400-10
REFUELER

ORIGINALS

DO NOT DESTROY

7-31-00

SPOKANE INDUSTRIES, INC.

SPOKANE METAL PRODUCTS DIVISION
Spokane Washington

400 GALLON FUEL REFUELER
TECHNICAL MANUAL
PARTS, OPERATION AND MAINTENANCE
MODEL NUMBER BOW 400-10

400 GALLON REFUELER BOWSER

TECHNICAL MANUAL
PARTS, OPERATION AND MAINTENANCE
MODEL NUMBER BOW 400-10

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1.0 Introduction

1.1 To obtain optimum benefit from your refueler unit, it is recommended that all personnel operating it read and understand this manual prior to operation.

1.2 Upon receipt of the refueler unit, a visual inspection should be made to determine that it is complete and has not sustained any damage during transportation.

2.0 Safety

2.1 Potential Fire and 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 refueler unit.

2.1.2 A 50-foot radius area around the refueler 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 refueler should never be used inside of an enclosed area. Proper ventilation is required at all times.

2.2 Telescoping Drain

2.2.1 Care should be exercised in using the telescoping drain to prevent injuries to fingers pinching between clamps by dropping sections.

2.3 Grounding

2.3.1 To eliminate static sparks; the refueler unit is equipped with two (2)-grounding reels and two (2) grounding receptacle connectors. Connect prior to draining or filling operations as described in the "Operations Section".

2.4 Towing

2.4.1 Make sure the tow bar is securely attached to the towing vehicle.

2.4.2 Before moving the refueler unit, check to assure the parking brake is released.

2.4.3 Maximum allowable towing speed is 15 MPH.

2.0 Safety (Continued)

2.5 Parking

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

2.6 Air Supply

2.6.1 CAUTION: Check the air pressure of supply lines to the refueler pump, located in the pump box, assure it is not in excess of 50 PSI.
CAUTION: Check the air pressure of supply lines to the Vacuum Generator, assure it is not in excess of 100 PSI.

2.7 Inspections

2.7.1 Inspections 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.

2.7.2 Internal inspection is necessary to insure structural integrity and cleanliness. It is recommended that interval inspections be performed at least every six (6) months. CAUTION: When entering confined spaces such as the interior of the refueler tank, 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.

2.8 Manway

2.8.1 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.

2.9 Refueler Pump Assembly

2.9.1 The refueler unit is equipped with a A) diaphragm pump, B) air regulator (preset at 40 PSIG), C) fuel meter, D) fuel filter housing and a E) hose reel supplied with a F) 35 foot long hose.

2.9.1-A Air Regulator

WARNING: Before servicing any pneumatic component, always turn off air supply and depressurize system.

2.0 Safety (Continued)

2.9 Refueler Pump Assembly (continued)

2.9.1-B Diaphragm Pump

WARNING: The diaphragm pump can cause personal injury, pump damage or property damage if supplied with EXCESSIVE AIR PRESSURE. Do not exceed the maximum inlet air pressure as stated on the pump model plate. Check all hoses for damage or wear prior to startup. Be sure dispensing device is clean and in proper working condition prior to startup. Disconnect air supply line and relieve pressure from the system by opening dispensing valve or devise and/or carefully and slowly loosening and removing outlet hose or piping from pump prior to any servicing.

Assure the user of the refueling unit reads and understands the supplied "Operating and Safety Precautions" provided at the end of this manual under the "Manufacture Supplied Data Section".

2.9.1-C Hoses

Inspect the hoses each day before it is put into use. The hoses should be extended, as it normally would be for fueling. 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 from service.

3.0 Operations

3.1 Intended Use

3.1.1 The refueler unit is intended for use in draining and collection of fuel from aircraft or storage area and then transportation to the aircraft or storage area. Any other use is prohibited and may void any and all warranties.

3.2 Tow Bar and Undercarriage

3.2.1 The refueler unit is equipped with steering front wheels controlled by the tow bar.

3.2.2 Care should be taken not to jackknife the refueler when backing up.

3.0 Operations (Continued)

3.2 Tow Bar and Undercarriage (continued)

3.2.3 Tire inflation should be checked and maintained as described in the "Maintenance Section".

3.2.4 Before towing, check to see the brake is disengaged, grounding reel and hoses are disconnected airlines and valves are closed, tow bar is securely attached to the towing vehicle and all manway and covers are closed and latched.

3.2.5 The refueler unit is equipped with a tow bar latch to hold it in the upright position.

3.3 Parking Brake

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

3.4 Manway

3.4.1 The refueler unit is equipped with a 16" quick opening manway assembly for internal inspections.

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

3.5 Vent, Overflow Preventer

3.5.1 The refueler unit is equipped with a float-actuated seal to prevent fuel from flowing out the vent in the event the refueler is overfilled.

3.6 Refueler Pump Assembly

3.6.1 The refueler unit is equipped with a A) diaphragm pump, B) air regulator (preset at 40 PSIG), C) fuel meter, D) fuel filter housing and a E) hose reel supplied with a F) 35 foot long hose.

3.6.1-A Diaphragm Pump

Prior to using this equipment assure the user of the refueling unit reads and understands the supplied "Operating Manual" provided at the end of this manual under the "Manufacture Supplied Data Section".

3.0 Operations (Continued)

3.6 Refueler Pump Assembly (Continued)

3.6.1-B Air Regulator

The diaphragm pump is supplied with a filter/ regulator for controlling of inlet air supply. IMPORTANT: Before turning on air supply, turn adjusting handle or knob counterclockwise until compression is released from pressure control spring. Adjustment to desired downstream pressure could be made only with pressure applied to the regulator. Regulator then acts as shut-off valve. Turn on air pressure. Then proceed to adjust to desired downstream pressure by turning adjusting knob clockwise. This permits pressure to build up slowly, preventing any unexpected operation of the pump.

Assure the user of the refueling unit reads and understands the supplied "Operating Instructions & Parts Manual" provided at the end of this manual under the "Manufacture Supplied Data Section".

3.6.1-C Fuel Meter

The refueler unit is equipped with a fuel meter and registers U.S. gallons. For accurate measurement, meter and piping must always be filled with liquid and free of air. Meter should be calibrated per instructions in "Pump System Technology By FILL-RITE "Parts and Technical Service Guide" provided at the end of this manual under the "Manufacture Supplied Data Section".

3.6.1-D Fuel Filter

The refueler unit is equipped with a Velcon VF-31E filter housing and is designed to operate with various Aquacon® cartridges in a wide variety of applications. The filter housing is shipped with no cartridge installed. Customer is responsible for selecting and providing the proper cartridge.

Assure the user of the refueling unit reads and understands the supplied "VF-31E Instructions Brochure" provided at the end of this manual under the "Manufacture Supplied Data Section".

3.0 Operations (Continued)

3.6 Refueler Pump Assembly (Continued)

3.6.1-E Hose Reel

The refueler unit is equipped with an ISO Series 800 Hannay Hose Reel. Assure the user of the refueling unit reads and understands the supplied "Safety Guidelines" documentation supplied at the end of this manual under the "Manufacture Supplied Data Section".

3.6.1-F Hoses

The hoses supplied on the hose reel, plumbing from tank to pump and pump to hose reel are special and are bonded and certified to 0.05 R Mega Ohm meter reading minimum with a cover resistance (M.R./Meter) of 0.13 (R/L) 3.28 minimum. Each hose has been tested to 600 PSI and is equipped with one (1) crimped on barrel with 1" MNPT on one end and one (1) crimped on barrel with 1" FNPT swivel connection on the other end.

Assure the user of the refueling unit reads and understands the supplied "Aircraft Refueling Hose in Service Inspection and Maintenance Guide" provided at the end of this manual under the "Manufacture Supplied Data Section".

3.7 Sample Port

3.7.1 The refueler unit is equipped with a ½" NPT valve for use as a sample port. The valve is located at the bottom of the sight gauge assembly.

3.8 Grounding

3.8.1 The refueler unit is supplied with two (2) grounding reels and two (2) grounding receptacle connectors.

3.8.2 Before filling or draining the grounding reels must be attached between the aircraft or object being serviced and an appropriate ground.

3.9 Drain Valve

3.9.1 The refueler unit is equipped with a 1 1/2" NPT ball valve with a Cam-lock connector.

3.0 Operations (Continued)

3.10 Reserved for future use

3.11 Telescoping Drain Assembly

3.11.1 The Refueler is equipped with a telescoping drain assembly. It is capable of being adjusted from 4'2" to 12'0" high.

3.11.2 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.

3.11.3 To lower:

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

3.11.4 The funnel is equipped with a nitrile rubber seal around the top edge to allow placement against the underside of the aircraft wing.

3.11.5 When not in use, telescoping funnel should be collapsed and the cover closed to eliminate contamination.

3.12 Telescoping Drain Sump/ Strainer

3.12.1 The Refueler unit is equipped with a sump with removable bottom to allow cleaning of the drain strainer.

3.13 Vacuum Assembly

3.13.1 This assembly is equipped with an air powered vacuum generator.

3.13.2 It is intended for vacuum draining or depuddling fuel and condensation. **Caution!** If other objects such as rock or metallic pieces are vacuumed into the vacuum chamber, they may create a hazard due to sparking.

3.0 Operations (Continued)

3.13 Vacuum Assembly (continued)

3.13.3 Start vacuum by attaching a recommended air supply of 60 CFM @ 100 PSI, and then turn on the air supply valve.

3.13.4 The vacuum chamber is equipped with an automatic drain valve that opens whenever vacuum is eliminated in the chamber. This valve opens directly into the main tank.

3.13.5 The vacuum generator is equipped with an automatic overflow protector. When the level of product is full, the valve shuts off and eliminates the vacuum. The vacuum chamber will then automatically drain. The air supply must be shut off to reset the overflow valve. Vacuuming may then continue.

3.13.6 The vacuum assembly is supplied with 50 feet of vacuum hose and a ball valve on the vacuum suction.

3.13.7 The vacuum assembly is equipped with (4) four each ½" NPT openings for use with pencil drains. To use, the pipe caps must be removed and self-closing quick disconnects attached that match local standards. To operate, close vacuum suction valve and turn air supply on and connect drain lines.

4.0 Maintenance

4.1 Tow Bar and Under Carriage

4.1.1 The refueler unit is equipped with steering front wheels, controlled by the tow bar and fixed real wheels.

4.1.2 Maintenance should consist of the following:

1) Kingpin bushing, turning bushings and tie rod ends are self-lubricating and need no additional maintenance.
2) Inspect wheel bearings at three (3) month intervals. Repack and, or replace as needed.
3) Check tire pressure weekly. Maintain pressure as per tire markings.

4.1.3 Tow bar pivot pin and hook ring should be inspected monthly for excessive wear or cracks.

4.0 Maintenance (continued)

4.2 Parking Brake

4.2.1 The refueler unit is equipped with a parking brake assembly consisting of a 7" diameter brake drum with 2 ¼" wide brake shoes.

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

4.2.3 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.

4.2.4 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.

4.3 Manway

4.3.1 Inspect manway gasket weekly for cuts, cracks or galling. Replace as needed.

4.4. Vent, Overflow Preventer

4.4.1 The Vent, Overflow Presenter is located inside the tank directly under the vent.

4.4.2 It consists of a caged float with an elastomer gasket.

4.4.3 Inspect gasket once per year for wear. Replace as needed.

4.5 Refueler Pump

4.5.1 The refueler unit is equipped with; A) diaphragm pump, B) air regulator (preset at 40 PSIG), C) fuel meter, D) fuel filter housing and a E) hose reel supplied with a F) 35 foot long hose assembly.

4.5 Refueler Pump (continued)

4.5.1-A Diaphragm Pump

The diaphragm pump should be inspected before every use for leaks or damage. Repair any leaking or damages immediately. Refer to the "Operators Manual" under the "Manufacture Supplied Data Section" at the back of this manual for parts and repair instructions.

4.5.1-B Air Regulator

Inspect the Filter/Regulator before every use. Both free moisture and solids are removed automatically by the filter/regulator. Drain whenever water level in sump reaches the lower baffle. Install automatic drain if bowl draining is frequent.

The filter element should be removed and replaced when a pressure differential across the element exceeds 10 PSI.

Refer to the "Operating Instructions and Parts Manual" under the "Manufacture Supplied Data Section" at the back of this manual for parts and repair instructions.

4.5.1-C Fuel Meter

Reset meter to "0". Meter is ready for use. Do not exceed 50 PSI line pressure.

4.5.1-D Fuel Filter Housing

1) Close inlet and outlet shutoff valves (if any)
2) Open drain valves or remove the drain plug to drain liquid from vessel.
3) Unscrew lid bolt
4) Drop shell and remove spent cartridge
5) place new cartridge in shell
6) Look at lid gasket (located in grooved in the head) to make sure it's not split or otherwise damaged. Replace as needed.
7) Reattach shell to head. Do not over-tighten.
8) Close the drain valve or reinstall the drain plug
9) Open shutoff valves.
10) Restart system. Check for leaks.

4.0 Maintenance (Continued)

4.5 Refueler Pump (Continued)

4.5.1-E Hose Reel

Refer to the "ISO 42 Parts List Series 800" under the "Manufacture Supplied Data Section" at the back of this manual for parts and repair instructions.

4.5.1-F Hoses

Refer to the "Dayco Aircraft Refueling Hose in Service Inspection and Maintenance Guide" under the "Manufacture Supplied Data Section" at the back of this manual for parts and repair instructions.

4.6 Sight Gauge Assembly

4.6.1 The sight gauge should be inspected monthly for loose connections and weathering of clear tubing. Replace as needed.

4.7 Grounding

4.7.1 Grounding reel cables should be pulled out, cleaned and inspected monthly.

4.7.2 Cable clamps and ends should be inspected for loose connections monthly.

4.7.3 There are two (2) grounding receptacle connectors located on the rear end of the skids. Clean the sleeve with a ¼"diameter wire brush by reaming as needed.

4.8 Reserved for future use

4.9 Reserved for future use

4.10 Telescoping Drain Assembly

4.10.1 The telescoping drain assembly consists of a stainless steel housing 4 ½" in diameter permanently attached to the tank and four (4) aluminum tube sections.

4.10.2 The stainless tube and three largest aluminum tubes are equipped with clamp assemblies.

4.10.3 Each aluminum tube is crimped on the lower end, which acts as a stop to prevent the tube from sliding through the clamp.

4.0 Maintenance (Continued)

4.10 Telescoping Drain Assembly (continued)

4.10.4 Disassembling of the telescoping assembly is accomplished by rotating the four (4) sections 180 degrees from normal position then gently lifting each section so that the crimped edge on the tube is aligned with the slot on the clamp.

4.11 Telescoping Drain Sump/ Strainer

4.11.1 Telescoping drain strainer is located on the bottom of the stainless steel drain housing.

4.11.2 Maintenance should consist of inspection and cleaning monthly.

4.11.2 Removal:

(1) Removal is accomplished by loosening the wing nut on the clamp holding the base of the sump. NOTE! Check interior to assure fuel has been thoroughly drained before loosening the wing nut.

(2) Remove clamp and sump base.

(3) Loosen clamp holding screen to stainless steel drain housing and pull screen down.

4.12 Vacuum Assembly

4.12.1 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) eccentric latches.

4.12.2 The vacuum chamber is equipped with an automatic drain valve. This valve is pre-adjusted at the factory and should not need further adjustment.

4.12.3 The vacuum cover is equipped with an overflow valve, which should require no maintenance.

4.12.4 The vacuum generator is attached to the chamber cover. It is equipped with an exhaust silencer, which should be cleaned at six (6) month intervals or more often depending on the amount of use and conditions.

4.12.5 The vacuum hose should be inspected monthly for cracks. Any sudden loss of vacuum suction power may indicate a crack in the vacuum hose.

4.0 Maintenance (Continued)

4.12 Vacuum Assembly (continued)

4.12.6 The cover gasket should be inspected monthly for deterioration. This gasket should be pliable and free from weather checking.

4.13 Trouble Shooting

SYMPTOM	PROBABLE CAUSE	PROBABLE CORRECTIONS
Refueler does not track or steer correctly or steers loosely	Bent King Pin Housing	Replace King Pin housing See section 5.2.1 Item #7
	Defective Tie Rod End	Replace Tie Rod end See section 5.2.1 Item #12
	Loose or worn out bushings	Replace as needed See section 5.2.1 item #11 #16 or #18
Toe Bar does not stay in the up-right position	Broken or Stretched spring	Replace as needed See section 5.2.1 item #26
Parking Brake does not work	Need adjustment or repairing	Adjust or replace as per instructions. See section 4.2 and 5.3.3-B
Vacuum System does not have much suction	Defective lower drain stop gasket	Replace as needed See section 5.6 Item #2
	Not enough air pressure to operate vacuum generator	Increase air pressure and volume, see section 3.5.3 4.4
	Plugged outlet filter	Replace or clean as required See section 5.6
Fuel Drains out vent	Vent, Overflow Preventer is stuck in the open condition	Remove and clean as required. See section 4.4 and section 5.6

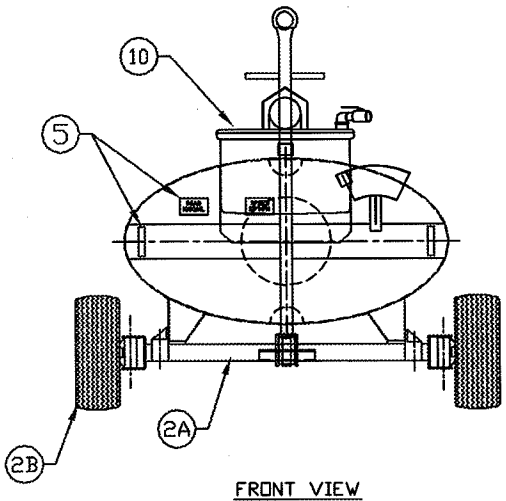
4.13 Trouble Shooting (continued)

SYMPTOM	PROBABLE CAUSE	PROBABLE CORRECTIONS
Fuel misting is occurring through vacuum generator	Defueler tank is to full	Empty main defueler tank
	Overflow stop gasket needs	Replace or adjust as needed
	Replaced or adjusting	See section 3.5.0 and 5.6
	Float on vacuum shutoff is bent	Fix or repair as needed. See Section 5.6
Fuel will not pump out the hose attached to the hose reel.	Plugged Fuel Filter	Remove / Replace as needed See section 4.5.1-D, 5.6 and 7.4
	Obstructed Fuel Line	Remove hose and clean as req.
	Diaphragm pump may be defective or bad seals.	Repair as needed See section 5.7 and 7.1
	Filter/Regulator may be adjusted in correctly.	Adjust as needed See section 5.7 and 7.2
	Air supply may be too low or off	Check to ensure that air supply is appropriate See section 3.6.1, 5.7 and 7.2
Telescoping funnel won't stay up	Loose clamp handles	Tighten handles a little tighter
Telescoping drain is over flowing	Defueler tank is full	Empty defueler tank
	Clogged drain screen	Remove and clean as required See section 4.7 or 5.5 item 4

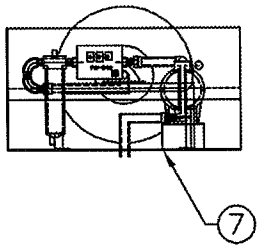
5.0 Replacement Parts

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:

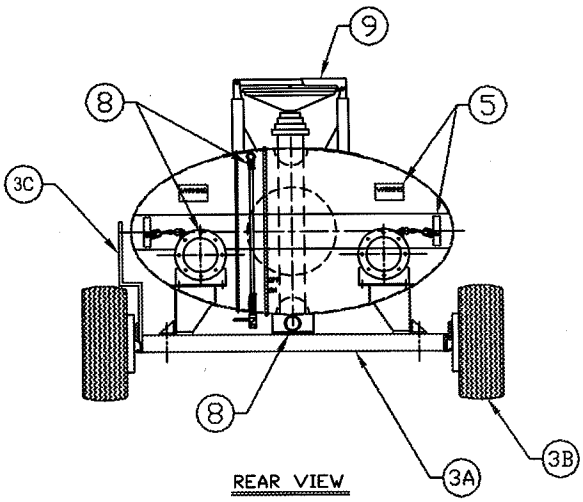
Spokane Industries, Inc.
Spokane Metal Products Division
P.O. Box 3303
Spokane, WA 99220-3303
Telephone: (509) 928-0720
Tele Fax: (509) 927-0826
Email: DYORKE@SPOKANEINDUSTRIES.COM



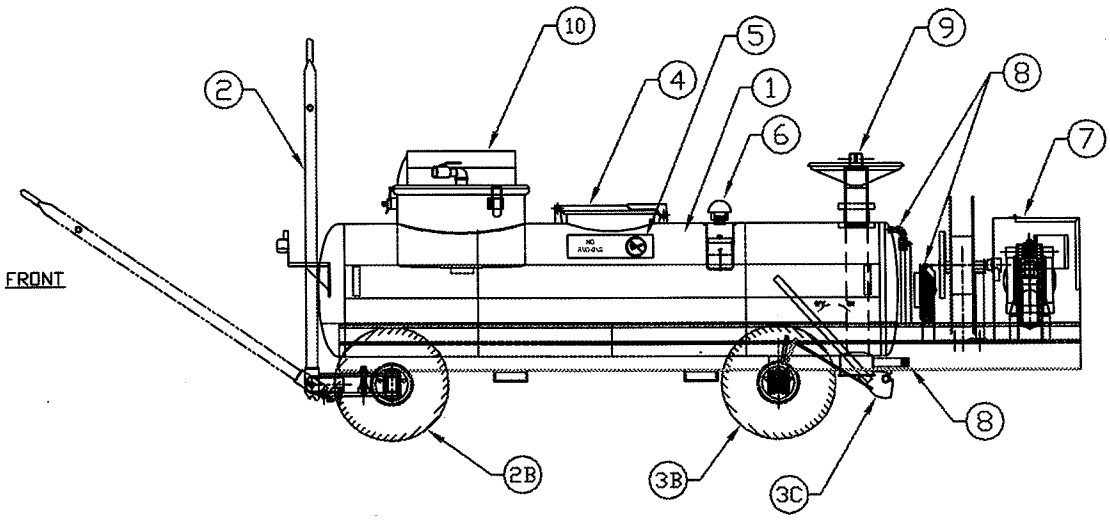
FRONT VIEW



PUMP BOX VIEW



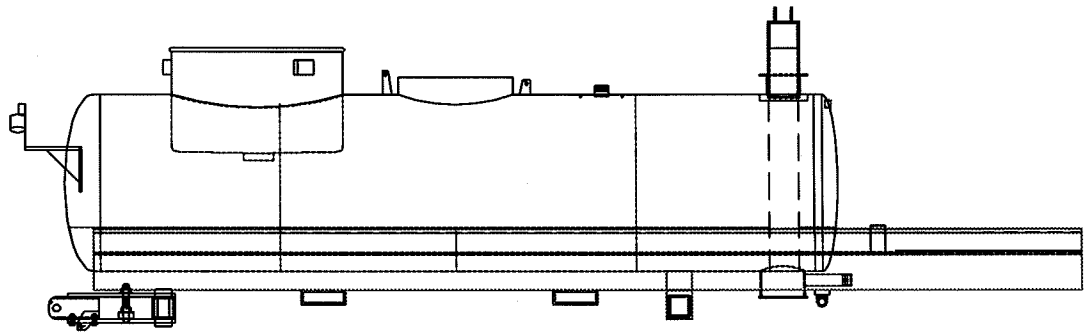
REAR VIEW



ITEM No.	ASSEMBLY	SECTION
1	Main Tank Assembly	5.1
2A	Axle, Front Assembly	5.2.1
2B	Wheel Assembly, Front	5.2.2
3A	Axle, Rear Assembly	5.3.1
3B	Wheel Assembly, Rear	5.3.2
3C	Parking Brake Assemlby	5.3.3
4	Manway Assembly	5.4
5	Decal Package	5.5
6	Vent, Overflow Preventor Assembly	5.6
7	Refueler Pump Box Assembly	5.7
8	Miscellaneous Fixtures	5.8
9	Telescoping Funnel Assembly	5.9
10	Vacuum Pot Assembly	5.10

SECTION 5.1

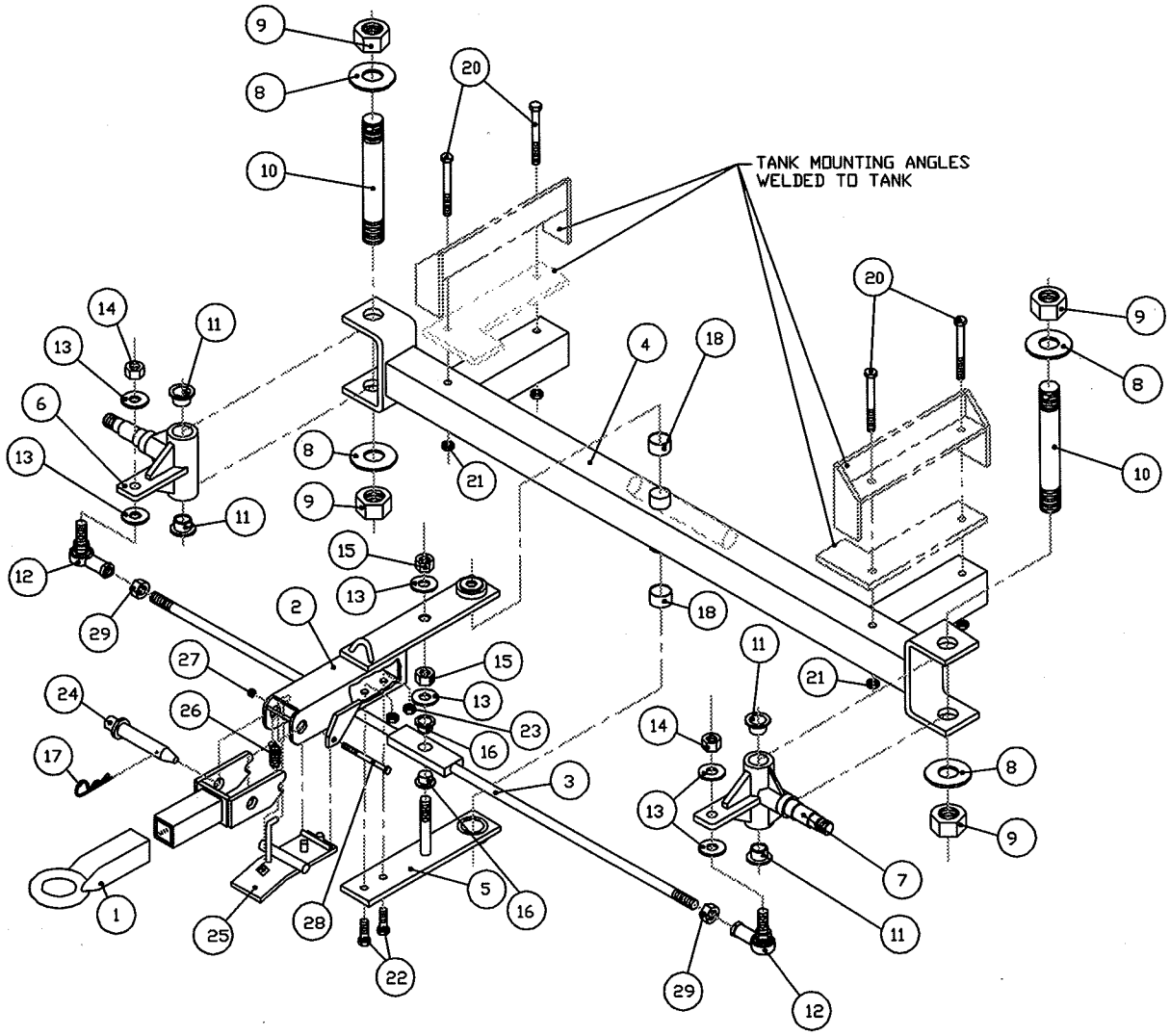
FRONT



REAR

Sub Assy.	Item	Part No.	Quantity	Description	Wt. #'s
–	1	16451	1	Stainless Steel Tank Weldment, 400 Gallon Refueler Type, BOW 400–10	550#

SECTION 5.2.1



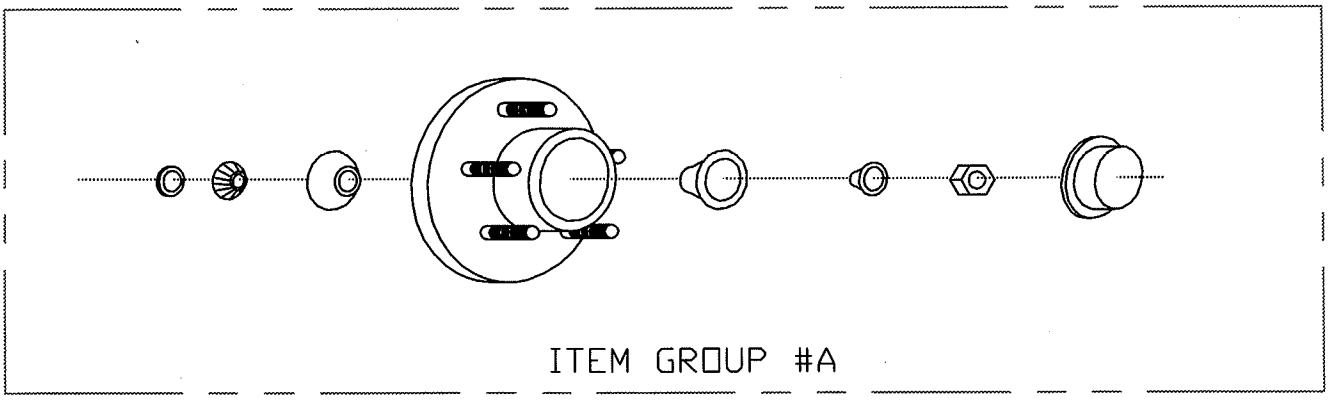
ASSEMBLY No. 08–1018
MAJOR ASSEMBLY– AXLE ASSEMBLY

Sub Assy.	Item	Part No.	Quantity	Description	Wt. #'s
08–10181	–	–	1	Axle, Assembly, Front	160#
–	1	07–1103	1	Tow Bar	23.0
–	2	07–1104	1	Arm, Turning	16.0
–	3	07–1005	1	Tie Rod	7.3
–	4	07–11071	1	Axle, Front	53.0

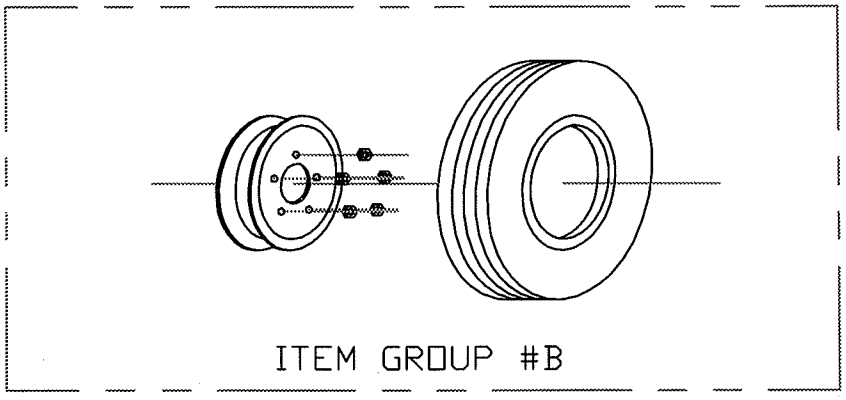
ASSEMBLY No. 08–1018
MAJOR ASSEMBLY– AXLE ASSEMBLY (CONTINUED)

