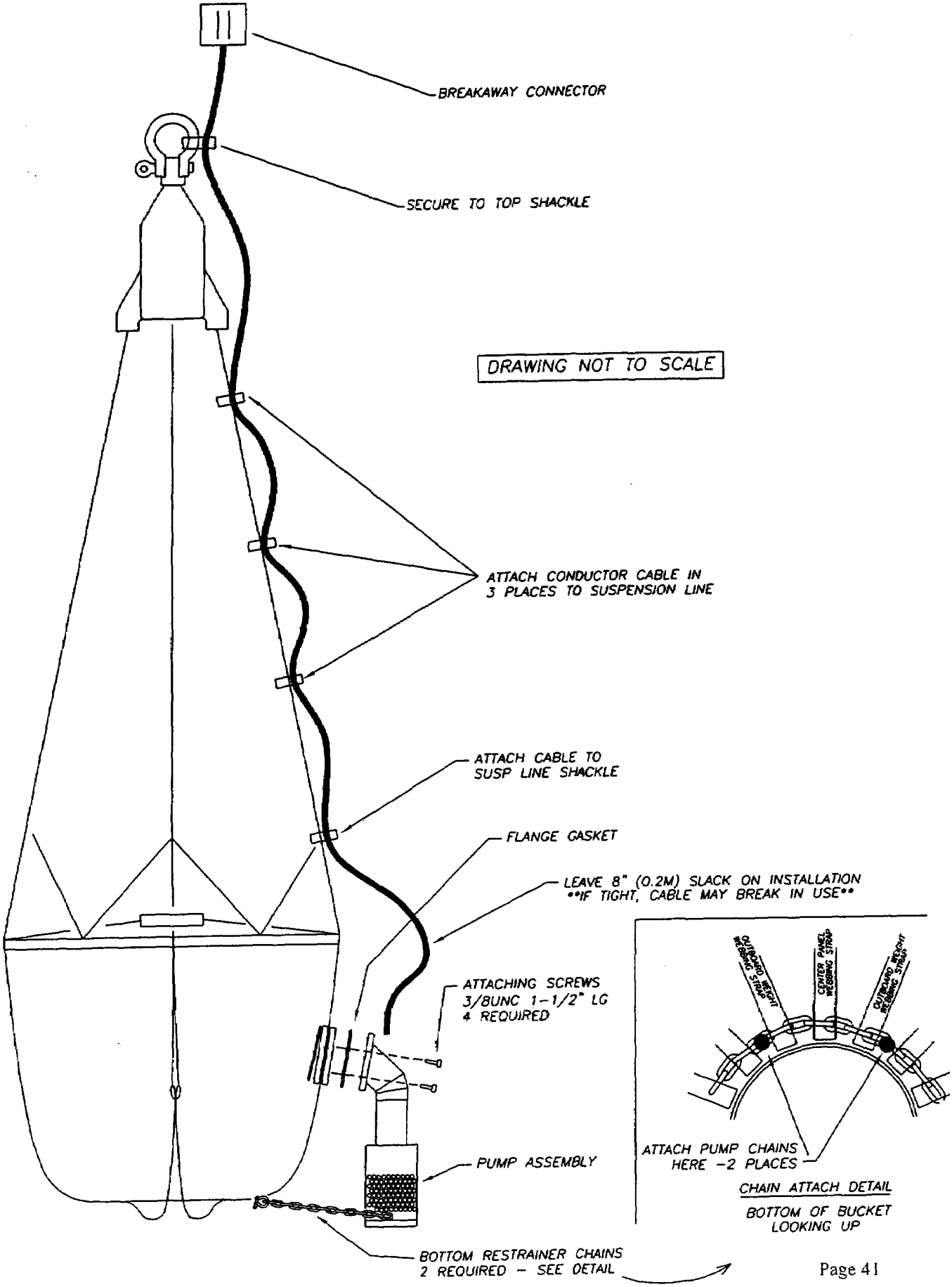
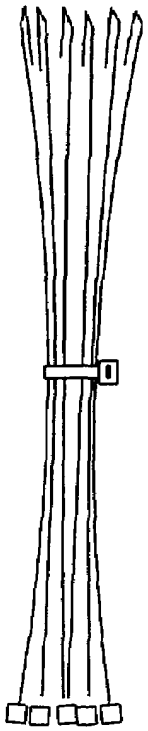
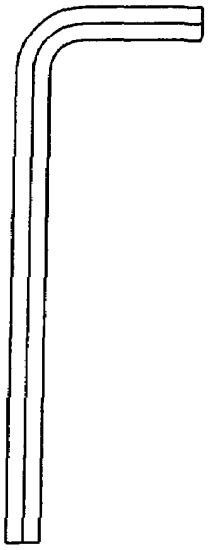