Sub Assy.	Item	Part No.	Quantity	Description	Wt. #'s
	5	07–1016	1	Steering Arm, Lower Plate	6.7
07–1007	6	05–1009	1	Sleeve, King Pin, Right	12
07–1008	7	05–1009	1	Sleeve, King Pin, Left	12
	8	02–11131	4	Washer, King Pin	.7
	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	.4
	14	02–12071	2	Nuts, Tie Rod Ends	.6
	15	02–12071	2	Nut, Tie Rod Pivot	.6
	16	03–1015	2	Bushing, Tie Rod Pivot	.8
	17	02–1300	1	Cotter Pin	.2
	18	03–1014	2	Bushing, Axle Pivot	1
	19	–	–	–	–
	20	02–1503	4	Bolts, Tank Mounting	1.3
	21	02–12041	4	Nuts, Tank Mounting	.8
	22	02–1502	2	Bolts, Turning Arm Clamp	.3
	23	02–12041	2	Nuts, Turning Arm Clamp	.4
	24	02–1304	1	Hitch Pin	2
	25	07–1020	1	Toe Latch	3.7
	26	04–1054	1	Spring, Toe Latch	.5
	27	02–12012	1	Nut, Toe Latch	.6
	28	02–1501	1	Bolt, Toe Latch	.2
	29	02–12141	2	Hex Nut, Tie Rod	.6

SECTION 5.2.2



ITEM GROUP #A

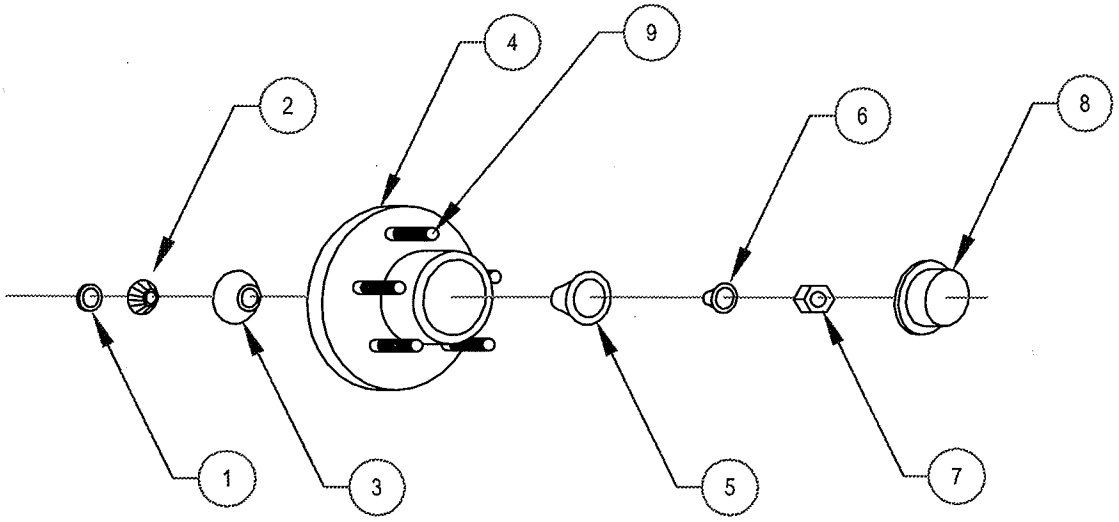


ITEM GROUP #B

ASSEMBLY No. 10-100042
MAJOR ASSEMBLY- FRONT WHEEL

Sub Assy.	Item	Part No.	Quantity	Description	Wt. #'s
10-100042	-	-	2	FRONT WHEEL ASSEMBLY	116#
-	A	08-1011	1	Bearing And Hub Assembly, Front	23
-	B	08-10061	1	Tire/Wheel/Tube Assembly	35

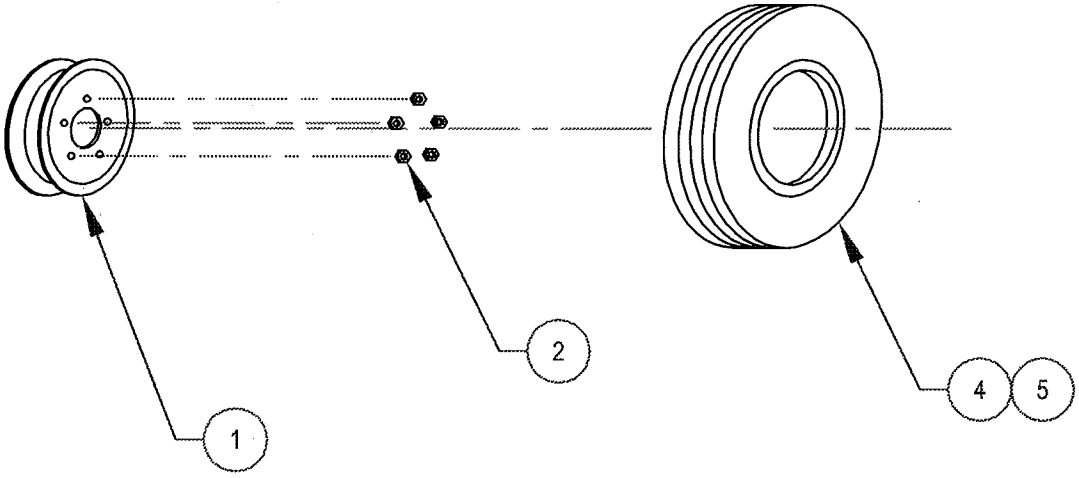
SECTION 5.2.2–A



ASSEMBLY No. 08–1011
MAJOR ASSEMBLY– FRONT WHEEL

Sub Assy.	Item	Part No.	Quantity	Description	Wt. #'s
08–1011		04–1050	1	Bearing and Hub Assembly, Front	23#
	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	Nut, Spindle	1
	8	04–1019	1	Cap, Dust	1
	9	02–1017	5	Studs, Hub	1

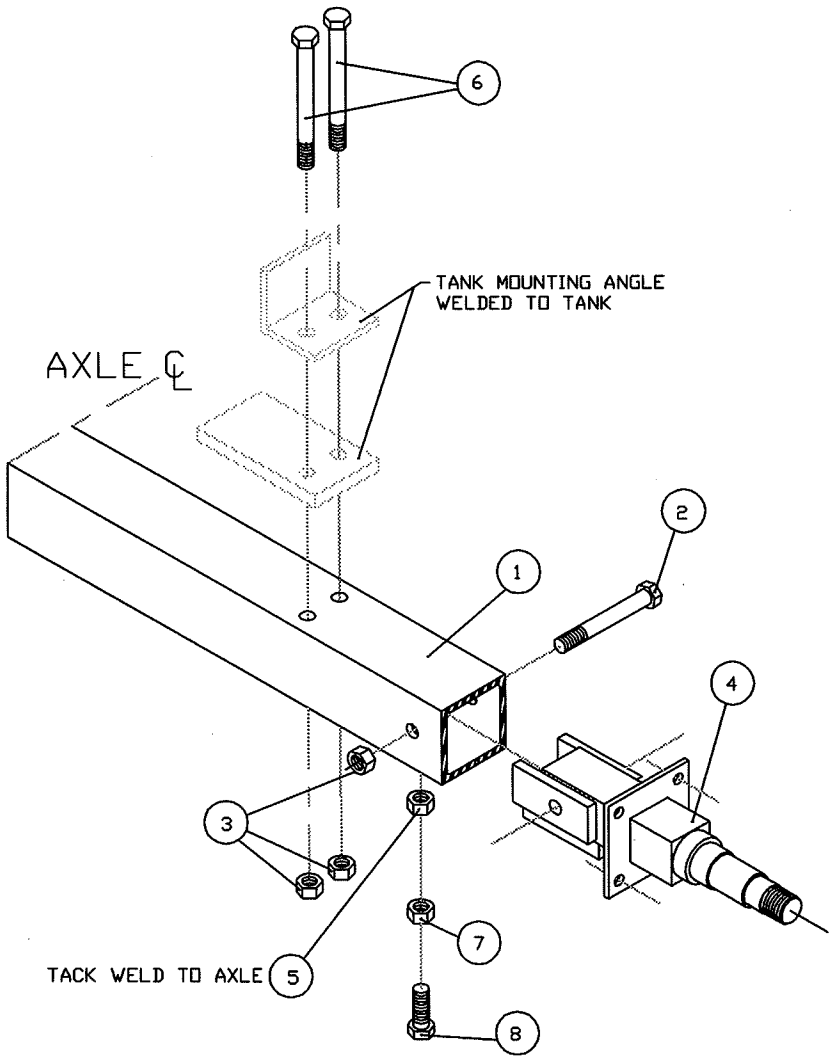
SECTION 5.2.2–B



ASSEMBLY No. 08–10061
MAJOR ASSEMBLY– FRONT WHEEL

Sub Assy.	Item	Part No.	Quantity	Description	Wt. #'s
08–10061	–	–	1	Tire/Wheel/Tube Assembly	35#
–	1	04–1020	1	Wheel, Split Rim	19
–	2	04–1021	5	Nuts, Lug	1
–	3	04–10221	1	Tire	4
–	4	04–1045	1	Tube	11

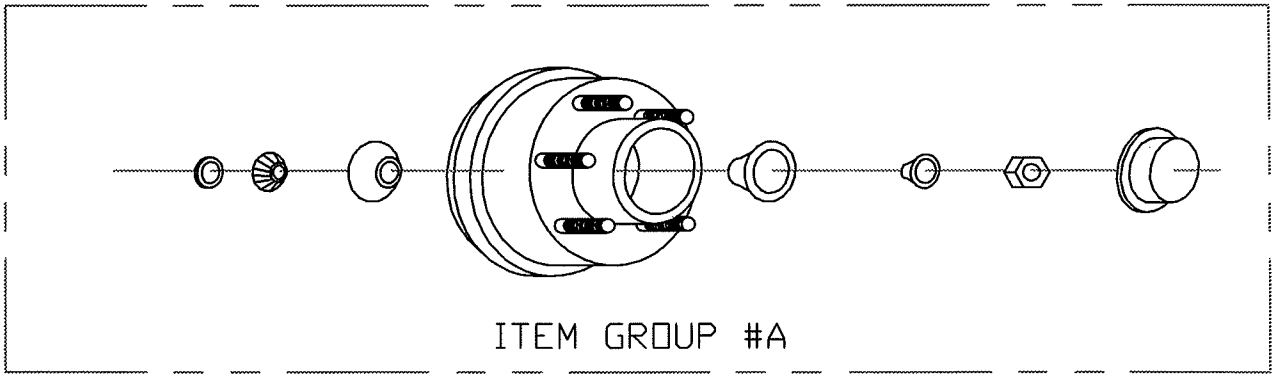
SECTION 5.3.1



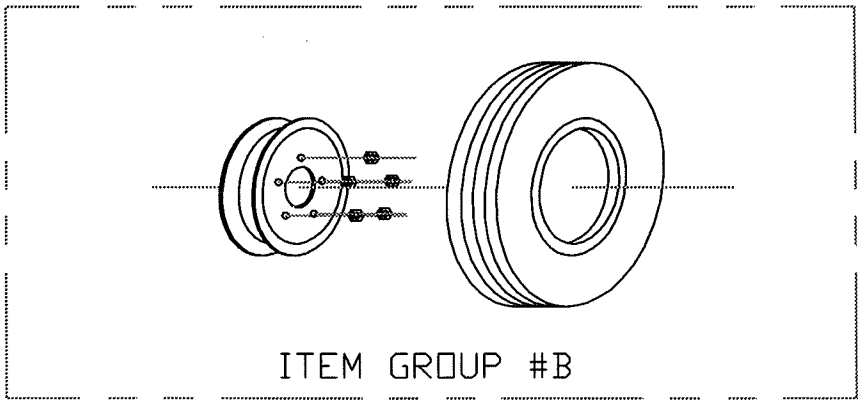
ASSEMBLY No. 08–10102R
MAJOR ASSEMBLY– AXLE ASSEMBLY

Sub Assy.	Item	Part No.	Quantity	Description	Wt. #'s
08–10102R	–	–	1	Axle, Assembly, Rear	60#
–	1	05–1023	1	Axle,Rear, Special	40.0
–	2	02–1505	2	Bolts, Mounting Spindle	.6
–	3	02–12041	2	Nuts, Mounting Spindle	.5
–	4	07–1010R	2	Spindle, Rear	17.0
–	5	02–12035	1	Nut, Jam	.1
–	6	02–1503	4	Bolt, Mounting Angles	1.3
–	7	02–1203	4	Nuts, Mounting	.5
–	8	02–10041	2	Bolt, Mounting Spindle	.5

SECTION 5.3.2



ITEM GROUP #A

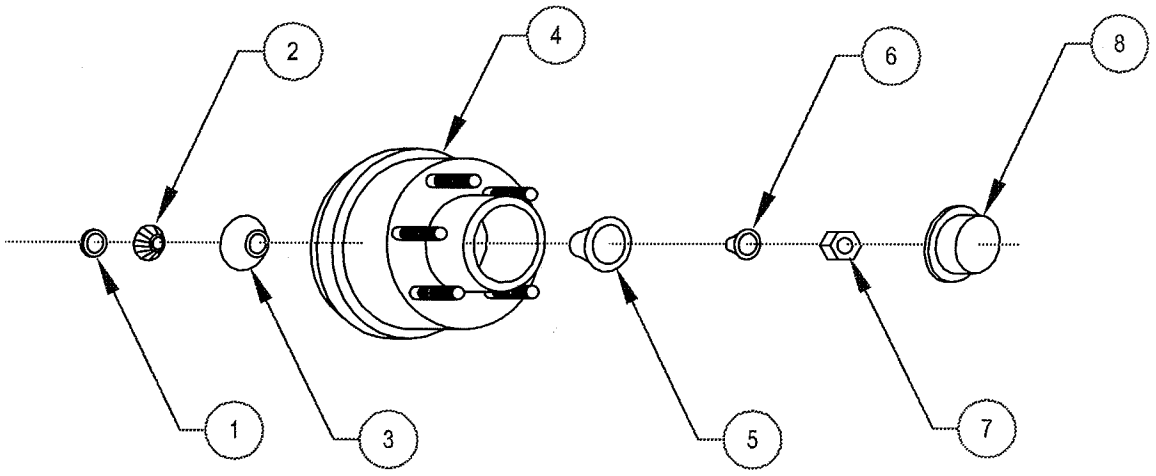


ITEM GROUP #B

ASSEMBLY No. 10-100052
MAJOR ASSEMBLY- REAR WHEEL

Sub Assy.	Item	Part No.	Quantity	Description	Wt. #'s
10-100052	-	-	2	REAR WHEEL ASSEMBLY	136.3#
-	A	08-10111R	1	Bearing And Hub Assembly, Front	32.6
-	B	08-10061	1	Tire/Wheel/Tube Assembly	35

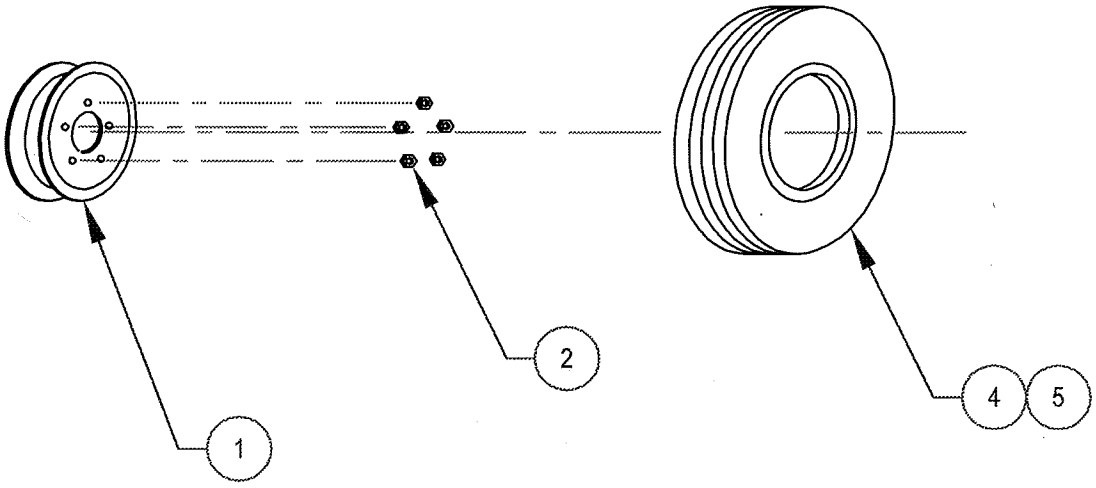
SECTION 5.3.2–A



ASSEMBLY No. 08–10111R
MAJOR ASSEMBLY– REAR WHEEL

Sub Assy.	Item	Part No.	Quantity	Description	Wt. #'s
08–10111R			1	Bearing and Hub Assembly, Rear	32.6#
04–1062R			1	Bearing and Hub Assembly, Rear	32.6
	1	04–1012	1	Seal, Bearing	1
	2	04–1013	1	Bearing, Inner	3
	3	04–1015	1	Cup, Inner	2
	4	05–1008R	1	Hub And Brake Drum Sub–Assembly	17.6
		05–1021R	1	Brake Drum (04–1051R)	6.3
		05–1020	1	Hub, 5–Hole (04–1017)	9.0
		02–1017	5	Studs, Hub	2.3
	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	Cap, Dust	1

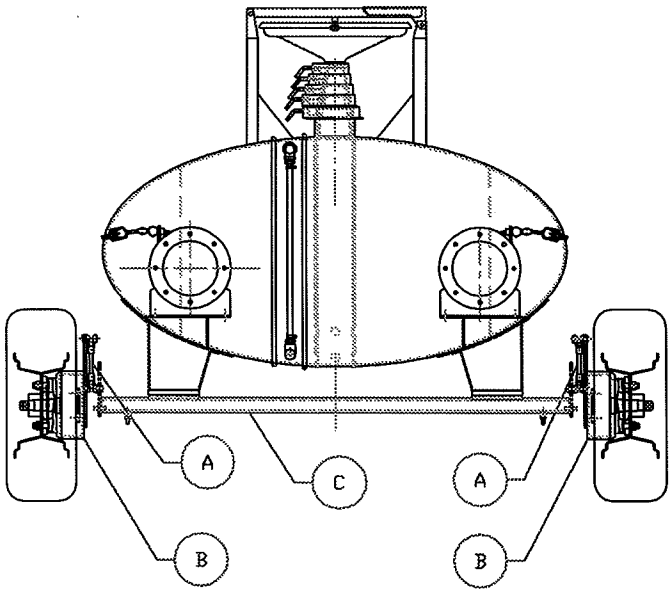
SECTION 5.3.2–B

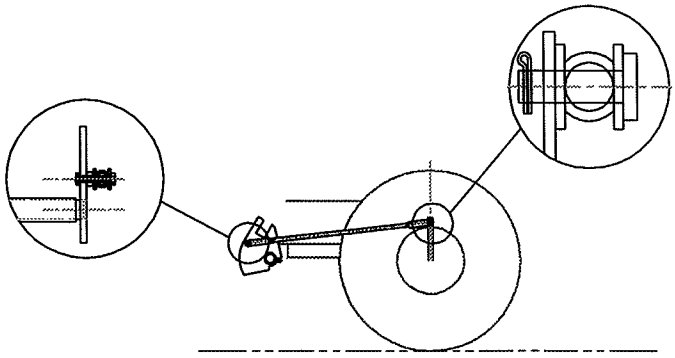


ASSEMBLY No. 08–10061
MAJOR ASSEMBLY– FRONT WHEEL

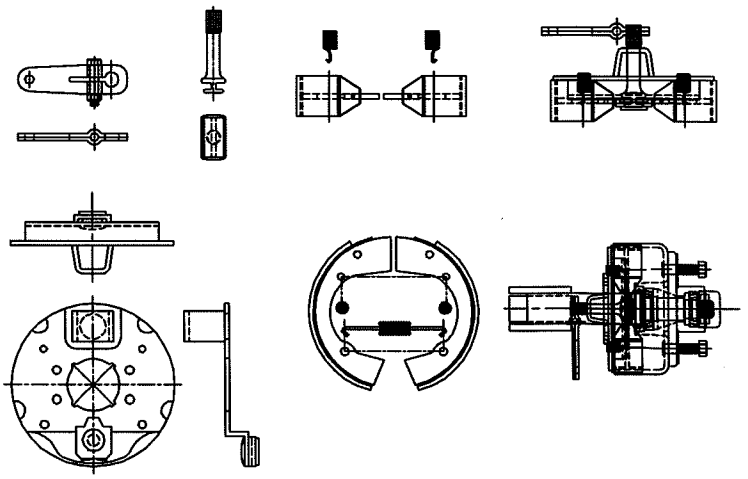
Sub Assy.	Item	Part No.	Quantity	Description	Wt. #'s
08–10061	–	–	1	Tire/Wheel/Tube Assembly	35#
–	1	04–1020	1	Wheel, Split Rim	19
–	2	04–1021	5	Nuts, Lug	1
–	3	04–10221	1	Tire	4
–	4	04–1045	1	Tube	11

SECTION 5.3.3

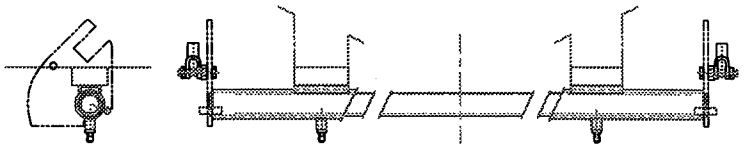




(A) BRAKE LINKAGE ASSEMBLY
SECTION 5.3.3-A



(B) BRAKE ASSEMBLY
SECTION 5.3.3-B

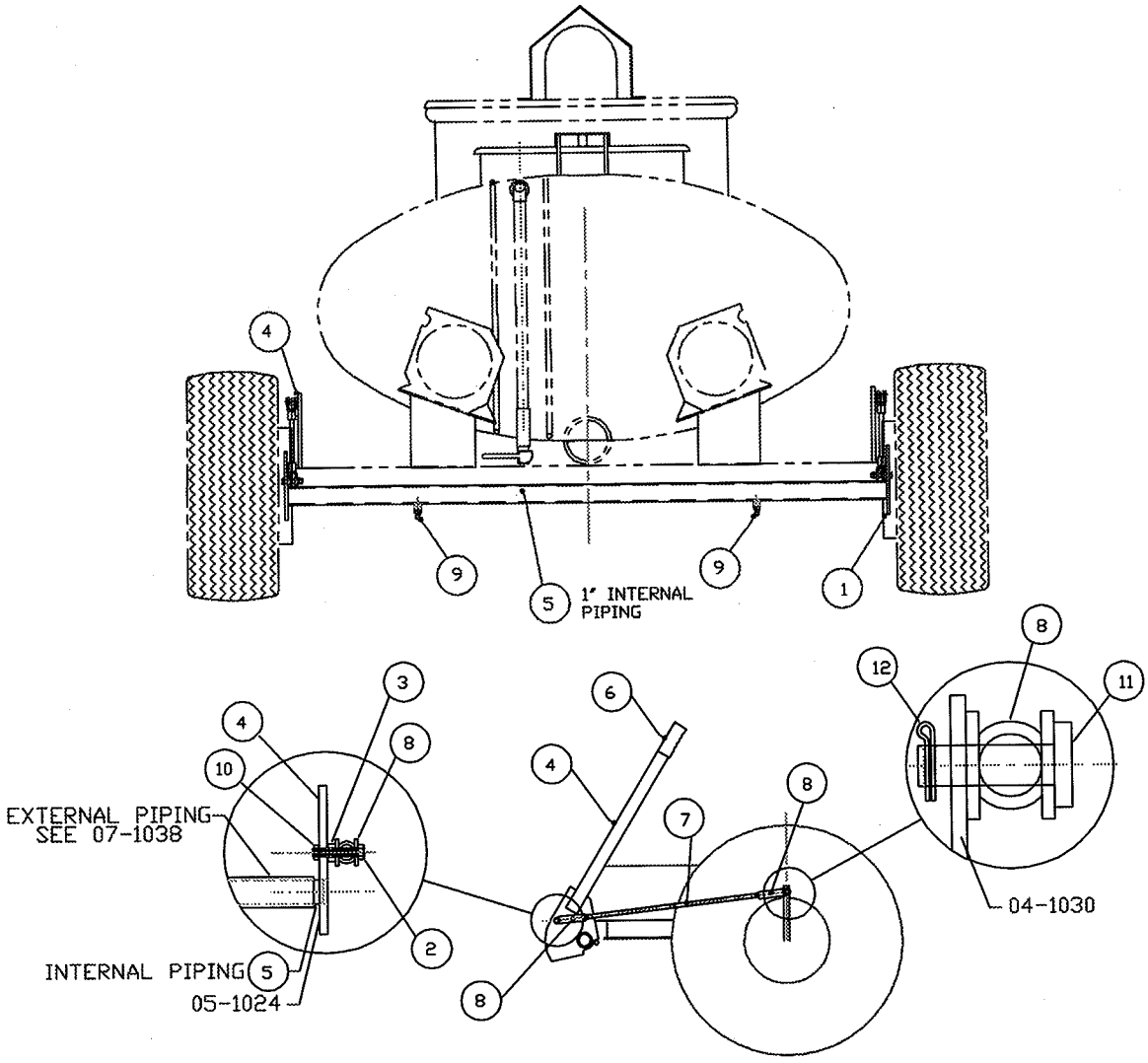


(C) BRAKE SLEEVE ASSEMBLY
SECTION 5.3.3-C

ASSEMBLY No. 10-100030
MAJOR ASSEMBLY- BRAKE ASSEMBLY

Sub Assy.	Item	Part No.	Quantity	Description	Wt. #'s
10-100030	-	-	1	Brake Assembly	45#
-	A	08-1008	1	Brake Linkage Assembly	14.3
-	B	08-1007R	1	Brake Assembly	17.9
-	C	07-1038	1	Brake Sleeve Assembly	8.6

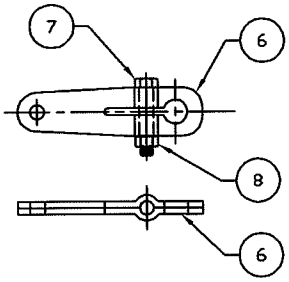
SECTION 5.3.3–A



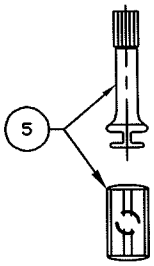
ASSEMBLY No. 08–1008
MAJOR ASSEMBLY– BRAKE ASSEMBLY

Sub Assy.	Item	Part No.	Quantity	Description	Wt. #'s
08-1008			1	Brake Linkage Assembly	20#
	1	05-1025	1	Cam, Brake Linkage, Right	1.4
	2	02-10012	2	Bolt, Cam	1.6
	3	02-12021	2	Nut, Cam	.4
	4	07-1033	1	Brake Handle, Fab'd Sub Assembly	5.4
	5	01-8104	1	Shaft, Brake	7.5
	6	04-1055	1	Grip, Vinyl	1.0
	7	05-1026	2	Rod, Brake	.5
	8	04-2516	4	Yoke End	.5
	9	03-1020	2	Greese Fitting	.5
	10	02-100231	2	Nut, Jam	.5
	11	–	2	Pin	.1
	12	–	2	Pin, Cotter	.1

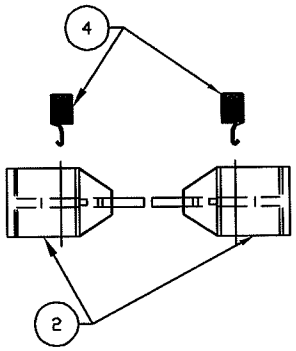
SECTION 5.3.3-B



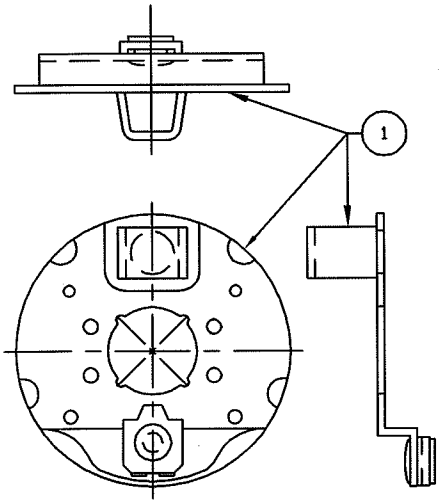
CAM LEVER OPERATOR DETAIL



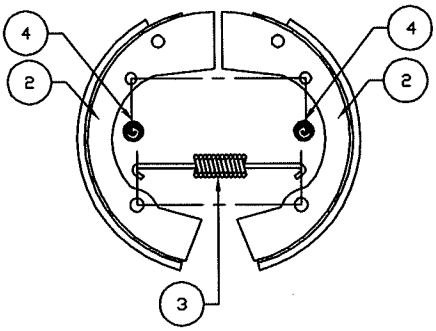
CAM DETAIL



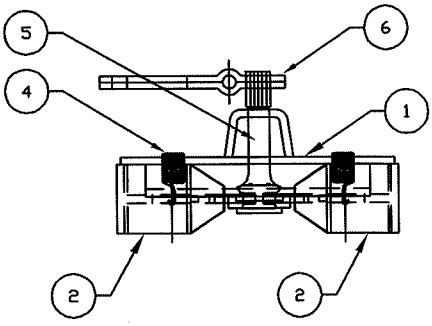
BRAKE SHOE / HOLD DOWN SPRING DETAIL



BACKING PLATE DETAIL



BRAKE SHOE / SPRING ORIENTATION
RETURN SPRING

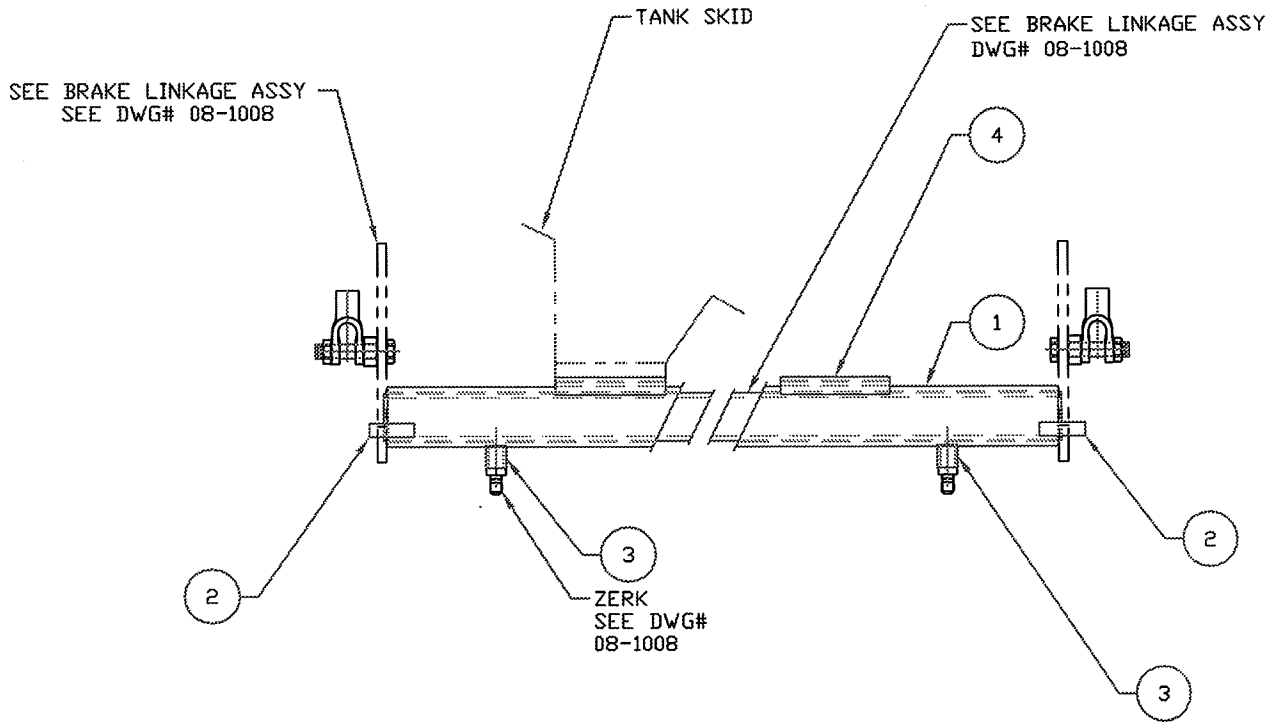


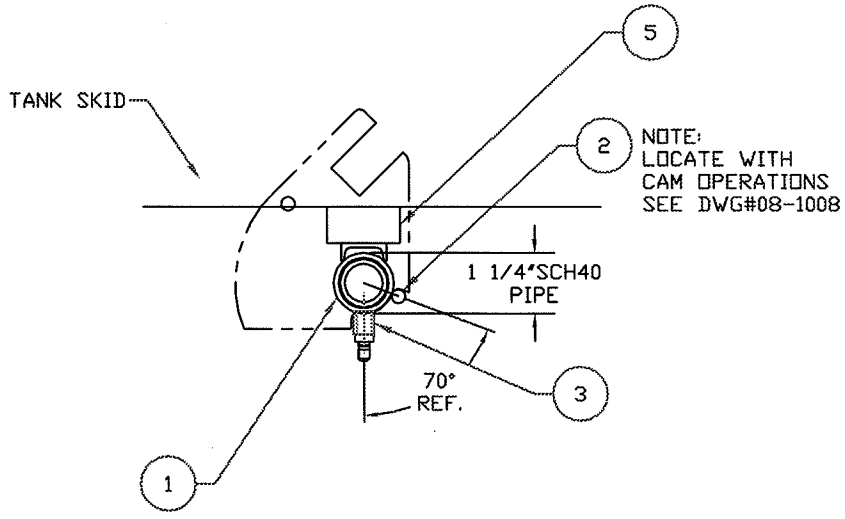
BRAKE/CAM/LEVER/BACKING PLATE ASSY

ASSEMBLY No. 08-1007R
MAJOR ASSEMBLY- BRAKE ASSEMBLY

Sub Assy.	Item	Part No.	Quantity	Description	Wt. #'s
08-1007R		-	1	MECHANICAL BRAKE ASSEMBLY PRE ASSEMBLED	4.4#
	1	04-1064R	1	Brake Plate Assembly	1.4
	2	04-1065R	2	Brake Shoe Assembly	1.6
	3	04-10265R	1	Return Spring	-
	4	04-1026R	2	Brake Shoe Hold Down Spring	-
	5	04-1028R	1	Cam	.5
	6	04-1030R	1	Cam Lever	.7
	7	02-10017R	1	Lever Bolt	-
	8	02-12012	1	Lever Nut	-

SECTION 5.3.3–C

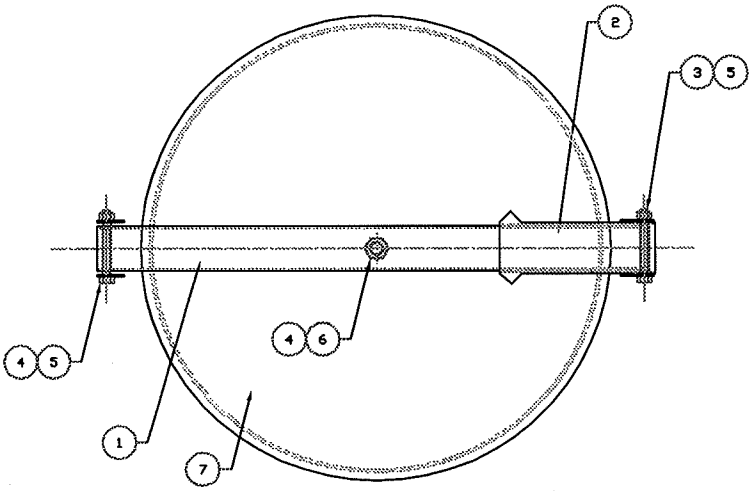


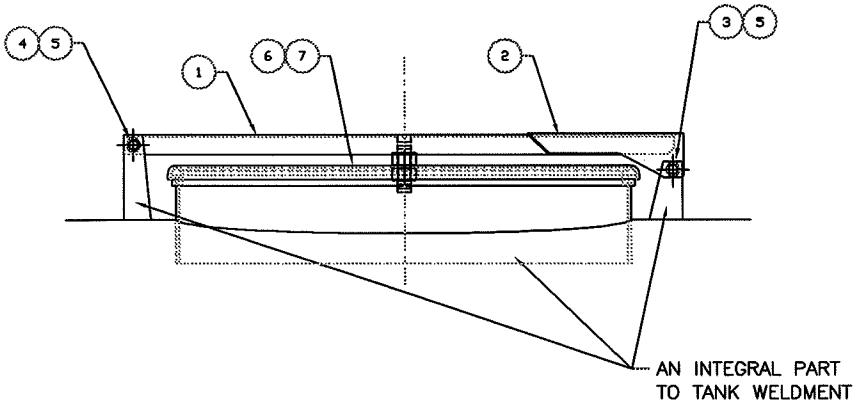


ASSEMBLY No. 07–1038
MAJOR ASSEMBLY– BRAKE ASSEMBLY

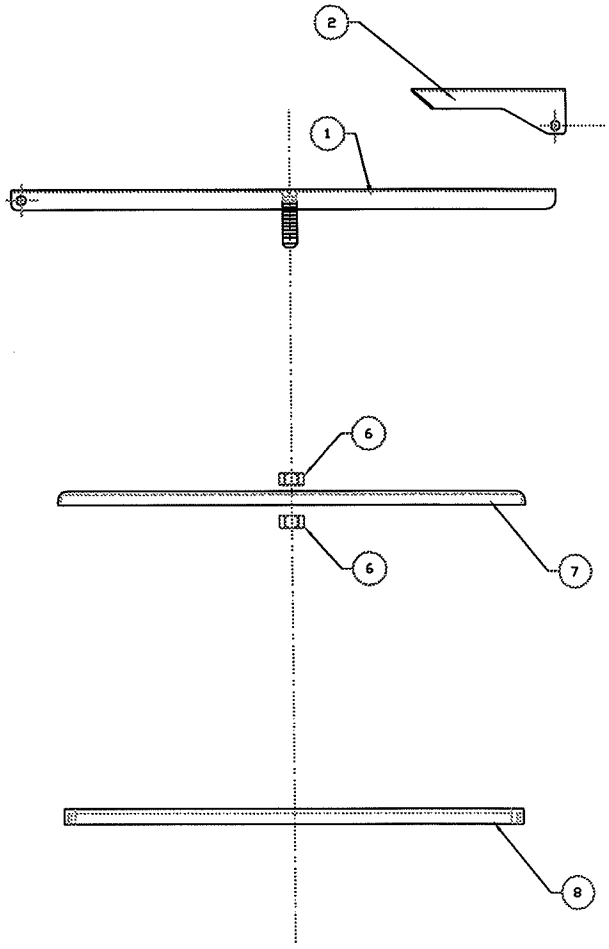
Sub Assy.	Item	Part No.	Quantity	Description	Wt. #'s
07–1038		–	1	BRAKE SLEEVE ASSEMBLY	13#
	1	01–8031	1	Sleeve, Brake Assembly	7.4
	2	01–9124	2	Stop, Cam	.08
	3	03–0371	1	Coupling, Zirk	.03
	4	01–8545	2	Mount, Cannel	.49
	5	01–9791	2	Spacer	5.0

SECTION 5.4





ASSEMBLED DETAIL

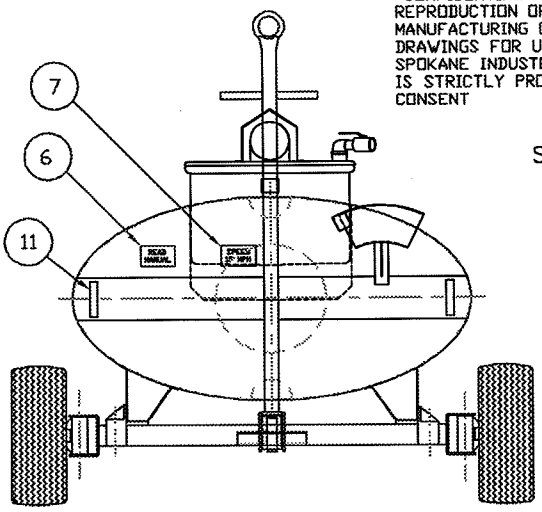


EXPLODED DETAIL

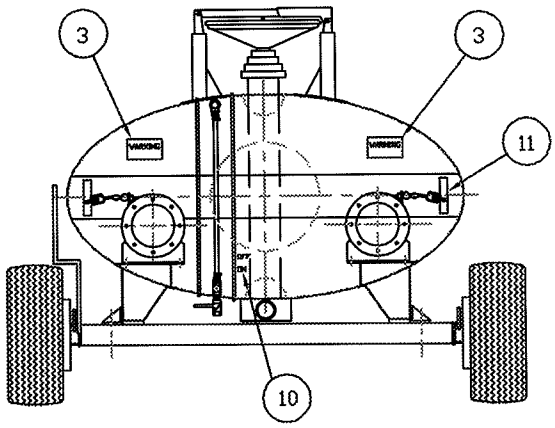
ASSEMBLY No. 10-100060
MAJOR ASSEMBLY- 16" QUICK OPENING MANWAY

Sub Assy.	Item	Part No.	Quantity	Description	Wt. #'s
10-100060		08-1025	1	MANWAY ASSEMLBY	16.6#
	1	07-1039S	1	Large Cross Arm	3.3
	2	01-8222S	1	Small Cross Arm	1.3
	3	02-10013	1	Bolt, Small Cross Arm	.2
	4	02-10013	1	Bolt, Large Cross Arm	.2
	5	-	2	Nuts, Cross Arms	.3
	6	02-20611S	2	Nuts, Lid	.5
	7	01-9005S	2	Lid	10.6
	8	06-3000	2	Gasket	.2

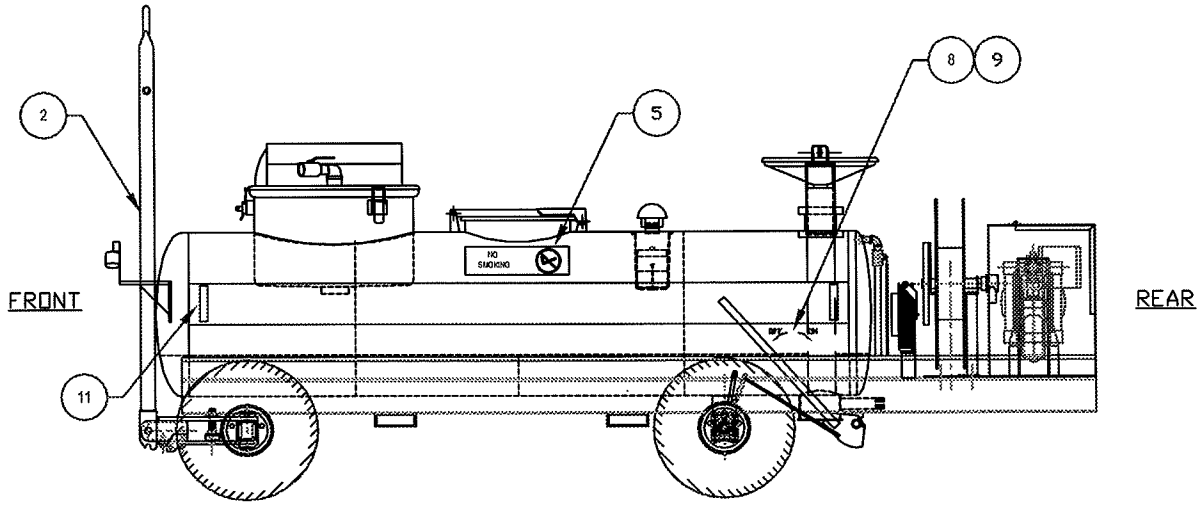
SECTION 5.5



FRONT VIEW



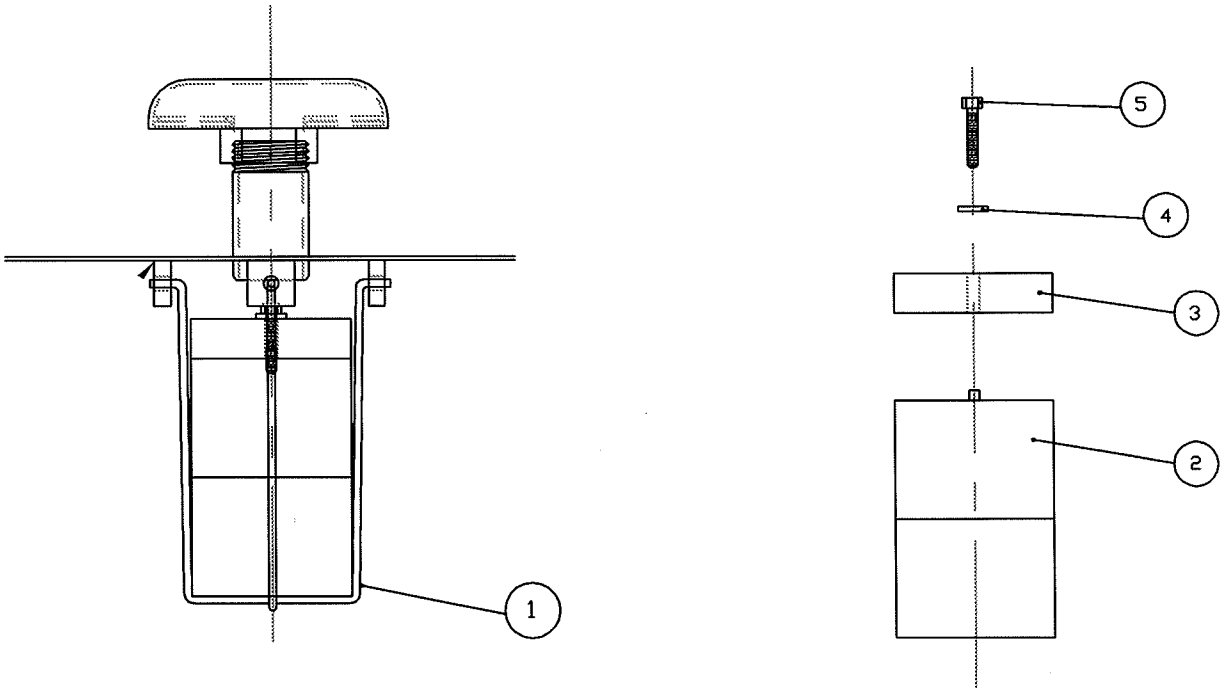
REAR VIEW



ASSEMBLY No. 10-100070
MAJOR ASSEMBLY- DECAL PACKAGE

Sub Assy.	Item	Part No.	Quantity	Description	Wt. #'s
10-100070	–	–	1	DECAL PACKAGE	2.7#
	1	–	–	–	–
	2	06-1003	1	Caution-Park Brake	.1
	3	06-1004	2	Warning-Grounding Reels	.1
	4	–	–	–	.1
	5	06-1006	2	Danger-No Smoking	.2
	6	06-1007	1	Notice-Read Manual	.1
	7	06-1008	1	Maximum Tow Speed	.1
	8	06-1010	1	On/Off-Park Brake	.1
	9	06-1010	1	On/Off-Park Brake	.1
	10	06-1011	8	On/Off Drain Valve	.8
	11	–	8	Reflector Tape, 6" lg.	.8
	12	–	–	–	–

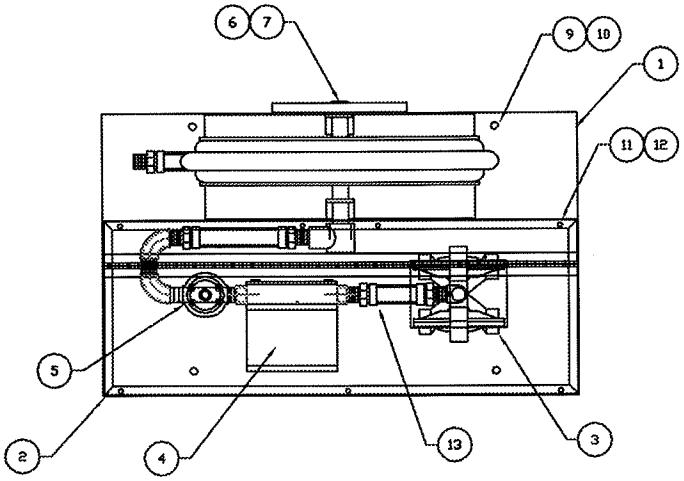
SECTION 5.6

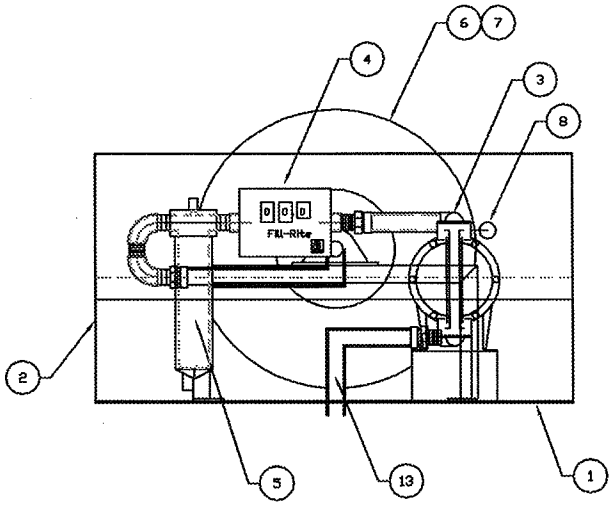


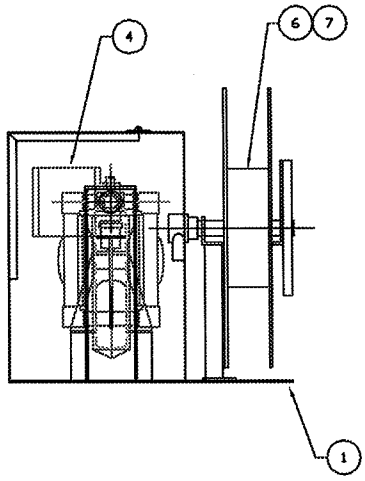
ASSEMBLY No. 08–1011
MAJOR ASSEMBLY– VENT, OVERFLOW PREVENTOR

Sub Assy.	Item	Part No.	Quantity	Description	Wt. #'s
08–1011	–	–	1	DECAL PACKAGE	2.7#
	1	08–1023	1	Cage Assembly	.5
	2	06–1018	1	Float	.1
	3	04–1047	1	Gasket	.2
	4	02–1100	1	Washer	.1
	5	02–10010	1	Bolt	.1

SECTION 5.7



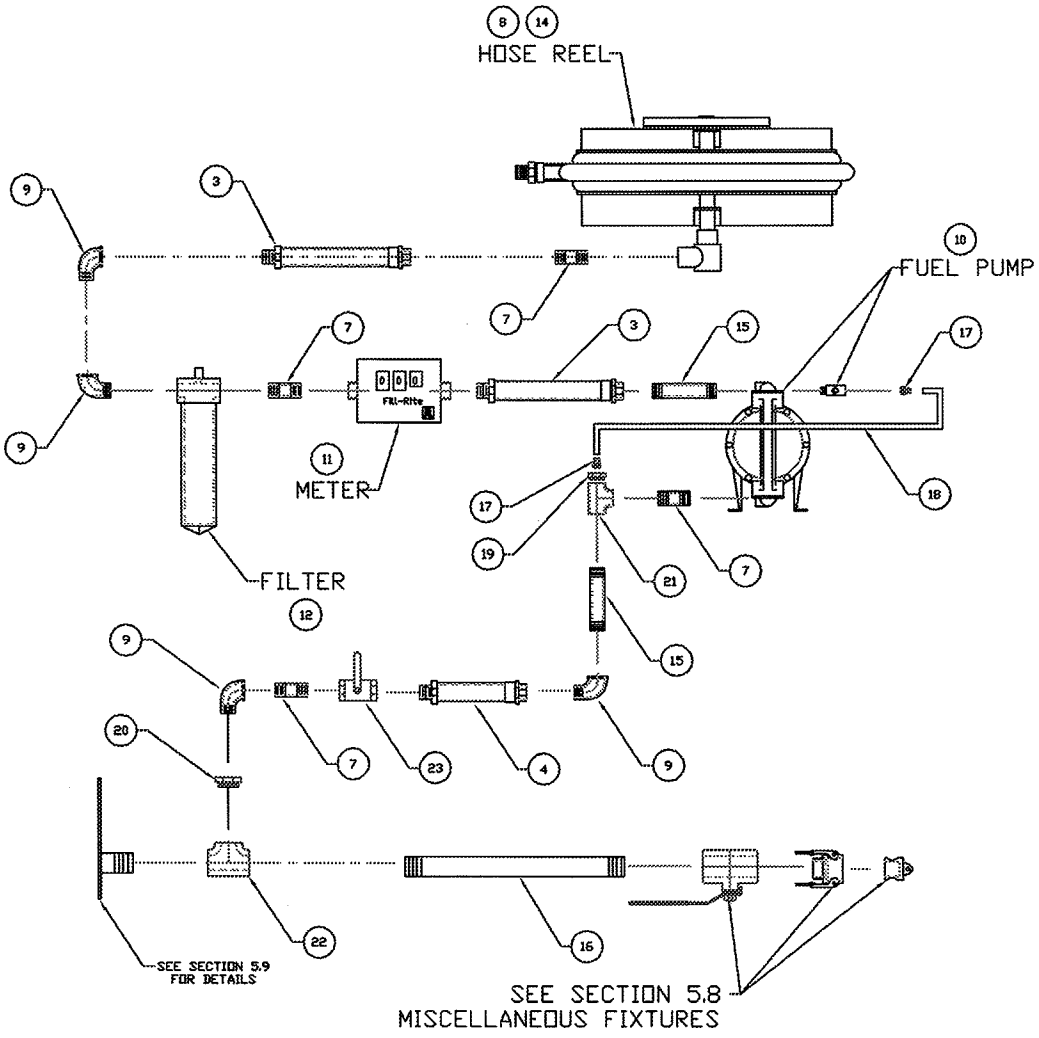




ASSEMBLY No. SMP-16451A
MAJOR ASSEMBLY- REFUELER PACKAGE

Sub Assy.	Item	Part No.	Quantity	Description	Wt. #'s
SMP-16451A	-	-	1	Refueler Package	375#
	1	01-9025S	1	Platform	65.9
	2	01-902S	1	Pump Box	94.6
	3	-	1	Pump	18
	4	-	1	Meter	5
	5	-	1	Filter	5
	6	-	1	Reel	121
	7	-	35ft	Hose	35
	8	-	1	Regulator Assembly	2
	9	02-100115	4	Bolt	.2
	10	02-1216	4	Nut	.2
	11	02-10015	7	Bolt	.2
	12	02-12012	7	Nut	.1

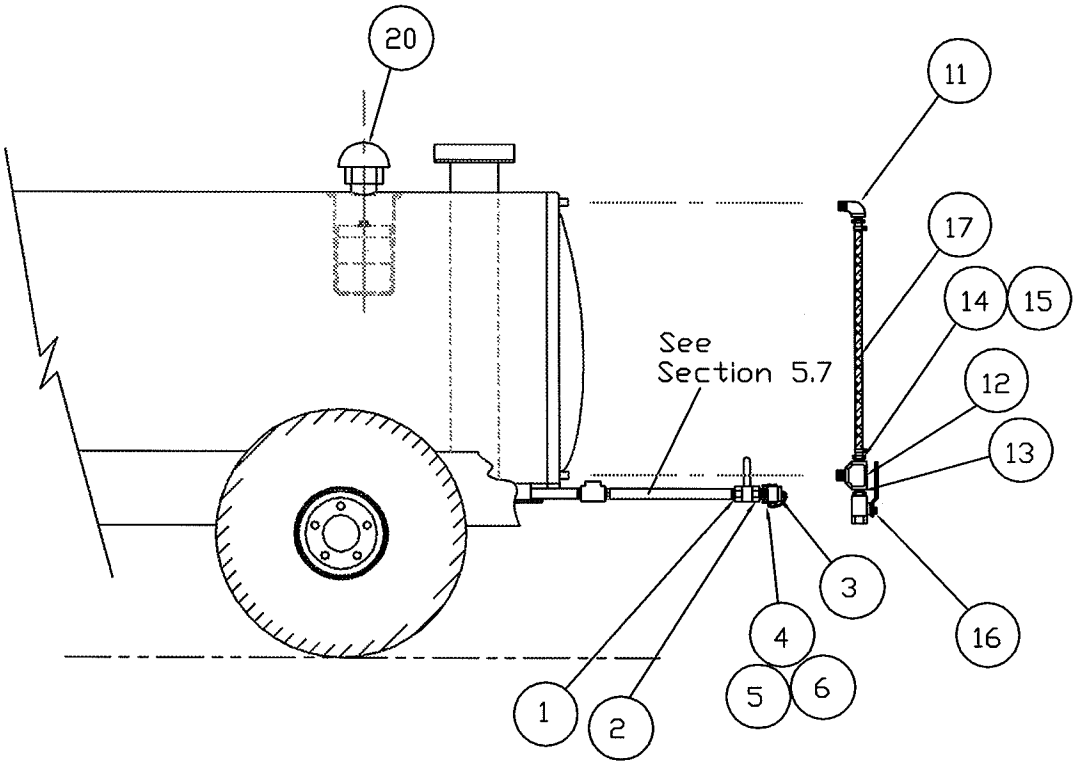
SECTION 5.7.A

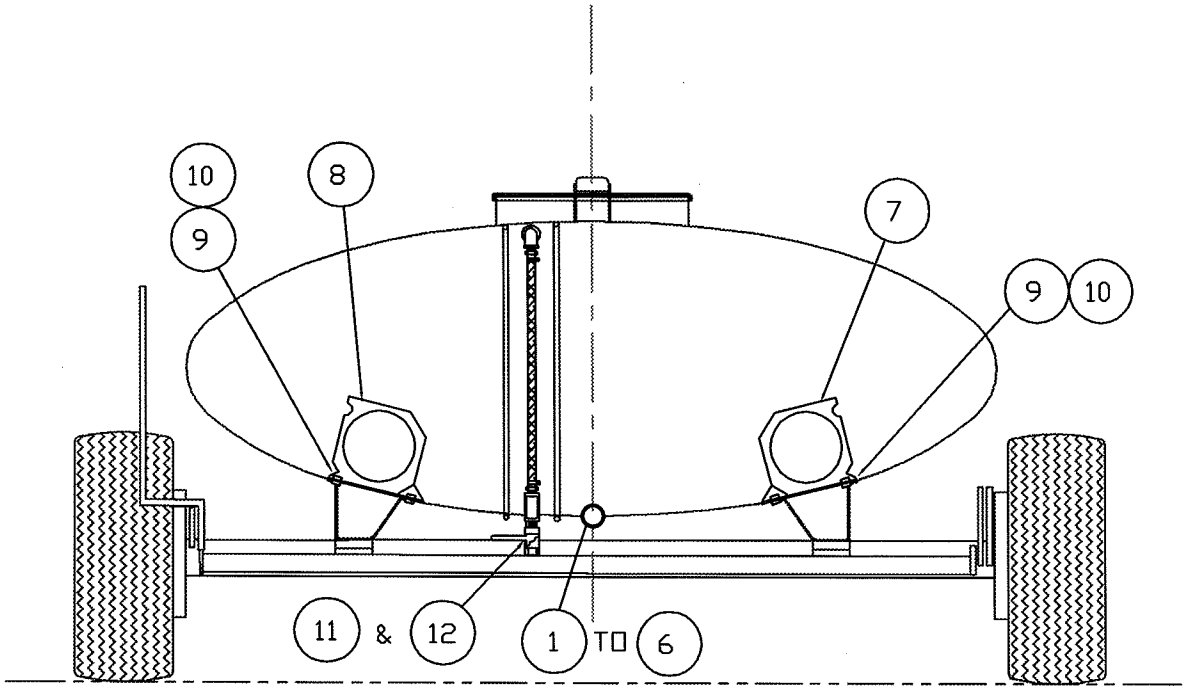


ASSEMBLY No. SMP-16451A (CONTINUED)
MAJOR ASSEMBLY- REFUELER PACKAGE

Sub Assy.	Item	Part No.	Quantity	Description	Wt. #'s
SMP-16451A	–	–	1	Refueler Package Continued	–
	13	–	–	–	–
	14	–	1	Tee	2
	15	03-10145	1	Bushing	.1
	16	–	4	Elbow, 90° Street	4
	17	03-0041S	4	Nipple	1.7
	18	–	1	Valve, Ball	2
	19	–	3	Hose, Dayco Bonded	6
	20	03-0258S	2	Nipple	.8
	21	03-10071	1	Tee	1
	22	–	1	Bushing	1
	23	03-11133	2	Hose Barb	1
	24	06-2505	1	Hose	1
	25	01-9236S	1	Nipple	4.8