fig. 3.11 POWER FILL II RECOMMENDED CARRY-ON TOOL KIT

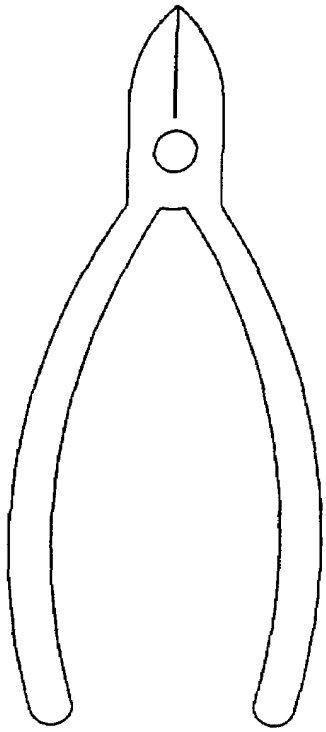
KEEP WITH PUMP UNIT FOR QUICK INSTALLATION/REMOVAL



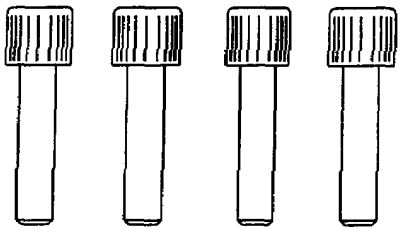
1 BUNDLE OF 20 HEAVY DUTY ZIP STRAPS



2 5/16" ALLEN KEY



3 SIDE CUTTERS



4 4 SPARE 3/8UNC X 1-1/2" SOC HD CAP SCREWS

4.3 Operation of the Power Fill II

Flying with the Power Fill II system
The addition of the Power Fill II system will not adversely affect the flight characteristics of the Bambi Bucket. Please see the Bambi Bucket Operator's manual for information on flying the Bambi Bucket.

Filling the Bambi Bucket with Power Fill II
Initiating a fill with the Power Fill II is simple and can be quickly mastered. Operation of the pump is accomplished by simply pressing the fill button for as long as it takes to fill the bucket. There are a few key points to keep in mind:

- To initiate a fill, the pump impeller must be immersed. It may not be possible to fill from water sources less than 12" (0.30m) deep. Fig 4.4

- Once a fill has been started, the bucket will need to be supported by maintaining some tension on the suspension lines, particularly when the bucket is nearly full. If the bucket is not supported, the flexible nature of the bucket shell may allow it to collapse to one side as the water load increases

- Once a fill has been started, the bucket can be raised or lowered relative to the water line without losing the prime, as long as the top row of filter screen holes does not rise above the water line Fig 4.5

- Frothing of the water or slow fill rate indicates pump is not submerged far enough to maintain prime

- The further the bottom of the bucket can be lowered into the water source, the faster the bucket will fill

- Where possible, employ a partial dip fill augmented by the pump to reduce the total fill time

- It is recommended that the pump should not be run where a conventional dip fill is possible

- Do not run the pump if it is submerged to a depth of 8 feet (2.4 m) or more.

- Do not submerge the bucket to a depth of more than 20 feet (6.1 m) when performing conventional dip fills (pump "off") in deep water sources.

- The filter screen is designed to filter out objects large enough to damage the pump impeller, and to prevent weeds and debris from clogging the pump intake. If operating the pump in extremely dirty or swampy water sources, more frequent inspections of the pump impeller and filter screen may be required to maintain optimal function.

- The pump can be run "dry" without damage. However, maximum life can be obtained from the pump motor if the run time is limited only to filling the bucket. Excessive run time will require more frequent lubrication of the pump output shaft. See Section 5, *Maintenance and Troubleshooting,* for shaft seal lubrication procedure.