SECTION 5.8

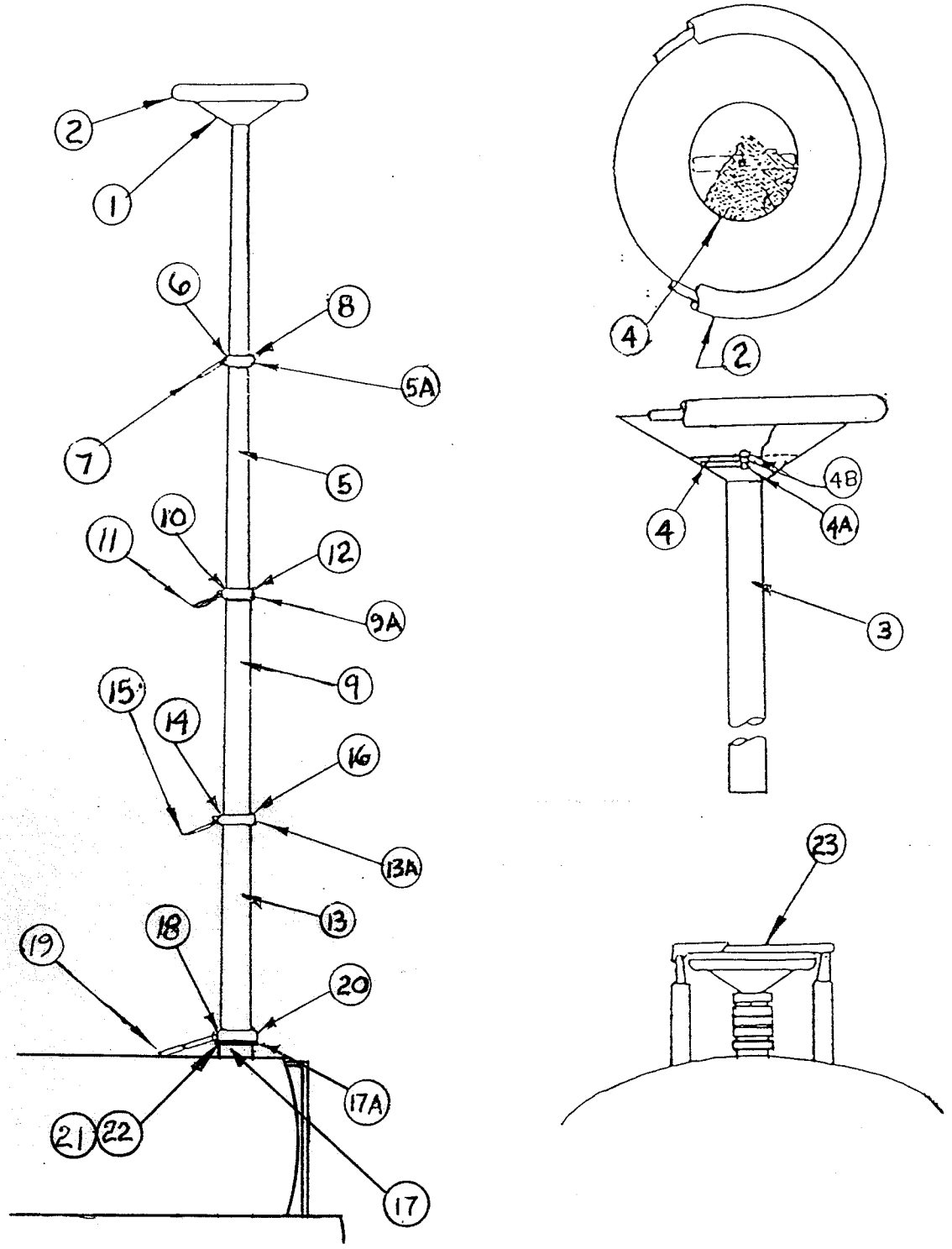




ASSEMBLY No. 10–100110
MAJOR ASSEMBLY– MISC. FIXTURES

Sub Assy.	Item	Part No.	Quantity	Description	Wt. #'s
08–1012			1	Drain Assemlby	
	1	04–10321	1	Valve, Ball Locking	6
	2	04–1033	1	Coupler, Camlock	1.5
	3	04–10331	1	Plug, Camlock	.5
	4	04–1034	1	Chain	.2
	5	04–1035	1	Link	.1
	6	04–10351	1	Hook, S–Type	.1
08–1013			1	Grounding Reel Assemblies	
	7	04–1036	1	Reel, Grounding Clamp Type	12
	8	04–10361	1	Reel, Grounding Plug Type	12
	9	02–10040	4	Bolt	.3
	10	02–100115	4	Nut	.1
08–1014			1	Sight Gauge Assembly	
	11	03–0017S	2	Elbow	.3
	12	03–1007	1	Tee	.3
	13	03–1008	2	Nipple	.3
	14	03–11130	2	Hose Barb	.3
	15	03–1010	2	Hose Clamp	.3
	16	04–1032	1	Valve, Ball	.3
	17	06–2527	1	Tubing	.3
	18	–	–	–	–
	19	–	–	–	–
04–1037	20	04–1037	1	Vent, Morrison	1

SECTION 6.0



ASSEMBLY 08-1034W

MAJOR ASSEMBLY - TELESCOPING DRAIN ASSEMBLY

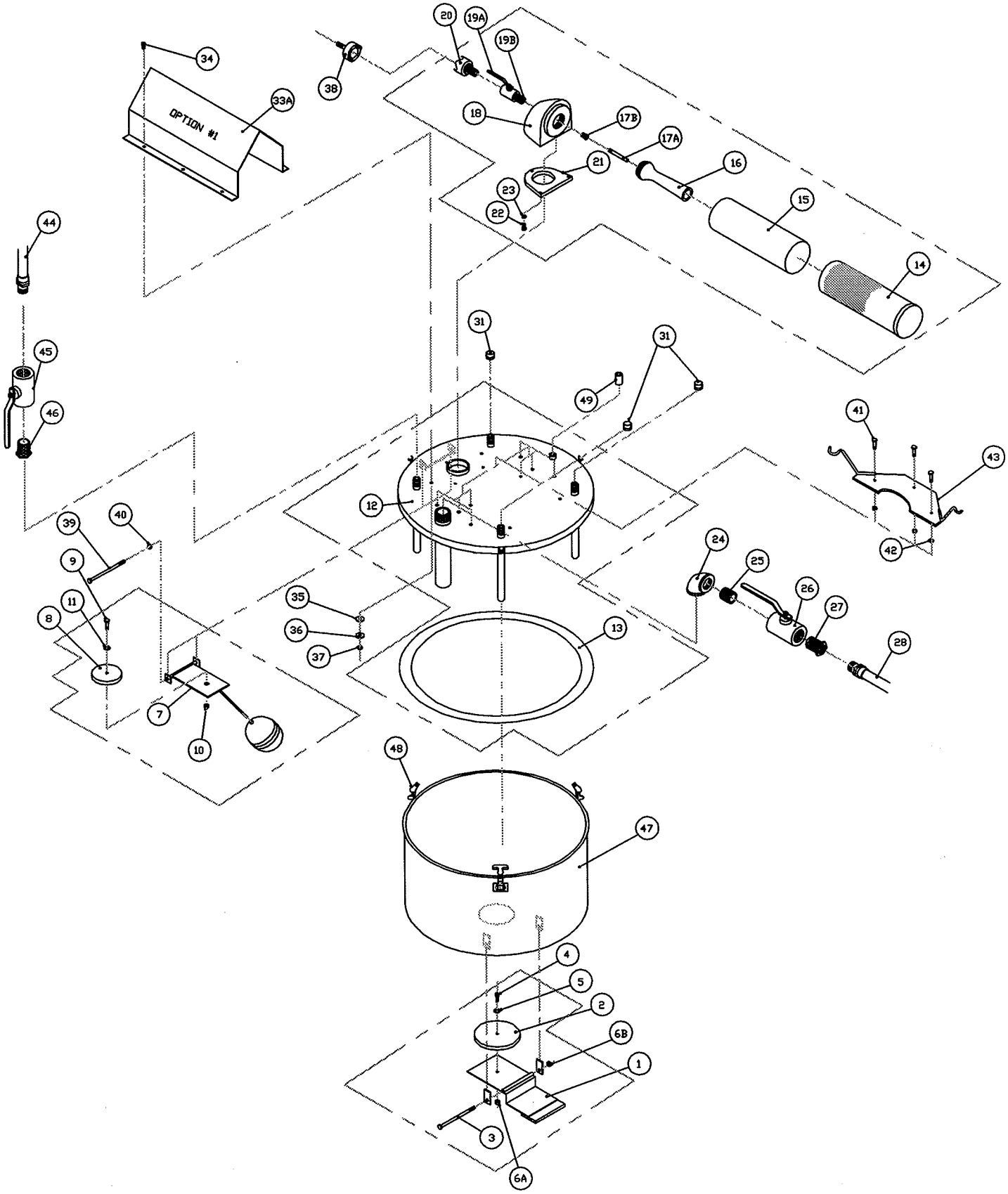
Sub Assy.	Item	Part No.	Quantity	Description	Wt.#
07-1054W				Drain Funnel Section Assembly	
	1	01-8250	1	Drain, Top (funnel)	5
	2	06-1022	1	Gasket	.7
	3	01-92402	1	Tubing, 2" OD	
	4	04-1039	1	Screen	.5
	4A	2-10002	1	Bolt, 1/4"	.2
	4B	02-1200	1	Nut, 1/4"	.1
08-1012W				Drain, Telescoping Sect. Assembly, 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	HANDLE,CLAMP	.3
	8	02-1005	1	SCREW,SET	.01
08-1013W				Drain, 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	HANDLE,CLAMP	.3
	12	02-1005	1	SCREW,SET	.01

ASSEMBLY 08-1034W CONTINUED

MAJOR ASSEMBLY - TELESCOPING DRAIN ASSEMBLY

08-1014W				Drain, 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	HANDLE,CLAMP	.3
	16	02-1005	1	SCREW,SET	.01
07-1041				Drain, Telescoping Section Assembly, 3-1/2" 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	Handles, Clamp	.3
	20	02-1005	1	SCREW,SET	.01
	22A	04-10562	1	Base Flange	
	25	02-100121	4	MOUNTING BOLTS,1/4-16x3/4"	.2
	26	08-1026	1	COVER ASSEMBLY	5

SECTION 6.1



ASSEMBLY No. 08–0001U
MAJOR ASSEMBLY– VACUUM SYSTEM

Sub Assy.	Item	Part No.	Quantity	Description	Wt. #'s
08–0001U			1	VACUUM SYSTEM ASSEMBLY	208.1#
08–1000	1	07–1000	1	Drain Stop Arm (Optional)	3.5
–	2	04–1000	1	Gasket (Optional)	.1
–	3	02–10016	1	Bolt (Optional)	.1
	4	02–10002	1	Bolt (Optional)	.1
	5	02–1100	1	Washer, Flat (Optional)	.1
	6A	02–1201	1	Nut (Optional)	.1
	6B	02–1200	1	Nut (Optional)	.1
08–1001			1	Overflow Stop Assembly	
	7	07–1001	1	Float Assembly	4
	8	04–1001	1	Gasket	.1
	9	02–10003	1	Bolt	.1
	10	02–1200	1	Nut, Nylon Lock	.1
	11	02–1102	1	Washer, Flat	.1
08–1002	12		1	Cover Assembly	29.6
06–1022	13		1	Gasket	3.5
08–1003			1	Vacuum Generator Assembly	
	14	04–1004	1	Housing, Exhaust	9.5
	15	04–1005	1	Silencer	4.7
	16	04–1006	1	Venturi	2.2
	17A	04–1007	1	Jet, Air	2.7
	17B	03–11135	1	Reducer, Air Jet	.1
	18	04–1008	1	Box, Venturi	2.7
	19A	04–1032	1	Valve, Ball	5.8
	19B	03–0264S	1	Nipple	.2
	20	04–1056	1	Coupler, Air Twist	.7
	21	04–1010	1	Gasket	.1
	22	02–10010	3	Bolt	.1
	23	02–11002	3	Washer, Lock	.1
08–1004			1	Assessories	
	24	03–1001	1	Elbow, 90°	2
	25	03–02922S	1	Nipple	.5
	26	04–10321	1	Valve, Ball	3
	27	03–1002	1	Bushing	.2
	28	06–10162	50ft	Hose, Jet Fuel Bonded and Certified	25
	29	–	–	–	–
	30	–	–	–	–

	31	03–1021	3	Cap, Pipe	1
	32	–	–	–	–
	33A	07–1034	1	Cover, Vacuum Generator	11
	33B	–	–	–	–
	34	02–10010	6	Bolt	.1
	35	06–25123	6	Washer, Flat	.1
	36	02–1100	6	Washer, Flat	.1
	37	02–1200	6	Nut, Nylon Insert	.1
	38	04–1057	1	Coupler, Air Twist	.1
	39	02–10004	1	Bolt	.1
	40	02–1200	1	Nut	.1
	41	02–100115	6	Bolt	1
	42	02–1202	6	Nut	.5
	43	07–1075	2	Hanger, Hose	3
	44	–	3	Hose, Jet Fuel Bonded And Certified	12
	45	04–2507	3	Valve, Ball	6
	46	–	3	Bushing	3.1
	47	–	–	–	–
	48	–	–	–	–
07–10341	49		1	Valve, Vacuum Check Assembly	2.5

DIAPHRAGM PUMP
SECTION 7.1

OPERATOR'S MANUAL

INCLUDING: OPERATION, INSTALLATION & MAINTENANCE

650709–C
650717–C
RELEASED: 10–5–89
REVISED: 7–20–98
(REV. F)

1" DIAPHRAGM PUMP
U.L. LISTED, 1:1 RATIO (METALLIC)

READ THIS MANUAL CAREFULLY BEFORE INSTALLING, OPERATING OR SERVICING THIS EQUIPMENT.

It is the responsibility of the employer to place this information in the hands of the operator. Keep for future reference.

THIS MANUAL COVERS THE FOLLOWING MODELS

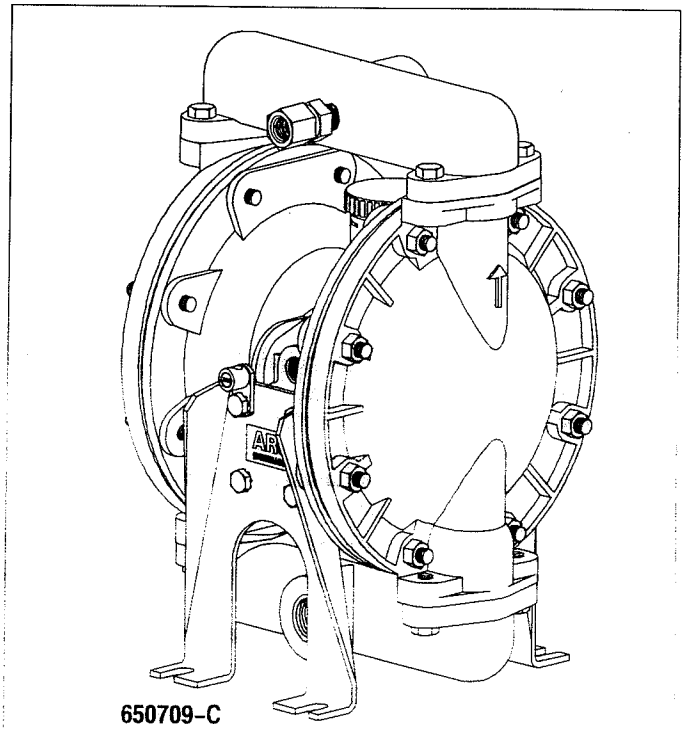
MODEL	TH'D	DIAPHRAGM MATERIAL	APPLICATION
650709-C	NPT	BUNA "N"	Diesel Fuel, Kerosene, Aviation Gasoline, Jet Fuel
650717-C	NPT	VITON	Unleaded Automotive & Aviation Gasoline

SERVICE KITS

637118-C for Air Section repair. (See page 6.)
637137-62-C for repair of Model 650709-C Fluid Section.
637137-63-C for repair of Model 650717-C Fluid Section.

PUMP DATA

Models 650709-C, 650717-C
Pump Type U.L. Listed Metallic Air Operated Double Diaphragm for use with Petroleum Product Dispensing Systems
Material . . . Aluminum Center Body, Fluid Caps and Manifolds
Weight . . . . . 18.5 lbs (8.39 kg)
Maximum Air Inlet Pressure . . . . . 50 p.s.i. (3.4 bar)
Maximum Outlet Pressure . . . . . 50 p.s.i. (3.4 bar)
Maximum Flow Rate (Flooded Inlet) . . . . . 29 g.p.m. (109.8 l/m)
Maximum Particle Size . . . . . 1/8" (3.2 mm)
Maximum Temperature Limits . . . . 10° – 200°F (–12° to 93°C)
Dimensional Data . . . . . See page 8
Noise Level* . . . . . 64.5 db(A) @ 70 p.s.i., 60 cycles per minute



650709-C
1" DIAPHRAGM PUMP

* The pump sound pressure levels published here have been updated to an Equivalent Continuous Sound Level (L_{Aeq}) to meet the intent of ANSI S1.13-1971, CAGI-PNEUROP S5.1 using four microphone locations.

GENERAL DESCRIPTION

The ARO U.L. Listed pump for pumping petroleum products, offers high volume delivery at low air pressures and easy self-priming. This model is designed specifically for transfer, bulk un-loading or fueling applications. It includes a pressure relief valve (per U.L. Specification 79) which restricts the fluid outlet pressure to under 50 p.s.i. (3.4 bar), The relief valve can be plumbed to return the bleed off fuel to the storage container.

ARO
INGERSOLL–RAND COMPANY
ONE ARO CENTER • BRYAN, OHIO 43506–0151
(419) 636–4242 • FAX (419) 633–1674

INGERSOLL-RAND
FLUID PRODUCTS

OPERATING AND SAFETY PRECAUTIONS

READ, UNDERSTAND, AND FOLLOW THIS INFORMATION TO AVOID INJURY AND PROPERTY DAMAGE


EXCESSIVE AIR PRESSURE
STATIC SPARK


HAZARDOUS MATERIALS
HAZARDOUS PRESSURE

⚠WARNING EXCESSIVE AIR PRESSURE. Can cause personal injury, pump damage or property damage.

- Do not exceed the maximum inlet air pressure as stated on the pump model plate.
- Be sure material hoses and other components are able to withstand fluid pressures developed by this pump. Check all hoses for damage or wear. Be certain dispensing device is clean and in proper working condition.

⚠WARNING STATIC SPARK. Can cause explosion resulting in severe injury or death. Ground pump and pumping system.

- Sparks can ignite flammable material and vapors.
- The pumping system and object being sprayed must be grounded when it is pumping, flushing, recirculating or spraying flammable materials such as paints, solvents, lacquers, etc. or used in a location where surrounding atmosphere is conducive to spontaneous combustion. Ground the dispensing valve or device, containers, hoses and any object to which material is being pumped.
- Use the pump grounding screw terminal provided. Use Aro Part No. 66885-1 Ground Kit or connect a suitable ground wire (12 ga. min.) to a good earth ground source.
- Secure pump, connections and all contact points to avoid vibration and generation of contact or static spark.
- Consult local building codes and electrical codes for specific grounding requirements.
- After grounding, periodically verify continuity of electrical path to ground. Test with an ohmmeter from each component (e.g., hoses, pump, clamps, container, spray gun, etc.) to ground to insure continuity. Ohmmeter should show 100 ohms or less.
- Submerse the outlet hose end, dispensing valve or device in the material being dispensed if possible. (Avoid free streaming of material being dispensed.)
- Use hoses incorporating a static wire.
- Use proper ventilation.
- Keep inflammables away from heat, open flames and sparks.
- Keep containers closed when not in use.

⚠WARNING Pump exhaust may contain contaminants. Can cause severe injury. Pipe exhaust away from work area and personnel.

- In the event of a diaphragm rupture material can be forced out of the air exhaust muffler.
- Pipe the exhaust to a safe remote location when pumping hazardous or inflammable materials.
- Use a grounded 3/8" min. I.D. hose between the pump and the muffler.

⚠WARNING HAZARDOUS PRESSURE. Can result in serious injury or property damage. Do not service or clean pump, hoses or dispensing valve while the system is pressurized. Disconnect air supply line and relieve pressure from the system by opening dispensing valve or device and/or carefully and slowly loosening and removing outlet hose or piping from pump.

⚠WARNING HAZARDOUS MATERIALS. Can cause serious injury or property damage. Do not attempt to return a pump to the factory or service center that contains hazardous material. Safe handling practices must comply with local and national laws and safety code requirements.

- Obtain Material Safety Data Sheets on all materials from the supplier for proper handling instructions.

⚠WARNING EXPLOSION HAZARD. Models containing aluminum wetted parts cannot be used with III.-Trichloroethane, Methylene Chloride or other Halogenated Hydrocarbon solvents which may react and explode.

- Check pump motor section, fluid caps, manifolds and all wetted parts to assure compatibility before using with solvents of this type.

⚠CAUTION Verify the chemical compatibility of the pump wetted parts and the substance being pumped, flushed or recirculated. Chemical compatibility may change with temperature and concentration of the chemical(s) within the substances being pumped, flushed or circulated. Consult ARO Form No. 8677-P, Fluid Compatibility Guide, for information on chemical compatibility.

⚠CAUTION Maximum temperatures are based on mechanical stress only. Certain chemicals will significantly reduce maximum safe operating temperature. Consult Fluid Compatibility Guide for chemical compatibility and temperature limits. Refer to PUMP DATA on page 1 of this manual.

⚠CAUTION Be certain all operators of this equipment have been trained for safe working practices, understand it's limitations, and wear safety goggles/equipment when required.

⚠CAUTION Do not use the pump for the structural support of the piping system. Be certain the system components are properly supported to prevent stress on the pump parts.

- Suction and discharge connections should be flexible connections (such as hose), not rigid piped, and should be compatible with the substance being pumped.

⚠CAUTION Prevent unnecessary damage to the pump. Do not allow pump to operate when out of material for long periods of time.

- Disconnect air line from pump when system sits idle for long periods of time.

⚠CAUTION Use only genuine ARO replacement parts to assure compatible pressure rating and longest service life.

NOTICE Replacement warning labels are available upon request: "Static Spark PN 93616-1 & Diaphragm Rupture PN 93122."

⚠WARNING = Hazards or unsafe practices which could result in severe personal injury, death or substantial property damage.

⚠CAUTION = Hazards or unsafe practices which could result in minor personal injury, product or property damage.

NOTICE = Important installation, operation or maintenance information.

AIR AND LUBE REQUIREMENTS

⚠WARNING **EXCESSIVE AIR PRESSURE. Can cause pump and property damage. The air supply must be limited to 50 psig (3.4 bar) maximum inlet air pressure.**

- The air supply line or hose to the pump should be adequately sized to carry a sufficient volume of air to the pump. The material inlet supply tubing should not be too small or restrictive which will inhibit material flow. The outlet material volume is governed not only by the air supply but also by the material volume available at the inlet.
- Air supply provided should be filtered to provide clean dry air. A filter capable of filtering out particles larger than 50 microns should be used on the air supply. In most applications there is no lubrication required other than the "O" ring lubricant which is applied during assembly or repair.
- When lubricated air is necessary, supply the air lubricator with a good grade of SAE 90 wt. non-detergent oil and set the lubricator to a rate not to exceed one drop per minute.

INSTALLATION

IMPORTANT

- Requirements for the installation are included in the flammable and combustible liquids code, ANSI/NFPA No. 30 and the National Electric Code, ANSI/NFPA No. 70.
- A fluid return hose which is compatible with the fluid being pumped must be installed to the relief valve on the outlet manifold to return fluid back to the supply tank or pump inlet.
- The pump must be grounded to prevent static discharge. Grounding may be accomplished through the legs or to the ground lug provided on the pump.
- Notice that the material inlet/outlet manifolds may be removed and rotated 180° to facilitate various mounting applications.
- If the body of the pump must be rotated remove the end covers and manifolds and index it so the bolts line up properly. NOTE: The arrow on the end caps must always point upward for optimum performance.
- When the Diaphragm Pump is used in a force-feed situation it is recommended that a Check Valve be installed at the air inlet to keep material out of air line in the event of diaphragm failure.
- Secure diaphragm pump legs to a suitable surface to insure against damage by excessive vibration.

OPERATING INSTRUCTIONS

- The pump should never be operated at pressures exceeding 50 PSIG inlet air pressure. This pump is equipped with a pressure relief valve on the material outlet manifold which will open at 45+/-4 PSI to relieve pressure increases in the outlet hoses/plumbing caused by thermal expansion or other external forces.
- Disconnect the air supply from the pump if it is to be inactive for a few hours.

MAINTENANCE

Refer to the part views and descriptions as provided on page 4 through 7 for parts identification and Service Kit information.

- Certain ARO "Smart Parts" are indicated which should be available for fast repair and reduction of down time.
- Service kits are divided to service two separate diaphragm pump functions: 1. AIR SECTION, 2. FLUID SECTION. The FLUID SECTION is divided further to match typical part MATERIAL OPTIONS.
- Provide a clean work surface to protect sensitive internal moving parts from contamination from dirt and foreign matter during service disassembly and reassembly.
- Keep good records of service activity and include pump in preventive maintenance program.
- Before disassembling empty captured material in the outlet manifold by turning the pump upside down to drain material from the pump.

PARTS LIST / 650709-C FLUID SECTION

✓ KITS INCLUDE: (22) BALLS, (7) DIAPHRAGM, items: 2, 3, 19, (Refer to chart below) and 93706-1 Key-Lube grease.

WETTED COMMON PARTS

ITEM	DESCRIPTION (SIZE IN INCHES)	QTY	650709-C (BUNA) PART NO.	[MT]	650717-C (VITON) PART NO.	[MT]
	Fluid Section Service Kits		637137-62-C		637137-63-C	
□1	Rod	☆(1)	98724-1	[C]	98724-1	[C]
✓2	"O" Ring (3/32" x 3/4" o.d.)	(1)	Y330-113	[B]	Y330-113	[B]
✓3	"O" Ring (5/8" o.d.)	(4)	92957	[B]	Y327-14	[V]
5	Plate (Air side) (3-5/8" o.d.)	(2)	93441-2	[C]	93441-2	[C]
□6	Plate (Fluid side) (3-5/8" o.d.)	(2)	93441-2	[C]	93441-2	[C]
✓7	Diaphragm	(2)	90533-2	[B]	90533-3	[V]
9	Washer (.505" i.d.)	(2)	93189-1	[SS]	93189-1	[SS]
14	Screw (1/2" - 20 x 1")	(2)	Y5-85-K	[C]	Y5-85-K	[C]
15	Fluid Cap	(2)	92002	[A]	92002	[A]
16	Manifold (Top w / valve port)	(1)	93127	[A]	93127	[A]
	Manifold	(1)	92001	[A]	92001	[A]
✓19	"O" Ring (1-9/16" o.d.)	(4)	92961	[B]	Y327-126	[V]
21	Seat	(4)	92941	[K]	92941	[K]
✓22	Ball	(4)	90532-6	[D]	90532-6	[D]
26	Bolt (5/16"-18 x 1")	(8)	Y6-55-C	[C]	Y6-55-C	[C]
29	Nut (5/16"-18)	(16)	Y12-5-C	[C]	Y12-5-C	[C]
43	Ground Lug	(1)	93004	[Co]	93004	[Co]
	Relief Valve (1/4" - 18 n.p.t.)	(1)	93130	[BR]	93130	[BR]

MATERIAL CODE
[A] = Aluminum
[B] = Buna "N"
[BR] = Brass
[C] = Carbon Steel
[Co] = Copper
[D] = Acetal
[K] = P.V.D.F. (Kynar)
[SS] = Stainless Steel
[V] = Viton

Service Note: Part No. 98930-T Installation Tool is available separately for use with items (1) and (2).

☆Service Kit Note: Extra "O" rings are included in kits to service models built prior to Sept. 1989.

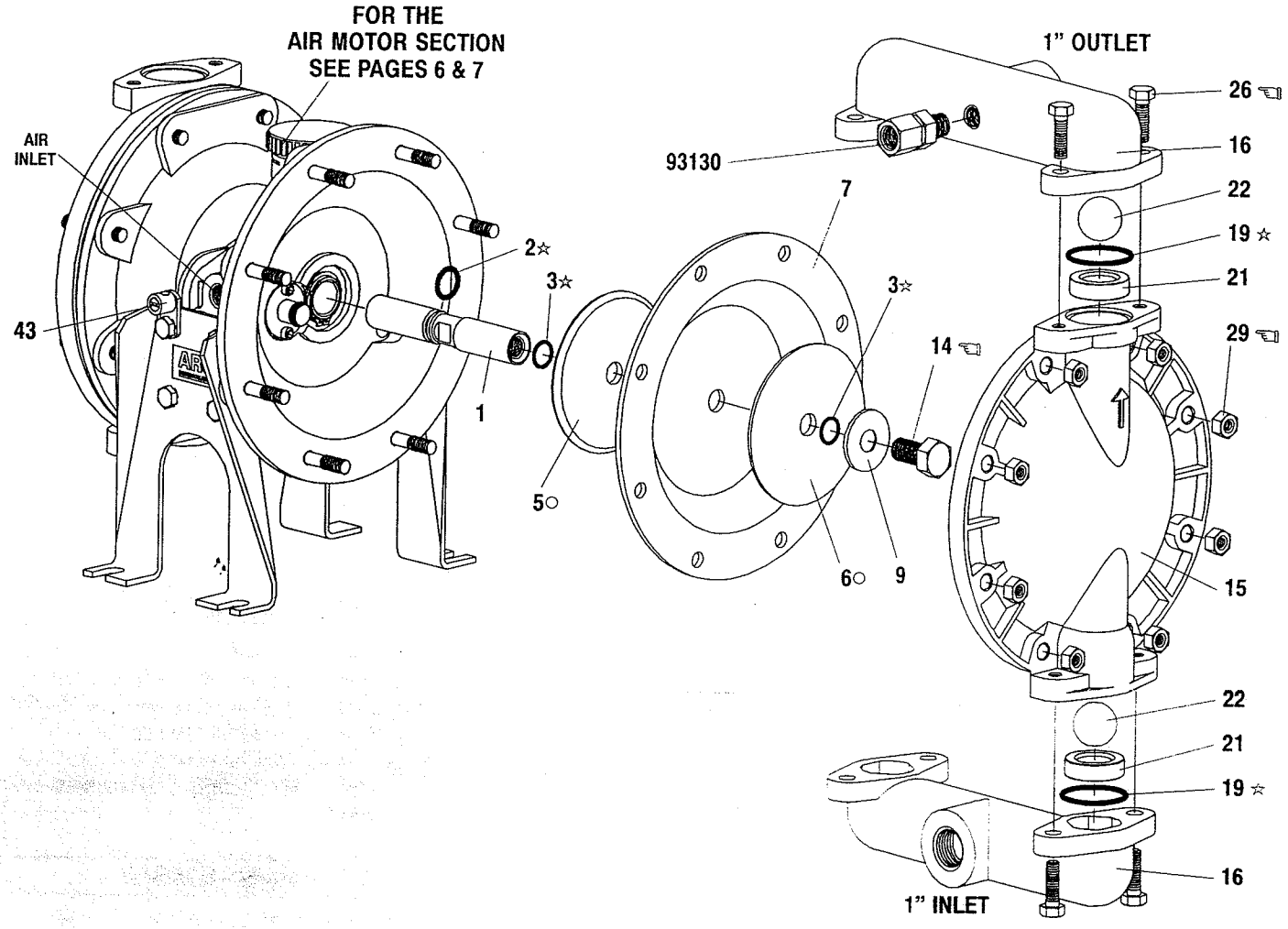
FLUID SECTION DISASSEMBLY

1. Remove top manifold(s).
2. Remove (22) balls, (19) "O" rings and (21) seats.
3. Remove (15) fluid caps.
4. Remove the (14) screw, (9) washer, (3) "O" ring, (6) plate, (7) diaphragm and (5) plate.
5. Remove (3) "O" rings.