fig. 4.4 POWER FILL II INITIATING FILL

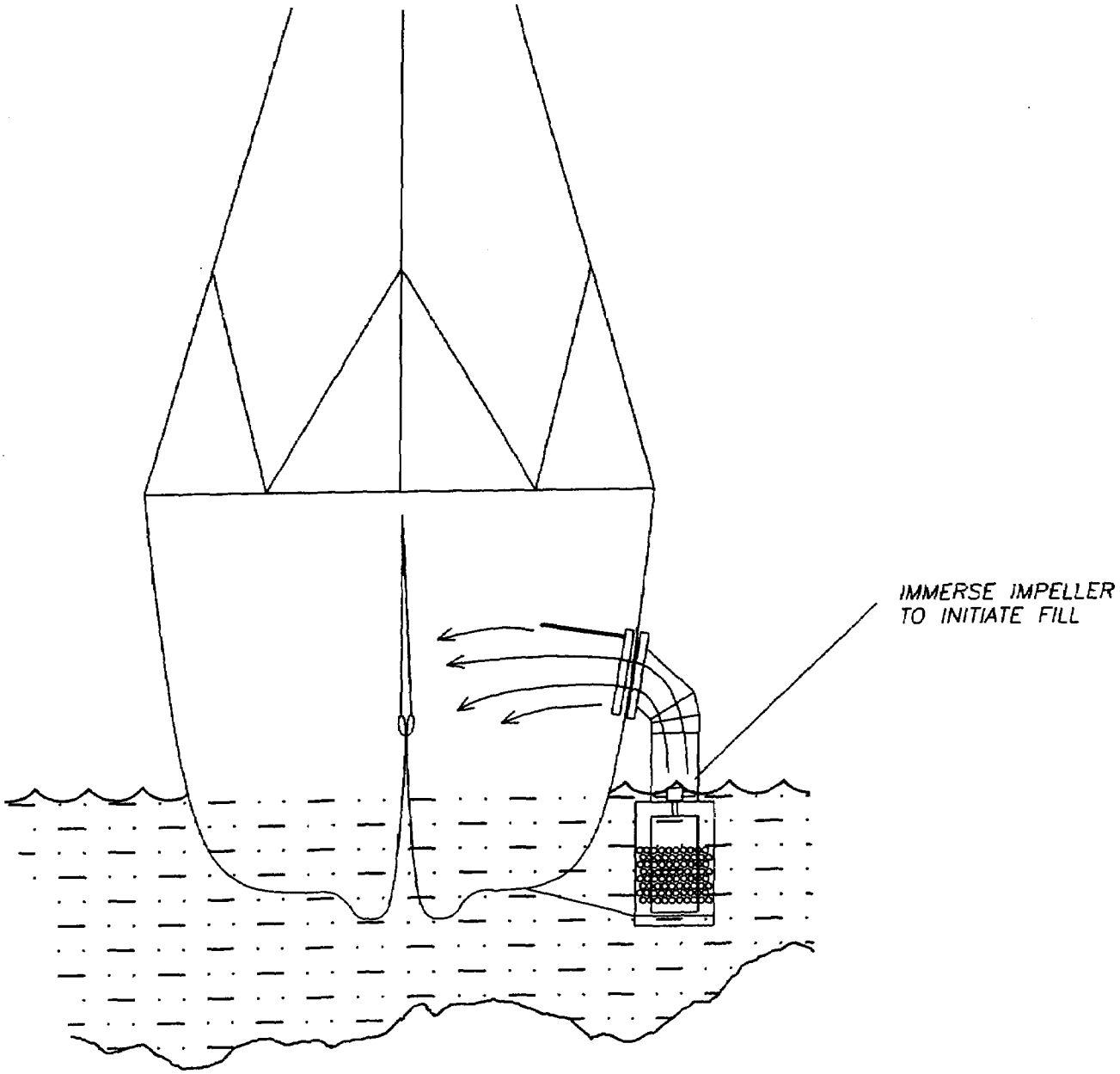
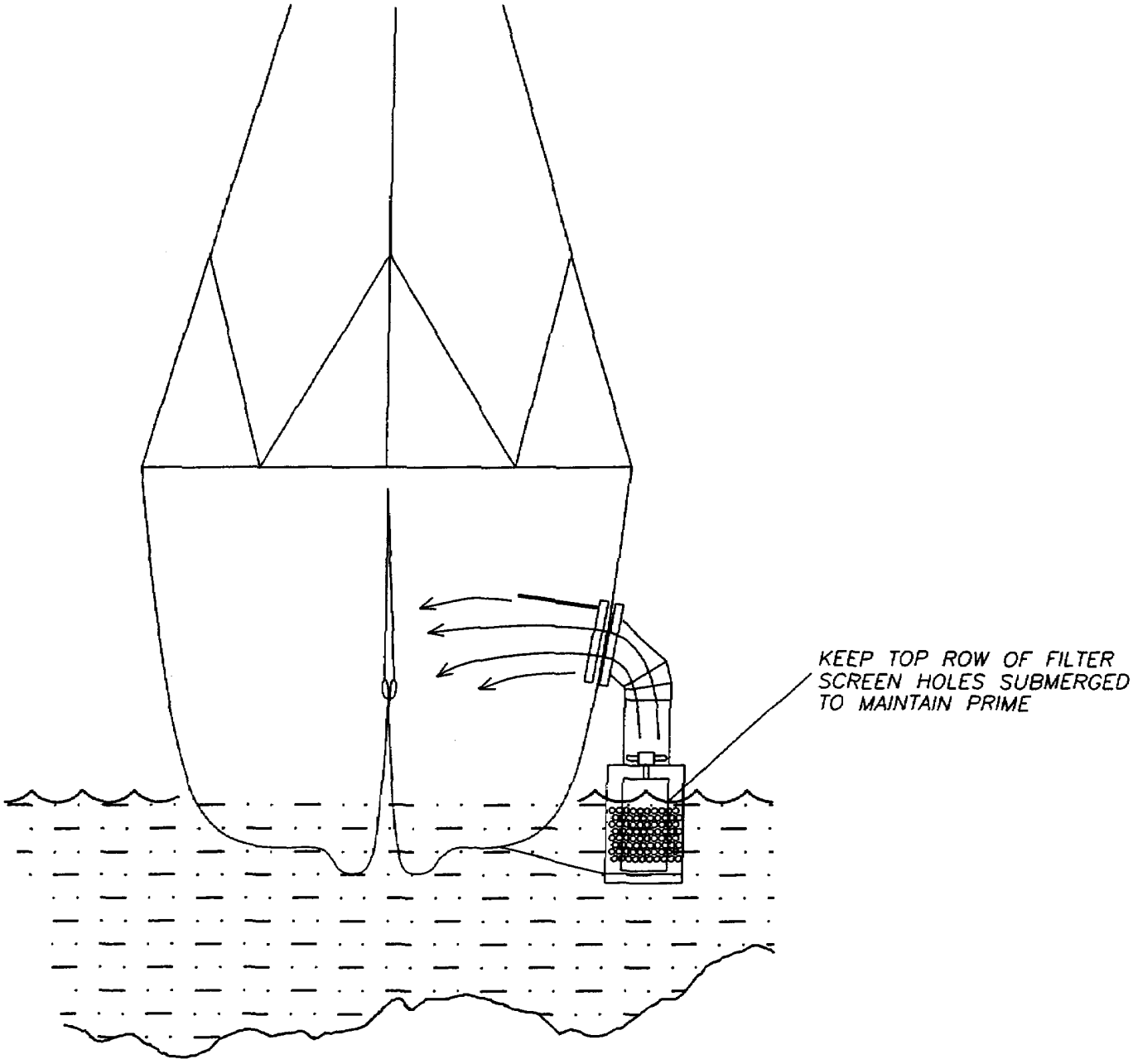


fig. 4.5 POWER FILL II MAINTAINING PRIME



5.6 Power Fill II Maintenance and troubleshooting

Power Fill II System description
The System consists of the following main components: 1) A 28 volt DC driven pump; 2) Mating flange on the bucket shell.

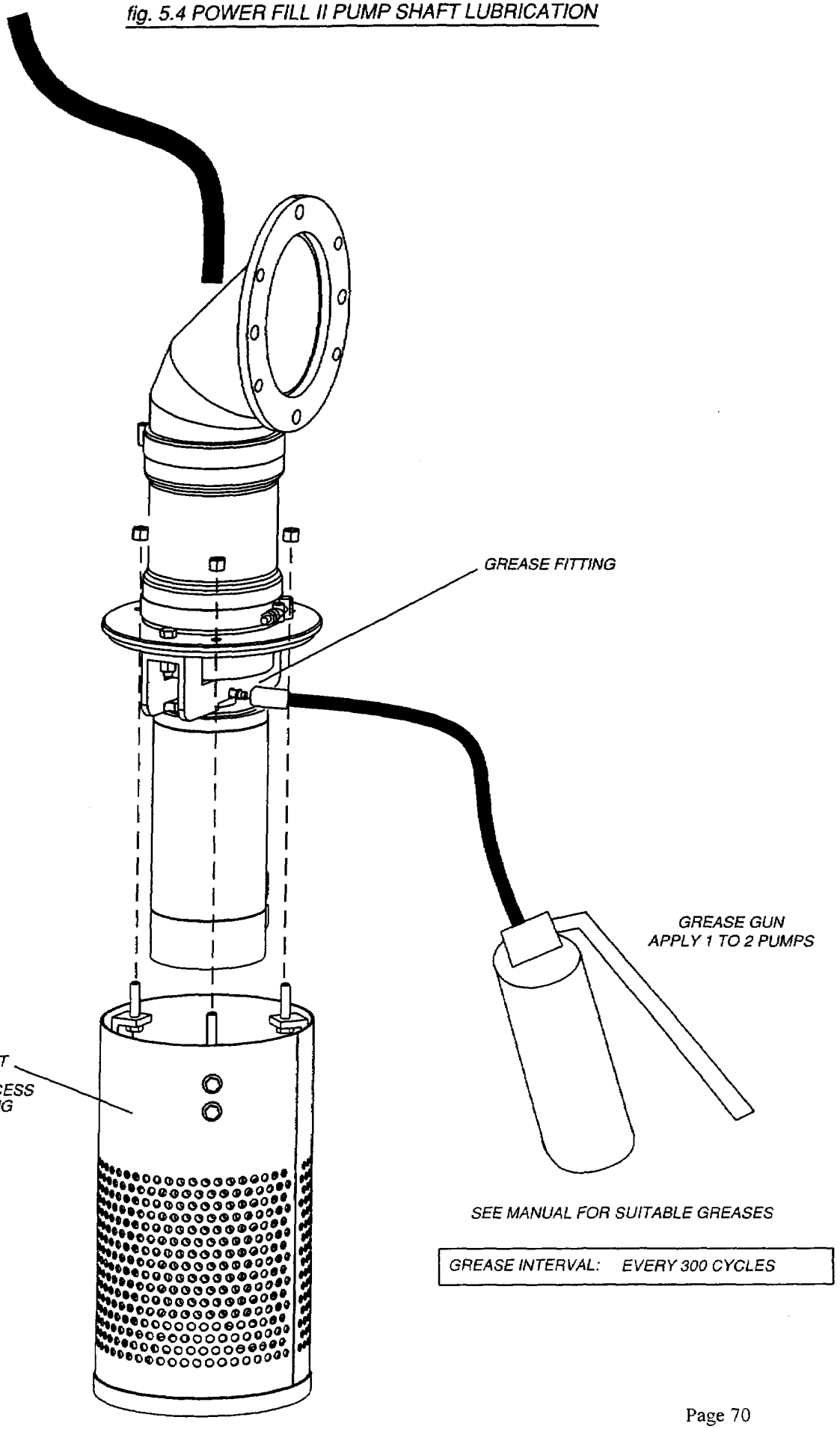
Pump: The 28 Volt DC-powered pump is very compact, light weight and efficient. The pump draws up to 45 Amps of current and can pump 425 US Gallons of clean water per minute (26 liters per second) The power is supplied by 28 Volt DC power from the aircraft non-essential or utility bus. Power is transmitted through a waterproof and oil resistant cable to the pump motor. At the top end of the cable is a quick-disconnect plug that will separate with minimal force in the event of a load jettison. The pump motor, impeller and housing are contained within a circular steel filter basket. The filter basket serves to protect the components from impact damage while also acting as a debris screen. The pump can be run "dry" without damage. The pump is fully waterproof in operation to a depth of 10 ft. (3.0m) and has a standard hydraulic grease nipple provision to extend the life of the motor output shaft seal.