NOTE: Do not scratch or mar the surface of (1) diaphragm rod.

FLUID SECTION REASSEMBLY

- Reassemble in reverse order.
- Clean and inspect all parts. Replace worn or damaged parts with new parts as required.
- Lubricate (1) diaphragm rod and (2) "O" ring with Key-Lube® "O" ring lube or equivalent.
- Use ARO PN/98930-T Bullet (installation tool) to aid in installation of (2) "O" ring on (1) diaphragm rod.
- Be certain (7) diaphragms align properly with (15) fluid caps before making final torque adjustments on bolt and nuts to avoid twisting the diaphragm.
- Re-check torque settings after pump has been re-started and run a while.



○ NOTE: Radius edge of parts (5 and 6) is against diaphragm.

TORQUE REQUIREMENTS

NOTE: DO NOT OVERTIGHTEN FASTENERS

(14) Diaphragm Bolt 25 - 30 ft lbs (33.9 - 40.7 Nm), Pre-coated with Thread Locker

(26, 29) Fluid Caps/Manifold nuts 120 - 140 in. lbs (13.6 - 15.8 Nm).

LUBRICATION / SEALANTS

☆ Apply Keylube to all "O" rings, "U" Cups & mating parts.

FIGURE 1

PARTS LIST / 650709–C AIR MOTOR SECTION

✓ Indicates parts included in 637118-C Air Section Service Kit.

ITEM	DESCRIPTION (Size in Inches)	QTY	PART NO.	[MTL]
101	Motor Body	(1)	66836-1	[A]
□102	"O" Ring (.07" x 1" o.d.)	(2)	92959	[B]
□103	Sleeve	(1)	98722-1	[BZ]
✓104	Retaining Ring, TruArc (.925" i.d.)	(2)	Y145-25	[C]
105	Cap Screw (1/4" - 20 x 5/8")	(8)	93860	[C]
107	Leg	(2)	92003	[C]
✓108	Gasket (with notch)	(1)	92878	[B/NY]
□109	Piston	(1)	92011	[D]
✓110	"U" Cup (3/16 x 1-3/8" o.d.)	(1)	Y186-51	[B]
□111	Spool	(1)	92005	[A]
112	Washer (1.557" o.d.)	(5)	92877	[Z]
✓113	"O" Ring (Small) (1/8" x 1-1/4" o.d.)	(5)	Y325-214	[B]
✓114	"O" Ring (Large) (3/32" x 1-9/16" o.d.)	(6)	Y325-126	[B]
□115	Spacer	(4)	92876	[Z]
□116	Spacer	(1)	92006	[Z]
✓117	Gasket	(1)	92004	[B/NY]
118	Pilot Rod	(1)	93309-1	[C]
✓119	"O" Ring (1/8" x 3/4" o.d.)	(4)	93075	[U]
120	Spacer	(3)	115959	[Z]
121	Sleeve Bushing	(2)	98723-1	[BZ]
✓122	"O" Ring (3/32" x 9/16" o.d.)	(2)	94820	[U]
✓123	Screw (#8 - 32 x 3/8")	(4)	Y154-41	[C]
124	Stud (5/16" - 18 x 1-3/4")	(16)	92866	[C]
128	Pipe Plug (1/8" - 27 n.p.t. x 1/4")	(1)	Y227-2-L	[C]
201	Muffler	(1)	93110-1	[P]
✓	Keylube, "O" Ring Lubricant	(1)	93706-1	
	10 Pak of Keylube		637175	

MATERIAL CODE

[A] = Aluminum	[NY] = Nylon
[B] = Buna "N"	[P] = Polypropylene
[BZ] = Bronze	[U] = Polyurethane
[C] = Carbon Steel	[Z] = Zinc
[D] = Acetal	

AIR MOTOR SECTION SERVICE

Service is divided into two parts - 1. Pilot Valve, 2. Major Valve.

GENERAL REASSEMBLY NOTES:

- Air Motor Section Service is continued from Fluid Section repair.
- Inspect and replace old parts with new parts as necessary. Look for deep scratches on metallic surfaces, and nicks or cuts in "O" rings.
- Take precautions to prevent cutting "O" rings upon installation.
- Lubricate "O" rings with Key-lube or equivalent.
- Do not over-tighten fasteners, refer to torque requirement block on view.
- Re-torque fasteners following restart.

PILOT VALVE DISASSEMBLY

1. Remove (104) retaining ring.
2. Remove (123) screws and (122) "O" rings.
3. Remove (118) piston rod, (121) sleeve bushing, (119) "O" rings and (120) spacers from the (101) motor body.
4. Remove (103) sleeve and (102) "O" rings.

PILOT VALVE REASSEMBLY

1. Replace two (102) "O" rings if worn or damaged and reinstall (103) sleeve.
2. Install one of the (121) sleeve bushings, (119) "O" rings, (120) spacers and the remaining (121) bushing.
3. Carefully push (118) pilot rod into bushings etc. and retain on each end with the two (122) "O" rings, retain with (123) screws.
4. Replace (104) retaining rings.

MAJOR VALVE DISASSEMBLY

1. Remove (107) legs, (108) and (117) gaskets.
2. On the side opposite the air inlet, push on the inner diameter (111) spool. This will force the (109) piston out. Continue pushing the (111) spool and remove. Check for scratches and gouges.
3. Reach into the air section (exhaust side) and remove (116) spacer. (115) spacers, (113) "O" rings, (114) "O" rings, (112) washers, etc. Check for damaged "O" rings.

MAJOR VALVE REASSEMBLY

NOTE: Replace worn parts as necessary. Lubricate "O" ring with Key-Lube "O" ring lube or equivalent when reassembling.

1. Replace (112) washer, (114) "O" ring and (113) "O" ring onto (115) spacer and insert etc.

NOTE: Be careful to orient spacer legs away from blocking internal ports.

2. Lubricate and carefully insert (111) spool.
3. Install (117) gasket and (107).
4. Lubricate and install (110) packing cup and insert (109) piston into (air inlet side) cavity, the (110) packing cup lips should point outward.
5. Install (108) gasket and replace (107).

□ "Smart Parts" Keep these items on hand in addition to the Service Kits for fast repair and reduction of down time.

IMPORTANT
BE CERTAIN TO ORIENT (115) SPACER LEGS AWAY FROM BLOCKING INTERNAL PORTS WHEN REASSEMBLING AIR SECTION.

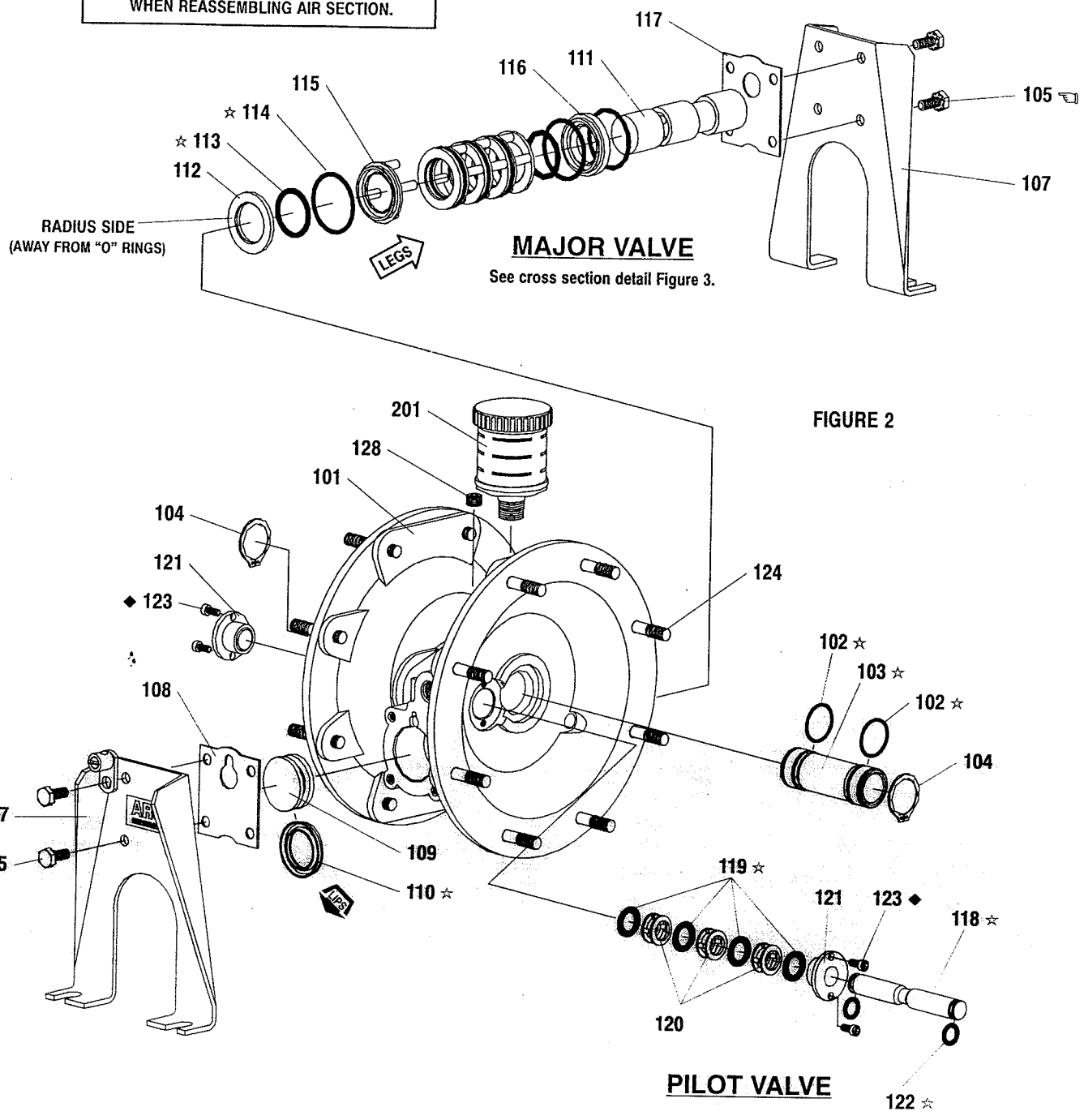


FIGURE 2

MAJOR VALVE CROSS-SECTION DETAIL

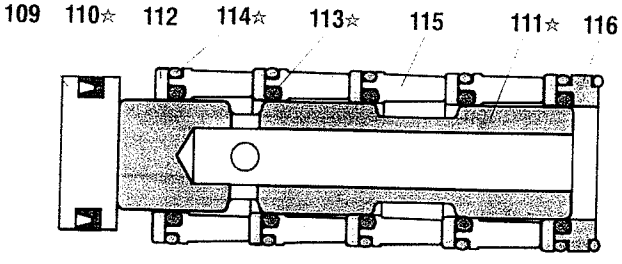


FIGURE 3

☞ TORQUE REQUIREMENTS ☜
NOTE: DO NOT OVERTIGHTEN FASTENERS
(105) 40 - 50 in. lbs (4.5 - 5.6 Nm).

LUBRICATION / SEALANTS
☆ Apply Keylube to all "O" rings, "U" Cups & mating parts.
◆ Pre-coated Thread Locker Screw used

TROUBLE SHOOTING

Product discharged from exhaust outlet.
- Check for diaphragm rupture.
- Check tightness of diaphragm nut.

Air bubbles in product discharge.
- Check connections of suction plumbing.
- Check "O" rings between intake manifold and fluid caps.
- Check tightness of diaphragm nut.

Low output volume, erratic flow or no flow.
- Check air supply.
- Check for plugged outlet hose.
- Check for kinked (restrictive) outlet material hose.
- Check for kinked (restrictive) or collapsed inlet material hose.
- Check for pump cavitation – suction pipe should be sized at least as large as the inlet thread diameter of the pump for proper flow if high viscosity fluids are being pumped. Suction hose must be a non-collapsing type, capable of pulling a high vacuum.
- Check all joints on the inlet manifolds and suction connections. These must be air tight.
- Inspect the pump for solid objects logged in the diaphragm chamber or the seat area.

DIMENSIONAL DATA

Dimensions shown are for reference only, they are displayed in inches and millimeters (mm).

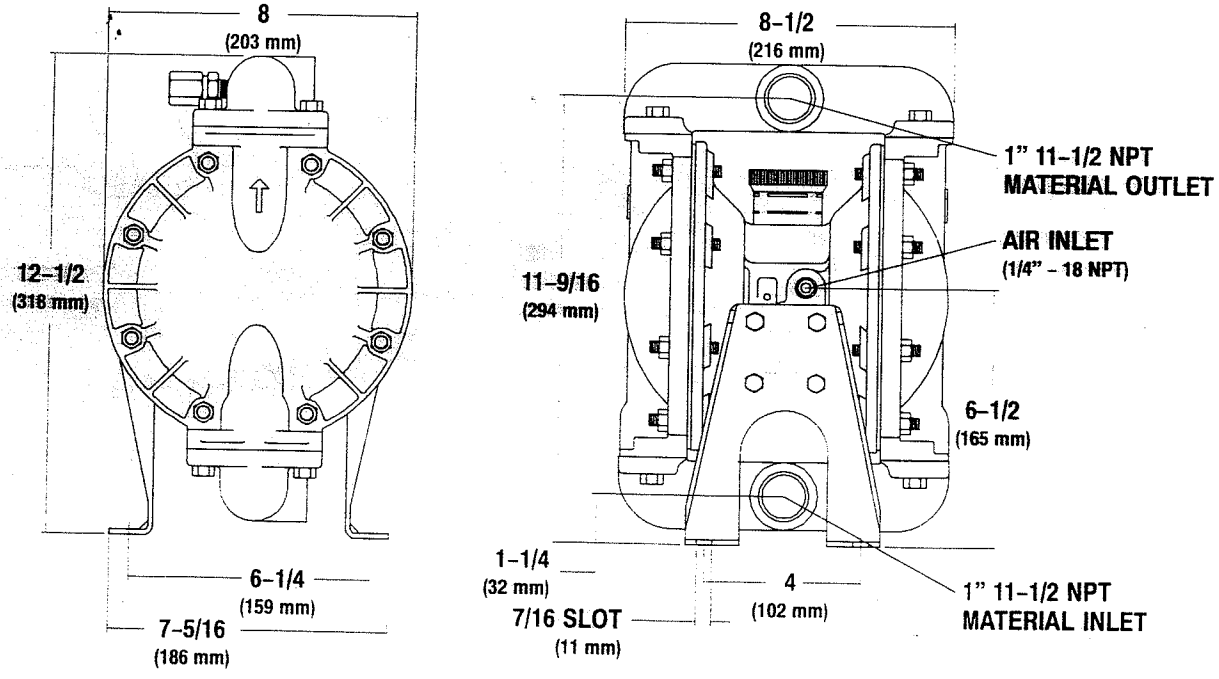


FIGURE 4

S-631 REV. 8-99 / (I)

MODEL • MODELE • MODELO • MODELL • MODELLO • MODEL • MODEL • MODELL • MALI • MODELL • MODELO

66602( )-( ), 66605( )-( )
66610A-( )-C / 666139-( )-C
6661A3-( )-C / 6661B4-( )-C
66615A-( )-C / 666182-( )-C
6661T3-( )-C / 6661U4-( )-C
6661M( )-( )-C / 6661N( )-( )-C
66620A-( )-C / 666232-( )-C
6662A3-( )-C / 6662B4-( )-C
6507XX-X-X
PD( )-( )-( ), PF( )-( )-( )
PM( )-( )-( )-( ), PS( )-( )-( )

ARO
INGERSOLL-RAND COMPANY
ONE ARO CENTER • BRYAN, OHIO 43506-0151
(419) 636-4242 • FAX (419) 633-1674

INGERSOLL-RAND
FLUID PRODUCTS

- Germany:
  Ingersoll–Rand GMBH
  PEG Fluid Products Division
  Gewerbeallee 17
  45478 Mülheim, Deutchland
  Tel. (49) 02 08 99 940, Fax. (49) 02 08 99 94 444

- Benelux & France:
  Ingersoll–Rand
  PEG Fluid Products Division
  111, Avenue Roger Salengro
  59450 Sin Le Noble, France
  Tel. (33) 03 27 930 808, Fax. (33) 03 27 930 820

- Great Britan, Africa, Scandanavia & Middle East Sales
  Ingersoll–Rand Co. Ltd.
  PEG Fluid Products Division
  Swan Lane Works
  Swan Lane Hindley Green
  Wigan WN2 4EZ, England
  Tel. (44) 01 942 502 167, Fax. (44) 01 942 502 181

- Greece, Italy, Morocco, Portugal & Spain
  Ingersoll–Rand Co. Italianna S.p.A
  PEG Fluid Products Division
  C. so Duca degli Abruzzi, 54
  10129 Torino, Italy
  Tel. (39) 011 56 81 594, Fax. (39) 011 56 83 277

- Canada
  Production Equipment Group
  Ingersoll–Rand Canada Inc.
  51 Worchester Road
  Rexdale, Ontario M9W 4K2
  Tel. 1 (416) 213–4500, Fax. 1 (416) 213–4510

- Latin America
  Ingersoll–Rand PEG Aro Division
  730 N.W. 107 Avenue, Suite 300
  Miami, FL 33172–3107
  Tel. (305) 222–0812/559–0500, Fax. (305) 222–0864/559–7505

GENERAL INFORMATION

(English) P3

COVERING: SAFETY PRECAUTIONS & PLACING INTO SERVICE

AIR OPERATED DIAPHRAGM PUMPS

READ THIS MANUAL CAREFULLY BEFORE INSTALLING, OPERATING OR SERVICING THIS EQUIPMENT.

It is the responsibility of the employer to place this information into the hands of the operator.

PLACING INTO SERVICE

⚠WARNING = Hazards or unsafe practices which could result in severe personal injury, death or substantial property damage.

⚠ CAUTION = Hazards or unsafe practices which could result in minor personal injury, product or property damage.

NOTICE = Important installation, operation or maintenance information.

AIR AND LUBE REQUIREMENTS

⚠WARNING EXCESSIVE AIR PRESSURE. Can cause personal injury, pump damage or property damage. Do not exceed maximum inlet air pressure as stated on air motor plate.

- Filtered and oiled air will allow the pump to operate more efficiently and yield a longer life to operating parts and mechanisms.
- A filter capable of filtering out particles larger than 50 microns should be used on the air supply. In most applications there is no lubrication required other than the "O" ring lubricant which is applied during assembly or repair.
- When lubricated air is necessary, supply the air lubricator with a good grade of SAE 90 wt. non-detergent oil and set the lubricator to a rate not to exceed one drop per minute.

TRANSPORT AND STORAGE

- Store in a dry place, do not remove product from box during storage.
- Do not remove protection caps from inlet and outlet prior to installation.
- Do not drop or damage box, handle with care.

INSTALLATION

- Secure the diaphragm pump legs to a suitable surface to insure against damage by excessive vibration.
- Pump cycle rate and operating pressure should be controlled by using an air regulator on the air supply.
- When the diaphragm pump is used in a forced-feed (flooded inlet) situation it is recommended that a "Check Valve" be installed at the air inlet.
- The outlet material volume is governed not only by the air supply but also by the material supply available at the inlet. The material supply tubing should not be too small or restrictive. Be sure not to use hose which might collapse.
- Use flexible connections (such as hose), at the suction and discharge, these connections should not be rigid piped and must be compatible with the material being pumped.
- Pipe exhaust away to a safe location. Size Series (Minimum recommended i.d. size hose): All 1/4" (1/4"), All 1/2" (1/4"), All 1" (3/8"), All 1-1/2" and larger (3/4").
- Install a ground wire where applicable.

OPERATION

NOTICE On non-metallic Diaphragm Pumps re-check the torque settings after pump has been re-started and run a while. Re-torque to specifications after initial running.

START-UP

1. Turn pressure control knob until motor starts to cycle.
2. Allow pump to cycle slowly until it is primed and all air is purged from the fluid hose or dispensing valve.
3. Turn off dispensing valve and allow pump to stall-check all fittings for leakage.
4. Adjust the regulator as required to obtain desired operating pressure and flow.

SHUTDOWN

- It is good practice to periodically flush entire pump system with a solvent that is compatible with the material being pumped, especially if the material being pumped is subject to "settling-out" when not in use for a period of time.
- Disconnect the air supply from the pump if it is to be inactive for a few hours.

SERVICE

- Keep good records of service activity and include pump in preventive maintenance program.
- USE ONLY GENUINE ARO REPLACEMENT PARTS TO ASSURE PERFORMANCE AND PRESSURE RATING.
- Contact your local authorized ARO Service Center for parts and customer service information. Refer to page 2.

OPERATING AND SAFETY PRECAUTIONS

READ, UNDERSTAND, AND FOLLOW THIS INFORMATION TO AVOID INJURY AND PROPERTY DAMAGE.


EXCESSIVE AIR PRESSURE
STATIC SPARK
EXPLOSION HAZARD


HAZARDOUS MATERIALS
HAZARDOUS PRESSURE


INJECTION HAZARD

⚠ WARNING EXCESSIVE AIR PRESSURE. Can cause personal injury, pump damage or property damage.

- Do not exceed the maximum inlet air pressure as stated on the pump model plate.
- Be sure material hoses and other components are able to withstand fluid pressures developed by this pump. Check all hoses for damage or wear. Be certain dispensing device is clean and in proper working condition.

⚠ WARNING STATIC SPARK. Can cause explosion resulting in severe injury or death. Ground pump and pumping system.

- Sparks can ignite flammable material and vapors.
- The pumping system and object being sprayed must be grounded when it is pumping, flushing, recirculating or spraying flammable materials such as paints, solvents, lacquers, etc. or used in a location where surrounding atmosphere is conducive to spontaneous combustion. Ground the dispensing valve or device, containers, hoses and any object to which material is being pumped.
- Use the pump grounding lug provided on metallic pumps for connection of a ground wire to a good earth ground source. Use Aro Part No. 66885-1 Ground Kit or a suitable Ground wire (12 ga. min.).
- Secure pump, connections and all contact points to avoid vibration and generation of contact or static spark.
- Consult local building codes and electrical codes for specific grounding requirements.
- After grounding, periodically verify continuity of electrical path to ground. Test with an ohmmeter from each component (e.g., hoses, pump, clamps, container, spray gun, etc.) to ground to insure continuity. Ohmmeter should show 100 ohms or less.
- Submerse the outlet hose end, dispensing valve or device in the material being dispensed if possible. (Avoid free streaming of material being dispensed.)
- Use hoses incorporating a static wire.
- Use proper ventilation.
- Keep inflammables away from heat, open flames and sparks.
- Keep containers closed when not in use.

⚠ WARNING Pump exhaust may contain contaminants. Can cause severe injury. Pipe exhaust away from work area and personnel.

- In the event of a diaphragm rupture material can be forced out of the air exhaust muffler.
- Pipe the exhaust to a safe remote location when pumping hazardous or inflammable materials.
- Use a grounded hose between the the pump and the muffler. (Refer to minimum size under Installation).

⚠ WARNING HAZARDOUS PRESSURE. Can result in serious injury or property damage. Do not service or clean pump, hoses or dispensing valve while the system is pressurized.

- Disconnect air supply line and relieve pressure from the system by opening dispensing valve or device and / or carefully and slowly loosening and removing outlet hose or piping from pump.

⚠ WARNING INJECTION HAZARD. Any material injected into flesh can cause severe injury or death. If an injection occurs immediately contact a doctor.

- Do not grab front end of dispensing device.
- Do not aim dispensing device at anyone or any part of the body.

⚠ WARNING HAZARDOUS MATERIALS. Can cause serious injury or property damage. Do not attempt to return a pump to the factory or service center that contains hazardous material. Safe handling practices must comply with local and national laws and safety code requirements.

- Obtain Material Safety Data Sheets on all materials from the supplier for proper handling instructions.

⚠ WARNING EXPLOSION HAZARD. Models containing aluminum wetted parts cannot be used with Ill.-Trichloroethane, Methylene Chloride or other Halogenated Hydrocarbon solvents which may react and explode.

- Check pump motor section, fluid caps, manifolds and all wetted parts to assure compatibility before using with solvents of this type.

⚠ CAUTION Verify the chemical compatibility of the pump wetted parts and the substance being pumped, flushed or recirculated. Chemical compatibility may change with temperature and concentration of the chemical(s) within the substances being pumped, flushed or circulated. Consult ARO Form No. 8677-P, Fluid Compatibility Guide, for information on chemical compatibility.

⚠ CAUTION Maximum temperatures are based on mechanical stress only. Certain chemicals will significantly reduce maximum safe operating temperature. Consult Fluid Compatibility Guide for chemical compatibility and temperature limits.

⚠ CAUTION Be certain all operators of this equipment have been trained for safe working practices, understand it's limitations, and wear safety goggles / equipment when required.

⚠ CAUTION Do not use the pump for the structural support of the piping system. Be certain the system components are properly supported to prevent stress on the pump parts.

- Suction and discharge connections should be flexible connections (such as hose), not rigid piped, and should be compatible with the substance being pumped.

⚠ CAUTION Prevent unnecessary damage to the pump. Do not allow pump to operate when out of material for long periods of time.

- Disconnect air line from pump when system sits idle for long periods of time.

DECLARATION OF CONFORMITY

DECLARATION DE CONFORMITE • DECLARACION DE CONFORMIDAD • ERKLÄRUNG BEZÜGLICH EINHALTUNG DER VORSCHRIFTEN
DICHIARAZIONE DI CONFORMITÀ • CONFORMITEITSVERKLARING • KONFORMITETS DEKLARATION • FÖRSÄKRAN OM ÖVERENSSTÄMMELSE
VAATIMUSTENMUKAISUUSTODISTUS • SAMSVARSERKLÆRING • DECLARAÇÃO DE CONFORMIDADE

MANUFACTURED BY:

FABRIQUE PAR: FREMSTILLET AF:
FABRICADA POR: TILLVERKAT AV:
HERGESTELLT VON: VALMISTAJA:
FABBRICATO DA: PRODUSERT AV:
VERVAARDIGD DOOR: MANUFACTURADO POR:

INGERSOLL-RAND COMPANY
ONE ARO CENTER • BRYAN, OHIO, USA 43506-0151

TYPE / SERIES:

AIR OPERATED DIAPHRAGM PUMPS

TYPE / SERIE:
TIPO / SERIE:
TYP / SERIE:
TIPO / SERIE:
TYPE / SERIE:
TYPE / SERIER:
TYP / SERIE:
TYYPPI / SARJA:
TYPE / SERIE:
TYPO / SERIES

POMPES PNEUMATIQUES A MEMBRANES
BOMBAS NEUMATICAS DE DIAFRAGMA
DRUCKLUFTBETRIEBENE MEMBRANPUMPE
POMPE PNEUMATICHE A MEMBRANA
PNEUMATISCHE MEMBRAAM POMPEN
LUFTDREVNE MEMBRAN PUMPER
TRYKLUFTSDRIVNA MEMBRANPUMPAR
PAINEILMATOIMISET KALVOPUMPUT
TRYKKLUFTDREVET MEMBRANPUMPE
BOMBAS PNEUMÁTICAS DE DIAFRAGMA

MODEL:

MODELE: MODEL:
MODELO: MODELL:
MODELL: MALI:
MODELLO: MODELL:
MODEL: MODELO:

66602( )-( ), 66605( )-( ), 66610A-( )-C / 666139-( )-C, 66615A-( )-C / 666182-( )-C, 6661A3-( )-C / 6661B4-( )-C, 6661T3-( )-C / 6661U4-( )-C, 6661M( )-( )-C / 6661N( )-( )-C, 66620A-( )-C / 666232-( )-C, 6662A3-( )-C / 6662B4-( )-C, 6507XX-X-X, PD02( )-( )-( ), PD05( )-( )-( ), PF20( )-( )-( ), PD20( )-( )-( ), PD30( )-( )-( ), PS15( )-( )-( ), PS20( )-( )-( ), PS30( )-( )-( ), PM( )-( )-( )-( )

SERIAL NO. RANGE: (1999 & 2000) A9XX9-XXX ⇨ L0XX0-XXX

Nº SERIE: • GAMA DE No. DE SERIE: • SERIEN–NR.–BEREICH: • NUMERI DI SERIE: • SERIENUMMERS: • SERIE NR. RÆKKE:
SERIE–NR–OMRÅDE: • SARJA N:O: • SERIENUMMERREKKE: • NO DE SERIE DA GAMA:

This product complies with the following European Community Directives:

Ce produit est conforme aux directives de la Communauté européenne suivantes:
Este producto cumple con las siguientes Directrices de la Comunidad Europea:
Dieses Produkt erfüllt die folgenden Vorschriften der Europäischen Gemeinschaft:
Questo prodotto è conforme alle seguenti direttive CEE:
Dit produkt voldoet aan de volgende EG–richtlijnen:
Dette produkt imødekommer følgende EU direktiver:
Denna produkt överensstämmer med EU:s nedanstående föreskrifter:
Tämä tuote täyttää seuraavat EU – direktiivit:
Dette produktet er i samsvar med følgende direktiver fra Det europeiske felleskap:
Este produto está conforme as Directivas da Comunidade Econòmica Europeia:

98/37/EC

The following Standards were used to verify compliance with the Directives:

Les normes suivantes ont été utilisées pour vérifier la conformité avec les Directives :
Las siguientes Normas se usaron para verificar el cumplimiento de las Directrices:
Folgende Normen wurden angewandt, um Erfüllung der Vorschriften zu bestätigen:
Per verificare la conformità del prodotto alle direttive sono stati usati i seguenti standard:
De volgende normen zijn gebruikt om naleving van de richtlijnen te bevestigen:
Følgende standarder blev benyttet til at efterkontrollere overenstemmelse med direktiverne:
Följande normer har använts för bekräfta överensstämmelse med föreskrifterna:
Seuraavia standardeja on kätetty varmistamaan:
Følgende standard ble benyttet til å fastlå samsvar med direktivene:
As seguintes Normas foram usadas para se verificar o cumprimento das Directivas:

EN 292

Approved by:

Approuvé par:
Aprobado por:
Genehmigt von:
Approvato da:
Goedgekeurd door:
Godkendt af:
Godkänt av:
Hyväksytty:
Godkjent av:
Aprovado por:

Allen L Clark
ALLEN CLARK ARO–BRYAN, U.S.A.