Mating Flange: The flange consists of two plates that clamp together over the bucket shell to form a hard point for quick mounting of the pump unit. The flange can be installed on a number of buckets to accept the same pump unit. Mounted to the inside of the flange is a one-way flapper valve that prevents water from flowing back through the pump when the pump is not running. When the pump is not in use a blank plate is secured in place of the pump.

Preflight Safety Check: Follow the preflight checklist as outlined in section 2.

Routine maintenance procedures
Weekly inspection: Follow the weekly inspection checks outlined in section 5.3

fig. 5.4 POWER FILL II PUMP SHAFT LUBRICATION



SEE MANUAL FOR SUITABLE GREASES

GREASE INTERVAL: EVERY 300 CYCLES

Pump output shaft lubrication
The pump output shaft must be lubricated periodically to preserve the life of the seals. Good seal condition will prolong the life of the motor by preventing moisture and other contaminants from entering the motor case. Lubrication will require a hand pump grease gun with a standard hydraulic coupler.

Grease selection is outlined in section 5.3.2.

Grease procedure (See fig. 5.4)
Interval: All models every 300 fill cycles

Note: Regular dip fills do not count as fill cycles if pumps are not operated.

1) Remove the 3 nuts securing the filter basket to the top mount ring, and pull the filter basket free from the pump assembly
2) Gently apply 1 to 2 pumps of grease to the grease nipple – enough to purge grease through the seal
3) Check for dirt of gravel accumulation between the seal cup and the bottom shank of the impeller. Also clean out any dirt and debris that may have accumulated inside the filter basket
4) Re-install filter basket.

Unscheduled maintenance procedures

Follow the procedures described in section 5.4 for maintenance on Power Fill II pump unit. The construction of the external pump unit is very similar to the Torrentula Valve type, with only minor variations to note:

1) **Removal and installation of the discharge hose:** The discharge hose has to be stretched slightly to fit over the discharge elbow and the pump housing. When removing or replacing the hose, undo the hose clamps completely and work the hose from side to side while restraining the pump unit, and/or discharge elbow. When installing the hose, apply soapy water or a small amount of petroleum jelly to the inside lip of the hose to assist in getting the hose over the nipple. Use a round rod or screwdriver to help pry the hose onto the nipple – in a manner similar to changing a bicycle tire. If you have a new piece of hose, cut a 1/8" (3mm) chamfer on the inside edge of the hose before installation.
2) **Two O-ring seals reside in the filter mount ring:** One seals the pump housing, and one seals the interface between the filter basket. Whenever the filter basket is removed, always check the condition of the mating seal. If cut or broken, it should be replaced with a new seal. If disassembly of the pump proceeds to the point where the pump housing is separated from the filter mount ring, replace the mating seal as a matter of course.
3) **Conductor cable seal:** If removing the pump motor, impeller, or impeller housing, you will need to break the silicone RTV seal at the conductor cable through point on the filter mount ring. Upon re-assembly, apply a small amount of silicone RTV sealant to re-seal the cable.

Important: a good seal at the filter mount ring will help prevent pump cavitation in water sources less than 6" deep

SECTION 6: STORAGE

- To ensure operational readiness, carry out any required repairs before putting the system in storage. SEI Industries offer comprehensive repair services for all Bambi Bucket operators.

- No additional preparations for storage are required after performing the yearly maintenance procedures, as outlined in Section 5.

- It is highly recommended that the Bambi Bucket and Power Fill / Power Fill II system components are stored indoors when not in use. This will minimize deterioration due to temperature change, UV light, and atmospheric moisture.

7.2 Power Fill II specifications

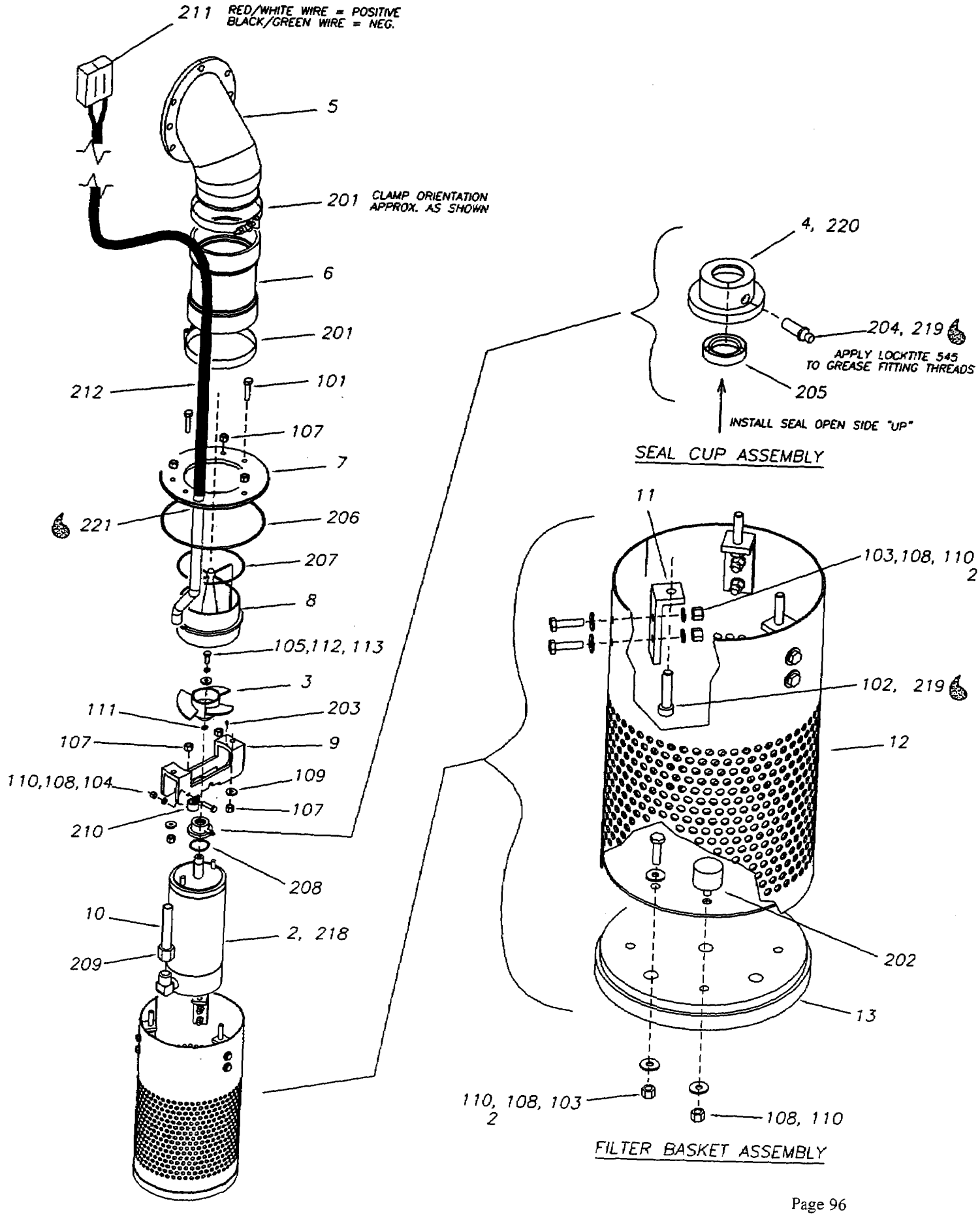
Bucket Model	Number of pumps	Current draw Amps @ 24.5 VDC	Optimal Fill time (sec)	Power Fill System Additional Weight Lbs. (Kg)	Bucket weight Empty * Incl. pump Lbs. (kg)	Bucket Gross weight * Lbs. (Kg)
2024	1	45	34	40 (18)	175 (80)	2175 (989)
2732	1	45	45	40 (18)	194 (88)	2893 (1315)
3542	1	45	59	40 (18)	207 (94)	3707 (1685)
4453	1	45	75	32 (15)	202 (92)	4619 (2100)

*Note: specifications subject to change. Check bucket control head serial number plate for capacity, add listed Power Fill additional system weight to Empty, Gross weights.

- System Additional Weights base on removal of center ballast weight from bucket
- Fill time and current draw listed are based on pumping clean fresh water at Standard Atmospheric conditions
- Recommended Aircraft circuit protection: 50 Amps
- Maximum immersion depth, pumps running: 8 feet (2.4 m)
- Maximum immersion depth, pumps "off": 20 feet (6.1 m)

Listed weight does not include longline conductors. See section 3.4 for recommended longline conductor configuration.