Date:

Date:
Fecha:
Datum: 8-6-99
Data:
Datum:
Dato:
Datum:
Päivämäärä
Dato:
Data:

(Engineering Manager) • (Directeur technique) • (Gerente de Ingeniería) • (verantwortlicher Konstruktionsleiter) • (Responsabile tecnico) • (ondersteunend technisch manager) (Vedvarende ingeniørmæssige driftsleder) • (Konstruktionschef) • (Tekninen johtaja) • (Konstruksjonssjef) • (Técnico responsável)

ARO

INGERSOLL-RAND COMPANY • ONE ARO CENTER • BRYAN, OHIO, USA 43506-0151

CONTROLLED DOCUMENT NO.
REV: I **S-631**

A FULL SIZE VERSION OF THIS MANUAL IS AVAILABLE UPON REQUEST (PN 97999-590)

⚠WARNING

Pressure gauges must be selected and installed so that the possibility of failure resulting in injury or damage caused by misuse or misapplication is minimized. Personnel responsible for selection and installation should read ANSI B40.1 which is available from ASME, 345 East 47th Street, NY, NY 10017. The most important factors which must be considered in selecting the proper gauge are as follows:

PRESSURE — The range of the gauge should be approximately twice the intended operating pressure. Avoid applying pressure beyond top of scale.

VIBRATION — Excessive vibration could cause movement wear, resulting in loss of accuracy. The gauge should be isolated from the source of vibration.

PULSATION — Excessive pressure pulsation could result in fatigue failure of the pressure element, or rapid movement wear. A liquid filled gauge, or a pulsation dampening device, should be considered.

TEMPERATURE — Excessive temperature could result in long term creep of soldered joints, and possibly eventual failure. The gauge should be moved away from heat source.

PROCESS — Materials of pressure containing parts must be resistant to the process fluid. A different pressure element material, or diaphragm seal my be required.

Gauges used on high pressure gas, or on potentially hazardous services, such as Oxygen, should be carefully selected in accordance with the recommendations of B40.1.

Use aluminum socket gauges on air or oil only.

FILTER/REGULATOR
SECTION 7.2

Please read and save these instructions. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage! Retain instructions for future reference.

Speedaire® Filter/Regulators

Description

Speedaire filter/regulators are used to give filtration and accurate regulation of compressed air from a single compact unit. Filters employ a deflector plate to create a swirling action to the air stream assuring entrainment separation at all flow rates. The extra fine filter element with large surface area assures maximum filtration with low pressure drop. Turn manual drain counterclockwise to open and clockwise to close. Pressure regulator portion is high capacity self-relieving type for commercial and industrial applications. Balanced poppet design provides quick response and accurate regulation. Design gives long life and high flow characteristics with minimum pressure drop.

General Safety Information

Air line filter/regulators are utilized in a variety of air system applications. Because the unit and other components (compressor, spray gun, filters, regulators, lubricators, hoses, etc.) make up a high pressure pumping system, the following safety precautions should be observed at all times.

1. Read the instruction manuals for each component carefully before attempting to assemble, disassemble or operate your particular system.
2. Do not exceed the pressure rating of any component in the system.
3. Protect material lines and air lines from damage or puncture.
4. Never point a spray gun at oneself or any other person. Accidental discharge may result in serious injury.
5. Check hoses for weak or worn condition before each use, making certain that all connections are secure.
6. Release all pressures within the system before attempting to service any component.

Installation

1. Install filter regulator so air flows in direction of arrow.
2. Installation should be upstream of and as close as possible to the devices the filter is to protect: lubricator, valve, cylinder, tools or other air devices.
3. The filter bowl must hang vertically downward so free moisture will drain into the sump ("quiet zone") at the bottom of the bowl.

Operation

1. Adjustment to desired downstream pressure can be made only with pressure applied to the regulator. Regulator then acts as shut-off valve. Turn on air pressure. Then proceed to adjust to desired downstream pressure by turning adjusting knob clockwise. This permits pressure to build up slowly, preventing any unexpected operation of valve, cylinders, tools, etc., in the line.
2. To increase regulated pressure, turn clockwise. Adjustment can be made either with or without air flowing. It is desirable to make the adjustment to required pressure under typical operating conditions. When desired setting has been reached, push adjusting knob down to lock.
3. Your regulator is self-relieving. Therefore it is not necessary to "blow-down" the secondary lines by exhausting them. To lower setting, always reset from a pressure lower than the final setting desired. For example, lowering the secondary pressure from 80 PSI to 60 PSI is best accomplished by dropping the secondary pressure to 50 PSI or less, then adjusting UPWARD to 60 PSI.
4. Both free moisture and solids are removed automatically by the filter/regulator.
5. Drain whenever water level in sump ("quiet zone") reaches the lower baffle. Install automatic drain if bowl draining is frequent.
6. The filter element should be removed and replaced when a pressure differential across the element exceeds 10 PSI.

Maintenance

⚠WARNING ***Before servicing any pneumatic component, always turn off air supply and depressurize system.***

IMPORTANT: Before turning on air supply, turn adjusting handle or knob counterclockwise until compression is released from pressure control spring.

1. Before disassembling filter/regulator, shut off air supply and depressurize system. For servicing the regulator section, remove the bonnet assembly and bowl assembly.
2. To remove filter element.
   a. Remove bowl, unscrew lower baffle and remove filter element.
   c. Clean all internal parts, and bowl before reassembling. See polycarbonate bowl cleaning section.
   d. Install filter element.
   e. Attach lower baffle and tighten firmly.
   f. Replace bowl seal; lubricate seal to assist in retaining it in position. Use only mineral base oils or grease.
   g. Install bowl into body and tighten to 28 to 32 inch pounds torque.
3. Clean and carefully inspect parts for wear or damage. If replacement is desired, service kits are available (see service kit section).

Manufactured for Dayton Electric Mfg. Co., 5959 W. Howard St., Niles, Illinois 60714 U.S.A.

Form 5S3856

Printed in U.S.A.
06767
0996/145/VCPVP

SPEEDAIRE®

Models 3JV12, 3JV28 - 3JV31, 4Z027A - 4Z029A, 5Z415A - 5Z418A, 4Z030C and 6ZC29C

ENGLISH

For Replacement Parts, call 1-800-323-0620

24 hours a day - 365 days a year

Please provide following information:

- Model number
- Serial number (if any)
- Part description and number as shown in parts list

Address parts correspondence to:
Grainger Parts Operations
P.O. Box 3074
1657 Shermer Road
Northbrook, IL 60065-3074 U.S.A.

Maximum Pressure and Temperatures

150 PSI at 125°F (10 bar, at 52°C) with Polycarbonate Bowl.

250 PSI at 175°F (17 bar, at 80°C) with Metal Bowl.

10 PSI minimum (0.68 bar) with Automatic Drain.

Conversions: 1 bar = 14.5 PSI, °C = 5/9 (°F - 32).

ESPAÑOL

Para solicitar repuestos, en EE.UU. llame al 1-800-323-0600 en Mexico llame al 95-800-527-2331

Servicio Permanente, 24 horas al dia al año

Por favor proporciónenos la siguiente información:

- Número de Modelo
- Número de Serie (si lo tiene)
- Descripción de la Parte y Número que le Corresponde en la Lista de Partes

Envie correspondencia relacionada con pedidos de partes a:
Grainger Parts Operations
P.O. Box 3074
1657 Shermer Road
Northbrook, IL 60065-3074 U.S.A.

Presión y temperaturas máximas

10 bar a 52° C (150 psi a 125° F) con recipiente de policarbonato.

17 bar a 80° C (250 psi a 175° F) con recipiente metálico.

Conversiones: 1 bar = 14,5 psi, °C = 5/9 (°F - 32).

FRANÇAIS

Pour des pièces de rechange, composez le 1-800-323-0620

24 heures sur 24, 365 jours par année

S'il vous plaît fournir l'information suivant:

- Numéro de Modèle
- Numéro de Série (s'il y en a un)
- Description de la pièce et son numéro sur la liste

Correspondance:
Grainger Parts Operations
P.O. Box 3074
1657 Shermer Road
Northbrook, IL 60065-3074 U.S.A.

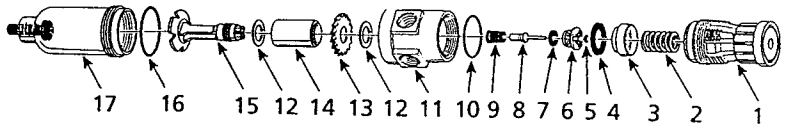
Pression et températures maximales

10 bar à 52 °C (150 PSI à 125 °F) avec cuvette en polycarbonate

17 bar à 80 °C (250 PSI à 175 °F) avec cuvette métallique

Conversion : 1 bar = 14,5 PSI, °C = 5/9 (°F - 32)

Figure 1 —
Replacement Parts Illustration for Models 4Z030C & 5Z415A
Ilustración de los repuestos para Modelos 4Z030C y 5Z415A
Illustration des pièces de rechange pour le Modèles 4Z030C et 5Z415A



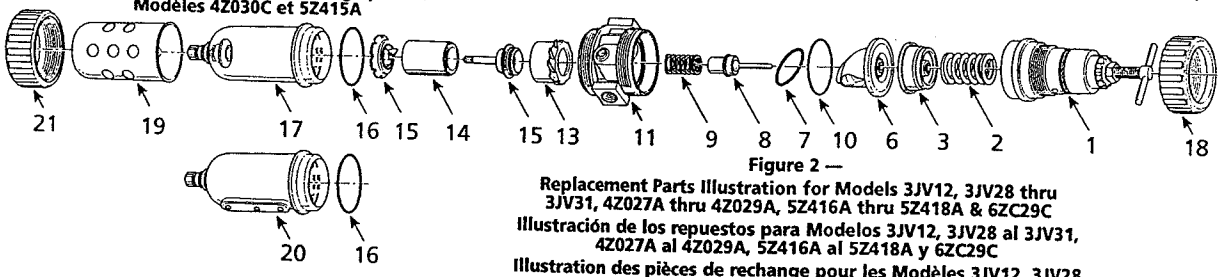


Figure 2 —
Replacement Parts Illustration for Models 3JV12, 3JV28 thru 3JV31, 4Z027A thru 4Z029A, 5Z416A thru 5Z418A & 6ZC29C
Ilustración de los repuestos para Modelos 3JV12, 3JV28 al 3JV31, 4Z027A al 4Z029A, 5Z416A al 5Z418A y 6ZC29C
Illustration des pièces de rechange pour les Modèles 3JV12, 3JV28 à 3JV31, 4Z027A à 4Z029A, 5Z416A á 5Z418A et 6ZC29C

Replacement Parts List / Lista de Partes de Repuestos / Liste de Pièces de Rechange

Reference Number	English Description	Español Descripción	Français Description	Part Number for Models: 4Z030C 5Z415A	4Z027A 4Z028A 5Z416A 5Z417A 3JV30	3JV28 3JV29 3JV31	4Z029A 5Z418A 6ZC29A 3JV12	Qty
1	Bonnet	Sombrerete	Chapeau	L01369	PS715	PS715	PS715	1
2	Control Spring	Resorte de control	Ressort de commande	P01173	P04063	P04063	P04063	1
3	Piston or Diaphgram	Pistón o diafragma	Piston ou Diaphragme	▲	▲	▲	▲	1
4	Piston Seal	Sello del pistón	Joint de piston	▲	N/A	N/A	N/A	1
5	Vent Seal	Sello de válvula	Joint d'évent	▲	N/A	N/A	N/A	1
6	Seat	Asiento	Cale	▲	●	●	●	1
7	O-Ring	Aro en O	Joint torique	▲	▲●	▲●	▲●	1
8	Poppet	Cabezal	Clapet	▲	▲	▲	▲	1
9	Return Spring	Resorte de retorno	Ressort de rappel	▲	▲	▲	▲	1
10	Bonnet Seal	Sello del sombrerete	Joint de chapeau	▲	▲●	▲●	▲●	1
11	Body	Cuerpo	Corps	■	■	■	■	1
12	Gasket	Junta	Garniture	◆●	N/A	N/A	N/A	2
13	Deflector	Deflector	Déflecteur	◆	◆	◆	◆	1
14	Element	Elemento	Élément	◆●	◆1R423	◆1R423	◆1R424	1
15	Post/Baffle	Vástago/Divisor	Tige/Chicane	◆	◆	◆	◆	1
16	O-Ring	Aro en O	Joint torique	◆●	◆	◆	◆	1
17	Bowl	Bolsa o recipiente	Cuvette	PS404	PS732	N/A	PS832	1
18	Collar	Anillo	Bague	N/A	P04068	P04068	P04068	1
19	Bowl Guard	Protector del recipiente	Protège-cuvette	N/A	PS705	N/A	PS805	1
20	Metal Bowl	Bolsa de metal	Cuvette en métal	N/A	N/A	PS735	N/A	1
21	Collar	Anillo	Bague	N/A	P04068	P04068	P04265	1
▲	Repair Kit	Kit de reparación	Nécessaire de réparation	PS426	PS710	PS710	PS810	
◆	Repair Kit	Kit de reparación	Nécessaire de réparation	PS407	PS712	PS712	PS812	
●	Repair Kit	Kit de reparación	Nécessaire de réparation	1R426	PS713	PS713	PS813	

(■) Not Available as a Replacement Part.
(N/A) Not Applicable.

(■) No Disponibl como una Parte Reemplazable.
(N/A) No Aplicable.

(■) Non offert en pièce de rechange.
(N/A) Sans objet.

Manufactured by / Fabricado para / Fabriqué pour Dayton Electric Mfg. Co., Niles, Illinois 60714 U.S.A.

SPEEDAIRE®

FUEL METER
SECTION 7.3

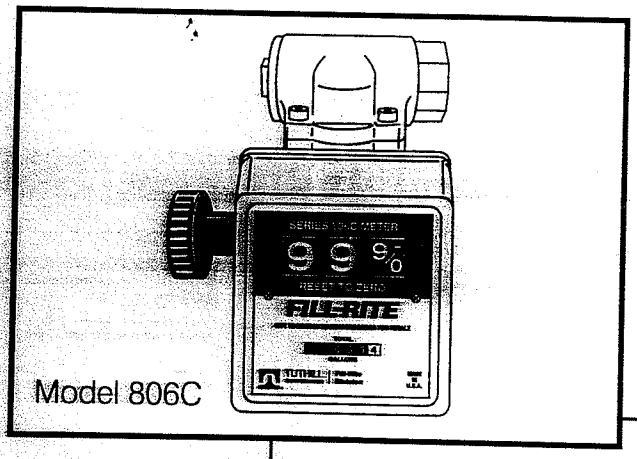
Pump System Technology

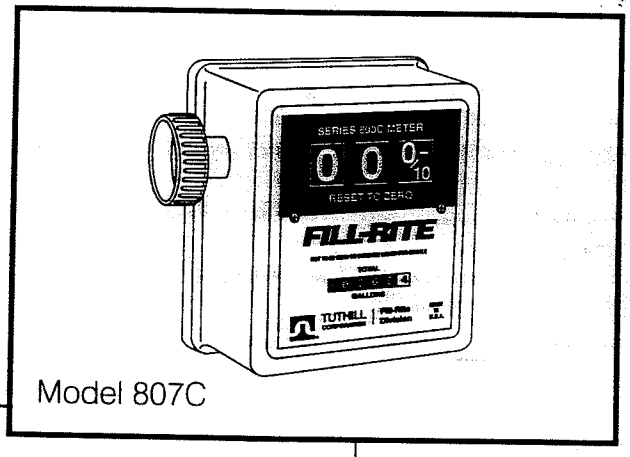
FILL-RITE

Owner's Operation & Safety Manual

SERIES 800C METER

For models 806C, 807C





OUTSTANDING FEATURES

- 5 to 20 GPM / 19 to 76 LPM flow rate
- ±1% accuracy
- 3/4" or 1" NPT flow ports
- Large, easy to read numbers
- Quick reset knob
- Totalizer
- UL/CSA Listed

TUTHILL Transfer Systems
8825 Aviation Drive
Fort Wayne, Indiana USA 46809
Tel 219 747-7524 Fax 219 747-3159
www.tuthill.com

Dear Fill-Rite Customer,

Thank you for buying a Fill-Rite product. We believe that you have bought the best. This piece of literature contains information about your new equipment and its operating and service requirements. Please take a few minutes to read it carefully.

Fill-Rite's products are distributed around the world and are the result of people at Fill-Rite working together to design, manufacture, sell, ship and service products which meet the needs of each and every customer.

If, for any reason, any of our products do not meet your performance expectations, we would like to hear from you. Our best sales force is you, our customer, and we want you to be satisfied. We appreciate your purchase of a Fill-Rite product and look forward to providing your future equipment needs.

Sincerely,

George P. Jenkins
President

SAFETY INSTRUCTIONS

To ensure safe and efficient operation, it is essential to read and follow each of these warnings and precautions.

1. **Improper use or installation of this product can cause serious bodily injury or death.**
2. Do NOT smoke near meter or use meter near an open flame when dispensing flammable fluids. Fire could result.
3. **This product should not be used for fluid transfer into aircraft.**
4. **This product is not suited for use with fluids for human consumption.**

GENERAL DESCRIPTION

The Fill-Rite Series 800C meter is a nutating disc flow meter. The meter uses wheel counters for registering either U.S. gallons or liters. The U.S. gallon meter has two unit wheels and a tenth wheel which can be reset to zero. It's totalizer has five unit wheels and a tenth wheel. The liter counter has three unit wheels which can be reset to zero. It's totalizer has six unit wheels.

OPTIONS

- Liter registers
- 1" NPT Flow Ports
- Teflon or nickel coatings
- EPDM O-rings
- BSPT threads

SAFETY

The safety of Fill-Rite Series 800 meters is proven by their listing with the following agencies.

Underwriters Laboratories Inc., a nationally recognized independent organization for testing of products to ensure public safety.

Canadian Standards Association, a Canadian organization for testing of products to ensure public safety.

Underwriters Laboratories Inc.®

Northbrook, Illinois • (847) 272-8800
Melville, New York • (516) 271-6200
Santa Clara, California • (408) 985-24
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FILL-RITE DIV
TUTHILL CORP
MR R NALLENWEG, DIRECTOR OF ENGRG
PO BOX 9100
FT WAYNE IN 46899

Your most recent listing is shown below. Please review this information and report any inaccuracies to the UL Engineering staff member who handled your UL project.

PLRZ
Flammable Liquid Meters

July 25, 1997

FILL-RITE DIV TUTHILL CORP
8825 AVIATION DR, FT WAYNE IN 46809
Models 806B, 806C, 807B, 807C, 886, 887; Series 900.

MH8290 (N)

LOOK FOR LISTING MARK ON PRODUCT

Replaces MH8290 dated May 11, 1995.
470414001

Underwriters Laboratories Inc.®

CLL/0072005
76

For information on placing an order for UL Listing Cards in a 3 x 5 inch card format, please refer to the enclosed ordering information.

UNDERWRITERS LABORATORIES INC.

A not-for-profit organization dedicated to public safety and committed to quality service

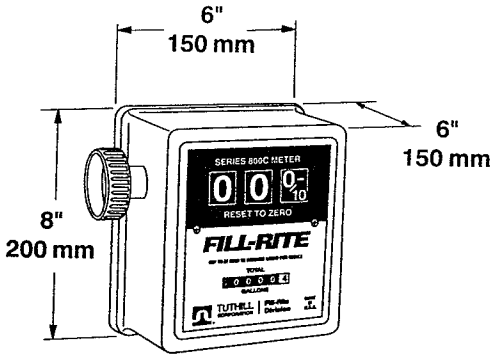
TECHNICAL INFORMATION

Design Features

- 3/4" or 1" NPT female inlet and outlet ports
- Recommended for 5 to 20 GPM (19 to 76 LPM) output
- ± 1% accuracy
- 50 PSI maximum pressure
- Meters fluid at temperatures from -15°F (-26°C) to 150°F (66°C)
- Weatherproof, corrosion resistant
- Zero reset unit wheels have large 11/16" figures
- Easy to read totalizer registers to 99,999.9 gallons
- Compact design - 8" x 6" x 6" (200 x 150 x 150 mm)

- Convenient, large reset knob
- Not for resale use
- Maximum viscosity of fluid: Diesel Fuel
- Pressure drop* through meter:
  5 GPM (19 LPM) --1 psid (0.07 bar)
  10 GPM (38 LPM) --2 psid (0.14 bar)
  20 GPM (76 LPM) --8 psid (0.55 bar)

*Nominal data based on mineral spirits. Actual pressure drop may vary.



Fluid Compatibility

The 800C is compatible with the following fluids:

- Diesel Fuel, Gasoline, Kerosene, Mineral Spirits, Heptane, and Hexane

The 800C is NOT compatible with the following fluids:

- Bleach, Hydrochloric Acid, Ink, Motor Oil, and Salt Water

If in doubt about compatibility of a specific fluid, contact supplier of fluid to check for any adverse reactions to the wetted materials in the parts list.

INSTALLATION

Meters are furnished for horizontal piping, left to right flow, unless otherwise specified. Use oil and gasoline resistant pipe compound on all threaded joints. Flow ports can be located in any of four positions for horizontal or vertical piping.

1. Determine direction of fluid flow.
2. Rotate meter so that counter points slightly down. This prevents parts from falling out when casting is separated.
3. Remove four screws (item 20) and meter housing (item 19).
4. Lift and rotate chamber assembly (item 26) so that chamber inlet points toward where the meter housing inlet will be.
5. Rotate meter housing (item 19) to desired position. Make sure chamber inlet is also pointing in the same direction.
6. Replace four screws (item 20).

ASSEMBLY/DISASSEMBLY

Meter consists of a chamber housing, measuring chamber, gear train, counter assembly and cover. Meter can be completely disassembled without disturbing piping, or meter can be partially disassembled as required.

Counter Assembly

For access to counter assembly, remove reset knob (item 3) by grasping edges and pulling firmly. Knob is held in place by a spring clip. Loosen two screws (item 29) and lift counterface (item 2) and cover (item 1) off. Remove two screws (item 13) to extract counter (item 4). Reassemble by reversing procedure.

Meter Chamber Assembly

To expose meter chamber assembly, tilt the meter at least slightly face down, so that no parts fall out when removing meter housing. Remove the four screws (item 20), then remove meter housing (item 19). Meter chamber assembly consists of upper and lower chambers, a nutating disc and seal gasket. Reassemble by reversing procedure.

If replacement of any components of the meter chamber assembly is required, the complete assembly must be replaced due to the precise method of its construction. This assures a proper fit and a correctly operating chamber.

Gear Train and Seal

To disassemble gear train and seal, remove gear frame (item 12) by prying slightly. Remove cluster gear (item 10) and washer (item 11) from shaft (item 9). Remove drive gear (item 8) and washers (item 7) by rotating and pulling drive gear. Remove O-ring seal (item 6).

When reassembling seal, lubricate O-ring liberally with oil or petroleum jelly and replace in cover. Place washer on drive gear shaft. Rotate and push shaft through O-ring and cover carefully to prevent damage to O-ring. Shaft must then be guided into pinion bevel (item 28) if counter has not been removed. Replace remaining parts to complete assembly by reversing disassembly procedure.

CALIBRATION

The Fill-Rite Series 800C meters can be calibrated for either U.S. gallons or liters. Calibration is required after disassembly, when metering a different fluid, or after significant wear. Depending on the model, Series 800C meters are calibrated at the factory, metering Stoddard solvent in either U.S. gallons or liters.

Meter calibration can be easily changed by following the calibration procedure listed below. A proving container or a container of KNOWN volume will be needed for the calibration procedure. It is recommended that the container's volume be at least five times larger than the unit of calibration. For example, a five gallon container should be used when calibrating for gallons.

Procedure for Calibration

1. Fill container to a known volume.

2. If indicated amount does not match known volume, insure pump is off and pressure relieved, then remove seal screw (item 23) and turn calibration screw (item 21) counterclockwise to reduce indicated amount or clockwise to increase the amount. A full turn will change the indicated amount by approximately 0.1 Gal. (0.4L). Reinstall seal screw
3. Repeat step 2 until calibration is acceptable.

OPERATING INSTRUCTIONS

For accurate measurement, meter and piping must always be filled with liquid and free of air. Meter should be calibrated per instructions in this manual prior to its use.

1. Reset meter to "0".
2. Meter is ready for use. Do not exceed 50PSI line pressure.

MAINTENANCE

Meter should operate maintenance free. However, certain liquids can dry out while in the meter housing, causing meter to stop. If this happens, meter should be thoroughly cleaned (see instructions below).

Cleaning Instructions

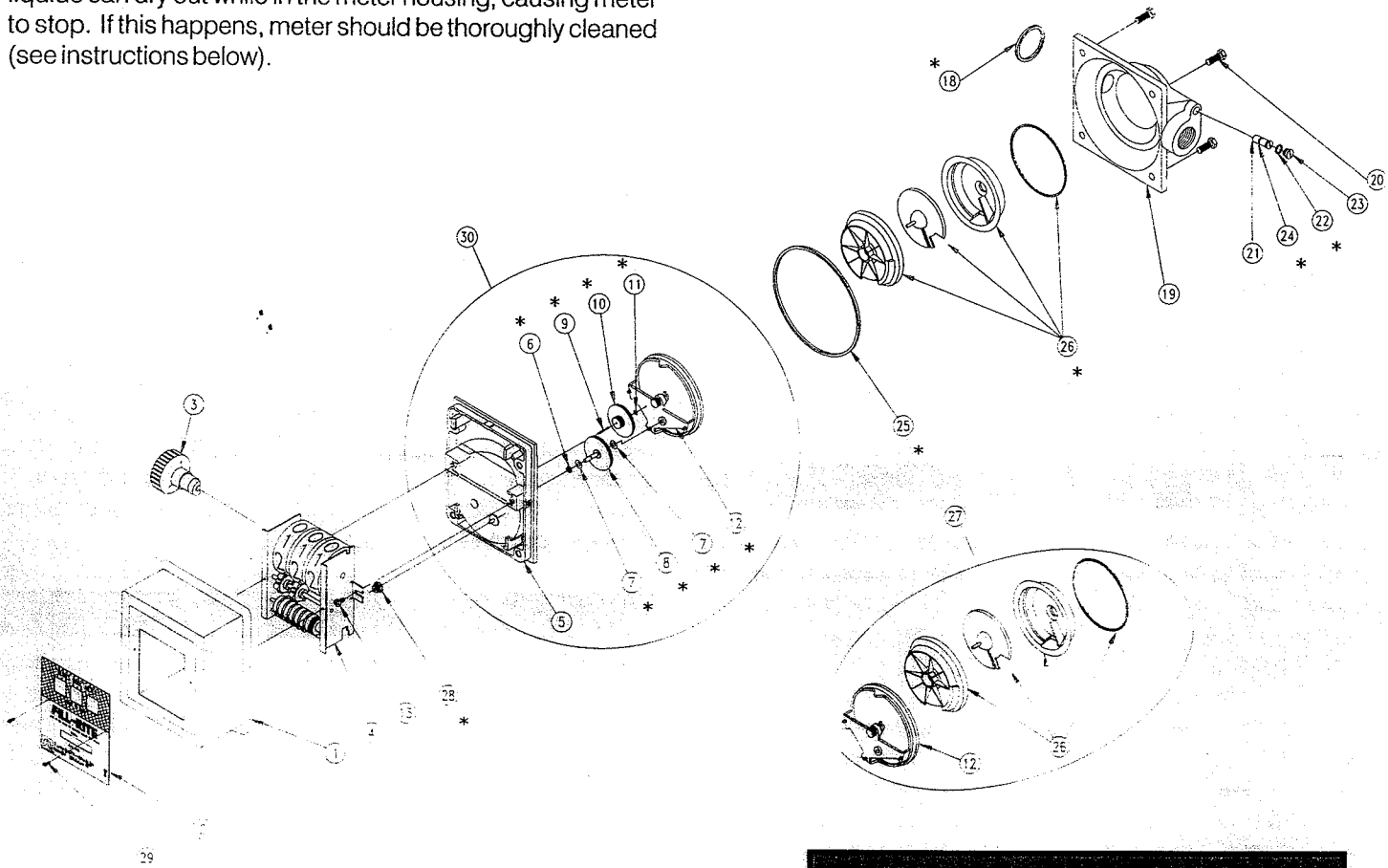
Run a flushing fluid through meter. For a more thorough cleaning, disassemble meter per "ASSEMBLY/ DISASSEMBLY" section, "Meter Chamber Assembly" subsection. Rinse all meter components. Recalibrate meter following calibration instructions above.

Storage

If meter is to be stored for a period of time, clean thoroughly. This will help protect meter from damage.

REPAIR

Meters needing repair should be taken to an authorized repair shop or returned to factory for service. Meters must be thoroughly triple-rinsed before being taken in for repair.



*These parts are in the 800C Series Repair Parts Kit..

800C METER PARTS LIST

ITM. NO.	PART NO.	DESCRIPTION	MATERIAL OF CONSTRUCTION	QTY.
1	800F4132	Counter Cover		1
2	800G0208	Counter Face, U.S. Gallon		1
	800G0241	Counter Face, Liter		Opt.
3	800F4261	Knob Assembly		1
4	800F4080	Counter - U.S. Gallon		1
	800F4081	Counter - Liter		Opt.
5	800G2246	Meter Cover	Aluminum	1
	800G2247	Meter Cover, Nickel Plated		Opt.
	800G2248	Meter Cover, Teflon Coated		Opt.
6	800F4191	O-Ring (5-106)	Fluorocarbon	1
	800F4033	O-Ring (5-106)	EPDM	Opt.
7	800F3980	Washer	Stainless Steel	2
8	800F3845	Drive Gear (70T) - U.S. Gallon	Ryton	1
	800F3846	Drive Gear (84T) - Liter	Ryton	Opt.
	800F4185	Drive Gear (73T) - Imperial Gallon	Ryton	Opt.
9	800F3820	Shaft, Cluster Gear	Stainless Steel	1
10	800F3841	Cluster Gear (22T/67T) - U.S. Gallon	Ryton	1
	800F3843	Cluster Gear (10T/67T) - Liter	Ryton	Opt.
	800F3541	Cluster Gear (19T/67T) - Imperial Gallon	Ryton	Opt.
11	800F3830	Washer	Stainless Steel	1
12	800G2250	Gear Frame Assembly	Ryton and Stainless Steel	1
13	900F4007	#8-32 x 5/16 PHMS ACR II		2
18	700F2800	O-Ring (-218), Buna-N (For 800A, 700A/B)		Opt.
	700F2801	O-Ring (-218), Fluorocarbon (For 800A, 700A/B)		Opt.
	800G2601	O-Ring (-218), EPDM (For 800A, 700A/B)		Opt.
19	800G2236	3/4 Inlet - 3/4 Outlet Housing	Aluminum	1
	800G2237	3/4 Inlet - 3/4 Outlet Hsg., Nickel Pltd.		Opt.
	800G2238	3/4 Inlet - 3/4 Outlet Hsg., Teflon Ctd.		Opt.
	800G2242	1 Inlet - 1 Outlet U.S. Housing		Opt.
	800G2243	1 Inlet - 1 Outlet U.S. Hsg., Nickel Pltd.		Opt.
	800G2244	1 Inlet - 1 Outlet U.S. Hsg., Teflon Ctd.		Opt.
	800G2255	1 Inlet - 1 Outlet BSPT Housing		Opt.
	800G2256	1 Inlet - 1 Outlet BSPT Hsg., Nickel Pltd.		Opt.
	800G2257	1 Inlet - 1 Outlet BSPT Hsg., Teflon Ctd.		Opt.
20	700F2810	5/16-18 x 7/8 HHCS		4
21	800F4463	Calibration Screw (Includes Item 24)	Stainless Steel	1
22	800F4449	O-Ring (-012)	Fluorocarbon	1
	800F3389	O-Ring (-012)	EPDM	Opt.
23	800F4440	Seal Screw	Stainless Steel	1
24	800F4036	O-Ring (-008) (Included with Item 21)	Fluorocarbon	1
	800F4034	O-Ring (-008), EPDM		Opt.
25	800F4010	O-Ring (-156), Buna-N		1
	800F4011	O-Ring (-156), Fluorocarbon		Opt.
	800F4032	O-Ring (-156), EPDM		Opt.
26	800G2262	Meter Chamber Assembly - Buna-N	Ryton, Stainless Steel, Buna-N	1
	800G2599	Meter Chamber Assembly - Fluorocarbon	Ryton, Stainless Steel, Fluorocarbon	Opt.
	800G2600	Meter Chamber Assembly - EPDM	Ryton, Stainless Steel, EPDM	Opt.
27	800G2531	Meter Chamber Assembly, Buna-N (Includes Items 12 & 26)		1
28	800F3959	Pinion Bevel		
29	800F2221	#4-6 x 3/8 PHMS Type AB		2
30	800G2532	Cover Assembly - U.S. Gallon		1
	800G2533	Cover Assy. - U.S. Gallon - Nickel Pltd.		Opt.
	800G2534	Cover Assy. - U.S. Gallon - Teflon Ctd.		Opt.
	800G2535	Cover Assembly - Liter		Opt.
	800G2536	Cover Assembly - Liter, Nickel Plated		Opt.
	800G2537	Cover Assembly - Liter, Teflon Coated		Opt.
	800G2544	Cover Assembly - Imperial Gallon		Opt.
	800G2765	Cover Assy. - U.S. with EPDM Seal		Opt.
	800G2778	Cover Assy. - U.S. Nickel with EPDM Seal		Opt.
	800G2900	Cover Assembly - Liter with EPDM Seal		Opt.