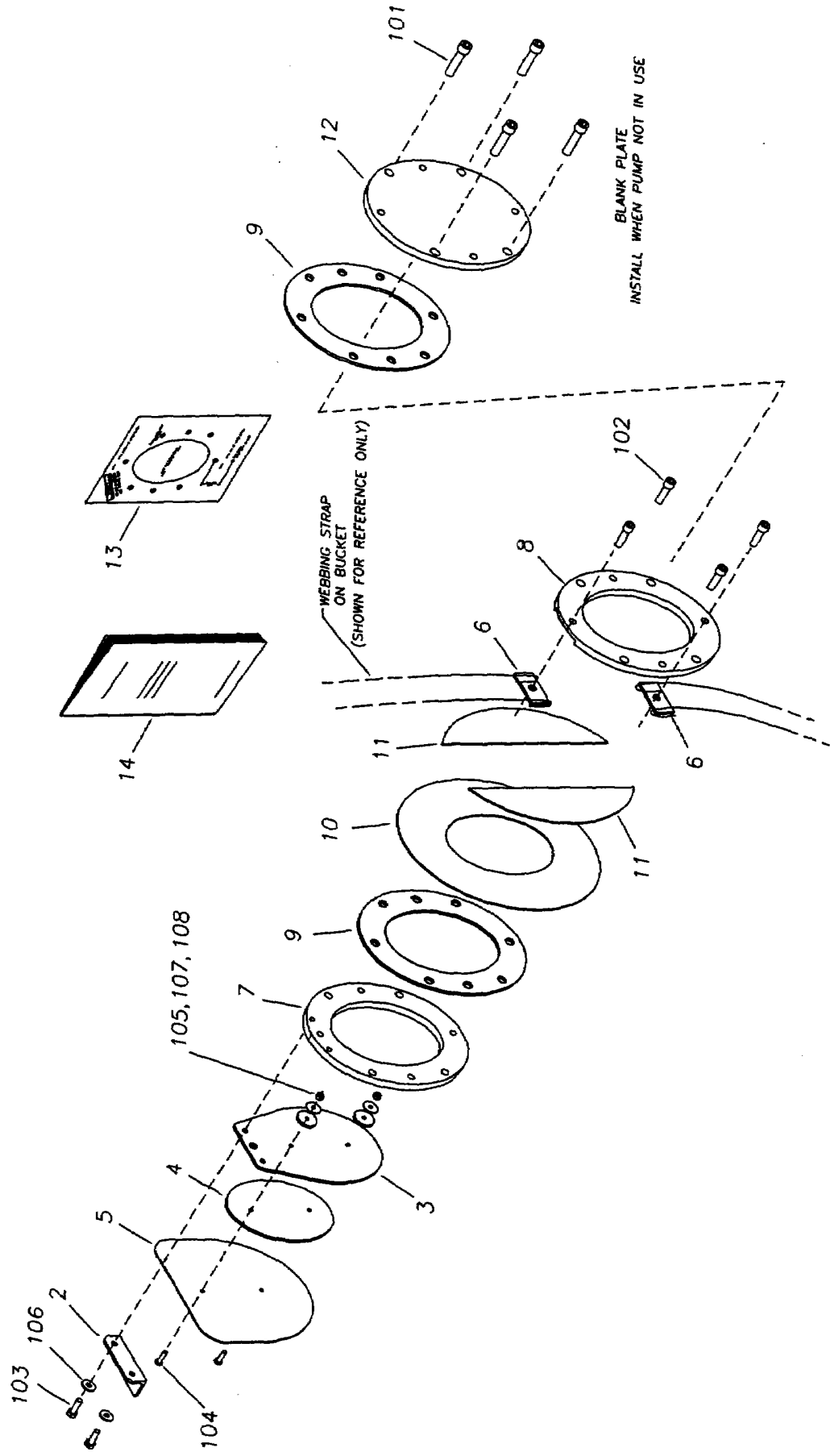
fig. 8.9 POWER FILL II PUMP ASSEMBLY



POWER FILL II PUMP UNIT ASSEMBLY PARTS LIST. FROM FIG 8.9

ITEM	QTY.	DESCRIPTION	SEI PART #
1		PUMP ASSEMBLY	
2	1	MOTOR	
3	1	IMPELLER	
4	1	SEAL CUP	
5	1	ELBOW	
6	1	DISCHARGE HOSE (SPEC MODEL #)	
7	1	FILTER MOUNT RING	
8	1	RECUPERATOR	
9	1	ADAPTER	
10	1	CONDUCTOR CONDUIT	
11	3	FILTER BASKET BRACKET	
12	1	FILTER BASKET	
13	1	BUMPER BLOCK	
101	2	HEX HD BOLT, 5/16UNC X 1-3/4" LONG	
102	3	SOC HD SCREW, 5/16UNC X 1-1/2" LONG	
103	10	HEX HD BOLT, 1/4UNC X 1" LONG	
104	1	HEX HD BOLT, 1/4UNC X ¾" LONG	
105	1	HEX HD BOLTGR 8, ¼-28UNF X ¾" LONG	
107	4	NYLOCK NUT, 5/16UNF	
108	15	NYLOCK NUT, 1/4UNC	
109	4	PLAIN WASHER, 5/16" ID X 5/8" OD	
110	25	PLAIN WASHER, ¼" ID 5/8" OD	
111	1	PLAIN WASHER, ¼" ID – AN THICK TYPE	
112	1	PLAIN WASHER, ¼" ID X ¾" OD X 1/8" THICK	
113	1	SPLIT LOCK WASHER, ¼" ID	
201	2	BOLT CLAMP, 4-1/4" ID	
202	4	STUD MOUNT ISOLATOR	
203	1	1/8" SPLIT ROLL PIN	
204	1	GREASE FITTING	
205	1	LIP SEAL	
206	1	O-RING SEAL	
207	1	O-RING SEAL	
208	1	O-RING SEAL	
209	1	FLARE NUT	
210	1	CABLE CLAMP, 5/8" ID	
211	1 SET	175 AMP CONNECTOR PLUG	
212	23'	10/4 SOW CONDUCTOR CABLE	
219	AS REQ	THREAD SEALANT, LOCKTITE 545	
220	AS REQ	GENERAL PURPOSE GREASE, SEE MANUAL	
221	AS REQ	SEALANT, SILICONE RTV	