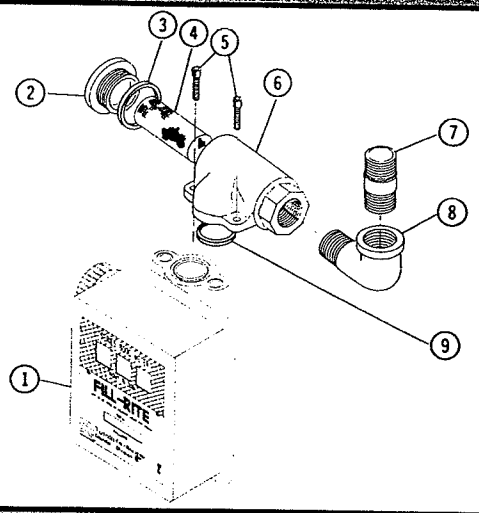
800B/800C SERIES REPAIR PARTS KITS

PART NO.	DESCRIPTION
800KTG2540	Repair Kit, U.S. Gallon (Standard Seals) (Includes items 6-12, 18, 22, 24-26, 28)
800KTG2541	Repair Kit, U.S. Gallon (Viton Seals) (Includes items 6-12, 18, 22, 24-26, 28)
800KTG2542	Repair Kit, Liter (Standard Seals) (Includes items 6-12, 18, 22, 24-26, 28)
800KTG2543	Repair Kit, Liter (Viton Seals) (Includes items 6-12, 18, 22, 24-26, 28)
800KTG2579	Repair Kit, U.S. Gallon, (EPDM Seals) (Includes items 6-12, 18, 22, 24-26, 28)

800B TO 800C CONVERSION KIT

PART NO.	DESCRIPTION
800F4134	Conversion Kit Includes items 1, 2, & 29

800C SERIES STRAINER KIT



ITM NO.	PART NO.	DESCRIPTION	QTY.
1	800G1325	806C, 1", U.S. Gallon	1
	800G2727	806C, 1", U.S. Gallon, Nickel Plated	Opt.
	800G1387	806C, 1", U.S. Gallon, Teflon Coated	Opt.
	800G1998	806C, 1" BSP, Liters	Opt.
	800G2705	806C, 1" BSP, Liters, Nickel Plated	Opt.
	800G1440	806C, 1" BSP, Liters, Teflon Coated	Opt.
2	800F4360	Cover	1
	800F4362	Cover, Nickel Plated	Opt.
	800F4361	Cover, Teflon Coated	Opt.
3	800F4380	O-Ring (-131), Buna-N	1
	800F4381	O-Ring (-131), Viton	Opt.
4	800F4350	Screen	1
5	800F4320	5/16-18 x 7/8 SHCS	2
6	800F4340	Strainer Housing	1
	800F4343	Strainer Housing, Nickel Plated	Opt.
	800F4342	Strainer Housing, Teflon Coated	Opt.
	800F4337	Strainer Housing, BSP Threads	Opt.
	800F4339	Strainer Housing, BSP Threads, Teflon	Opt.
	800F4338	Strainer Housing, BSP Threads, Nickel	Opt.
7	800F4390	1 x 2 Pipe Nipple	1
8	800F4400	1" Street Elbow	1
9	700F2800	O-Ring (-218)	1
	700F2801	O-Ring (-218), Viton	Opt.
	TH18	Strainer Kit, 1", U.S. (Includes items 2-6, 9)	
	TH18T	Strainer Kit, 1", U.S., Teflon Ctd. (items 2-9)	
	TH18X418	Strainer Kit, 1" BSP (Includes items 2-6, 9)	
	TH18TX418	Strainer Kit, 1" BSP, Teflon Ctd. (items 2-6, 9)	

NOTE: OTHER REPAIR AND STRAINER KITS AVAILABLE UPON REQUEST.

TROUBLE SHOOTING GUIDE

PROBLEM	POSSIBLE CAUSE	SOLUTION
Counter reading high or low	•Calibration off •Air in product •Measuring chamber or gears sticking	•Recalibrate meter. •Find and repair air leaks in system. •Clean or replace internal metering components.
Shaft seal leakage	•Dirty seal •Bad seal	•Clean O-ring seal and seat area. •Replace seal.
Gasket leakage	•Loose joints •Dirty gasket •Bad gasket	•Tighten joints. •Clean gasket and seat area. •Replace gasket.
Low capacity	•Clogged meter chamber •Clogged screen (806C)	•Clean meter chamber. •Clean screen.
Meter body cracks	•High pressure	•Install pressure relief valve to allow bleed back to tank.
Nutating disc breaks	•Flow surge	•Put shut-off valve on outlet of meter •Place meter as close as possible to pump

Fill-Rite: A Worldwide Reputation for Reliability.

For over 50 years, people all over the world who have needed tough, dependable pumps have insisted on Fill-Rite products. For them, Fill-Rite has been "the reliable pump" that keeps on working even under the toughest of conditions. We're proud of the reputation our hand pumps, DC and AC pumps and meters have earned. Today they're only a part of the rapidly expanding Fill-Rite line.

Applying the Science of Fluid Transfer.

An active research and development program is the centerpiece of our ongoing commitment to respond to new fluid transfer opportunities. This has led to new products and to new technologies and new facilities to produce these products.

To bring this advanced technology to market, we have invested in precision engineering and testing equipment. This improves our ability to produce fluid handling equipment that meets market demands for quality, performance and price.

A Hard Working Support Network.

Just as important as these capabilities are the people behind them - our design and production personnel. They give you the ability to specify systems that meet the most challenging of applications. With them, you can be assured of prompt, intelligent answers to your fluid transfer questions.

To service customers in the field, we've put together a select, well-monitored team of distributors. Throughout the world, they are ready to help you with technical advice, ordering and delivery.

Fill-Rite will always stand for reliable pumps and fluid handling equipment. We'll continue to develop new products and production techniques to keep pace with ever changing technologies. Each of our products will always be made with the same care and quality that made our pumps famous.

PRODUCT WARRANTY

Tuthill Transfer Systems ("Manufacturer") warrants to each buyer of its Fill-Rite products (the "Buyer") for a period of 12 months from date of invoice or sales receipt, but in no event more than 18 months from date of manufacture, that goods of its manufacture ("Goods") will be free from defects of material and workmanship. Manufacturer's sole obligation under the foregoing warranties will be limited to either, at Manufacturers' option, replacing or repairing defective Goods (subject to limitations hereinafter provided) or refunding the purchase price for such Goods theretofore paid by the Buyer, and Buyer's exclusive remedy for breach of any such warranties will be enforcement of such obligations of Manufacturer. If Manufacturer so requests the return of the Goods, the Goods will be redelivered to Manufacturer in accordance with Manufacturer's instructions F.O.B. Factory. The remedies contained herein shall constitute the sole recourse of the Buyer against Manufacturer for breach of warranty. IN NO EVENT SHALL MANUFACTURER'S LIABILITY ON ANY CLAIM FOR DAMAGES ARISING OUT OF THE MANUFACTURE SALE, DELIVERY OR USE OF THE GOODS EXCEED THE PURCHASE PRICE OF THE GOODS. The foregoing warranties will not extend to Goods subjected to misuse, neglect, accident or improper installation or maintenance, or which have been altered or repaired by anyone other than Manufacturer or its authorized representative. THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE OF ANY OTHER TYPE, WHETHER EXPRESS OR IMPLIED. No person may vary the foregoing warranties and remedies except in writing signed by a duly authorized officer of Manufacturer. Warranties or remedies that differ from the foregoing shall not otherwise be binding on Manufacturer. The Buyer's acceptance of delivery of the Goods constitutes acceptance of the foregoing warranties and remedies, and all conditions and limitations thereof.

[redacted]

FILL-RITE

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www.tuthill.com

800F9146 REV. 6

GRAINGER MODELS 1P894 & 1P951 FILL-RITE MODEL 1210B PUMP WITH MODEL 807CN-1 METER

ASSEMBLY INSTRUCTIONS

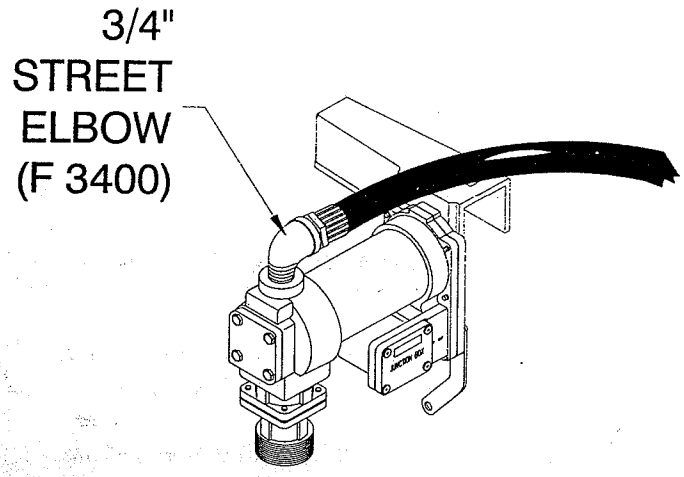


Illustration 1

NOTE: Use gasoline and oil resistant pipe compound on all threaded joints.

1. Remove 3/4" street elbow from outlet (top) of pump. See illustration 1. Save street elbow for step number 4.
2. Install 3/4" x 2-1/2" pipe nipple (included with meter) at outlet of pump.
3. Install 3/4" x 1" hex bushings (included with meter) in both inlet and outlet of meter.
4. Install 3/4" street elbow (removed previously) at inlet of meter.
5. Assemble meter to pump as shown in Illustration 2.
6. Install hose at outlet of meter.

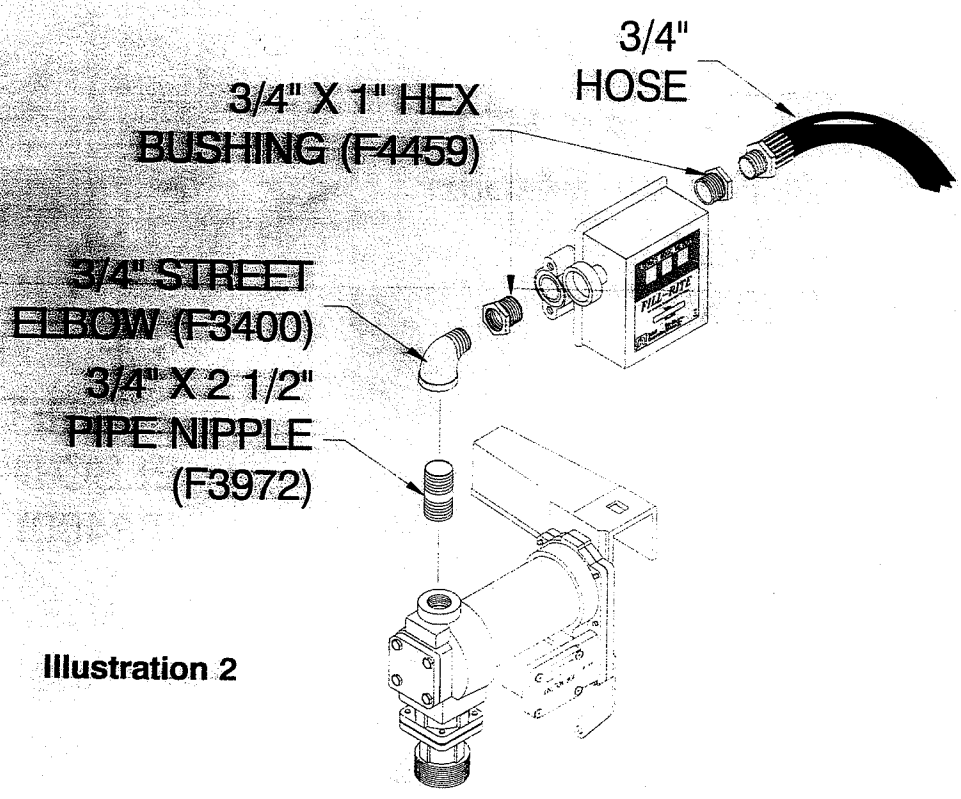
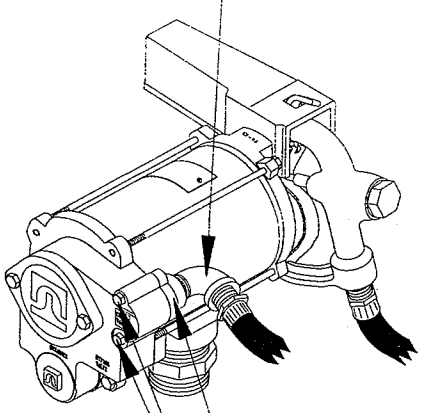


Illustration 2

TUTHILL CORPORATION | Fill-Rite Division
8825 Aviation Drive
Fort Wayne, Indiana USA 46809
Tel 219 747-7524 Fax 219 747-3159

GRAINGER MODELS 2P279 & 1P951 FILL-RITE MODEL FR700 PUMP WITH MODEL 807CN-1 METER

DISCHARGE ASSEMBLY



FLANGE

Illustration 1

5/16"-18 x 2 1/4" BOLTS (F7717)

ASSEMBLY INSTRUCTIONS

NOTE: Use gasoline and oil resistant pipe compound on all threaded joints.

1. Disconnect pump discharge assembly by removing two 5/16" bolts at pump outlet. See Illustration 1. Save bolts and O-ring for step number 4.

2. Install 3/4" x 1" bushing (included with meter). See Illustration 2.

3. Install 3/4" street elbow (Fill-Rite part number F3400, not included with pump or meter) in hex bushing.

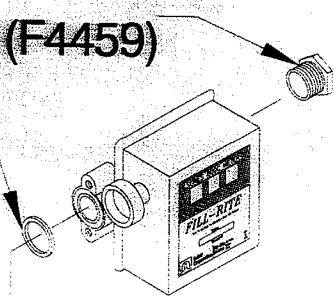
4. Place O-ring (removed previously) in proper position at meter inlet. Connect meter to pump using two 5/16" hex bolts (removed in step number 1). Caution: Pump must NOT be operated without its check valve (F2661) or the check valve alternate (F2679).

5. Install hose at outlet of meter.

3/4" X 1" HEX BUSHING (F4459)

GASKET (F2800)

5/16"-18 x 2 1/4" BOLTS (F7717)



3/4" STREET ELBOW (F3400)

HOSE

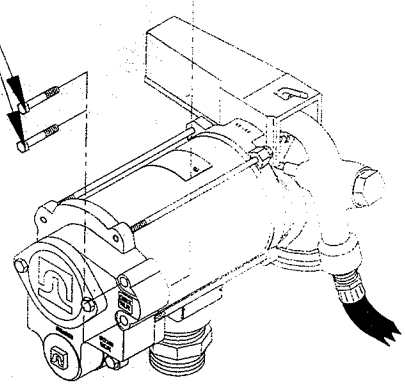


Illustration 2

TUTHILL CORPORATION | Fill-Rite Division
8825 Aviation Drive
Fort Wayne, Indiana USA 46809
Tel 219 747-7524 Fax 219 747-3159

No Postage
Necessary
If Mailed
In The
United States

BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO. 4463 FORT WAYNE, IN

POSTAGE WILL BE PAID BY ADDRESSEE

TUTHILL CORPORATION FILL-RITE DIVISION
PO BOX 9100
FORT WAYNE IN 46897-9905

FILL-RITE

F9097

Thank you for purchasing this product from Fill-Rite. Please register your warranty within 10 days by filling out this card and mailing it to us.

Date of Purchase_____
Pump Model Number_____ Meter Model Number_____

Name_____
☐ Owner ☐ Employee
Company_____
Address_____
City/State/Zip_____

In a continuous effort to improve our products, we would like to hear what you think about Fill-Rite products.

Where was this product purchased?
Supplier Company Name_____
Supplier City/State_____
Price paid_____

Where will this product be used?
☐ Farm/Ranch ☐ Construction ☐ Mining & Logging
☐ Industrial ☐ Home or Hobby

What type of fluid will this product be used with?
☐ Fuel ☐ Lubricant ☐ Other (please specify) _____

What was the main reason you chose this Fill-Rite pump/meter?
☐ Price ☐ Design ☐ Performance ☐ Supplier Recommendation
☐ Other reason _____

Which of these applies to your purchase?
☐ This is my first pump/meter
☐ This is a replacement pump/meter
☐ This is an additional pump/meter

Would you like to receive additional Fill-Rite product information or information about future new products? ☐ Yes ☐ No

May we contact you in the future to ask about your satisfaction with this purchase?
☐ Yes ☐ No
Phone number_____

PRODUCT WARRANTY

Fill-Rite Division of Tuthill Corporation ("Manufacturer") warrants to each buyer of its products (the "Buyer") for a period of 12 months from date of installation, but in no event more than 18 months from date of manufacture that goods of its manufacture ("Goods") will be free from defects of material and workmanship. Manufacturer's sole obligation under the foregoing warranties will be limited to either, at Manufacturer's option, replacing or repairing defective Goods (subject to limitations hereinafter provided) or refunding the purchase price for such Goods theretofore paid by the Buyer, and Buyer's exclusive remedy for breach of any such warranties will be enforcement of such obligations of Manufacturer. If Manufacturer so requests the return of the Goods, the Goods will be redelivered to Manufacturer in accordance with Manufacturer's instructions F.O.B. Factory. If Manufacturer elects to repair defective Goods and written notice of defects is given to Manufacturer during the warranty period specified above and within 90 days from date of installation, then Manufacturer will provide at its cost the services of an authorized representative for on-site repair of defective Goods. If such notice is given after 90 days, all service costs incurred in the repair or replacement of defective Goods shall be the responsibility of the Buyer. The remedies contained herein shall constitute the sole recourse of the Buyer against Manufacturer for breach of warranty. IN NO EVENT SHALL MANUFACTURER BE LIABLE FOR CONSEQUENTIAL DAMAGES, NOR SHALL MANUFACTURER'S LIABILITY ON ANY CLAIM FOR DAMAGES ARISING OUT OF THE MANUFACTURE, SALE, DELIVERY OR USE OF THE GOODS EXCEED THE PURCHASE PRICE OF THE GOODS. The foregoing warranties will not extend to Goods subjected to misuse, neglect, accident or improper installation or maintenance, or Goods which have been altered or repaired by anyone other than Manufacturer or its authorized representative. THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE AND OF ANY OTHER TYPE, WHETHER EXPRESSED OR IMPLIED. No person may vary the foregoing warranties and remedies except in writing signed by a duly authorized officer of Manufacturer. Warranties or remedies that differ from the foregoing shall not otherwise be binding on Manufacturer. The Buyer's acceptance of delivery of the Goods constitutes acceptance of the foregoing warranties and remedies, and all conditions and limitations thereof.

FUEL FILTER HOUSING
SECTION 7.4

Velcon®
4525 Centennial Blvd., Colorado Springs, CO 80919
Phone: (719) 531-5855 FAX: (719) 531-5690
e-mail: vfsales@velcon.com

VF-31E INSTRUCTIONS

DESCRIPTION

The Velcon VF-31E filter housing is designed to operate with various ***Aquacon***® cartridges in a wide variety of applications. The filter housing is shipped with no cartridge installed. The correct cartridges for the application are ordered and shipped separately.

CARTRIDGE SELECTION

APPLICATION	CARTRIDGE	FLOW RATE	MICRON RATING
AVIATION FUEL	ACO-21001K	2 - 15 GPM	1/2
MOTOR GASOLINE	AC-21005	1 - 15 GPM	5
DIESEL FUEL	AD-21025	1 - 15 GP	25
OILS	AC-21005 AD-21025	Varies with oil viscosity	5 or 25
COMPRESSED AIR & OTHER GASES	ACA-210 at 100 psig	100 SCFM	1

PRESSURE RATING

Maximum operating pressure for the VF-31E is 150 psi.

Collapse strength of the ACO-21001K, AC-21005 and AD-21025 is 60 psid.

Collapse strength of the ACA-210 is 150 psid.

1706 R2 7/99
P/N 09-883

INSTALLATION

GENERAL

Write the proper cartridge model number on the enclosed replacement element label and fasten it to the VF-31E shell. Cover the label with the enclosed clear plastic sticker.

Install either the plug or the petcock drain into the bottom of the vessel. Usually the plug is used for oil applications, and the petcock drain for compressed air and fuel applications where daily draining is recommended.

Install cartridges. See "Cartridge Change-Out" instructions below.

Mounting brackets with two screws are enclosed and can be attached to the vessel head if desired for installation.

Note the "IN" and "OUT" markings on the vessel head and make sure the head is connected in the proper flow direction.

Valves ahead of and/or behind the vessel may be required to isolate it during cartridge change-out. This is especially true if large volumes of liquid are in the piping above the level of the filter vessel.

It is good practice to install pressure gauges so that the differential pressure across the VF-31E can be monitored. This allows accurate determination of when filter cartridges should be changed.

FOR AVIATION FUELS — IF THE SYSTEM PRESSURE CAN EXCEED 25 PSI ALWAYS INSTALL PRESSURE GAUGES OR OTHER MEANS OF DETERMINING THE DIFFERENTIAL PRESSURE.

FUEL AND OIL APPLICATIONS

The VF-31E can be installed on either side of the pump. However, it is generally recommended that it be located on the discharge (pressure) side as this will give longer cartridge life.

Large amounts of water will cause the Aquacon cartridges to plug up very rapidly. If the pump can exceed 40 psi it is recommended you install a pressure bypass or other means of protecting the cartridge from collapse.

COMPRESSED AIR APPLICATIONS

The VF-31E with the ACA-210 cartridge is intended for critical point-of-use applications where any dirt or free water must be prevented. Install it downstream of existing filtration and drying equipment to minimize cartridge changeouts.

The ACA-210 cartridge will completely block the flow when loaded with dirt or water. In some applications it may be desirable to use an automatic duplex or bypass arrangement.

Routine draining is not required to insure positive water protection. However, in some locations large amounts of gross water will fall into the filter housing sump. When the sump water level reaches the cartridge, it will "shut off" and must be replaced. If this situation occurs, routine draining will greatly extend the life of the cartridge. Operating experience will quickly tell you if routine draining is desirable.

CARTRIDGE CHANGE-OUT

FOR AVIATION FUEL

Replace the cartridge if the differential pressure exceeds 15 psid, after 2 years of service, or if there is a reduction in flow rate, whichever occurs first.

FOR ALL OTHER APPLICATIONS

Replace the cartridge if the differential pressure exceeds 25 psi, after 1 year of service, or if flow is significantly reduced.

IMPORTANT SAFETY PRECAUTION:
MAKE CERTAIN FILTER HOUSING IS COMPLETELY VENTED AND NO PRESSURE REMAINS BEFORE OPENING HOUSING.

1. Close inlet and outlet shutoff valves (if any).
2. Open drain valve or remove the drain plug to drain liquid from vessel.
3. Unscrew lid bolt.
4. Drop shell and remove spent cartridge.
5. Place new cartridge in shell.
6. Look at lid gasket (located in groove in the head) to make sure it's not split or otherwise damaged. Under normal conditions, the lid gasket seldom needs replacing.
7. Reattach shell to head. Do not over-tighten.
8. Close the drain valve or reinstall the drain plug.
9. Open shutoff valves.
10. Restart system. Check for leaks.

REPLACEMENT LID GASKET

Specify part number G-0995.

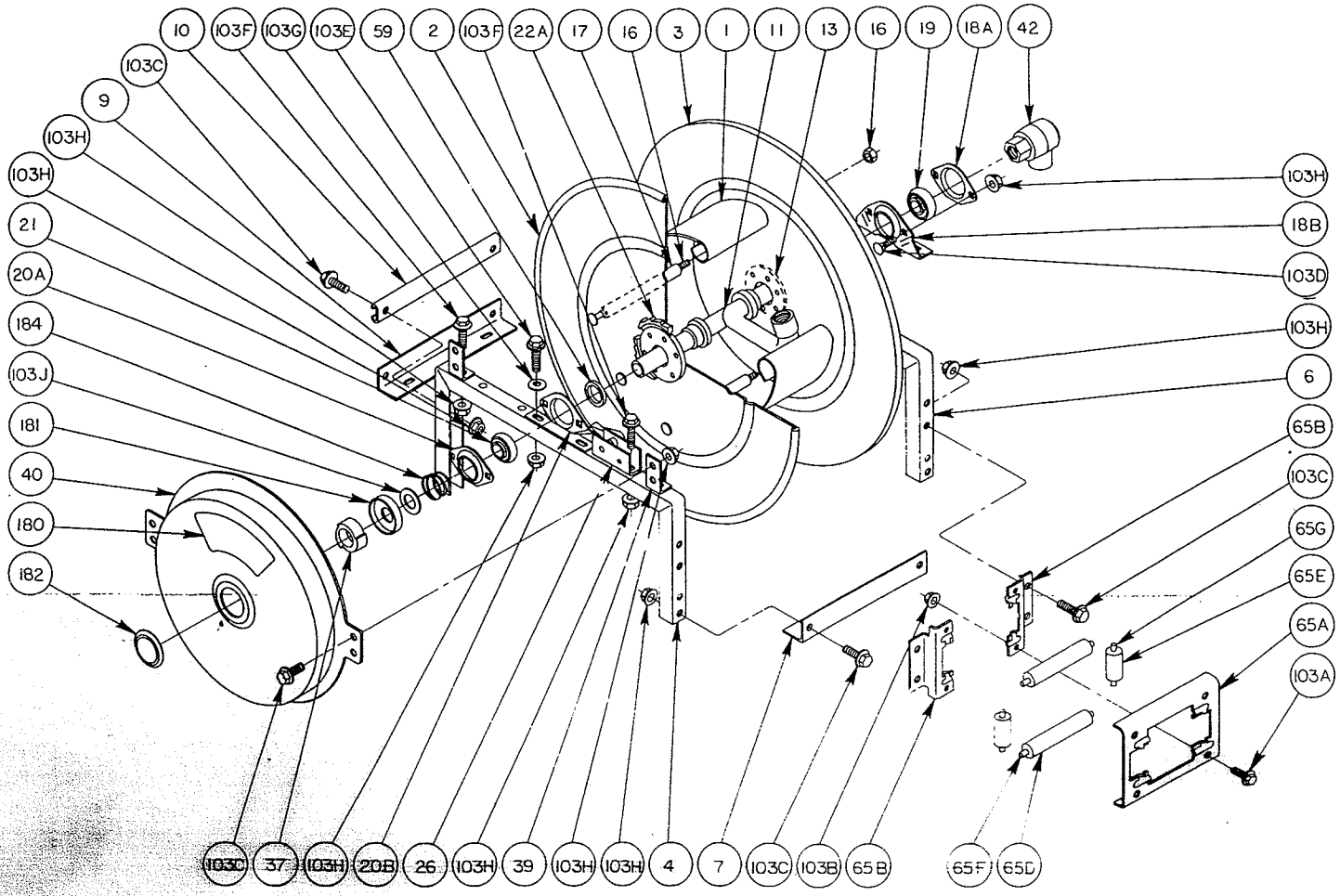
REPLACEMENT CARTRIDGES

Contact your local Velcon distributor for replacement cartridges.

HANNAY HOSE REEL
SECTION 7.5

Hannay Reels®
The reel leader.
Hannay Reels, Inc., 553 State Route 143
P.O. Box 159, Westerlo, NY 12193-0159
Telephone 518-797-3791
FAX 1-800-REELING (733-5464)
INT'L FAX (518) 797-3259
Website: www.hannay.com
E-mail: reels@hannay.com

ISO 42
PARTS LIST
SERIES 800



PARTS LIST
ISO-42
SERIES 800

When ordering parts

BE SURE TO SPECIFY COMPLETE MODEL NUMBER and SERIAL NUMBER OF REEL.

USE PART NUMBER!

Item No.	Description	PART NUMBER	Quantity
1	Drum, 10-1/2" Dia. - Wrap Around (Specify Model)	9905.0138	1
1	Drum, 15-1/2" Dia. - Wrap Around (Specify Model)	9905.0178	1
2	Front Disc, 19-20, 18-3/4" Dia. (Specify Model)	9903.0821	1
2	Front Disc, 23-24, 21-3/4" Dia. (Specify Model)	9903.1121	1
2	Front Disc, 25-26, 24-3/4" Dia. (Specify Model)	9903.1321	1
2	Front Disc, 28-29, 26-3/4" Dia. (Specify Model)	9903.1521	1
2	Front Disc, 30-31, 28-3/4" Dia. (Specify Model)	9903.1621	1
3	Back Disc, 19-20, 18-3/4" Dia. (Specify Model)	9903.0821	1
3	Back Disc, 23-24, 21-3/4" Dia. (Specify Model)	9903.1121	1

PARTS LIST
ISO-42
SERIES 800

When ordering parts

BE SURE TO SPECIFY COMPLETE MODEL NUMBER and SERIAL NUMBER OF REEL.

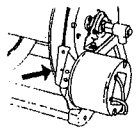
USE PART NUMBER!

Item No.	Description	PART NUMBER	Quantity
3	Back Disc, 25-26, 24-3/4" Dia. (Specify Model)	9903.1321	1
3	Back Disc, 28-29, 26-3/4" Dia. (Specify Model)	9903.1521	1
3	Back Disc, 30-31, 28-3/4" Dia. (Specify Model)	9903.1621	1
4	Front Frame, 19-20, 1-1/2" Rollform Channel	9906.0081	1
4	Front Frame, 23-24, 1-1/2" Rollform Channel	9906.0111	1
4	Front Frame, 25-26, 1-1/2" Rollform Channel	9906.0121	1
4	Front Frame, 28-29, 1-1/2" Rollform Channel	9906.0141	1
4	Front Frame, 30-31, 1-1/2" Rollform Channel	9906.0151	1
6	Back Frame, 19-20, 1-1/2" Rollform Channel	9906.0081	1
6	Back Frame, 23-24, 1-1/2" Rollform Channel	9906.0111	1
6	Back Frame, 25-26, 1-1/2" Rollform Channel	9906.0121	1
6	Back Frame, 28-29, 1-1/2" Rollform Channel	9906.0141	1
6	Back Frame, 30-31, 1-1/2" Rollform Channel	9906.0151	1
7	Front Foot	Specify Model	1
9	Back Foot	Specify Model	1
10	Back Brace - C Channel	Specify Model	1
11	1" Hub Assembly, Welded Iron Pipe w/1" FNPT Riser (Specify Model)	9901.1600	1
13	Disc Washer w/Rivets, EH-936	9965.0015	1
16	3/8" - 16 Carriage Bolt w/Nut (10-1/2" Drum)	Specify Model	6
16	3/8" - 16 Carriage Bolt w/Nut (15-1/2" Drum)	Specify Model	10
17	Spacer Pipe (10-1/2" Drum)	Specify Model	6
17	Spacer Pipe (15-1/2" Drum)	Specify Model	10
18A	Self Aligning Bearing Holder (Back)	9902.2800	1
18B	Self-Aligning Bearing Pillow Block (Back)	9902.2900	1
19	Self-Aligning Bearing Insert (Back)	9902.1500	1
20A	Self-Aligning Bearing Holder (Front)	9902.2800	1
20B	Self-Aligning Bearing Pillow Block (Front)	9902.2900	1
21	Self-Aligning Bearing Insert (Front)	9902.1500	1
22A	Ratchet Wheel	9922.0003	1
26	Ratchet Locking Assembly, GH-784	9922.0005	1
37	Spring Arbor For A & D Spring	9922.0001	1
37	Spring Arbor For B, G, & J Spring	9922.0002	1
39	Spring Mounting Bracket	9922.0009	2
40	Spring Motor, A	9921.0010	1
40	Spring Motor, B	9921.0015	1
40	Spring Motor, D	9921.0020	1
40	Spring Motor, G	9921.0021	1
40	Spring Motor, J	9921.0030	1
42	1" 90 Deg. FxF Swivel Joint	9929.2588	1
59	Hub Spacer	9954.0021	2
65A	Roller Bracket Frame, GH-895	Specify Model	1
65B	Roller Mounting Bracket, GH-896	9940.0170	1
65D	1" Dia Roller for Stamped Housing, GH-1012	Specify Model	2
65E	1" Dia. Roller for Stamped Housing, 2" Long, GH-1012A	9940.0180	2
65F	1/4" Dia. Stainless Steel Rod	Specify Model	2
65G	1/4" Dia. Stainless Steel Rod, 2-3/4" Long	9940.0190	2
66	EH-678D Roller Assembly (Not Shown)	9939.0009	1
103A	5/16" - 18 x 3/4" Spinlock Bolt	9904.2101	4
103B	5/16" - 18 Spinlock Nut	9904.6100	4
103C	3/8" - 16 x 3/4" Spinlock Bolt	9904.2201	14
103D	3/8" - 16 x 3/4" Carriage Bolt	9904.0201	4
103E	3/8" - 16 x 1-1/4" Spinlock Bolt	9904.2203	4
103F	3/8" - 16 x 1-1/2" Spinlock Bolt	9904.2204	4
103G	3/8" Flat Washer	9954.0007	4
103H	3/8" - 16 Spinlock Nut	9904.6200	22
103J	1-7/8" O.D. x 1-5/16" I.D. x .049 Washer	9954.0055	1
180	Caution Decal, "Spring Under Tension"	9922.0010	1
181	Cap-Plug for Spring (Inner Side)	9922.0036	1
182	Cap-Plug for Spring (Outer Side)	9922.0037	1
184	Dust Cap Spring	9922.0038	1

AVERTISSEMENT : POINTS DE PINCEMENT
ÊTRE TRÈS PRUDENT LORS DU FONCTIONNEMENT PRÈS DE CHAÎNES ET DE PIGNONS.

Si les enrouleurs sont fournies avec des protections de chaîne, il ne faut pas les utiliser avec les protections retirées.

REMARQUE :

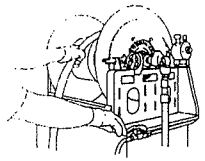


OSHA indique qu'une protection appropriée des chaînes et des pignons est au moins partiellement la responsabilité de l'installateur final d'équipement, étant donné que l'équipement peut être installé dans un nombre important de positions différentes et avec un grand nombre de degrés d'accès différents pour l'opérateur.

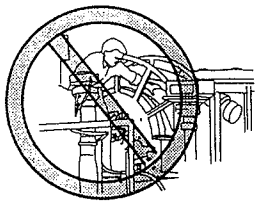
Veuillez vous assurer d'avoir résolu ce problème lors de l'installation de l'enrouleur.

E'TRE PRUDENT LORS DU GUIDAGE DES TUYAUX OU DU CÂBLE POUR LE REMBOBINAGE SUR LES ENROULEURS MOTORISÉES.

Garder la main guidant le flexible sur l'enrouleur à plusieurs centimètres du tambour pour éviter les risques de coincement ou de pincement des doigts.



GARDER LES MAINS ÉLOIGNÉES DES DISQUES À RAYONS LORS DE LEUR ROTATION.



INSTRUCTIONS DE MANIPULATION SANS DANGER DES FLUIDES

UTILISER UN ENROULEUR DE FLEXIBLE ET UN FLEXIBLE D'UNE CAPACITÉ SUFFISANTE POUR LE TRAVAIL ENVISAGÉ.

Ne jamais dépasser la pression nominale spécifiée pour un enrouleur et un tuyau particuliers. De plus, s'assurer que la taille et le matériau de l'enrouleur et du tuyau soient adaptés à l'utilisation envisagée.

UTILISER UN CONNECTEUR FLEXIBLE ENTRE UNE ARTICULATION ET UNE CONDUITE D'ADMISSION.

VÉRIFIER L'ABSENCE DE FUITE AUX RACCORDS DE FLUIDE AVANT L'EMPLOI.

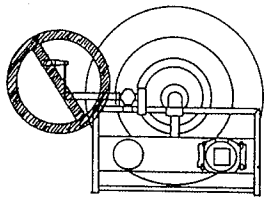
RELÂCHER LA PRESSION DANS LE FLEXIBLE AVANT DE RETIRER LES RACCORDS OU D'EFFECTUER UN ENTRETIEN.

AVANT D'ENROULER UN FLEXIBLE PLAT SUR UN DÉVIDOIR S'ASSURER QUELE FLEXIBLE A ÉTÉ VIDANGÉ DE TOUT LIQUIDE.

ENROULEURS À REMBOBINAGE MOTORISÉ
UTILISER DES DISJONCTEURS POUR LES MOTEURS ÉLECTRIQUES DE REMBOBINAGE.

S'assurer que le disjoncteur soit correctement dimensionné pour le moteur. Vérifier également la bonne installation de toutes les connexions électriques avant l'emploi.

RETIRER LA MANIVELLE AUXILIAIRE DE REMBOBINAGE LORS DE L'UTILISATION DU REMBOBINAGE MOTORISÉ.



DÉBRANCHER LA SOURCE D'ALIMENTATION AVANT D'EFFECTUER UN ENTRETIEN.

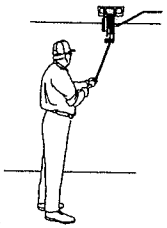
Ceci s'applique à la fois aux enrouleurs électriques et pneumatiques. Débrancher également l'alimentation électrique avant de déposer les couvercles de boîte de jonction et les boîtiers de bague de collecteur.

ENROULEURS À REMBOBINAGE À RESSORT

ÊTRE PRUDENT LORSQUE LE VERROUILLAGE DE CLIQUET DE ENROULEUR À RESSORT EST DÉSENGAGÉ.

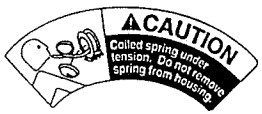
Lorsque le verrou est désengagé, toujours tenir le flexible,

et le glisser sur l'enrouleur pendant qu'elle se rembobine.



SUR L'ENROULEUR À RESSORT, NE JAMAIS DÉPOSER LE COUVERCLE CONTENANT LE RESSORT.

Les ressorts enrouleurs sont sous tension, et la dépose du couvercle peut entraîner des blessures corporelles graves.



SAFETY GUIDELINES

READ THIS FIRST.

These guidelines provide general safety recommendations for using hose and cable reels. However, the employer should assess and determine if any additional safety measures are required for its particular application and operation, and fully instruct employees on those safety measures.

Additionally, the employer should make a copy of this safety manual available to all employees working with reels. Additional copies of this safety manual may be obtained upon request. No warranty of the correctness or sufficiency of the information in this manual is made by Hannay Reels.

Read all relevant manuals and safety instructions prior to unpackaging reels. If there is ANYTHING you do not understand about the safe installation and use of your Hannay reel, please contact Hannay Reels (Attn: Customer Safety). We are always glad to help.

NOTICE

Hannay Reels will not assume any liability for any alterations and/or modifications to Hannay Reels or products supplied by Hannay Reels nor for uses other than for which these products are intended. All warranties expressed or implied will become null and void.

Hannay® Reels
The reel leader.

Hannay Reels
553 State Route 143
P.O. Box 159
Westerlo, NY 12193-0159
(518) 797-3791
FAX: 1-800-REELING (733-5464)
Int'l. Fax: (518) 797-3259

70M HP 1-98

H-9602-ISG

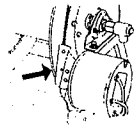
USE CAUTION WHEN OPERATING NEAR CHAIN AND SPROCKETS.

Where chain guards are furnished, the reels should not be operated with them removed.

NOTE:

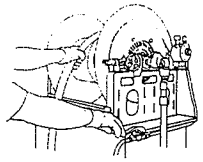
OSHA indicates the appropriate guarding of chains and sprockets is t least partly the responsibility of the final installer of equipment, ased on the fact that equipment can be installed in so many differ- nt positions and so many different degrees of accessibility to the perator.

ease make sure that you have thoroughly reviewed this issue when aking the installation of the reel.

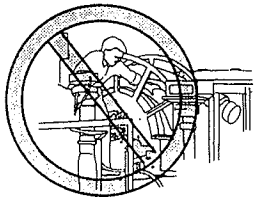


USE CAUTION WHEN GUIDING HOSE OR CABLE BACK ONTO POWER REELS.

ep the hand guiding the hose back onto the reel several inches away from the drum so that ere is no possibility of trapped or pinched fingers.



EEP HANDS AWAY FROM SPOKED DISCS WHEN TURNING.

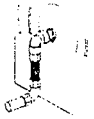


NSTRUCTIONS FOR SAFE FLUID HANDLING

USE A HOSE REEL AND HOSE PROPERLY RATED FOR THE JOB.

ver exceed the pressure rating (psi) specified for a particular reel and hose. Also, make sure t the size and material of both the reel and hose are designed for the intended use.

USE A FLEXIBLE CONNECTOR BETWEEN A SWIVEL JOINT AND INLET PIPING.



CHECK FOR POSSIBLE LEAKS AT FLUID CONNECTIONS PRIOR TO USE.

RELEASE PRESSURE IN HOSE BEFORE REMOVING FITTINGS OR PERFORMING ANY MAINTENANCE.

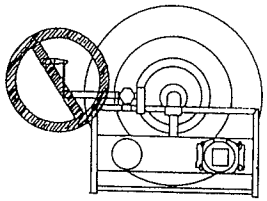
BEFORE WINDING COLLAPSIBLE HOSE ONTO A IVE REEL, HOSE MUST BE EVACUATED OF ALL FLUID.

POWER REWIND REELS

USE CIRCUIT BREAKERS FOR ELECTRIC REWIND MOTORS.

Make sure that the circuit breaker is properly sized for the motor. Also, check all electrical connections for proper installation prior to use.

REMOVE AUXILIARY CRANK REWIND HANDLE WHEN USING POWER REWIND.



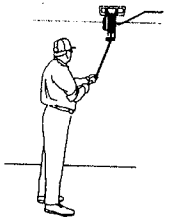
DISCONNECT POWER SOURCE BEFORE PERFORMING MAINTENANCE.

This applies to both electric and air-powered reels. Also, disconnect electrical power before removing junction box covers or collector ring housings.

SPRING REWIND REELS

USE CAUTION WHEN SPRING REEL RATCHET ASSEMBLY LOCK IS DISENGAGED.

When the lock is disengaged, always hold onto the hose and guide it onto the reel as it rewinds.



ON SPRING REELS, NEVER REMOVE THE COVER CONTAINING THE SPRING.

Coiled springs are under tension and removal of cover can result in severe personal injury.

CONSIGNES DE SÉCURITÉ

À LIRE EN PREMIER.

Ces instructions donnent des recommandations générales de sécurité pour l'utilisation d'enrouleurs de câble et de flexible. Mais c'est à l'employeur qu'il revient d'évaluer et de déterminer s'il est nécessaire d'adopter des mesures de sécurité supplémentaires dans le cadre de son application particulière, et d'en informer ses employés.

De plus, l'employeur doit s'assurer que tous les employés travaillant avec l'enrouleurs puissent prendre connaissance de ce manuel de sécurité. Des copies supplémentaires de ce manuel de sécurité peuvent être obtenues sur demande. Aucune garantie n'est faite par Hannay Reels quant à l'exactitude de ce manuel ni à la qualité de son information.

Lire tous les manuels et toutes les consignes de sécurité applicables avant de déballer les enrouleurs. S'il y a QUOI QUE CE SOIT d'incompréhensible au niveau de l'installation et de l'utilisation en toute sécurité des enrouleurs Hannay, veuillez contacter Hannay Reels (à l'attention de Sécurité des clients). Nous serons ravis de vous aider.

REMARQUE

Hannay Reels n'assume aucune responsabilité pour les altérations ou modifications des enrouleurs Hannay ou des produits fournis par Hannay Reels, ni pour les utilisations autres que celles prévues pour ces produits. Toutes les garanties express ou implicites deviennent nulles et non avenues.

Hannay® Reels

The reel leader.

Hannay Reels
553 State Route 143
P.O. Box 159
Westerlo, NY 12193-0159 U.S.A.
Tél : (518) 797-3791
Télécopieur : 1-800-REELING (733-5464)
Télécopieur international : (518) 797-3259

GUARANTEE

Equipment manufactured by Hannay Reels, Inc. is guaranteed for one year from date of shipment when installed according to our instructions, given proper care, and used for the purpose for which it is designed.

Equipment which proves to be defective upon our inspection will be replaced free of charge, F.O.B., Westerlo, New York. No allowance will be made for labor charges incurred in making exchanges, replacements or repairs.

Components, swivel joints, and hose, which are manufactured by other vendors, will be subject to the warranty terms of their own manufacturers.

We expressly disclaim any liability for damage or injuries resulting from the use, operation, service, maintenance or failure of equipment.

Every Hannay Reel is built to order and, therefore, reels are not returnable nor subject to cancellation.

FOR YOUR RECORDS

Reel Model Number _____

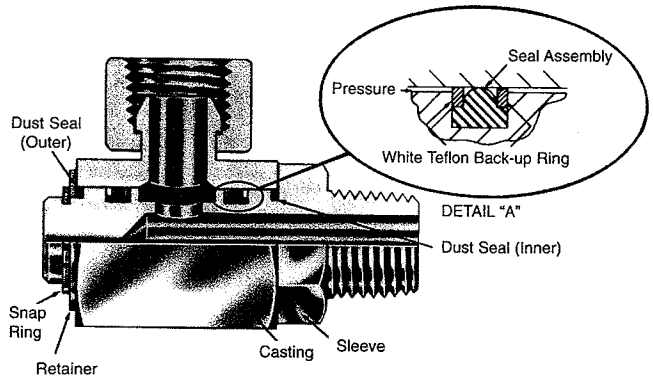
Reel Serial Number _____

Dated Installed _____

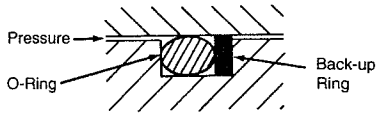
Purchased From _____

Hannay Reels
The reel leader
Hannay Reels, Inc.
553 State Route 143
Westerlo, New York 12193-0159
Telephone: 518-797-3791
FAX: 800-REELING (733-5464)
International FAX: 518-797-3259

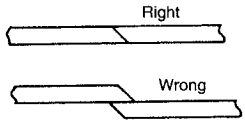
5500 Series Balanced Pressure Swivel Joints



DETAIL "B" O-Ring Assembly



DETAIL "C" Back-up Ring



Seal Replacement Instructions

Disassembly

1. Remove snap ring, retainer and outer dust seal.
2. Remove sleeve from casing by hand or by gently tapping solid end of sleeve.
3. Remove the inner dust seal and seal assemblies (take care not to scratch groove).
4. Clean thoroughly and inspect bearing surfaces of sleeve and casing and seal grooves of sleeve. If these surfaces appear to be galled, scratched, or worn in any way, the sleeve, casing or entire swivel joint should be replaced.

Assembly

1. Assemble the seals to the sleeve as follows:

   A. Lubricate sleeve and rubber portion of seal with any petroleum or silicone base lubricant.* The seal nearest the fitting end of the sleeve is to be assembled first.

   B. Assemble the rubber portion of the seal into groove in sleeve (care must be taken so that the rubber portion is not damaged during assembly).

   C. Assemble back-up ring portions of seal into groove in sleeve (see Details "A" and "B").

   CAUTION – Back-up rings must be expanded carefully or they are likely to be damaged. Visually examine seal assembly to assure that it is properly and completely seated in the seal grooves. When in the groove the skive cut back-up rings must be completely closed (see Detail "C").

2. Assemble the inner dust seal to the sleeve by stuffing it into its sleeve groove so that when assembled the dust seal contacts the chamfer in the casing and forms a seal (the outer dust seal slides over the sleeve end and the above technique does not apply).
3. Reassemble sleeve into casing after lubricating casing bearing surfaces with any petroleum or silicone base lubricant.*
4. Assemble outer dust seal, dust seal retainer and snap ring. Use snap ring pliers to prevent deformation of the snap ring.

* Use **only** silicone base lubricant with EPR seals (all kits with the last two digits of the kit part number, "-04" have EPR seals).

Aeroquip Corporation
Aeroquip Industrial Group
Americas Industrial Division
1225 W. Main Street
Van Wert, OH 45891-0389
419/238-7000
FAX: 419/238-6833

AEROQUIP CORPORATION/MAUMEE, OHIO, U.S.A. 43537

IMPORTANT INSTRUCTIONS

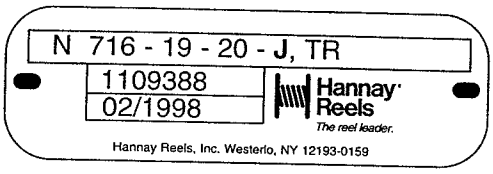
INSTALLING HOSE OR CABLE ON A HANNAY SPRING RETRACTABLE REEL

Note: Instructions must be followed or warranty is void.

1) CHECK SPRING TYPE

The spring type is indicated by the first letter at the end of the model number on the metal nameplate. It is also stamped on the mounting ear of the spring housing on most models. The maximum number of usable turns for which each spring is designed, is shown at right (listed in descending order of pull force ability):

Spring Type	Usable Turns
"SA"	17
"A"	23
"K"	13
"B"	18
"D"	30
"G"	25
"J"	17
"C"	14
"F"	32
"SCR"	26
"LC"	18
"B5" (HGR-100)	42
"B6" (HGR-50)	30

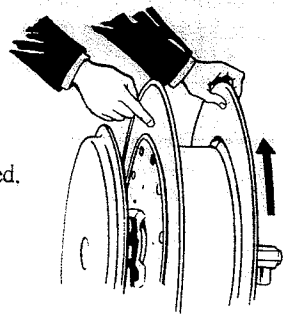


2) RELEASE SPRING (if needed)

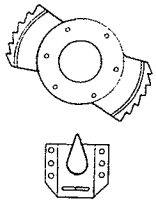
To release the spring, disengage the pawl from the ratchet wheel and allow the spring to unwind completely and slowly. (If the reel is shipped from the factory without hose installed, the spring is normally discharged and this step would be unnecessary.)

3) SET SPRING TENSION

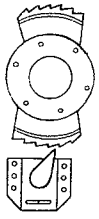
Carefully turn the discs by hand in the direction that the outlet is facing (you will begin feeling resistance after the first couple of turns). The number of revolutions you need to turn is determined by the type of spring you have (see the chart in step 1 above). When the last turn is completed, lock the reel by engaging the pawl in the ratchet wheel (Figure B).



CAUTION: Do not wind more than the number of turns listed in the table above for the spring that you have. Never wind the spring in reverse or free wheel past the start of the spring load.



(Figure A)



(Figure B)

4) ATTACH HOSE OR CABLE

HOSE: After setting the spring tension, insert the hose between the rollers and attach the hose fitting to the reel outlet. (If you have a 1-1/2" spring reel, also known as the 900 series, the outlet riser can be temporarily removed to aid in attaching the hose.)

CABLE: After setting the spring tension, feed the cable through the drum and hub with the aid of the pull wire supplied. Then connect the cable to the collector ring terminals. You will need to remove the collector cover to expose the collector rings if you have an SCR-700 series cable reel. CAUTION: Always use a cable clamp connected to the drum in order to keep pressure off the wire connections.

5) WIND HOSE OR CABLE TO REEL

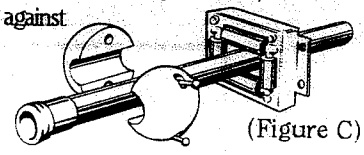
Pull gently on the hose until the pawl is clear of the ratchet teeth (Figure A). Retract the hose slowly until it is completely on the reel. Then pull the hose out until the pawl drops into one of the ratchet wheel teeth. This will lock the reel (Figure B).

6) REDUCE TENSION

If the spring tension is greater than that required to adequately retract the hose, you can decrease this tension. Just let the end of the hose (after it is completely rewound on the reel) pass back through the roller assembly and carefully allow the reel to unwind by another revolution (or possibly more) until the proper tension is reached. Relock the reel and pass the end of the hose back through the rollers.

7) ATTACH BALL STOP TO HOSE

Draw the hose through the rollers to the point where the ball stop should be attached. *NOTE:* After ball stop is positioned, make sure that when the stop is resting against the rollers the brass pawl is *disengaged* from the ratchet wheel. Now take the two halves of the ball stop and join them together over the hose. Fasten ball stop with provided fasteners. (Figure C.)



(Figure C)

8) MAKE FINAL CONNECTIONS

You should now be ready to make your hose connection to the inlet swivel joint on the side of the reel. A flexible connector must be used between the inlet pipe and the inlet swivel joint on the reel or the warranty will be void.

Hannay Reels®
The reel leader.
553 State Route 143, Westerlo, NY 12193-0159, USA
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Website: www.hannay.com
E-mail: reels@hannay.com

CHANGING THE ROLLER ARM POSITION ON "N" SERIES SPRING REELS

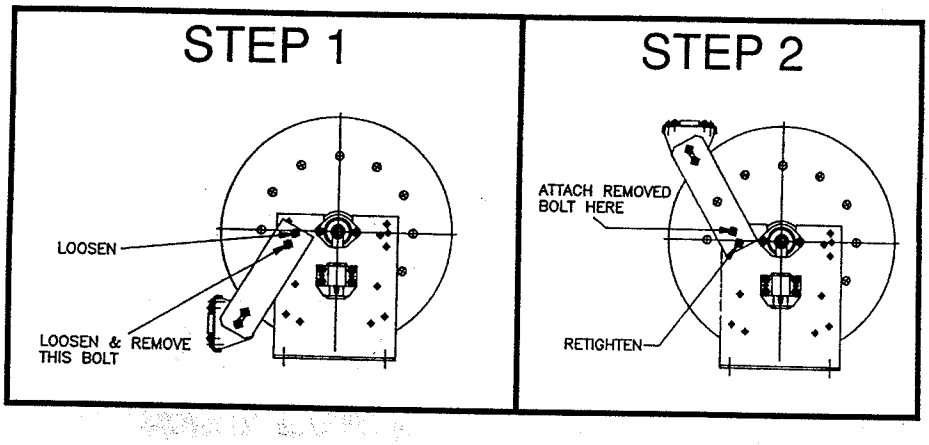
From "SR" position to "VR" position (and vice versa):

All "N" series reels that have the suffix "SR" or "VR" and have a serial tag date of 4-94 or later are interchangeable between those two roller positions. For safety reasons, **NEVER** work on a spring reel unless the tension is first removed from the spring (i.e., fully retract the hose onto the reel before starting).

1. Loosen and remove the two bolts with a 9/16˝ wrench as shown in the diagram below and swing the arm up into the VR position.

2. Retighten both bolts in the new position.

3. If you have a spring reel with a DOUBLE roller arm (which became standard in 1999 on all reels), you will have to repeat steps 1 & 2 above on the 2nd roller arm. However, this requires first removing the spring motor itself. A separate sheet is available for help with this additional task.

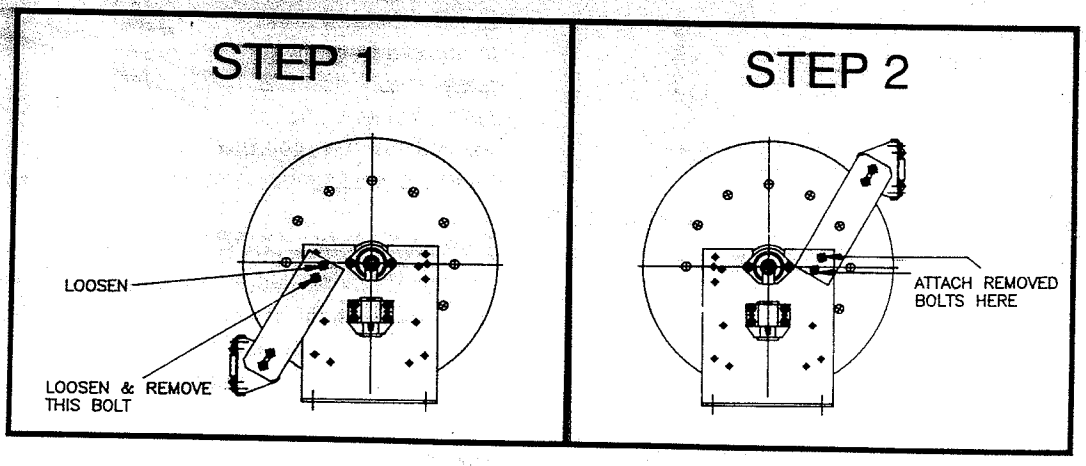


From "SR" (or "VR") position to "TR" position (and vice versa):

1. Loosen and remove the two bolts with a 9/16˝ wrench as shown in the diagram below and move the arm to the TR position, which is on the opposite side of the frame as shown in the diagram.

2. Retighten both bolts in the new position.

3. If you have a spring reel with a DOUBLE roller arm (which became standard in 1999 on all reels), you will have to repeat steps 1 & 2 above on the 2nd roller arm. However, this requires first removing the spring motor itself. A separate sheet is available for help with this additional task.



AIRCRAFT REFUEL HOSE
SECTION 7.6

Gold Label® Aircraft Refueling Hose
Series 7300
Test Certification

Spokane House of Hose, Inc.
Dayco Certified Coupler

DAYCO GOLD LABEL® AIRCRAFT REFUELING HOSE MEETS OR EXCEEDS THE REQUIREMENTS OF API 1529, BS 3158 AND NFPA 407 SPECIFICATIONS.

THIS HOSE ASSEMBLY WAS HYDROSTATICALLY TESTED TO 200% OR MORE OF RECOMMENDED WORKING PRESSURE AFTER COUPLINGS WERE ATTACHED.

ASSEMBLY SERIAL NO. 7300
HOSE SERIAL NO. HH071200-A
INVOICE NO. 99031
COUPLING TYPE Scovill
HOSE I.D. (INCHES) 1"
TEST PRESSURE (P.S.I.) 600 / 10 Min.

MEGA OHM METER READING (M.R.) 0.05 R
ASSEMBLY LENGTH (FT.) 30' L
COVER RESISTANCE (M.R./METER) .005 (R/L) 3.28
TIME TESTED 1:00 AM/PM
DATE TESTED 7 / 12 / 00
TESTED BY Scott Kober

DAYCO
Dayco Products, Inc.

CERTIFICATE NO. 0463

DF-1156

DAYCO

Aircraft Refueling Hose In Service Inspection and Maintenance Guide

DAILY

Aircraft Refueling Hose shall be inspected each day before it is put into use. The hose shall be extended as it normally would be for fueling.

Check the portion of the hose that is exposed, extend and check for evidence of blistering, carcass saturation or separation, cuts, nicks or abrasions which expose reinforcement material. Look for slippage, misalignments or leaks at the couplings; if coupling slippage or leaks are found, the cause of the problem shall be determined. Defective hose shall be removed from service.

MONTHLY

At least once each month the hose shall be completely extended and inspected. Inspect as required above for daily inspection. Examine the hose couplings and the hose about 12 inches down from the couplings. Check for structural weakness by pressing the hose in this area around its entire circumference and feel for soft spots. Hose that shows evidence of soft spots shall be removed from service. Examine the nozzle screens for rubber particles. Presence of such particles indicates possible deterioration of the interior and the hose shall be removed from service. With the hose still completely extended it shall be checked at normal operating pressure. Any abnormal twisting or ballooning during this test indicates a weakening of the hose carcass and the hose shall be removed from service.

YEARLY

Each assembly shall be hydrostatically pressure tested with water at 1½ times the rated working pressure. While under pressure, the entire length should be examined as required above for the daily inspection. Defective hose shall be removed from service.

A hose assembly that has been subjected to abuse, such as severe end pull, flattening or crushing by vehicle, sharp bending or kinking shall be removed from service.

RECOUPLING:

Under no condition is it allowable to recouple used hose. Any damaged leaking or defective hose shall be permanently removed from service.

DF-1425

WARRANTY

SPOKANE INDUSTRIES, INC.

SPOKANE METAL PRODUCTS DIVISION
Spokane Washington

400 GALLON REFUELER TANK
ONE YEAR LIMITED WARRANTY

Seller warrants its "400 Gallon Refueler Tank" 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.