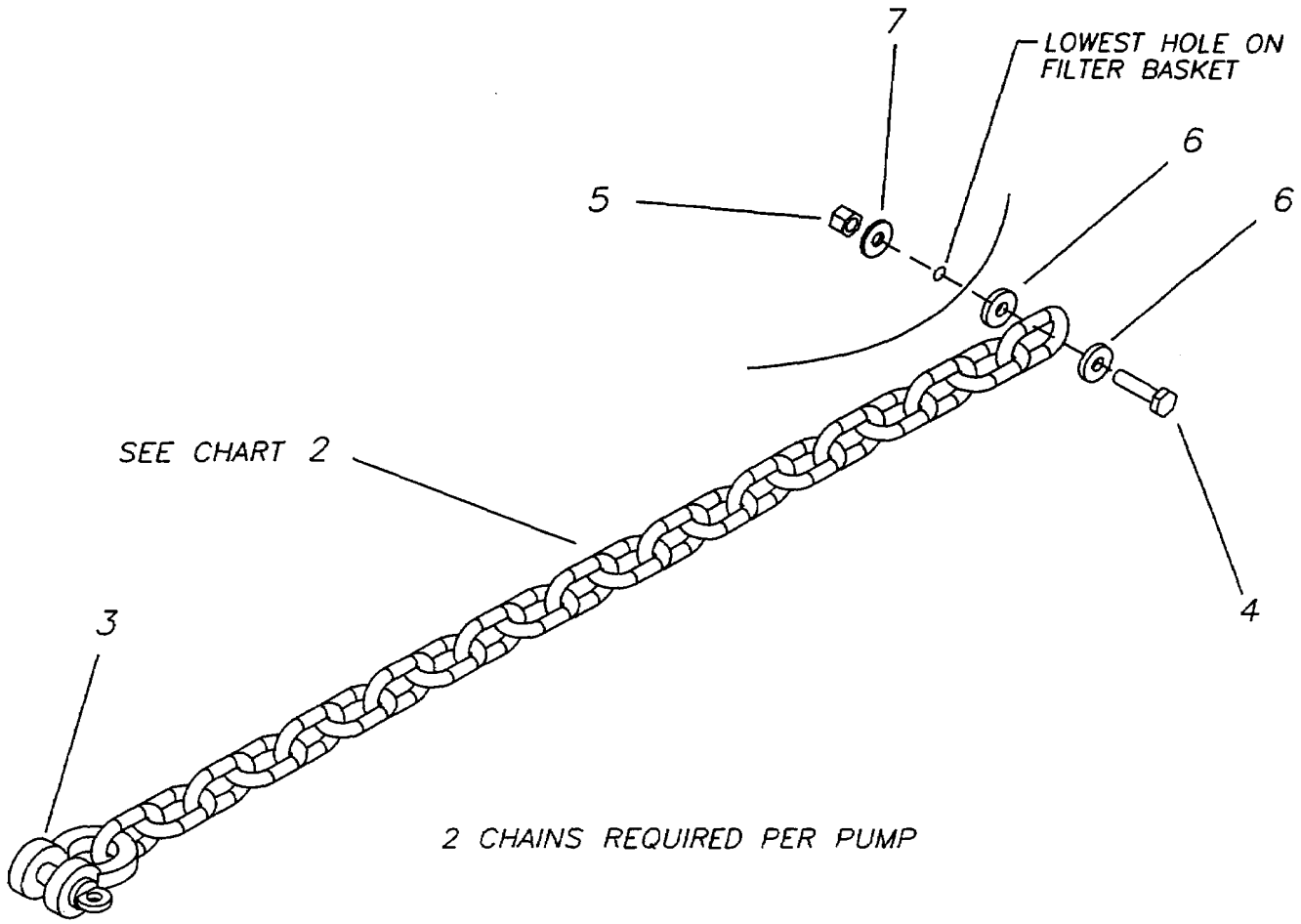
fig. 8.10 POWER FILL II FLANGE ASSEMBLY



POWER FILL II FLANGE ASSEMBLY PARTS LIST. FROM FIG 8.10

ITEM	QTY.	DESCRIPTION	SEI PART #
1		FLANGE ASSEMBLY KIT	
2	1	FLAPPER VALVE BRACKET	
3	1	FLAPPER VALVE	
4	1	FLAPPER VALVE SPACER	
5	1	FLAPPER VALVE DEFLECTOR PLATE	
6	2	WEBBING ANCHOR PLATE	
7	1	INNER FLANGE PLATE	
8	1	OUTER FLANGE PLATE	
9	2	FLANGE GASKET	
10	1	BUCKET SHELL DOUBLER (INST. KIT ONLY)	
11	2	BUCKET SHELL SPACER (INST. KIT ONLY)	
12	1	BLANK PLATE	
13	1	FLANGE LOCATOR TEMPLATE (INST. KIT ONLY)	
14	1	INSTALLATION INSTRUCTIONS (INST. KIT ONLY)	
101	4	SOC HD CAP SCREW, 3/8UNC X 1-1/2" LONG	
102	4	SOC HD CAP SCREW, 5/16UNC X 1" LONG	
103	2	HEX HD CAP SCREW, 1/4UNC X ¾" LONG	
104	2	PANPHIL SCREW, 10-24UNC X ¾" LONG	
105	2	NYLOCK NUT, 10-24UNC	
106	2	PLAIN WASHER, ¼" ID X 5/8" OD	
107	2	RUBBER WASHER, 3/16" ID X 1" OD	
108	2	PLAIN WASHER, 3/16" ID X ¾" OD	
201	6"	BUTYL TAPE	

fig. 8.11 POWER FILL II RESTRAINER CHAIN ASSY.



MODEL #	# LINKS OF CHAIN
2024	CONTACT SEI IND.
2732	"
3542	"
4453	"

POWER FILL II RESTRAINER CHAIN PARTS LIST. FROM FIG 8.11

ITEM	QTY.	DESCRIPTION	SEI PART #
1	2 REQ	RESTRAINER CHAIN ASSEMBLY	
2	1	CHAIN, 3/16" UTILITY (SPEC BUCKET MODEL #)	
3	1	SHACKLE, ¼"	
4	1	HEX HD BOLT, 1/4UNC X ¾" LONG	
5	1	NYLOCK NUT, 1/4UNC	
6	2	WASHER, ¼" ID X ¾" OD X 1/8" THICK	
7	1	PLAIN WASHER, ¼" ID X 5/8" OD	